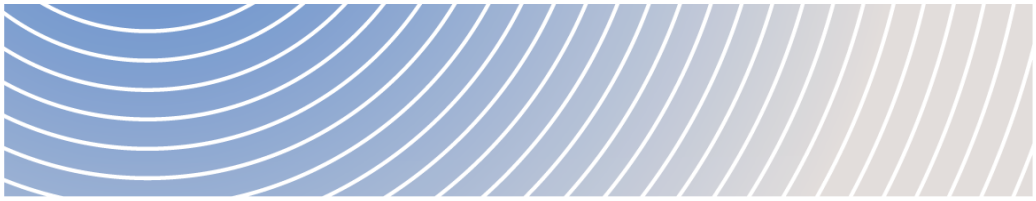
Impact Assessment Agency of Canada | Agence d'évaluation d'impact du Canada

Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area



DRAFT REGIONAL ASSESSMENT REPORT

November 2026

Canada

DRAFT

© His Majesty the King in Right of Canada, as represented by the Minister of the Environment, Climate Change and Nature, 2026.

This publication may be reproduced for personal or internal use without permission, provided the source is fully acknowledged. However, multiple copy reproduction of this publication in whole or in part for purposes of redistribution requires the prior written permission from the Impact Assessment Agency of Canada, Ottawa, Ontario K1A 0H3, or information@iaac-aeic.gc.ca.

Catalogue Number:

This document has been issued in French under the title: Évaluation régionale du forage exploratoire pétrolier et gazier dans la zone extracôtière Canada-Nouvelle-Écosse

Contents

Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area

List of tables v
List of figures viii
List of abbreviations and acronyms x
Glossary xvi
1 Introduction to the project and impact assessment process 24
1.1 Purpose and Rationale 24
1.2 Regulatory Context for Offshore Exploratory Drilling 30
1.3 Consideration of a Ministerial Exclusion Regulation 34
1.4 References 36
2 Scope 36
2.1 Spatial Boundaries 36
2.2 Temporal Boundaries 37
2.3 Activity Boundaries 38
3 Exploratory Drilling 38
3.1 Drilling Units 39
3.2 Exploratory Drilling Process 42
3.3 Accidents and Malfunctions 48
3.4 References 52
4 Approach, Methodology and Activities 54
4.1 Consultation and Engagement 54
4.2 Baseline Information 61
4.3 Supporting Analyses 62
5 Regional Setting Overview 63
5.1 Physical and Oceanographic Setting 64
5.2 Biological and Ecological Context 75
5.3 Health, Social and Economic Context 185
5.4 Indigenous Peoples: The Mi'kmaq 217
5.5 Data and Knowledge Gaps 227

DRAFT

6 Potential Effects of Offshore Exploratory Drilling Activities 233
6.1 Atmospheric Environment 235
6.2 Fish, Fish Habitat, and Marine Plants (including Species at Risk) 235
6.3 Marine Mammals and Sea Turtles (including Species at Risk) 237
6.4 Aerofauna (including Species at Risk) 240
6.5 Indigenous Peoples and Indigenous Rights 242
6.6 Commercial Fisheries 246
6.7 Other Ocean Users 248
6.8 Health, Social and Economic Environment 250
6.9 Protected and Special Areas 252
6.10 Accidents and Malfunctions 253
6.11 References 255
7 Mitigation, Monitoring, and Follow-up 256
7.1 Mitigation 256
7.2 Compliance Monitoring and Follow-up 259
7.3 Adaptive Management 261
7.4 Regional Assessment Findings 262
8 GHG Analysis Chapter 262
8.1 Explanation of GHGs 262
8.2 Purpose and Decision Context 263
8.3 Climate Change Context 265
8.4 Sources of Greenhouse Gas Emissions 271
8.5 GHG Analysis 274
8.6 Consistency with Canada's Climate Commitments 282
8.7 Monitoring, reporting and adaptive management 286
8.8 References 287
9 Cumulative Effects Assessment 288
9.1 Scope and Objectives 288
9.2 CEA Approach and Methodology 289
9.3 Regional Context and Cumulative Pressures 300
9.4 Development and Climate Scenarios 320
9.5 Valued Component Cumulative Effects Assessments 327

DRAFT

9.6 Accidents and Malfunctions 359
9.7 Integrated Discussion of Cumulative Effects 361
9.8 Challenges, Data Gaps, and Limitations 364
9.9 Management of Cumulative Effects 366
9.10 Application of this CEA to Future Regulatory Decision-Making 376
9.11 References 377
10 Gender-Based Analysis Plus 390
10.1 Benefits of Doing GBA Plus 391
10.2 Approach and Scope 392
10.3 Analysis 393
10.4 Data for GBA Plus: Gaps and Limitations 408
10.5 Conclusion 413
10.6 References 413
11 Recommendations 420
Theme 1: Exclusion Regulation 420
Theme 2: Spill Prevention and Response 424
Theme 3: Governance, Adaptive Management, and Planning 426
Theme 4: Indigenous Engagement and Knowledge 427
Theme 5: Regional Monitoring, Research, and Information Management 428
Theme 6: Climate Change and Greenhouse Gas Management 432
Theme 7: Cumulative Effects 432
Theme 8: Gender-Based Analysis Plus 434
Annexes 436
Appendix 1-1: Terms of Reference – Table of Concordance 436
Appendix 4-1: RA Meeting Summary Tables 437
Appendix 4-2: Issues Tracking Table 445
Appendix 5-1: Marine Mammals Occurring in/near the Study Area 448
Appendix 5-2: Sea Turtles Occurring in/near the Study Area 464
Appendix 7-1: Mitigation Measures 466

DRAFT

List of tables

Table 1.1 – Key provincial and federal legislation applicable to offshore exploratory drilling 32
Table 4.1 – Summary of Participants for Virtual Sessions 58
Table 5.1 – Summary of SARA Listed or COSEWIC assessed finfish and cartilaginous fish occurring in offshore Nova Scotia in/near the Study Area 83
Table 5.2 – Summary of Marine Mammals at risk or of conservation concern occurring in/near the Study Area. 103
Table 5.3 – Summary of SARA Listed Sea Turtles Occurring in/near the Study Area ... 106
Table 5.4 – Birds and insects of Special Status occurring in/near the Study Area 126
Table 5.5 – Summary of Listed Bats Occurring in/near the Study Area 133
Table 5.6 – Federal Legislation for Protected Areas 142
Table 5.7 – MPAs and AOIs located within or adjacent to the Study Area 147
Table 5.8 – Marine Refuges located within or adjacent to the Study Area 155
Table 5.9 – Proposed or potential NMCAs within and adjacent to the Study Area 159
Table 5.10 – Migratory Bird Sanctuaries within and adjacent to the Study Area 161
Table 5.11 – List of IBAs around the Study Area 166
Table 5.12 – List of KBAs with marine systems within and adjacent to the Study Area . 172
Table 5.13 – Sea Duck Key Habitat Sites in Nova Scotia 176
Table 5.14 – Overview of Major Commercial Fisheries in Nova Scotia (Maritime and Gulf Regions) with TAC associated 190
Table 5.15 – Number of Commercial Fishing Vessels by Length (in feet) in Nova Scotia, 2024 193
Table 5.16 – Recreational fishing by type and season 196
Table 5.17 – Aquaculture species, individual values, and production areas in Nova Scotia 198
Table 5.18 – Population of Indigenous Communities in Nova Scotia 214
Table 5.19 – Summary of Mi'kmaq Regional Organizations 218
Table 5.20 – Overview of Baseline Gaps 228
Table 8.1 – Quantitative GHG Analysis Boundaries 264
Table 8.2 – Climate Commitments, Targets and GHG Inventory Context 266
Table 8.3 – Potential GHG Emission Sources, Activity Drivers and Data Sources 271

DRAFT

Table 8.4 – GHG Modelling Assumptions for Low, Reference and High Per-Well Operating Profiles 275
Table 8.5 – GHG Emission Estimates for CEA Activity Scenarios 277
Table 8.6 – Cumulative, annual-average and conditional peak results 279
Table 8.7 – Key Sources of Uncertainty and Recommended Treatment 280
Table 8.8 – Potential Review Triggers and Responses for Future Exploratory Drilling Programs 281
Table 8.9 – Modeled GHG Emissions Relative to 2024 Canada and Nova Scotia Inventories 283
Table 8.10 – Potential GHG Mitigation Measures and Implementation Considerations 284
Table 9.1 – Key Messages and Lessons Learned from the NL Offshore Drilling RA and NS Offshore Wind RA 293
Table 9.2 – Summary of Legacy Production Projects in the Canada-Nova Scotia Offshore Area 302
Table 9.3 – Identification of Activities and Pressures Potentially Affecting Cumulative Change on the Scotian Shelf 312
Table 9.4 – Proposed Future Scenarios for Cumulative Effects Assessment 322
Table 9.5 – Future CEA Scenario Implications for the Marine Ecosystem 333
Table 9.6 – Future CEA Scenario Implications for Fisheries and Other Ocean Uses 342
Table 9.7 – Future CEA Scenario Implications for Indigenous Communities, Rights and Interests 350
Table 9.8 – Future CEA Scenario Implications for Atmospheric Environment and Climate 357
Table 9.9 – Federal Government Initiatives Relevant to Cumulative Effects 367
Table 10.1 – Key GBA Plus Considerations for Offshore Oil and Gas Exploratory Drilling and Examples of Measures to Address Potential Barriers and Risks 403
Table 10.2 – Key data sources for GBA Plus in NS 409
Table 1-1A – Table of Concordance 436
Table 4-1A – Meeting Summaries with RA Participants 437
Table 4-1B – Meeting Summaries with Indigenous Communities and Organizations 442
Table 4-2A – Summary of issues raised during engagement and consultation for RA and relevant RA report sections. 445
Table 5-1A – Marine Mammals Occuring in/near the Study Area 448
Table 5-2A – Sea Turtles Occuring in/near the Study Area 464

DRAFT

Table 7-1A – Mitigation measures for offshore oil and gas exploratory drilling in the Study Area..... 466

DRAFT

List of figures

Figure 1.1. Regional Assessment Study Area 27
Figure 2.1. Licenses, petroleum wells, and jurisdictional boundaries 36
Figure 2.2. CNSOER Strategic Environmental Assessment Areas 37
Figure 3.1. Semisubmersible drilling rig (Amec 2016) 40
Figure 3.2. Drill ship (Amec 2016) 41
Figure 3.3. Jack-up drilling rig (Amec 2016) 42
Figure 3.4. Schematic of a completed offshore well (CAPP 2017) 44
Figure 5.1. Bathymetry of Offshore Nova Scotia 65
Figure 5.2. Water Circulation on the Scotian Shelf 67
Figure 5.3. Species Distribution of Corals and Sponges 81
Figure 5.4. MPAs and AOIs within and adjacent to the Study Area 146
Figure 5.5. Marine Refuges located within or adjacent to the Study Area 154
Figure 5.6. Sable Island National Park Reserve 157
Figure 5.7. National Wildlife Areas and Marine National Wildlife Areas 158
Figure 5.8. Migratory Bird Sanctuaries within and adjacent to the Study Area 161
Figure 5.9. EBSAs in relation to the Study Area 163
Figure 5.10. Roseway Basin in relation to the Study Area 165
Figure 5.11. IBAs around the Study Area 166
Figure 5.12. KBAs within Nova Scotia 171
Figure 5.13. Sea Duck Key Habitat Sites in Nova Scotia 175
Figure 5.14. SiBAs within the Study Area 178
Figure 5.15. Georges Bank in relation to the Study Area 180
Figure 5.16. Commercial Fisheries within the Study Area 193
Figure 5.17. All Mobile Commercial Fishing Gear Landings Density within the Study Area 194
Figure 5.18. All Fixed Commercial Fishing Gear Landings Density within the Study Area 195
Figure 5.19. Vessel Density within the Study Area 206
Figure 5.20. Legacy Offshore Oil and Gas Infrastructure within the Study Area 209
Figure 5.21. Offshore Wind Potential Areas within the Study Area 210
Figure 5.22. Map of Nova Scotia Mi'kmaw First nations in Mi'kma'ki 218

DRAFT

Figure 9.1. Scotian Shelf Planning Area as Reference for Regional CEA Boundary..... 298
Figure 9.2. History of Wells Drilled in the Canada-Nova Scotia Offshore Area 302
Figure 9.3. Interaction of Cumulative Effects Drivers and Pressures with Valued Components 315
Figure 9.4. Cumulative Human Impact Mapping: Relative Cumulative Impact Score..... 318
Figure 9.5. Hot and Cold Spots of Modelled Cumulative Human Impacts 319
Figure 9.6. Pathways of Effects: Marine Ecosystem 331
Figure 9.7. Pathways of Effects: Commercial Fisheries and Other Ocean Uses..... 341
Figure 9.8. Pathways of Effects: Indigenous Communities, Rights and Interests 349
Figure 9.9. Pathways of Effects: Atmospheric Environment and Climate 356

DRAFT

List of abbreviations and acronyms

Abbreviation/Acronym	Definition
ACOA	Atlantic Canada Opportunities Agency
Accord Acts	The Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act
AECOM	Architecture, Engineering, Construction, Operations, and Management
AOIs	Areas of Interest
AZMP	Atlantic Zone Monitoring Program
BAT	Best Available Technology
BBL	Barrel
BEP	Best Environmental Practice
BHP	Broken Hill Proprietary
BOEM	Bureau of Ocean Management (US)
BOP	Blow-out Preventer
BP	British Petroleum
BRI	Bird Research Institute
CAD	Canadian Dollar
CAPP	Canadian Association of Petroleum Producers
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers an
CCS	Carbon Capture and Storage
CEA	Cumulative Effects Assessment

DRAFT

Abbreviation/Acronym	Definition
CEAA	*Canadian Environmental Assessment Act*
CFB	Canadian Forces Base
CH_4	Methane
CIS	Canadian Ice Service
Cm	Centimeter
CMM	Confederacy of Mainland Mi'kmaq
CNSOER	Canada-Nova Scotia Offshore Energy Regulator
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
CNWA	*Canadian Navigable Waters Act*
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide Equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSAS	Canadian Science Advisory Secretariat
DEIA	Diversity, Equity, Inclusion and Accessibility
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DST	Drill Stem Testing
EA	Environmental Assessment
EBSAs	Ecologically and Biologically Significant Areas
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EEZ	Exclusive Economic Zone
EL	Exploration Licences
ESAs	Ecologically Significant Areas

DRAFT

Abbreviation/Acronym	Definition
ESRF	Environmental Studies Research Fund (Canada)
FB	Facebook
FSC	Food, Social and Ceremonial (fisheries)
GBA+	Gender-based Analysis Plus
GCIFA	Guysborough County Inshore Fishermen's Association
GDP	Gross domestic product
GHGs	Greenhouse gases
GW	Gigawatts
GWPs	Global Warming Potentials
HADD	Harmful Alteration, Disruption, or Destruction
HFCs	Hydrofluorocarbons
HVDC	High-Voltage Direct Current
IA	Impact Assessment
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
IBAs	Important Bird Areas
IEPP	Indigenous Engagement and Partnership Plan
IPCAs	Indigenous Protected and Conserved Areas
IUCN	International Union for Conservation of Nature
KBAs	Key Biodiversity Areas
km	Kilometers
km2	Square Kilometers
KMK	Kwilmu'kw Maw-klusuaqn
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
Kt	Kilotonnes
KtCO2e	Kilotonnes of Carbon dioxide Equivalent
L/day	Litter per Day
LFA	Lobster Fishing Area
LULUCF	Land Use, Land-Use Change and Forestry

DRAFT

Abbreviation/Acronym	Definition
m3	Cubic meters
m	Meters
MAARS	Maritime Aboriginal Aquatic Resources Secretariate
MAPC	Maritime Aboriginal Peoples Council
MARLOAs	Marine Local Operating Areas
MBCA	*Migratory Birds Convention Act, 1994*
MBSs	Migratory Bird Sanctuaries
MEKS	Mi'kmaq Ecological Knowledge Study
Minister	Minister of the Environment, Climate Change and Nature
MMIWG2S+	Missing and Murdered Indigenous Women, Girls, and Two-Spirit
MMOs	Marine Mammal Observers
MMscf	Million Standard Cubic Feet
MNWAs	Marine National Wildlife Areas
MODUs	Mobile Offshore Drilling Units
MPAs	Marine Protected Areas
MRs	Marine Refuges
Mt	Megatonnes
MtCO2e	Megatonnes of Carbon dioxide Equivalent
N2O	Nitrous oxide
NAFO	Northwest Atlantic Fisheries Organization
NATO	North Atlantic Treaty Organization
NL	Newfoundland and Labrador
NMCAs	National Marine Conservation Areas
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen oxides
NRC	National Research Council
NRCan	Natural Resources Canada
NS	Nova Scotia

DRAFT

Abbreviation/Acronym	Definition
NSDoE	Nova Scotia Department of Energy
NS OSW RA	Nova Scotia Offshore Wind Regional Assessment
NWAs	National Wildlife Areas
OCAP	First Nations' principles of Ownership, Control, Access and Possession
OECMs	Other Effective Area-Based Conservation Measures
OSW	Offshore Wind
PAM	Passive Acoustic Monitoring
PCB	Polychlorinated biphenyls
PM	Particulate Matter
PVS	Platform Supply Vessel
RA	Regional Assessment
Registry	Canadian Impact Assessment Registry Internet Site
ROVs	Remotely Operated Vehicles
SACC	Strategic Assessment of Climate Change
SARA	*Species at Risk Act*
SBMs	Synthetic-based Muds
SDJV	Sea Duck Joint Venture
SDKHS	Sea Duck Key Habitat Sites
SDM	Species distribution models
SEAs	Strategic Environmental Assessments
SiBAs	Significant Benthic Areas
SO_2	Sulphur dioxide
t	Tonnes
TAC	Total Allowable Catch
TC	Transport Canada
tCO_2e	Tonnes of Carbon dioxide Equivalent
The RA	The Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area
The Shelf	The Scotian Shelf

DRAFT

Abbreviation/Acronym	Definition
TUC	Traditional Use Study
UINR	Unama'ki Institute of Natural Resources
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Science and Cultural Organization
USA	United States of America
ULC	Unlimited Liability Company
UXO	Unexploded Explosive Ordnance
VC	Valued Component
VMEs	Vulnerable Marine Ecosystems
VOCs	Volatile Organic Compounds
VSP	Vertical seismic profiling
WBMs	Water-based Muds

DRAFT

Glossary

Term/Phrase	Definition/Explanation
Accord Acts	The Accord Acts refer to the *Canada-Newfoundland and Labrador Accord Implementation Act* and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*. These acts were the legal basis for managing oil and gas activity in the offshore areas of Canada. The amended acts are the result of agreements between the federal and provincial governments to develop renewable resources, including offshore wind, in the jointly managed waters of the Atlantic offshore area.
Adaptive management	Adaptive management, in the context of impact assessment, is a planned and systematic process to respond to uncertainty around predicted project effects or the effectiveness of mitigation measures. It ensures timely and meaningful actions are taken to respond to adverse outcomes and allows for learning from the results of the actions that are taken. Adaptive management plans for specific issues can be required in addition to a follow-up program.
Adverse federal effects	Collectively refers to two types of non-negligible effects defined in section 2 of the *Impact Assessment Act*, summarized here: • "adverse effects within federal jurisdiction" (includes non-negligible adverse effects caused by a project to fish and fish habitat; to marine plants (which are included in addition to fish as "aquatic species"); to migratory birds; to the marine environment outside of Canada caused by pollution; to boundary waters, international waters, and interprovincial waters caused by pollution; to the environment on federal lands; to Indigenous Peoples; and the adverse effects of any federal work or undertaking or activity occurring on federal lands); and • "direct or incidental adverse effects" (such as non-negligible adverse effects directly linked or necessarily incidental to a federal permit required for the project).
Advisory Groups	A group of experts/knowledge holders who lend their skills, guidance, and knowledge to the Regional

DRAFT

Term/Phrase	Definition/Explanation
	Assessment Committee related to Science and Community Knowledge, Indigenous Knowledge, and Fisheries.
Aerofauna	Aerofauna is the term for animals that live in the aerosphere, which is the area of the atmosphere where birds, bats, and flying insects can be found.
Archaeological	The study of the ancient and recent human past through material remains.
Artificial lighting	Artificial lighting refers to the light that is produced from human-made sources (not naturally occurring).
Atmospheric emissions	Gaseous or particulate pollutant substances emitted into the atmosphere by human and natural activities which can cause health and environmental problems such as acid rain, air quality degradation and global warming/climate change.
Benthic	Associated with or occurring on the bottom of a body of water.
Buffer	A specified zone around a map feature or features, measured in units of distance or time.
Cetacean	Marine mammals that have two front flippers. This group includes whales, dolphins and porpoises, animals that are completely aquatic.
Coastal/Inshore/ Nearshore Area	The area between the low tide shoreline and the point at which breakers (breaking waves) form.
Coexistence	Placement of multiple activities or uses within the same marine area, including safety zones where applicable.
Compensation	Following avoidance and minimization measures for reducing negative impacts from development on other users of the marine space, such as the fishing industry, compensation may serve as a mitigation option to reduce the anticipated financial and environmental impacts that offshore wind development may have on the commercial and recreational fishing industries.
Conservation Area	Areas that safeguard biodiversity for present and future generations by reducing stresses from human activities. These areas also provide opportunities for people to

Term/Phrase	Definition/Explanation
	connect with nature and include protected areas and other effective area-based conservation measures (OECMs).
Consultation	Consultation refers to the legal obligations of the Crown (Government) when Aboriginal interests (rights and title) may be adversely affected by a Crown decision. Consultation consists of information sharing between government and affected Indigenous Nations and seeks to resolve potential adverse impacts to Aboriginal interests.
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act* (section 2(1)).
Cumulative effects	Effects likely to result from the project's residual effects in combination with other physical activities that have been or will be carried out.
Demersal	Living or occurring on the bottom of a sea or a lake.
Ecologically and Biologically Significant Area	Area within Canada's oceans that have been identified through formal scientific assessments as having special biological or ecological significance when compared with the surrounding marine ecosystem.
Endangered (COSEWIC)	Species facing imminent extirpation or extinction.
Engagement	Engagement aims to build relationships by exchanging information in the absence of legal consultation obligations. The purpose of engagement is to build trust and create meaningful relationships. This includes information sharing regarding regulations, policy, legislation and procedures.
Etuaptmumk (Two-Eyed Seeing)	An approach introduced by Albert Marshall, a respected Mi'kmaq Elder, which recognizes the strength of Indigenous ways of knowing and the strength of Western ways of knowing and uses both competencies together.
Exclusion Zone	A designated zone around an offshore wind farm that ensures safety and control over operations near the wind farm.
Fish	As defined in the *Fisheries Act*, "fish" includes fish and fish parts, as well as shellfish, crustaceans, marine animals and their parts, and the eggs, sperms, spawn, larvae, spat and juveniles stages of these animals.

Term/Phrase	Definition/Explanation
Food, Social and Ceremonial Fisheries	Fish that are caught by First Nations and must be consumed by the individual or community, can be used for the purpose of harvesting other species of food and is not sold, bartered or traded. This right is only limited or infringed if justified in specific circumstances (such as for conservation purposes). DFO issues these licenses to Indigenous communities for a variety of species, including lobster.
Food web	A natural interconnection of food chains and a representation of what-eats-what in an ecological community.
Fossil Fuels	These fuels are found in Earth's crust and contain carbon and hydrogen, which can be burned for energy. Coal, oil, and natural gas are examples of fossil fuels.
Gender-based Analysis Plus (GBA Plus)	A tool for assessing a proposed project's potential positive and negative impacts on people of different genders, identities and abilities.
Gigawatt (GW)	A unit of power equal to one billion watts or one thousand megawatts.
Glacial Till	Unsorted material deposited directly by glacial ice and showing no stratification. Till is sometimes called boulder clay because it is composed of clay, boulders of intermediate sizes, or a mixture of these. The rock fragments are usually angular and sharp rather than rounded, because they are deposited from the ice and have undergone little water transport. The pebbles and boulders may be faceted and striated from grinding while lodged in the glacier.
Greenhouse gas (GHG)	Gases in the earth's atmosphere that trap heat.
Important Bird Area	Places of international significance for the conservation of birds and biodiversity.
Indigenous Knowledge	For the purposes of impact assessment, generally, Indigenous knowledge is considered as a body of knowledge built up by a group of Indigenous peoples through generations of living in close contact with the land. While the term 'traditional knowledge' is often used, the Impact Assessment Act uses the term 'Indigenous knowledge' to recognize that the knowledge system

DRAFT

Term/Phrase	Definition/Explanation
	evolves and is not set in the past, as the word 'traditional' may imply.
Invasive Species	An organism that causes ecological or economic harm in a new environment where it is not native.
Marine plants	As defined in the *Fisheries Act*, includes all benthic and detached algae, marine flowering plants, brown algae, red algae, green algae and phytoplankton.
Marine Protected Area (MPA)	Areas created by government under a variety of legislation, e.g., *Oceans Act, Canada Wildlife Act, Canada National Marine Conservation Act* etc. MPAs are established for the long-term, and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Similar to protected areas on land, MPAs conserve the natural environment for the long term, protecting not just one single species, but the ecosystem as a whole.
Marine Refuge	Area-based fisheries closures under the federal *Fisheries Act* to protect marine ecosystems and species and to contribute to other ecosystem-based conservation measure criteria and the conservation of biodiversity over the long-term. Marine refuges protect only single species and do not usually prohibit activities such as oil and gas or mineral extraction.
Marine Spatial Planning	Process for managing ocean spaces to achieve ecological, economic, cultural and social objectives.
Migratory birds	Birds identified and protected by the *Migratory Birds Convention Act* and listed in the schedule to that act.
Migratory Bird Sanctuaries	Areas established under the Migratory Birds Convention Act (1994) and administered by the Canadian Wildlife Service to help protect migratory birds by conserving their habitat and making it illegal to hunt or disturb them.
Mi'kma'ki	The ancestral and unceded territory of the Mi'kmaq.
National Marine Conservation Areas (NMCAs)	Areas established for the purpose of protecting and conserving representative marine areas for the benefit, education and enjoyment of the people of Canada and the world. They are managed and used in a sustainable manner that meets the needs of present and future

Term/Phrase	Definition/Explanation
	generations without compromising the structure and function of their ecosystems.
North Atlantic Oscillation (NAO)	A large-scale alternation of atmospheric mass between subtropical high surface pressure, centered on the Azores, and subpolar low surface pressures, centered on Iceland. The NAO determines the speed and direction of the westerly winds across the North Atlantic and winter sea surface temperature.
Paleontological	A science dealing with the life of past geologic periods as known from fossil remains.
Passive Acoustic Monitoring	Observation method where an acoustic device is deployed in the ocean to capture sounds from the surrounding environment (the instrument does not produce any sounds). The sounds received by the instrument are identified and classified. PAM has become an important tool in observing cetaceans, especially deep-diving species.
Pelagic	Relating to or living or occurring in the open sea.
Pinniped	Marine mammals that have front and rear flippers. This group includes seals, sea lions and walruses, animals that live in the ocean but are able to come on land for long periods of time.
Registry (The Canadian Impact Assessment Registry)	A website where the Impact Assessment Agency of Canada stores project files for public access. The Registry site for the Regional Assessment includes public notices, reports, scientific information, background documents, Committee updates and additional information relevant to the Regional Assessment.
Remote Operating Vehicle (ROV)	Unoccupied, highly maneuverable underwater machines that can be used to explore ocean depths while being operated by someone at the water surface.
Residual effect	An effect expected to result from the project that is predicted to remain after the application of mitigation measures.
Safety Zone	Safety zones are intended to safeguard the safety of other users of the marine environment and the offshore renewable energy installation itself during the construction,

Term/Phrase	Definition/Explanation
	maintenance and decommissioning phases of the installation.
Sea Ice	Frozen seawater that floats on the ocean surface. Seasonal ice that forms and melts each year (called first-year ice) and ice present all-year round (multi-year ice).
Significant Benthic Area	According to DFO's Ecological Risk Assessment Framework (ERAF), these are significant areas of cold-water corals and sponge dominated communities.
Special Concern (COSEWIC)	Species which may become threatened or endangered because of a combination of biological characteristics and identified threats.
Species at risk	Any species listed in Schedule 1 of the *Species at Risk Act*. This does not include species recommended for inclusion in Schedule 1 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), nor species that are listed under only provincial legislation.
Substrate	The surface or material on or from which an organism lives, grows, or obtains its nourishment.
Surficial Geology	Material and area landforms found at the surface of the Earth.
Terms of Reference	Guiding document that defines and summarizes the purpose, objectives, mandate, and activities of the Regional Assessment Committee.
Threatened (COSEWIC)	Species which are likely to become endangered if nothing is done to reverse the factors leading to their extirpation or extinction.
Traditional Knowledge	Knowledge, know-how, skills and practices that are developed, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity.
Two-Eyed Seeing	Refer to *Etuaptmumk*
Valued component	An element of the natural or human environment that may be impacted by the project and is of value to participants.
Viewscape	The geographical area that is visible from one or more viewing points.

DRAFT

Term/Phrase	Definition/Explanation
Waterfowl	A bird that frequents water, especially when regarded as game.

DRAFT

1 Introduction to the project and impact assessment process

This **Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area** (the RA) has been undertaken to improve the effectiveness, efficiency, and transparency of impact assessment (IA) and regulatory decision-making for future offshore exploratory drilling activities in Nova Scotia. Through a regional-scale evaluation of environmental, social, economic, cultural, and Indigenous considerations in the Study Area, the RA provides an evidence-based foundation for assessing the potential effects of offshore exploratory drilling and the effectiveness of existing mitigation measures, documenting key issues and concerns, identifying gaps in knowledge and data, and providing recommendations for the future of exploratory drilling. The RA also considers whether regional-scale information and management measures could support more efficient and predictable assessment and regulatory processes while ensuring the protection of the marine environment and the sustainable use of offshore resources.

The information to inform the RA process was assembled from previous regional assessments, where relevant to the Study Area and the activity namely the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador and the Regional Assessment of Offshore Wind Development in Nova Scotia, from past Strategic Environmental Assessments (SEAs), and from feedback provided from a range of participants during engagement and consultation activities undertaken throughout the RA process. Indigenous Peoples, government agencies, industry representatives, stakeholders, expert consultants, and members of the public have contributed knowledge, perspectives, and expertise to help inform the RA and its recommendations. This collaborative approach has strengthened the understanding of regional considerations and has helped identify priorities for environmental protection, monitoring, future research, and regulatory approaches.

1.1 Purpose and Rationale

1.1.1 Rationale

On December 1, 2025 the Honourable Tim Houston, Premier of Nova Scotia, wrote to the Minister of the Environment, Climate Change and Nature (the Minister), the Honourable Julie Dabrusin, to request a regional assessment for offshore oil and gas exploratory drilling, citing a need to create a competitive regime consistent across Atlantic Canada offshore areas with a clear regulatory pathway to reduce regulatory risk, attract investment in offshore resources, and to accelerate exploration while ensuring responsible resource management.

The RA request is aligned with the Government of Canada's commitment to strengthening long-term energy security through energy diversification. It also supports the implementation of *Canada's Strategy to Protect Nature*[1], specifically the second pillar, *Building Canada Well*, which promotes the integration of environmental considerations, scientific evidence, and data-driven approaches into infrastructure and development planning to achieve sustainable development while protecting ecosystems. The Strategy includes an explicit commitment to use regional assessments as a planning tool and this RA was the first assessment initiated under that commitment. The RA builds upon existing information, Indigenous knowledge, known mitigation and monitoring, and previous offshore regional assessments, SEAs, and environmental assessments with the objective to inform and reduce duplication for future project-specific IAs.

The RA is being undertaken during a period of significant change in global and domestic energy systems. While Canada and Nova Scotia continue to advance investments in renewable and low-carbon energy sources, governments are also considering broader energy policy objectives, including energy security, energy diversification, economic competitiveness, and the long-term resilience of energy supply. Recent geopolitical events, evolving energy markets, and increasing demand for reliable sources of energy have highlighted the importance of maintaining secure and diversified energy systems while advancing environmental and climate objectives.

While offshore oil and gas development has not been a focus for Nova Scotia in recent years, the industry is not a new one. Major projects have included:

- Sable (1999–2018): Nova Scotia's first offshore gas project, supplying Canada and the US from 5 fields;
- Deep Panuke (2013–2018): a smaller, short-term gas project from a single field; and
- Cohasset-Panuke (1992–1999): Canada's first offshore oil project.

Renewed interest in the offshore area and potential untapped oil and gas resources may lead to new exploration projects in the future. Development of potential resources could contribute to Canada's and Nova Scotia's energy security, reliability, and support a diversified energy mix. In addition, oil and gas development and production has the potential to contribute to economic development, employment, government revenues, and the continued development of Canada's upstream energy sector.

Exploration drilling is required to confirm new oil and gas resources, and this RA reflects the need to proactively understand and evaluate the potential effects associated with the activity before future exploration activity occurs. Undertaking this RA provides a common foundation of regional conditions, environmental and socio-economic sensitivities,

[1] Canada's Strategy to Protect Nature outlines a plan for how the Government of Canada will deliver Canada's 2030 Nature Strategy

cumulative effects, and appropriate mitigation measures, knowledge and data gaps, and recommendations in advance of project-specific planning and decision-making. By completing this work at a regional scale, the assessment supports informed, transparent, and evidence-based decisions while reducing duplication and improving regulatory efficiency for future proposals.

The RA does not constitute approval of offshore exploration drilling or subsequent development activities. Rather, it provides an opportunity to analyze the current processes and knowledge for exploratory drilling activities. By undertaking the assessment now, governments and regulators will be better positioned to respond to future proposals in a manner that is timely, predictable, transparent, inclusive and equitable and consistent with environmental stewardship and responsible resource management.

Following the request from the Premier, this RA was initiated and conducted pursuant to Terms of Reference established by Minister Dabrusin on July 8, 2026. The Terms of Reference provides overall direction on the purpose, scope, objectives and deliverables for the RA. The objectives are integrated across the relevant chapters of the report, including the description of regional conditions, assessment of potential effects, consideration of Indigenous knowledge and rights, Gender-Based Analysis Plus, cumulative effects assessment, mitigation measures, and recommendations. To identify where specific Terms of Reference objectives have been addressed in the RA Report, a concordance table is provided in Appendix 1-1.

The RA is focused on offshore exploratory drilling and associated activities within a Study Area within the jointly managed offshore waters of Nova Scotia (Figure 1.1).

DRAFT

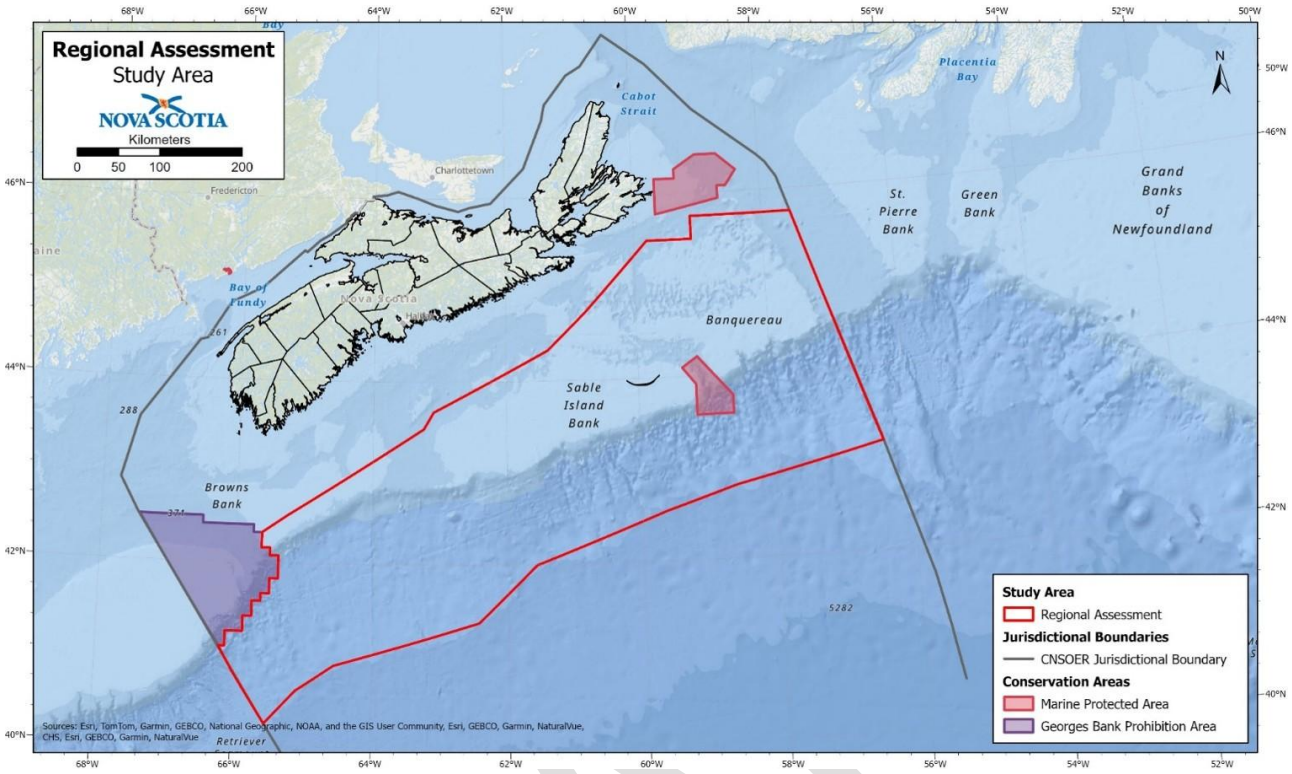


Figure 1.1. Regional Assessment Study Area

1.1.1.1 Sustainability

The policy context for considering offshore exploratory drilling has evolved significantly in recent years. Since the completion of the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, federal and provincial governments have introduced or strengthened a range of climate, sustainability, and biodiversity policies that provide additional context for understanding how offshore activities may contribute to, or interact with, broader sustainability objectives. These include the *Canadian Net-Zero Emissions Accountability Act*, the 2030 Emissions Reduction Plan, the Federal Sustainable Development Strategy, A Force of Nature: Canada's Strategy to Protect Nature, *Nova Scotia Environmental Goals and Climate Change Reduction Act*, and Our Climate, Our Future: Nova Scotia's Climate Change Plan for Clean Growth.

Taken together, these initiatives reflect an increasingly integrated approach to sustainability that seeks to balance economic development and needs and energy diversification with environmental protection, climate change considerations, biodiversity and conservation, social well-being, and reconciliation with Indigenous Peoples. Within this context, offshore exploratory drilling is not considered solely in relation to its direct environmental effects, but also in relation to broader sustainability objectives and future development pathways.

From a climate perspective, future offshore exploratory drilling would occur within a policy environment shaped by Canada's commitment to achieve net-zero greenhouse gas emissions by 2050 through the *Canadian Net-Zero Emissions Accountability Act* and associated emissions reduction planning. The 2030 Emissions Reduction Plan identifies the oil and gas sector as a key contributor to national emissions reductions through measures such as emissions caps, methane reductions, and deployment of emissions-reduction technologies. While exploratory drilling activities typically create a relatively small source of greenhouse gas emissions (Section 8.0), exploration activities may enable future petroleum development, raising broader questions regarding how potential future production aligns with Canada's long-term emissions reduction and energy transition objectives. At the same time, governments continue to consider issues related to energy demand, energy security, affordability, economic development, and workforce transition. As a result, sustainability considerations for offshore exploration increasingly involve understanding both the potential benefits and the potential implications of future development within a decarbonizing economy. The Federal Sustainable Development Strategy further reinforces the need for integrated decision-making across environmental, economic, and social dimensions of sustainability. Consistent with the United Nations Sustainable Development Goals, the strategy recognizes that sustainability involves balancing objectives that may at times be complementary and at other times involve trade-offs, including economic growth, affordable energy, climate action, healthy ecosystems, and community well-being. Within this framework, consideration of offshore exploratory drilling requires examination of both the opportunities it may provide and the potential effects it may have on other sustainability priorities.

Biodiversity conservation and nature-positive development have also become increasingly important components of Canada's sustainability framework. A Force of Nature: Canada's Strategy to Protect Nature is particularly relevant to this RA because the Strategy's second pillar, Building Canada Well, specifically promotes planning and carrying out development in ways that work with nature rather than against it. This approach recognizes that economic development and infrastructure planning should be informed by the protection of biodiversity, ecosystem functions, and ecological resilience. Applied to offshore exploratory drilling, this perspective highlights the importance of this RA in identifying and avoiding sensitive marine habitats and species, considering cumulative pressures on marine ecosystems, incorporating the best available science and Indigenous Knowledge, and ensuring that future activities are undertaken in a manner consistent with long-term biodiversity objectives and marine conservation commitments. In the context of offshore exploratory drilling, the Building Canada Well approach reinforces the importance of understanding how future activities may interact with marine ecosystems, ecologically significant areas, species at risk, fisheries resources, and other ocean uses at a regional scale. It encourages consideration of whether and how offshore activities can be planned, located, timed, and managed to maintain ecosystem integrity and biodiversity values while supporting broader economic and societal objectives. This aligns closely with the purpose of regional assessments under the *Impact Assessment Act* (IAA), which seek to provide

information on cumulative effects, future conditions, and regional sustainability considerations before project-specific and planning decisions are made.

At the provincial level, the *Nova Scotia Environmental Goals and Climate Change Reduction Act* establishes legislated targets to reduce greenhouse gas emissions and achieve net-zero emissions by 2050, while Our Climate, Our Future: Nova Scotia's Climate Change Plan for Clean Growth sets out actions related to emissions reductions, climate adaptation, economic opportunities associated with the transition to a cleaner economy, and ecosystem resilience. These initiatives recognize both the need to respond to climate change and the importance of supporting economic prosperity and community well-being for Nova Scotia during that transition. In this context, consideration of offshore exploratory drilling includes evaluating how the activity may interact with the province's climate objectives, marine resource sectors, employment opportunities, and long-term economic development goals.

Throughout the RA, stakeholders expressed differing perspectives regarding how offshore exploratory drilling fits within these sustainability frameworks. Some participants noted the potential contribution of offshore activities to employment, economic growth, government revenues, energy security, and the utilization of existing offshore expertise and infrastructure. Other participants questioned whether activities that could facilitate future petroleum production are compatible with long-term climate and biodiversity goals. These differing views reflect broader societal discussions regarding how sustainability should be interpreted in the context of energy development and the transition to lower-carbon energy systems. The RA is intended to provide a mechanism to gather baseline information, and initiate discussions and processes to inform the understanding and response to potential interactions of offshore exploration activities in light of evolving sustainability objectives and priorities. This information can help inform future decision-making regarding offshore activities within Nova Scotia's offshore area.

1.1.2 Purpose

The purpose of this RA is to provide an understanding of existing conditions, potential effects and mitigation measures, key issues and concerns, and knowledge gaps associated with offshore exploratory drilling in the Study Area to support future decision-making. Specifically, this RA was carried out with intent to:

- Provide an overview of regional-level information for environment, social, economic and health aspects relevant to the Study Area;
- Provide a description and overview of the Mi'kmaq people, including an understanding of traditional and cultural values, relevant to the Study Area;
- Identify valued components (VCs) and potential effects to those VCs from offshore exploratory drilling;

- Consider the potential effects of exploratory drilling on the exercise of Indigenous rights, and incorporate Indigenous knowledge alongside scientific and technical information;
- Complete a Gender Based Analyses Plus (GBA+) to examine how the regional environmental, health, social, and economic effects of offshore exploratory drilling may be experienced differently by diverse groups of people;
- Identify mitigation measures, standard practices, and regulatory controls that may mitigate or remove adverse effects of exploratory drilling;
- Examine current conditions and trends and identify concerns and issues, and gaps in knowledge relevant to the Study Area and to offshore exploratory drilling;
- Assess the potential cumulative effects of exploratory drilling activities in combination with other past, existing, and reasonably foreseeable activities in the region;
- Examine greenhouse gas (GHG) emissions relevant to federal and provincial climate change policies, commitments, and objectives in the context of exploratory drilling activities; and
- Provide recommendations for the future of offshore exploratory drilling.

The RA also considered a potential regulatory action to exclude future proposed exploratory drilling activities from the requirement to undergo a project-specific federal IA under the IAA. This consideration is discussed further in section 1.3.

1.2 Regulatory Context for Offshore Exploratory Drilling

Canada has a long coastline and manages its offshore areas based on international law, including the United Nations Convention on the Law of the Sea (UNCLOS), which Canada has signed. UNCLOS provides the international legal framework that gives Canada rights over offshore resources and imposes environmental protection obligations. Under UNCLOS, Canada has the right to explore and develop non-living natural resources, such as oil and gas, in its Exclusive Economic Zone (EEZ) and on its continental shelf, including in some areas beyond 200 nautical miles. Obligations under UNCLOS are reflected in federal legislation including the IAA, *Oceans Act*, *Fisheries Act*, and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation and Offshore Renewable Energy Management Act* (which, together with its provincial mirror legislation, constitute the Accord Acts).

The regulatory framework for offshore exploration drilling in the Canada-Nova Scotia offshore area is enshrined in the Accord Acts, which establish the joint federal-provincial offshore regulatory regime and provide the legal basis for offshore licencing, activity authorizations, environmental protection, safety oversight, and resource management.

Within this framework, exploration drilling is also subject to the requirements of the IAA. Depending on the nature, location, and potential effects of a proposed project, additional federal legislation, permits, approvals, or regulatory reviews may also apply, including those related to commercial fisheries, fish and fish habitat, species at risk, migratory birds, navigation, and other matters within federal jurisdiction.

It is important to distinguish between the federal IA process and the regulatory role of the Canada-Nova Scotia Offshore Energy Regulator (CNSOER). The IAA determines whether a project requires an IA and, where applicable, whether the project is in the public interest. In contrast, the CNSOER is the lifecycle regulator responsible for administering and enforcing the federal and provincial Accord Acts and regulating offshore energy activities throughout planning, construction, operation and maintenance, and decommissioning.

1.2.1 Legislative Framework

The Accord Acts are the federal/provincial mirror legislation that implement the agreement between the Government of Nova Scotia (Department of Energy – NSDoE) and the Government of Canada (Natural Resources Canada – NRCan) on offshore petroleum resources management and revenue sharing and establish the legal framework for the joint management of offshore petroleum resources. The Accord Acts establish the legal framework of joint management for offshore petroleum resources and, more recently, offshore renewable energy resources. The framework sets the rules for offshore oil and gas activities, including exploratory drilling, and helps ensure that these activities are carried out in a safe and environmentally responsible manner.

The Accord Acts establish the CNSOER as the lead independent lifecycle regulator for all offshore energy projects and activities in the Canada-Nova Scotia Offshore Area. The primary functions of the CNSOER are to:

- manage offshore resource rights;
- approve offshore energy operators;
- authorize offshore activities;
- regulate safety;
- protect the environment;
- monitor and enforce compliance; and
- manage and conserve petroleum resources.

Under the Accord Acts, proponents who wish to conduct exploration drilling must obtain an operating licence, exploration licence, and an activity authorization before conducting any physical work or activity in the offshore area:

- An Operating Licence confirms that a company has the necessary corporate, technical, and financial capacity to conduct offshore work. It does not authorize any specific activity.
- An Exploration Licence grants a company the exclusive right to explore for petroleum within a defined offshore area. It is a land tenure right, not an approval to perform physical work.
- An Activity Authorization approves a specific offshore activity, such as exploratory drilling. The operator must demonstrate that the activity can be carried out safely and in an environmentally responsible manner before authorization is granted.

The Accord Acts integrate the provisions of the IAA. The IAA establishes an IA process which applies specifically to "designated projects" as defined by the Act and listed in the *Physical Activities Regulations* (SOR/2019-285) pursuant to the Act. For the offshore area adjacent to Nova Scotia, the drilling, testing and abandonment of offshore exploratory wells in the first exploration drilling program in an exploration licence area are designated projects and require an IA. The IA is subject to the approval of the Minister of Environment, Climate Change and Nature. Proponents are required to comply with all terms and conditions of each licence, authorization, and Minister's IA Decision Statement and its associated conditions when conducting exploration drilling in the Canada-Nova Scotia offshore area.

1.2.2 Other Provincial and Federal Legislation

Table 1.1 provides a list of additional key provincial and federal legislation that may apply to exploration drilling in the Canada-Nova Scotia Offshore Area. These additional statutes do not directly authorize offshore exploratory drilling; however, they can indirectly influence the planning, assessment, and regulation of offshore drilling activities through requirements related to marine conservation, fish and fish habitat protection, endangered species protection, and environmental effects management.

Table 1.1 – Key provincial and federal legislation applicable to offshore exploratory drilling

Legislation	Organization	Relevance
Provincial Legislation		
Nova Scotia Special Places Protection Act	NS Department of Communities, Culture, Tourism and Heritage	Provides preservation and management of archaeological, historical, and paleontological resources;

Nova Scotia Endangered Species Act	NS Department of Natural Resources	Provides protection, designation, recovery, and conservation of species at risk and their habitats within the province.
Federal Legislation		
Fisheries Act	Fisheries and Oceans Canada	Provides for the protection of fish and fish habitat.
Oceans Act	Fisheries and Oceans Canada	Provides the protection of designated protected areas in the marine environment.
Migratory Birds Convention Act (1994)	Environment and Climate Change Canada	Provides for the protection of migratory birds and their nests.
Canada National Parks Act	Parks Canada	Federal law governing the creation, protection, and management of Canada's national parks, including Sable Island which is designated a National Park Reserve.
Species at Risk Act	Fisheries and Oceans Canada, Environment and Climate Change Canada	Provides the protection of federally listed species and their designated critical habitat.
Canadian Navigable Waters Act	Transport Canada	Provides safe navigation and support vessel interactions with commercial shipping routes.
Canadian Environmental Protection Act (1999)	Environment and Climate Change Canada	Provides the use and discharge of chemical and deleterious substances in the marine environment.

1.2.3 Regulatory Coordination

The CNSOER accepts the federal IA process under the IAA to satisfy its environmental assessment and study requirement under the Accord Acts and the Canada-Nova Scotia

Offshore Area Petroleum Operations Framework Regulations (CNSOER, 2026). Furthermore, as the lead lifecycle regulator for offshore energy activities, the CNSOER coordinates with federal and provincial authorities that hold responsibilities and/or decision-making authority under their respective statutes and mandates (e.g., Fisheries and Oceans Canada). Through coordinated review processes, information sharing, and regulatory collaboration, facilitated and supported by a number of memorandums of understanding (MOUs) and agreements, the CNSOER integrates the expertise and requirements of federal authorities into the authorization and oversight of routine offshore energy related activities as well as management of spill response and other relevant accidental events.

1.2.4 Regional Assessment Governance

Regional assessments, under the IAA, are processes where the Government of Canada and interested jurisdictions collaborate to evaluate the positive and adverse effects of multiple past, existing and future activities and developments within a given geographical region to inform future proposed project-specific IAs, planning and decision-making related to projects, and to inform future regulatory processes. The IAA mandates that any relevant regional assessment be considered at specific stages during the IA process for future proposed designated projects within a studied region. The purpose of a regional assessment is to examine the broader environmental, health, social, and economic effects associated with physical activities, identify potential mitigation measures, and consider regional issues and context. Although the RA does not authorize any activities, its findings may inform subsequent project-specific IAs and regulatory decisions under the IAA and other applicable legislation.

Pursuant to sections 92 and 93 of the IAA, the Minister may authorize the Impact Assessment Agency of Canada (IAAC) to undertake a regional assessment. This RA was initiated following a request from the Province of Nova Scotia and is being led by IAAC in collaboration with the NSDoE, NRCan and the CNSOER. An IAAC RA Team is responsible for coordinating and administering the process.

1.3 Consideration of a Ministerial Exclusion Regulation

Under section 112 of the IAA, the Minister may, after considering the results of a regional assessment, make a regulation excluding certain designated physical activities from the requirement to undergo a project-specific federal IA, provided that all prescribed conditions of the regulation are met. Rather than assessing each project individually, an exclusion regulation relies on information gathered through a regional assessment, together with established mitigation measures and regulatory requirements. This authority recognizes that where the potential effects of an activity and the measures available to

avoid, mitigate, and manage those effects are sufficiently understood, information developed through a regional assessment may be used to support a streamlined assessment process for future projects. Accordingly, section 112 of the IAA may provide the basis for a regulation excluding certain future offshore exploratory drilling projects from the requirement to undergo a project-specific federal IA, provided that the projects are located within the RA Study Area and satisfy prescribed conditions. Any such exclusion regulation would establish eligibility criteria, information requirements, and environmental protection measures that proponents would be required to meet.

The Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, completed in 2020 established a precedent for developing an exclusion regulation for offshore exploratory drilling. Following that regional assessment, the Minister of the Environment created the *Regulations Respecting Excluded Physical Activities (Newfoundland and Labrador Offshore Exploratory Wells)* which came into force on June 4, 2020. The regulation excludes certain offshore exploratory drilling projects from the requirement to undergo a project-specific federal IA, provided that a project is located in the area of application set out in the regulation and meets all the conditions set out in the regulation, including Indigenous engagement, environmental protection, accident prevention, and monitoring. It also sets out the information that must be provided to IAAC when such a project is being proposed. The 2020 exclusion regulation, applicable to an areas of the Canada-NL offshore, was based on the conclusion that the potential effects of exploratory drilling, and the measures available to avoid or mitigate those effects, were sufficiently understood at a regional scale to support a more streamlined federal assessment approach. Projects subject to the regulation must still obtain all necessary licences and authorizations from the Canada-Newfoundland and Labrador Offshore Energy Regulator and any additional permits and approval that may be required as noted above in section 1.2.2.

This RA similarly contemplates whether the findings of this RA process could support recommendations for an exclusion regulation for offshore exploratory drilling in the RA Study Area. An exclusion regulation would not transfer responsibility for environmental protection or project oversight away from the CNSOER. Rather, projects that qualify under an exclusion regulation would continue to undergo CNSOER review and would still be required to obtain all applicable authorizations before drilling could commence. The CNSOER would remain responsible for evaluating proposed drilling programs, verifying compliance with regulatory requirements, imposing conditions where appropriate, conducting inspections and audits, and enforcing requirements related to safety, environmental protection, emergency preparedness, well design, and operational integrity. As is the case for the Canada-NL offshore area, proponents of projects excluded from the IA process would still be required to obtain all licences and authorizations from the Canada-Newfoundland Offshore Energy Regulator and would still be subject to all applicable federal and provincial legislation. Proponents would maintain responsibility for

meeting all applicable environmental, safety, operational, monitoring and reporting requirements as well as any conditions established under the exclusion regulation.

1.4 References

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2026. Environmental Assessment. Retrieved from: Environment | CNSOER

2 Scope

2.1 Spatial Boundaries

The Study Area is based on offshore CNSOER jurisdictional boundaries and on the boundaries associated with previously completed CNSOER SEAs. The Study Area includes the location of existing and historic exploration, significant discovery, and production licences as well as additional offshore areas considered prospective for future oil and gas exploration (Figures 2.1 and 2.2).

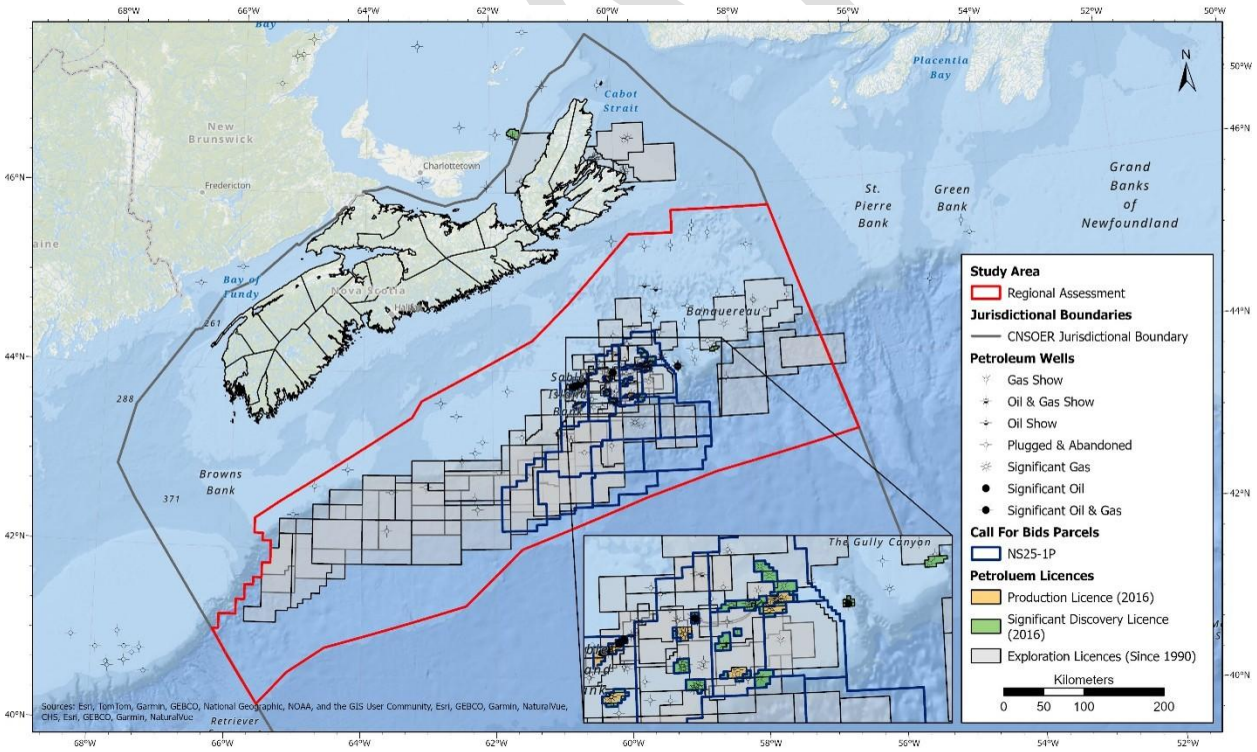


Figure 2.1. Licenses, petroleum wells, and jurisdictional boundaries

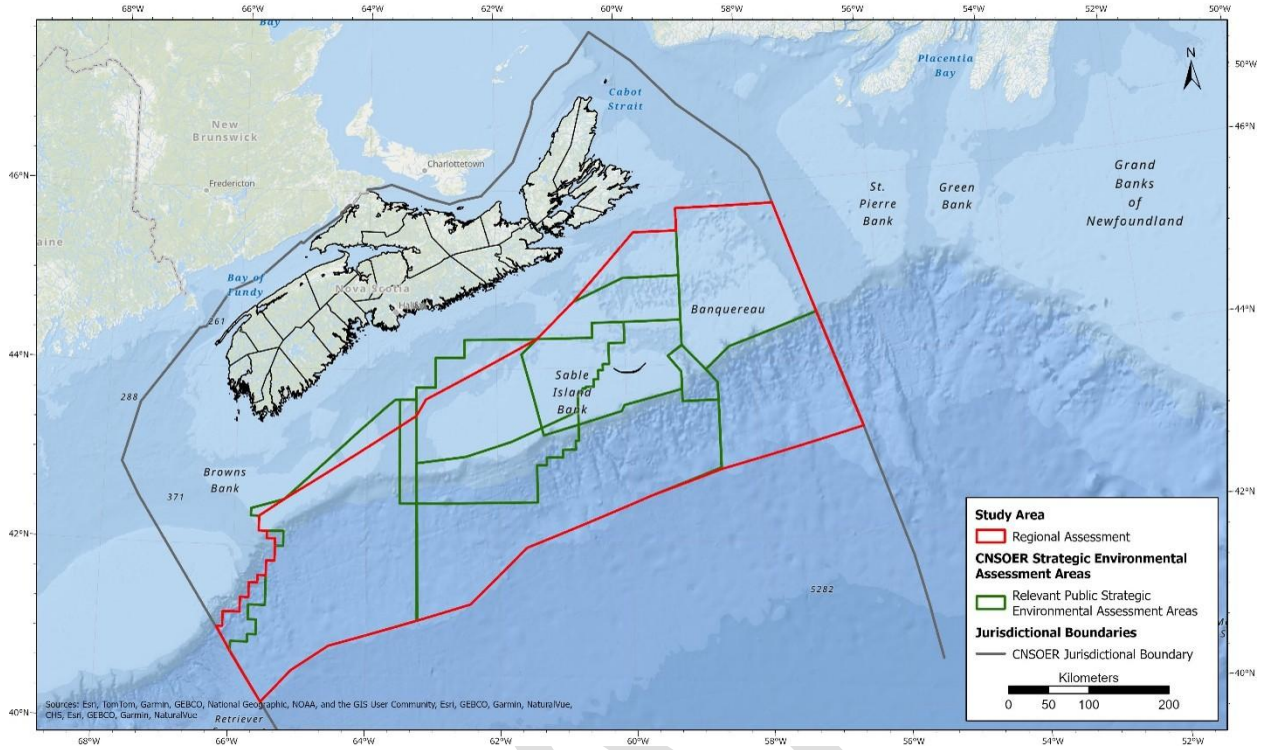


Figure 2.2. CNSOER Strategic Environmental Assessment Areas

The Study Area encompasses approximately 199,289 km², with distances from shore ranging from a minimum of 38 km to a maximum of 408 km. Water depths within the Study Area range from 0 m at Sable Island to approximately 4,334 m along the continental slope. Future exploratory drilling activities occurring within these spatial boundaries are considered to be within the scope of this RA. However, the information and analyses presented in the RA also consider relevant environmental components that overlap with, extend beyond, or are located entirely outside the Study Area where they may be affected by exploratory drilling activities conducted within it. This includes situations where the spatial extent of potential effects may exceed the Study Area boundaries, such as those associated with underwater noise or accidental spill events. The RA also considers the movement patterns and geographic ranges of migratory species, relevant oceanographic processes, and the distribution and extent of marine activities (e.g., fisheries, transportation).

2.2 Temporal Boundaries

The RA focuses on future exploratory drilling activities and associated operations within the Study Area but is based on the information and analyses available at the time it was conducted (2026). It is noted however, that as environmental conditions, scientific understanding, and regulatory considerations continue to evolve, the information, findings, and recommendations of the RA may require periodic review and updating. This is

particularly relevant given the dynamic nature of the offshore environment and the potential effects of climate change, including shifts in species distributions, migratory patterns, and fisheries resources.

2.3 Activity Boundaries

The scope of this RA encompasses future offshore exploratory drilling programs and all activities directly associated with those programs within the Study Area, including well drilling, testing including vertical seismic profiling and flaring, suspension or abandonment, vessel and aircraft support operations, supply and logistics activities, and routine operational discharges. A description of these activities is provided in section 3.0.

The scope does not include offshore petroleum development or production activities that may occur following the discovery of a resource, as such activities would be subject to separate regulatory review and impact assessment processes. Similarly, any onshore activities and infrastructure, including processing facilities, terminals, pipelines, and transportation networks located on land, are outside the scope of this RA.

3 Exploratory Drilling

Exploratory drilling is undertaken to determine the potential presence of hydrocarbons at specific locations that have been previously identified as areas of interest from geophysical surveys and other investigations. Drilling programs are carried out to fulfill an operator's obligations under one or more Exploration Licences issued by the CNSOER and may involve only one well or multiple wells. While seismic surveys provide indirect indications of subsurface conditions, the presence, composition, and commercial potential of oil and gas resources can only be confirmed through exploration drilling and evaluation of one or more wells. As such, exploratory drilling represents a critical stage in the progression from resource identification to potential development.

The Scotian Basin and onshore/offshore formations contain both hydrocarbon types, though historical and major commercial discoveries in Nova Scotia have been predominantly natural gas (such as the Sable Offshore Energy Project and Deep Panuke) alongside smaller light oil and condensate finds (such as Cohasset-Panuke). The geological evidence suggests that natural gas is more likely to be discovered than oil, particularly on the Scotian Shelf, where most historical exploration and production has occurred (Mukhopadhyay et., al. 2003; NRCan, 2026) with Shelf and deep-water parcels noted as having good to excellent natural gas potential (CNSOER, 2025).

Prior to drilling activities, IAAC, leads a project-specific IA to fulfill the requirements under IAA. IAAC works closely with the CNSOER throughout the IA process as it also supports an activity authorization application pursuant to the Accord Acts (refer to Section 1). This

process must be completed before an application for an authorization for offshore activities may be approved. Operators must prepare and compile documentation related to the proposed project including applying for an operating licence for petroleum-related activities. The CNSOER facilitates the review of the fully detailed drilling program and once all documents are reviewed and an authorization is granted, the regulator then transitions to Monitoring and Compliance. This process is in place to ensure activities are conducted in compliance with all regulatory requirements and commitments made as part of the application for the activity.

For offshore exploratory drilling programs in Nova Scotia, operators seeking authorization to drill must also submit environmental protection plans and other information demonstrating how environmental risks will be managed throughout the drilling program. The Regulations further require operators to report on the environmental performance of exploratory drilling activities, including the effectiveness of environmental protection measures and actions taken to reduce environmental risks (Canada-Nova Scotia Offshore Area Petroleum Operations Framework Regulations, 2024, s. 200).

Operators must also fulfill strict financial responsibility obligations to cover potential spill response and cleanup costs. Under the regulatory framework enforced by the CNSOER, operators face an absolute, no-fault liability limit of $1 billion, which becomes unlimited if fault or negligence is proven. To guarantee immediate financial capacity in the event of an incident or debris discharge, operators must submit formal proof of financial responsibility to the CNSOER through the authorization process and provide comprehensive evidence of net assets or insurance policies to verify they can fully support the broader financial liabilities of the drilling program.

3.1 Drilling Units

Wells are drilled as part of an offshore exploratory drilling program, and in the Study Area, this may require the drilling of multiple wells, involving the use of mobile offshore drilling units (MODUs), such as semi-submersible rigs, drill ships, or, in shallower waters, jack-up rigs. The type of rig chosen is often based primarily on the characteristics of the physical environment at the proposed drill site, particularly water depth, expected drilling depth, expected weather conditions, and associated mobility requirements (Amec 2014).

Semisubmersible drilling rigs are commonly used in moderate to deep water depths, (approximately 70 to 1,000 m) when moored with anchors, and at greater depths when equipped with dynamic positioning systems. These rigs are well suited to harsh offshore environments and areas where operational flexibility is required. These units may be towed to a drilling location or move under their own power (Amec 2016; CAPP 2017).

A semisubmersible rig consists of a working deck supported by vertical columns mounted on submerged lower hulls (i.e., pontoons). During operations, the pontoons are ballasted

with seawater so that they remain below the sea surface, while the deck remains well above the sea surface. The ballast system can be adjusted to control the draft, trim, and stability under varying conditions. Since much of the rig's mass is submerged, semisubmersibles are highly stable and can operate effectively in rough sea conditions. At the drilling site, the unit may be secured using anchors; however, in deeper water, positioning is maintained using a dynamic positioning system that employs computer-controlled thrusters to hold the rig in place (Figure 3.1) (Amec 2016; CAPP 2017).



Figure 3.1. Semisubmersible drilling rig (Amec 2016)

Drill ships are the most mobile type of offshore drilling installation and are generally used in deep-water environments. These vessels incorporate a complete drilling system and are largely self-sufficient, allowing them to operate for extended periods at remote offshore locations with minimal external support.

In water depths of approximately 200 to 1,000 m, drill ships may be anchored; however, most modern drill ships operating in deeper waters rely on dynamic positioning systems to maintain their location. Drilling equipment is typically housed in a derrick (framework) located near the centre of the vessel, with access to the well provided through an opening, commonly referred to as the moon pool, that extends vertically through the hull from the deck into the sea below (Figure 3.2) (Amec 2016; CAPP 2017).



Figure 3.2. Drill ship (Amec 2016)

Jack-up drilling units are most commonly used in shallow waters, generally between 10 and 100 m in depth. These units are transported to the drilling location and positioned using three or four retractable legs. Once on site, the legs are lowered to the seafloor, and the drilling platform is elevated above the water surface by raising the hull along the legs (Figure 3.3).



Figure 3.3. Jack-up drilling rig (Amec 2016)

3.2 Exploratory Drilling Process

Prior to drilling, a site-specific seabed investigation is typically conducted to confirm that the well location is safe, suitable for drilling, free of hazards that could affect operations or the environment and characterize benthic conditions. These surveys may employ cameras mounted on remotely operated vehicles (ROVs), multibeam echosounders, side-scan sonar, and other geophysical or visual inspection tools deployed from the drilling unit or supporting vessels. If the surveys identify any safety or environmental risks, the well location can be adjusted accordingly.

Exploratory drilling typically takes approximately 1-4 months depending on water depth, planned well depth, geological complexity, weather and operational conditions (CAPP 2017). Once the selected drilling unit is mobilized to the well location and following completion of pre-drilling surveys and rig set-up, the well is drilled in stages using standard offshore drilling practices, including sequential drilling and casing installation, drilling fluid circulation, well control, and formation evaluation.

Daily drilling operations are monitored and reviewed by the CNSOER as the well is being drilled as part of the daily communications between the operator and the regulator throughout the drilling operations. Depending on the results of an exploration well, an operator may also drill appraisal and delineation wells at different locations of the identified hydrocarbon accumulation to confirm the size, boundaries, and the characteristics of the resource.

Drilling a well involves establishing a borehole below the seafloor (commonly referred to as the “spudding the well”) using drill string and drill bit and progressively advancing to a desired depth. As sections are drilled, steel pipes (casings) are placed inside the wellbore and cement is then pumped into the space (known as the annulus) between the outside of the casing and the surrounding rock to create a series of sealed barriers that separate different shallow geological formations, prevent the movement of fluids between formations, and help maintain the structural stability and integrity of the well. The process continues with progressively smaller diameter holes and several casing strings installed at predetermined intervals throughout the well as it is drilled to its eventual final depth. A completed well resembles a long cone, wide at the top and narrow at the bottom (Figure 3.4). Data is collected and the well is evaluated throughout the drilling process.

DRAFT

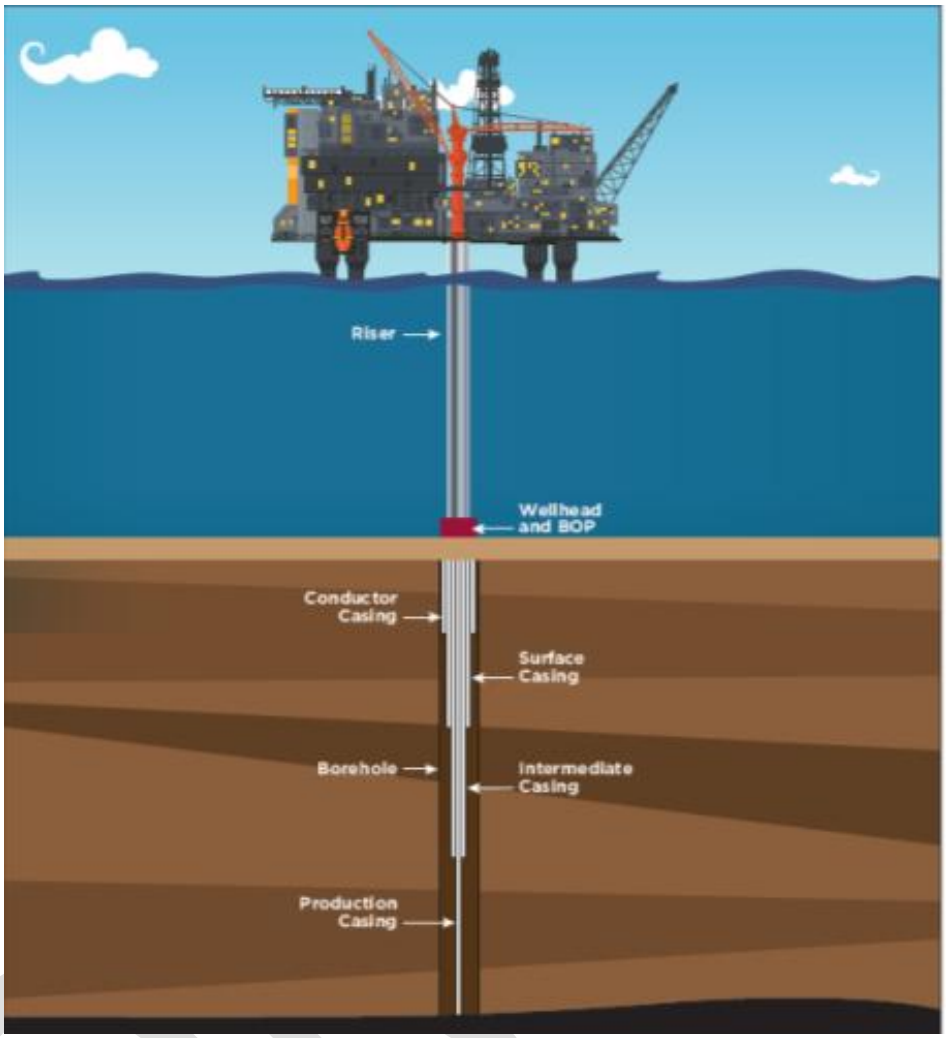


Figure 3.4. Schematic of a completed offshore well (CAPP 2017)

During drilling of the surface hole section(s), drilling fluids and well cuttings (rock) are circulated out of the wellbore and settle on the seabed near the well location. For this reason, the drilling fluid used in the upper sections is comprised of mostly water (sea water or fresh water) and very few additives to adjust fluid properties such as density and pH. Once the upper sections are drilled, the casing is set, and a closed drilling fluids and well cuttings circulation system is established to allow for recycling of drilling mud. For deeper sections of the well, water-based drilling fluids are often transitioned to synthetic-based drilling muds (SBMs), which are formulated with non-toxic mineral oil (Amec 2016). This transition depends on well design, downhole drilling conditions, and anticipated formation characteristics. SBMs offer better wellbore control, stability, and lubrication, perform better in higher temperatures and pressures, and improve drilling efficiency. On the drill rig, the drilling fluid is separated from the drill cuttings and reused while the cuttings are transported to shore for disposal or discharged to sea if they meet the

requirements of the *Offshore Waste Treatment Guidelines* posted on the CNSOER website.

The casing and cement installed throughout the well act as a physical barrier for isolating geological formations and preventing the unintended movement of formation fluids within the well and help prevent incidents such as uncontrolled fluid releases or blowouts. A Blow-out Preventer[2] (BOP) is also installed on top of the surface casing once it has been set and cemented. The BOP is a large, specialized system of hydraulically operated valves and rams designed to control well pressures and seal the wellbore if abnormal conditions are encountered during drilling operations. The BOP is connected to the drilling rig by a marine riser, which provides a conduit for drilling fluids to circulate between the borehole and the drilling rig (Figure 3.4) (Amec 2016). It serves as a secondary well control measure to prevent the uncontrolled release of formation fluids (i.e., water, oil, or natural gas) into the environment (Amec 2016; CAPP 2017) during drilling operations. If necessary, the BOP can close around the drill pipe or completely seal the well. The BOP also allows unmoored semi-submersible or drillships to disconnect and move away from the well if storm conditions impact the drilling location. Closed valves at the seafloor maintain the wellbore integrity and prevent fluid release until the rig can reconnect and continue normal drilling operations.

Once the BOP has been installed and pressure tested, the drill bit and drill string are lowered through the BOP and into the surface hole and drilling resumes. After each section is completed, the drill string is removed, and lengths of casing are connected, lowered into the wellbore, and cemented in place (CAPP 2017). The derrick on the drilling rig raises and lowers the drill string using heavy-duty wire cables.

Regulations enforced by the CNSOER require that a BOP be placed on top of a well at all times during drilling and that it must be tested regularly; if there is any serious impairment to the BOP at any time, the operator must stop drilling and repair the BOP before continuing drilling operations (CNSOPB, 2017). Activating a BOP to prevent or stop a blowout is necessary if the pressure in a well becomes too high and drilling fluids, along with oil and/or natural gas that may have been encountered, starts flowing to the surface in an uncontrolled manner (CNSOPB, 2017).

3.2.1 Vertical Seismic Profiling

Vertical seismic profiling (VSP) is a down hole seismic survey (as opposed to a regional surface survey) that may be conducted during or after drilling to accurately correlate

[2] A blowout preventer (BOP) is a large, heavy-duty valve system placed at the top of a well to control extreme underground pressures, seal the borehole, and stop unexpected releases of oil or gas. In exploratory drilling, it acts as a critical safety barrier when probing unknown geological formations. BOPs are inspected regularly.

geological formations encountered in the well with features observed on seismic survey data, typically gathered prior to drilling, allowing geoscientists to precisely determine which seismic reflections correspond to specific rock layers and hydrocarbon bearing intervals. VSPs use receivers positioned within the wellbore and a surface seismic source (such as an air gun) in the water column from the rig or a supply vessel. Sound waves travel between the acoustic source and the receivers and the results from different depths provide operators with a continuous profile from top to bottom. The output of the VSP is a depth calibrated, high-resolution subsurface image around the well.

VSP programs are generally short-duration activities, often lasting only a few days, with seismic source operation typically limited to several hours.

3.2.2 Well Testing and Flaring

Flaring is the controlled burning of natural gas and other hydrocarbon gases generated during oil and gas operations. In exploratory drilling programs, flaring most often occurs during well flow testing (also known as drill stem testing), when hydrocarbons are brought to the surface from a newly drilled well to evaluate reservoir characteristics, production potential, fluid composition, pressure conditions, and overall commercial viability. Because exploration wells are typically not connected to permanent production or transportation infrastructure, the gas produced during testing is often combusted in a flare system rather than released directly into the atmosphere. This approach provides a safe means of managing excess gas while reducing methane emissions that would otherwise result from venting (Ohio EPA, 2014; WBG, 2026).

Flaring may occur for periods ranging from several hours to several days, and occasionally several weeks in the case of extended well tests. The duration and extent of flaring is not prescribed, rather the operator must identify the rationale for the proposed flaring program and its estimated rate, quantity and duration before flaring is permitted. Flaring is limited by the technical need for test data (i.e., what is necessary to determine reservoir deliverability and well productivity, reservoir characteristics, and representative samples of well formation fluids); safety; environmental protection; resource conservation; and regulatory oversight.

Although flaring produces GHG emissions, it is generally regarded as a safer and environmentally preferable option than the direct release of methane, a significantly more potent greenhouse gas. In the exploration phase, flaring is typically temporary and limited to specific activities such as well clean-up and formation flow testing. Consistent with both regulatory expectations and industry best practices, operators are expected to minimize flaring volumes and durations and to consider alternatives that capture, reinject, or otherwise utilize produced gas whenever technically and economically feasible (WBG 2026). The release of GHGs from flaring activities is addressed further in the GHG Analysis completed for this RA in section 8.0.

Within the Canada-Nova Scotia offshore area, flaring is subject to strict regulatory controls under the *Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations*, enacted pursuant to the Accord Acts. Section 82 of the Regulations prohibits operators from flaring or venting gas unless the activity has been specifically authorized by the offshore regulator, occurs as part of an approved formation flow test under subsection 63(5), or is required to address an emergency that poses a serious risk to human health or safety and the regulator is notified, as soon as the circumstances permit of the flaring or venting and of the volume flared or vented (*Canada-Nova Scotia Offshore Area Petroleum Operations Framework Regulations, 2024,* s. 82). This provision reflects the principle that flaring should be limited to circumstances where it is operationally necessary and justified. There are other technologies for well testing, other than flaring, that can be employed to limit or avoid generation of formation flow test hydrocarbons such as closed-loop / zero-flaring well testing; closed-chamber testing, and downhole enhanced measurement techniques. Use of these technologies depends on reservoir characteristics and the objectives of the testing.

3.2.3 Post-Exploration Activities

Post-exploration activities may include well suspension, well abandonment, or further appraisal drilling. Depending on the results of an exploratory well, operators may conduct additional activities, including:

- further delineation (appraisal) drilling to better define the extent, geometry, and characteristics of a hydrocarbon accumulation;
- additional VSP to improve the correlation between seismic data and well results; and/or
- formation evaluation and well testing, including extended flow testing, to assess reservoir properties, fluid characteristics, and production potential.

If the well was successful, progression of the field to the development and production phase could follow. As noted in Section 2, this RA does not consider subsequent development and production activities that may occur following a petroleum discovery.

If the well does not contain economically recoverable quantities of oil or natural gas, it is permanently abandoned. This involves installing one or more cement plugs, which may extend up to 100 m in length, to securely isolate the well and prevent fluid migration (CAPP 2017). Depending on the water depth and the authorization granted by the CNSOER, the wellhead may need to be removed or may be permitted to stay in place once a well is abandoned. Shallow water wells typically require the wellhead to be removed to prevent interaction with other ocean users such as fishing fleets, while in deep water it is more acceptable to leave the wellhead in place. Exploratory drilling operations

in Nova Scotia which are completed in shallow water differ slightly from those in Newfoundland and Labrador. In Nova Scotia, well heads can be placed at the seabed, however, in Newfoundland and Labrador, the area is excavated and wellheads are installed below the seabed (known as “glory holes”) to avoid scour from icebergs.

3.2.4 Drilling Support

Logistics and support for offshore exploratory drilling operations are provided by marine and air transportation. Platform supply vessels and other support ships deliver drilling materials, fuel, equipment, food and other supplies and manage waste streams where required. Helicopters are used to transport personnel between shore bases and offshore drilling rigs. A standby vessel must always remain at the drilling unit when it is operating in Canadian waters to provide safety and emergency response.

3.3 Accidents and Malfunctions

Accidents and malfunctions associated with offshore exploratory drilling may range from relatively small operational incidents to low-probability events with potentially significant environmental and socio-economic consequences. As noted above, an exploration well on the Scotian Shelf is more likely to encounter natural gas or gas-condensate accumulations than a large conventional oil accumulation. The predominance of natural gas has important implications for environmental risk as a natural gas release behaves differently from an oil spill. Most released gas rises rapidly through the water column and disperses into the atmosphere and is therefore less likely to result in persistent surface slicks or shoreline contamination than crude oil spills. Nevertheless, gas-condensate and oil-bearing prospects remain possible, and robust spill prevention, emergency response, and well-control measures would continue to be required to address the full range of potential offshore hydrocarbon release scenarios.

Potential events could include accidental releases of fuel, drilling muds, chemicals or other hazardous materials from the drilling installation or support vessels; loss of containment from equipment or piping; dropped objects; vessel collisions; loss of station keeping; well-control incidents; fires and explosions; and failures associated with subsea equipment or other drilling systems.

Although prevention, well-control, maintenance, safety and emergency-response measures are intended to reduce the likelihood and consequences of such events, accidental releases cannot be completely eliminated. Operators are therefore required to incorporate accident prevention, emergency preparedness, spill response and well-control measures into the planning and execution of exploratory drilling programs, which are considered in the CNSOER’s authorization process. Under this authorization process, operators are required to submit spill response plans that are specific to the drilling activity

and location, including spill trajectory modelling, identification of response equipment and resources, notification procedures, and arrangements for spill response exercises to test preparedness and response capabilities. Notification plans form part of these spill response plans and identify how regulatory authorities, Indigenous communities, fishers, coastal communities, and other potentially affected parties would be informed in the event of a spill.

Of particular concern is the potential for a loss of well control event during which formation fluids (oil or gas) could flow uncontrollably from a well (e.g., well blowout). The *Offshore Area Petroleum Operations Framework Regulations* under the Accord Acts establish multiple requirements intended to prevent a loss of well control. Operators are required to have adequate procedures, materials and equipment in place throughout the life cycle of a well to detect and control kicks and prevent blowouts. Following installation and cementing of the surface casing, a blowout preventer must be installed before drilling can continue into the formations below, and at least two independent verified barriers must be maintained throughout the life cycle of the well. The first of these barriers is provided by the drilling-fluid column which creates hydrostatic pressure in the wellbore that counteracts the pressure of fluids in the surrounding rock formation. Adjusting the density of the drilling fluid can bring the well under control. The BOP, described in section 3.2 above, provides a secondary well control measure.

If a barrier fails, well operations must cease, other than operations required to restore or replace the failed barrier, and the restored or replaced barrier must be verified before normal well operations resume. The Regulations also establish requirements for casing, cementing, pressure-control equipment and formation-flow-test equipment that support the maintenance of well control. If the BOP closing mechanisms fail and there is an uncontrolled release of oil and/or gas, a capping stack may be required. A capping stack is a 50 to 100 tonne piece of equipment that is placed over a well to stop or redirect the flow of oil and/or gas in an emergency situation where control of a well has been lost (CNSOPB, 2017). An operator must ensure a capping stack be available when drilling is taking place and must provide details to the CNSOER on the mobilization, transport and installation of the capping stack, as well as other containment options and the details for drilling a relief well (CNSOER, 2017). As capping stacks are massive pieces of equipment and require sophisticated maintenance and testing to ensure that they remain ready for deployment, they are stored at strategic locations in Norway, Brazil, Singapore and South Africa. When an uncontrolled release of oil and/or gas from a well occurs, a capping stack is prepared for shipment to the drilling site. In parallel with the shipping of the capping stack, the site (i.e., the ocean floor and exploration well) are prepared (e.g. removal of debris) so that the capping stack can be placed on top of the well once it arrives. Depending on the amount of preparatory work that needs to be completed, the time required before the capping stack can be deployed will vary.

Surface containment operations may also be deployed in the event of a spill to minimize impacts. The properties of the fluid and metocean conditions will influence which measures are considered, which could range from booms, skimmers, in situ burning and spill treating agents. The CNSOER is consulted during any response measures and are required to grant approvals prior to certain response activities being initiated.

Spill preparedness and response in the offshore environment involves coordination among the CNSOER, operators, response organizations, federal departments, provincial authorities, Indigenous communities, and other stakeholders. Memoranda of Understanding and other coordination arrangements help clarify roles, responsibilities, information-sharing protocols, and decision-making processes related to spill preparedness, response, and environmental protection. For each authorized drilling program, the CNSOER works with relevant authorities to review spill response planning. In the event of a spill requiring resources beyond those immediately available to an operator, established notification and response mechanisms are activated in accordance with the operator's approved spill response plan.

Spill communication and notification processes at the CNSOER have been developed in consultation with Mi'kmaq communities and other potentially affected parties to help ensure information is accessible, understandable, and responsive to community concerns. The CNSOER and operators maintain spill notification and communication protocols to support the timely sharing of information with Indigenous communities, coastal communities, fishers, and other stakeholders. Depending on the circumstances, information may include the nature and extent of the spill, response measures being undertaken, monitoring results, potential environmental and socioeconomic effects, and measures implemented to protect affected communities and environmental resources. Information regarding minor spills is routinely made publicly available through the CNSOER website.

Potential effects of accidents and malfunctions and mitigation measures are discussed further in sections 6 and 7, respectively, of this report.

3.3.1 Advances in Oil Spill Response and Science

Past offshore accidents and spill events in different areas of the world have contributed to significant advancements in spill prevention, emergency preparedness, response technologies, environmental monitoring, and scientific understanding of oil behaviour and effects. Lessons learned from these events have informed improvements in industry practices, regulatory requirements, response planning, and the development of new technologies and methodologies for detecting, tracking, containing, and assessing spills (Afshar-Mohajer et al., 2018 and 2019; Chang et al., 2019; Chapman et al. 2014; Li et al., 2017; Dannreuther et al., 2021; Dukhovskoy et al., 2021; Laxague et al., 2018; Özgökmen et al., 2018; Rascle et al., 2017; Ward and Overton, 2020). Advances include:

- improved oil spill trajectory and fate modelling, including the integration of oceanographic, atmospheric, microbial, and sediment transport processes;
- enhanced subsurface monitoring technologies, including autonomous and remotely operated underwater vehicles capable of detecting and tracking deepwater oil plumes;
- improved remote sensing and surveillance tools, including satellite, aerial, drone-based, and vessel-based technologies for detecting and monitoring surface oil;
- new approaches for studying oil droplet behaviour, marine oil snow[3] formation, biodegradation, and other processes that influence the transport and fate of oil in the marine environment;
- enhanced understanding of the effects of oil spills on marine mammals, sea turtles, fish, corals, and other marine organisms, including both acute and long-term impacts;
- improvements in environmental risk assessment, oil toxicity science, and human health studies related to spill response operations;
- development of alternative dispersant technologies and improved evaluation of dispersant effectiveness and potential environmental effects; and
- improved understanding of oil weathering processes, particularly the role of photochemical oxidation and other mechanisms influencing the behaviour of oil in marine environments.

The Office of Response and Restoration at the National Oceanic and Atmospheric Administration provides an overview of some the key advances in science since the Deepwater Horizon spill in 2010 (NOAA 2021):

- Improvements in Oil Spill Modeling
- New Technology Patrolling America's Oceans for Pollution Using Satellites
- Classifying oil spill thickness with research born from Deepwater Horizon
- Advances in Oil Toxicity Science
- Understanding how Oil Impacts Deep Sea Corals
- Dolphin Discoveries that Help Prepare for Disasters
- Advances in Assessing Sea Turtles and Marine Mammals During Oil Spills
- Using Deepwater Horizon Data Tools to Protect America's Coastal Resources

Continued advancements such as those noted above are key to supporting decision-making and response planning for offshore emergency events.

[3] Marine oil snow is a sticky aggregate of crude oil droplets, natural marine snow (dead phytoplankton, zooplankton fecal pellets, bacteria, and mucus), and fine mineral particles that forms during marine oil spills.

3.4 References

Afshar-Mohajer, N., C. Li, A.M. Rule, J. Katz, and K. Koehler. 2018. A laboratory study of particulate and gaseous emissions from crude oil and crude oil-dispersant contaminated seawater due to breaking waves. Atmospheric Environment 179:177–186, https://doi.org/10.1016/j.atmosenv.2018.02.017

Afshar-Mohajer, N., M.A. Fox, and K. Koehler. 2019. The human health risk estimation of inhaled oil spill emissions with and without adding dispersant. Science of The Total Environment 654:924–932, https://doi.org/10.1016/j.scitotenv.2018.11.110

Amec Environment and Infrastructure. 2014. Eastern Newfoundland Strategic Environmental Assessment (SEA). Prepared for the Canada-Newfoundland and Labrador Offshore Petroleum Board (August 2014).

Amec Foster Wheeler Environment and Infrastructure (2016). Eastern Newfoundland Offshore Exploration Drilling Program, 2019-2030. Environmental Assessment Project Description - Final Report (September 2016).

Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations (SOR/2024-26). Justice Laws Website. Available at: https://laws.justice.gc.ca/eng/regulations/SOR-2024-26/index.html

CAPP (Canadian Association of Petroleum Producers) 2017. Exploration Drilling in Atlantic Canada Offshore (October 2017).

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2017. Fact Sheet: Capping Stack. Revised September 2017.

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2025. Report Overview for Petroleum-related Call for Bids NS25-1P: Acreage above the 'Sable Delta' and its deepwater stratigraphic equivalents by Deptuck, M. E. and Kendell, K. L. Available at: Geoscience and Data | CNSOER

Chang, H., Huntley, H. S., Kirwan, A. D., Carlson, D. F., Mensa, J. A., Mehta, S., Novelli, G., Özgökmen, T. M., Fox-Kemper, B., & Pearson, B. 2019. Small-scale dispersion in the presence of Langmuir circulation. Journal of Physical Oceanography, 49(12), 3069–3085.

Chapman, P., S. Socolofsky, and R. Hetland. 2014. From blowout to beach: An integrated modeling approach. International Oil Spill Conference Proceedings, 2014(1):919-932. https://doi.org/10.7901/2169-3358-2014.1.919

Dannreuther, N., Halpern, D., Rullkötter, J., and Yoerger, D. 2021. Technological developments since the Deepwater Horizon oil spill. Oceanography, 34(1), 192-211. https://doi.org/10.5670/oceanog. 2021.126

Dukhovskoy DS, Morey SL, Chassignet EP, Chen X, Coles VJ, Cui L, Harris CK, Hetland R, Hsu T-J, Manning AJ, Stukel M, Thyng K and Wang J. 2021. Development of the CSOMIO Coupled Ocean-Oil-Sediment- Biology Model. Front. Mar. Sci. 8:629299. Retrieved at: https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2021.629299/full

Laxague, N.J.M., Özgökmen, T.M., Haus, B.K., Novelli, G., Shcherbina, A., Sutherland, P., Molemaker, J. 2018. Observations of near-surface current shear help describe oceanic oil and plastic transport. Geophysical Research Letters, 45(1):245-9. https://doi.org/10.1002/2017GL075891

Li, C., J. Miller, J. Wang, S.S. Koley, and J. Katz. 2017. Size distribution and dispersion of droplets generated by impingement of breaking waves on oil slicks. Journal of Geophysical Research Oceans, 122(10):7,938–7,957. https://doi.org/10.1002/2017JC013193

NOAA (National Oceanic and Atmospheric Administration). 2021. 8 Advances in Oil Spill Science in the Decade Since Deepwater Horizon. Accessed at: 8 Advances in Oil Spill Science in the Decade Since Deepwater Horizon | NOAA's Office of Response & Restoration Blog. Originally published on April 21, 2020.

Özgökmen, T. M., Boufadel, M., Carlson, D. F., Cousin, C., Guigand, C., Haus, B. K., Horstmann, J., Lund, B., Molemaker, J., and Novelli, G. 2018. Technological advances for ocean surface measurements by the Consortium for Advanced Research on Transport of Hydrocarbons in the Environment (CARTHE). Marine Technology Society Journal, 52(6), 71-76. https://doi.org/10.4031/MTSJ.52.6.11

Mukhopadhyay, Prasanta K. Muki; D.E. Brown; A. G Kidston; T. D. Bowman; J. Faber; and P. J. Harvey. 2003. Petroleum Systems of Deepwater Scotian Basin, Eastern Canada: Challenges for Finding Oil versus Gas Provinces. Retrieved at: https://doi.org/10.4043/15304-MS

NRCan (Natural Resources Canada). 2026. The BASIN Database – Production: Scotian Basin - Total Scotian Basin Production Graphs. Retrieved at: The BASIN Database.

Ohio EPA (Ohio Environmental Protection Agency). 2014. Understanding the Basics of Gas Flaring. Columbus, Ohio. Retrieved at: https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/27/oil%20and%20gas/Basics%20of%20Gas%20Flaring.pdf

Rascle, N., Molemaker, J., Marié, L., Nouguier, F., Chapron, B., Lund, B., & Mouche, A. 2017. Intense deformation field at oceanic front inferred from directional sea surface roughness observations. Geophysical Research Letter, 44(11):5599-608. https://doi.org/10.1002/2017GL073473

SLB, Industry article: The Defining Series: Well Testing Fundamentals. (May 2024)

Ward, C. P. and Overton, E. B. 2020. How the 2010 Deepwater Horizon spill reshaped our understanding of crude oil photochemical weathering at sea: a past, present, and future perspective. Environmental Science: Processes Impacts, 22(1125). https://doi.org/10.1039/d0em00027b

WBG (World Bank Group). 2026. Gas Flaring Explained. Global Flaring and Methane Reduction Partnership (GFMR). Retrieved at: https://www.worldbank.org/en/programs/gasflaringreduction/gas-flaring-explained

4 Approach, Methodology and Activities

4.1 Consultation and Engagement

IAAC implemented a comprehensive consultation and engagement program to support the RA. The program included engagement and consultation with Indigenous communities and organizations, engagement with federal and provincial government departments, industry representatives, fisheries organizations, academia, non-government organizations, and members of the public. Activities were designed to gather information, identify concerns and knowledge gaps, and ensure that the RA was informed by a broad range of perspectives and expertise.

The overall objective of consultation and engagement during the RA was to collect and evaluate information, including Indigenous and community knowledge, to inform the RA analysis and recommendations. Activities were structured to present accessible, factual information about the scope, context, and potential considerations associated with offshore exploratory drilling in Nova Scotia. This information supported participants in sharing informed perspectives on the offshore environment, concerns and issues on the advancement of exploratory drilling, and thoughts on gaps in knowledge and/or data relevant to the offshore and the activity. Feedback from participants was collected in various ways reflective of the familiarity, expertise, and potential involvement with offshore exploratory drilling and all input was sought and considered on a broad regional scale, with a focus on the Study Area.

Information was shared through a variety of formats depending on the participant groups and included presentations, questions to facilitate discussions, and feedback forms. Standardized tools (e.g., meeting templates, reporting formats) were used to ensure consistency and transparency.

Engagement and consultation activities, in which Indigenous Peoples and Indigenous organizations participated, included virtual and in-person meetings with groups, organizations, and with individuals; responses to general communications; official notices and updates posted to the Registry; and virtual information sessions. All consultation and engagement meetings were tracked in an Engagement Log which was posted to the Registry and updated monthly. A summary of meetings that took place during the RA is provided in Appendix 4-1 (Table 4-1A and Table 4-1B).

Information sharing throughout the RA process was achieved via the Registry and the use of the RA e-mail account. This email account was also used to issue invitations to Indigenous Peoples and other RA participants to regarding the various engagement activities and to distribute information throughout the process. Participants were also able to submit questions and comments via the RA email (NSOffshoreDrilling-NEForageEnMer@iaac-aeic.gc.ca) or via the public commenting tool on the Registry which were both monitored regularly.

4.1.1 Public and Stakeholder Engagement

4.1.1.1 Public Engagement Plan

A Public Engagement Plan was posted to the Registry to inform the public of the engagement activities related to the RA. The purpose of the Plan was to provide a structured and documented approach for engaging participants during the conduct phase of the RA.

The goal of public engagement was to provide opportunities for participant involvement to ensure that the RA was informed by the diverse knowledge, values, concerns, and priorities of participants. The objectives of the public engagement program for this RA were to:

- gather information, perspectives, and expertise relevant to the Study Area from a variety of participants;
- identify regional issues and concerns related to offshore oil and gas exploratory drilling;
- identify gaps in knowledge related to the Study Area and offshore oil and gas exploratory drilling;

- contribute knowledge related to mitigative measures for offshore oil and gas exploratory drilling; and
- ensure engagement activities are transparent, accessible, and proportionate to the scope and timeline of the RA.

4.1.1.2 Public Engagement Approach

The approach to public and stakeholder engagement was designed to reflect practicalities and lessons learned in past regional assessments and was scaled within the RA timeframe of June to September with the majority of engagement taking place in July, August, and September as part of the RA conduct phase and included:

- Public Comment Periods for the draft Terms of Reference and draft RA Report;
- targeted outreach to key participants with known information;
- passive outreach using a range of methods and with reliance on the RA Registry page;
- Discussion meetings; and
- Virtual Information Sessions (2).

The engagement approach was also informed by past regional assessments, incorporating what has proven effective, such as proactively reaching out to key participants and subject-matter stakeholders known to hold relevant knowledge. This included the use of targeted questions to maximize the quality and relevance of input from all participants.

Public engagement activities were designed to capture higher-level perspectives, including general concerns, values, and priorities while engagement with government departments focused on obtaining specific, expertise-driven input aligned with departmental mandates and regulatory responsibilities. Other participants, including industry, organizations, and subject-matter experts, were invited to provide input based on technical knowledge, experience, or specific areas of interest relevant to the RA.

4.1.1.3 Activities

Public engagement activities were varied with the intent to offer multiple opportunities to participate in the RA.

Public Comment Periods

Two Public Comment Periods were held for the RA:

i. Draft Terms of Reference Public Comment Period (May 19 – June 8, 2026). Comments were received by email, Registry submission, and from discussions during the planning phase. Approximately 111 comments (from 24 submissions) were received and were used to finalize the Terms of Reference. Issues raised in comments were documented in an Issues Tracking Table (Appendix 4-2) and a summary of the feedback was provided in a *What We Heard Summary* that was posted to the Registry site on July 9, 2026.

ii. Draft RA Report Public Comment Period (November 4 – December 4, 2026). Comments were received by email and Registry submission. Approximately (*TBD*) comments (from *TBD* submissions) were received and were considered in the finalization of the RA Report.

Targeted Outreach

IAAC conducted targeted outreach via e-mail to individuals, organizations, and communities possessing knowledge, expertise, data, or perspectives relevant to the RA. Participants were identified through previous engagement processes (i.e., the Regional Assessment of Offshore Wind Development in Nova Scotia) and from submissions received during the public comment period on the draft Terms of Reference.

Participants were engaged through a variety of methods including:

- in-person and hybrid meetings;
- technical discussions with subject-matter experts;
- presentations about the RA and content to initiate discussions;
- follow-up discussions; and
- written submissions

Feedback from participants was documented in meeting minutes which once reviewed by all attendees were posted to the RA Registry site. A monthly Summary of Meetings was posted to the RA Registry site and included information about the date, attendees and main discussion topics. Presentation materials used for meetings were also posted to the RA Registry site.

Passive Outreach

IAAC used a range of public outreach methods to share information about the RA including:

- general media (e.g., radio, newspaper) on a provincial scale;
- social media posts (e.g., Facebook, X, LinkedIn);

- News Releases of upcoming events (e.g., public comment periods, information sessions etc.); and
- RA Registry site which was used for general RA updates and other relevant information that was posted to the RA Registry page regularly for public access and review and included:
    - Participation Plans;
    - Summary of Meetings;
    - Meeting Minutes;
    - Engagement Materials including presentations; and
    - Information materials such as *Frequently Asked Questions* documents.

Discussion Meetings

IAAC met with governments (federal, provincial and municipal), non-government organizations, fisheries groups, industry and academia to provide an overview of the RA as well as discuss questions and concerns. Feedback was documented and tracked in the Issues Tracking Table (Appendix 4-2). A summary of these meetings is provided in Appendix 4-1 (Table 4-1A).

Virtual Information Sessions

Two public information sessions were held on August 17 and September 14, 2026. The objective of the sessions was to provide participants with a general information presentation about the RA process, provide a summary of offshore oil and gas exploratory drilling, and to offer a question/answer and comment period. Notifications were sent out via the contact list and advertised through social media, on radio stations and in news outlets across the province two weeks prior to the session date. The information was also posted on the Information Sessions tab of the RA Registry site. As part of the registration process for each session, participants provided feedback with respect to their key concerns, the information that they were interested in hearing about, and their familiarity with the RA overall. Participants in the September 14 public engagement session were also sent an explanation of Gender Based Analysis Plus and questions about community well-being concerns, barriers to benefits, and monitoring. A total of 26 participants attended the sessions. Table 4.1 provides a representation summary of session attendees for both sessions.

Table 4.1 – Summary of Participants for Virtual Sessions

Session Attendees	Number of Participants
Government (Federal, Provincial and Municipal)	11
Public	6

Fishing Organization	3
ENGO	1
Energy Regulator	2
Industry	1
Consultants	2

Questions and issues that were brought up at these sessions included concerns relating to the RA timeline, marine spatial planning in the Study Area, the public comment period, and the potential for an exclusion regulation.

4.1.2 Indigenous Engagement and Consultation

4.1.2.1 Indigenous Engagement and Partnership Plan

With direction from Indigenous communities and organizations, and development of an Indigenous Engagement and Partnership Plan (IEPP), the following objectives and methods were identified to ensure meaningful participation throughout the RA process:

- Prioritizing relationship building and communicating with Indigenous groups in an ongoing, open, and transparent manner.
- Providing funding under the Participant Funding Program[4] to support the participation of Indigenous groups, including Elders, youth, children, women, men, persons with disabilities, and gender-diverse and two-spirit persons in the RA process.
- Providing clear and timely information to Indigenous groups on the RA process and opportunities for collaboration during the RA.
- Accommodating communication and consultation processes according to the communities' schedule and protocols, where possible.
- Considering cultural needs including seasonal events (e.g., harvesting and hunting periods) and cultural protocols (e.g., offerings and gift-giving), and ceremony (e.g., opening prayers).
- Using workshop formats to discuss key documents through the RA process, where appropriate.
- Recognition of place names as part of Indigenous Knowledge and the use of Indigenous place names to promote dialogue.

[4] More information on IAAC funding programs can be found on the IAAC website.

- Determining the approach for handling confidentiality of both written and oral information to prevent unauthorized disclosure of Indigenous Knowledge and thereby promote the sharing of Indigenous Knowledge.
- Prioritizing inclusive meetings that allowed for diverse participation (e.g., accessibility of meeting locations, timing etc.).

4.1.2.2 Indigenous Consultation and Engagement Approach

Throughout the RA process, IAAC consulted with Indigenous communities and engaged Indigenous organizations across Nova Scotia to build understanding of the RA, facilitate meaningful participation, and collaborate on the development of key documents.

Outreach, via e-mail, was initiated early in February 2026 during the planning phase and continued throughout the conduct phase of the RA. Where possible, all meetings were attended in-person.

4.1.2.3 Activities

Early conversations by phone, email, and meetings took place from February to June 2026. They focused on sharing information about offshore oil and gas exploratory drilling activities and the RA, soliciting expressions of interest from Indigenous participants, and providing a draft version of the IEPP for input and feedback. Further conversations by phone, email and in meetings took place from July to October 2026, during the planning and conduct phases of the RA. They provided ongoing opportunities for dialogue with Indigenous communities and organizations. These meetings focused on Indigenous Knowledge and information to help inform the RA, as well as discussions regarding funding, participation, and community-specific concerns. The meetings also supported continued engagement on potential effects of offshore oil and gas exploratory drilling activities on the exercise of Mi'kmaq rights and interests, enabling IAAC to better understand community perspectives and consider them in the development of the RA analysis and recommendations, where appropriate. A list of Indigenous communities and organizations consulted and engaged with during the RA is provided below.

- Kwilmu'kw Maw-Klusuaqn Negotiation Office (KMKNO), representing 11 of 13 Mi'kmaw First Nations in Nova Scotia
- Sipekne'katik First Nation
- Millbrook First Nation
- Maritime Aboriginal Peoples Council (MAPC) / Maritime Aboriginal Aquatic Resources Secretariate (MAARS)
- Nova Scotia Native Women's Association (NSNWA)
- Atlantic Policy Congress of First Nations Chiefs Secretariat

- Confederacy of Mainland Mi'kmaq (CMM)
- Mi'kmaq Grand Council
- Native Council of Nova Scotia / Maritime Aboriginal Aquatic Resources Secretariate
- Unama'ki Institute of Natural Resources
- Union of Nova Scotia Mi'kmaq
- Wskijnu'k Mtmo'taqnuow Agency Ltd

Communication with communities and several Indigenous organizations was continuous throughout the RA process. A summary of meetings that took place with Indigenous representatives of communities and organizations is provided in Table 4-1B in Appendix 4-1.

4.2 Baseline Information

It is widely recognized that environmental, social, economic, and cultural conditions are interconnected, dynamic and continue to evolve in response to factors such as climate change, changing species distributions, and shifting patterns of resource use. As a result, a detailed description of baseline conditions at a single point in time can quickly become outdated. For the purposes of this RA, the focus was therefore not on information requests from government and the subsequent development of a detailed baseline inventory, but rather on providing a regional level summary of baseline conditions and using the RA process and analyses to identify effects of future offshore exploratory drilling, mitigative measures, key gaps and issues, and to evaluate whether any outstanding uncertainties could be effectively managed through existing regulatory requirements, project-specific conditions, monitoring programs, and/or targeted information-gathering initiatives prior to the reinitiation of the industry in Nova Scotia.

The starting point for the RA was the extensive body of baseline information provided and compiled for the Regional Assessment of Offshore Wind Development in Nova Scotia completed in 2025 and which involved substantial data gathering and synthesis from federal, provincial and municipal government departments, Indigenous Peoples and organizations, academic institutions, industry, organizations representing diverse social and economic identities and other knowledge holders. Given the regional nature of both regional assessments and the overlap of the Study Areas and many of the valued components and environmental considerations, the offshore wind regional assessment provided a comprehensive foundation from which to evaluate the readiness of the region for future offshore exploratory drilling activities. Information from previous SEAs conducted by the CNSOER was also incorporated to provide coverage of offshore areas that fell outside the Study Area defined for the offshore wind regional assessment. Similarly, a review of the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, completed in 2019, was also done to understand key

concerns raised during that process, methodological approaches, and assessment outcomes, relevant to the NS regional context and objectives, to help inform this RA.

To confirm the continued relevance and completeness of the information used in the offshore wind regional assessment and the Newfoundland and Labrador regional assessment, targeted engagement was undertaken with the federal and provincial departments that had previously contributed baseline information. These discussions focused on identifying new information for datasets, studies, management initiatives, and any emerging issues since completion of the previous regional assessments. Discussions also focused on the identification gaps or uncertainties in relation to offshore exploratory drilling activities, and potential actions required to address them. Meeting summaries for these discussions are included Appendix 4-1 (Table 4-1A).

4.3 Supporting Analyses

To support the RA, three targeted supporting analyses were undertaken:

- GHG Analysis;
- Cumulative effects analysis (CEA); and
- GBA+ Study.

These analyses provide a focused examination of issues that warranted additional consideration based on the feedback from the public comment period on the draft Terms of Reference as well as feedback received on the 2020 Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador. The findings from each analysis form distinct sections in this report (refer to Sections 8.0, 9.0 and 10.0) and findings were used to inform recommendations.

4.3.1 GHG Analysis

The GHG analysis was undertaken to provide insight into the potential direct operational emissions associated with a range of reasonably foreseeable offshore exploratory drilling scenarios. The analysis relied on existing information, including historical offshore drilling activity, available emissions data from offshore operations, and applicable federal and provincial climate policy frameworks. Using accepted methodologies and publicly available emission factors, the analysis estimated potential emissions associated with key operational activities (e.g., mobile offshore drilling units, vessel traffic, helicopter transportation, and well testing activities).

The purpose of the GHG analysis was not to predict emissions from specific future projects, but rather to provide regional-scale context regarding the potential contribution of exploratory drilling activities to provincial and national emissions inventories under a range

of exploration scenarios. The analysis also examined opportunities to reduce operational emissions through existing and emerging technologies, management practices, and mitigation measures.

4.3.2 CEA

The CEA evaluated how offshore exploratory drilling could interact with other past, present, and reasonably foreseeable activities and stressors within the region. The assessment focused on cumulative interactions affecting environmental, health, social, economic, and cultural valued components and considered how these interactions may change over time and across geographic areas. The analysis was conducted using regional-scale spatial and temporal boundaries and examined potential interactions between offshore exploratory drilling and other activities occurring in the region, including climate-driven environmental change. The assessment considered pathways through which cumulative effects may occur (e.g., underwater noise, habitat disturbance, etc.) and identified valued components that are sensitive to cumulative pressures. Indigenous Knowledge and perspectives were also considered in this assessment and were important in identifying cumulative pressures on culturally important species, harvesting activities, Indigenous cultures, and Indigenous communities.

4.3.3 GBA+ Study

The GBA Plus study examined how the potential environmental, health, social, and economic effects associated with offshore exploratory drilling may be experienced differently by diverse groups of people. The assessment considered the influence of gender and other intersecting identity factors and also considered relevant findings from the 2025 Regional Assessment of Offshore Wind Development in Nova Scotia, the 2020 Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, as well as Indigenous Peoples and public input to identify and examine issues such as offshore workplace culture, safety and equity, workforce demographics and inclusion, and community well-being. The analysis also considered how Mi'kmaq People and communities may experience the potential benefits and risks associated with offshore exploratory drilling differently due to unique cultural, socio-economic, geographic, and rights-related circumstances. This included consideration of community perspectives, participation in economic opportunities, and impacts on community well-being.

5 Regional Setting Overview

This chapter provides a high-level regional overview of the existing setting within the RA Study Area. The information is intended to provide background and context for the RA by identifying the environmental, social, cultural, and economic components that are most likely to be affected by offshore exploratory drilling activities in the Study Area. The

overview information presented provides the foundation for the identification and analysis of potential effects to VCs from offshore exploratory drilling activities, supports the identification and evaluation of mitigation, monitoring, and follow-up measures, and informs recommendations regarding the planning, assessment and management of future exploratory drilling projects in the Study Area.

Overall, the Study Area supports diverse marine biodiversity, productivity, and habitat including numerous species of fish, marine birds, (marine transients (e.g., landbirds, bats), marine mammals, sea turtles, benthic invertebrates, and planktonic organisms. Many species use the area seasonally or throughout their life cycles for feeding, migration, spawning/reproduction, nursery, and overwintering activities. The offshore waters of Nova Scotia are considered critical habitat for a variety of species at risk and other species of conservation concern, including several areas designated under varying levels of protection. In addition to its ecological importance, the Study Area supports a variety of human activities and ocean uses. Commercial, recreational, and Indigenous fisheries occur throughout the region and contribute significantly to the local, regional, and national economy. Other marine activities include shipping and maritime transportation, scientific research, defence operations, submarine cable infrastructure, tourism, and existing energy and emerging offshore energy activities.

5.1 Physical and Oceanographic Setting

The physical environment includes seabed features, bathymetry and geology, ocean circulation and wind patterns, temperature, salinity, mixing, ice conditions, and climatic influences. The oceanographic setting ranges from shallow offshore banks and the Scotian Shelf to the continental slope and the deep ocean. Variations in the physical and oceanographic setting will influence the occurrence and distribution of marine species and ecological communities.

5.1.1 Bathymetry and Marine Geology

The Study Area encompasses the offshore waters of Nova Scotia, including Sable Island, portions of the mid-Scotian Shelf, continental slope, and offshore deep-ocean areas of the Northwest Atlantic Ocean (Figure 5.1). The Study Area includes a complex marine and terrestrial environment characterized by varied bathymetry, from relatively shallow banks and shelf habitats to deep continental slope and abyssal environments. Water depths range from 0 m at Sable Island to less than 50 m in some shelf areas to more than 4,000 m in deeper offshore regions (Figure 5.1). Major bathymetric features include Georges Bank, LaHave Bank, Emerald Basin, Sable Island Bank, Banquereau Bank, the Northeast Channel, and the continental slope, all of which contribute to the ecological diversity and oceanographic complexity of the region (CNSOPB 2021, 2019, 2012). The SEAs completed by the CNSOER for offshore Nova Scotia identify bathymetry as a key physical

characteristic influencing circulation patterns, habitat distribution, biological productivity, and the occurrence of ecologically significant areas throughout the Scotian Shelf and slope environment (CNSOPB, 2022, 2021).

Sable Island forms the emergent portion of the Sable Island Bank; a large shallow sand bank located on the Scotian Shelf (Figure 5.1). The island has a dynamic sedimentary environment characterized by continual erosion, transport, and deposition. Bathymetric conditions are defined by the shallow elevations of the Sable Island Bank, which contrast with the deeper waters of the surrounding shelf. Sediment transport processes are strongly influenced by seasonal oceanographic and meteorological conditions, prevailing westerly winds which contribute to net west-to-east sediment movement of the island, and storm events which can redistribute significant volumes of sediment across the bank and adjacent seabed, influencing the morphology of both island and the surrounding marine environment (Parks Canada, 2026).

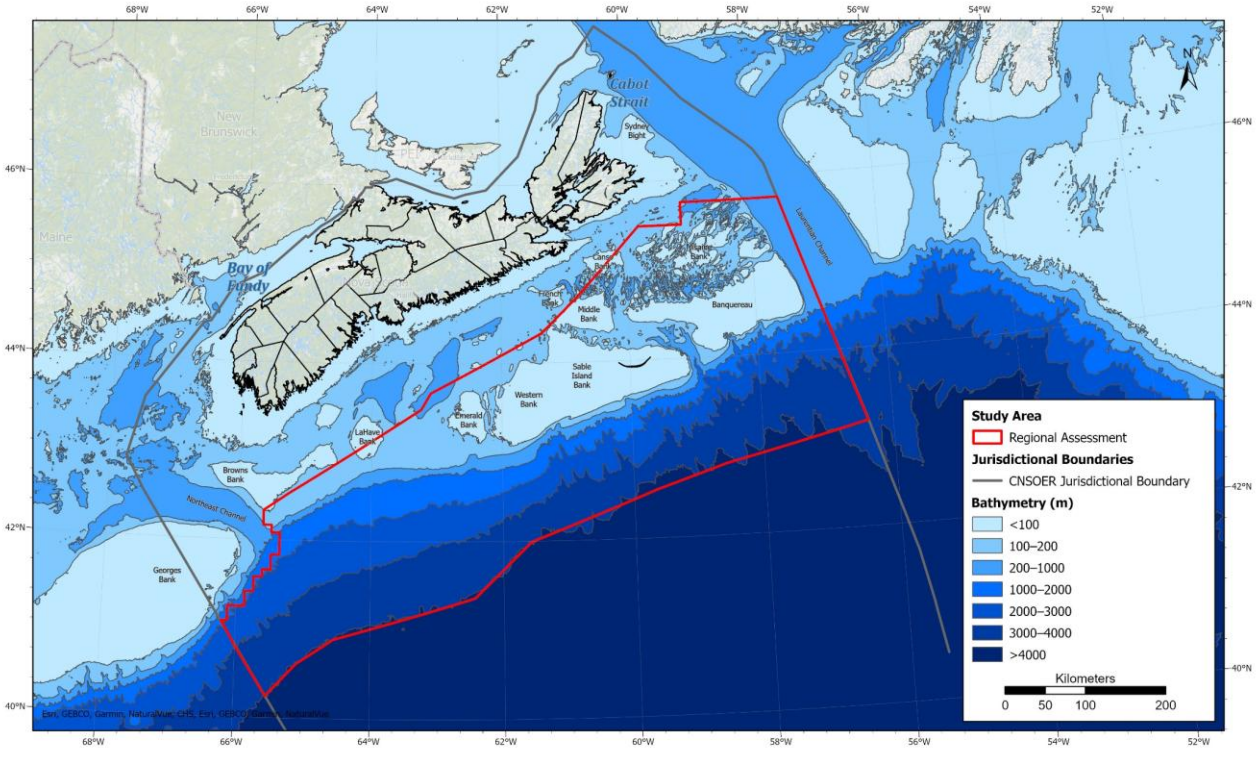


Figure 5.1. Bathymetry of Offshore Nova Scotia

The Study Area falls within the Scotian Shelf-Bay of Fundy bioregion (DFO, 2014), which is characterized by a productive and diverse marine ecosystem with coastal habitats (Sable Island), offshore banks and basins, steep slopes, submarine canyons, and deep offshore environments (Figure 5.1). The Scotian Shelf extends from Nova Scotia coastline to the shelf break (~200m) and is separated from Georges Bank by the Northeast Channel and from the Newfoundland Shelf by the Laurentian Channel. The Scotian Shelf can be

divided into three regions: the inner, middle, and outer shelf. The inner region, extending from the coast to about 25 km offshore, consists of an extension of the coastal bedrock which is primarily granite, along with competent schist, shale or quartzite, resulting in an irregular surface, ranging from bedrock to mounds of glacial material (Philibert et al., 2024; MacLean and King, 1971; King, 2001). The middle shelf contains complex topography with small-sized banks and basins of various depths, including extensive deposits of silt and glacial till that vary in thickness, up to 50 m. The outer shelf contains flat, shallow banks, and includes Sable Island Bank and Sable Island (Figure 5.1) (Byrne et al., 2014; DFO, 2011; Zwanenburg et al., 2002). The SEAs conducted by the CNSOER for the Scotian Shelf have highlighted the importance of the region's banks, basins, channels, and slope environments in supporting productive fisheries, sensitive benthic habitats, and areas of high biodiversity (CNSOPB 2021, 2013a, 2013b)

5.1.2 Circulation

The region's oceanographic conditions are shaped by interactions among major currents, including the cold Labrador Current and the warmer Gulf Stream, creating highly dynamic physical, chemical, and biological conditions. These processes support productive marine ecosystems and contribute to the distribution and abundance of a wide range of marine species and habitats (DFO, 2019).

The circulation of the Scotian Shelf is shaped by the interaction of fresher subpolar waters transported from the Gulf of St. Lawrence and the Newfoundland and Labrador Shelves, mixed in with the warmer offshore slope waters associated with the Gulf Stream. The mixing of these waters also occurs though the pathways modified by the shelf banks, marine channels, wind forcing, tides, and broader atmospheric variability such as the North Atlantic Oscillation. Prevailing southwestward throughflow carries water from the Cabot Strait and across the Shelf toward the Gulf of Maine. The bathymetry in this area steers currents around banks and channels, producing persistent, yet seasonally variable shelf-edge flow and partial gyres around Browns Bank and Sable Island Bank. This circulation and resulting mixing influence water-column stratification, nutrient supply, plankton and fish-larval transport, biological productivity, and exchange of water-mass properties across the shelf-slope system (Hannah et al., 2001; Hebert et al., 2024; MacLean et al., 2013; Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025; Sui et al., 2017). Across the Shelf, the circulation follows the major channels (Figure 5.2).

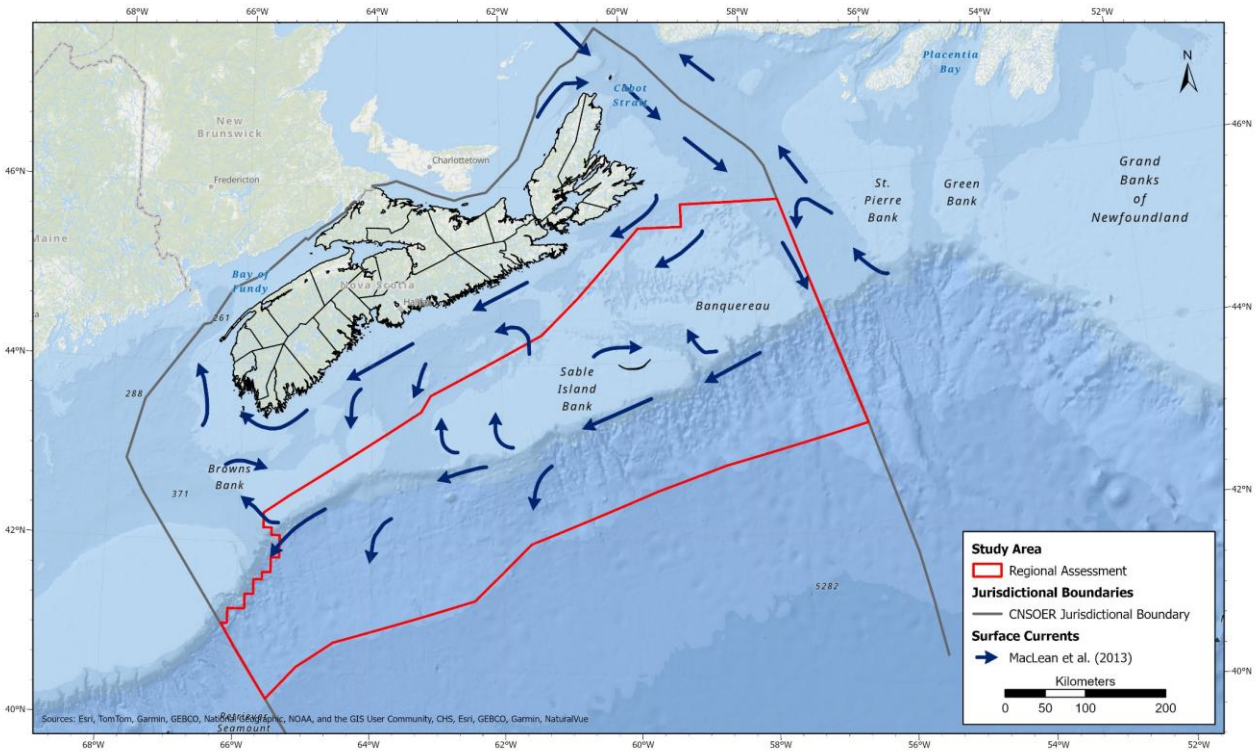


Figure 5.2. Water Circulation on the Scotian Shelf

5.1.3 Temperature, Salinity, and Surface Water Mixing

Overall, the Study Area is characterized as a relatively dynamic system with strong seasonal surface mixing, persistent spatial gradients in temperature and salinity, and locally important stratification and water-mass layering in banks, basins, canyons, slope waters, and adjacent offshore areas.

As mentioned previously, the geomorphology of the offshore environment along with the multitude of currents and atmospheric conditions shape the temperature, salinity, and surface water mixing of the waters. The position and strength of the Gulf Stream, the water flow from the Labrador Sea, the North Atlantic Oscillation, and vertical mixing controls the temperature variability of the Scotian Shelf. This then produces strong spatial gradients, with cooler, fresher conditions generally along the eastern and northwestern area of the Shelf, and warmer, more saline waters on the western Shelf and slope from the Shelf edge, canyons, channels, and deep basins (CNSOPB, 2021; Layton et al., 2026; Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025).

Seasonally, the surface layer warms and stratifies during the spring and summer, and cools and deepens during the winds, waves and heat loss experienced in the fall and

winter. This can cause the upper few tens of meters of the ocean in the summer to exceed 16°C due to heat transfer from the atmosphere and solar insulation. In the winter the ocean surface can be less than 0°C and these cold temperatures can extend throughout the water column to nearly 100m. Waters in deeper areas have less temperature variation throughout the year (Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025). Recent reporting (Layton et al, 2026) indicates that the 2025 sea-surface temperatures remained above normal for most of the Scotian Shelf, but cooler than the previous several years in the eastern portion. Overall, at depth, the central and western shelf bottom waters have shifted from above normal conditions observed from 2012 to 2022 towards normal to below normal conditions, which is consistent with increased Labrador Current influence (Galbraith et al., 2026; Layton et al., 2026).

Upper ocean mixing is controlled by the balance between wind and wave turbulence, tides and topographic steering over banks and channels, shelf-break exchange, upwelling/downwelling events, and the strength of density stratification (Chassé, 2001; Galbraith et al., 2026; Hannah et al., 2001; Hebert et al., 2024; Shan et al., 2014). Stratification affects vertical mixing, nutrient supply, plankton distribution, and the coupling between surface productivity and deeper shelf and slope habitats (Hebert et al., 2024). The western shelf SEA (CNSOPB, 2021) notes that wind-driven changes in the strength and depth of vertical mixing influence bloom dynamics, and that low-salinity Scotian Shelf Current inflows can affect spring bloom conditions on the western Scotian Shelf and Gulf of Maine. Recent reporting from Fisheries and Oceans Canada (DFO) indicates that stratification on the Scotian Shelf has increased over the long term because of the reduced surface density from both warming and freshening but was near normal over the shelf for 2025 (Galbraith, 2026).

Over longer time scales, the Scotian Shelf has experienced notable changes in oceanographic and ecosystem conditions. These include warming trends, increased occurrence of marine heat waves, ocean acidification, and changes in lower-trophic-level productivity and community structure. A recent DFO syntheses indicated that near-bottom temperatures on the Scotian Shelf have increased over recent decades, although conditions vary considerably among years and areas, and some 2025 bottom-water conditions were closer to or below long-term normals. Marine heat waves have also become more frequent in recent years. In addition, ocean pH has declined over the longer term, reflecting increasing ocean acidification, with some areas of the eastern Scotian Shelf potentially more susceptible than others. These changes may influence species distributions, food-web relationships, habitat suitability, and the productivity and resilience of marine ecosystems (Bernier et el., 2023; Curran et al., 2025; Galbraith et al., 2026; Layton et al., 2026).

5.1.4 Sea Ice and Icebergs

Sea ice within the Study Area is seasonal, spatially variable, with most occurrences within the northern and eastern portions of the region, and influenced by the Gulf of St. Lawrence, the Cabot Strait, and adjacent waters. Sea ice typically reaches a maximum extent near the end of February, and a maximum thickness around mid-March. There is a greater risk of first-year sea ice in the northern/eastern areas and more intermittent or limited risk across much of the Scotian Shelf, the slope, and adjacent deep offshore waters, with the year-to-year conditions controlled by the air and water temperatures, winds, water depth, currents, waves, and tides (CIS, 2023).

Icebergs are not common in the offshore waters of Nova Scotia and remain a low-frequency hazard for offshore activities. The National Research Council manages an Iceberg Sighting Database for Canada's East Coast and notes that the absence of icebergs does not necessarily confirm absence of icebergs at a given time or location. Iceberg sightings are becoming increasingly rare, with most sightings occurring in the Cabot Strait and in the southernmost area, with 252 sightings between 1836 and 2020, 34 sightings in the last 50 years, and sightings in only 6 of the last 30 years (NRC, 2023; Committee for the Regional Assessment for Offshore Wind Development in Nova Scotia, 2025).

5.1.5 Atmospheric Environment

In combination with the ocean conditions described above, atmospheric circulation patterns and seasonal weather systems, the Study Area is characterized by a temperate marine climate. Due to the proximity of the Gulf Stream, the Labrador current, and frequent interactions with low-pressure systems, the atmospheric conditions experienced in the area are highly variable throughout the year. The combination of these factors contributes to the area's wind regimes, seasonal temperature variations, fog occurrence, and precipitation.

5.1.5.1 Climate and Meteorological Conditions

Meteorological conditions within the Study Area and Nova Scotia's offshore region in general are influenced by the interaction of the warm Gulf Stream and the cold Labrador current. This contributes to the dynamic and highly variable climate characteristic of the offshore area. The relative influence of these currents varies across the Scotian Shelf and Slope, resulting in regional differences in air temperature, fog occurrence, storm activity, and seasonal weather conditions. Consequently, the western Scotian Shelf generally experiences warmer and more variable climatic conditions than the eastern Scotian Shelf.

Wind is one of the defining meteorological characteristics of offshore Nova Scotia which strongly influence sea state, ocean circulation, vertical mixing, wave generation, and the broader ocean-atmosphere interactions. These wind patterns are shaped by regional and large-scale atmospheric processes, which contribute to the transport of heat, nutrients and

biological material (NOAA, 2011). Across the Study Area, winds are generally strongest during fall and winter and weakest during the summer months, with varying seasonal averages:

- Historical eastern Scotian Shelf assessments reported average wind speeds ranging from approximately 17.5 km/h in September to 31.5 km/h in January, with maximum hourly wind speeds reaching approximately 130 km/h during severe storm events.
- The more recent analyses of the middle and eastern Scotian Slope and Sable Island Bank area and the western Scotian Shelf and Slope, utilize the MSC50 hindcast record (1962-2018 and 1954-2018, respectively) indicating monthly mean wind speed ranging from 5.6 m/s in the summer to 10.5-10.9 m/s in the winter (CNSOPB 2021, 2022).
- The Eastern Scotian Slope (eastern portion), Laurentian Fan (western portion), the Misaine bank and Banquereau Banks experience an average range of 17.5 km/h winds in September to 31.5 km/h in January (CNSOPB, 2013a, 2013b).
- Based on the MSC50 hindcast from 1955 to 2004, the Sydney Basin and Orpheus Graben area experiences an average of 4-6 m/s in August to 8 m/s in February (CNSOPB, 2016).

Since these statistics are derived from a representative hindcast node, they provide a regional characterization rather than site-specific conditions (CNSOPB, 2022).

Air temperature exhibits strong seasonal variability throughout the Study Area. Historical marine meteorological indicate daily air temperatures range from approximately -1.4°C in February and 17.8°C in August for the eastern Scotian Shelf (CNSOPB, 2012). In the northern and northeastern offshore region, an analysis of marine observations for 1962 to 2013 reported mean monthly air temperatures ranging from -4.2°C in February and 18.5 °C in August. These regional differences reflect variations in latitude and oceanographic influences across offshore Nova Scotia. While the marine environment tends to keep temperatures mild, the region still experiences cold winters and warm summers (CNSOPB, 2012, 2016, 2019).

Precipitation occurs throughout the year, although the type and frequency vary seasonally and geographically across the Study Area. Rain and drizzle occur year-round, while snowfall, mixed precipitation, and freezing precipitation/spray are more common during the winter months. Analyses conducted for the middle and eastern Scotian Slope and Sable Island Bank area indicate rainfall frequencies ranging from approximately 8.5% of observations in September to 14.2% in November, while hail and thunderstorms occur relatively infrequently (CNSOPB, 2022). Other areas, such as the western Scotian shelf and slope, the eastern Scotian Slope (eastern portion) and Laurentian Fan (western portion), the Misaine and Banuqereau Banks, the Sydney Basin and Orpheus Graben and the Middle Scotian Shelf, all report to having an average monthly range of precipitation (seasonally varying from rain, mixed and snow fall) being from 95.2 mm in July to 147 mm

in November (CNSOPB, 2013a, 2013b, 2019, 2021. Existing SEAs emphasize considerable local variability in precipitation patterns and recommend the use of location specific meteorological data for operational planning.

Additional occurrences of elevated wind speeds and wave heights are associated with severe weather systems affecting the region, including extratropical storms and occasional tropical, subtropical, and post tropical cyclones (Guo and Sheng, 2015; Wang and Sheng, 2020). The Scotian Shelf lies within the path of storms tracking northward along the eastern coast of North America and is periodically affected by tropical systems during the Atlantic hurricane season (June to November). Tropical cyclone activity affecting offshore Nova Scotia is concentrated primarily between August and October, with the greatest frequency generally occurring during September and October. As tropical cyclones move northward over colder waters, they typically weaken or undergo post-tropical transition; however, some systems may retain substantial strength through interaction with the Gulf Stream and frontal weather systems. Post-tropical storms often retain considerable moisture and may generate severe winds, heavy precipitation, elevated sea states, reduced visibility, and extreme wave conditions (CNSOPB, 2022; ECCC (MSC), 2023). Extreme-event analysis conducted for offshore Nova Scotia estimate 100-year return-period wind speeds of approximately 30 m/s and 100-year return-period wave heights ranging from approximately 20m to 26m in offshore portions of the Scotian Shelf and Slope. Future climate models project increases in intensity and frequency of major storm events in Atlantic Canada, leading to the increasing wind velocities and significant wave heights during storm events (Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025). This increase in intensity is an increasingly substantial consideration for offshore activities and infrastructure.

5.1.5.2 Fog

Fog is a common feature of this region, particularly during the spring and summer, when warm, moist air masses move over cooler ocean waters. The interaction between the Gulf Stream and Labrador Current contributes to the development of advection fog (low-lying and horizontally moving) across portions of the Scotian Shelf and slope. Parts of offshore Nova Scotia experience some of the highest marine fog frequencies in North America. On portions of the eastern Scotian Shelf, an average of approximately 127 days of fog per year have been reported. Advection fog may persist for extended periods and can substantially reduce visibility, creating important navigational and operational considerations for offshore operations. Visibility may be further reduced by precipitation and severe weather systems, with the poorest visibility conditions generally occurring during spring and summer months (CNSOPB, 2012, 2013a, 2019, 2021, 2022).

5.1.5.3 Air Quality

Overall, air quality in the Study Area reflects a relatively low level of industrial development and is dominated by natural marine conditions and regional-scale atmospheric processes (CNSOPB, 2012, 2013b, 2019, 2021).

The Study Area is generally distant from major sources of air contaminants and contains relatively few permanent emission sources. Consequently, the regional air quality is generally considered good and is largely influenced by long-range atmospheric transport, marine aerosols, marine traffic, and temporary industrial activities (CNSOPB, 2012, 2013b, 2019, 2021).

Greenhouse gases (GHGs) are present and include carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride (ECCC, 2024) from existing sources including:

- terrestrial industries;
- marine shipping and transportation;
- fishing;
- aviation, and defence activities.

These GHGs are generally dispersed rapidly due to the open ocean setting and prevailing winds. Nova Scotia and Canada have established broader climate policy frameworks intended to reduce national GHG emissions and support a transition to a lower-carbon economy. GHGs with respect to offshore oil and gas exploratory drilling, and related provincial and national policies are further discussed in Section 8.0.

5.1.6 References

Byrne, M.-L., Freedman, B., and Colville, D. (2014). The geology of Sable Island and the Evolution of the Sable Island Bank. Chapter 2 in An Ecological and Biodiversity Assessment of Sable Island. Freedman, B. (ed.). Parks Canada.

Chassé, J. 2001. Physical oceanography in the southern Gulf of St. Lawrence and Sydney Bight areas of coastal Cape Breton. DFO Can. Sci. Advis. Sec. Res. Doc. 2001/113. v + 21 p.

CIS (Canadian Ice Service). (2023). Ice climate normals for the Canadian East Coast waters 1991 to 2020.

CNSOPB. (2012). *Strategic Environmental Assessment for Offshore Petroleum Exploration Activities: Eastern Scotian Shelf – Middle and sable Island Banks (Phase 1A)*. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/15581_75354.7.1_sea_-

_eastern_scotian_shelf_and_slope_middle_and_sable_island_banks_2012_final_reportsphase1a_10032012.pdf

CNSOPB. (2013a). *Strategic Environmental Assessment for Offshore Petroleum Exploration Activities: Misaine and Banquereau Banks (Phase 2A).* CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/seareport_phase2a_final_0.pdf

CNSOPB. (2013b). *Strategic Environmental Assessment for Offshore Petroleum Exploration Activities: Eastern Scotian Slope (Eastern Portion) and Laurentian Fan (Western Portion) (Phase 2B).* CNOSER. https://cdn.cnsoer.ca/sites/default/files/2025-01/seareport_phase2b_final_1_0.pdf

CNSOPB. (2016). *Strategic Environmental Assessment for Offshore Petroleum Activities: Eastern Scotian Shelf – Middle and Sable Island Banks (Phase 1A)*. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/15581_75354.7.1_sea_-_eastern_scotian_shelf_and_slope_middle_and_sable_island_banks_2012_final_reportsphase1a_10032012.pdf

CNSOPB. (2019). *Middle Scotian Shelf and Slope Strategic Environmental Assessment.* CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_middle_scotian_shelf_sea_%20%281%29.pdf

CNSOPB. (2021). *Western Scotian Shelf and Slope Strategic Environmental Assessment.* CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/western_scotian_shelf_and_slope_sea_-_march_2021.pdf

CNSOPB. (2022). *Strategic Environmental Assessment: Middle and Eastern Scotian Slope and Sable Island Bank Areas.* CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_sea_26_may_2022_0.pdf

Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia. (2025). Regional Assessment of Offshore Wind Development in Nova Scotia: Final Report. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

DFO. 2011. The Marine Environment and Fisheries of Georges Bank, Nova Scotia: Consideration of the Potential Interactions Associated with Offshore Petroleum Activities. Can. Tech. Rep. Fish. Aquat. Sci. 2945: xxxv + 492pp.

DFO. (2014). *Regional oceans plan: Scotian Shelf, Atlantic Coast, Bay of Fundy: Background and program description*. Government of Canada. https://publications.gc.ca/collections/collection_2016/mpo-dfo/Fs104-32-1-2014-eng.pdf

DFO. (2019). *Regional Oceans Plan – Scotian Shelf, Atlantic Coast, Bay of Fundy Background and Program Description.* Government of Canada. https://www.dfo-mpo.gc.ca/oceans/publications/oceans-plan/background-contexte/index-eng.html

ECCC (MSC). (2023). Environment and Climate Change Canada (Meteorological Service of Canada) Response to the Committee's Request for Advice. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/evaluations/proj/84343/document/153393

ECCC. (2024). *Canadian Environmental Sustainability Indicators: Greenhouse gas emissions*. Government of Canada. https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/ghg-emissions/2024/greenhouse-gas-emissions-en.pdf

Galbraith, P.S., Blais, M., Lizotte, M., Bélanger, D., Casault, B., Clay, S., Layton, C., Penney, J., Gabriel, C.-E., Ringuette, M., Azetsu-Scott, K., Chassé, J., Coyne, J., Devred, E., Johnson, C.L., Maillet, G., Shaw, J.-L., Starr, M. 2026. Oceanographic conditions in the Atlantic Zone in 2025. Can. Tech. Rep. Hydrogr. Ocean. Sci. 420: v + 49 p. https://doi.org/10.60825/q1xj-q540

Guo, L., and Sheng, J. (2015). Statistical estimation of extreme ocean waves over the eastern Canadian Shelf from 30-year numerical wave simulation. *Ocean Dynamics*, 65, 1489-1507. https://doi.org/10.1007/s10236-015-0878-y

Hannah, C.G., Shore, J.A., Loder, J.W., and Naimie, C.E. (2001). Seasonal Circulation on the Western and Central Scotian Shelf. *Journal of Physical Oceanography*, 31, 591-615. https://doi.org/10.1175/1520-0485(2001)031<0591:SCOTWA>2.0.CO;2

Hebert, D., Layton, C., Brickman, D., and Galbraith, P.S. (2024). Physical Oceanographic Conditions on the Scotian Shelf and in the Gulf of Maine during 2023.

King, E.L. (2001). A glacial origin for Sable Island: ice and sea-level fluctuations from seismic stratigraphy on Sable Island Bank, Scotian Shelf, offshore Nova Scotia; Geological Survey of Canada, Current Research 2001-D19, 18p

Layton, C., Brickman, D., Greenan, B., Galbraith, P.S., and Shaw, J.-L. 2026. Physical Oceanographic Conditions on the Scotian Shelf and in the Gulf of Maine during 2025. Can. Tech. Rep. Hydrogr. Ocean Sci. 421: vi+93p. https://doi.org/10.60825/pfp0-tx20

MacLean, B., and King, L.H. (1971). Surficial geology of the Banquereau and Misaine Bank map area. *Geological Survey of Canada*, Paper, 71-52, 19. Canada Department of Energy, Mines and Resources. https://doi.org/10.4095/102408

MacLean, M., Breeze, H., Walmsley, J. and Corkum, J. eds. 2013. State of the Scotian Shelf Report. Can. Tech. Rep. Fish. Aquat. Sci. 3074: xvi + 352 p.

NOAA. (2011). *Ocean Currents*. https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-currents

NRC (National Research Council). (2023). PERD Iceberg Sighting Database, 1836-2020.P

Parks Canada. (2026). *Sable Island National Park Reserve*. https://parks.canada.ca/pn-np/ns/sable

Philibert, G., Todd, B.J., Campbell, D.C., King, E.I., Normandeau, A., Hayward, S.F., Patton, E.R., and Campbell, L. (2024). Updated surficial geology compilation of the Scotian Shelf bioregion, offshore Nova Scotia and New Brunswick, Canada (rev. ed.). *Geological Survey of Canada*, Open File, 8911, 31. Natural Resources Canada. https://doi.org/10.4095/332375

Shan, S., Sheng, J., and Greenan, B.G. 2014. Physical processes affecting circulation and hydrography in the Sable Gully of Nova Scotia. Deep-Sea Res. II. 104: 35-50.

Sui, Y., Sheng, J., Ohashi, K., and Wu, Y. (2017). Circulation, dispersion and hydrodynamic connectivity over the Scotian Shelf and adjacent waters. *Satellite Oceanography and Meteorology*, 2(2). https://doi.org/10.18063/som.v2i2.321

Wang, P., and Sheng, J. (2020). Effects of wave-induced vertical Reynolds stress on upper-ocean momentum transfer over the Scotian Shelf during extreme weather events. *Regional Studies in Marine Science*, 33, (100954). https://doi.org/10.1016/j.rsma.2019.100954

Zwanenburg et al. (2002). Decadal changes in the Scotian Shelf Large Marine Ecosystem. *Large Marine Ecosystems of the North Atlantic: Changing States and Sustainability*, pp. 105-150. https://doi.org/10.1016/S1570-0461(02)80056-8

5.2 Biological and Ecological Context

Marine ecosystems within the Study Area consist of interconnected physical, chemical, and biological components that interact across a wide range of spatial and temporal scales. These interactions form complex ecological systems and influence patterns of habitat availability, species distribution, biodiversity, and ecosystem productivity throughout the offshore region.

The biological environment includes organisms occupying all levels of the marine food web. Primary producers, such as phytoplankton and marine algae, form the foundation of

ecosystem productivity and support secondary production by zooplankton and benthic invertebrates. These organisms, in turn, provide prey resources for fish, seabirds, marine mammals, sea turtles, and other marine predators. Together, these components contribute to the ecological integrity, biodiversity, and productivity of the Scotian Shelf and adjacent offshore ecosystems. The ecological importance of these interconnected biological components is reflected in the designation of numerous protected or special areas within the region, including Marine Protected Areas (MPAs), marine refuges, a National Park Reserve (Sable Island), Ecologically and Biologically Significant Areas (EBSAs), Important Bird Areas (IBAs), Key Biodiversity Areas (KBAs), and critical habitats, all of which contribute to the conservation and long-term sustainability of marine biodiversity and ecosystem functions within the Nova Scotia offshore area. In addition to the broader network of protected and special areas, the Study Area includes the Sable Island National Park Reserve. It supports a unique ecosystem and a diversity of wildlife, including wild horses, grey seals, and numerous plants, birds, and insect species.

The Study Area also contains a range of other non-designated but ecologically important features and habitats, for fish, invertebrates, marine mammals, and seabirds; this includes spawning grounds/reproductive areas, nursery areas, feeding grounds, and migration corridors. This includes areas recognized for their ecological and biological significance and their importance to Indigenous peoples. The connectivity among these habitats and species supports ecosystem functioning and resilience and contributes to the long-term sustainability of marine resources in the Nova Scotia offshore region.

The following sections also note species listed under the *Species at Risk Act* (SARA)[5], assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)[6] or otherwise identified by the International Union for Conservation of Nature (IUCN), and/or government departments as species or habitats of conservation concern.

5.2.1 Fish and Fish Habitat and Marine Plants

The Nova Scotia offshore region (including the Scotian Shelf and Slope) supports diverse and productive marine ecosystems that support important economic activities such as

[5] SARA is a federal law in Canada designed to prevent wildlife species from becoming extinct or extirpated, aid in the recovery of listed species, and manage species of special concern. The Act includes prohibitions on harming listed endangered, threatened, and extirpated species and on damaging their residences, and provides for the identification and protection of critical habitat, including prohibitions against its destruction where applicable.

[6] COSEWIC is an independent scientific advisory body that assesses the conservation status of wildlife species in Canada using the best available scientific, community, and Indigenous knowledge. COSEWIC assessments inform, but are separate from, legal listing decisions under SARA. Species designated as Endangered, Threatened, or Special Concern may require additional consideration in environmental assessment and planning processes due to their conservation status, population trends, habitat requirements, or identified threats.

fisheries. Fish and fish habitat encompasses planktonic communities, marine macrophytes, benthic organisms, corals and sponges, and fish populations. These components are interconnected and include species listed under SARA, assessed by the COSEWIC, or otherwise identified by DFO as species or habitats of conservation consideration and merit.

5.2.1.1 Plankton and Macrophytes

The plankton community on the Scotian Shelf and adjacent offshore waters of Nova Scotia is composed of a diverse assemblage of free-floating organisms, including microscopic primary producers (phytoplankton), zooplankton (e.g., copepods, krill, larvae of benthic organisms), ichthyoplankton (fish eggs and larvae), as well as bacteria, fungi, and viruses (Casault et al., 2025a; Head et al., 2022). These communities form the base of marine food webs and underpin ecosystem productivity through primary and secondary production (Chowdhury et al., 2026; Mordret et al., 2024), while also playing a critical role in biogeochemical cycling, including carbon sequestration and nutrient dynamics (Casault et al., 2023, 2025a; Xue et al., 2024; Zhu et al., 2026). Zooplankton community spatial structure is strongly structured by bathymetry, surface temperature, and salinity gradients on the shelf and slope (Pepin et al., 2015)

Seasonally, the Scotian Shelf exhibits a pronounced spring phytoplankton bloom, generally occurring between March and May, associated with increasing light availability and water column stratification that traps nutrients in the surface layers. A secondary, often less intense, bloom may occur in the fall (September–October) following the breakdown of stratification and reintroduction of nutrients into surface waters (Zhai et al., 2011; Casault et al., 2025b). Zooplankton production closely follows these phytoplankton blooms, with peak abundance typically occurring from late spring to summer. Dominant zooplankton taxa include copepods (e.g., *Calanus finmarchicus*), which are a key energy source for higher trophic level, animals including fish, seabirds, and marine mammals. Interannual variability in plankton dynamics has been linked to climate-driven changes in temperature, stratification, and circulation patterns, with implications for ecosystem structure and productivity (Song et al., 2011).

Longer-term monitoring also indicates changes in plankton community composition and productivity on the Scotian Shelf. Since approximately 2011, DFO monitoring has identified lower abundance of the large, energy-rich copepod *Calanus finmarchicus* and higher abundance of smaller *Pseudocalanus* species, coinciding with warmer ocean conditions. Declines in overall zooplankton biomass have also been observed in parts of the Scotian Shelf. Broader changes in nutrients, chlorophyll-a, and zooplankton biomass may indicate changes in ecosystem production potential, although the consequences for higher trophic levels remain uncertain. Because plankton form the base of the marine food web, changes in their abundance, composition, and seasonal dynamics may influence

prey availability and the distribution of fish, seabirds, marine mammals, and other predators (Bernier et al., 2023; Curran et al., 2025).

Macroalgae (seaweeds) and marine vascular plants (e.g., eelgrass (*Zostera marina*) are important components of coastal ecosystems adjacent to the Study Area (O'Brien et al., 2022; Krimbansl et al., 2024). These primary producers are largely confined to shallow, nearshore environments where sufficient light penetrates the water column to support photosynthesis. On the Scotian Shelf, macroalgal communities (e.g., kelps such as brown kelp (Laminaria spp.) and Sugar Kelp (*Saccharina latissima*), and eelgrass beds provide structurally complex habitats that enhance local biodiversity, support productivity, stabilize sediments, and serve as nursery and feeding grounds for a variety of fish and invertebrate species (Guijarro-Sabaniel et al., 2024; Wong and Kay, 2019). These ecosystems are also important for carbon sequestration, both locally and through transport to deeper shelf waters (Krumhansl et al., 2026). Although these habitats are generally limited in extent within exploratory offshore drilling areas due to depth constraints, the broader regional ecological importance of these habitats remains significant for life stages of species that utilize the offshore environment (Wong and Dowd, 2016).

5.2.1.2 Benthic Invertebrates

Benthic invertebrates on the Scotian Shelf and adjacent offshore slope of Nova Scotia comprise diverse assemblages including crustaceans (e.g., snow crab (*Chionoecetes opilio*), northern shrimp (*Pandalus borealis*), molluscs (e.g., clams, scallops), echinoderms (e.g., sea stars, sea urchins), polychaetes, and habitat-forming corals and sponges that play essential roles in nutrient cycling, sediment turnover, and energy transfer from primary production to higher trophic levels. Several species, especially snow crab, scallops and shrimp, support important commercial fisheries (Buhl-Mortensen et al., 2017; DFO, 2014a; Tremblay et al., 2007).

The distribution and composition of benthic invertebrate communities on the Scotian Shelf are strongly influenced by environmental conditions, including depth, substrate type (e.g., sand, gravel, mud, bedrock), bottom temperature, salinity, and oceanographic processes such as currents and sedimentation (Beazley et al., 2017; Kostylev et al., 2001; Tremblay et al., 2007). Depth gradients correspond to distinct community assemblages, ranging from shallow shelf communities associated with sandy or mixed substrates to deeper slope communities dominated by muds and characterized by cold-water corals, sponges, and deep-sea invertebrates. Complex seabed features such as banks, basins, and submarine canyons further increase habitat heterogeneity and biodiversity across the region (Beazley et al., 2017).

Many benthic invertebrate species are relatively sessile or exhibit limited mobility, making them particularly sensitive to physical disturbance. Deep-sea canyon habitats on the Scotian Shelf (e.g., Shortland Canyon) are dominated by sessile taxa such as cold-water

corals and sponges, which are slow-growing, long-lived, and mobility-limited, making them vulnerable to disturbance. Recovery post-impact is extremely slow - the low resilience of such communities after bottom trawl exclusion has been demonstrated by Clark et al. (2019) and is consistent with observations specific to Scotian Slope canyons (Lacharité and Stanley, 2019). Mobile species such as snow crab and shrimp undertake seasonal, or life cycle migrations influenced by environmental factors such as temperature, depth, and substrate. For example, snow crab distribution on the Scotian Shelf is associated with cold water masses and specific substrate types, with seasonal movements linked to mating and molting cycles (Choi et al., 2025). Northern shrimp may also exhibit diel vertical migrations in the water column, particularly during larval and juvenile stages (Barr, 1970; Le Corre et al., 2024). In contrast, sessile or sedentary organisms such as bivalves, corals, and sponges remain fixed to the seabed and rely on local hydrodynamic and environmental conditions for food acquisition (Gili and Coma, 1998). Although adults may be sessile, many species have eggs or larvae that disperse through the water column via ocean currents, facilitating connectivity among benthic populations and habitats. These species are often associated with areas of enhanced current flow that facilitate food delivery, such as shelf edges and canyon systems (Lacharité and Stanley, 2019).

The Study Area contains a diverse range of benthic habitats that support marine biodiversity and contribute to ecosystem structure and function (DFO, 2017). These habitats include areas of ecological importance associated with sensitive benthic communities, productive marine ecosystems, and interconnected pelagic and seafloor processes (Scrosati and Ellrich, 2018). Collectively, these features support a variety of marine species and ecological functions throughout the region. Additional information on protected and special areas can be found in Section 5.2.6.

5.2.1.3 Corals and Sponges

Deep-sea corals and sponges are important components of benthic ecosystems on the Scotian Shelf and adjacent continental slope offshore Nova Scotia. These taxa are of ecological significance due to their role as structure-forming organisms that create complex three-dimensional habitats, supporting a wide range of associated species, including fish and other invertebrates. Corals and sponges are also recognized as sensitive components of the marine environment, particularly vulnerable to disturbance from physical impacts and environmental change (Kenchington, 2014; Roberts et al., 2006).

Coral and sponge communities are particularly associated with the continental shelf break, slope environments, and submarine canyon systems such as the Gully, Shortland Canyon, and Haldimand Canyon (Beazley et al., 2019). These areas are characterized by complex bathymetry, enhanced current flow, and increased food supply, all of which favour the establishment and persistence of these taxa (DFO, 2017a; Kenchington, 2014; Kostylev et al., 2001; Lacharité and Stanley, 2019; Roberts et al., 2006).

On the Scotian Shelf and slope, gorgonian corals (e.g., *Primnoa resedaeformis, Paragorgia arborea*) and sea pens (e.g., *Pennatula spp*., *Anthoptilum* grandiflorum) are among the most frequently encountered coral groups. Gorgonian corals are often associated with harder substrates and areas of stronger current, typically occurring along the shelf break and upper slope at depths ranging from approximately 200 to over 1,000 m. Sea pens are more commonly associated with softer sediments on the shelf and slope and can occur across a broad depth range (generally 100–1,500 m), often forming dense fields in suitable habitats (DFO, 2017; Kenchington, 2014). Black corals and small cup corals are also present but are less well documented.

Sponge communities in offshore Nova Scotia are similarly diverse, with both encrusting and structure-forming species present. Large-bodied sponges, including glass sponges and demosponges *(Polymastia spp*.), may form aggregations in certain areas, contributing significantly to benthic biomass and habitat complexity. Sponge distributions are influenced by environmental factors such as substrate type, depth, bottom temperature, salinity, and food availability, and are often associated with areas of enhanced current flow where suspended particulate matter provides a reliable food source (Breeze et al., 2002; Murillo et al., 2012, 2024).

The distribution of corals and sponges in offshore Nova Scotia is strongly linked to environmental variables, including depth, substrate, bottom currents, and the availability of particulate organic matter. As such, these organisms are commonly found along the continental shelf edge, canyon systems, and other areas of topographic complexity where currents enhance food delivery and prevent sediment accumulation (Figure 5.3). Predictive modelling studies and seabed mapping efforts have identified these areas as having high habitat suitability for coral and sponge assemblages (DFO, 2017a; Kenchington, 2014; Kostylev et al., 2001; Murillo et al., 2012, 2024; Roberts et al., 2006)

Species distribution models (SDMs) and habitat suitability mapping have increasingly been used to supplement empirical observations and extrapolate the potential distribution of corals and sponges across broader spatial scales. These models integrate environmental variables such as depth, substrate, temperature, salinity, seafloor topography, and currents to predict likely habitat for different functional groups. On the Scotian Shelf, SDM outputs generally indicate that areas of highest habitat suitability occur along the shelf break and slope, particularly in canyon systems, basin margins, and other areas of complex topography, while shallower inner shelf areas and abyssal plains are typically less suitable. For example, habitat suitability modelling for the glass sponge *Vazella pourtalesii* identified the highest probabilities of occurrence in the central Scotian Shelf basins, with additional suitable habitat predicted along the shelf break and within the Fundian and Northeast Channels and demonstrated that bottom temperature was a key driver of distribution (Beazley et al., 2018).

More recent climate-informed SDMs suggest that suitable habitat for *Vazella pourtalesii* may expand and shift toward deeper waters and higher latitudes under future climate

scenarios, although the persistence of existing sponge grounds on the Scotian Shelf may be challenged by changing environmental conditions. Habitat suitability projections indicated that the species' suitable habitat could increase substantially, with future distributions increasingly associated with deeper slope environments and northern areas of the northwest Atlantic. Similarly, modelling of the vulnerable habitat-forming bubblegum coral *Paragorgia arborea* found that the most important predictors of occurrence were terrain variables associated with the upper continental slope and that areas of the eastern Scotian Slope are likely to remain suitable under projected mid-century climate conditions. These areas were identified as potential climate refugia and may play an important role in maintaining regional coral populations through time (Beazley et al., 2021; Wang et al., 2022).

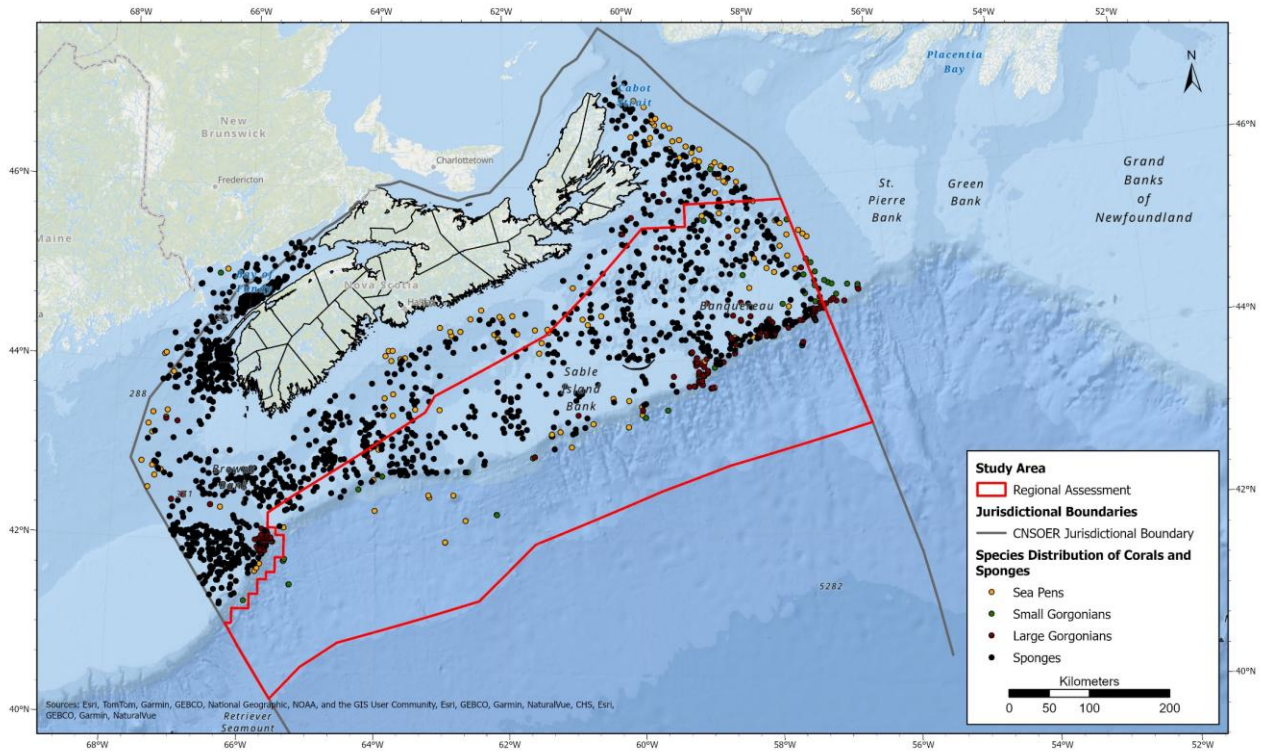


Figure 5.3. Species Distribution of Corals and Sponges

5.2.1.4 Fish

Marine finfish in the Scotian Shelf and Slope region exhibit a wide range of ecological roles, habitat preferences, and life history strategies, with numerous demersal and pelagic species occurring within the Study Area either year-round or seasonally (Breeze et al., 2002; Mahon et al., 1998). These species form identifiable assemblages associated with depth gradients, substrate type, and oceanographic conditions (e.g., temperature, salinity, and circulation patterns influenced by the Labrador Current and Gulf Stream). (Breeze et al., 2002; Kostylev et al., 2001; Mahon et al., 1998).

Species distributions and community structure for finfish vary both spatially and temporally in response to oceanographic variability, including seasonal stratification, ocean currents, and climate-driven changes. Vertical structure in the water column also influences assemblages, with pelagic and mesopelagic species (e.g., lanternfish, numerous sharks, cephalopods) undertaking diel vertical migrations, and demersal species maintaining closer associations with the seabed (Halliday et al., 2012; Mahon et al., 1998). These variations reflect species-specific habitat preferences, trophic interactions, and life history requirements and contribute to the diversity of commercial and culturally important fish species that make up the marine fish community in offshore Nova Scotia.

Across the Scotian Shelf, “shallow to mid-depth” assemblages are typically associated with the continental shelf and banks (e.g., Sable Island Bank, Emerald Bank) and include species such as Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), Atlantic herring (*Clupea harengus*), sand lance (*Ammodytes spp*.), American plaice (*Hippoglossoides platessoides*), and yellowtail flounder (*Myzopsetta ferruginea*). Species considered to be “slope and deepwater assemblages” occur along the shelf break and continental slope (e.g., the Gully and adjacent canyons), and include species such as redfish (*Sebastes spp*.), white hake (*Urophycis tenuis*), grenadiers (*Macrouridae*), lanternfish (*Myctophidae*), and deepwater sharks. In deeper offshore waters beyond the shelf break, finfish assemblages transition to “deep slope and abyssal communities,” including blue hake (*Antimora rostrata*), roughhead grenadier (*Macrourus berglax*), and various skate species (Breeze et al., 2002; Halliday et al., 2012; Mahon et al., 1998). Highly migratory pelagic species do not show such consistent affiliation with depth and would contribute to fish assemblages throughout the North Atlantic.

5.2.1.5 Species at Risk and of Conservation Concern

Several finfish species that occur within offshore Nova Scotia, including parts of the Study Area such as the Scotian Shelf, Scotian Slope, and adjacent offshore waters, have been listed under Schedule 1 of SARA or assessed by COSEWIC as Endangered, Threatened, or Special Concern (Table 5.1) due to declining population trends and are considered particularly sensitive to mortality because of life-history characteristics, restricted distributions or identified threats to recovery (COSEWIC, 2011, 2012e, 2012d, 2012c, 2012b, 2012a; DFO, 2014b, 2020). For some species such as depleted populations of Atlantic cod, fisheries management measures are in place that focus on rebuilding. Collectively, at-risk species contribute significantly to the biodiversity, ecological functioning, and cultural value of marine ecosystems within the Study Area and are considered in the RA because of their conservation status, ecological sensitivity, and importance to Indigenous peoples and other marine resource users (DFO, 2018a).

Table 5.1 – Summary of SARA Listed or COSEWIC assessed finfish and cartilaginous fish occurring in offshore Nova Scotia in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
American eel (*Anguilla rostrata*)	Not Listed	Threatened	• Migratory species that crosses the Scotian Shelf during movements between Atlantic Canadian rivers and the Sargasso Sea spawning grounds. • May occur throughout the Study Area, including offshore banks and slope waters.
American plaice - Maritimes population (*Hippoglossaides platessoides*)	Not Listed (Under consideration for addition)	Threatened	• Distributed contiguously from Georges Bank and the Bay of Fundy in the south, northward over the Scotian Shelf, into the Gulf of St, Lawrence, surrounding Newfoundland and Labrador and along the eastern coast of Baffin Island.
Atlantic cod – Southern population (*Gadus morhua*)	Not Listed (Under consideration for addition)	Endangered	• Occupies a broad range in Atlantic Canada, from Georges Banks and the Bay of Fundy in the south. • Northward over the Scotian Shelf, into the Gulf of St. Lawrence, Grand Bank, and Labrador Shelf to Baffin Island. • Habitat type for adult Cod is quite diverse.
Atlantic wolffish (*Anarhichas lupus*)	Special Concern	Special Concern	• Distributed throughout the Scotian Shelf and shelf-edge waters, including offshore banks such as Sable Island Bank.
Cusk (*Brosme brosme*)	Not Listed (Under consideration for addition)	Endangered	• Demersal species widely distributed on the Scotian Shelf, particularly in areas of rocky and hard-bottom habitat.

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• Occurs on offshore banks and the shelf edge, with likely occurrence near the Laurentian Fan upper slope. • Typically found at depths of 150 to 400 m with ratively warm water temperature of 6 to 10 °C.
Northern wolffish (*A denticulatus*)	Threatened	Threatened	• Primarily a deep-water species occurring along the Scotian Shelf slope and deeper offshore waters. • Most likely to occur near the shelf break and Laurentian Fan[7], with less frequent occurrence on shallow banks such as Sable and Misaine Banks.
Smooth skate – Laurentian-Scotian population (*Malacoraja senta*)	Not Listed (Under consideration for addition)	Special Concern	• Occupies a broad range in Atlantic Canada, from Georges Bank to the nose of the Grand Bank. • Lives on the sea bottom and prefer soft mud and clay substrates. • Densest concentrations occur between 150 and 550 m.
Spotted wolffish (*A. minor*)	Threatened	Threatened	• Occurs mainly in deeper offshore waters and along the Scotian Shelf edge. Present but less common than Atlantic Wolffish, with potential occurrence near Sable Island Bank, Misaine Bank, and the Laurentian Fan.
Thorny skate (*Amblyraja radiata*)	Not Listed - (Under consideration for addition)	Special Concern	• Widespread and common on the Scotian Shelf, particularly on the Eastern Scotian Shelf including Misaine Bank. Occurs on sand, mud, and mixed-bottom habitats and may extend onto adjacent slope habitats. • Eggs are benthic, laid year-round on bank edges and slopes.

[7] The Laurentian Fan is located on the deep-water continental slope and rise southeast of the Scotian Shelf, spanning the offshore boundary between Nova Scotia and Newfoundland

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
White hake – Atlantic and Northern Gulf of St Lawrence population (*Urophycis tenuis)*	Not Listed (Under consideration for addition)	Threatened	• Widely distributed in the Bay of Fundy, Scotian Shelf, the perimeter of the southern Gulf of St. Lawrence, and the slopes of St. Pierre Bank and the southern Grand Banks.
Winter skate - Eastern Scotian Shelf-Newfounland population (*Leucoraja ocellata*)	Not Listed (Under consideration for addition)	Endangered	• They are concentrated in three areas in Canadian waters: the Gulf of St. Lawrence, Eastern Scotian Shelf/Southern Newfoundland, and Western Scotian Shelf/Bay of Fundy/Canadian portion of Georges Bank. • Occurs on offshore banks including Sable Island Bank, and Misaine Bank. • Less common in deeper Laurentian Fan habitats.
Pelagic fish			
Acadian redfish – Atlantic population (*Sebastes spp.*)	Not Listed (Under consideration for addition)	Threatened	• Scotian Shelf, Laurentian Channel, shelf edge. • Typical depth for Acadian redfish: 150-300 m. • Acadian Redfish is only found in the western Atlantic. Range extends from the Gulf of Maine to the southern Labrador Sea, and includes the Gulf of St Lawrence, the Laurentian Channel and the Brand Banks.
Atlantic bluefin tuna (*Thunnus thynnus*)	Not Listed	Endangered	• Highly migratory pelagic species that regularly uses the Scotian Shelf and slope, as well as offshore, as seasonal feeding habitat.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• Frequently occurs around Sable Island Bank and shelf-edge waters and may occur near the Laurentian Fan. • Migrates to spawning grounds in the Gulf of Mexico (for the western stock), and to the Mediterranean (for the eastern stock) (Block et al. (2026).
Atlantic salmon (Inner Bay of Fundy population) (*Salmo salar*)	Not Listed (Under Consideration for addition)	Endangered	• Most stocks originating from the Inner Bay of Fundy have been extirpated by overfishing and habitat destruction. Present stocks are mainly sustained by hatchery production and Live Gene Bank additions. • Like other stocks the animals were repeat spawners, with males returning from sea usually after one year, and females after two or more years feeding at sea. • Their use of the RA Study Area was possibly limited, but some of the males, most of which were thought to overwinter in the Bay of Fundy/Gulf of Maine may have ventured further afield. The more extensive sea migrations of females might have included the Labrador Sea.
Atlantic salmon - Nova Scotia Southern Upland East and West populations (*Salmo salar*)	Not Listed (Under Consideration for addition)	Endangered	• Population consist of species that occupy rivers in a region of Nova Scotia extending from the northeastern mainland near Canso, into the Bay of Fundy at Cape Split. • Include rivers on both the Eastern Shore and the South Shore of Nova Scotia draining into the Atlantic Ocean, as well as Bay of Fundy rivers south of Cape Split. • Migratory species using marine waters of the Scotian Shelf during oceanic migrations.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• May transit through waters over Sable Island Bank, Misaine Bank, and the Laurentian Fan, although these are not considered core habitats. • Though not well known for all populations, most adults migrate to the eastern Grand Banks, Labrador Sea or Greenland. • Return in the fall to freshwater when ready to spawn
Atlantic salmon – Southern Gulf of St Lawrence and Cape Breton population (*Salmo salar*)	Not Listed (Under Consideration for addition)	Endangered	• This population spawns in a large number of rivers in the southern Gulf of St. Lawrence and Cape Breton Island, that drain into the Gulf of St. Lawrence, Bras d'Or Lakes, and the Atlantic Ocean.
Atlantic salmon – Outer Bay of Fundy population (*Salmo salar*)	Not Listed (Under Consideration for addition)	Endangered	• Anadromous, returning to natal rivers to spawn after the completion of ocean scale migrations. • Adults are repeat spawners, i.e., are *iteroparous*, returning to their natal rivers for several successive years after a feeding stage at sea from May to November, with some fish returning as early as March. • Female salmon deposit eggs in gravel nests in October and November, usually in gravel riffle sections of streams. Spawned-out or spent adults (kelts) return to sea immediately after spawning or remain in fresh water until the following spring. Fertilized eggs incubate in nests over the winter and begin to hatch in April.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• Hatchlings (alevins) remain in the gravel riverbed for several weeks while living off a large yolk sac. Once the yolk sac has been absorbed, free swimming parr begin to actively feed. • Young salmon (parr) will remain in fresh water for one to eight years before they begin a behavioral and physiological transformation and migrate to sea as smolts. After spawning, adults either return to sea following spawning or wait until the following spring in some river systems. • Most Atlantic salmon form the Outer Bay of Fundy overwinter in the Labrador Sea and Flemish Cap area. Inevitably, they must traverse the RA Study Area, but the transit is likely to be rapid.
Atlantic Sturgeon – Maritimes populations (*Acipenser oxyrinchus*)	Not Listed (Under Consideration for addition)	Threatened	• Occur in rivers, estuaries, nearshore marine environments and the shelf regions to at least 50 m depths along the Atlantic coast of North America.
Deepwater redfish - Gulf of St Lawrence and Laurentian Channel population (*Sebastes mentella*)	Not Listed (Under Consideration for addition)	Endangered	• Observed in the Gulf of St Lawrence and on the Scotian Shelf, up to the continental slope. • Live along continental slopes and in deep channels, from 250 to 500 m. • Larvae prefer surface waters, where they feed on copepods and fish eggs.
Deepwater redfish –	Not Listed (Under	Threatened	• Inhabit cold waters along slopes of banks and channels.

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Northern population (*Sebastes mentella*)	Consideration for addition)		• Its range extends from the Grand banks to Baffin Bay, and t includes the Gulf of St Lawrence, the Laurentian Channel and the Grand Banks.
Lumpfish (*Cyclopterus lumpus*)	Not Listed (Under Consideration for addition)	Threatened	• Distributed demersally and pelagically in the North Atlantic Ocean with diverse habitat during different life stages and season. • Occasionally caught up to 65ºN in Davis Strait but are more common further south with highest estimates of abundance in waters surrounding the island of Newfoundland. • Occasional records occur as far south as the mid-Atlantic Bight.
Roundnose grenadier (*Coryphaenoides rupestris*)	Not Listed (Under Consideration for addition)	Endangered	• Continental slope species with the deeper part of its geographic range not well surveyed. It is closely associated with the seafloor and commonly found inhabiting waters 400 to 1,200 m in depth but has been found in water depths of up to 2,600 m. • Prefer areas of low currents and can be found in aggregations in troughs, gorges and lower parts of the Scotian Slope. • Aggregations found around the North Atlantic Seamounts. Spawning is believed to occur year-round with peaks at different times for different areas. • Feeds in the water column on various prey items including copepods, amphipods, squid and small fish.
Striped bass – Bay of Fundy population	Not Listed (Under Consideration for addition)	Endangered	• The natural range of this species extends along the Atlantic coast of North America from the St. Lawrence Estuary to the St Johns River in northern Florida. • Spawn in five rivers in eastern Canada: The St Lawrence, Miramichi, Shubenacadie, Annapolis, and Sanit John Rivers.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
(*Morone saxatilis*)			• The Atlantic Canadian Striped Bass populations migrate upstream in the fall and overwinter in the fresh or brackish water to avoid low ocean temperatures in winter.
Striped bass – Southern Gulf of St. Lawrence population (*Morone saxatilis*)	Not Listed (Under Consideration for addition)	Special concern	• Occurs in the southern Gulf of St. Lawrence, primarily on the east of New Brunswick, but also part of the coast of Nova Scotia, Prince Edward Island, and eastern Québec (Chaleur Bay and Gaspé). • There is a single spawning population (Northwest Miramichi River).
Sharks			
Basking shark – Atlantic population (*Cetorhinus maximus*)	Not Listed (Under Consideration for addition)	Special Concern	• Found in waters of Atlantic Canada during summer and fall. • Usually detected near the coast in areas like the Gulf of St Lawrence, Scotian Shelf, and Bay of Fundy. • Often found in offshore areas with temperature range between 7 and 16°C.
Porbeagle shark (*Lamna nasus*)	Not Listed - (Under consideration for addition)	Endangered	• Highly migratory, cold-temperate pelagic shark found throughout Atlantic Canadian waters. • Typically moves onto the Scotian Shelf in late spring. • Widely distributed across Scotian Shelf and shelf-edge waters during summer and autumn. • Commonly occurs around offshore banks, including Sable Island Bank. • Uses both inshore and offshore habitats of the Scotian Shelf. • Occurs along the Scotian Shelf slope and in deeper offshore basin and continental slope habitats.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• May occur in offshore slope habitats associated with the Laurentian Fan. • Likely present at Misaine Bank due to its broad use of Eastern Scotian Shelf waters. • Moves into deeper waters off the continental shelf during winter. • Spawns on Georges Bank and the Gulf of St Lawrence entrance, likely pups in the Sargasso Sea.
Shortfin mako shark (*Isurus oxyrinchus*)	Not Listed (Under consideration for addition)	Endangered	• Found throughout Atlantic Canada. • Seasonally detected in summer and fall, with documented occurrences in winter, within coastal and pelagic (offshore) waters that range between 14 and 25ºC.
Spiny dogfish – Atlantic population (*Squalus acanthias*)	Not Listed (Under Consideration for addition)	Special Concern	• Widely distributed year-round in Atlantic Canadian waters; - particularly in the Bay of Fundy and along the Scotian Shelf. • Moves inshore in summer and offshore in winter. • Often found in waters between 5 to 15ºC.
White shark – Atlantic Population (*Carcharodon carcharias*)	Endangered	Endangered	• Seasonal visitor to Atlantic Canadian waters. • Occurs in coastal, shelf, and shelf-edge waters of the Scotian Shelf and may occur around Sable Island Bank, Misaine Bank, and offshore slope areas including the Laurentian Fan.

Sources: Adapted form Curran et al. (2025) with supplementary information from COSEWIC, 2011, 2012e, 2012d, 2012c, 2012b, 2012a; DFO, 2014b, 2020, 2025 and NS OSW RA Report, Ricard et al., 2022).

DRAFT

In addition to species designations, critical and important habitat has been identified for several finfish species occurring within or adjacent to the Study Area through recovery planning, species distribution modelling, and fisheries research. These habitats include spawning grounds, nursery and rearing areas, feeding habitats, migration corridors, and other areas supporting essential life history functions and include the shelf edge, submarine canyons, deep-water slope environments, and migration corridors (DFO, 2020).

Several finfish species are also recognized by Indigenous groups as having cultural, subsistence, and economic importance. These include Atlantic salmon, American eel, Atlantic bluefin tuna, swordfish, Atlantic cod, and a variety of groundfish and pelagic species that support Indigenous food, social, ceremonial, and communal commercial fisheries. Additional information related to these species and their importance to the Mi'kmaq is described in Section 5.4.

5.2.1.6 Key Areas and Timing

Fish community analyses based on DFO Research vessel survey data indicate that areas of elevated species richness, diversity, and biomass occur along the shelf edge and slope, particularly in areas such as the Gully, Shortland Canyon, and Haldimand Canyon, which are also designated as EBSAs (DFO, 2014a; King et al., 2016). These areas are often associated with complex bathymetry and enhanced productivity linked to oceanographic processes (DFO, 2014a; Stortini, 2015). In contrast, some inner shelf areas exhibit comparatively lower overall diversity and abundance, although they may still support important spawning or nursery habitats for key species. Spatial overlap between high-value fish habitat and fisheries closures (e.g., coral and sponge conservation areas) further highlights the ecological importance of these regions (DFO, 2014a).

Within the Study Area, several offshore features support important habitats for fish species at risk and other species of conservation concern (Table 5.1). The Scotian Shelf, shelf edge, Sable Island Bank, Misaine Bank, and the Laurentian Fan are consistently identified as important areas for a range of pelagic, demersal, and migratory species. Sable Island Bank provides habitat for Atlantic wolffish, spotted wolffish, Atlantic bluefin tuna, porbeagle shark, winter skate, white shark, shortfin mako shark, and migratory species such as Atlantic salmon and American eel (Ricard et al., 2022; DFO, 2015; COSEWIC, 2018; Curran et al., 2025, NOAA, 2026). Misaine Bank is an important area for thorny skate, winter skate, spotted wolffish, porbeagle shark, white shark, and migrating Atlantic salmon (Ricard et al., 2022; DFO, 2015; COSEWIC, 2018, NOAA, 2026). The shelf edge and adjacent slope habitats support several deep-water species, including Atlantic, northern, and spotted wolffish, and cusk, as well as pelagic species such as porbeagle shark, shortfin mako shark and white shark, while the Laurentian Fan is particularly important for species associated with deeper slope environments, including northern wolffish, cusk, and other demersal fishes (Ricard et al., 2022; DFO, 2015; COSEWIC, 2018; Curran et al.,

2025). These areas collectively represent locations where multiple species at risk overlap spatially and where interactions with offshore exploratory drilling activities may be most likely.

Several fish species assessed by COSEWIC or listed under SARA utilize habitats within the Nova Scotia offshore and exhibit life-history characteristics that may increase their sensitivity to disturbance during critical life stages. Diadromous species such as Atlantic salmon (*Salmo salar*) and American eel (*Anguilla rostrata*) rely on marine habitats during key phases of their life cycles and undertake extenstive migrations between marine and freshwater environments. Other species, including thorny skate (*Amblyraja radiata*), utilise offshore benthic habitats for reproduction and egg development. Across the Scotian Shelf, important spawning, nursery, feeding, and adult habitats have been identified for numerous fish species, demonstrating the importance of bank, shelf, and slope habitats in supporting critical life-history functions and population persistence (Horsman and Shackell, 2009). Spawning phenology varies among species, with reproductive activity occurring seasonally or over extended periods depending on species-specific life-history strategies (Lowerre-Barbieri et al., 2023). Early life stages, including eggs, larvae, and juveniles, are often associated with specific habitats that provide favourable environmental conditions and refuge from predation, while migratory species may utilize offshore habitats seasonally during critical portions of their life cycles (DFO, 2014; Melvin et al., 2009). Consequently, sensitive life stages of certain COSEWIC-assessed and SARA-listed species may be present in offshore environments for prolonged periods, highlighting the importance of considering the timing and location of offshore exploratory drilling activities when evaluating potential interactions with species at risk.

Seasonal patterns of habitat use vary among species. Summer and autumn represent periods of particularly high species overlap within offshore Nova Scotia waters. Highly migratory pelagic species, including Atlantic bluefin tuna, porbeagle shark, shortfin mako shark and white shark, use the Scotian Shelf and shelf-edge waters extensively during these seasons for movement and feeding. Porbeagle sharks typically move onto the Scotian Shelf in late spring, remain widely distributed across shelf and slope habitats throughout summer and autumn, and then move into deeper offshore waters during winter. Atlantic salmon and American eel may transit offshore areas during marine migrations, while Atlantic salmon generally return to freshwater habitats during the fall spawning migration. In contrast, many demersal species, including wolffish, cusk, thorny skate, and winter skate, occupy shelf and slope habitats throughout the year, resulting in year-round ecological importance of these areas.

A variety of fish migration patterns also occur within, and in relation to, the Study Area, ranging from localized seasonal movements to large-scale transboundary migrations. Key migration strategies include:

- **Seasonal migrations**: Species such as Atlantic cod (*Gadus morhua*) and Atlantic herring (*Clupea harengus*) migrate to spawning and feeding areas on the Scotian

Shelf and adjacent regions (Bundy et al., 2014; Melvin et al., 2009; Wang et al., 2018).

- **Long-distance pelagic migrations**: Highly migratory species such as Atlantic bluefin tuna (**Thunnus thynnus**), swordfish (*Xiphias gladius*), white sharks (*Carcharodon carcharias*), and porbeagle sharks (*Lamna nasus*) enter the Scotian Shelf seasonally from lower latitudes for feeding (Bundy et al., 2014).
- **Anadromous migrations**: Atlantic salmon migrate through offshore waters between marine feeding grounds (including the Labrador Sea and West Greenland) and natal rivers in Atlantic Canada (Bundy et al., 2014).
- **Catadromous migrations**: American eel migrate from freshwater habitats through marine environments to spawning grounds in the Sargasso Sea (Bundy et al., 2014; Lowerre-Barbieri et al., 2023).
- **Vertical migrations**: Mesopelagic and some demersal species undertake diel vertical migrations linked to feeding and predator avoidance (Bundy et al., 2014). Numerous predators, such as the porbeagle shark, also exhibit vertical migration (Braun et al., 2023; Francis et al., 2015; Wang et al., 2020)

These migration patterns often extend well beyond the Study Area, reflecting connectivity across regional and ocean-basin scales (Bundy et al., 2014). Collectively, the concentration of migratory pathways, feeding areas, spawning habitats, and year-round occupancy within features such as Sable Island Bank, Misaine Bank, the Scotian Shelf edge, and the Laurentian Fan underscores the importance of considering both spatial and seasonal patterns of fish habitat use.

5.2.1.7 References

Barr, L. (1970). Diel Vertical Migration of Pandalus borealis in Kachemak Bay, Alaska. Journal of the Fisheries Research Board of Canada, 27(4), 669–676. https://doi.org/10.1139/f70-071

Beazley, L., Kenchington, E., and Lirette, C. (2017). Species Distribution Modelling and Kernel Density Analysis of Benthic Ecologically and Biologically Significant Areas (EBSAs) and Other Benthic Fauna in the Maritimes Region (Can. Tech. Rep. Fish. Aquat. Sci. 3204, p. vi + 159). https://waves-vagues.dfo-mpo.gc.ca/Library/40576140.pdf

Beazley, L., Lirette, C., and Guijarro, J. 2019. Characterization of the corals and sponges of the Eastern Scotian Slope from a benthic imagery survey. Can. Tech. Rep. Fish. Aquat. Sci. 3302: vi + 83 p.

Beazley, L., Kenchington, E., Murillo, F. J., Brickman, D., Wang, Z., Davies, A. J., Roberts, E. M., and Rapp, H. T. (2021). Climate change winner in the deep sea? Predicting

the impacts of climate change on the distribution of the glass sponge Vazella pourtalesii. Marine Ecology Progress Series, 657, 1–23. https://doi.org/10.3354/meps13566

Beazley, L., Wang, Z., Kenchington, E., Yashayaev, I., Rapp, H. T., Xavier, J. R., Murillo, F. J., Fenton, D., and Fuller, S. (2018). Predicted distribution of the glass sponge Vazella pourtalesi on the Scotian Shelf and its persistence in the face of climatic variability. PLOS ONE, 13(10), e0205505. https://doi.org/10.1371/journal.pone.0205505

Block, B. A., Aalto, E. A., Pagniello, C. M. L. S., Whitlock, R. E., Stokesbury, M. J. W., Schallert, R. J., Castleton, M. R., Walter, J. F., Ferter, K., Nøttestad, L., Bjelland, O., Maxwell, H. W., Drumm, A., Waters, C., and Cermeño, P. (2026). Ensuring the future of Atlantic bluefin tuna. Proceedings of the National Academy of Sciences, 123(17), e2535185123. https://doi.org/10.1073/pnas.2535185123

Braun, C.D., Della Penna, A., Arostegui, M.C., Afonso, P., Berumen, M.L., Block, B.A., Brown, C.A., Fontes, J., Furtado, M., Gallagher, A.J., Gaube, P., Golet, W.J., Kneebone, J., Macena, B.C.L., Mucientes, G., Orbesen, E.S., Queiroz, N., Shea, B.D., Schratwieser, J., Sims, D.W., Skomal, G.B., Snodgrass, D., Thorrold, S.R. (2023). Linking vertical movements of large pelagic predators with distribution patterns of biomass in the open ocean. Proceedings of the National Academy of Science, 120(47). https://doi.org/10.1073/pnas.2306357120

Breeze, H., Fenton, D. G., Rutherford, R. J., and Silva, M. A. (2002). The Scotian Shelf: An ecological overview for ocean planning (Can. Tech. Rep. Fish. Aquat. Sci. 2393, p. x + 259). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2012/mpo-dfo/Fs97-6-2393-eng.pdf

Buhl-Mortensen, P., Gordon, D. C., Buhl-Mortensen, L., and Kulka, D. W. (2017). First description of a Lophelia pertusa reef complex in Atlantic Canada. Deep Sea Research Part I: Oceanographic Research Papers, 126, 21–30. https://doi.org/10.1016/j.dsr.2017.05.009

Bundy, A., Themelis, D., Sperl, J., and den Heyer, N. (2014). Inshore Scotian Shelf Ecosystem Overview Report: Status and Trends (Can. Sci. Advis. Sec. Res. Doc. 2014/065, p. xii + 213). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/360197.pdf

Casault, B., Devred, E., Head, E., and Beazley, L. (2023). Optical, Chemical, and Biological Oceanographic Conditions on the Scotian Shelf and in the eastern Gulf of Maine during 2021 (Can. Sci. Advis. Sec. Res. Doc. 2023/016, p. v +74). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41110924.pdf

Casault, B., Johnson, C. L., Devred, E., and Beazley, L. (with Fisheries and Oceans Canada). (2025a). Chemical and biological oceanographic conditions on the Scotian Shelf and in the eastern Gulf of Maine during 2023 (Canadian Technical Report of Fisheries and Aquatic Sciences 3658). Fisheries and Oceans Canada. https://doi.org/10.60825/4D69-8120

Casault, B., Johnson, C. L., Devred, E., Clay, S., and Beazley, L. (2025b). Chemical and biological oceanographic conditions on the Scotian Shelf and in the Eastern Gulf of Maine during 2024 (Can. Tech. Rep. Fish. Aquat. Sci. 3744). Fisheries and Oceans Canada. https://doi.org/10.60825/P6AD-1K52

Choi, J. S., Cameron, B. J., and Glass, A. C. (2025). Assessment of Scotian Shelf Ecosystem Snow Crab in 2024 (Can. Sci. Advis. Sec. Res. Doc. 2025/036, p. iv + 46). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2025/mpo-dfo/fs70-5/Fs70-5-2025-036-eng.pdf

Chowdhury, P., Khan, S. J., Sumon, M. A. A., El-Regal, M. A. A., Tayyamath, K., and Van Doan, H. (2026). The role of planktons in sustaining the function and diversity of marine ecosystems: A systematic review. Discover Animals, 3(1), 9. https://doi.org/10.1007/s44338-025-00113-7

Clark, M. R., Bowden, D. A., Rowden, A. A., and Stewart, R. (2019). Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years. Frontiers in Marine Science, 6, 63. https://doi.org/10.3389/fmars.2019.00063

COSEWIC. (2011). COSEWIC assessment and status report on the Atlantic Bluefin Tuna Thunnus thynnus in Canada (p. ix + 30). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/atlantic-bluefin-tuna-2011.html#_docInfo

COSEWIC. (2012a). COSEWIC assessment and status report on the American Eel Anguilla rostrata in Canada (p. xii + 109). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/american-eel-2012.html#_docInfo

COSEWIC. (2012b). COSEWIC assessment and status report on the Atlantic Wolfish Anarchichas lupus in Canada (p. ix + 56). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/atlantic-wolffish-2012/chapter-1.html

COSEWIC. (2012c). COSEWIC assessment and status report on the Cusk Brosme brosme in Canada (p. x + 85). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/cusk-2012/chapter-1.html

COSEWIC. (2012d). COSEWIC assessment and status report on the Northern Wolfish Anarhichas denticulatus in Canada (p. x + 41). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/northern-wolffish.html#_Toc350148007

COSEWIC. (2012e). COSEWIC assessment and status report on the Spotted Wolfish Anarhichas minor in Canada (p. x + 44). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/spotted-wolffish-2012.html

COSEWIC. (2018, January 2). *White shark (Carcharodon carcharias) COSEWIC assessment and status report: Chapter 4*. Government of Canada. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/white-shark/chapter-4.html

Curran, K. J., Nagel, E. J., Murphy, S. A., Huskins-Shupe, M. L., and Marotte, E. C. (2025). Four Wind Energy Areas (WEA) in the offshore of Nova Scotia: A description of the primary marine ecosystem features, significant and protected areas, at-risk and depleted species, fish and fisheries, science surveys, and other human uses that may occur in and around the French Bank, Middle Bank, Sable Island Bank, and Sydney Bight Areas (Can. Manuscr. Rep. Fish. Aquat. Sci. 3312, p. ix + 65.). Fisheries and Oceans Canada. https://doi.org/10.60825/KP16-ZX06

DFO. (2013). Canadian Atlantic swordfish and other tunas: Integrated Fisheries Management Plan. Fisheries and Oceans Canada. https://www.dfo-mpo.gc.ca/fisheries-peches/ifmp-gmp/swordfish-espadon/NEW-swordfish-2013-espado-eng.html

DFO. (2014a). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs70-6-2014-041-eng.pdf

DFO. (2014b). Update to the Recovery Potential for Cusk in Canadian Waters (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/048). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/364365.pdf

DFO. (2015). *Recovery potential assessment for porbeagle (Lamna nasus) in Atlantic Canada (Canadian Science Advisory Secretariat Science Advisory Report 2015/048)*. Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/365107.pdf

DFO. (2017). Delineation of Significant Areas of Coldwater Corals and Sponge-Dominated Communities in Canada's Atlantic and Eastern Arctic Marine Waters and their Overlap with Fishing Activity (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/007). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2017/mpo-dfo/Fs70-6-2017-007-eng.pdf

DFO. (2018a). Aquatic species at risk found in Canadian waters. Search Aquatic Species at Risk. https://www.dfo-mpo.gc.ca/species-especes/sara-lep/identify-eng.html

DFO. (2020). Recovery Strategy for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada (p. vii + 81). Fisheries and Oceans Canada, Ottawa. https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/MpRs-3LoupsWolffish-v01-2020Feb-Eng.pdf

DFO. (2023). Engaging on a strategy to restore and rebuild Atlantic salmon: What we heard (p. 13). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41199509.pdf

DFO. (2025). Recovery Strategy for the White Shark (*Carcharodon carcharias*) in Atlantic Canadian Waters. Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. p. vii + 44. https://publications.gc.ca/collections/collection_2025/mpo-dfo/En3-4-381-2025-eng.pdf

DFO. (2024). Canada's national strategy to ensure the future of Atlantic salmon 2024-2036 (p. 32). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41286686.pdf

Francis, M.P., Holdsworth, J.C. and Block, B.A. (2015). Life in the open ocean: seasonal migration and diel diving behaviour of Southern Hemisphere porbeagle sharks (*Lamna nasus*). *Mar Biol* 162, 2305–2323 (2015). https://doi.org/10.1007/s00227-015-2756-z

Gili, J.-M., and Coma, R. (1998). Benthic suspension feeders: Their paramount role in littoral marine food webs. Trends in Ecology and Evolution, 13(8), 316–321. https://doi.org/10.1016/S0169-5347(98)01365-2

Guijarro-Sabaniel, J., Thomson, J. A., Vercaemer, B., and Wong, M. C. (2024). National Eelgrass Task Force (NETForce): Building a dynamic, open eelgrass map for Canada (Can. Tech. Rep. Fish. Aquat. Sci. 3583). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41223147.pdf

Halliday, R. G., Guelpen, L. V., and Themelis, D. E. (2012). Demersal fish fauna of the continental slope off Nova Scotia, Canada, based on exploratory bottom trawl surveys in 1994-95. Journal of Northwest Atlantic Fishery Science, 44, 41–60. https://doi.org/10.2960/J.v44.m681

Head, E. J. H., Johnson, C. L., and Pepin, P. (2022). Plankton monitoring in the Northwest Atlantic: A comparison of zooplankton abundance estimates from vertical net tows and Continuous Plankton Recorder sampling on the Scotian and Newfoundland shelves, 1999–2015. ICES Journal of Marine Science, 79(3), 901–916. https://doi.org/10.1093/icesjms/fsab208

Horsman, Tracy, and Nancy Shackell. 2009. Atlas of important habitat for key fish species of the Scotian Shelf, Canada. Vol. 2835. Fisheries and Oceans Canada.

Kenchington, E. (2014). A General Overview of Behthic Ecological or Biological Significant Areas (EBSAs) in Maritimes Region (Can. Tech. Rep. Fish. Aquat. Sci. 3072, p. iv + 45). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs97-6-3072-eng.pdf

King, M., Fenton, D., Aker, J., and Serdynska, A. (2016). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion (Can. Sci. Advis. Sec. Res. Doc. 2016/007, p. viii + 92). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/363946.pdf

Kostylev, V., Todd, B., Fader, G., Courtney, R., Cameron, G., and Pickrill, R. (2001). Benthic habitat mapping on the Scotian Shelf based on multibeam bathymetry, surficial geology and sea floor photographs. Marine Ecology Progress Series, 219, 121–137. https://doi.org/10.3354/meps219121

Krumhansl, K. A., Brooks, C. M., Lowen, J. B., O'Brien, J. M., Wong, M. C., and DiBacco, C. (2024). Loss, resilience and recovery of kelp forests in a region of rapid ocean warming. Annals of botany, 133(1), 73-92.

Krumhansl, K. A., Wong, M. C., Picard, M. M., Fraser, M., Gabriel, C. E., Wu, Y., and Azetsu-Scott, K. (2026). Blue carbon sequestration dominated by dissolved organic carbon pathways for kelp forests and eelgrass meadows in Nova Scotia, Canada. *Communications Earth and Environment*, 7(1), 98.

Lacharité, M., and Stanley, R. R. E. (2019). Protecting the deep sea in Canadian waters: A rationale based on the Eastern Canyons area (Eastern Scotian Shelf, Atlantic Canada) (Can. Tech. Rep. Fish. Aquat. Sci. 3347, p. vi +35). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2019/mpo-dfo/Fs97-6-3347-eng.pdf

Le Corre, N., Skanes, K. R., Baker, K. D., Sullivan, D., Coffey, W., Cyr, F., Belanger, D., Morrissey, K., and Malayny, C. (2024). Assessment of Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*Pandalus montagui*) in Shrimp Fishing Area 4 in 2022 (Can. Sci. Advis. Sec. Res. Doc. 2024/036, p. V + 82). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41249070.pdf

Lowerre-Barbieri, S. K., Brown-Peterson, N. J., Wyanski, D. M., Moncrief-Cox, H. E., Kolmos, K. J., Menendez, H. S., Barnett, B. K., and Friess, C. (2023). A unified framework and terminology for reproductive traits integral to understanding fish population productivity. Marine and Coastal Fisheries, 15(6), e210276. https://doi.org/10.1002/mcf2.10276

Mahon, R., Brown, S. K., Zwanenburg, K. C., Atkinson, D. B., Buja, K. R., Claflin, L., Howell, G. D., Monaco, M. E., O'Boyle, R. N., and Sinclair, M. (1998). Assemblages and biogeography of demersal fishes of the east coast of North America. Canadian Journal of Fisheries and Aquatic Sciences, 55(7), 1704–1738. https://doi.org/10.1139/f98-065

Melvin, G. D., Stephenson, R. L., and Power, M. J. (2009). Oscillating reproductive strategies of herring in the western Atlantic in response to changing environmental conditions. ICES Journal of Marine Science, 66(8), 1784–1792. https://doi.org/10.1093/icesjms/fsp173

Mordret, S., MacKinnon, J., Behnke, J., O'Leary, S. J. B., and Chénard, C. (2024). Identification of phytoplankton isolates from the eastern Canadian waters using long-read sequencing. Journal of Plankton Research, 46(6), 527–541. https://doi.org/10.1093/plankt/fbae043

Murillo, F. J., Muñoz, P. D., Cristobo, J., Ríos, P., González, C., Kenchington, E., and Serrano, A. (2012). Deep-sea sponge grounds of the Flemish Cap, Flemish Pass and the Grand Banks of Newfoundland (Northwest Atlantic Ocean): Distribution and species composition. Marine Biology Research, 8(9), 842–854. https://doi.org/10.1080/17451000.2012.682583

Murillo, F. J., Weigel, B., Clark, D., and Kenchington, E. (2024). Hierarchical modelling of epibenthic communities on the Scotian Shelf and Gulf of Maine (Atlantic Canada) in support of conservation planning. Canadian Journal of Fisheries and Aquatic Sciences, 81(12), 1752–1772. https://doi.org/10.1139/cjfas-2023-0326

NOAA (National Oceanic and Atmospheric Administration Fisheries). (2026, August 31). Atlantic salmon and ocean ecology. NOAA Fisheries. https://www.fisheries.noaa.gov/new-england-mid-atlantic/endangered-species-conservation/atlantic-salmon-and-ocean-ecology

Pepin, P., Johnson, C. L., Harvey, M. Casault, B. Chassé, J., Colbourne, E. B., Galbraith, P. S., Hebert, D., Lazin, G. Maillet, G., Plourde, S. Starr, M. (2015) A multivariate evaluation of environmental effects on zooplankton community structure in the western North Atlantic. Progress in Oceanography 134: 197-220. https://doi.org/10.1016/j.pocean.2015.01.017

O'Brien, J. M., Wong, M. C., and Stanley, R. R. (2022). Fine-scale ensemble species distribution modeling of eelgrass (*Zostera marina*) to inform nearshore conservation planning and habitat management. *Frontiers in Marine Science*, 9, 988858.

Ricard, D., Gomez, C., Emberley, J., Regnier-McKellar, C. and Martin, R. 2022. Marine fish and invertebrate atlas: geographic distribution, population indices and environmental associations of marine species in the Scotian Shelf and Bay of Fundy derived from the annual Maritimes summer survey (1970-2020). Can. Tech. Rep. Fish. Aquat. Sci. 3498: viii+192p

Roberts, J. M., Wheeler, A. J., and Freiwald, A. (2006). Reefs of the Deep: The Biology and Geology of Cold-Water Coral Ecosystems. Science, 312(5773), 543–547. https://doi.org/10.1126/science.1119861

Scrosati, R. A., and Ellrich, J. A. (2018). Benthic–pelagic coupling and bottom-up forcing in rocky intertidal communities along the Atlantic Canadian coast. Ecosphere, 9(5), e02229. https://doi.org/10.1002/ecs2.2229

Song, H., Ji, R., Stock, C., Kearney, K., and Wang, Z. (2011). Interannual variability in phytoplankton blooms and plankton productivity over the Nova Scotian Shelf and in the Gulf of Maine. Marine Ecology Progress Series, 426, 105–118. https://doi.org/10.3354/meps09002

Stortini, C. H. (2015). A description of the habitats and special natural features within the Scotian Slope Ecologically and Biologically Significant Area in the Maritimes Region. (Can. Tech. Rep. Fish. Aquat. Sci. 3136, p. iv + 53). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2016/mpo-dfo/Fs97-6-3136-eng.pdf

Tremblay, M. J., Black, G. A. P., and Branton, R. M. (2007). The distribution of common decapod crustaceans and other invertebrates recorded in annual ecosystem surveys of the Scotian Shelf 1999-2006 (Can. Tech. Rep. Fish. Aquat. Sci. 2762, p. iii + 74). https://waves-vagues.dfo-mpo.gc.ca/Library/331786.pdf

Wang, L., Kerr, L. A., Record, N. R., Bridger, E., Tupper, B., Mills, K. E., Armstrong, E. M., and Pershing, A. J. (2018). Modeling marine pelagic fish species spatiotemporal distributions utilizing a maximum entropy approach. Fisheries Oceanography, 27(6), 571–586. https://doi.org/10.1111/fog.12279

Wang, Z., Horwitz, R., Bowlby, H.D., Ding, F., Joyce, W.N. (2020) Changes in ocean conditions and hurricanes affect porbeagle *Lamna nasus* diving behavior. Mar Ecol Prog Ser 654:219-224 https://doi.org/10.3354/meps13503

Wang, S., Murillo, F. J., and Kenchington, E. (2022). Climate-Change Refugia for the Bubblegum Coral *Paragorgia arborea* in the Northwest Atlantic. Frontiers in Marine Science, 9, 863693. https://doi.org/10.3389/fmars.2022.863693

Wong, M. C., and Dowd, M. 2016. A model framework to determine the production potential of fish derived from coastal habitats for use in habitat restoration. *Estuaries and Coasts*, 39(6), 1785-1800

Wong, M. C., and Kay, L. M. (2019). Partial congruence in habitat patterns for taxonomic and functional diversity of fish assemblages in seagrass ecosystems. *Marine Biology*, 166(4), 46

Xue, T., Terhaar, J., Prowe, A. E. F., Frölicher, T. L., Oschlies, A., and Frenger, I. (2024). Southern Ocean phytoplankton under climate change: A shifting balance of bottom-up and top-down control. Biogeosciences, 21(10), 2473–2491. https://doi.org/10.5194/bg-21-2473-2024

Zhai, L., Platt, T., Tang, C., Sathyendranath, S., and Hernández Walls, R. (2011). Phytoplankton phenology on the Scotian Shelf. ICES Journal of Marine Science, 68(4), 781–791. https://doi.org/10.1093/icesjms/fsq175

Zhu, J., Cheng, J., Zeng, J., Zhang, W., Liu, C., Effiong, K. S., and Hao, Q. (2026). A Review of Phytoplankton Sinking Rates: Mechanisms, Methodologies, and Biogeochemical Implications. Biology, 15(2), 130. https://doi.org/10.3390/biology15020130

5.2.2 Marine Mammals and Sea Turtles

Marine mammals and sea turtles are important components of marine ecosystems within the Study Area. The occurrence and distribution of these two groups may vary spatially and seasonally in response to environmental conditions, prey availability, habitat preferences, and life history requirements. Several species known to occur within the Study Area are listed under SARA or have been assessed by COSEWIC, reflecting their conservation significance and the importance of Atlantic Canadian waters to their recovery and long-term persistence. Several EBSAs identified within the Scotian Shelf Bioregion

are noted as providing important habitat for both marine mammals, sea turtles, or both, and include the Eastern Scotian Shelf Canyons (the Gully Complex), Scotian Slope, Laurentian Channel, Roseway Basin, and other productive shelf-edge habitats (see Section 5.2.6 for detailed information on other offshore protected and special management areas). These areas support, feeding, migration, aggregation, and other life-history functions for numerous marine mammal and sea turtle species (Vanderlaan et al., 2025; King et al., 2016). The Study Area encompasses identified critical and important habitats for Endangered Northern bottlenose whale, Blue whale, and North Atlantic right whale (DFO, 2018, 2026b; Ratelle et al., 2025), as well as four IUCN important Marine Mammal Areas (IMMAs) ("Eastern Scotian Slope Canyons IMMA," n.d.; "Northwest Atlantic Canyon and Slope System IMMA," n.d.; "Sable Island Grey Seal Breeding Area IMMA," n.d.; "Western and Central Scotian Shelf Basins IMMA," n.d.)

5.2.2.1 Marine Mammals

Marine mammals are ecologically significant components of marine ecosystems and are also culturally, socially, recreationally, and economically important to Indigenous Peoples, coastal communities, governments, researchers, the public, and the marine tourism sector (DFO, 2016, 2026a).

A diverse assemblage of marine mammals occurs within or near the Study Area, including six species of baleen whales (Mysticeti), at least 18 species of toothed whales, dolphins and porpoises (Odontoceti), and at least four species of seals (pinnipeds) (Feyrer et al., 2026; Wildlife and Birds of Nova Scotia, n.d.). Species occurrence, abundance, and distribution may vary seasonally and spatially in response to oceanographic conditions, prey availability, migration patterns, and habitat preferences. The Scotian Shelf, Scotian Slope, and adjacent offshore waters provide important feeding, breeding and migratory areas, and in some cases are considered important habitats or have been designated as critical habitat pursuant to the SARA (DFO 2016, 2022a; Gómez-Salazar and Moors-Murphy, 2014; Hooker et al., 1999; Ratelle et al., 2025).

Table 5.2 provide a summary of marine mammal species known to occur within or near the Study Area that are considered species listed as at risk under SARA or have been assessed by COSEWIC. Further details on these species and other marine mammal species found in/near the Study Area are provided in Appendix 5-1.

Table 5.2 – Summary of Marine Mammals at risk or of conservation concern occurring in/near the Study Area.

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area

Blue Whale (Atlantic population) (*Balaenoptera musculus*)	Endangered	Endangered	• Year-round presence in the offshore waters of Nova Scotia including coastal waters and open ocean: Eastern Scotian Shelf Canyons, with high sighting and acoustic detection rates at The Gully and in Emerald Basin. • Frequently observed in waters with high abundance of krill.
Fin whale (Atlantic population) (*Balaenoptera physalus*)	Special Concern	Special Concern	• Present throughout the Study Area year-round. • More information is available for summer feeding grounds, while less is known about calving and breeding sites.
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Endangered	• Present year-round mainly in shelf waters: particularly Outer Bay of Fundy and Roseway Basin EBSA. • Presence is lowest in winter, increases in spring and summer, and peaks in fall. • Scotian Shelf and adjacent offshore habitats form part of the broader seasonal range and migratory corridor. • NARW migrate to/from the Gulf of St. Lawrence and other areas along the Scotian Shelf rather than along the Scotian Slope.
Sei whale (Atlantic population) (*Balaenoptera borealis*)	Under Consideration for Addition to Schedule 1	Endangered	• Common both along the Scotian Shelf and in the Bay of Fundy • Present year-round in Atlantic Canada.
Beluga whale (St. Lawrence Estuary	Endangered	Endangered	• Rare, although individuals may occasionally occur in the Study Area, this is outside the normal

DRAFT

population) (*Delphinapterus leucas*)			distributional range of beluga (which includes the St. Lawrence Estuary and Gulf of St. Lawrence, and the Arctic).
Killer whale (Northwest Atlantic and Eastern Arctic population) (*Orcinus orca*)	No Status (Under consideration for addition)	Special Concern	• Relatively few sightings on Scotian Shelf at various times of year.
Northern bottlenose whale (Scotian shelf population) (*Hyperoodon ampullatus*)	Endangered	Endangered	• Present year-round in deep water habitats of the eastern Scotian Shelf, including The Gully and associated canyons.
Sowerby's beaked whale (*Mesoplodon bidens*)	Special Concern	Special Concern	• Found in deep waters of the Gully and associated canyons and elsewhere along the shelf edge year-round.
Harbour porpoise (Northwest Atlantic population) (*Phocoena phocoena*)	No Status	Special Concern	• Present year-round in shallow coastal waters and throughout the Scotian Self.

Note: Table adapted from the Regional Assessment of Offshore Wind Development in Nova Scotia (2025)

Sources: Bartha et al., 2011; Beauchamp et al., 2009; Bowen et al., 2003; Bowen and Harrison, 2007; Breeze et al., 2002; Bundy et al., 2014; Cole et al., 2013; Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025; COSEWIC, 2006c, 2008b, 2019b, 2019c, 2019d, 2019e, 2026; Davis et al., 1998, DFO, 1998, 2011a, 2011b, 2012b,, 2016a, 2016b,, 2017, 2018, 2019; Duengen et al. 2022; Feyrer et al., 2024; Gowans and Whitehead, 1995; Hammill et al., 2010; Ingram et al., 2007; Jourdain et al., 2019; Keller et al., 2012; Kennedy et al., 2013; King et al., 2016; Lawson and Stenson, 1995; Lawson and Stevens, 2013; Lesage et al., 2017; Lucas et al., 2003; McAlpine et al., 2024; Moors-Murphy et al., 2025; NOAA, 2007b, 2014, 2015,

2016a, 2016b, 2017, 2020a, 2020b, 2020c, 2020d, 2020e, 2022a, 2022b; 2026a, 2026b; Olson, 2009; Ottensmeyer and Whitehead, 2003; Ramp et al., 2024; Ratelle et al., 2025; Servidio et al., 2019; Vacquié-Garcia et al., 2024; Vanderlaan and Moors-Murphy, 2025; Waring et al., 2011; Westgate and Read, 2007; Whitehead et al., 1992; Whitehead, 2013; Wingfield et al., 2022; Zwamborn and Whitehead, 2016

5.2.2.2 Sea Turtles

Four species of sea turtles have been documented within offshore waters of Nova Scotia; two of which are listed under SARA and have been assessed by COSEWIC (Curran et al., 2025) (Table 5.3). Leatherback sea turtle (*Dermochelys coriacea*) and loggerhead sea turtle (*Caretta caretta*) are the most frequently observed species, while sightings of Kemp's ridley sea turtle (*Lepidochelys kempii*), and green sea turtle (*Chelonia mydas*) are less common, which may be explained, in part, by the small size class distribution of both species in Atlantic Canadian waters and their relatively low representation in observed fisheries by catch.

Sea turtles occur in Atlantic Canadian waters primarily between late spring and autumn, when ocean temperatures and prey availability are favourable. The Scotian Shelf and adjacent offshore waters provide important seasonal foraging habitat, particularly for leatherback sea turtles (James et al., 2006).

Table 5.3 provides a summary of two sea turtle species known to occur within or near the Study Area that are considered listed as species at risk under SARA or have been assessed by COSEWIC. Further details on these species and other sea turtle species found in/near the Study Area is provided in Appendix 5-2.

Table 5.3 – Summary of SARA Listed Sea Turtles Occurring in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Leatherback Sea Turtle (Atlantic population) (*Dermochelys coriacea*)	Endangered	Endangered	• Extensive geographic range spanning open ocean and coastal waters from sub-polar regions to tropical nesting beaches • Does not nest in Canada. • Frequently occurs offshore Nova Scotia during summer and fall (June to November with peak occurrence July to October), where it forages on jellyfish.

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• Commonly observed along the Scotian Shelf nearshore waters through to the edge, slope, Laurentian Channel, Northeast Channel, Georges Bank, Sydney Bight, and St. Anns Bank. Portions of some of these areas are considered critical habitat for this species under SARA[8].
Loggerhead Sea Turtle (*Caretta caretta*)	Endangered	Endangered	• The species' known distribution in Atlantic Canada extends from Georges Bank to the southern Grand Banks • Regular (June - November) • Typically found offshore along the Scotian Shelf, Northeast Channel, Georges Bank, and Grand Banks • Habitat use is influenced by ambient ocean temperature, turtle size, and behaviour. • Does not nest in Canada • Worldwide in subtropical and temperate waters across the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea

Source: (Brazner and McMillan, 2008; Hall and James, 2021; CNSOPB, 2021, 2022; COSEWIC, 2010, 2012; Curran et al., 2025; DFO, 2010, 2020, 2022, 2026cb, 2026dc; DFO, 2020; Government of Canada, n.d.; James et al., 2024)

5.2.2.3 Key Areas and Times

As noted by Curran *et al*. (2005), significant knowledge gaps remain regarding marine mammals on the Scotian Shelf, including their abundance, population trends, distribution, and habitat use. Changes in environmental conditions associated with climate change,

[8] Formal designation is forthcoming.

together with shifts in prey abundance and distribution, are likely to influence future marine mammal population trends in the region.

Marine mammals occur throughout the Study Area, although distribution and abundance vary seasonally and among species groups. The Scotian Shelf and Scotian Slope and adjacent offshore waters provide habitat for feeding, migration, breeding, and other life-history functions. Areas of particular importance include shelf-edge habitats, submarine canyons (e.g., the Gully, Shortland Canyon, and Haldimand Canyon), oceanographic fronts, and regions of enhanced productivity where marine mammal prey tends to concentrate. These habitats support a diverse range of baleen whales, toothed whales, dolphins, porpoises, and pinnipeds. Several species are present year-round, while others occur primarily during seasonal migrations or peak feeding periods in spring, summer, and autumn (Table 5.2; Appendix 5-1).

The Gully, Shortland Canyon, and Haldimand Canyon support persistent concentrations of squid and deep-water fish that provide essential feeding habitat for deep-diving cetaceans. The steep bathymetry and enhanced productivity associated with canyon environments provides foraging opportunities and support high concentrations of deep-diving cetaceans, including sperm whales, Sowerby's beaked whales, and several dolphin species. For Northern Bottlenose Whales, the Gully represents critical habitat used for feeding, social behaviour, and rearing of calves. High sighting rates of blue whales and fin whales have also been reported within these canyon systems, particularly in the Gully and Emerald Basin. The shelf edge and continental slope similarly support important habitat for baleen whales, beaked whales, dolphins, and sperm whales, functioning as feeding areas and migration corridors associated with productive oceanographic features and prey aggregations.

Additional areas of regional importance include Roseway Basin (located beyond the Study Area boundary), an identified critical habitat area for North Atlantic right whales important for foraging, socializing, and reproduction, as well as Sable Island and adjacent offshore waters. Sable Island provides a unique ecological feature within the offshore environment that is unavailable throughout most of the Study Area. The island supports the world's largest breeding colony of grey seals in the world and provides important breeding, pupping, hauling-out, and resting habitat for other pinniped species as well. The surrounding waters are also used extensively for foraging and seasonal movements by seals.

The critically endangered Northern Right Whale have been reported year-round, except for March, although North Atlantic Right Whale upcalls are detected through acoustic monitoring efforts in all months, though infrequently from December through March (Curan et al, 2025).

In Atlantic Canada, sea turtles occur widely across the Scotian Shelf, including offshore waters and adjacent slope habitats. Occurrence is generally highest from late spring

through autumn, when warmer water temperatures and enhanced productivity provide suitable foraging conditions. Among offshore habitats, the Shelf-edge waters heavily influenced by the Gulf Stream, and areas characterized by a presence of abundant jellyfish and other prey are particularly important for species such as leatherback and loggerhead sea turtles. Most sea turtles occurring in the Study Area primarily use these waters as foraging habitat, with individuals resident in these areas for up to several months (Table 5.3; Appendix 5-2).

For sea turtles, the most important offshore habitats include the Scotian Shelf edge, continental slope, Laurentian Channel, Northeast Channel, Georges Bank, Sydney Bight and St. Anns Bank. Leatherback sea turtles frequently occur throughout these areas between June and November, with peak occurrence from July through October, where they forage primarily on jellyfish. Loggerhead sea turtles utilize offshore Nova Scotia waters during the same period. Kemp's Ridley and green sea turtles are sighted less frequently, which may be explained, in part, by the small-size class distribution of both species in Atlantic Canadian waters and their relatively low representation in observed fisheries bycatch. Overall, summer and autumn represent the periods of greatest overlap between sea turtle distributions and offshore exploratory drilling activities within the Study Area.

Despite the recognized importance of the various habitats present, information on species abundance, distribution, population trends, and habitat use remains limited across the Study Area. Furthermore, given that potential offshore exploratory drilling activities are unlikely to occur soon (i.e. 5-8 years), oceanographic changes such as climate change and shifts in prey availability may also alter where and when species occur. Additional, contemporary, site-specific information will therefore be needed for future exploratory oil and gas drilling projects to characterize species occurrence and habitat use (including the location of important habitat for marine mammals), assess potential effects, and inform appropriate mitigation, monitoring, and follow-up measures.

5.2.3 References

Bartha, G.B., Gowans, S., Simard, P., Tetley, M., and Keith, E.O. (2011). Population size and site fidelity of North Atlantic minke whales (*Balaenoptera acutorostrata acutorostrata*) off the Atlantic coast of Nova Scotia, Canada. Aquatic Mammals, 37(4), 454-463. https://www.proquest.com/openview/e8ed80840b08e040f909bd9ea5d0f543/1?pq-origsite=gscholarandcbl=38594

Bernier, R. Y., Jamieson, R. E., Kelly, N. E., Lafleur, C., and Moore, A. M. (eds.) (2023). State of the Atlantic Ocean Synthesis Report (Can. Tech. Rep. Fish. Aquat. Sci. 3544, p. v + 219). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2023/mpo-dfo/Fs97-6-3544-eng.pdf

Beauchamp, J., Bouchard, H., de Margerie, P., Otis, N., and Savaria, J-Y. (2009). Recovery strategy for the blue whale (*Balaenoptera musculus*), Norwest Atlantic population, in Canada. Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. 62 pp. https://species-registry.canada.ca/index-en.html#/consultations/1773

Bowen, W.D., McMillan, J., and Mohn, R. (2003). Sustained exponential population growth of grey seals at Sable Island, Nova Scotia. ICES Journal of Marine Science, 60(6), 1265-1274. https://doi.org/10.1016/S1054-3139(03)00147-4

Bowen, W.D., and Harrison, G. (2007). Seasonal and interannual variability in grey seal diets on Sable Island, eastern Scotian Shelf. NAMMCO Scientific Publications, 6. https://doi.org/10.7557/3.2728

Breeze, H., Fenton, D. G., Rutherford, R. J., and Silva, M. A. (2002). The Scotian Shelf: An ecological overview for ocean planning (Can. Tech. Rep. Fish. Aquat. Sci. 2393, p. x + 259). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2012/mpo-dfo/Fs97-6-2393-eng.pdf

Brazner, J. C., and McMillan, J. (2008). Loggerhead turtle (*Caretta caretta*) bycatch in Canadian pelagic longline fisheries: Relative importance in the western North Atlantic and opportunities for mitigation. Fisheries Research, 91(2-3), 310–324.

Bundy, A., Themelis, D., Sperl, J., and den Heyer, N. (2014). Inshore Scotian Shelf Ecosystem Overview Report: Status and Trends (Can. Sci. Advis. Sec. Res. Doc. 2014/065, p. xii + 213). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/360197.pdf

CNSOPB. (2021). *Western Scotian Shelf and Slope Strategic Environmental Assessment. CNSOER*. https://cdn.cnsoer.ca/sites/default/files/2025-01/western_scotian_shelf_and_slope_sea_-_march_2021.pdf

CNSOPB. (2022). *Strategic Environmental Assessment: Middle and Eastern Scotian Slope and Sable Island Bank Areas*. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_sea_26_may_2022_0.pdf

Cole, T.V.N., Hamilton, P., Henry, A.G., Duley, P., Pace III, R.M., White, B.N., and Frasier, T. (2013). Evidence of a North Atlantic right whale *Eubalaena glacialis* mating ground. Endangered Species Research, 21, 55-64. https://doi.org/10.3354/esr00507

Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia. (2025). Regional Assessment of Offshore Wind Development in Nova Scotia: Final

Report. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

COSEWIC. (2002). COSEWIC assessment and update status report on the Blue Whale *Balaenoptera musculus* in Canada (p. vi + 32). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/blue-whale-2002.html

COSEWIC. (2006c). COSEWIC assessment and update status report on the harbour porpoise *Phocoena phocoena* (Northwest Atlantic population) in Canada, Committee on the Status of Endangered Wildlife in Canada. Ottawa. 32 pp. https://wildlife-species.az.ec.gc.ca/species-risk-registry/virtual_sara/files//cosewic/sr_harbour_porpoise_e2.pdf

COSEWIC. (2008b). COSEWIC assessment and status report on the killer whale Orcinus orca in Canada. Committee on the Status of Endangered Wildlife in Canasa. Ottawa. 65 pp. https://wildlife-species.az.ec.gc.ca/species-risk-registry/virtual_sara/files//cosewic/sr_killer_whale_0809_e.pdf

COSEWIC. (2010). COSEWIC assessment and status report on the Loggerhead Sea Turtle *Caretta caretta* in Canada (p. vii + 75). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/loggerhead-sea-turtle-2010.html#_Toc263150036

COSEWIC. (2012). COSEWIC assessment and status report on the Leatherback Sea Turtle *Dermochelys coriacea* in Canada (p. xv + 58). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/leatherback-sea-turtle-2012.html

COSEWIC. (2013). COSEWIC assessment and status report on the North Atlantic Right Whale *Eubalaena glacialis* in Canada (p. xi +58). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/north-atlantic-right-whale-2013.html#_doc

COSEWIC. (2014). COSEWIC assessment and status report on the Beluga Whale *Delphinapterus leucas*, St. Lawrence Estuary population, in Canada (p. xii + 64). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2016/eccc/CW69-14-703-2015-eng.pdf

COSEWIC. (2018). *Sei whale (Balaenoptera borealis) COSEWIC assessment and status report: Chapter 4*. Government of Canada. Sei whale (Balaenoptera borealis). https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/sei-whale/chapter-4.html

COSEWIC. (2019a). COSEWIC assessment and status report on the Fin Whale *Balaenoptera physalus*, Atlantic population and Pacific population, in Canada (p. xv + 72). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2020/eccc/CW69-14-428-2019-eng.pdf

COSEWIC. (2019b). COSEWIC assessment and status report on the Sowerby's Beaked Whale *Mesoplodon bidens* in Canada (p. xi + 41). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2020/eccc/CW69-14-502-2019-eng.pdf

COSEWIC. (2019c). COSEWIC assessment and status report on the Sei Whale *Balaenoptera borealis*, Atlantic population, in Canada (p. xi + 48). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2020/eccc/CW69-14-335-2019-eng.pdf

COSEWIC. (2019d). COSEWIC assessment and status report on the Sowerby's beaked whale *Mesoplodon bidens* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, 41 pp. https://wildlife-species.az.ec.gc.ca/species-risk-registry/virtual_sara/files//cosewic/SrBaleineBecSowerbyBeakedWhale-v00-2019-Eng.pdf

COSEWIC. (2019e). COSEWIC assessment and status report on the ringed seal *Pusa hispida* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 82 pp. https://wildlife-species.az.ec.gc.ca/species-risk-registry/virtual_sara/files//cosewic/sr-PhoqueAnneleRingedSeal-v00-2020ct-Eng.pdf

COSEWIC. (2022). COSEWIC assessment and status report on the Harbour Porpoise *Phocoena phocoena*, Northwest Atlantic population, in Canada (p. xii + 46). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2023/eccc/CW69-14-232-2022-eng.pdf

COSEWIC. (2023). COSEWIC assessment and status report on the Killer Whale *Orcinus orca*, Northeast Pacific Southern Resident population, Northeast Pacific Northern Resident population, Northeast Pacific Transient Killer Whale population, Northeast

Pacific Offshore population, and Northwest Atlantic / Eastern Arctic population in Canada (p. xxxi + 114). Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC. (2023). COSEWIC assessment and update status report on the Killer Whale *Orcinus orca*, Southern Resident population, Northern Resident population, West Coast Transient population, Offshore population and Northwest Atlantic / Eastern Arctic population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/killer-whale-2023.html

COSEWIC. (2024). COSEWIC assessment and status report on the Northern Bottlenose Whale *Hyperoodon ampullatus*, Davis Strait-Baffin Bay-Labrador Sea population and Scotian Shelf population, in Canada (p. xviii + 58). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/northern-bottlenose-whale-2024.html

COSEWIC. (2026). COSEWIC candidate wildlife species. COSEWIC. https://cosewic.ca/index.php/en/reports/candidate-wildlife-species.html#mm

Curran, K. J., Nagel, E. J., Murphy, S. A., Huskins-Shupe, M. L., and Marotte, E. C. (2025). Four Wind Energy Areas (WEA) in the offshore of Nova Scotia: A description of the primary marine ecosystem features, significant and protected areas, at-risk and depleted species, fish and fisheries, science surveys, and other human uses that may occur in and around the French Bank, Middle Bank, Sable Island Bank, and Sydney Bight Areas (Can. Manuscr. Rep. Fish. Aquat. Sci. 3312, p. ix + 65.). Fisheries and Oceans Canada. https://doi.org/10.60825/KP16-ZX06

Davis, R.A., Thompson, D.H., and Malme, C.I. (1998). Environmental Assessment of Seismic Exploration on the Scotian Shelf. Report by LGL Limited.

Delarue, J., K.A. Kowarski, E.E. Maxner, J.T. MacDonnell, and S.B. Martin. 2018. Acoustic Monitoring Along Canada's East Coast: August 2015 to July 2017. Document Number 01279, Environmental Studies Research Funds Report Number 215, Version 1.0. Technical report by JASCO Applied Sciences for Environmental Studies Research Fund, Dartmouth, NS, Canada. 120 pp + appendices.

DFO. (1998). The Gully: A Scientific Review of its Environment and Ecosystem. Canadian Stock Assessment Secretariat Research Document.

DFO. (2010). Recovery Potential Assessment for Loggerhead Sea Turtle (*Caretta Caretta*) in Atlantic Canada (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/042). Fisheries and

Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/341241.pdf

DFO. (2011a). The Marine Environment and Fisheries of Georges Bank, Nova Scotia: Consideration of the Potential Interactions Associated with Offshore Petroleum Activities. Can. Tech. Rep. Fish. Aquat. Sci. 2945:xxxv + 492pp.

DFO. (2011b). The Scotian Shelf in Context. State of the Scotian Shelf Report. 67 pp.

DFO. (2012b). Recovery strategy for the beluga whale (*Delphinapterus leucas*) St. Lawrence Estuary population in Canada. Species at Risk Act recovery strategy series. Ottawa. 88 pp. https://wildlife-species.az.ec.gc.ca/species-risk-registry/virtual_sara/files//plans/rs_st_laur_beluga_0312_e.pdf

DFO. (2014). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs70-6-2014-041-eng.pdf

DFO. (2016a). Fin whale (*Balaenoptera physalus*), Atlantic population: Management plan. Government of Canada. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/management-plans/fin-whale-atlantic-population.html

DFO. (2016b). Recovery Strategy for the Northern Bottlenose Whale, (*Hyperoodan ampullatus*), Scotian Shelf population, in Atlantic Canadian Waters (Species at Risk Act Recovery Strategy Series, p. vii + 70). Fisheries and Oceans Canada, Ottawa. https://publications.gc.ca/collections/collection_2016/mpo-dfo/En3-4-66-2014-eng.pdf

DFO. (2017). Threat Assessment for Loggerhead Sea Turtle (*Caretta caretta*), Northwest Atlantic Population (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/014). Fisheries and Oceans Canada. https://csas-scas.dfo-mpo.gc.ca/publications-publications/654eb5c6-e29c-4a08-8fcb-a6abe4ede8dc?lang=en

DFO. (2018). Identification of habitats important to the blue whale in the western North Atlantic. (Can Sci. Advis. Sec. Sci. Advis. Rep. 2018/003). Fisheries and Ocean Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40687776.pdf

DFO. (2019). Atlantic Hagfish. Government of Canada. https://www.dfo-mpo.gc.ca/species-especes/profiles-profils/atl-hagfish-myxine-du-nord-eng.html

DFO. (2020). Using Satellite Tracking Data to Define Important Habitat for Leatherback Turtles in Atlantic Canada: 2019 Update (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/014). https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40966033.pdf

DFO. (2022). Marine mammals and sea turtles at risk in the Maritimes Region. https://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/maritimes-eng.html

DFO. (2023). Search aquatic species at risk. Government of Canada. https://www.dfo-mpo.gc.ca/species-especes/sara-lep/identify-eng.html?province=Nova%20Scotia

DFO. (2026a, May 19). Government of Canada invests $258.1 million to protect whales [News releases]. https://www.canada.ca/en/fisheries-oceans/news/2026/05/government-of-canada-invests-2581-million-to-protect-whales.html

DFO. 2026b). Important Habitat of Northern Bottlenose Whales, Scotian Shelf Population (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/006). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41315868.pdf

DFO. (2026c). Leatherback Sea Turtle (*Dermohelys coriacea*), Atlantic population. Government of Canada. https://species-registry.canada.ca/index-en.html#/species/1191-861

DFO. (2026d). Loggerhead Sea Turtle (*Caretta caretta*). Government of Canada. https://species-registry.canada.ca/index-en.html#/species/1090-753

Duengen, D., Burkhardt, E., and El-Gabbas, A. (2022). Fin whale (*Balaenoptera physalus*) distribution modeling on their Nordic and Barents Seas feeding grounds. Marine Mammal Science, 38(4), 1583−1608. https://doi.org/10.1111/mms.12943

Eastern Scotian Slope Canyons IMMA. (n.d.). Marine Mammal Protected Areas Task Force. Retrieved October 8, 2026, from https://www.marinemammalhabitat.org/factsheets/eastern-scotian-slope-canyons-imma/

Feyrer, L.J., Stanistreet, J.E., Gomez, C., Adams, M., Lawson, J.W., Ferguson, S.H., Heaslip, S.G., Lefort, K.J., Davidson, E., Hussey, N.E., Whitehead, H., and Moors-Murphy, H. (2024). Identifying important habitat for northern bottlenose and Sowerby's beaked whales in the western North Atlantic. Aquatic Conservation: Marine and Freshwater Ecosystems, 34(1), e4064. https://doi.org/10.1002/aqc.4064

Feyrer, L., Macklin, G., Stanistreet, J., and Moors-Murphy, H. (2026). Understanding the distribution and diversity of cetaceans in Nova Scotia's proposed offshore wind areas: A baseline synthesis (Version 3.2). Zenodo. https://doi.org/10.5281/ZENODO.21924816

Gómez-Salazar, C., and Moors-Murphy, H. B. (2014). Assessing Cetacean Distribution in the Scotian Shelf Bioregion using Habitat Suitablity Models (Can. Tech. Rep. Fish. Aquat. Sci. 3088, p. iv + 49). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2015/mpo-dfo/Fs97-6-3088-eng.pdf

Government of Canada. (n.d.). Loggerhead Sea Turtle (*Caretta caretta*). Species at Risk Public Registry. Retrieved October 8, 2026, from https://species-registry.canada.ca/index-en.html#/species/1090-753

Gowans, S., and Whitehead, H. (1995). Distribution and habitat partitioning by small odontocetes in the Gully, a submarine canyon on the Scotian Shelf. Canadian Journal of Zoology, 73(9). https://doi.org/10.1139/z95-190

Hall, K. E., and James, M. C. (2021). Predation of satellite-tagged juvenile loggerhead turtles *Caretta caretta* in the Northwest Atlantic Ocean. Endangered Species Research, 46, 279–291

Hammill, M.O., Bowen, W.D., and Sjare, B. (2010). Status of harbour seals (*Phoca vitulina*) in Atlantic Canada. NAMMCO Scientific Publications, 8. https://doi.org/10.7557/3.2684

Hooker, S. K., Whitehead, H., and Gowans, S. (1999). Marine Protected Area Design and the Spatial and Temporal Distribution of Cetaceans in a Submarine Canyon. Conservation Biology, 13(3), 592–602. https://doi.org/10.1046/j.1523-1739.1999.98099.x

Ingram, S.N., Walshe, L., Johnston, D., and Rogan, E. (2007). Habitat partitioning and the influence of benthic topography and oceanography on the distribution of fin and minke whales in the Bay of Fundy, Canada. Journal of the Marine Biological Administration of the United Kingdom, 87(1), 149-156. doi:10.1017/S002531540705488

James, M. C., Hall, K. E., Bond, E. P., Sherrill-Mix, S., and Plot, V. (2024). Post-release survival of loggerhead sea turtles (*Caretta caretta*) incidentally hooked in a North Atlantic pelagic longline fishery. *Frontiers in Marine Science*, 11, 1392582

James, M. C., Sherrill-Mix, S. A., Martin, K., and Myers, R. A. (2006). Canadian waters provide critical foraging habitat for leatherback sea turtles. Biological Conservation, 133(3), 347–357. https://doi.org/10.1016/j.biocon.2006.06.012

Jourdain, E., Ugarte, F., Víkingsson, G.A., Samarra, F.I.P., Ferguson, S.H., Lawson, J., Vongraven, D., and Desportes, G. (2019). North Atlantic killer whale Orcinus orca populations: A review of current knowledge and threats to conservation. Mammal Review, 49(4), 284-400. https://doi.org/10.1111/mam.12168

Keller, C.A., Garrison, L., Baumstark, R., Ward-Geiger, L.I., and Hines, E. (2012). Application of a habitat model to define calving habitat of the North Atlantic right whale in the southeastern United States. Endangered Species Research, 18(1), 73-87. https://doi.org/10.3354/esr00413

Kennedy, A.S., Zerbini, A.N., Vásquez, O.V., Gandilhon, N., Clapham, P.J., and Adam, O. (2013). Local and migratory movements of humpback whales (Megaptera novaeangliae) satellite-tracked in the North Atlantic Ocean. Canadian Journal of Zoology, 92(1). https://doi.org/10.1139/cjz-2013-0161

King, M., Fenton, D., Aker, J., and Serdynska, A. (2016). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion (Can. Sci. Advis. Sec. Res. Doc. 2016/007, p. viii + 92). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/363946.pdf

Lawson, J.W., and Stenson, G.B. (1995). Historic variation in the diet of harp seals (*Phoca groenlandica*) in the Northwest Atlantic. Developments in Marine Biology, 4, 261-269. https://doi.org/10.1016/S0163-6995(06)80029-6

Lawson, J.W., and Stevens, T.S. (2013). Historic and current distribution patterns and minimum abundance of killer whales (*Orcinus orca*) in the northwest Atlantic. Journal of the Marine Biological Administration of the United Kingdom, 94(6), 1253-1265. doi:10.1017/S0025315413001409. URL: https://www.cambridge.org/core/journals/journal-of-the-marine-biological-Administration-of-the-united-kingdom/article/historic-and-current-distribution-patterns-and-minimum-abundance-of-killer-whales-orcinus-orca-in-the-northwest-atlantic/B3A207BAE64073A80CDC65C94112E08C

Lesage, V., Gavrilchuk, K., Andrews, R.D., and Sears, R. (2017). Foraging areas, migratory movements and winter destinations of blue whales from the western North Atlantic. Endangered Species Research, 34, 27-43. https://doi.org/10.3354/esr00838

Lucas, Z., Daoust, P-Y., Conboy, G., and Brimacombe, M. (2003). Health status of harp seals (*Phoca groenlandica*) and hooded seals (*Cystophora cristata*) on Sable Island, Nova Scotia, Canada, concurrent with their expanding range. Journal of Wildlife Diseases, 39(1), 16-28. https://doi.org/10.7589/0090-3558-39.1.16

McAlpine, D.F., Wimmer, T., Ledwell, W., Daoust, P-Y., Bourque, L., Lawson, J.K., Bachara, W., Lucas, Z.N., Reid, G.A., Lain, S., François, A., and Michaud, R. (2024). A review of beaked whale (*Ziphiidae*) stranding incidents from the inshore waters of Eastern Canada. The Canadian Field-Naturalist, 137(3). https://doi.org/10.22621/cfn.v137i3.2967

Moors-Murphy, H.B., Macklin, G.F., Evers, C., Stanistreet, J.E., Colbourne, E.B., Wingfield, J.E., Xu, J., and Vanderlaan, A.S. 2025. Acoustic Occurrence of North Atlantic Right Whales (*Eubalaena glacialis*) from 2017-2022 off Nova Scotia, Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2025/049. v + 43 p.

NOAA (National Oceanic and Atmospheric Administration). (2007b). White-Beaked Dolphin (*Lagenorhynchus albirostris*): Western North Atlantic Stock. Marine Mammal Stock Assessment Report. 5 pp. https://media.fisheries.noaa.gov/dam-migration/ao2006dowb-wn-508.pdf

NOAA (National Oceanic and Atmospheric Administration). (2014). Atlantic Spotted Dolphin (*Stenella frontalis*): Western North Atlantic Stock. https://media.fisheries.noaa.gov/dam-migration/ao2013_spotteddolphin-wna_-_508_final.pdf

NOAA (National Oceanic and Atmospheric Administration). (2015). False killer whale (*Pseudorca crassidens*): Western North Atlantic Stock. https://www.fisheries.noaa.gov/s3/2023-07/74-falsekiller-F2014July-508.pdf

NOAA (National Oceanic and Atmospheric Administration). (2016a). Common Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Offshore Stock. https://www.fisheries.noaa.gov/s3/dam-migration/f2015-bodooffshorena-508-1-.pdf

NOAA (National Oceanic and Atmospheric Administration). (2016b). Risso's Dolphin (*Grampus griseus*): Western North Atlantic Stock. https://media.fisheries.noaa.gov/dam-migration/87_rissos_f2014august_508.pdf

NOAA (National Oceanic and Atmospheric Administration). (2017). Fin Whale (*Balaenopteraphysalus*): Western North Atlantic Stock. https://media.fisheries.noaa.gov/dam-migration/f2015_finwhale_508.pdf

NOAA (National Oceanic and Atmospheric Administration). (2020a). Pygmy sperm whale (*Kogia breviceps*): Western North Atlantic stock. https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_pygmyspermwhale.pdf

NOAA (National Oceanic and Atmospheric Administration). (2020b). False killer whale (*Pseudorca crassidens*): Western North Atlantic stock.

https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_falsekillerwhale.pdf

NOAA (National Oceanic and Atmospheric Administration). (2020c). Atlantic spotted dolphin (*Stenella frontalis*): Western North Atlantic stock. https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_atlanticspotteddolphin.pdf

NOAA (National Oceanic and Atmospheric Administration). (2020d). Common bottlenose dolphin (*Tursiops truncatus truncatus*): Western North Atlantic offshore stock. https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_offshorebottlenose.pdf

NOAA (National Oceanic and Atmospheric Administration). (2020e). White-beaked dolphin (*Lagenorhynchus albirostris*): Western North Atlantic stock. https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_whitebeakeddolphin.pdf

NOAA (National Oceanic and Atmospheric Administration). (2022a). Short-finned pilot whale (*Globicephala macrorhynchus*): Western North Atlantic stock. https://media.fisheries.noaa.gov/2022-08/Short%20Fin%20Pilot%20Whale-West%20N%20Atl%20Stock_SAR%202021.pdf

NOAA (National Oceanic and Atmospheric Administration). (2022b). Atlantic white-sided dolphin (*Lagenorhynchus acutus*): Western North Atlantic stock. https://media.fisheries.noaa.gov/2022-08/Atl%20White-Side%20Dolphin-West%20N%20Atl%20Stock_SAR%202021.pdf

NOAA (National Oceanic and Atmospheric Administration). (2026a). Blue whale (*Balaenoptera musculus*). https://www.fisheries.noaa.gov/species/blue-whale.

NOAA (National Oceanic and Atmospheric Administration). (2026b). Sei whale (*Balaenoptera borealis*). https://www.fisheries.noaa.gov/species/sei-whale.

Northwest Atlantic Canyon and Slope System IMMA. (n.d.). Marine Mammal Protected Areas Task Force. Retrieved October 8, 2026, from https://www.marinemammalhabitat.org/factsheets/northwest-atlantic-canyon-and-slope-system-imma/

Olson, P.A., (2009). Pilot whales: *Globicephala melas* and *G. macrorhynchus*. In: Enclyclopedia of Marine Mammals (Second Edition). 847-852. https://doi.org/10.1016/B978-0-12-373553-9.00197-8

Ottensmeyer, C.A., and Whitehead, H. (2003). Behavioural evidence for social units in long-finned pilot whales. Canadian Journal of Zoology, 81(8). https://doi.org/10.1139/z03-127

Ramp, C., Lesage, V., Ollier, A., Auger-Méthé, M., and Sears, R. (2024). Migratory movements for fin whales from the Gulf of St. Lawrence challenge our understanding of the Northwest Atlantic stock structure. Scientific Reports, 14, 11472. https://doi.org/10.1038/s41598-024-62173-1

Ratelle, S.M., Vanderlaan, A.S., Thompson, E.D., Sorochan, K.A., Pisano, O.M., and Labbé, A.C. 2025. Important Habitats of the North Atlantic Right Whale (*Eubalaena glacialis*) in Eastern Canadian Waters. DFO Can. Sci. Advis. Sec. Res. Doc. 2025/059. v + 131 p. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

Ricard, D., Gomez, C., Emberley, J., Regnier-McKellar, C. and Martin, R. 2022. Marine fish and invertebrate atlas: geographic distribution, population indices and environmental associations of marine species in the Scotian Shelf and Bay of Fundy derived from the annual Maritimes summer survey (1970-2020). Can. Tech. Rep. Fish. Aquat. Sci. 3498: viii+192p

Sable Island Grey Seal Breeding Area IMMA. (n.d.). Marine Mammal Protected Areas Task Force. Retrieved October 8, 2026, from https://www.marinemammalhabitat.org/factsheets/sable-island-grey-seal-breeding-area-imma/

Servidio, A., Pérez-Gil, E., Pérez-Gil, M., Cañadas, A., Hammond, P.S., and Martín, V. (2019). Site fidelity and movement patterns of short-finned pilot whales within the Canary Islands: Evidence for resident and transient populations. Aquatic Conservation, 29(S1), 227–241. https://doi.org/10.1002/aqc.3135

Stanistreet, J.E., Adams, M., Babin, A., Colbourne, N., Macklin, G.F., Moors-Murphy, H.B. 2026. Passive acoustic monitoring for beaked and baleen whales in deep slope waters around the Fundian Channel off southwestern Nova Scotia. Can. Tech. Rep. Fish. Aquat. Sci. 3802: iv + 28 p. https://doi.org/10.60825/g05g-a307

Vanderlaan, A.S.M., Labbé, A.C., and Moors-Murphy, H.B. 2025. Recovery Potential Assessment for the North Atlantic Right Whale (*Eubalaena glacialis*). DFO Can. Sci. Advis. Sec. Res. Doc. 2025/078. iv + 67 p.

Vacquié-Garcia, J., Spitz, J., Hammill, M., Stenson, G.B., Kovacs, K.M., Lydersen, C., Chimienti, M., Renaud, M., Fernandez, P.M., and du Dot, T.J. (2024). Foraging habits of Northwest Atlantic hooded seals over the past 30 years: Future habitat suitability under global warming. Global Change Biology, 30(3), e17186. https://doi.org/10.1111/gcb.17186

Waring, G.T., Josephson, E., Maze-Foley, K., and Rosel, P.E. (eds). (2011). US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2011. NOAA Tech. Memo. NMFS-NE 221.

Western and Central Scotian Shelf Basins IMMA. (n.d.). Marine Mammal Protected Areas Task Force. Retrieved April 15, 2026, from https://www.marinemammalhabitat.org/factsheets/western-and-central-scotian-shelf-basins-imma/

Westgate, A.J., and Read, A.J. (2007). Reproduction in short-beaked common dolphins (*Delphinus delphis*) from the western North Atlantic. Marine Biology, 150, 1011-1024. https://doi.org/10.1007/s00227-006-0394-1

Whitehead, H., Brennan, S., and Grover, D. (1992). Distribution and behaviour of male sperm whales on the Scotian Shelf, Canada. Canadian Journal of Zoology, 70(5). https://doi.org/10.1139/z92-130

Whitehead, H. (2013). Trends in cetacean abundance in the Gully submarine canyon, 1988–2011, highlight a 21% per year increase in Sowerby's beaked whales (*Mesoplodon bidens*). Canadian Journal of Zoology, 91: 141–148.

Wildlife and Birds of Nova Scotia. (n.d.). Retrieved October 9, 2026, from https://novascotia.ca/natr/wildlife/wns/wns8d.asp

Wingfield, J.E., Rubin, B., Xu, J., Stanistreet, J.E., and Moors-Murphy, H.B. (2022). Annual, seasonal, and diel patterns in blue whale call occurrence off eastern Canada. Endangered Species Research, 49, 71-86. https://doi.org/10.3354/esr01204

Zwamborn, E.M.J., and Whitehead, H. (2016). Repeated call sequences and behavioural context in long-finned pilot whales off cape Breton, Nova Scotia, Canada. Bioacoustics, 26(2), 169-183. https://doi.org/10.1080/09524622.2016.1233457

5.2.4 Aerofauna (including Species at Risk)

The province of Nova Scotia holds ecological importance for bird populations for breeding, feeding habitat, refuge, migratory destinations and staging areas for different species. Most migratory birds in Canada are protected under the federal *Migratory Birds Convention Act*. In Nova Scotia, SARA protects species at risk and their habitat at the federal level, combined with the provincial *Wildlife Act* and the *Endangered Species Act.*

Although bats are commonly classified as terrestrial mammals, they are often considered alongside birds under the broader category of aerofauna because of their ability to fly and their use of aerial environments during foraging, migration, and dispersal. The Nova

Scotian region is a habitat for various bat species, including migratory species and species at risk.

5.2.4.1 Birds

The offshore waters of Nova Scotia, including Sable Island, the Scotian Shelf, shelf break, slope waters, and adjacent coastal environments, support a diverse assemblage of marine and migratory birds. These habitats provide important breeding, foraging, staging, migratory, and wintering areas for seabirds, waterfowl, shorebirds, and other avifauna associated with the Northwest Atlantic. The region lies within a major Atlantic migratory corridor and supports both resident and migratory populations originating from eastern Canada, the Arctic, Greenland, Europe, and the Southern Hemisphere (Breeze et al., 2002; Bundy et al., 2014). Marine and migratory birds are protected under the *Migratory Birds Convention Act, 1994* and associated regulations, while several species and their critical habitats receive additional protection under SARA. Provincially, wildlife conservation is supported through Nova Scotia's *Wildlife Act* and protected-areas framework. In addition to their ecological functions, marine birds contribute substantially to tourism, recreation, Indigenous cultural values, and ecosystem functioning. On Sable Island, birds are also protected under the *Canada Wildlife Act* (Sable Island Migratory Bird Sanctuary) which protects migratory birds, their eggs, and their nests from hunting, handling, or disturbance and also restricts harmful human activities within the designated 3,100-hectare sanctuary boundaries (Parks Canada, 2019). The *Canada National Parks Act* was enacted for the Sable Island National Park Reserve (SNIPR) in 2013. Under this act, wildlife, including birds, is protected from industrial developments and unregulated tourism (Parks Canada, 2022).

Marine birds occurring in offshore Nova Scotia can generally be grouped into three broad categories: (1) seabirds, including alcids, storm-petrels, shearwaters, gulls, terns, gannets, skuas, and fulmars; (2) waterfowl and divers, including sea ducks, loons, and grebes; and (3) shorebirds, which are concentrated primarily in coastal and intertidal habitats but may occasionally occur offshore during migration. Species composition and abundance vary seasonally, with highest diversity generally occurring during migration periods and summer months when northern breeding species overlap with Southern Hemisphere migrants such as Great Shearwater (*Ardenna gravis*) and Sooty Shearwater (*Ardenna grisea*) (Breeze et al., 2002; Bundy et al., 2014).

Several avian species assessed by COSEWIC, listed under SARA, or provincial conservation frameworks may occur within or adjacent to offshore Nova Scotia (Table 5.4). In addition, several globally important seabird species that use offshore Nova Scotia are recognized by the IUCN as species of conservation concern, including Black-legged Kittiwake (Vulnerable), Atlantic Puffin (Vulnerable), and Leach’s Storm-petrel (Vulnerable) (BirdLife International, n.d.). Offshore Nova Scotia provides important feeding and migration habitat for these populations throughout the year (Curran et al., 2025).

Seabirds

The Scotian Shelf supports one of the most ecologically significant seabird assemblages in Atlantic Canada. Seabirds occurring in offshore Nova Scotia include Northern Gannet (*Morus bassanus*), Black-legged Kittiwake (*Rissa tridactyla*), American Herring Gull (*Larus smithsonianus*), Great Black-backed Gull (*Larus marinus*), Atlantic Puffin (*Fratercula arctica*), Common Murre (*Uria aalge*), Razorbill (*Alca torda*), Dovekie (*Alle alle*), Leach's Storm-petrel (*Hydrobates leucorhous*), Northern Fulmar (*Fulmarus glacialis*), and several species of shearwaters and jaegers. The productivity of the Scotian Shelf, shelf-edge fronts, offshore banks, and associated upwelling areas provides important feeding habitat throughout the year (ECCC, 2023; Fifield et al., 2009).

Leach's Storm-petrel (*Hydrobates leucorhoa*) is among the most important seabird species associated with offshore Nova Scotia. Significant breeding colonies with foraging grounds on the Scotian Shelf (Hedd et al. 2018; Mauck et al. 2023) occur on Bon Portage Island, Country Island, and Kent Island. Bon Portage Island supports approximately 50,000 breeding pairs, making it one of the largest colonies in Atlantic Canada. Country Island and Kent Island support an additional 36,000 and 21,000 pairs respectively, and numerous smaller colonies are located throughout eastern Nova Scotia, including Sable Island. The species was assessed as Threatened by COSEWIC in 2020 due to substantial population declines throughout Atlantic Canada, and it is considered globally Vulnerable by the IUCN. Documented threats include predation, light attraction, climate-driven changes in prey availability, contaminants, and mortality associated with offshore industrial activities and illuminated offshore infrastructure (COSEWIC, 2020; Gutowsky et al., 2023; Pollet et al. 2023).

Large numbers of alcids, including Common Murres, Razorbills, Atlantic Puffins, and Dovekies, use offshore Nova Scotia for migration and wintering. Alcids are highly susceptible to marine oil pollution because they spend prolonged periods resting on the water surface and rely on plumage integrity for insulation. Many species congregate in dense aggregations over productive shelf-edge habitats and offshore banks, increasing their potential exposure to oiling events and other marine disturbances (EC (Environment Canada), 2007, 2013; Fifield et al., 2009).

The Scotian Shelf is also an important feeding area for pelagic species originating from the Southern Hemisphere, including Great and Sooty Shearwaters, which occur in large numbers during the austral non-breeding season (May to October). Black-legged Kittiwakes (*Rissa tridactyla*), which have undergone substantial declines across portions of the North Atlantic, are common throughout offshore Nova Scotia, particularly during migration and winter (Bundy et al., 2014).

Waterfowl and Divers

Waterfowl and divers occur throughout Nova Scotia's marine and coastal waters, although most species are concentrated in nearshore habitats rather than offshore environments. Species with the greatest potential to occur within offshore project areas include Common Eider (*Somateria mollissima*), Long-tailed Duck (*Clangula hyemalis*), scoters (*Melanitta spp*.), Red-throated Loon (*Gavia stellata*), and Common Loon (*Gavia immer*) (Breeze et al., 2002; Bundy et al., 2014).

Large wintering concentrations of Common Eiders occur along the Atlantic coast and around Cape Breton Island. Sea ducks generally form large rafts in coastal and offshore waters from autumn through spring and may periodically occur within offshore development areas, particularly during migration and winter. Loons and grebes are less abundant offshore but may be encountered during seasonal movements (Breeze et al., 2002; Bundy et al., 2014).

Shorebirds

Nova Scotia supports numerous shorebird species during breeding, migration, and overwintering periods. Important habitats include tidal mudflats, estuaries, salt marshes, beaches, barrier islands, and coastal wetlands. Most shorebirds remain associated with coastal habitats and rarely occur offshore other than overflights during migration. Species commonly recorded include Semipalmated Sandpiper (*Calidris pusilla*), Least Sandpiper (*Calidris minutilla*), Greater Yellowlegs (*Tringa melanoleuca*), Hudsonian Whimbrel (*Numenius hudsonicus*), Red Knot (*Calidris canutus*), Sanderling (*Calidris alba*), and Semipalmated Plover (*Charadrius semipalmatus*) (Breeze et al., 2002).

Phalaropes, particularly Red-necked Phalarope (*Phalaropus lobatus*), differ from most shorebirds in that they spend substantial periods in pelagic waters. Historically, exceptionally large concentrations have been reported in marine waters near Brier Island and the Bay of Fundy region during migration, where they exploit highly productive oceanographic features.

Sable Island serves as an important migratory stopover and refuge for Arctic-breeding shorebirds, including White-rumped Sandpiper, Pectoral Sandpiper, and Semipalmated Sandpiper, as well as several SARA-listed or COSEWIC-assessed shorebird species (Table 5.4). While shorebirds are generally less exposed to offshore developments than pelagic seabirds, they remain vulnerable during nocturnal migration, particularly during adverse weather conditions. Potential interactions with offshore exploration activities include attraction to lighting, flaring-related mortality, collisions with illuminated infrastructure, temporary attraction to offshore structures, disturbance from vessel traffic, and contamination resulting from accidental hydrocarbon releases. These risks are expected to be greatest during peak spring and fall migration periods when large numbers of Arctic-breeding shorebirds move through the Scotian Shelf and Sable Island region (Parks Canada, 2024; Ronconi, 2015).

Although landbirds do not breed or reside in offshore marine environments, offshore area of Nova Scotia may constitute migratory airspace for many species during spring and fall migration. Nova Scotia occupies a strategic geographic position in the western North Atlantic and is crossed by substantial seasonal movements of migratory birds. Landbirds may therefore pass through or over the region during movements between breeding and wintering grounds, although the density and species composition of offshore movements will vary spatially and temporally.

Many landbird species undertake extensive nocturnal migrations and may traverse offshore airspace during direct over-water flights. Offshore islands, including Sable Island, and coastal habitats can provide stopover opportunities for migrating birds, particularly when adverse weather interrupts migration or cause birds to descend. Migrants may also occur offshore after displacement by strong winds, storms, fog, precipitation, or other meteorological conditions. Consequently, although offshore marine habitats generally do not provide breeding or regular foraging habitat for landbirds, the offshore region may function as migratory airspace and, to a lesser extent, as stopover habitat.

Potential interactions between landbirds and offshore exploratory drilling activities are expected to occur primarily during migration periods. Offshore drilling units and associated vessels may introduce artificial lighting into the marine environment, that can attract, disorient, or alter the behaviour of migratory birds, particularly nocturnal migrants. A review of offshore oil and gas platforms found that attraction to lights and flares, sometimes followed by collisions, is among the most frequently reported effects for both seabirds and landbirds; the risk may be exacerbated when fog, precipitation, or low cloud coincides with migration (Ronconi et al., 2015). Under conditions of fog, precipitation, low cloud cover, or poor visibility, migratory birds may fly at lower altitudes or become concentrated around illuminated structures, increasing opportunities for interaction with drilling units, support vessels, cranes, flare booms, and other above-water infrastructure. Attraction to illuminated structures may result in prolonged circling, altered migration behaviour, increased energy expenditure, and elevated collision or stranding risk (Ronconi et al., 2015; Russell, 2005).

Flaring, where required for operational or safety purposes, may further increase attraction risks for some migratory birds. Birds attracted to illuminated facilities or flares may experience increased mortality through direct collision or exhaustion, incineration, stranding, or exhaustion, particularly when intense migration coincides with adverse weather. The likelihood of such interactions is generally greatest during spring and fall migration and lower during breeding and wintering periods, when most landbirds occupy terrestrial habitats (Ellis et al., 2013; Ronconi et al., 2015).

Because offshore exploratory drilling activities are localized and temporary relative to the scale of regional migration systems, effects on landbirds would generally be expected to involve individual birds passing through the area rather than direct effect on breeding habitat. However, cumulative exposure to multiple offshore structures, combined with

attraction effects associated with lighting and flaring, may contribute to increased risk for migratory landbirds that regularly use offshore airspace (Ellis et al., 2013; Ronconi et al., 2015).

Table 5.4 – Birds and insects of Special Status occurring in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Birds			
Bank Swallow (*Riparia riparia*)	Threatened	Threatened	• Temporary visitor to Sable Island primarily appearing as a transient or accidental vagrant during migration season. • Migrates across coastal and offshore areas; may occur over marine waters during migration. • April - October
Barn Swallow (*Hirundo rustica*)	Special Concern	Special Concern	• Adults are regularly seen on Sable Island. • Frequently observed along coasts and over offshore waters during migration. • April - October
Barrow's Godeneye (Eastern population (*Bucephala islandica*)	Special Concern	Special Concern	• Occurs only in small numbers in coastal and nearshore marine waters of Nova Scotia during winter, with records concentrated around Annapolis River Pugwash, and Pictou. • Considered very rare in Nova Scotia as the province lies at that periphery of the population's winter range. • They are centered in Québec where most of the birds breed and winter

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Bicknell's Thrush (*Catharus bicknelli*)	Threatened	Threatened	• May cross offshore waters during spring and fall migration – considered an accidental vagrant or rare migrant on Sable Island. • May - October
Bobolink (*Dolichonyx oryzivorus*)	Specil Concern	Special Concern	• Migrant occasionally occurring over offshore waters – considered primarily as a migrant or accidental vagrant on Sable Island. • May - September
Buff-breasted Sandpiper (*Calidris subruficollis*)	Special Concern	Special Concern	• Rare migrant along Atlantic coast and offshore islands. • Recorded on Sable Island as a rare or uncommon migrant visitor. • August - October
Canada Warbler (*Cardellina canadensis*)	Special Concern	Special Concern	• Migrates through Atlantic Canada; may cross offshore waters. • Rare migrant visitor to Sable Island. • May - October
Chimney Swift (*Chaetura pelagica*)	Threatened	Threatened	• May occur over offshore waters during migration. • Recorded as a rare or accidental visitor on Sable Island. • May - September
Common Nighthawk	Special Concern	Special Concern	• Migratory species that may traverse offshore waters. • Rare visitor to Sable Island.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
(*Chordeiles minor*)			• May – October
Eastern Whip-poor-will (*Antrostomus vociferus*)	Special Concern	Special Concern	• Occasional migrant crossing coastal and offshore areas. • Very rare on Sable Island – only considered as an accidental vagrant. • May – October
Eastern Wood-Pewee (*Contopus virens*)	Special Concern	Special Concern	• Migratory species that may occur offshore during migration. • Recorded as a rare visitor on Sable Island. • May – October
Gray-cheeked Thrush (minimus subspecies) (*Catharus minimus minimus*)	Not Listed (Under consideration for addition)	Threatened	• Migratory movements can include offshore Atlantic Canada. • Regular migrant to Sable Island. • May – June; August - October
Harlequin Duck (Eastern Population) (*Histrionicus histrionicus*)	Special Concern	Special Concern	• Coastal and offshore marine waters during winter and migration. • Considered an exceptionally rare visitor to Sable Island. • August - May
Horned Grebe (Magdalen Islands Population) (*Podiceps auritus*)	Not Listed (Under consideration for addition)	Special Concern	• Offshore and nearshore marine waters during migration and winter. • Occasionally found on Sable Island, though it is considered a rare or accidental visitor. • September - April

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Hudsonian Godwit (*Limosa haemastica*)	Not Listed (Under consideration for addition)	Threatened	• Migrant through coastal and offshore Atlantic regions. • Utilize Sable Island as a migratory stopover. • May – June; July - October
Ivory Gull (*Pagophila eburnea*)	Endangered	Endangered	• Rare winter visitor to offshore Nova Scotia waters. • Considered a rare and accidental vagrant on Sable Island. • November - April
Leach's storm-petrel (*Hydrobates eucorhous*)	Not Listed (Under consideration for addition)	Threatened	• Widespread over the Scotian Shelf; major breeding colonies occur on coastal and offshore islands including Sable Island. • April - November
Lesser Yellowlegs (*Tringa flavipes*)	Not Listed (Under consideration for addition)	Threatened	• Migrates through Atlantic coastal habitats and offshore islands. • May – June; July - October • Recorded as a migrant visitor to Sable Island.
Olive-sided Flycatcher (*Contopus cooperi*)	Special Concern	Special Concern	• Migratory species potentially crossing offshore waters. • Considered a rare or accidental visitor to Sable Island. • May - September
Piping plover (*melodus* subspecies)	Endangered	Endangered	• Occurs in coastal and nearshore habitats bordering offshore waters • Distribution is concentrated on sandy Atlantic and Gulf coast

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			beaches of Nova Scotia during breeding season • Breeding habitat consists of barrier beaches, sand spits, dunes, and upper intertidal zones rather than marine offshore habitats.
Red Crossbill (percna subspecies) (*Loxia curvirostra percna*)	Threatened	Threatened	• Rare; may occur on Sable Island and during dispersal movements. • Year round, irregular
Red Knot (rufa subspecies) (*Calidris canutus rufa*)	Endangered	Endangered	• Migratory shorebird using Nova Scotia coastal habitats and offshore islands. • Noted as a migratory stopover visitor to Sable Island. • May – June; July - October
Red-necked Phalarope (*Phalaropus lobatus*)	Special Concern	Special Concern	• Migrates through offshore Nova Scotia, particularly over shelf waters and marine feeding areas. • Recorded during migration periods on Sable Island. • July to October, smaller spring passage
Roseate Tern (*Sterna dougallii*)	Endangered	Endangered	• Coastal and offshore waters of eastern Nova Scotia; • Small breeding colony on Sable Island. • May to September
Rusty Blackbird (*Euphagus carolinus*)	Special Concern	Special Concern	• Migratory species that may occur in offshore migration corridors.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• Classified as an accidental or transient vagrant on Sable Island. • April – May; August - October
Savannah Sparrow (Ipswich/princeps subspecies) (*Passerculus sandwichensis princeps*)	Special Concern	Special Concern	• Breeds exclusively on Sable Island; occurs in dune and coastal habitats and may be encountered near offshore infrastructure on Sable Island. • Primarily April to November; some overwintering.
Short-eared Owl (*Asio flammeus*)	Threatened	Threatened	• Migratory species occurring on offshore islands and coastal habitats. • Recorded as a rare or occasional visitor to Sable Island. • Year round; peak migration spring and fall
Wood Thrush (*Hylocichla mustelina*)	Threatened	Threatened	• Migrant that may traverse offshore Atlantic waters. • Recorded as rare, occasional vagrant or migration stopover visitor to Sable Island. • May – October
Insects			
Monarch (*Danaus plexippus*)	Threatened	Threatened	• Occurs throughout Nova Scotia during breeding and migration. • Migratory individuals may occur in coastal areas, on islands such as Sable Island, and potentially over offshore waters during seasonal movements.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
			• May – October; peak migration typically August to October

Note: Table adapted from Stantec (2019) and the NS OSW RA Report (2025), with supplementary information from Breeze et al. (2022), Bundy et al. (2014), DFO (2011), Gjerdrum et al. (2021), Government of Canada (n.d.). CNSOPB (2022), COSEWIC (2007, 2009b, 2009a, 2011, 2013a, 2013b, 2014, 2020).

5.2.4.2 Bats

Bat species are generally terrestrial in distribution; however, Nova Scotia's peninsular geography and extensive coastline place it along important migratory pathways and create opportunities for the use of coastal and offshore habitats for several bat species for both migration and foraging. Growing evidence indicates that several species regularly occur in offshore environments, particularly during seasonal migration periods (Doucette et al., 2024; Lucas and Hebda, 2011; Peterson et al., 2016).

While records of bats over water are most common in coastal and nearshore environments, studies from North America and Europe have demonstrated that bats can occur substantial distances from land. Bats have been recorded as far as 817 km offshore (Pelletier et al., 2013), although most observations along the Atlantic coast of North America occur within approximately 42 km of shore (Peterson et al., 2016). Solick and Newman (2021) reviewed oceanic records of North American bats and summarized multiple studies documenting regular offshore bat activity in coastal waters, including detections occurring within approximately 22-44 km of shore and at offshore monitoring sites up to about 42 km from coastline. Bats that undertake long-distance latitudinal migration, such as Eastern Red Bat (*Lasiurus borealis*) (COSEWIC-assessed Endangered) and Hoary Bat (*Lasiurus cinereus*) (COSEWIC-assessed Endangered), are especially known to traverse marine environments during spring and autumn migrations (Goodale et al., 2025). Recent evidence also indicates that smaller bat species, including members of the genus Myotis, may undertake offshore movements, although generally at smaller spatial scales than migratory tree bats (Doucette et al., 2024).

Several records confirm the presence of bats at considerable distances from the Nova Scotia coastline, including observations of bats resting on vessels, occupying offshore structures, or occurring on remote islands (Goodale et al., 2025; Lucas and Hebda, 2011: Solick and Newman, 2021). The reasons for these offshore occurrences are not always clear. Some observations may reflect purposeful migration, foraging, or dispersal behaviour, while others may result from displacement caused by storms or strong winds

(Solick and Newman, 2021; True et al., 2023). Consequently, the degree to which offshore habitats form an integral component of bat life-history strategies remains an area of active research (Peterson et al., 2016; Solick and Newman, 2021).

Sable Island provides some of the strongest evidence for offshore bat occurrence in the regional assessment area. Lucas and Hebda (2011) documented Silver-haired Bats (*Lasionycteris noctivagans*), Hoary Bats, and Eastern Red Bats on Sable Island between May and December. These species are among the larger-bodied bat species occurring in Nova Scotia and have extensive geographic ranges across North America (COSEWIC, 2023). More recently, acoustic monitoring conducted by Doucette et al. (2024) detected Silver-haired Bat, Eastern Red Bat, Hoary Bat, and Myotis species on Sable Island from late September through early December. There is currently no evidence that bats breed on the island. Earlier interpretations suggested that many occurrences may have resulted from storm-assisted displacement (Lucas and Hebda, 2011). However, recent findings suggest that Sable Island may function as a stopover location during southward migration and that at least some offshore movements are intentional rather than accidental (Doucette et al., 2024).

Bat populations in Atlantic Canada face a range of ongoing pressures, including white-nose syndrome, reduction in insect prey, pollution, habitat loss and fragmentation, climate change, collisions with wind turbines, and interactions with other human infrastructure (COSEWIC, 2023). Three migratory tree bat species the Hoary Bat, Eastern Red Bat, and Silver-haired Bat have been assessed by COSEWIC as Endangered (COSEWIC, 2023) in Canada, these species are characterized by long-distance seasonal movements to overwintering locations in the US and are the bat species most frequently documented in offshore environments. An overview of these bat species and their status under SARA and COSEWIC is provided in Table 5.5.

Table 5.5 – Summary of Listed Bats Occurring in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution in/near the Study Area
Eastern Red Bat (*Lasiurus borealis*)	Not Listed (Under consideration for addition)	Endangered	• May migrate across offshore Atlantic waters, including the Scotian Shelf. • Regularly pass through or stop over on Sable Island during autumn migration. • August to October.

Silver-haired Bat (*Lasionycteris noctivagans*)	Not Listed (Under consideration for addition)	Endangered	• Regular migratory offshore movements documented in Atlantic Canada. • Detected through acoustic monitoring on Sable Island. • August to October.
Hoary Bat (*Lasiurus cinereus*)	Not Listed (Under consideration for addition)	Endangered	• Frequently recorded offshore; one of the bat species most likely encountered in offshore Nova Scotia. • Detected through acoustic monitoring on Sable Island. • Primarily July to October.
Little Brown Myotis (*Myotis lucifugus*)	Endangered	Endangered	• Documented over coastal and offshore Atlantic waters during seasonal movements. • Recorded and detected in offshore and coastal island environments in Atlantic Canada, including Sable Island. • Primarily August to October and April to May.
Northern Myotis (*Myotis septentrionalis*)	Endangered	Endangered	• Detections are extremely rare – this bat species is a forest-dwelling species that lacks the long-distance migratory traits and open-water behavioral tendencies found in other bat species. • May occur over the Scotian Shelf during seasonal movements. • Identification of this species on Sable Island has not been definitively confirmed. • August to October and April to May.
Tri-coloured Bat (*Perimyotis subflavus*)	Endangered	Endangered	• Offshore records are extremely rare.

DRAFT

			• May occur over the Scotian Shelf during seasonal movements. • Has not been officially recorded on Sable Island.

Note: Table adapted from the NS OSW RA Report (2025), with supplementary information from COSEWIC (2023, 2013c), Government of Canada (n.d.)

5.2.4.3 Key Areas and Times

Several offshore areas are particularly important for aerofauna because they support feeding, breeding, migration, staging, stopover, and wintering functions. These include the Scotian Shelf and shelf-edge feeding habitats, offshore banks and frontal zones, Sable Island and surrounding waters, and major migratory corridors crossing offshore Nova Scotia. The Scotian Shelf supports one of the most ecologically significant seabird assemblages in Atlantic Canada, providing important feeding habitat for Northern Gannet, Atlantic Puffin, Common Murre, Razorbill, Black-legged Kittiwake, Leach's Storm-petrel, Northern Fulmar, shearwaters, and numerous other pelagic species. Shelf-edge fronts, offshore banks, and associated upwelling areas concentrate prey resources and support elevated densities of seabirds throughout the year.

Sable Island is among the most important locations for both birds and bats within the regional assessment area. It supports nesting and breeding colonies of various bird species, including a small breeding colony of Roseate Tern and the only breeding population of the Ipswich Savannah Sparrow. Though a landbird, Ipswich Sparrows migrate between the island and mainland Nova Scotia, across the Scotian Shelf (Crysler et al., 2015). Seabirds breeding on Sable Island, including two species of gulls and three species of terns, foraging in surrounding water (see Ronconi et al., 2022 for foraging ranges). The island also functions as a migratory stopover site for numerous shorebirds and passerines.

Observations of bats on Sable Island indicate connectivity between the island and mainland Nova Scotia and demonstrate that bats may use offshore environments during migration and other movements; however, the ecological role of Sable Island for bats remains an area of active research. While moderate numbers of gulls breed on the island, large numbers of Great Black-backed Gulls over-winter on the island (Ronconi et al., 2016), coming here from colonies throughout Atlantic Canada.

Nova Scotia lies within a major Atlantic migratory corridor linking eastern Canada, the Arctic, Greenland, Europe, and the Southern Hemisphere. Consequently, many migratory bird species may cross offshore waters during seasonal movements.

The period from April through November, and particularly August through October, represents the greatest potential for interactions between offshore exploratory drilling activities and aerofauna because it coincides with peak seabird abundance, migration activity, colonial breeding periods, and offshore bat movements. Spring migration (April to June) is characterized by movements of shorebirds, songbirds, swallows, waterfowl, and other migratory species through offshore Nova Scotia. Summer (June to August) corresponds with peak seabird abundance and breeding activity, including intensive use of offshore feeding habitats. Autumn (August to November) represents the period of greatest overlap between offshore infrastructure and migratory aerofauna, including large numbers of shorebirds, songbirds, and bats moving through offshore areas and utilizing Sable Island as a stopover location.

Overall, the Scotian Shelf, shelf edge, offshore banks, Sable Island, and major offshore migratory corridors represent the most important areas for birds and bats within the Study Area. These regions support key feeding concentrations, breeding colonies, migratory pathways, stopover habitat, and wintering assemblages, highlighting the importance of considering both spatial and temporal patterns of aerofauna use when evaluating potential interactions with offshore exploratory drilling activities.

5.2.5 References

BirdLife International. (n.d.). BirdLife DataZone. Retrieved July 22, 2026, from https://datazone.birdlife.org/

Breeze, H., Fenton, D. G., Rutherford, R. J., and Silva, M. A. (2002). The Scotian Shelf: An ecological overview for ocean planning (Can. Tech. Rep. Fish. Aquat. Sci. 2393, p. x + 259). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2012/mpo-dfo/Fs97-6-2393-eng.pdf

Bundy, A., Themelis, D., Sperl, J., and den Heyer, N. (2014). Inshore Scotian Shelf Ecosystem Overview Report: Status and Trends (Can. Sci. Advis. Sec. Res. Doc. 2014/065, p. xii + 213). Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/360197.pdf

Burke, C. M., Montevecchi, W. A., and Wiese, F. K. (2012). Inadequate environmental monitoring around offshore oil and gas platforms on the Grand Bank of Eastern Canada: Are risks to marine birds known? Journal of Environmental Management, 104, 121–126. https://doi.org/10.1016/j.jenvman.2012.02.012

CNSOPB. (2022). Strategic Environmental Assessment: Middle and Eastern Scotian Slope and Sable Island Bank Areas (TE211002). Canada-Nova Scotia Offshore Petroleum Board. https://cnsoer.ca/public-registry-strategic-environmental-assessments

COSEWIC. (2007). COSEWIC assessment and status report on the Red Knot *Calidris canutus* in Canada (p. vii + 58). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/red-knot.html

COSEWIC. (2009a). COSEWIC assessment and status report on the Savannah Sparrow, princeps subspecies (*Passerculus sandwichensis*) in Canada (p. vi + 21). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2011/ec/CW69-14-275-2010-eng.pdf

COSEWIC. (2009b). COSEWIC assessment and update status report on the Roseate Tern *Sterna dougallii* in Canada (p. vi + 48). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/roseate-tern-2009.html

COSEWIC. (2011). COSEWIC assessment and status report on the Barrow's Goldeneye *Bucephala islandica*, Eastern population,in Canada (p. xii). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/barrow-goldeneye-appraisal-summary-2011.html

COSEWIC. (2013a). COSEWIC assessment and status report on the Harlequin Duck *Histrionicus histrionicus* Eastern populationin Canada (p. ix + 38). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/harlequin-duck-eastern-population-2013.html

COSEWIC. (2013b). COSEWIC assessment and status report on the Piping Plover circumcinctus subspecies (*Charadrius melodus circumcinctus*) and the melodus subspecies (*Charadrius melodus melodus*) in Canada (p. xiv + 39). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2014/ec/CW69-14-193-2014-eng.pdf

COSEWIC. (2013c). COSEWIC assessment and status report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis* and Tri-colored Bat *Perimyotis subflavus* in Canada (p. xxxiv + 93). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-

climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/little-brown-myotis-tri-coloured-bat-2013.html

COSEWIC. (2014). COSEWIC assessment and status report on the Red-necked *Phalarope Phalaropus lobatus* in Canada (p. x + 52). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://publications.gc.ca/collections/collection_2016/eccc/CW69-14-702-2015-eng.pdf

COSEWIC. (2020). COSEWIC assessment and status report on the Leach's Storm-Petrel (Atlantic population) *Oceanodroma leucorhoa* in Canada (p. xii + 70). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/leachs-storm-petrel-2020.html#toc0

COSEWIC. (2023). COSEWIC assessment and status report on the Hoary Bat Lasiurus cinereus, Eastern Red Bat *Lasiurus borealis* and Silver-haired Bat, *Lasionycteris noctivagans*, in Canada (p. xxi + 100). Committee on the Status of Endangered Wildlife in Canada. Ottawa. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/hoary-bat-eastern-red-bat-silver-haired-bat-2023.html

Crysler, Z. J., Ronconi, R.A., and Taylor, P.D. (2016). Differential fall migratory routes of adult and juvenile Ipswich Sparrows (*Passerculus sandwichensis princeps*). Movement Ecology, 4, 3(2016). https://doi.org/10.1186/s40462-016-0067-8

Curran, K. J., Nagel, E. J., Murphy, S. A., Huskins-Shupe, M. L., and Marotte, E. C. (2025). Four Wind Energy Areas (WEA) in the offshore of Nova Scotia: A description of the primary marine ecosystem features, significant and protected areas, at-risk and depleted species, fish and fisheries, science surveys, and other human uses that may occur in and around the French Bank, Middle Bank, Sable Island Bank, and Sydney Bight Areas (Can. Manuscr. Rep. Fish. Aquat. Sci. 3312, p. ix + 65.). Fisheries and Oceans Canada. https://doi.org/10.60825/KP16-ZX06

DFO. (2011). The Marine Environment and Fisheries of Georges Bank, Nova Scotia: Consideration of the Potential Interactions Associated with Offshore Petroleum Activities (Can. Tech. Rep. Fish. Aquat. Sci. 2945). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2011/mpo-dfo/Fs97-6-2945-eng.pdf

DFO. (2014). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs70-6-2014-041-eng.pdf

Doucette, K. M., Patriquin, K. J., Broders, H. G., and Horn, A. G. (2024). Soundwaves in the North Atlantic: Detecting the offshore bats of Sable Island. Proceedings of the Nova Scotian Institute of Science (NSIS), 53(2), 305–319. https://doi.org/10.15273/pnsis.v53i2.12328

EC (Environment Canada). (2007). Management Plan for the Harlequin Duck (*Histrionicus histrionicus*) Eastern Population, in Atlantic Canada and Québec [Proposed] (Species at Risk Act Management Plan Series, p. vii + 32). Environment Canada. Ottawa. https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/mp_harlequin_duck_0207_e.pdf

EC (Environment Canada). (2013). Management Plan for the Barrow's Goldeneye (*Bucephala islandica*), Eastern Population, in Canada (p. IV + 16). Environment Canada. Ottawa. https://publications.gc.ca/collections/collection_2013/ec/En3-5-27-2013-eng.pdf

ECCC (Environment and Climate Change Canada). (2023, May 30). East coast: Potential high-density areas for seabirds. Government of Canada. https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/birds-sea/high-density-areas-east-coast.html

Ellis, J. I., Wilhelm, S. I., Hedd, A., Fraser, G. S., Robertson, G. J., Rail, J.-F., Fowler, M., and Morgan, K. H. (2013). Mortality of Migratory Birds from Marine Commercial Fisheries and Offshore Oil and Gas Production in Canada. Avian Conservation and Ecology, 8(2), art4. https://doi.org/10.5751/ACE-00589-080204

Fifield, D. A., Lewis, K. P., Gjerdrum, C., Robertson, G. J., and Wells, R. (2009). Offshore Seabird Monitoring Program (Environmental Studies Research Funds Report No. 183 St. John's, p. 68). https://www.esrfunds.org/sites/esrf/files/2023-03/esrf183-fifield-et-al.pdf

Gjerdrum, C., Ronconi, R., Turner, K., and Hamer, T. (2021). Bird strandings and bright lights at coastal and offshore industrial sites in Atlantic Canada. Avian Conservation and Ecology, 16(1). https://doi.org/10.5751/ACE-01860-160122

Goodale, M. W., Knaga, P., Dodgin, S., Gilardi, E., Guilbert, J. M., Howe, M., Frankina, B., and Stearns, C. (2025). Opportunistic Vessel-Based Detections of Migratory Bats in the Gulf of Maine. Northeastern Naturalist, 32(2), 168–178. https://doi.org/10.1656/045.032.0203

Government of Canada. (n.d.). Species search—Species at risk registry. Retrieved August 31, 2026, from https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSortandsortDirection=ascandpageSize=10andkeywords=chimney%20swift

Guest, E. E., Stamps, B. F., Durish, N. D., Hale, A. M., Hein, C. D., Morton, B. P., Weaver, S. P., and Fritts, S. R. (2022). An Updated Review of Hypotheses Regarding Bat Attraction to Wind Turbines. Animals, 12(3), 343. https://doi.org/10.3390/ani12030343

Gutowsky, S. E., Robertson, G. J., Calvert, A. M., Fifield, D. A., Ronconi, R. A., and Rock, J. C. (2023). Apparent survival among adult Leach's Storm Petrels *Hydrobates leucorhous* on a colony managed for predators in Nova Scotia, Canada. https://www.researchgate.net/publication/370847638_Apparent_survival_among_adult_Leach%27s_Storm_Petrels_Hydrobates_leucorhous_on_a_colony_managed_for_predators_in_Nova_Scotia_Canada

Hedd, A., Pollet, I. L., Mauck, R. A., Burke, C. M., Mallory, M. L., McFarlane Tranquilla, L. A., Montevecchi, W. A., Robertson, G. J., Ronconi, R. A., Shutler, D., Wilhelm, S. I., and Burgess, N. M. (2018). Foraging areas, offshore habitat use, and colony overlap by incubating Leach's storm-petrels Oceanodroma leucorhoa in the Northwest Atlantic. PLOS ONE, 13(5), e0194389. https://doi.org/10.1371/journal.pone.0194389

Lucas, Z., and Hebda, A. (2011). LASIURINE BATS IN NOVA SCOTIA. Proceedings of the Nova Scotian Institute of Science (NSIS), 46(2), 117–138. https://doi.org/10.15273/pnsis.v46i2.4056

Mauck, R. A., Pratte, I., Hedd, A., Pollet, I. I., Jones, P. L., Montevecchi, W. A., Ronconi, R. A., Gjerdrum, C., Adrianowyscz, S., McMahon, C., Acker, H., Taylor, L. U., McMahon, J., Dearborn, D. C., Robertson, G. J., and McFarlane Tranquilla, L. A. (2023). Female and male Leach's Storm Petrels (Hydrobates leucorhous) pursue different foraging strategies during the incubation period. Ibis, 165(1), 161–178. https://doi.org/10.1111/ibi.13112

Parks Canada. (2019). Sable Island National Park Reserve of Canada: Management Plan, 2019. https://parks.canada.ca/pn-np/ns/sable/info/plan/gestion-management-2019

Parks Canada. (2022). Protected Area Establishment: Establishment of Sable Island National Park Reserve Public Statement – October 17, 2011. https://parks.canada.ca/nature/eie-eia/processus-process/strategique-strategic/itm4/eap-pae/page4d4

Parks Canada. 2024. *Migratory Birds - Sable Island National Park Reserve*. Government of Canada. Available at: https://parks.canada.ca/pn-np/ns/sable/nature/animaux-animals/oiseaux-birds/migratory-birds.

Pelletier, S. K., Omland, K. S., Watrous, K. S., and Peterson, T. S. (2013). Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities—Final

Report (OCS Study BOEM 2013-01163; p. 119). US Department of the Interior, Bureau of Ocean Energy Management, Headquarters, Herndon, VA. https://tethys.pnnl.gov/sites/default/files/publications/BOEM_Bat_Wind_2013.pdf

Peterson, T., Pelletier, S., and Giovanni, M. (2016). Long-term Bat Monitoring on Islands, Offshore Structures, and Coastal Sites in the Gulf of Maine, mid-Atlantic, and Great Lakes—Final Report. Stantec Consulting Services. https://doi.org/10.2172/1238337

Pollet, I., Lenske, A., Ausems, A., Barbraud, C., Bedolla-Guzmán, Y., Bicknell, A., Bolton, M., Bond, A., Delord, K., Diamond, A., Fifield, D., Gjerdrum, C., Halpin, L., Hansen, E., Hedd, A., Hoeg, R., Major, H., Mauck, R., McClelland, G., … Mallory, M. (2023). Experts' opinions on threats to Leach's Storm-Petrels (Hydrobates leucorhous) across their global range. Avian Conservation and Ecology, 18(1), art11. https://doi.org/10.5751/ACE-02370-180111

Ronconi, R. A., Allard, K. A., and Taylor, P. D. (2015). Bird interactions with offshore oil and gas platforms: Review of impacts and monitoring techniques. Journal of Environmental Management, 147, 34–45. https://doi.org/10.1016/j.jenvman.2014.07.031

Ronconi, R. A., Boyne, A.W., Gjerdrum, C., and Horn, A.G. (2016). Population status and ecology of seabirds on Sable Island. *Sable Island: Exploration in Ecology and Biodiversity* (213-241).

Ronconi, R. A., Lieske, D. J., McFarlane Tranquilla, L. A., Abbott, S., Allard, K. A., Allen, B., Black, A. L., Bolduc, F., Davoren, G. K., Diamond, A. W., Fifield, D. A., Garthe, S., Gjerdrum, C., Hedd, A., Mallory, M. L., Mauck, R. A., McKnight, J., Montevecchi, W. A., Pollet, I. L., ... Wilhelm, S. I. (2022). Predicting seabird foraging habitat for conservation planning in Atlantic Canada: Integrating telemetry and survey data across thousands of colonies. Frontiers in Marine Science, 9(2022). https://doi.org/10.3389/fmars.2022.816794

Russell, R. W. 2005. Interactions between migrating birds and offshore oil and gas platforms in the northern Gulf of Mexico: Final Report. U.S. Dept. of the Interior, Mineral Management Service, Glulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2005-009. 348 pp. https://espis.boem.gov/final%20reports/2955.pdf

Solick, D. I., and Newman, C. M. (2021). Oceanic records of North American bats and implications for offshore wind energy development in the United States. Ecology and Evolution, 11(21), 14433–14447. https://doi.org/10.1002/ece3.8175

Stantec (Stantec Consulting Services Inc.). (2019). Middle Scotian Shelf and Slope Strategic Environmental Assessment. Canada-Nova Scotia Offshore Petroleum

Board. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_middle_scotian_shelf_sea_%20%281%29.pdf

True, M. C., Gorman, K. M., Taylor, H., Reynolds, R. J., and Ford, W. M. (2023). Fall migration, oceanic movement, and site residency patterns of eastern red bats (Lasiurus borealis) on the mid-Atlantic Coast. Movement Ecology, 11(1), 35. https://doi.org/10.1186/s40462-023-00398-x

USGS (U.S. Geological Survey). (2025, December 1). Bat Fatalities at Wind Turbines—Investigating the Causes and Consequences | U.S. Geological Survey. USGS. https://www.usgs.gov/centers/fort-collins-science-center/science/bat-fatalities-wind-turbines-investigating-causes-and

5.2.6 Protected and Special Areas

There are numerous areas within the offshore marine environment in Nova Scotia that have been designated as protected, to varying degrees, under provincial, federal or other legislation or agreements, due to their ecological, historical, or socio-cultural characteristics or importance. Other areas are also identified as important or sensitive through other relevant processes and initiatives. This section will identify and describe currently identified protected or special areas that are within or around the Study Area.

5.2.6.1 Federal Legislation and Associated Areas

Canada has various pieces of legislation and other processes that are implemented to protect and conserve marine ecosystems. Responsibilities are distributed across various federal departments and agencies dependent on conservation purposes. A list of all federal legislation that allows for the establishment of various types of protected areas is provided in Table 5.6.

Table 5.6 – Federal Legislation for Protected Areas

Legislation	Type of Protected Area	Lead Department	Purpose
Oceans Act, 1996, c.31	Marine Protected Area (MPA)	DFO	To conserve and protect fish, marine mammals, and their habitats; unique areas; areas of high productivity or biological diversity; maintaining ecological integrity of marine areas.

Legislation	Type of Protected Area	Lead Department	Purpose
Fisheries Act, 1985, c.F-14	Fisheries Closure Areas; Marine Refuges; Ecologically Significant Areas	DFO	To conserve and protect fish and fish habitat; to manage inland fisheries (among other purposes).
Migratory Birds Convention Act, 1994, c. 22	Marine Bird Sanctuaries (MBS)	ECCC	To conserve and protect habitat for migratory bird species.
Canada Wildlife Act, R.S., 1985, c.W-9	National Wildlife Areas (NWA)	ECCC	To conserve and protect habitat for a variety of wildlife, including migratory birds and species at risk.
Canada National Marine Conservation Areas Act, 2002, c. 18	National Marine Conservation Areas (NMCAs)	Parks Canada	To conserve and protect representative examples of Canada's natural and cultural marine heritage and provide opportunities for public education and enjoyment.
Canada National Parks Act, 2000, c. 32	National Park/National Park Reserve	Parks Canada	To protect representative examples of Canada's natural heritage for the benefit, education and enjoyment of Canadians.
Species at Risk Act, 2002, c. 29	Critical Habitat	DFO, ECCC, Parks Canada	To prevent destruction of critical habitat (defined as the habitat necessary for survival or recovery) for species listed as endangered, threatened, or extirpated that has been identified in a Species at Risk recovery strategy or action plan as necessary for the survival or recovery of listed extirpated, endangered, or threatened species.

DRAFT

Source: (Government of Canada, 2026)

In addition to the information in Table 5.6, DFO, in conjunction with ECCC, and Parks Canada, and through engagement and consultation with provinces, Indigenous Peoples, stakeholders and the public, has created a marine conservation network for the Scotian Shelf-Bay of Fundy Bioregion. The network has been developed through systematic, scientific, and collaborative processes to provide a long-term strategy for spatial marine conservation that balances ecological and socioeconomic priorities. The network is comprised of existing Oceans Act MPAs, OEACMs, such as Marine Refuges, current AOIs for Oceans Act MPA designation, and additional marine conservation areas for future implementation. While public engagement concluded in 2024, with a 'What We Heard' report published in 2025 (DFO, 2025a), the network will be adapted as required to address relevant ecological and socioeconomic conditions, including those related to climate change. Future iterations of the network will reflect these adjustments as planning proceeds (DFO, 2024a).

5.2.6.2 Marine Protected Areas and Areas of Interest

Through the federal *Oceans Act*, DFO can facilitate the process of identifying, establishing and managing MPAs and Areas of Interest (AOIs). Designation as an MPA provides legal protection for marine ecosystems and resources that are considered important for conservation, including areas that support species, habitats, or ecological processes that require special consideration. The specific regulations established for an MPA are informed by the conservation objectives identified for the area and the risk posed by activities that may overlap with those objectives. These regulations determine which activities can occur within the MPA and, where appropriate, the restrictions or conditions that would apply to those activities (CNSOER, n.d.).

MPAs can be designed either by ministerial order regulations or by regulations made by the Governor-in-Council. If a ministerial order is utilized, it can establish an MPA for up to five years, enabling the minister of DFO to 'freeze the footprint' of the area, allowing for existing activities taking place to continue for five years, while prohibiting new activities from taking place. During these five years, additional analysis and consultation take place to determine the conservation approach. If the MPA is established through regulations made by the Governor-in-Council, it is through recommendations made by the Minister of Fisheries and Oceans and then approved by the Governor-in-Council.

MPAs are established based on scientific evidence, comprehensive understanding of the state of the ecosystem in the area, consultations, socioeconomic considerations, traditional knowledge, and risk assessments. During the time that the area is under consideration, it is first classified as an Area of Interest (AOI), during which conservation objectives are identified and the risks posed by activities within the area are assessed. The area may subsequently be established as an MPA through Governor-Council

regulations, following an interim period in which the area is protected by ministerial order (DFO, 2026a).

In 2019, the Government of Canada introduced a Federal Marine Protected Area Protection Standard to provide greater consistency in the level of protection afforded by new federal MPAs. This Standard establishes a consistent baseline for the long-term conservation of nature by prohibiting oil and gas exploration, development and production within most new federal MPAs. This provides greater certainty that offshore oil and gas activities will not occur within areas designated for long-term biodiversity conservation, while allowing other activities to be managed according to their potential impacts on MPA conservation objectives.

Within the Study Area there is one established *Oceans Act* MPAs: the Gully; and one AOI, the Fundian Channel-Browns Bank (Figure 5.4). These areas were established or initiated at different times relative to the Federal MPA Standard and therefore differ in the level of protection when considering offshore exploratory drilling. Table 5.7 provides an overview of these areas.

While not situated within the Study Area boundaries, the Eastern Shore Island AOI is located approximately 76 km from the Study Area (Figure 5.4). The Laurentian Channel MPA is substantially closer, at approximately 12 km from the Study Area; both areas are relevant to discussions of potential accidental spills and malfunctions (Sections 6.0 and 7.0).

DRAFT

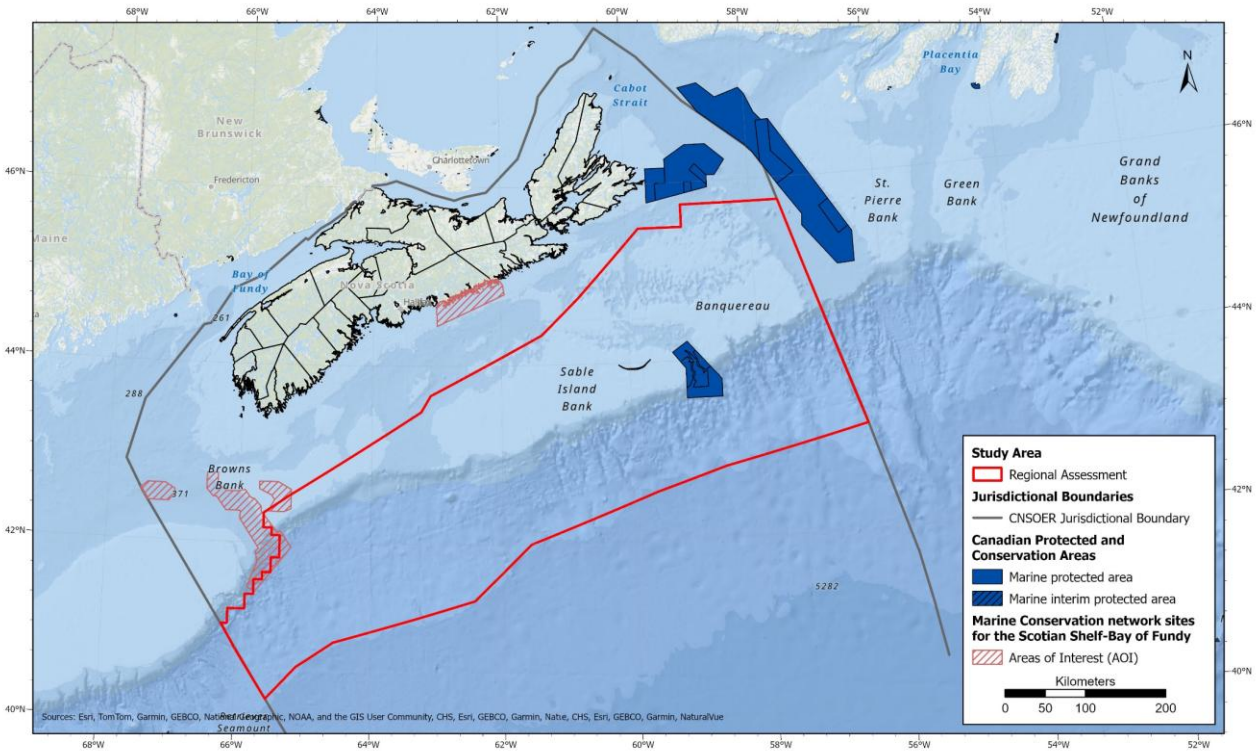


Figure 5.4. MPAs and AOIs within and adjacent to the Study Area

For MPAs, site-specific regulations establish legally binding restrictions on activities that could potentially damage the protected ecosystems, while AOIs generally do not have the same regulatory prohibitions since they are still in planning or consultation phases. Table 5.7 describes each of the four areas, along with the current status of exploratory drilling regulations, the expected future regime where applicable, and the key legal and policy instruments that influence these activities to occur.

Table 5.7 – MPAs and AOIs located within or adjacent to the Study Area

Name	Size (km^2)	Summary	
Located within Study Area Boundaries			
The Gully MPA	2,363	Legal Status / Designation	Designated as an *Oceans Act* MPA in 2004. The Regulations prohibit activities that disturb/damage/destroy/ remove living marine organisms or habitat unless an exception applies or the Minister approves.
		Location	~200 km offshore of Nova Scotia, east of Sable Island, on the edge of the Scotian Shelf.
		Ecological Features	Largest submarine canyon in the western North Atlantic. Habitat spans shallow sandy banks, deep-water canyon, slope and abyssal plain which is important for cetaceans including the endangered Scotian Shelf population of northern bottlenose whale. The ocean floor supports the highest known variety of cold-water corals in Atlantic Canada (~30 species).
		Conservation Objectives	• Minimize harmful impacts from human activities on cetacean populations/habitats. • Minimize disturbance of seafloor habitat/benthic communities. • Maintain/monitor water and sediment quality. • Manage human activities to minimize impacts on other living resources.
		Governance and Management	DFO is the lead federal authority; management is supported by the Gully MPA Management Plan (2017) and includes ecosystem monitoring, monitoring of human activities, compliance promotion, education/outreach, and an activity approval process for permitted activities.

Name	Size (km^2)	Summary	
		Current treatment of exploratory drilling	Restricted/effectively prohibited. No petroleum exception. "Other activities" would need ministerial approval and be limited to Zone 3 with no effects on Zone 1 or 2 and only natural variation level effects on Zone 3.
		Expected future treatment of exploratory drilling	No rewrite of restrictions since the 2019 MPA Standards were released. Continued restrictions under the existing regulation
Fundian Channel Browns-Bank AOI	7,200	Legal Status / Designation	Identified in 2018 as an AOI for a potential Oceans Act MPA. Public consultation concluded in late 2024, and now site is in the regulatory phase for future establishment as an Oceans Act MPA. This includes pre-publication of the *Oceans Act* Regulation in Canada Gazette Part 1, followed by a 30-day public consultation period, then establishment via Order in Council in Canada Gazette Part II. This Canada Gazette process is expected to occur in the 2026-2027 timeframe. The proposed regulation is intended to be consistent with the national MPA Protection Standard and would not provide an exception for oil and gas activities within the proposed MPA.
		Location	South of Yarmouth, Nova Scotia (Scotian Shelf bioregion). AOI includes two separate components: a western section centred on Georges Basin and a larger eastern section covering the Fundian (Northeast) Channel and part of Browns Bank; includes an existing marine refuge (Northeast Channel Marine Refuge).
		Ecological Features	• Important oceanographic processes and diverse benthic habitats. • Depleted species (e.g., groundfish) and deep-sea coral and sponge habitats.

DRAFT

Name	Size (km^2)	Summary	
			• Northeast Channel has densest known concentrations of large gorgonian corals in Atlantic Canada. • Browns Bank has significant sponge concentrations. • Migration corridor (e.g., basking sharks) and foraging habitat for a wide range of taxa.
		Conservation Objectives	Proposed overarching goal is to conserve and protect ecological integrity (biodiversity, productivity, ecosystem components, special natural features). Proposed conservation priorities include representation of habitat types (basin/bank/slope/channel), representative habitat for key fishes (e.g., cod, wolffish, skates, white hake), productive oceanographic features (internal waves/upwelling), and marine bird foraging grounds.
		Governance and Management	DFO leads the MPA establishment process; early steps include establishing consultation mechanisms (including a dedicated advisory committee), collecting/analyzing ecological and socio-economic data, and completing a risk assessment to inform conservation objectives, boundaries/zones, and future management measures. DFO's consultation page confirms an Advisory Committee and ongoing engagement framework for site design input prior to designation.
		Current treatment of exploratory drilling	No AOI-specific prohibitions There is overlap with a marine refuge (Northeast Channel Marine Refuge), which may trigger additional case-by-case reviews.
		Expected future treatment of exploratory drilling	Will be restricted/effectively prohibited with no petroleum exception. Prohibition Regulation under Canada-Nova Scotia Offshore Petroleum Resources Accord Act may be jointly established by NRCan and the Nova Scotia Department of Energy to prohibit oil and gas activities within the MPA boundary. Currently in the regulatory process for MPA establishment in compliance with 2019 MPA Standards.

DRAFT

Name	Size (km^2)	Summary	
Located adjacent to Study Area			
Eastern Shore Islands AOI	2,000	Legal Status / Designation	Identified in 2018 as an AOI for a potential *Oceans Act* MPA.
		Location	Nearshore waters around the dense archipelago along Nova Scotia's eastern shore from Clam Bay (near Jeddore Harbour) to Barren Island (near Liscomb Point), extending ~25 km offshore (Scotian Shelf bioregion).
		Ecological Features	• Highly natural coastal system with eelgrass, kelp and salt marsh. • Estuaries that are important for endangered Atlantic salmon. • Archipelago is identified as an EBSA supporting nesting/foraging for colonial seabirds and shorebirds.
		Conservation Objectives	• Proposed overarching goal is to conserve and protect ecological integrity, including biodiversity, productivity, ecosystem components, and special natural features. • Proposed conservation priorities include kelp/eelgrass concentrations and areas used by juvenile fish (e.g., juvenile Atlantic cod, white hake, pollock) and bird foraging habitat (including species at risk).
		Governance and Management	Leads the MPA establishment process, including consultation mechanisms (e.g., advisory committee), collection/analysis of ecological and socio-economic data, and completion of a risk assessment.
		Current treatment of exploratory drilling	• No AOI-specific prohibitions • Drilling would be subject to petroleum environmental or impact assessment.

DRAFT

Name	Size (km^2)	Summary	
		Expected future treatment of exploratory drilling	• Likely prohibited if designated as a new federal MPA • If the area transitions into an MPA, it would have to comply with the 2019 MPA Standard, which prohibits all oil and gas activities. • Process for MPA transition has not progressed since 2019.
Laurentian Channel MPA	11,580	Legal Status/Designation	Designated as an MPA under the Oceans Act in April 2019. Frist Oceans Act established under the federal MPA Protection Standard. The Regulations prohibit activities that disturb, damage, destroy, or remove living marine organisms or habitat unless specifically permitted by the Regulations or approved by the Minister.
		Location	Off the southwest coast of Newfoundland and Labrador, within the Newfoundland and Labrador Shelves Bioregion. Protects a portion of the Laurentian Channel, a deep submarine valley extending from the St. Lawrence Estuary to the edge of the continental shelf off Newofundland. Approximately 12.67km from the Study Area.
		Ecological Features	• Deep submarine valley (>1,200km long) characterized by complex oceanographic conditions and habitats ranging from banks to deep-channel environments. Contains the highest known concentrations of sea pens in the Newfoundland and Labrador Shelves Bioregion and provides important habitat for Black Dogfish, Smooth Skate, Porbeagle Shark, Northern Wolffish, Leatherback Sea Turtle, and numerous cetaceans. • Includes one of only two known Porbeagle shark mating grounds and serves as an important feeding and migration corridor for whales and dolphins.
		Conservation Objectives	• Protect corals, particularly sea-pen concentrations, from harm caused by human activities.

DRAFT

Name	Size (km^2)	Summary	
			• Protect Black Dogfish, Smooth Skate, and Porbeagle Shark from human-induced mortality. • Promote the survival and recovery of Northern Wolffish and Leatherback Sea Turtle by minimizing risks from human activities. • Conserve biodiversity through protection of key species, habitats, ecosystem structure, and function.
		Governance and Management	DFO is the lead federal authority responsible for administration, compliance, and enforcement under the Oceans Act. A management plan is under development and will provide guidance on management approaches, conservation measures, activity approvals, monitoring, and research. Certain activities may be permitted where compatible with conservation objectives.
		Current treatment of exploratory drilling	Prohibited throughout the MPA. The Regulations expressly prohibit oil and gas exploration and exploitation in all zones of the MPA. No petroleum-related exception exists.
		Expected future treatment of exploratory drilling	Continued prohibition under the existing Laurentian Channel MPA Regulations. This MPA was the first Oceans Act MPA established under the federal MPA Protection Standard, which prohibits oil and gas exploration, development and production activities, including exploratory drilling.

Sources: (DFO, 2023a, 2023b, 2023c, 2023d, 2024b, 2025b, 2025c, 2025d, 2025i, 2026b; The Gully Marine Protected Area Regulations, 2004)

DRAFT

5.2.6.3 Marine Refuges

Marine refuges are fisheries closure areas established under the *Fisheries Act* that have been assessed as meeting Canada's criteria for Other Effective Area-Based Conservation Measures (OECMs) and are formally recognized as such. Marine refuges are complementary to MPAs and contribute to the protection of marine biodiversity by supporting the long-term conservation of species, habitats, and ecosystems. These areas are intended to be long term and make lasting contributions to the conservation of marine areas (DFO 2026c, 2026d). There are four marine refuges within or adjacent to the Study Area (Figure 5.5). Those areas adjacent to the Study Area have been included as they are important for discussions related to accidental spills and malfunctions (Sections 6.0 and 7.0).

While MPAs are established specifically for biodiversity conservation as their primary objective, OECMs are areas governed and managed for purposes other than conservation but still achieve effective and sustained long-term biodiversity conservation outcomes. These include fisheries closures, watershed protection areas, and lands managed for other purposes, where biodiversity conservation is achieved as a co-benefit (DFO, 2025e). This allows OECMs to help expand Canada's network of conserved areas and meet its conservation targets, such as the commitment to conserve 30% of Canada's lands, inland waters, and marine and coastal areas by 2030 (DFO, 2026c). In Nova Scotia's context, DFO has published the 'Scotian Shelf-Bay of Fundy Bioregion Marine Refuge Management Plan, Part 1 and 2' (2025f), which provides descriptions for marine refuges within the bioregion. Annex B, within the Management Plan, provides operational guidance with respect to oil and gas activities in marine refuges, which were co-developed by DFO and the CNSOER. Unlike MPAs, marine refuges do not automatically prohibit offshore oil and gas exploratory drilling. Proposed oil and gas activities are assessed on a case-by-case basis, determining if the activities would compromise the conservation outcomes of the refuge. If the activities pose unacceptable risks to conservation objectives, then the activities would not be supported, while activities that can avoid or effectively mitigate impacts may be considered under the applicable offshore petroleum regulatory framework (DFO, 2025f). Table 5.8 provides a summary of marine refuges located within or adjacent to the Study Area.

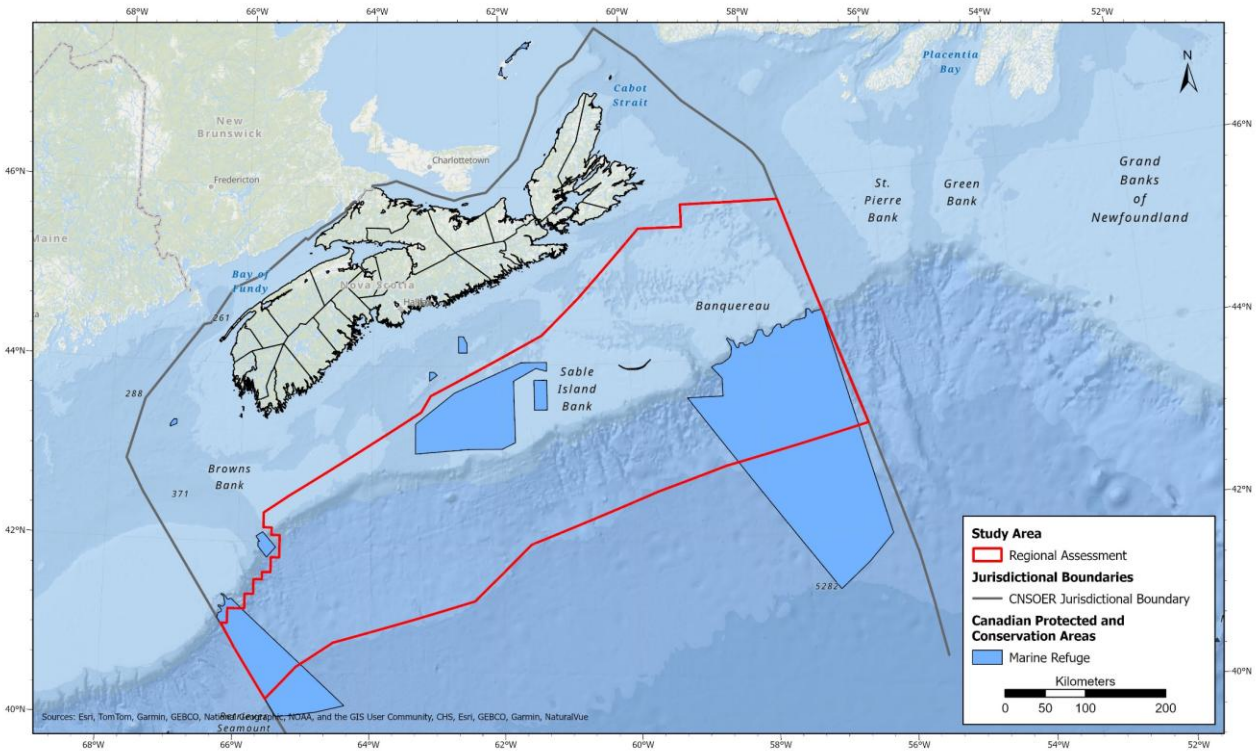


Figure 5.5. Marine Refuges located within or adjacent to the Study Area

Fisheries closures under the *Fisheries Act* may be established for a variety of objectives (protecting spawning areas, juvenile fish habitat, and depleted fish stocks), but only closures that meet OECM criteria are recognized as marine refuges and count towards Canada's marine conservation targets (DFO, 2022a). Within OECMs, all existing and foreseeable activities are also evaluated on a case-by-case basis to ensure that risks to biodiversity conservation outcomes are avoided or effectively mitigated (DFO, 2022b). One of the most prominent examples is the Western/Emerald Bank Refuge formerly the Rockall Haddock Box ("the Haddock Box")), a long-standing fisheries closure area established to protect juvenile haddock and support stock rebuilding. Although the refuge does not prohibit offshore exploratory drilling, it represents an important fisheries management consideration within the Study Area and contributes to the broader regional conservation objectives captured under the draft Scotian Shelf-Bay of Fundy Region draft conservation network design.

For the purposes of this baseline characterization, the focus is on marine refuges that occur within the Study Area, as these areas are most relevant to understanding the local environment and regulatory context for offshore exploratory drilling activities. However, several marine refuges and other conserved areas located adjacent to, but outside of, the Study Area are also identified in Table 5.8 and Figure 5.5. These adjacent areas are included because environmental effects resulting from accidental events, particularly large

spills, may extend beyond the Study Area boundary depending on oceanographic conditions and spill movement pathways. While the conservation values and management objectives of adjacent areas are recognized, their inclusion in this section is intended primarily to support the discussion of accidents and malfunctions rather than to characterize the baseline conditions within the Study Area itself.

Table 5.8 – Marine Refuges located within or adjacent to the Study Area

Name	Type	Conservation Objective	Priority Access
Northeast Channel Marine Refuge	Marine Refuge (*Fisheries Act* closure)	Protect sensitive benthic ecosystems, including corals and sponges (general OECM biodiversity conservation)	Includes restrictions on fishing activities to avoid impacts to benthic habitats
Corsair and Georges Canyons Marine Refuge	Marine Refuge	Protection of deep-sea ecosystems including corals and sponges	Manage human activities to: Avoid or mitigate damage to or loss of cold-water corals. Avoid or mitigate disturbance of benthic and deep-water habitats and communities.
Western and Emerald Banks Marine Refuge	Marine Refuge	Protection of benthic habitat and biodiversity	Manage human activities to: Avoid or mitigate damage to or loss of groundfish habitat and species, particularly 4VW haddock, avoid or mitigate disturbance of continental shelf habitats and communities. Increase understanding of: The role of the marine refuge as a reference area of low fishing activity for the Bioregion, what contributions the marine refuge provides to regional productivity and stock assessment. Evaluate, review and minimize harmful interactions associated with future fish harvest activities.

DRAFT

Name	Type	Conservation Objective	Priority Access
Eastern Canyons Marine Refuge	Marine Refuge	To protect cold-water corals and deep-water frontier area	To help preserve biodiversity within cold-water coral areas, and to mediate impacts within the deep-water frontier area where limited data is available, all communal commercial and commercial bottom-contact fishing gear is prohibited, with the exception of bottom longline gear that is permitted within a zone where fishing vessel have at-sea observers.

Sources: (DFO, 2022a, 2022b, 2025e, 2025f, 2025g, 2025h, 2026c, 2026d)

5.2.6.4 National Park Reserves

National Park Reserves are established and managed under the *Canada National Parks Act* (2000) by Parks Canada. They are managed in the same manner as national parks and are intended to protect representative examples of Canada's natural heritage while supporting ecological integrity, public appreciation, education, and enjoyment. National Park Reserve status is used in areas where unresolved Indigenous land claims or rights exist, pending the final settlement of those matters. Similar to National Parks, ecological integrity is the first priority in all aspects of management and decision-making.

The only National Park Reserve within the Study Area is Sable Island National Park Reserve (Figure 5.6). Established in 2013 and located approximately 290 km southeast of Halifax near the edge of the Scotian Shelf, the reserve protects the island and associated terrestrial environments. Sable Island is a narrow, highly dynamic sand island characterized by shifting dunes, freshwater ponds, beaches, wetlands, and grassland habitats. The island supports internationally significant wildlife populations, including the world's largest breeding colony of grey seals, the well-known population of free-ranging horses, numerous migratory and breeding bird species, and a variety of unique plants and invertebrates adapted to the island's isolated environment. There are at least 13 species of conservation concern at the reserve, including four listed on Schedule I of the SARA (Roseate Tern, Sable Island Sweat Bee, Barn Swallow and the Ipswich Sparrow) and one species assessed by COSEWIC (Leach's Storm Petrel) (Parks Canada, 2026c).

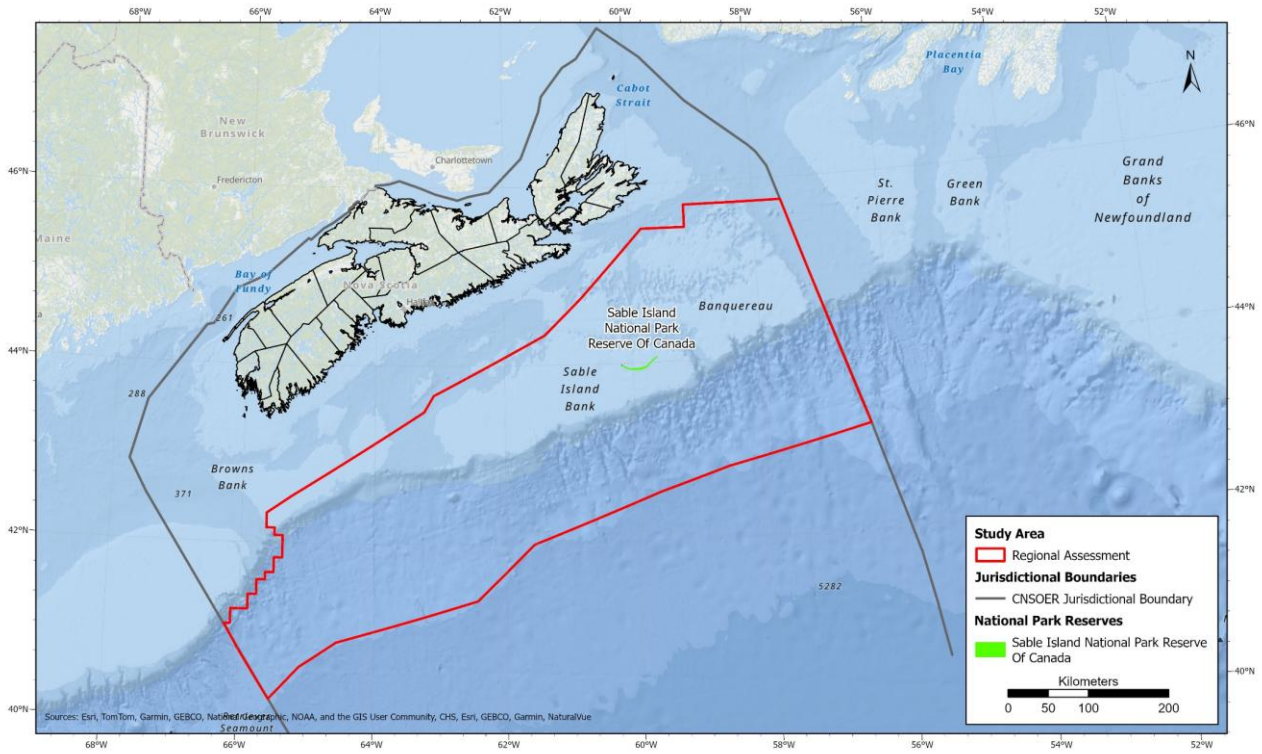


Figure 5.6. Sable Island National Park Reserve

Sable Island is also recognized for its cultural and historical significance, including its long history of shipwrecks, meteorological observations, scientific research, and traditional connections to Indigenous Peoples. The reserve is managed by Parks Canada in collaboration with partners and stakeholders to protect ecological and cultural values while supporting research, monitoring, and carefully managed visitor access. Visitor use is highly regulated due to the island's ecological sensitivity and remote location.

Legislation for Sable Island prohibits most forms of surface access and industrial development within the protected area. While certain existing rights related to offshore petroleum resources beneath the island were recognized when the reserve was established, activities that could negatively affect the ecological integrity of the reserve are subject to strict regulatory controls and additional review requirements. Although activities proposed in adjacent offshore waters may still need to consider potential interactions with protected species, migratory birds, marine mammals, ecological processes, and visitor experience values associated with Sable Island (Parks Canada, 2026a).

5.2.6.5 National Wildlife Areas and Marine National Wildlife Areas

Under the *Canada Wildlife Act*, National Wildlife Areas (NWAs) and Marine National Wildlife Areas (MNWAs) are established and managed to conserve wildlife and their

habitats, with particular emphasis on migratory birds and species at risk. They also support research and public awareness activities. Candidate areas are identified based on biological criteria, including the presence of significant wildlife populations, critical habitat for species at risk, regionally or nationally important habitat, and opportunities for habitat restoration or enhancement. NWAs are designated on federally owned lands and are managed through site-specific measures that regulate human activities to protect sensitive habitats. Industrial activities, including exploratory drilling for offshore oil and gas, may be restricted or prohibited if they are incompatible with the conservation objectives of a particular area (ECCC, 2017). There are currently no NWAs or MNWAs located within the Study Area (ECCC, 2025a).

One NWA is located in the coastal area of Nova Scotia and adjacent to the Study Area. Country Island NWA is a 21-hectare island located off Guysborough County (Figure 5.7). The island is also designated as an IBA (refer to section 5.2.6.10) as it contains critical habitat for the roseate tern and supports one of the few breeding colonies in Canada. The island also supports over 30,000 Leach's Storm-petrel (approximately 2% of the western Atlantic population), is home to one of Nova Scotia's largest common and arctic tern nesting colonies and is a stop-over site for migrating shorebirds and songbirds (ECCC 2025b).

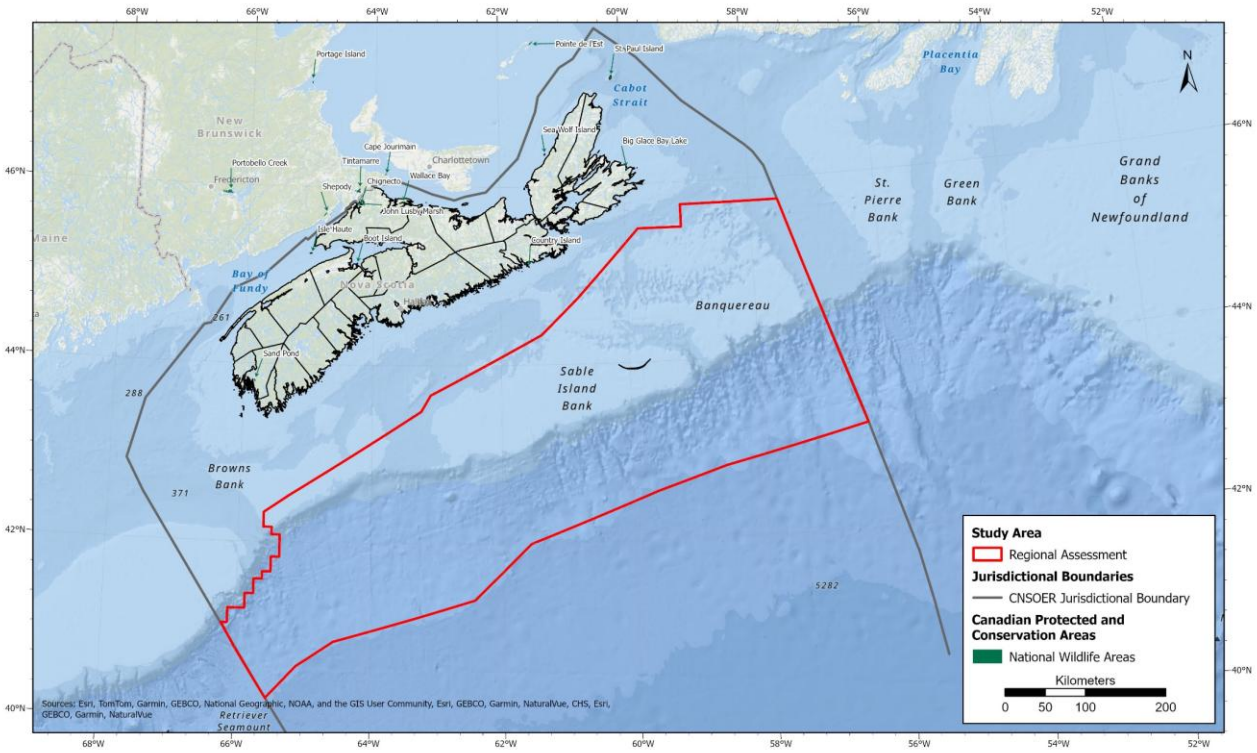


Figure 5.7. National Wildlife Areas and Marine National Wildlife Areas

5.2.6.6 National Marine Conservation Areas

National Marine Conservation Areas (NMCAs) are MPAs established under Parks Canada to protect and conserve representative marine ecosystems, while also supporting public education, enjoyment, and sustainable use. They include seabed, water column, and associated species, and may extend to coastal features such as islands, estuaries, and wetlands (Parks Canada, 2026b). The *Canada National Marine Conservation Areas Act* (2002) prohibits the exploration for or exploitation of hydrocarbons, minerals, aggregates, and other inorganic matter within NMCAs. Offshore oil and gas exploratory drilling activities are therefore prohibited within established NMCAs. There are no established NMCAs offshore of Nova Scotia but there are two proposed / potential NMCAs within and adjacent to the Study Area (Table 5.9).

Table 5.9 – Proposed or potential NMCAs within and adjacent to the Study Area

Area	Status	Location	Summary
Pemsɨk NMCA	Under exploration / candidate NMCA	South shore Nova Scotia, extends ~100 km offshore into the Scotian Shelf	Indigenous-led conservation initiative incorporating marine and coastal ecosystems, including inlets, estuaries, and offshore habitats supporting biodiversity, including seabirds, fish, and species at risk.
Cape Breton Highlands NMCA	Conceptual / early-stage consideration	Coastal and offshore areas adjacent to Cape Breton Highlands National Park	Identified as a potential future NMCA candidate representing coastal and marine ecosystems of the Scotian Shelf region.

Sources: (Parks Canada, 2023; DFO, 2024c)

5.2.6.7 Migratory Bird Sanctuaries

Migratory Bird Sanctuaries (MBS) are established under the *Migratory Birds Convention Act*, (1994) and its associated regulations to protect migratory birds, including their nests and eggs, from disturbance, harm, or destruction within designated areas. MBSs are created to conserve habitats that are essential for key stages of the migratory bird life cycle, such as breeding, feeding, staging, and migration. These areas may be located on federal, provincial, territorial, or private lands, depending on where important habitat occurs.

Candidate sites for designation are assessed using ecological criteria, including whether the area:

- Supports concentrated bird populations at any time of year;
- Vulnerable to threats that could affect a significant portion of those populations;
- Provides habitat for species with limited geographic ranges or species at risk; and
- Regularly supports a measurable proportion of a population.

Once designated, MBSs are subject to regulatory controls that restrict activities that could harm birds or their habitat. Activities that are permitted are generally limited to those compatible with conservation objectives, while other activities require permits. Additional protection measures may apply in certain areas (ECCC, 2025c). The offshore area of Nova Scotia contains eight MBSs (Table 5.10). MBSs adjacent to the Study Area have been included because bird species that use these sanctuaries may travel through the Study Area's airspace during daily movements, foraging activities, or seasonal migration.

While the *Migratory Birds Convention Act (1994)*, and associated regulations do not establish blanket prohibitions of offshore exploratory oil and gas activities, if the activities occur, operators must comply with the requirements which protect migratory birds, nests, eggs, and habitat. Depending on the location and timing of activities, operators may be required to implement additional mitigation measures, obtain addition authorizations, or modify operations to avoid effects on migratory birds.

DRAFT

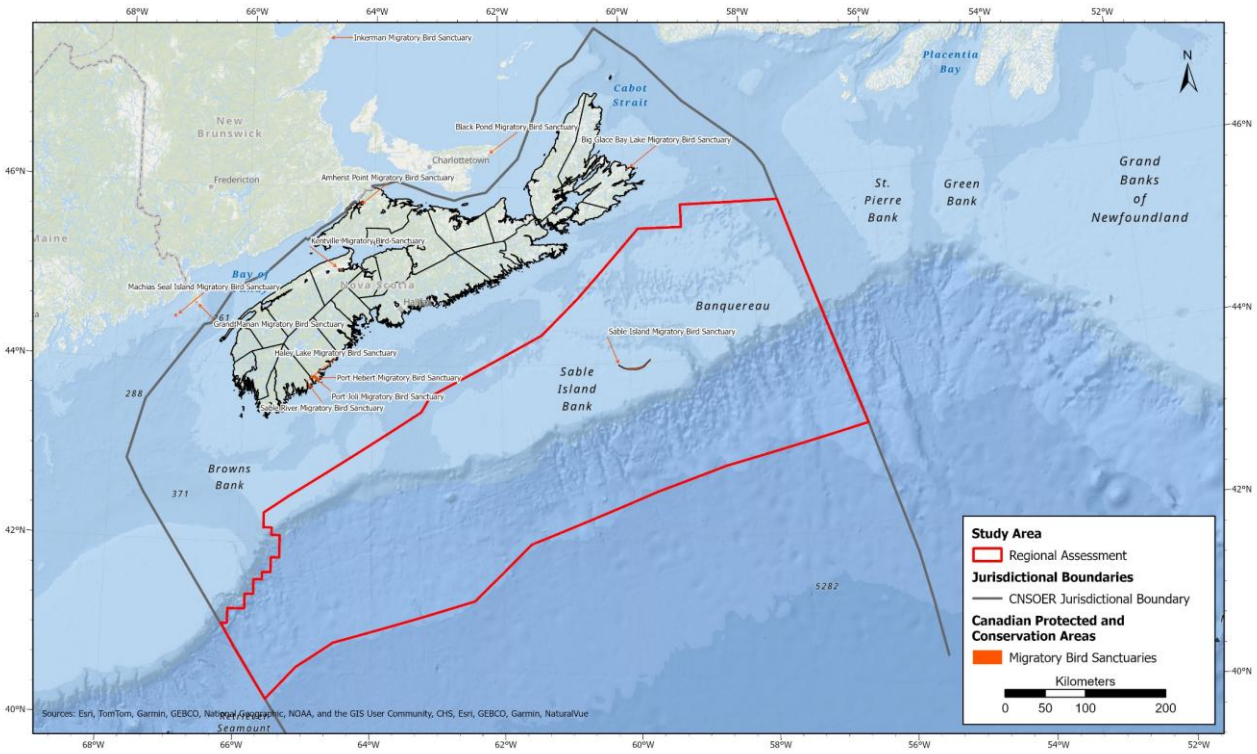


Figure 5.8. Migratory Bird Sanctuaries within and adjacent to the Study Area

Table 5.10 – Migratory Bird Sanctuaries within and adjacent to the Study Area

Name	Area (ha)	Summary
Amherst Point MBS	433	Wetland complex supporting a wide diversity of migratory birds; located along a major migration route and provides important nesting and feeding habitat.
Big Glace Bay Lake MBS	393	Coastal barrier beach pond providing important fall migration habitat for species such as Canada geese and American black ducks.
Haley Lake MBS	95	Listed sanctuary within Nova Scotia network (limited site-specific details available from main locations page).

Name	Area (ha)	Summary
Kentville MBS	506	Floodplain wetland with marshes, ponds, and river channels that support migratory birds and waterfowl.
Port Joli MBS	397	Coastal inlet and wetland system provides important feeding and breeding habitat for waterfowl and other bird species.
Port L'Hebert MBS	346	Shallow coastal inlet system extending inland, supporting habitat for migratory birds.
Sable Island MBS	3,100	Entire island ecosystem supporting seabird colonies and migratory birds; also provides breeding habitat and supports a wide diversity of species.
Sable River MBS	313	Listed sanctuary forming part of a network of coastal bird habitats (limited detailed description on.

Source: (ECCC, 2025c)

5.2.6.8 Ecologically and Biologically Significant Areas

EBSAs are marine areas identified through formal scientific assessment as having particularly high ecological or biological importance relative to surrounding ecosystems. In Canada, the EBSA concept is rooted in the *Oceans Act* (1996) and forms part of DFO's ecosystem based management approach.

EBSAs are identified using established science-based criteria that assess the ecological and biological significance of an area. The Canadian EBSA framework considers uniqueness, aggregation, and fitness consequences as primary criteria, with resilience and naturalness providing additional context. EBSAs are intended to support a precautionary, risk averse approach to management in areas where ecological values or functions are especially significant. These areas are distinguished not simply by the presence of ecological features, but by the disproportionate consequences that may result from disturbance, including impacts across space, time, or trophic interactions within the ecosystem.

While EBSAs themselves are non-regulatory designations and do not impose legal restrictions on activities, they serve as an important decision-support tool. In practice, they help to prioritize areas for enhanced management attention, including informing the design of conservation measures such as MPAs or other spatial protections where warranted. EBSAs that overlap with the Study Area can be seen in Figure 5.9.

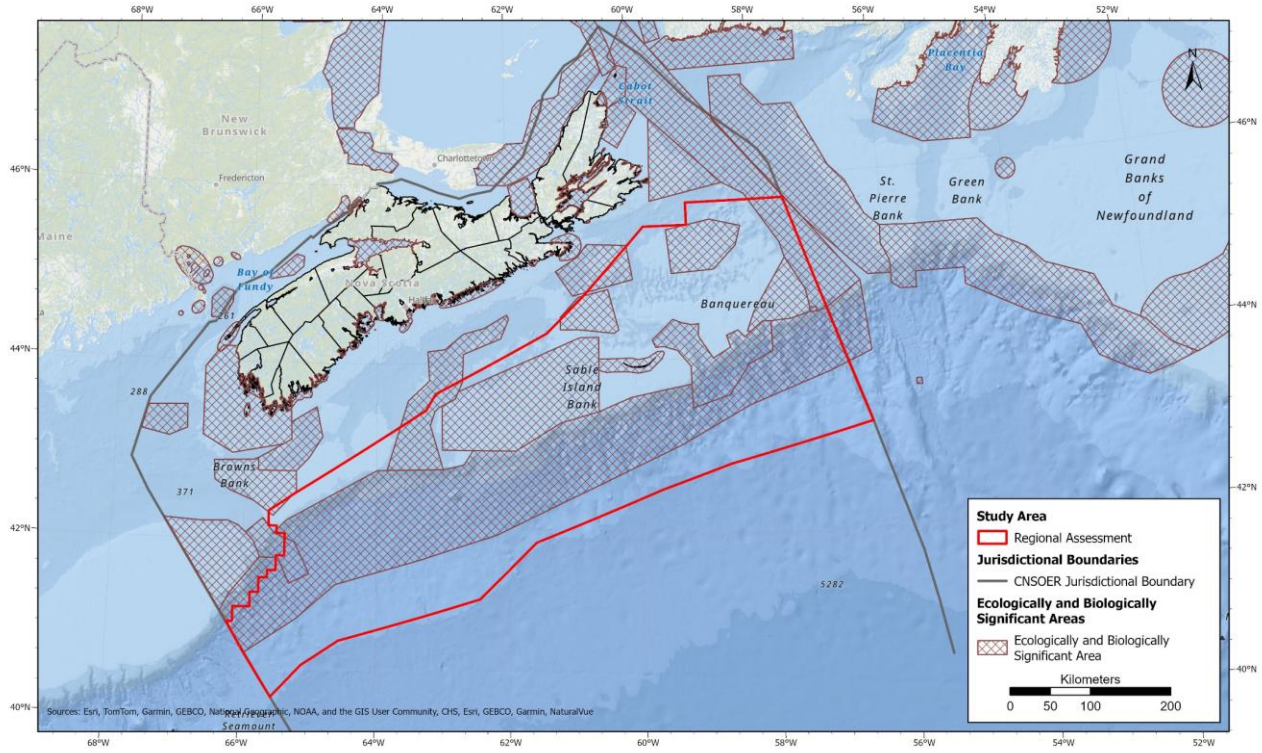


Figure 5.9. EBSAs in relation to the Study Area

Although EBSAs do not prohibit offshore oil and gas exploratory drilling, they are frequently considered during environmental and impact assessments, marine spatial planning initiatives, and regulatory decision-making processes. Since EBSAs identify areas of heightened ecological importance, any proposed exploratory drilling activities within or adjacent to these areas may receive increased scrutiny when evaluating potential effects.

In Atlantic Canada, EBSAs have been identified at both offshore and inshore scales. There are 18 offshore EBSAs within the Scotian Shelf Bioregion, many of which overlap with the Study Area. These EBSA boundaries are iteratively refined over time as new scientific information, monitoring data, and analytical methods become available, reflecting the adaptive nature of the EBSA framework (King et al., 2016). Seventeen of the EBSAs occur on the Scotian Shelf or Scotian Slope and one EBSA has been identified in the deeper waters beyond the slope (DFO, 2014):

- Basins and Deep Water Depressions: Jordan Basin and the Rock Garden; Roseway Basin; Emerald Basin and the Scotian Gulf; and Canso Bank and Canso Basin.
- Banks and Shallow Complexes: Canadian portion of Georges Bank; Browns Bank; Emerald-Western-Sable Island Bank Complex; Sable Island Shoals; Middle Bank; Misaine Bank; and Eastern Shoal.
- Channels, Slopes, and Canyons: Northeast Channel; Eastern Scotian Shelf Canyons; Stone Fence; Laurentian Channel; St. Anns Bank; and Scotian Slope.
- Extreme Deep Water and Hydrothermal Features: Laurentian Fan Cold Seep Communities.

5.2.6.9 Critical Habitat

Under SARA, *critical habitat* is defined (s.2(1)) as "…the habitat necessary for the survival or recovery of a listed wildlife species, as formally identified in a recovery strategy or action plan for the species.". For aquatic species, SARA defines *habitat* as "…spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced.". SARA requires that critical habitat be identified to the extent possible using the best available information, in a manner that supports species' population and distribution objectives and recovery planning.

Once identified, in a recovery strategy or action plan, critical habitat may be protected through a variety of mechanisms under SARA, depending on the location and jurisdiction of the habitat. Although SARA provides for the protection of critical habitat and prohibits its destruction where relevant legal protections apply, implementation of those protections varies according to the circumstances of the habitat and applicable regulatory authorities. For offshore exploratory drilling activities, potential effects on species at risk may include direct or indirect interactions with individuals, residences, and critical habitat. These considerations are relevant throughout project planning, impact assessment, and regulatory review processes, where potential effects must be evaluated to determine consistency with SARA requirements and other applicable regulatory obligations. Where effects cannot be avoided or sufficiently mitigated, additional mitigation, project modifications, permit requirements, or limitations on project approval may be necessary.

An important critical habitat to note for offshore Nova Scotia is the Roseway Basin off Southwestern Nova Scotia. This designation protects summer and fall habitat for the North Atlantic right whale from activities that may result in destruction of the habitat (DFO, 2026e) as seen in Figure 5.10.

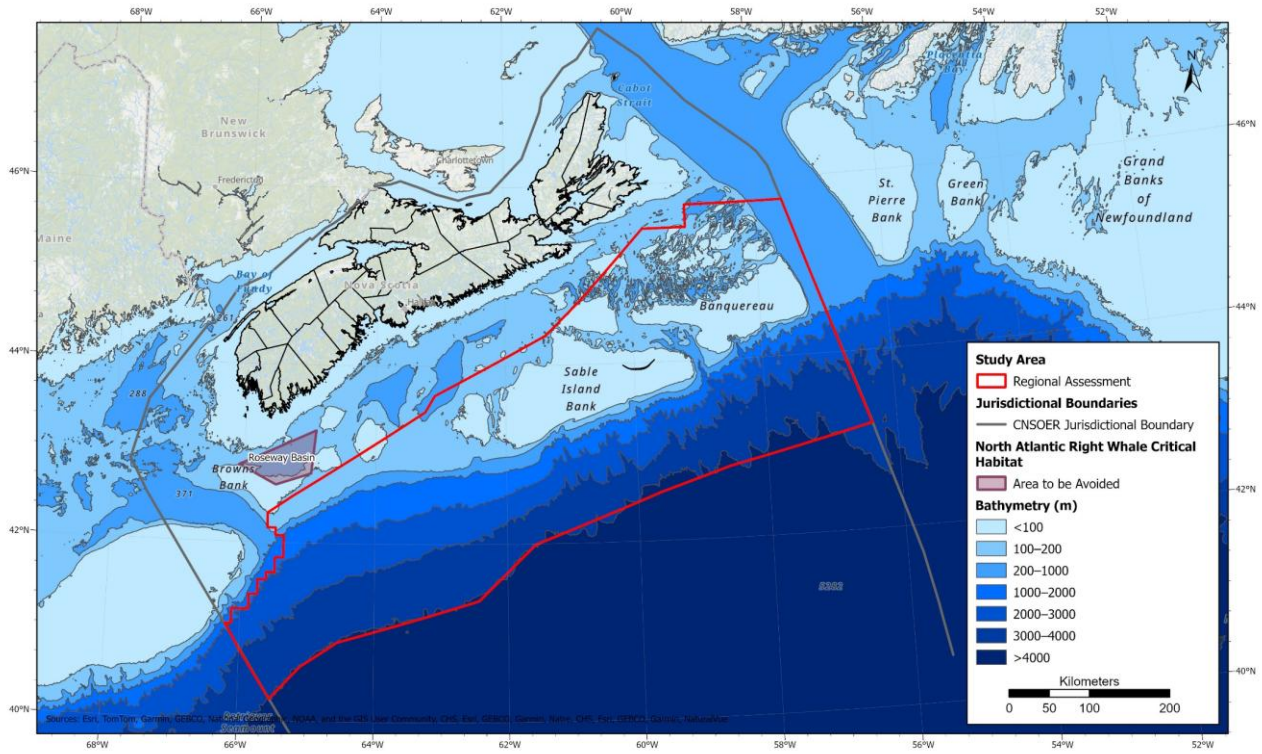


Figure 5.10. Roseway Basin in relation to the Study Area

5.2.6.10 Important Bird Areas, Key Biodiversity Areas and Sea Duck Key Habitat Sites

Important Bird Areas (IBAs) are geographically defined sites identified through standardized, science-based criteria as being critical to bird populations. Sites are designated based on factors such as the presence of threatened species, large aggregations of birds, or the regular support of a significant proportion (often around 1% or more) of a species' population during key life stages such as breeding, migration, or wintering. IBAs form part of a long-standing global conservation initiative led by BirdLife International and implemented in Canada by organizations such as Birds Canada (Chaundy and Wilcox, 2001). Table 5.11 and Figure 5.11 present the IBAs within and adjacent to the Study Area. Although some IBAs are located outside the Study Area and its immediate surroundings, the wide-ranging movements and migratory flight patterns of many bird species mean that individuals associated with these areas may nevertheless traverse the study area.

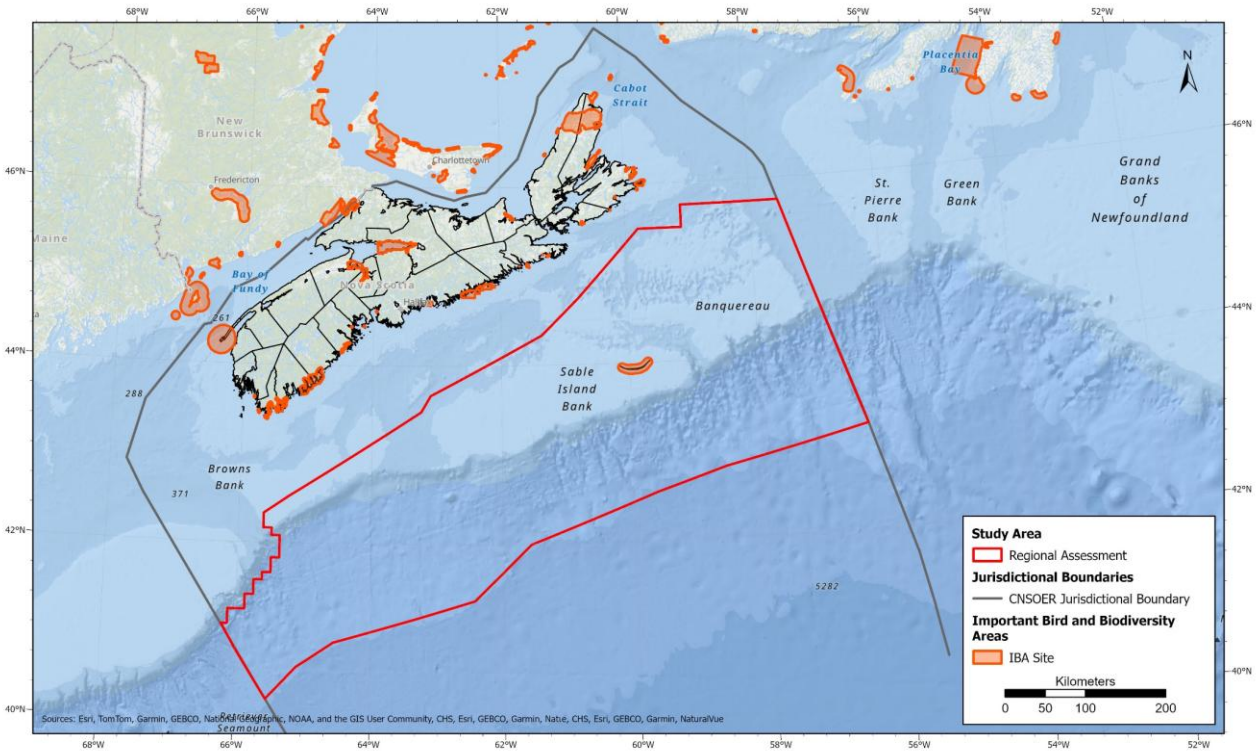


Figure 5.11. IBAs around the Study Area

Table 5.11 – List of IBAs around the Study Area

Important Bird Area (IBA)	IBA Code	Habitat	IBA Criteria	Bird Species
IBA within Study Area				
Sable Island	NS025	native grassland, mud or sand flats (saline), open sea	Globally Significant: Migratory Landbird; Nationally Significant: Threatened Species, Restricted Range Species	American Herring Gull, Great Black-backed Gull, Manx Shearwater, Roseate Tern, Savannah Sparrow
IBA adjacent to Study Area				
The Brothers	NS003	mud or sand flats (saline), coastal	Globally Significant:	Black-headed Gull and Roseate Tern

Important Bird Area (IBA)	IBA Code	Habitat	IBA Criteria	Bird Species
		sand dunes & beaches, open sea, inlets/coastal features (marine)	Congregatory Species; Nationally Significant: Threatened Species	
South Shore (Port Joli sector)	NS004	tidal rivers/estuaries, mud or sand flats (saline), open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Globally Significant: Congregatory Species; Nationally Significant: Threatened Species	Black-headed Gull, Dovekie, Great Cormorant, Harlequin Duck, Piping Plover, Roseate Tern, Savannah Sparrow
Portnova Islands	NS006	open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Globally Significant: Congregatory Species	Great Cormorant
Big Glace Bay Lake	NS007	mud or sand flats (saline), inlets/coastal features (marine)	Continentally Significant: Congregatory Species	Black-headed Gull, Piping Plover
Musquodoboit	NS014	coniferous forest (temperate), tidal rivers/estuaries, mud or sand flats (saline), open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Continentally Significant: Congregatory Species	Piping Plover, Savannah Sparrow, Semipalmated Plover
Bon Portage Island	NS015	coniferous forest (temperate), tidal rivers/estuaries, freshwater marsh, open sea,	Globally Significant: Congregatory Species, Colonial Waterbirds/Seabird Concentrations	American Herring Gull, Great Black-backed Gull, Manx Shearwater, Northern Gannet, Roseate Tern,

DRAFT

Important Bird Area (IBA)	IBA Code	Habitat	IBA Criteria	Bird Species
		inlets/coastal features (marine)		Savannah Sparrow
Eastern Cape Sable Island	NS016	mixed woods (temperate), scrub/shrub, salt marshes/brackish marshes, mud or sand flats (saline), coastal sand dunes & beaches, open sea, inlets/coastal features (marine), urban parks/gardens, other urban/industrial areas	Globally Significant: Congregatory Species, Shorebird Concentrations, Migratory Landbird Concentrations; Nationally Significant: Threatened Species, Congregatory Species	Brant, Dovekie, Manx Shearwater, Northern Gannet, Piping Plover, Razorbill, Roseate Tern, Sanderling, Savannah Sparrow
South Shore (Roseway to Baccaro)	NS017	tidal rivers/estuaries, mud or sand flats (saline), open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Nationally Significant: Threatened Species, Congregatory Species	American Herring Gull, Piping Plover, Roseate Tern
South Shore (Barrington Bay Sector)	NS018	mud or sand flats (saline), open sea, inlets/coastal features (marine)	Nationally Significant: Threatened Species, Congregatory Species	American Herring Gull, Dovekie, Great Black-backed Gull, Great Cormorant, Piping Plover, Roseate Tern, Savannah Sparrow
South Shore - East Queens Co. Sector	NS024	tidal rivers/estuaries, mud or sand flats (saline), open sea,	Globally Significant: Congregatory Species; Nationally	Black-headed Gull, Dovekie, Piping Plover, Purple Sandpiper,

DRAFT

Important Bird Area (IBA)	IBA Code	Habitat	IBA Criteria	Bird Species
		inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Significant: Threatened Species, Congregatory Species	Savannah Sparrow, Semipalmated Plover
Grassy Island Complex	NS026	open sea, inlets/coastal features (marine)	Nationally Significant: Threatened Species, Congregatory Species	Roseate Tern
Eastern Shore Islands	NS027	coniferous forest (temperate), open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Globally Significant: Congregatory Species; Continentally Significant: Congregatory Species; Nationally Significant: Threatened Species, Waterfowl Concentrations	Common Eider, Dovekie, Savannah Sparrow
Country Island Complex	NS028	native grassland, open sea, inlets/coastal features (marine)	Globally Significant: Congregatory Species, Colonial Waterbirds/Seabird Concentrations; Nationally Significant: Threatened Species	Manx Shearwater, Roseate Tern, Savannah Sparrow
Basque Islands and Michaud Point	NS045	coniferous forest (temperate), inlets/coastal features (marine),	Globally Significant: Congregatory Species	Great Cormorant, Savannah Sparrow

DRAFT

Important Bird Area (IBA)	IBA Code	Habitat	IBA Criteria	Bird Species
		coastal cliffs/rocky shores (marine)		
Rocks off Fourchu Head	NS047	inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Globally Significant: Congregatory Species	Great Cormorants
Harbour Rocks	NS049	open sea, inlets/coastal features (marine), coastal cliffs/rocky shores (marine)	Globally Significant: Congregatory Species	Great Cormorant
Scatarie Island	NS052	coniferous forest (temperate), scrub/shrub, bog, open sea, coastal cliffs/rocky shores (marine)	Nationally Significant: Threatened Species, Congregatory Species	Bicknell's Thrush, Savannah Sparrow
Northern Head and South Head	NS053	open sea, coastal cliffs/rocky shores (marine)		Black-headed Gull, Dovekie, Great Cormorant, Northern Gannet, Savannah Sparrow

Source: (Birds Canada & Nature Canada, n.d.)

In Canada, the IBA program is transitioning to the KBA framework, a broader global initiative introduced by the IUCN in 2016 to identify sites critical for the persistence of biodiversity across all taxa. Many IBAs serve as the foundation for KBAs, as they already capture sites important for species conservation (Birds Canada, n.d.).

Across Canada, including Nova Scotia, KBAs occur in marine, freshwater, and terrestrial environments, and are used to identify and prioritize areas that are particularly important for maintaining biodiversity and ecological functions. Site inventories are continuously updated and refined as new data becomes available, reflecting the evolving and collaborative nature of the KBA program. Table 5.12 and Figure 5.12 present the KBAs in Nova Scotia. Although some KBAs are located outside the Study Area and its immediate surroundings, the wide-ranging movements and migratory flight patterns of many bird

species mean that individuals associated with these areas may nevertheless traverse the study area.

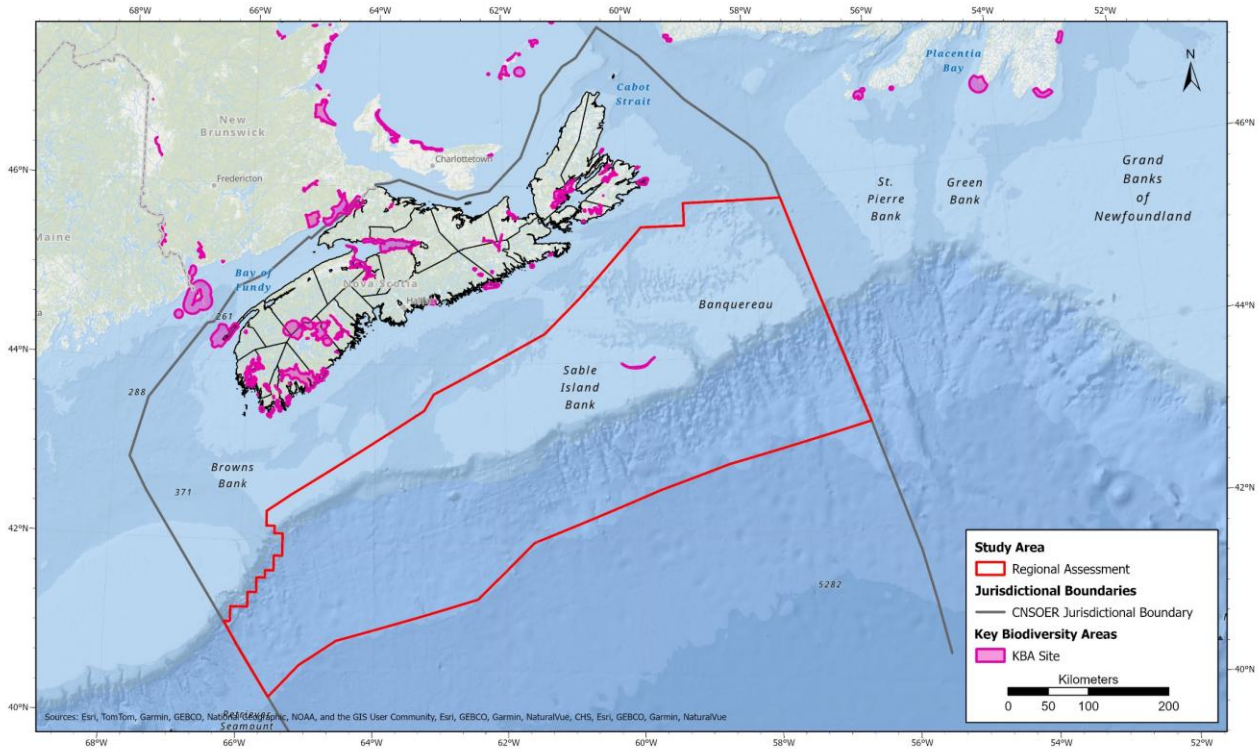


Figure 5.12. KBAs within Nova Scotia

Table 5.12 – List of KBAs with marine systems within and adjacent to the Study Area

Key Biodiversity Area (KBA)	KBA Code	KBA Level	Citeria Met – Global	Criteria Met - National
KBA within Study Area				
Sable Island National Park Reserve	NS025	National	A1 - Threatened species (invertebrates); B1 - Individual geographically restricted species (invertebrates); D1 - Demographic aggregations (mammals)	A1 - Threatened species (invertebrates); B1 - Individual geographically restricted species (invertebrates); D1 - Demographic aggregations (birds)
KBA adjacent to Study Area				
Tusket River and Estuary	NS085	National		A1 - Threatened species (vascular plants); B1 - Individual geographically restricted species (vascular plants)
The Brothers	NS003	National		A1 - Threatened species (birds); B1 - Individual geographically restricted species (birds); D1 - Demographic aggregations (birds)
Bon Portage Island	NS015	National	A1 - Threatened species (birds)	A1 - Threatened species (birds)
Eastern Cape Sable Island	NS016	Global	D1 - Demographic aggregations (birds)	A1 - Threatened species (birds); D1 - Demographic aggregations (birds)
South Shore (Roseway to Baccaro)	NS017	National		A1 - Threatened species (birds, vascular plants); B1 - Individual geographically restricted species (vascular plants)

Key Biodiversity Area (KBA)	KBA Code	KBA Level	Citeria Met – Global	Criteria Met - National
Roseway River Estuary	NS082	National		A1 - Threatened species (vascular plants)
Middle Ohio to Port Joli	NS004	National		A1 - Threatened species (birds, fungi and lichens); B1 - Individual geographically restricted species (fungi and lichens, vascular plants)
Medway River Estuary	NS079	National		A1 - Threatened species (vascular plants); B1 - Individual geographically restricted species (vascular plants)
LaHave River Estuary	NS078	National		A1 - Threatened species (vascular plants); B1 - Individual geographically restricted species (vascular plants)
Musquodoboit	NS014	Global	D1 - Demographic aggregations (birds)	D1 - Demographic aggregations (birds)
Eastern Shore Islands	NS027	Global	A1 - Threatened species (birds)	A1 - Threatened species (birds)
Country Island Complex	NS028	National	A1 - Threatened species (birds)	A1 - Threatened species (birds)
Scatarie Island	NS052	Global	A1 - Threatened species (birds)	A1 - Threatened species (birds)
Northern Head	NS053	National		D1 - Demographic aggregations (birds)
Bird Islands	NS001	National		D1 - Demographic aggregations (birds)

DRAFT

Key Biodiversity Area (KBA)	KBA Code	KBA Level	Citeria Met – Global	Criteria Met - National
River Philip Estuary	NS081	National		A1 - Threatened species (vascular plants); B1 - Individual geographically restricted species (vascular plants)
Pomquet Beach Region	NS009	National		A1 - Threatened species (birds)
Cobequid Bay	NS019	National	D1 - Demographic aggregations (birds)	A1 - Threatened species (invertebrates); B1 - Individual geographically restricted species (invertebrates); D1 - Demographic aggregations (birds)
Southern Bight, Minas Basin	NS020	National	A1 - Threatened species (vascular plants); D1 - Demographic aggregations (birds)	A1 - Threatened species (birds, invertebrates); B1 - Individual geographically restricted species (vascular plants); D1 - Demographic aggregations (birds)
Brier Island and Offshore Waters	NS021	Global	B1 - Individual geographically restricted species (vascular plants)	A1 - Threatened species (fungi and lichens); D1 - Demographic aggregations (birds)

Source: Key Biodiversity Areas Canada. (n.d.).

DRAFT

Sea Duck Key Habitat Sites (SDKHS) are geographically defined areas recognized as important habitats for sea duck species during key stages of their life cycle, including breeding, migration, molting, staging, and wintering. Identified through science-based assessments by the Sea Duck Joint Venture (SDJV), these sites support significant concentrations of sea ducks and are considered priorities for conservation, management, and environmental planning. The SDKHS Atlas describes 85 important sites across North America and provides information on sea duck abundance, seasonal habitat use, and potential sensitivities affecting these habitats (Sea Duck Joint Venture, n.d.). Table 5.13 and Figure 5.13 present the SDKHS in Nova Scotia. Although some SDKHS are located outside the Study Area and its immediate surroundings, the wide-ranging movements and migratory flight patterns of many bird species mean that individuals associated with these areas may nevertheless traverse the study area. Other sea ducks found in these key sites include Surf Scoter, Black Scoter, White-winged Scoter, Long-tailed Duck, Bufflehead, Common Goldeneye, Common Merganser, Red-breasted Merganser, and rarely, Barrow's Goldeneye and Hooded Merganser (Sea Duck Joint Venture, n.d.; Bird Studies Canada 2015, eBird 2019).

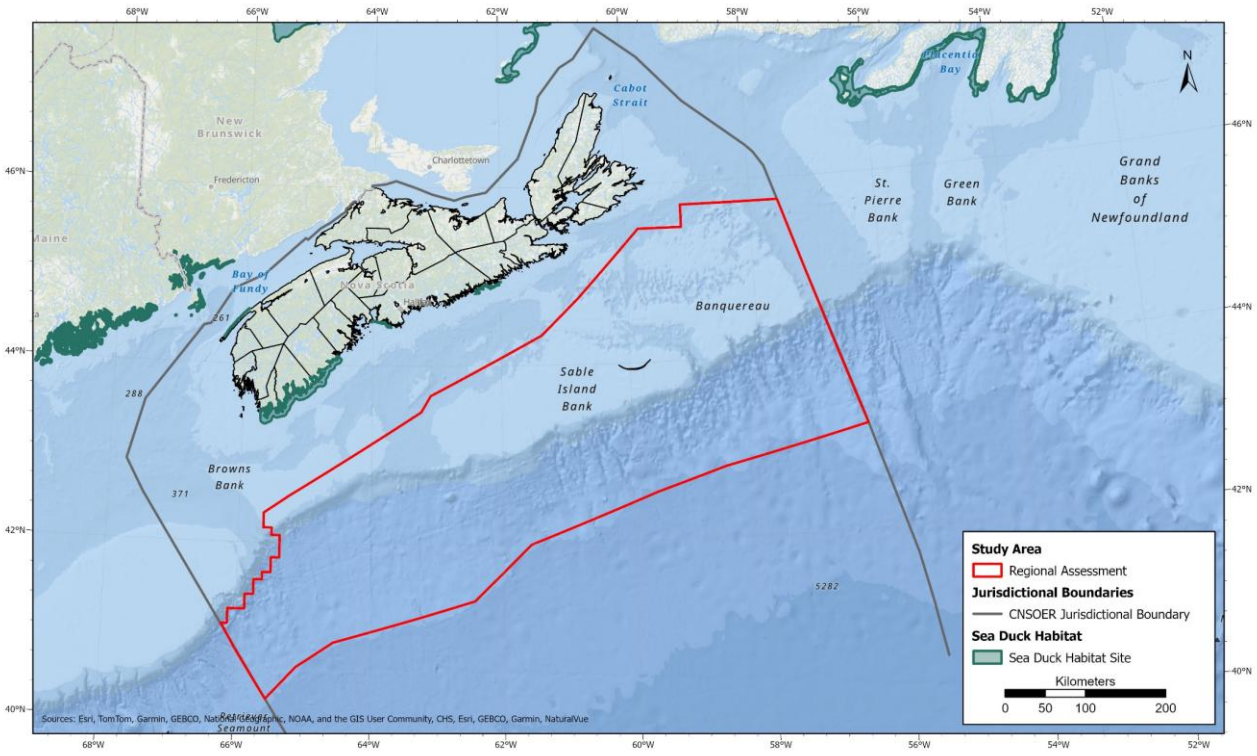


Figure 5.13. Sea Duck Key Habitat Sites in Nova Scotia

Table 5.13 – Sea Duck Key Habitat Sites in Nova Scotia

Key Site	Location	Biological Value	Status
Key Site 62: Eastern Shore, Nova Scotia	Eastern shore of NS including offshore islands and ledges from Southern Island and Pumpkin Island off Beaver Harbour northeast to Seal Ledges off Barren Island.	Important to overwintering Eastern Harlequin Ducks and supports wintering and breeding American Common Eider as well as other sea duck species	Most of the site falls within the Eastern Shore Islands Wildlife Management Area. The site also intersects the Eastern Shore Islands Important Bird Area
Key Site 63: Prospect, Nova Scotia	South shore of NS including coastal and island shorelines extending from Gravel Island near Aspotogan to Marrs Island near Terrance Bay.	Important to overwintering Eastern Harlequin Duck and supports wintering American Common Eider as well as other duck species	The site intersects the St. Margaret's Bay Ecologically or Biologically Significant Area (Hastings et al. 2014). There are three protected areas adjacent to the site: the West Dover Provincial Park, the Dr. Bill Freedman Nature Reserve, and Rogue's Roost Wilderness Area.
Key Site 64: South Shore, Nova Scotia	South shore of NS extending from Shag Harbour to Port Medway. It encompasses coastal areas, islands, estuaries, harbours, and bays.	Important to molting American Common Eider from August to early September and to overwintering Eastern Harlequin Ducks.	The site intersects four Important Bird Areas (IBAs): (1) Eastern Cape Sable Island, (2) South Shore (Barrington Bay Sector), (3) South Shore (Roseway to Baccaro), (4) South Shore (Port Joli Sector), and Kejimkujik National Park Seaside. It is

Key Site	Location	Biological Value	Status
			also adjacent to the Bon Portage Island IBA. The site also intersects five Ecologically or Biologically Significant Areas (Hastings et al. 2014).

Sources: Sea Duck Joint Venture (n.d.), Hastings et al., (2014)

Since IBAs, KBAs, and SDKHS are non-regulatory conservation initiatives, they do not impose any legal restrictions on offshore oil and gas exploration activities. However, they are often used by governments, regulators, conservation organizations, and proponents to identify potentially sensitive areas. Consequently, the presence of an IBA or KBA may inform environmental or impact assessments, mitigation planning, or regulatory reviews of proposed activities.

5.2.6.11 Significant Benthic Areas

DRAFT

A number of ecologically important areas for corals and sponges have been identified on the Scotian Shelf through DFO-led scientific processes (Figure 5.14). These include Significant Benthic Areas (SiBAs), which are delineated based on the presence and biomass of key taxa such as large gorgonian corals, small gorgonians, sea pens, and sponges. SiBAs have been informed by research vessel surveys, fisheries observer data, and predictive modelling approaches. In addition, several coral and sponge conservation areas and fisheries closures have been established to protect vulnerable benthic habitats (e.g., the Lophelia Coral Conservation Area, Northeast Channel Coral Conservation Area, and sponge conservation zones) (DFO, 2017, 2025f; Kenchington et al., 2016). While SiBAs do not constitute any legalities of protection of an area, and do not independently impose restrictions on activities, they do help inform management measures, fisheries closures and in the development of marine refuges and MPAs. If offshore exploratory drilling was to occur in an area within or near an SiBA, the activities may undergo further review to identify the potential for adverse effects on sensitive benthic habitats.

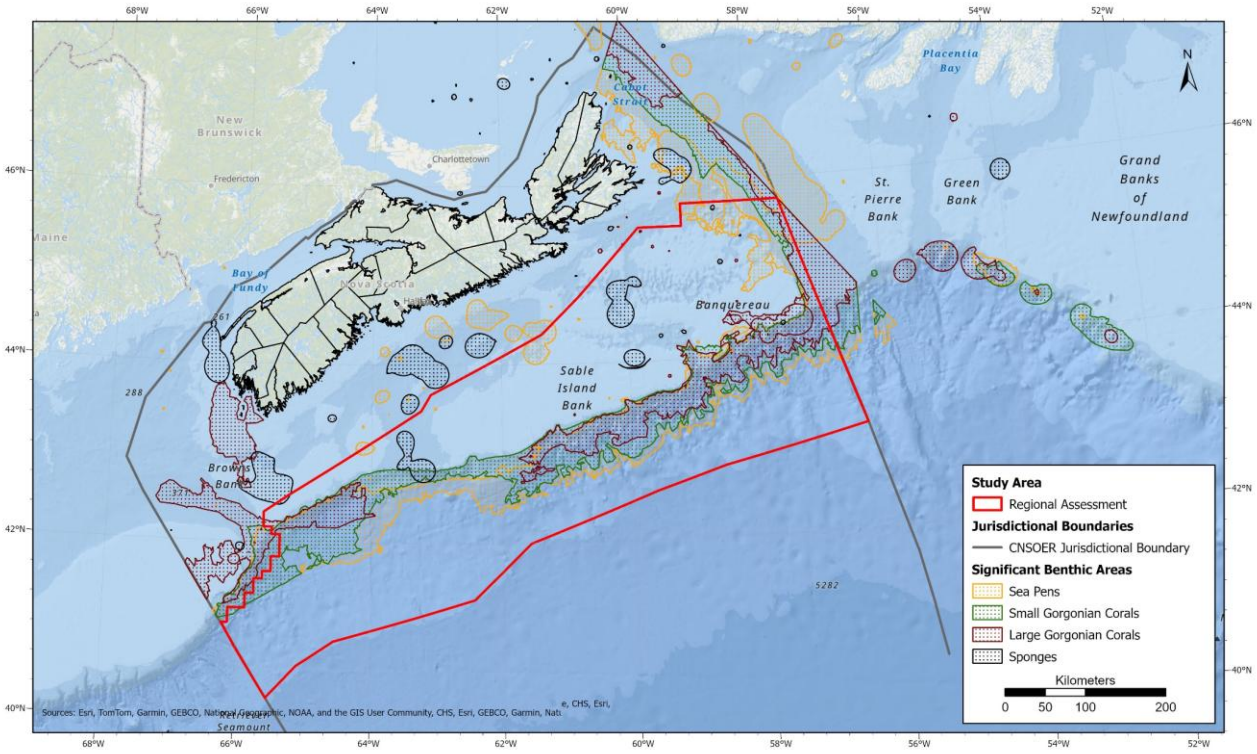


Figure 5.14. SiBAs within the Study Area

5.2.6.12 Vulnerable Marine Ecosystems (VMEs)

At an international scale, Vulnerable Marine Ecosystems (VMEs) have been identified in portions of the Northwest Atlantic, including areas relevant to offshore Nova Scotia. VMEs are considered broadly analogous to Canada's Significant Benthic Areas (above), as both are identified using similar scientific approaches to recognize benthic ecosystems that are

ecologically important and particularly sensitive to disturbance. While VMEs are often associated with concentrations of corals and sponges, they may also include other vulnerable taxa, such as bryozoans and tunicates, as well as geomorphic features that support vulnerable benthic communities, including seamounts and submarine canyons (Murillo et al., 2011; Kenchington et al., 2016). In the Northwest Atlantic Fisheries Organization (NAFO) Regulatory Area, VMEs are subject to management measures, including bottom fishing closures, intended to prevent significant adverse impacts on these vulnerable ecosystems (Kenchington et al., 2016; NAFO, 2019). Although VME designations do not directly regulate any offshore exploratory oil and gas activities, their presence indicates areas of elevated ecological value and sensitivity that may inform environmental assessments, project planning, and regulatory reviews. As with SiBAs above, if exploratory activities where to occur within or near a VME, there may be additional scrutiny where there is the potential for adverse effects on vulnerable benthic habitats and associated ecosystem function.

Specific information regarding the corals and sponges that occur within these areas can be found in Section 5.2.

5.2.6.13 Other Areas of Interest

Georges Bank Prohibition Area

Georges Bank Prohibition Area is a highly diverse ecosystem located southwest of Nova Scotia near the Canada-United States maritime boundary, just adjacent to the Study Area (Figure 5.15). The bank supports is an important habitat for groundfish, being an area of high fish and larval fish diversity as well as being an area of high primary productivity, which makes it one of the most important fishing grounds in Atlantic Canada. With these considerations in mind, in addition to the support the area provides to species of conservation concern, including Atlantic cod and American plaice, a portion of the Canadian section of Georges Bank has been identified as a proposed Tier 2 site within the Scotian Shelf-Bay of Fundy Marine Conservation Network. Although Georges Bank is widely recognized as one of Atlantic Canada's most important fishing grounds, its ecological significance and representative habitat values were considered during network design, resulting in its inclusion as a potential conservation network site (DFO, 2024d; Kennedy et al., 2011; Lee et al., 2011).

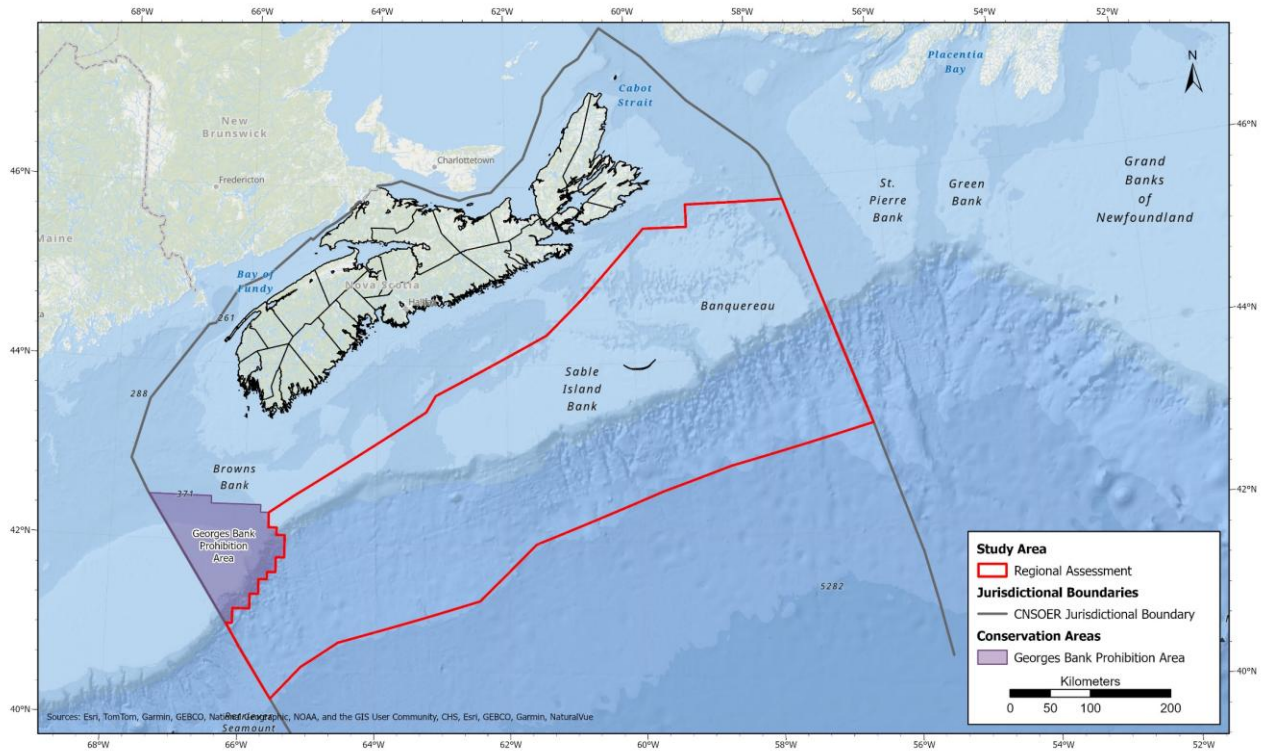


Figure 5.15. Georges Bank in relation to the Study Area

In 2022, the federal Minister of Natural Resources and the provincial Minister of Natural Resources and Renewables, announced the extension of the statutory moratorium on oil and gas activities in the Canadian portion of Georges Bank to December 31, 2032. These restrictions on offshore oil and gas activities differ from other protected and special areas, as they were implemented through the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation and Offshore Renewable Energy Management Act and its mirror provincial legislation (the Accord Acts), a Canada-Nova Scotia moratorium on petroleum activities in recognition of the area's ecological sensitivity and the importance of its fisheries resources (Natural Resources Canada, 2022).

5.2.7 References

Birds Canada. (n.d.). *Canada Key Biodiversity Areas*. Retrieved from Birds Canada. https://www.birdscanada.org/conserve-birds/iba-kba

Birds Canada and Nature Canada. (n.d.). *Canadian Important Bird Areas: Map viewer*. IBA Canada. https://www.ibacanada.org/mapviewer.jsp

Chaundy, R., and Wilcox, S. (2001). *Canadian Important Bird Area Criteria*. Bird Studies Canada. http://www.birdlife.org/datazone/info/ibacriteria

CNSOER. (n.d.). *Special Designated Areas*. Retrieved from Canada-Nova Scotia Offshore Energy Regulator: https://cnsoer.ca/about-cnsoer/what-we-do/environmental-protection/special-designated-areas

DFO. (2014). Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041.

DFO. (2017). Delineation of Significant Areas of Coldwater Corals and Sponge-Dominated Communities in Canada's Atlantic and Eastern Arctic Marine Waters and their Overlap with Fishing Activity (Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/007). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2017/mpo-dfo/Fs70-6-2017-007-eng.pdf

DFO. (2018). *4VWX5 groundfish – Maritimes Region*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/fisheries-peches/ifmp-gmp/groundfish-poisson-fond/groundfish-poisson-fond-4vwx5-eng.html#toc5.4.1

DFO. (2022ac). *2022 Marine Other Effective Area-Based Conservation Measures*. Retrieved from Government of Canada: https://www.canada.ca/en/fisheries-oceans/news/2022/12/2022-marine-other-effective-area-based-conservation-measures.html

DFO. (2022bd). *Guidance for recognizing marine Other Effective Area-Based Conservation Measures* 2022. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/publications/oecm-amcepz/guidance-directives-2022-eng.html

DFO. (2023ac). *Federal Marine Protected Areas Protection Standard*. Ottawa, ON: DFO.

DFO. (2023bd). *Fudian Channel-Browns Bank Area of Interest (AOI)*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/aoi-si/fundian-fundy-browns-eng.html

DFO. (2023ce). Eastern Shore Islands Area of Interest Consultations. Government of Canada. https://www.dfo-mpo.gc.ca/oceans/consultations/easternshore-ilescoteest/index-eng.html

DFO.(2023df). Fundian Chennel-Browns Bank Area of Interest consultation. Government of Canada. https://dfo-mpo.gc.ca/oceans/consultations/fundian-fundy-browns/index-eng.html

DRAFT

DFO. (2024a). *Marine conservation network development*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/networks-reseaux/development-developpement-eng.html

DFO. (2024b*). St. Anns Bank Marine Protected Area Management Plan 2023*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/stanns-sainteanne/mpa-management-plan-zpm-plan-gestion-eng.html

DFO. (2024c). *Pemsɨk*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/networks-reseaux/scotian-shelf-plateau-neo-ecossais-bay-baie-fundy/pemsik-eng.html

DFO. (2024d). *Georges Bank*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/networks-reseaux/scotian-shelf-plateau-neo-ecossais-bay-baie-fundy/georges-bank-banc-eng.html

DFO. (2025a). *What We Heard: Scotian Shelf - Bay of Fundy Marine Conservation Network Plan: Public Engagement.* Dartmouth, Nova Scotia: Government of Canada.

DFO. (2025b). *The Gully Marine Protected Area (MPA).* Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/gully/index-eng.html

DFO. (2025c). *St. Anns Bank Marine Protected Area (MPA)*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/stanns-sainteanne/index-eng.html

DFO. (2025d). *Eastern Shore Islands: Area of Interest (AOI).* Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/aoi-si/easternshore-ilescoteest-eng.html

DFO. (2025e). *Canada's conserved areas*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/conserved-areas.html

DFO. (2025f). *Scotian Shelf-Bay of Fundy Bioregional Marine Refuge Management Plan part 1 and 2*. Government of Canada. https://www.dfo-mpo.gc.ca/oceans/publications/oecm-amcepz/scotian-shelf-plate-forme-bioregion-management-plan-gestion/index-eng.html

DFO. (2025g). *Emerald Basin and Sambro Bank Sponge Marine Refuge*. Government of Canada. https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/emerald-emeraude-eng.html

DFO. (2025h). *Jordan Basin Marine Refuge*. Government of Canada. https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/jordan-eng.html

DFO. (2025i). *Laurentian Channel Marine Protected Area (MPA).* Government of Canada. https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/laurentian-laurentien/index-eng.html

DFO. (2026a). *Establishing new Marine Protected Areas*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/aoi-si/index-eng.html

DFO. (2026b). *Marine Protected Areas (APS) Protected Standard*. Government of Canada. https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/protection-standard-norme-protection-eng.html

DFO. (2026c). *Canada's existing and proposed marine protected and conserved areas*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/conservation/areas-zones/index-eng.html

DFO. (2026d). *Marine refuges across Canada*. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/index-eng.html

DFO. (2026e). *Protecting North Atlantic right whales in the Roseway Basin*. Government of Canada. https://tc.canada.ca/en/marine-transportation/navigation-marine-conditions/protecting-north-atlantic-right-whales-collisions-vessels-gulf-st-lawrence/protecting-north-atlantic-right-whales-roseway-basin

ECCC. (2016). *Critical habitat identification toolbox: Species at Risk Act guidance.* Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/critical-habitat-descriptions/identification-toolbox-guidance.html

ECCC. (2017). *Selection of sites as national wildlife areas*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/site-selection.html

ECCC. (2019). *Identification of critical habitat: loss or degradation is not a significant threat to recovery or survival*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/policies-guidelines/degradation-not-significant-threat-recovery-survival.html

ECCC. (2025a). *Current national wildlife areas*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations.html#ns

ECCC (2025b). *Country Island National Wildlife Area*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations/country-island.html

ECCC. (2025c). *Migratory bird sanctuaries across Canada*. Retrieved from Government of Canada: https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/locations.html

Government of Canada. (2026, February 25). *Protected areas*. Retrieved from Government of Canada: https://www.canada.ca/en/services/environment/conservation/protected-areas.html

Kenchington, E. (2014). A General Overview of Behthic Ecological or Biological Significant Areas (EBSAs) in Maritimes Region (Can. Tech. Rep. Fish. Aquat. Sci. 3072, p. iv + 45). Fisheries and Oceans Canada. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs97-6-3072-eng.pdf

Kenchington, E., Beazley, L., Lirette, C., Murillo, F. J., Guijarro, J., Wareham, V., Gilkinson, K., Koen Alonso, M., Benoît, H., Bourdages, H., Sainte-Marie, B., Treble, M., and Siferd, T. (2016). Delineation of Coral and Sponge Significant Benthic Areas in Eastern Canada Using Kernel Density Analyses and Species Distribution Models (Can. Sci. Advis. Sec. Res. Doc. 2016/093, p. vi + 178). Fisheries and Oceans Canada. https://www.nafo.int/Portals/0/PDFs/sc/2019/scs19-20.pdf

Kennedy, E., L. Bennett, S. Campana, K. Clark, P. Comeau, M. Fowler, C. Gjerdrum, F. Grégoire, C. Hannah, L. Harris, G. Harrison, M. James, I. Jonsen, C. Johnson, B. Law, W.K.W. Li, G. Melvin, T. Milligan, S. Paul, D. Pezzack, J. Sameoto, J. Simon, K. Smedbol, P. Smith, H. Stone, D. Themelis, J. Tremblay, L. Van Eeckhaute, J. Wade, Y. Wang, and T. Worcester. 2011. The Marine Ecosystem of Georges Bank. DFO. Can. Sci. Advis. Sec. Res. Doc. 2011/059: xiv + 232pp. (Erratum: October 2011)

Key Biodiversity Areas Canada. (n.d.). *Map viewer*. https://kbacanada.org/explore/map-viewer/

King, M., Fenton, D., Aker, J. and Serdynska, A. 2016. Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/007. viii + 92 p.

K. Lee, S.L. Armsworthy, S.E. Cobanli, N.A. Cochrane, P.J. Cranford, A. Drozdowski, D. Hamoutene, C.G. Hannah, E. Kennedy, T. King, H. Niu, B.A. Law, Z. Li, T.G. Milligan, J. Neff, J.F. Payne, B.J. Robinson, M. Romero, and T. Worcester. 2011. Consideration of the Potential Impacts on the Marine Environment Associated with

Offshore Petroleum Exploration and Development Activities. DFO. Can. Sci. Advis. Sec. Res. Doc. 2011/060: xii + 134p.

Migratory Birds Convention Act, SC 1994, c.22. https://laws-lois.justice.gc.ca/eng/acts/m-7.01/

Murillo, F.J., Kenchington, E., Sacau, M., Piper, D.J.W., Wareham, V., and Muñoz, A. 2011. New VME indicator species (excluding corals and sponges) and some potential VME elements of the NAFO Regulatory Area. NAFO SCR Doc. 11/73, Serial No. N6003, 19 p. https://www.nafo.int/Portals/0/PDFs/sc/2011/scr11-073.pdf

NAFO. (2019). Report of the Scientific Council, 31 May—June 2019, Halifax, Canada (NAFO SCS Doc. 19/20). https://www.nafo.int/Portals/0/PDFs/sc/2019/scs19-20.pdf

Natural Resources Canada. (2022). *Moratorium Extended on Oil and Gas Activities in Georges Bank*. Retrieved from Government of Canada: https://www.canada.ca/en/natural-resources-canada/news/2022/04/moratorium-extended-on-oil-and-gas-activities-in-georges-bank.html

Oceans Act, SC 1996, c. 31. https://laws-lois.justice.gc.ca/eng/acts/o-2.4/

Parks Canada. (2023). *Parks Canada Agency Recommendation Report*. Retrieved from Impact Assessment Agency of Canada: https://iaac-aeic.gc.ca/050/documents/p83514/155039E.pdf

Parks Canada. (2026a, March 16). *Sable Island National Park Reserve*. Retrieved from Government of Canada: https://parks.canada.ca/pn-np/ns/sable

Parks Canada. (2026b, April 30). *National marine conservation areas*. Retrieved from Government of Canada: https://parks.canada.ca/amnc-nmca

Parks Canada. (2026c, August 11). Parks Canada Agency Supporting Information: Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area.

Sea Duck Joint Venture. (n.d.). *Sea duck key habitat sites atlas*. https://seaduckjv.org/science-resources/sea-duck-key-habitat-sites-atlas/

The Gully Marine Protected Area Regulations, SOR 2004-112. https://laws-lois.justice.gc.ca/eng/regulations/SOR-2004-112/index.html

5.3 Health, Social and Economic Context

The marine environment in the province of Nova Scotia holds social, cultural, and economic importance. With a coastline exceeding 13,000 km, with ~70% of the province's population living within 20 km of the coast (Nova Scotia Department of Fisheries and Aquaculture, n.d.a), the coastal and marine environment play an important role in supporting communities, livelihoods, recreation, and cultural connections throughout the province. The marine economy extends beyond commercial fishing and seafood food production, to include various other sectors such as coastal tourism, manufacturing and construction, marine transportation, offshore energy, and public sector activities. The province's network of 171 small craft harbours, including 149 dedicated to core fishing and 22 to non-core fishing, support the local needs, small scale fishing and/or aquaculture, tourism, and recreational activities (DFO, 2026a). In 2024, Nova Scotia's marine GDP reached $10.98 billion (DFO, 2025a), highlighting the substantial contribution of marine-based industries and activities to the provincial economy.

The offshore and coastal waters of Nova Scotia are used by Indigenous Peoples, and a diverse range of stakeholders, government, industry, and recreational users. Commercial, recreational, and Indigenous fisheries remain among the most prominent uses of the marine environment, while shipping, tourism, recreation, defence activities, scientific research, and offshore resource development also contribute to economic activity and employment. These marine activities support food security, income generation, cultural practices, recreation, and community well-being, while providing important social and economic benefits to coastal communities throughout the province. Understanding the existing health, social, and economic context, including the range of ocean users and their reliance on marine resources and healthy ecosystems, is important for assessing how future offshore oil and gas exploratory drilling activities may interact with existing ocean uses, community values, and regional economic conditions.

The following sections describe the principal fisheries, other ocean users, tourism and recreational activities, community health and well-being considerations, and the broader economic conditions associated with the Study Area and surrounding coastal communities.

5.3.1 Fisheries

5.3.1.1 Indigenous Fisheries

Mi'kmaq in NS were signatories to Peace and Friendship Treaties with the British Crown in the eighteenth century. Other signatories include the Wolastoqey (Maliseet) and Peskotomuhkati communities (New Brunswick and Maine, USA) (Government of Canada, 2010). These treaties, including the Treaties of 1760-1761, recognize Indigenous rights to hunt, fish and gather in traditional territories for "necessaries" and benefits that include economic activities (DFO, 2022a; Harris and Millerd, 2010). The exercise of these rights

continues to be closely connected to Mi'kmaw relationships with marine environments and the resources found throughout Mi'kma'ki.

Like other treaties, the Peace and Friendship Treaties are constitutionally protected by Section 35 of the Constitution Act, 1982 (Government of Canada, 2010).

Moderate Livelihood Fisheries

R. v. Marshall (1999) is a landmark Supreme Court of Canada decision concerning treaty fishing rights under the Peace and Friendship Treaties. The decision affirmed that 35 Mi'kmaq, Wolastoqey and Peskotomuhkati communities in the Atlantic and Gaspé regions of Canada have a treaty right to hunt, fish, and gather in pursuit of a moderate livelihood (DFO, 2021; Government of Canada, 2010)[9]. The scope and implementation of Moderate Livelihood Fisheries continue to evolve, with approaches adapted over time according to First Nation preferences (Curran et al., 2025). For many Mi'kmaw communities, participation in these fisheries also reflects longstanding relationships with marine resources and contributes to community well-being and economic sustainability.

Food, Social and Ceremonial Fisheries

In its 1990 decision in *R. v. Sparrow*, the Supreme Court of Canada recognized Indigenous Peoples' right to fish for food, social, and ceremonial (FSC) purposes (Harris and Millerd, 2010). FSC fisheries are afforded priority over other fisheries, subject to conservation considerations (Warrior et al., 2022). DFO authorizes FSC fisheries through communal licences that specify species, areas and other conditions developed in collaboration with Indigenous communities; however, these licences do not define the Aboriginal right to fish or its scope (Curran et al., 2025). FSC fisheries continue to be an important component of community well-being, food security, and cultural continuity for many Mi'kmaw communities. FSC fisheries are generally managed separately from commercial and recreational fisheries and may occur within marine waters that overlap or are connected to the Study Area. These fisheries support the continued exercise of Aboriginal and Treaty rights and help maintain cultural practices and connections to marine environments.

Indigenous Commerical Fisheries

Indigenous participation in the fisheries sector also includes communal commercial fisheries and Indigenous-owned fishing enterprises, which are distinct from fishing

[9] On September 17, 1999, the Supreme Court of Canada affirmed rights established under the Peace and Friendship Treaties of 1760 and 1761, including the right to hunt, fish, and gather in pursuit of a moderate livelihood. In a second decision in November 1999, the Court clarified that these treaty rights may be regulated where justified for conservation or other compelling and substantial public objectives (DFO, 2022b).

undertaken for food, social and ceremonial purposes or in pursuit of a moderate livelihood. Indigenous fishing enterprises are important economic drivers and employers in some Indigenous communities, contributing to community well-being and supporting continued relationships with marine resources, and participation continues to expand and diversify across commercially harvested species (Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025). Indigenous communal commercial fisheries include species that occur within or may use the offshore Study Area, including swordfish and a variety of groundfish and pelagic species. As a result, Indigenous interests in fisheries within the Study Area encompass not only the exercise of treaty rights, but also commercial, employment, and broader economic interests associated with marine fisheries. These interests are also linked to longstanding cultural connections to marine environments and stewardship responsibilities associated with the sustainable use of marine resources

5.3.1.2 Commercial Fisheries

Commercial fisheries within the Study Area are undertaken by Indigenous and non-Indigenous harvesters and enterprises and form an important component of Nova Scotia's marine economy. The Study Area encompasses approximately 199,289 km², extending from 38 to 408 km offshore and from the shallow waters surrounding Sable Island to depths of approximately 4,334 m along the continental slope. It therefore includes offshore banks, bank margins, basins, shelf-edge habitat and deep slope waters used by a range of commercial fisheries.

Fishery management in Nova Scotia is shared between the federal and provincial governments. DFO Maritimes Region has a regulatory role and is responsible for managing marine resources sustainably, supporting environmental protection and the economic prosperity of the sector. The Nova Scotia Department of Fisheries and Aquaculture is responsible for developing, promoting and supporting fisheries, aquaculture, seafood processing and sportfishing in the province.

Commercial fisheries operating within the Study Area form part of a regionally and nationally important seafood sector. Of the nearly 200 fish species known to be present on the Shelf, more than 25 species are or were the focus of important commercial fisheries, representing some 50 distinct stocks. In addition, there are many invertebrate species harvested commercially on the Scotian Shelf including lobster, scallop, snow crab, shrimp, sea cucumber and whelk, surf clams, quahogs and other crabs, e.g., rock, Jonah, spider etc. (MacLean et al., 2013). The primary fish species that have been or continue to be exploited from the Shelf include groundfish (cod, halibut, haddock, pollock, monkfish, skates and flounders) and several pelagic species (notably herring, Atlantic mackerel, dogfish, tunas and swordfish). Several of these species have been reduced in population size sufficiently to warrant closure of some stocks, e.g., cod, haddock, pollock, plaice and

wolffish; other species are ranked as 'of concern', e.g., mackerel, dogfish and haddock (MacLean et al., 2013).

There is no direct commercial fishery for sharks in the Study Area. Porbeagle shark (*Lamna nasus*) and blue shark (*Prionace glauca*) may be retained as bycatch in the pelagic longline fishery, which primarily targets swordfish and tuna species. Sharks are not the target species for this fleet, and shark catches in the Study Area are generally associated with incidental capture rather than a directed fishery (CNSOPB, 2021, 2022; DFO, 2013).

The fisheries and aquaculture industry in Nova Scotia is a leading seafood exporter in Canada, generating $2.5 billion in 2024 (Nova Scotia Department of Fisheries and Aquaculture, 2025). In 2024, the province exported to over 60 countries, exporting $1.2 billion to the United States (52% of the region's seafood exports), $842 million to the Indo-Pacific region (36%), and $241 million to the European Union (10%) (Nova Scotia Seafoods, n.d.).

The seafood industry also contributes to multiple employment opportunities in Nova Scotia. There are over twelve thousand registered fish harvesters in the Maritimes and Gulf, including licence holders and crew members (DFO, 2026a). In 2024, the total number of jobs in the seafood sector amounted to 20,772 across aquaculture, commercial fishing, and seafood processing (DFO, n.d.).

Nova Scotia was responsible for 47% of Canada's lobster by value in 2023 (DFO, 2025b). Lobster is also the sea fishery harvest with highest landed value in the province, comprising 60.9% of total landing value. The remaining sea fishery harvests from the province include scallop (12.9%), groundfish (8.9%), crab (5.8%), shrimp (5.1%), tuna (0.9%), and other sea harvests (5.5%) (DFO, 2025b).

Several types of fishing gear are used within the Study Area. In some fisheries, one specific fixed gear type is used, such as crab pots or lobster traps. Fishing for groundfish species can be done using various gear types, e.g., baited longline, gillnets, bottom trawls, dredge, harpoon and spear. In general, gear types are classified as fixed or mobile gear. Mobile and fixed gear harvesting are not always compatible and may have a high potential for gear conflict if fishing in the same area at the same time. For example, bottom otter trawls and bottom longlines or nets, or shrimp trawls, are incompatible with lobster or snow crab trap fisheries. An overview of the major commercial fisheries in Nova Scotia is provided in Table 5.14.

The Study Area falls within five Northwest Atlantic Fisheries Organization (NAFO) fisheries management areas: 4X, 4W, 4Vs, 4Vn and 5Zc. Licenses for many species are issued with application to a specific NAFO area (NAFO, 2026) and managed through the establishment of the Total Allowable Catch (TAC) assigned to each license. In contrast, in the case of lobster, management involves limitations on the number and design of traps

set by license holders rather than TAC; the results are recorded as totals landed within each Lobster Fishing Area (LFA), except for LFA 41 where a TAC is also applied (DFO, 2022a, 2022b, 2022c, 2023).

Table 5.14 – Overview of Major Commercial Fisheries in Nova Scotia (Maritime and Gulf Regions) with TAC associated

Main Species	Technique(s)	# Licences (Maritime and Gulf Regions), 2024	Total Allowable Catch (tonnes)
Atlantic bluefin tuna	• Longline surface (pelagic); • Rod and reel; • Electric harpoon; • Tended line; and • Green stick	275	2,350 t (2018-2020)
Clam (Arctic surf clam, quahog)	Dredge	791	Quahog 12,387 t (2020); Arctic surf clams 20,943 t (2022)
Crab (snow, Jonah, rock, red, and green)	Pot/trap	602	8,449 t (N-ENS, S-ENS and 4X; 2022)
Groundfish (Cod, halibut, haddock, pollock, flounder, hake flatfish, wolffish, Argentine, redfish, spiny dogfish, skates)	• Bottom gillnets; • Midwater trawls; • Bottom trawl; and • Longline bottom (groundfish)	2,290	For 2022 – 2023, TACs across these species ranged from 660 mt for Atlantic cod (4X5Y) to 16,500 t for winter flounder (4X). Roughly 50,000 mt total including bycatch for other gear types and regions.

DRAFT

Main Species	Technique(s)	# Licences (Maritime and Gulf Regions), 2024	Total Allowable Catch (tonnes)
Herring	• Bottom gillnets; • Drift nets; and • Purse seine	1,822	4,000 t (2024) (offshore Scotian Shelf), 1000 t (2024) (Georges Bank), 4,682 t (2024) (Eastern Shore), 6,400 t (2024) (Little Hope), 16,000 t (2024) (Southwest NS/Bay of Fundy)
Lobster	Pots/traps	3,190	720 t (2023, Offshore)
Mackerel	Small seiners (purse, tuck and bar)	N/A[10]	470 t (2024)
Scallops	Dredge	416	5,005 t (2022)
Shortfin squid	• Jiggers; • Handline (SFA 17-21); and • Bottom and midwater trawls (4WX)	796	Directed fishery in the past, now mainly by-catch
Shrimp	• Pot/trap; and • Bottom trawl	39	2,300 t (SFA 13-15; 2022)
Swordfish	Longline surface (pelagic), e.g., harpoon and spear	1,006	1,348t (2020)
Whelk	Conical traps	1[11]	700 t (4VS)

[10] In 2022, DFO closed the Atlantic mackerel commercial and bait fisheries in Atlantic Canada and Quebec to allow the stock to rebuild (DFO, 2026e)
[11] There is only one commercial whelk licence holder in Area 4Vs. Due to DFO's rule of five (for privacy considerations), there is no information available regarding landings and landed values (DFO, 2024).

Main Species	Technique(s)	# Licences (Maritime and Gulf Regions), 2024	Total Allowable Catch (tonnes)
Other (Oysters, mussels, sea urchins, slime eel/hagfish, sea cucumber, whiting, red hake, dogfish, flounder, cod, turbot, lumpfish, blackback flounder, winter flounder, American plaice, white hake, sablefish sharks)	• Dredge; • Diving; • Bottom trawl; • Gillnets; • Pot/trap; • Bottom gillnets; • Drift nets; and • Longline bottom (groundfish)	2,266	Various, e.g., sea cucumber 2,300 t (2022-23), hagfish 1,550 t (2023)

Adapted from the Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025.

Sources: DFO, 2020a, 2020b, 2020c, 2022d, 2022e, 2022f, 2022g, 2022h, 2022i, 2022j, 2022k, 2022l, 2023b, 2024, 2026e; Perennia, 2023a, 2023b, 2023c; Rozalska and Coffen-Smout, 2020.

Commercial fishing activity within the Study Area is spatially and temporally variable because fisheries differ in target species, gear type, season, management regime, and environmental requirements. Some fisheries are concentrated in relatively discrete habitats or depth ranges, whereas mobile fisheries may operate across extensive portions of the shelf and slope. Consequently, mapped fishing activity should be interpreted as a representation of historical patterns rather than as a fixed indication of where fishing will occur in any given year.

These differences are reflected in the distribution of fisheries across the Study Area. Lobster fishing has traditionally been concentrated closer to the Nova Scotia coast; however, fishing activity has expanded farther offshore and into deeper waters in some areas, particularly in southwestern Nova Scotia. Groundfish harvesting using trawl or longline gear generally occurs farther offshore, while fisheries for scallop, sea cucumber, and whelk are associated with the tops and margins of offshore banks, and snow crab fisheries are associated with deeper channels. Longline fisheries for large pelagic species, including tuna and swordfish, as well as halibut, tend to be concentrated along the edges

of the Scotian Shelf. Table 5.15 provides an overview of vessels operating in the Maritimes and Gulf regions in 2024.

Table 5.15 – Number of Commercial Fishing Vessels by Length (in feet) in Nova Scotia, 2024

Location	Under 35’	34’-44’11”	45’-64’11”	65’-99’11”	Over 100’	Total
Maritimes	889	2,077	61	14	26	3,067
Gulf	133	453	100	3	0	689

Source: DFO, 2026b

Figures 5.16-5.18 present the Commercial Fisheries Landings for all species, landings by mobile gear and landings by fixed gear respectively between 2014 -2023.

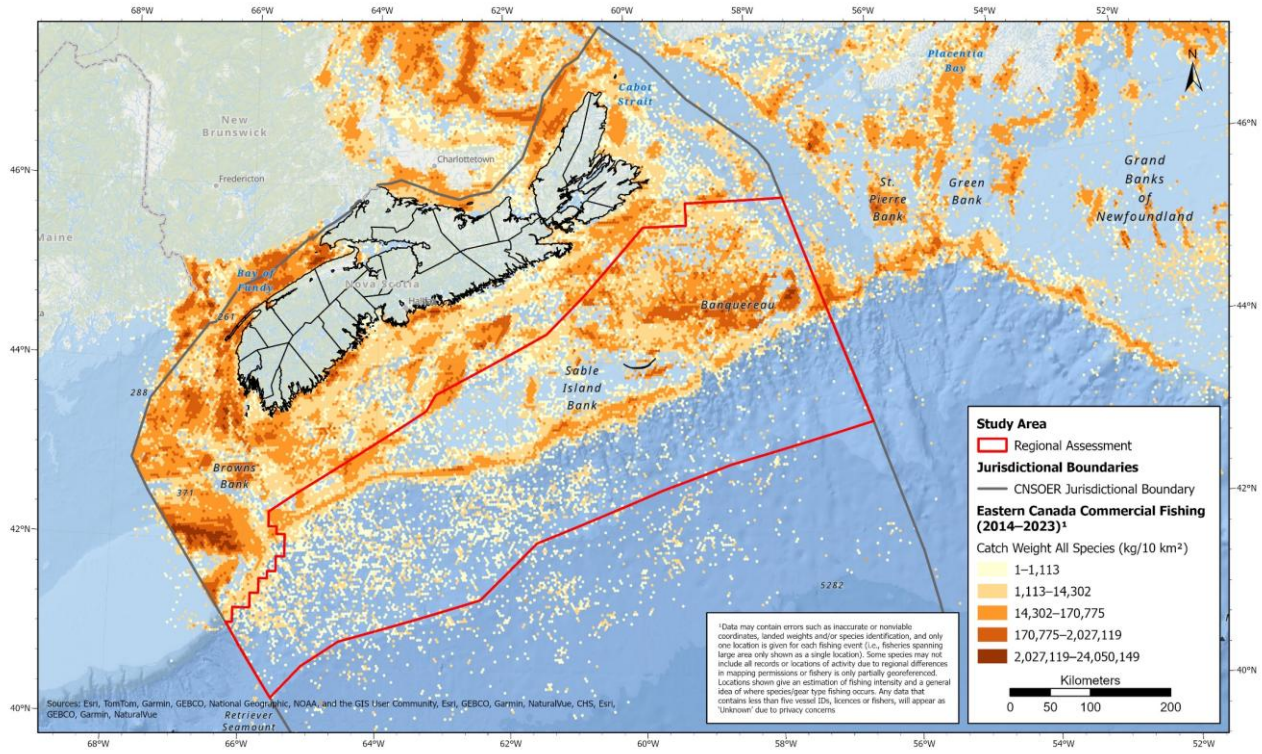


Figure 5.16. Commercial Fisheries within the Study Area[12]

[12] Data may contain errors such as inaccurate or nonviable coordinates, landed weights and/or species identification, and only one location is given for each fishing event (i.e., fisheries spanning large area only

It should be noted that the figure above shows commercial fishing density based on catch weight for all species combined. The variation in species size could skew the representation of this data. For example, landings where larger, heavier species are fished may appear to have higher fishing activity than areas where spaller species are fished. Seasonality is another important consideration. While many fisheries are open year-round, the summer months are typically when the highest levels of activity occur, due to favorable weather conditions

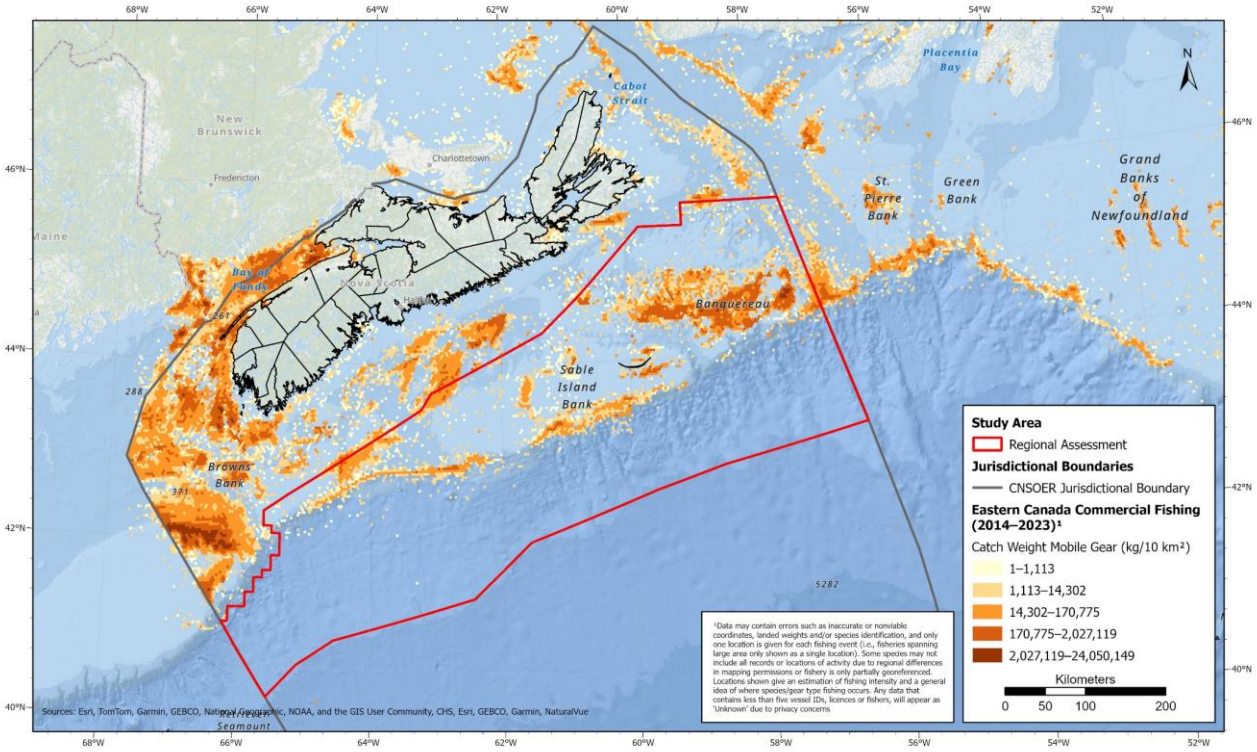


Figure 5.17. All Mobile Commercial Fishing Gear Landings Density within the Study Area[13]

shown as a single location). Some species may not include all records or locations of activity due to regional differences in mapping permissions or fishery is only partially georeferenced. Locations shown give an estimation of fishing intensity and a general idea of where species/gear type fishing occurs. Any data that contains less than five vessel IDs, licences or fishers, will appear as 'Unknown' due to privacy concerns.

[13] Data may contain errors such as inaccurate or nonviable coordinates, landed weights and/or species identification, and only one location is given for each fishing event (i.e., fisheries spanning large area only shown as a single location). Some species may not include all records or locations of activity due to regional differences in mapping permissions or fishery is only partially georeferenced. Locations shown give an estimation of fishing intensity and a general idea of where species/gear type fishing occurs. Any data that contains less than five vessel IDs, licences or fishers, will appear as 'Unknown' due to privacy concerns.

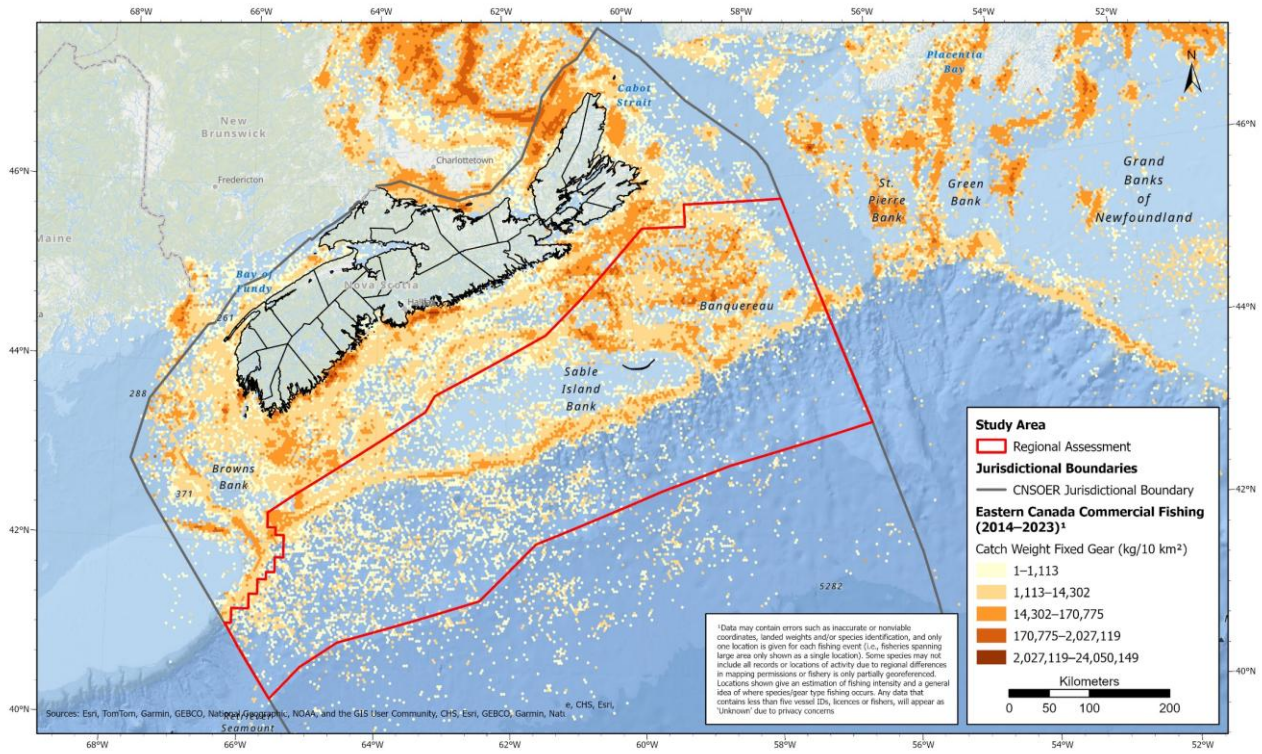


Figure 5.18. All Fixed Commercial Fishing Gear Landings Density within the Study Area[14]

One of the most important causes of changes in fish stocks on the Shelf has been the overexploitation of the fisheries, particularly, but not only of groundfish, during the decades prior to the 1990s. These changes caused a significant ecosystem response, including increases in primary production and invertebrates, e.g., shrimp and crab, and reductions in the numbers of many long-lived groundfish species (Bundy, 2005; Choi et al., 2005; Bernier et al., 2018; Wood Canada Ltd., 2022). It was also associated with an increased abundance of some cold-water fish species including capelin and Greenland halibut (Wood Canada Ltd., 2022).

As groundfish stocks collapsed, the fishery complex changed from one dominated by fin fish to one based primarily upon shellfish – in landings, but also particularly in value (DFO, 2007, 2010; MacLean et al., 2013). Commercial landings of pelagic fish, for example, declined from > 200,000 tonnes in the 1970s to < 60,000 tonnes in 2015, while

[14] Data may contain errors such as inaccurate or nonviable coordinates, landed weights and/or species identification, and only one location is given for each fishing event (i.e., fisheries spanning large area only shown as a single location). Some species may not include all records or locations of activity due to regional differences in mapping permissions or fishery is only partially georeferenced. Locations shown give an estimation of fishing intensity and a general idea of where species/gear type fishing occurs. Any data that contains less than five vessel IDs, licences or fishers, will appear as 'Unknown' due to privacy concerns.

invertebrate landings rose from <25,000 to ~100,000 tonnes in the same period (Bernier et al., 2018, 2023). Despite regulatory actions intended to enable the recovery of previously important stocks, some have not recovered.

5.3.1.3 Recreational Fisheries

Recreational fishing in Nova Scotia occurs in both inland and marine waters and is managed through different regulatory frameworks. Provincial sportfishing programs are primarily focused on inland fisheries, whereas DFO manages recreational fisheries for marine species in tidal waters. For the purposes of this RA, the focus is on marine recreational fishing activities that have the potential to occur within or in proximity to the Study Area. Recreational fisheries managed by DFO in the Maritimes Region include fisheries for groundfish, Atlantic mackerel, sharks, and Atlantic bluefin tuna, among other tidal-water species (DFO, 2026c).

Marine recreational fisheries are managed according to species, fishing area, season, gear, and retention limits rather than through Nova Scotia's inland Recreational Fishing Areas. Recreational groundfish fisheries target species such as cod, haddock, pollock, flounder, dogfish, and hake, with fishing permitted by angling or handline and no recreational licence required (DFO, 2023a). Atlantic mackerel may also be recreationally fished in tidal waters without a licence. More specifically offshore recreational opportunities include shark and Atlantic bluefin tuna fishing. Recreational shark fishing occurs within NAFO Divisions 4VWX and 5Z and requires a DFO licence, while recreational bluefin tuna fishing within NAFO Divisions 4VsWX and 5Z is conducted through licensed charter operations and tournaments rather than through individual recreational licences (DFO, 2025e).

Information on the extent and spatial distribution of recreational fishing activity in offshore Nova Scotia is limited. DFO management information identifies areas in which recreational fisheries may occur but does not, by itself, indicate the frequency or intensity of recreational fishing within the Regional Assessment Study Area. This distinction is particularly important for fisheries such as groundfish and mackerel, for which individual recreational licences are not required, and licence data therefore cannot be used to characterize participation or fishing locations. Recreational shark fisheries have additional licensing and trip-reporting requirements, while bluefin tuna charter and tournament fisheries are also licensed, providing comparatively more information on those activities (DFO, 2025c). Consequently, the presence of a recreational fishery within a broader management area should not be interpreted as evidence of regular recreational fishing activity at specific offshore locations. Table 5.16 provides an overview of recreational fishing by types and season.

Table 5.16 – Recreational fishing by type and season

Type		Seasons
Groundfish	Cod, dogfish, flounder, haddock, halibut, pollock, wolffish	Halifax Harbour and West: February 1st to December 31st
		Hartlen Point and East: 3rd Saturday in June to the end of Labour Day
Pelagic (NAFO Areas 4VWX and 5Z)	Bluefin Tuna	July 15 – December 31, mostly summer
	Mackerel	April 1 to December 31 in tidal waters
	Shark	April 1 – December 31, mostly summer Licence required and limited to organized derbies
Shark (NAFO 4VWX and 5Z)	White shark	Listed under SARA and cannot be fished
Shellfish and invertebrates	Marine worm	January 1 – December 31
	Oyster	September 15 – November 30
	Clam	Seasons vary depending on area
	Scallop	Season dates vary by area and are specified in licence conditions
	Mussel	Seasons vary depending on area
	Lobster	Not open for recreational fishing
	Whelk	Not open for recreational fishing
Tidal and Freshwater (Diadromous)	Atlantic salmon	Closed due to conservation concerns
	Atlantic sturgeon	Closed June 1 – June 30
	Eel	Fishing with spears is open year-round in tidal waters
	Gaspereau (alewives/kiack)	Yearly and weekly close times often subject to change
	Shad	For more information, contact DFO.MAR-FM-GP.MPO@dfo-mpo.gc.ca

DRAFT

Type		Seasons
	Smelt	Angling from August 1 to May 31; dip net from April 1 to June 15; spear year-round
	Striped bass	Open year-round

Source: DFO, 2026c

5.3.1.4 Aquaculture

Aquaculture is an established component of Nova Scotia's seafood sector and includes the cultivation of finfish, shellfish, and marine plants. The activity is regulated primarily by the Province under the *Fisheries and Coastal Resources Act* and associated Aquaculture Licence and Lease Regulations and Aquaculture Management Regulations. Marine aquaculture operations are concentrated primarily in coastal waters, where species such as Atlantic salmon, rainbow trout, oysters, mussels, scallops, and clams are cultivated (Government of Nova Scotia, 2024).

In 2024, Nova Scotia produced approximately 11,247 tonnes of aquaculture products valued at $114.7 million, representing approximately 7% of Canadian aquaculture production by volume and 8.4% by value. Finfish accounted for the majority of provincial aquaculture production, with approximately 10,060 tonnes valued at $99.5 million, while shellfish production totalled approximately 1,010 tonnes valued at $6.2 million (DFO, 2026d). Aquaculture production and value can vary between years in response to production cycles, market conditions, environmental conditions, and other factors affecting farm operations. A summary of the species, value, and production areas that contribute to Nova Scotia's aquaculture value is outlined in Table 5.17.

Table 5.17 – Aquaculture species, individual values, and production areas in Nova Scotia

Species	2024 Farm-Gate Value (CAD)	Share of Total Aquaculture Value	Principal Production Area
Atlantic Salmon	$93,392,511	81.4%	Primarily farmed in marine cages along Nova Scotia's South Shore and southwestern coast, including Shelburne County.

Rainbow Trout	$6,132,286	5.35%	Cultivated at several marine aquaculture sites along the South Shore and southwestern Nova Scotia.
American Oyster	$4,560,883	3.98%	Concentrated in Bras d'Or Lake (Cape Breton), St. Mary's Bay, Mahone Bay, and other sheltered estuarine environments.
Blue Mussel	$1,452,132	1.27%	Produced in sheltered bays and estuaries, including St. Mary's Bay, Bras d'Or Lake, and portions of the South and Eastern Shores.
Giant Sea Scallop	$166,308	0.14%	Limited commercial production in selected sheltered coastal waters of southwestern Nova Scotia.
Bay Quahog	$45,748	0.04%	Small-scale operations in suitable sheltered marine embayments.
Kelp	$6,342	0.01%	Emerging aquaculture activity along portions of the Atlantic coast and Bay of Fundy.
Other (American Eel, Bay Scallop, Dulse, Irish Moss)	$8,976,842	7.82%	Miscellaneous

Source: Nova Scotia Department of Fisheries and Aquaculture, n.d.d.

In contrast to many commercial fisheries described above, marine aquaculture in Nova Scotia is principally a coastal and nearshore activity. Provincial aquaculture lease information indicates that marine sites are distributed along the coast rather than across the offshore shelf and slope environments that comprise the Study Area (Nova Scotia Department of Fisheries and Aquaculture, n.d.c). Accordingly, direct spatial overlap between existing aquaculture sites and offshore exploratory drilling activities is likely limited. Nevertheless, aquaculture remains relevant to the regional socioeconomic context because it contributes to seafood production and coastal economies and relies on the quality and productivity of the broader marine environment. Potential pathways by which offshore activities could interact indirectly with coastal aquaculture, including through accidental events or changes in marine environmental quality, can be considered in the effects assessment where appropriate.

5.3.1.5 Key Times

Key timing considerations for fisheries in offshore Nova Scotia are largely associated with periods of concentrated fishing effort and the seasonal use of offshore fishing grounds by commercially important species. The offshore region supports several high-value fisheries that overlap with areas of potential exploratory drilling activity, including the outer banks, continental slope, and deep channels of the Scotian Shelf, Sable Island Bank and Western Bank, and Banquereau Bank. Pelagic fisheries for swordfish and tuna occur seasonally across offshore waters as migratory species move through the region, while bottom-trawl fisheries targeting species such as silver hake and redfish operate within deeper basins and depressions of the Scotian Shelf.

In addition to the timing of fishing activity, consideration should be given to sensitive life-history periods for fish and invertebrate species, including spawning, egg development, larval dispersal, nursery habitat use, and seasonal aggregations. These periods vary considerably among species and locations, making it difficult to identify a single timing window applicable to all fisheries resources.

5.3.2 References

Bernier, R.Y., Jamieson, R.E., and Moore, A.M. (eds.). (2018). State of the Atlantic Ocean Synthesis Report. Can. Tech. Rep. Fish. Aquat. Sci. 3167: iii + 149 p.

Bernier, R.Y., Jamieson, R.E., Kelly, N.E., Lafleur, C. and Moore, A.M. (eds.). (2023). State of the Atlantic Ocean Synthesis Report. Can. Tech. Rept. Fish. Aquat. Sci. 3544: v + 219 p.

Bundy, A. (2005). Structure and functioning of the eastern Scotian Shelf ecosystem before and after the collapse of groundfish stocks in the 1990s. Can. J. Fish. Aquat. Sci. 62: 1453-1473.

Choi, J.S., Frank, K.T., Petrie, B.D., and Leggett, W.C. (2005). Integrated assessment of a large marine ecosystem: a case study of the devolution of the Eastern Scotian Shelf, Canada. Oceanography and Marine Biology: 43, 47.

Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia. (2025). Regional Assessment of Offshore Wind Development in Nova Scotia: Final Report. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

DFO. (n.d.). Marine Seafood Sectors Direct and Total Employment by Province, 2024. Government of Canada. https://www.dfo-mpo.gc.ca/stats/maritime/tab/mar-tab8-eng.htm

DFO. (2007). Fisheries Management in the Maritimes Region (1990 – 2005). https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40572146.pdf

DFO. (2013). Canadian Atlantic swordfish and other tunas: Integrated Fisheries Management Plan (IFMP). Government of Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/40661313.pdf

DFO. (2010). 2010 Canadian Marine Ecosystem Status and Trends Report. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/030 (Revised).

DFO. (2020a). Offshore clam – Maritimes and Newfoundland and Labrador regions. https://www.dfo-mpo.gc.ca/fisheries-peches/ifmp-gmp/clams-palourdes/2020/offshore-hauturieres-eng.html

DFO. (2020b). 2020 offshore Arctic surf clam fishery – Banquereau and Grand Banks. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2020-gp/atl-01-eng.html

DFO. (2020c). Shark fisheries. https://www.dfo-mpo.gc.ca/species-especes/sharks/info/fisheries-eng.html

DFO. (2021). Implementing the right to fish in pursuit of a moderate livelihood: Rebuilding trust and establishing a constructive path forward. https://www.dfo-mpo.gc.ca/fisheries-peches/aboriginal-autochtones/moderate-livelihood subsistance-convenable/surette-report-rapport-mar-2021-eng.html

DFO. (2022a). Food, Social and Ceremonial Fishery: in Nova Scotia, New Brunswick and Prince Edward Island. https://publications.gc.ca/collections/collection_2023/mpo-dfo/Fs23-731-2022-eng.pdf

DFO. (2022b). Marshall Decisions. https://www.dfo mpo.gc.ca/fisheries-peches/aboriginal-autochtones/moderate-livelihood-subsistance convenable/marshall-overview-apercu-eng.html

DFO. (2022c). Vessel information 2022, Atlantic Region, Licenses, Commercial Fisheries. https://www.dfo-mpo.gc.ca/stats/commercial/licences permis/vess-embarc/ve22-eng.htm

DFO. (2022d). 2022 Offshore lobster (Maritimes Region) - Lobster Fishing Area 41. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-02-eng.html

DFO. (2022e). Fisheries Management Decisions for Atlantic Canada, Quebec and the Arctic –2022. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/index-atl-eng.html#surfclam

DFO. (2022f). 2022 Scotian Shelf shrimp (Shrimp Fishing Areas 13, 14, 15, and 16) - Maritimes Region. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-09-eng.html

DFO. (2022g). 2022 herring fishery (Maritimes Region) - Offshore Scotian Shelf (Outer Banks) spawning component. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-30-eng.html

DFO. (2022h). 2022-23 groundfish 4VWX5 (Maritimes Region). https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-10-eng.html

DFO. (2022i). 2022 offshore scallop fishery in the Maritimes Region – Scallop Fishing Areas 10-12, 25-27. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-36-eng.html

DFO. (2022j). 2022 offshore Arctic surf clam fishery (Maritimes Region) - Banquereau and Grand Bank. https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-04-eng.html

DFO. (2022k). 2022 to 2023 Scotian Shelf Sea Cucumber (4Vs, 4W, and 4X). https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-29-eng.html

DFO. (2022l). Atlantic mackerel – NAFO subareas 3 and 4 (2022). https://www.dfo-mpo.gc.ca/fisheries-peches/decisions/fm-2022-gp/atl-34-eng.html

DFO. (2023a). Groundfish. https://www.dfo-mpo.gc.ca/fisheries-peches/recreational-recreative/maritimes/groundfish-poisson-fond-eng.html

DFO. (2023b). Vessel information.

DFO. (2023c). Canadian Atlantic swordfish and other tunas: Integrated Fisheries Management Plan (IFMP). Government of Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/40661313.pdf

DFO. (2024). New commercial whelk fishery in Eastern Nova Scotia opens for the first season. Retrieved from Government of Canada: https://www.canada.ca/en/fisheries-oceans/news/2024/07/new-commercial-whelk-fishery-in-eastern-nova-scotia-opens-for-the-first-season.html

DFO. (2025a, October 14). Maritime region statistics: Table 1. https://www.dfo-mpo.gc.ca/stats/maritime/tab/mar-tab1-eng.htm

DFO. (2025b). Book2, A4 – Canadian Commercial Fisheries in 2023: Socio-Economic. Government of Canada. https://www.dfo-mpo.gc.ca/transparency-transparence/mtb-ctm/2025/2-a4-fish-seafood-harvesting-industry-recoltes-poisson-fruits-mer-eng.html

DFO. (2025e). Pelagics. https://www.dfo-mpo.gc.ca/fisheries-peches/recreational-recreative/maritimes/pelag-eng.html

DFO. (2026a). Harbours list. Government of Canada. https://www.dfo-mpo.gc.ca/sch-ppb/list-liste/harbour-list-liste-port-eng.html

DFO. (2026b, February 12). Atlantic Region licences. Government of Canada. https://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/licences-permis-atl-eng.htm

DFO. (2026c, March 20). Maritimes Region recreational fisheries. Government of Canada. https://www.dfo-mpo.gc.ca/fisheries-peches/recreational-recreative/maritimes/index-eng.html

DFO. (2026d). Aquaculture production quantities and value, 2024. https://www.dfo-mpo.gc.ca/stats/aqua/aqua24-eng.html

DFO. (2026e). 2024 Species information. Retrieved from Government of Canada: https://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/species-especes/se24-eng.htm

Government of Canada. (2010). Fact sheet on Peace and Friendship Treaties in the Maritimes and Gaspé. https://www.rcaanc-cirnac.gc.ca/eng/1100100028599/1539609517566

Government of Nova Scotia. (2024). Aquaculture statistics. https://novascotia.ca/fish/aquaculture/economic-impact/

Harris, D.C., and Millerd, P. (2010). Food Fish, Commercial Fish, and Fish to Support a Moderate Livelihood: Characterizing Aboriginal and Treaty Rights to Canadian Fisheries. Arctic Review on Law and Politics, (1), 1, 82-107. https://www.jstor.org/stable/48710113

MacLean, M., Breeze, H., Walmsley, J. and Corkum, J. eds. 2013. State of the Scotian Shelf Report. Can. Tech. Rep. Fish. Aquat. Sci. 3074: xvi + 352 p Nova Scotia Department of Fisheries and Aquaculture. (n.d.). Coastal communities. Government of Nova Scotia. https://dfa-climate-change.novascotia.ca/adapting-to-climate-change/coastal-communities

Northwest Atlantic Fisheries Organization (NAFO). (2026). Fishing in the NAFO Regulatory Area. https://www.nafo.int/Fisheries/Fishing-Activity-in-the-NRA

Nova Scotia Department of Fisheries and Aquaculture. (n.d.a). Coastal communities. Government of Nova Scotia. https://dfa-climate-change.novascotia.ca/adapting-to-climate-change/coastal-communities

Nova Scotia Department of Fisheries and Aquaculture. (n.d.b). Nova Scotia Seafood. https://nsseafood.com/

Nova Scotia Department of Fisheries and Aquaculture. (n.d.c). Licensing and leasing: aquaculture. https://novascotia.ca/fish/aquaculture/licensing-leasing/

Nova Scotia Department of Fisheries and Aquaculture. (n.d.d). Aquaculture Production (Farm-gate value) 2024. Government of Nova Scotia. https://novascotia.ca/fish/documents/aqua-stats/2024-production.pdf

Nova Scotia Department of Fisheries and Aquaculture. (2025). Accountability report 2024–2025. Government of Nova Scotia. https://www.novascotia.ca/sites/default/files/documents/1-2524/accountability-report-2024-25-department-fisheries-and-aquaculture-en.pdf

Nova Scotia Seafoods. (n.d.). https://nsseafood.com/

Perennia. (2023a). NOVA SCOTIA SPECIES SPOTLIGHT: SEA SCALLOP (Placopecten magellanicus). https://www.perennia.ca/wp-content/uploads/2023/04/Sea-Scallop.pdf

Perennia. (2023b). NOVA SCOTIA SPECIES SPOTLIGHT: REDFISH (Sebastus spp.). https://www.perennia.ca/wp-content/uploads/2023/04/Redfish.pdf

Perennia. (2023c). NOVA SCOTIA SPECIES SPOTLIGHT: SWORDFISH (Xiphias gladius). https://www.perennia.ca/wp-content/uploads/2023/04/Swordfish.pdf

https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdfRozalska, K., and Coffen-Smout, S. (2020). Maritimes Region Fisheries Atlas: Catch Weight Landings Mapping (2014–2018) on a Hexagon Grid. Can. Tech. Rep. Fish. Aquat. Sci. 3373:vi + 68p. http://publications.gc.ca/collections/collection_2020/mpo-dfo/Fs97-6-3373-eng.pdf

Warrior, M., Fanning, L., and Metaxas, A. (2022). Indigenous peoples and marine protected area governance: A Mi'kmaq and Atlantic Canada case study. Facets. https://www.facetsjournal.com/doi/10.1139/facets-2021-0128

Wood Canada Ltd. (2022). Strategic environmental assessment: Middle and Eastern Scotian Slope and Sable Bank areas. Report to the Canada-Nova Scotia Offshore Petroleum Board, Dartmouth, NS. Xii + 364 p.

5.3.3 Other Ocean Users

5.3.3.1 Tourism and Recreation

Marine tourism is a growing sector in Canada. Beyond fishing, there are a variety of marine touristic and recreational activities, including beach use, sea kayaking, recreational

boating, sailing, surfing, whale and bird watching, diving, sport fishing, boat tours, cruises, and more. Many marine tourism activities are seasonal, occurring primarily from May to October, with peaks in July and August. In 2023, there was $1.68 billion domestic expenditure on marine tourism in Nova Scotia and $0.44 billion foreign expenditure (DFO, 2025a).

Nova Scotia's extensive coastline, coastal communities, marine wildlife, and scenic landscape help support a vast diversity within their recreation and tourism sectors. Coastal and marine ecotourism are an important component of the tourism industry. They allow visitors the opportunities to gain better views of Nova Scotia's natural attractions, further expanding on the multitude of tourism and recreational activities within the province. Recreational boating and sailing are also popular throughout the province, supported by the numerous marinas, yacht clubs, and seasonal boating routes along the province's coast (Regional Assessment of Offshore Wind Development Committee, 2025).

Nova Scotia also receives cruises from April to November that support the local economy. The Port of Halifax hosts 25 cruise lines, and in 2025, there were 184 cruise ship calls, carrying approximately 357,000 passengers in addition to over 151,000 crew members (Halifax Port Authority, 2025). The Port of Sydney hosts 17 cruise lines and received 105 cruise chip calls carrying about 197,368 passengers in addition to crew members. Tourism associated with cruise visitations contribute to local businesses, accommodation, food services, transportation, and recreation providers within the vicinity of these ports.

Tourism in the province attracts visitors to coastal towns, cultural heritage sites recognized by UNESCO, and ecotourism. Nova Scotia's total tourism revenue in 2025 reached $3.7 billion, where food and beverage sector accounting for 33% of revenues, followed by accommodations at 23%, transportation at 18%, recreation and entertainment at 14%, and retail at 12% (Tourism Nova Scotia, n.d.).

5.3.3.2 Marine Transport and Vessel Traffic

Canada is part of the International Maritime Organization, which is a United Nations agency that regulates global shipping, maritime safety, security, and prevention of pollution by ships. Marine transport includes cargo (e.g. container ships and bulk carriers), passenger vessels (e.g. boats, ferries, and cruises), and tanker vessels. As a coastal province, Nova Scotia has multiple ports that support transport, shipping and trade. The Port of Halifax is a major international port managed by the Halifax Port Authority. The Port of Halifax is the largest container handling port in Atlantic Canada, being one of the few ports in the North American east coast that can handle a fully laden post-Panamax vessel (Transport Canada, 2025). It is also North America's closest ice-free point to Europe and Asia, when going through the Suez Canal. Nova Scotia also has thirteen other main, public ports in Nova Scotia, under Transport Canada custodianship. Other main ports in the province include the Strait of Canso Superport, a natural deep water harbour

located between mainland Nova Scotia and Cape Breton Island; the Atlantic Canada Bulk Terminal, a deep-water marine facility located in Sydney, Nova Scotia (cape Breton); and the Port of Sheet Harbour, a deep water port terminal located on the Atlantic shore of Nova Scotia northeast of Halifax.

Marine Atlantic provides two ferry ride services to transport passengers, vehicles, and freight between Nova Scotia and the Island of Newfoundland. There are daily year-round trips of 96 nautical miles from Port Sydney to Port aux Basques, and another route to Argentia of 280 nautical miles, offered only during the summer (Marine Atlantic, n.d.). There are also other ferry services connecting the province to New Brunswick, Prince Edward Island, and Maine, USA, in addition to ferries that operate within the province. The ferry services transport hundreds of thousands of passengers every year and play an important role in the regional economy.

The province plays a central role in the regional and national economy, connecting Canada to the global market. In 2024, the national marine transportation GDP was $3.43 billion (DFO, 2025b). Considering the province's marine market, future offshore development raises potential impacts to current shipping routes and traffic flow (Figure 5.19).

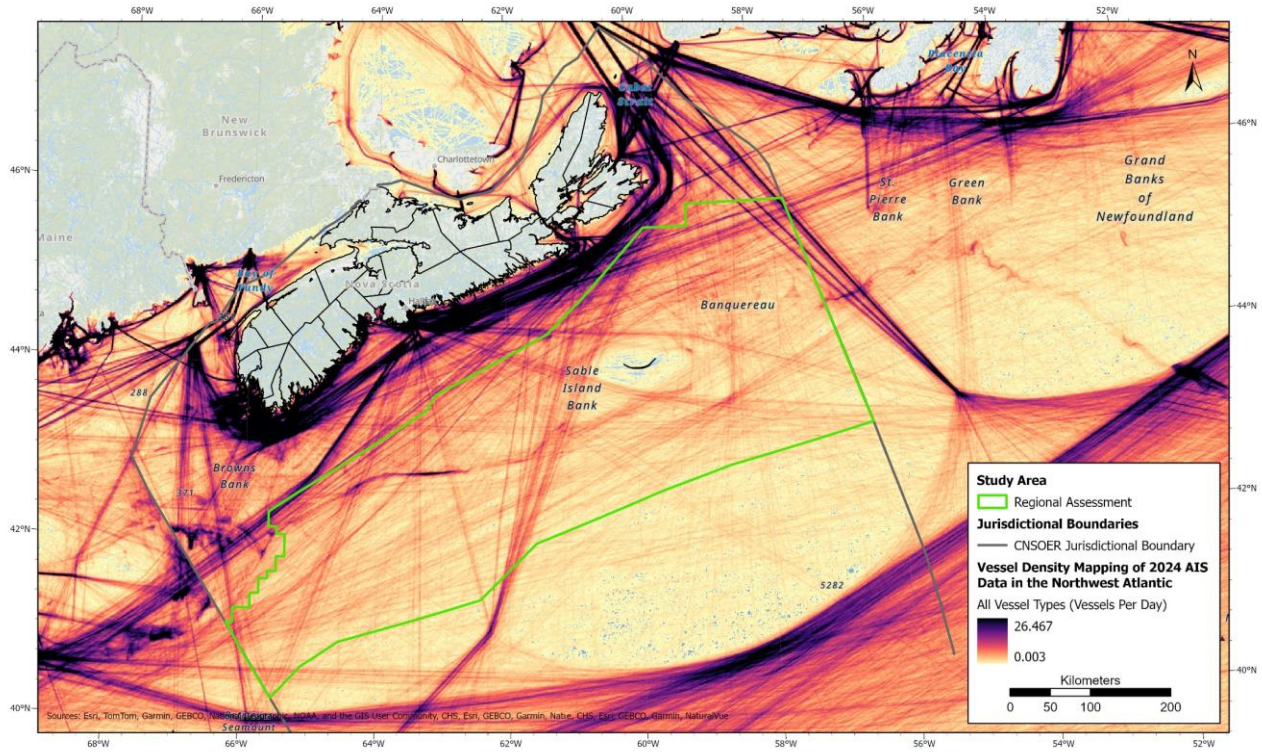


Figure 5.19. Vessel Density within the Study Area

5.3.3.3 Scientific Research and Monitoring

Scientific research and environmental monitoring are ongoing uses of offshore waters within and adjacent to the Study Area. Fisheries and Oceans Canada (DFO), other government agencies, academic institutions, and industry conduct a range of scientific surveys and monitoring programs to characterize fish populations, oceanographic conditions, marine ecosystems, and the distribution and abundance of marine species. DFO science activities on the Eastern Scotian Shelf include multi-species and single-species fisheries surveys, oceanographic monitoring, and marine mammal and other megafauna surveys. Information collected through these programs supports fisheries stock assessments, monitoring of ocean and ecosystem conditions, oceanographic modelling, marine conservation planning, and regulatory decision making (Curran et al., 2025).

Long-term fisheries science surveys conducted on the Eastern Scotian Shelf include the DFO Maritimes Summer Ecosystem Survey, Atlantic Halibut Longline Survey, Offshore Scallop Survey, Snow Crab Trawl Survey, and Northern Shrimp Trawl Survey. These surveys use a variety of mobile and fixed sampling gear and provide information on numerous fish and invertebrate species and stocks. Some surveys are conducted directly by DFO, while others are undertaken collaboratively with the fishing industry. Collectively, DFO fisheries science surveys provide long-term datasets that contribute to the assessment and management of fish stocks throughout the Maritimes Region (Curran et al., 2025).

DFO also conducts broader ecosystem and oceanographic monitoring through programs such as the Atlantic Zone Monitoring Program (AZMP), which collects physical, chemical, and biological oceanographic information across the Scotian Shelf, as well as marine mammal and megafauna surveys that provide information on the distribution and abundance of species such as Morth Atlantic right whales and other large marine fauna. These long-term monitoring programs provide important baseline information on environmental conditions and ecosystem change within the broader offshore region (Curran et al., 2025).

5.3.3.4 Military Presence

Nova Scotia is a strategic hub for Canada's defence and marine sectors and is home to the country's largest naval formation. The province is recognized for advanced shipbuilding, underwater vehicles and sensors, training and simulation, cybersecurity, and ocean technology innovation. The aerospace and defence sector employs more than 17,000 people and contributes approximately $2.6 billion in real GDP to the provincial economy.

Nova Scotia is home to Canadian Forces Base Halifax, Canada's largest naval base and the home port of the Royal Canadian Navy's Atlantic Fleet. The base provides operational, logistics, port, and emergency services for Maritime Forces Atlantic and supports naval

operations on Canada's East Coast. Offshore waters surrounding Nova Scotia are also used for military training and operational exercises, including within designated Maritime Local Operating Areas, making defence activities an important consideration in offshore marine planning.

Additional defence and security infrastructure in the province includes Canadian Coast Guard bases and facilities, the NATO Defence Innovation Accelerator for the North Atlantic, and Maritime Launch Services, Canada's first commercial spaceport project. Major ports, including Halifax, Sydney, Yarmouth, and the Strait of Canso, alongside Nova Scotia's growing ocean technology sector, further reinforce the province's strategic importance for national defence, marine transportation, and offshore industries. (Government of Nova Scotia, n.d.; Committee for the Regional Assessment for Offshore Wind Development in Nova Scotia, 2025).

UXO Legacy Sites

The presence of unexploded ordnance (UXO) Legacy Sites within or adjacent to the exploratory drilling study area may pose safety risks to offshore exploration activities. UXO can remain on or beneath the seabed for extended periods and may be unstable or difficult to detect. Activities associated with offshore exploration, including geophysical and geotechnical surveys, anchoring, drilling, and other seabed-disturbing operations, have the potential to interact with previously unidentified UXO, creating hazards for personnel, equipment, and the marine environment.

During the Nova Scotia Offshore Wind Regional Assessment (NS OSW RA), the Department of National Defence (DND) provided information on naval and merchant marine shipwreck locations, including several identified UXO Legacy Sites located between Emerald Bank and Sydney Bight and the Nova Scotia coast. The offshore exploratory drilling study area extends beyond the geographic scope considered in the NS OSW RA, and the currently identified UXO Legacy Sites may not represent all locations where unexploded ordnance is present (Regional Assessment of Offshore Wind Development Committee, 2025).

5.3.3.5 Offshore Energy Development

Offshore Oil and Gas

Nova Scotia has a long history of offshore oil and gas exploration and production. Offshore exploration activities began in 1959, with the first well drilled in 1967. Between 1967 and 2018, a total of 210 offshore wells were drilled on the Scotian Shelf and Slope, including 124 exploration wells, 29 delineation wells, and 57 production wells (CNSOPB, 2018).

Over that time, three production projects came online, including the Cohasset Panuke project, which was Canada's first offshore oil project and produced from 1992 – 1999. The Sable Offshore Energy Project (1999 – 2018) and Deep Panuke (2013 – 2018) projects followed and represent Canada's only offshore natural gas developments to date; however, both projects stopped production in 2018 and were decommissioned in 2020. While there are currently no active offshore oil and gas production projects in Nova Scotia and therefore no active infrastructure, there is legacy infrastructure that exists within the offshore environment, including pipelines and numerous plugged and abandoned wells associated with previous exploration and production activities (Figure 5.20) (CNSOPB 2019, 2021, 2022).

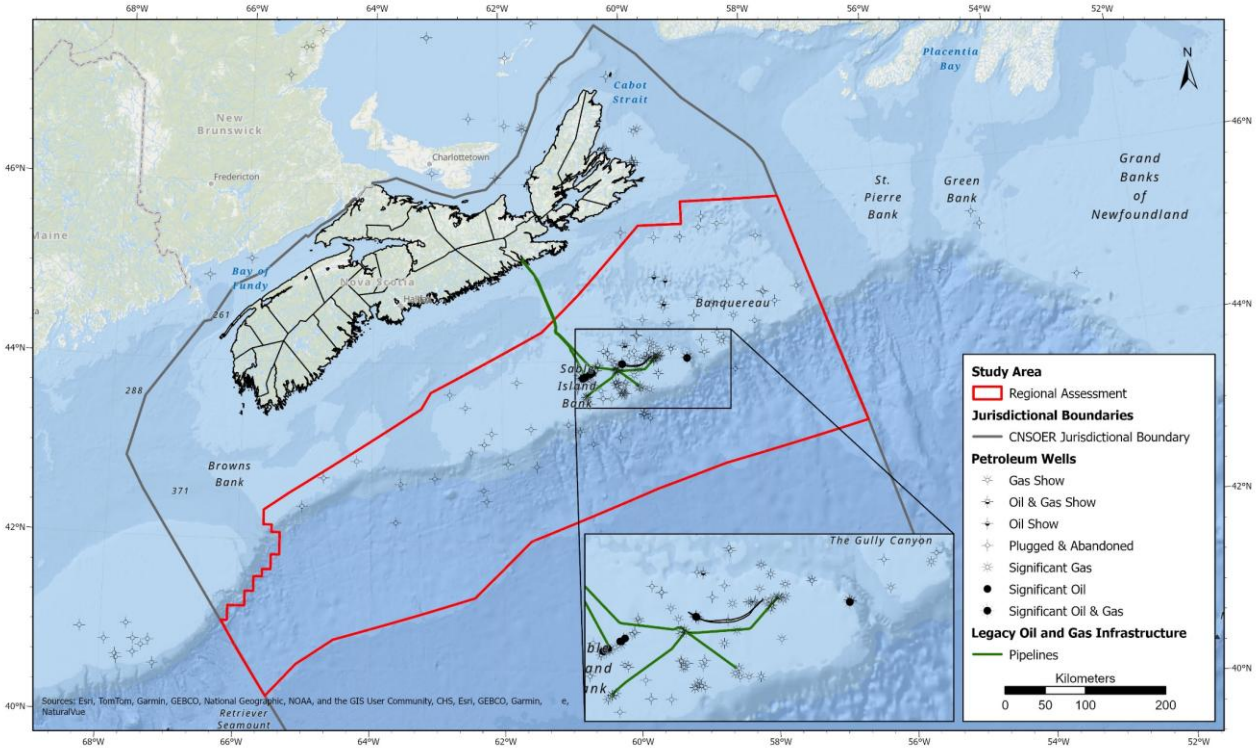


Figure 5.20. Legacy Offshore Oil and Gas Infrastructure within the Study Area

Offshore Renewable Energy

In line with provincial and federal plans to transition to cleaner energy sources, Nova Scotia is now pursuing plans for offshore renewable energy projects. The province has established a target of licencing up to five gigawatts of offshore wind capacity by 2030. Based on the Government Business Plan 2026-27 (Government of Nova Scotia, 2026), the province intends to invest $2.2 million in preparation for offshore wind development in the region. The Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia (2025) identified eight potential areas suitable for offshore wind development in the foreseeable future. On July 29, 2025, the federal and provincial governments

formally designated four Wind Energy Areas: French Bank, Middle Bank, Sydney Bight and Sable Island Bank (CNSOER, 2025; Curran et al., 2025; see Section 9). At the time of this RA, the call for bids is open for only three of the formally designated areas: Sydney Bight, Middle Bank, and French Bank (CNSOER, n.d.). Some of these areas are located within or adjacent to the Study Area, potentially creating overlaps in marine space use and highlighting the importance of future activity planning (Figure 5.21).

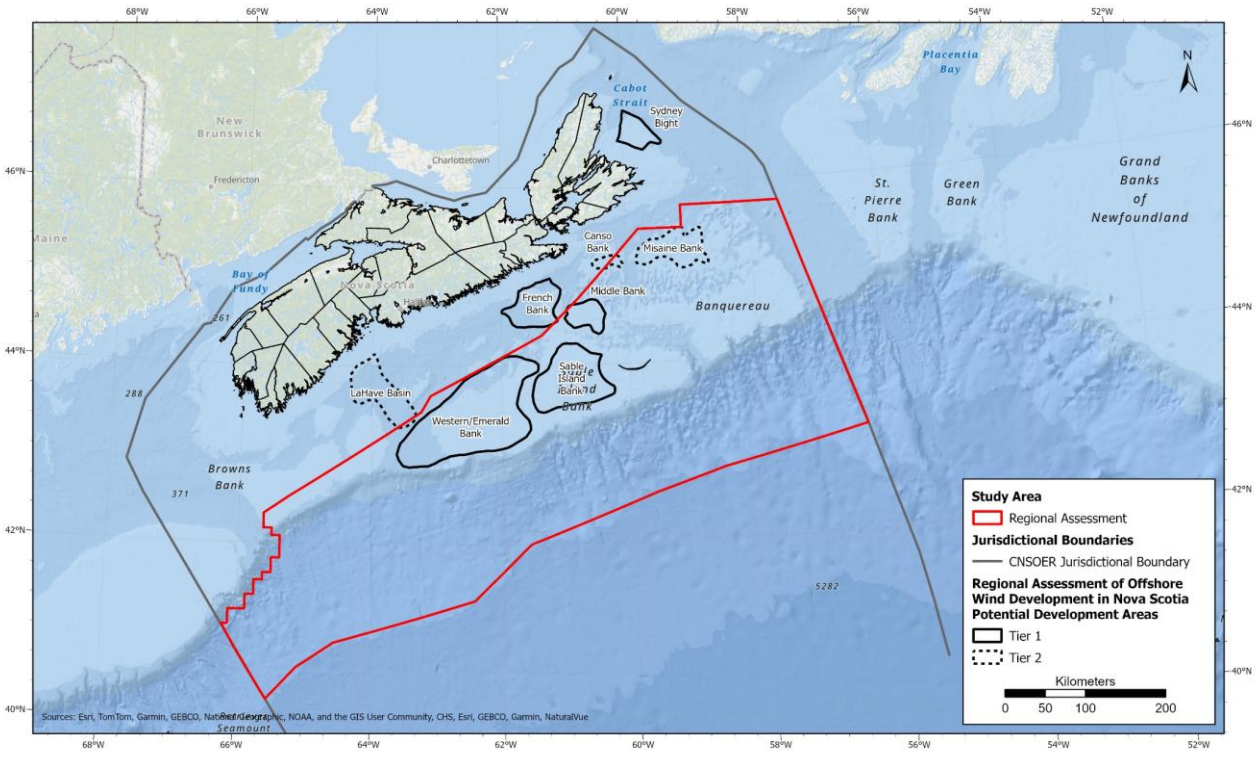


Figure 5.21. Offshore Wind Potential Areas within the Study Area

5.3.3.6 References

Babaleye, A. O., Kurt, R. E., and Khan, F. (2019). Safety analysis of plugging and abandonment of oil and gas wells in uncertain conditions with limited data. Reliability Engineering and System Safety, 188, 133–141. https://doi.org/10.1016/j.ress.2019.03.027

CNSOER. (2025). Governments designated offshore wind energy areas. CNSOER. https://cnsoer.ca/renewable-energy/lands-management/governments-designated-offshore-wind-energy-areas

CNSOER. (n.d.). Wind energy areas in offshore wind Call for Information NS25-1R. CNSOER. https://cnsoer.ca/renewable-energy/offshore-wind-land-tenure-process-ns25-1r/offshore-wind-call-information/wind

CNSOPB. (2018, December). Exploration and production history of the Nova Scotia offshore area. https://cdn.cnsoer.ca/sites/default/files/2025-01/exploration_production_history_of_ns_offshore_-_december_2018_0.pdf

CNSOPB. (2019). Middle Scotian Shelf and Slope Strategic Environmental Assessment. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_middle_scotian_shelf_sea_%20%281%29.pdf

CNSOPB. (2021). Western Scotian Shelf and Slope Strategic Environmental Assessment. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/western_scotian_shelf_and_slope_sea_-_march_2021.pdf

CNSOPB. (2022). Strategic Environmental Assessment: Middle and Eastern Scotian Slope and Sable Island Bank Areas. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_sea_26_may_2022_1.pdf

Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia. (2025). Regional Assessment of Offshore Wind Development in Nova Scotia: Final Report. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

Curran, K. J., Nagel, E. J., Murphy, S. A., Huskins-Shupe, M. L., and Marotte, E. C. (2025). Four Wind Energy Areas (WEA) in the offshore of Nova Scotia: A description of the primary marine ecosystem features, significant and protected areas, at-risk and depleted species, fish and fisheries, science surveys, and other human uses that may occur in and around the French Bank, Middle Bank, Sable Island Bank, and Sydney Bight Areas (Can. Manuscr. Rep. Fish. Aquat. Sci. 3312, p. ix + 65.). Fisheries and Oceans Canada. https://doi.org/10.60825/KP16-ZX06

DFO. (2025a). Marine economy: Marine tourism. Government of Canada. https://www.dfo-mpo.gc.ca/transparency-transparence/mtb-ctm/2025/2-a6-marine-economy-economie-maritime-eng.html#marine-tourism

DFO. (2025b, October 14). Maritime region statistics: Table 1. https://www.dfo-mpo.gc.ca/stats/maritime/tab/mar-tab1-eng.htm

Government of Nova Scotia. (n.d.). Nova Scotia: Proud to defend. https://novascotia.ca/proud-to-defend/

Government of Nova Scotia. (2026). Budget 2026-27: Defending Nova Scotia - Planning for the long term. Government of Nova Scotia. https://www.novascotia.ca/sites/default/files/documents/7-4172/government-business-plan-2026-27-en.pdf

Halifax Port Authority. (2025, December 16). Nova Scotia cruise ports enjoy exceptional 2025 season. https://www.porthalifax.ca/nova-scotia-cruise-ports-enjoy-exceptional-2025-season/

Marine Atlantic. (n.d.). About us. https://www.marineatlantic.ca/about-us

Tourism Nova Scotia. (n.d.). Tourism revenues. https://tourismns.ca/tourism-revenues

Transport Canada. (2025, October 6). Transportation in Canada 2020: Eastern Canada. Government of Canada. https://tc.canada.ca/en/corporate-services/transparency/corporate-management-reporting/transportation-canada-annual-reports/2020-2021/eastern-canada

5.3.4 Health, Social, and Economy

5.3.4.1 Demographic Context

The total population living in Nova Scotia at the start of 2026 was 1,090,074 (Statistics Canada, 2026a). In the 2021 Census, approximately one tenth of the Nova Scotian population identified as a visible minority, of which 30% are African Nova Scotian, 23% South Asian, 13% Chinese, 11% Arab, 7% Filipino, 3% Latin American, 3% Southeast Asian, 3% Korean, 1% Japanese, 3% multiple visible minorities, and 1% visible minorities not included elsewhere (Statistics Canada, 2023). Between 2016 and 2021, Nova Scotia's visible minority population increased from 58,650 to 93,430 (59%), compared with overall population growth of approximately 5% during the same period (Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025). Nova Scotia has a comparatively older population: as of July 1, 2026, people aged 65 and older represented 23.0% of the provincial population, compared with 20.0% nationally. Children aged 0 to 14 represented 13.3% of the population, compared with 15.0% nationally (Statistics Canada, 2026b). The proportion of seniors is projected to reach 25.5% by 2035, while the proportion of youth aged 15 to 29 is projected to decrease from 18.5% in 2025 to 17.7% in 2035 (Employment and Social Development Canada, 2026).

The African Nova Scotian population in the province dates to the 1700s, with a second wave of immigration in the 1800s. Shelburne, Africville, East Preston, the Annapolis Valley, Truro, Sydney, and other towns and rural communities are places where African communities historically settled. Presently, the African Nova Scotia population continues to increase, and Halifax is home to 72.9% of the African Nova Scotian population in the province (African Nova Scotian Road to Economic Prosperity, 2024). Socioeconomic challenges remain for the African Nova Scotian population in the province, including lower educational attainment and higher unemployment rates relative to the provincial average.

Nova Scotia is also home to established Acadian and francophone communities, including those in Clare, Argyle, Chéticamp, and Isle Madame, where fisheries contribute to local economies (Government of Nova Scotia, n.d.). In 2021, 34,670 Nova Scotians, or 3.6% of the provincial population, reported French as one of their mother tongues (Auclair et al., 2023).

Population growth in recent years has largely been driven by immigration and interprovincial migration. The total number of non-permanent residents in the first quarter of 2026 was 53,144, including permit holders and their families, as well as asylum claimants, protected persons, and related groups (Statistics Canada, 2026a).

Regional differences in socioeconomic conditions exist across Nova Scotia. In the 2021 Census, 41.1% of Nova Scotia's population lived in rural areas, compared with 17.8% nationally (Government of Nova Scotia, 2022). Population distribution and age profiles also vary considerably across the province. As of July 1, 2025, Halifax County accounted for 47.3% of the provincial population and had a median age of 38.9 years, compared with 59.0 years in Guysborough County (Government of Nova Scotia, 2026). While the Halifax Regional Municipality represents the province's largest economic centre, many rural and coastal communities continue to face challenges related to population decline, outmigration of youth, workforce shortages, and limited economic diversification. At the same time, many coastal communities maintain strong cultural, social, and economic connections to marine industries, particularly commercial fisheries and fisheries-related activities.

In 2026, average real GDP growth in Atlantic Canada is forecast to be between 1.2% and 1.6%, corresponding closely to the Canadian forecast of 1.3% (ACOA, 2026). Offshore oil and gas exploration could provide higher-paying employment opportunities and attract additional investment in the region. The unemployment rate averaged 6.6% in 2025, remaining relatively stable since 2022 (Government of Nova Scotia, Labour Market Information, 2026).

The Canadian Association of Petroleum Producers (CAPP) identifies employment, training, procurement, equity partnerships, and community investment as potential mechanisms for Indigenous participation in resource development. CAPP reports that Indigenous people accounted for 6% of workers in Canada's oil and natural gas industry and 6% of apprentices in industry-related trades (CAPP, 2020). In Nova Scotia specifically, CAPP highlights offshore safety and engagement seminars involving all 13 Mi'kmaq communities in 2018, which helped build awareness of offshore operations and establish a foundation for potential offshore supply-chain opportunities (CAPP, 2020).

Population growth in recent years has outpaced employment expansion and housing supply, contributing to increasing housing costs and affordability challenges throughout the province (Employment and Social Development Canada, 2025). The Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia (2025) also

found that major offshore development activities have the potential to generate economic benefits through direct employment, supply-chain opportunities, and increased government revenues. However, these benefits may not be distributed evenly across communities or demographic groups. Increased demand for skilled labour, accommodations, and services may further exacerbate existing affordability pressures in some regions, particularly where housing availability is already constrained.

Differences in employment patterns also exist across demographic groups in Nova Scotia. In 2023, women represented approximately 50.5% of the provincial population, and while employment levels were similar between women and men, part-time employment was more common among women (22%) than men (13%) (Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025). These differences provide additional context for understanding potential barriers to employment and the distribution of socioeconomic opportunities associated with offshore development.

Equity-seeking groups, including Indigenous Peoples, African Nova Scotians, newcomers, people with disabilities, women, youth, and low-income households, may experience both opportunities and challenges associated with offshore development. Targeted training, employment, procurement, and community benefit initiatives can influence how economic benefits are shared across the province. Consideration of these groups is important when assessing the potential socioeconomic implications of future offshore hydrocarbon exploration activities. Further information on this is provided in Section 10.0.

The offshore hydrocarbon industry may also introduce stressors and risks to existing ocean sectors, particularly the commercial fishing industry, which remains a significant economic and cultural contributor to many coastal communities. Perceived or actual interactions between offshore activities and fisheries resources, fishing access, navigation, or marine safety may affect livelihoods and community well-being. As a result, the distribution of economic benefits and potential adverse effects should be considered alongside broader regional socioeconomic conditions when evaluating future offshore exploration activities.

Indigenous Population

The Mi’kmaq are the founding people of Nova Scotia. There are 13 Mi’kmaq communities in the province with populations ranging from 333 in Annapolis Valley First Nation to over 4,800 in Eskasoni First Nation. Table 5.18 indicates that in 2026, there were 19,356 Mi’kmaq, of whom 11,366, or 58%, lived on reserve.

Table 5.18 – Population of Indigenous Communities in Nova Scotia

Reserve	On Reserve		Off Reserve		Total
	Males	Females	Males	Females	

Membertou	534	485	341	319	1,726
Wagmatcook	348	344	92	118	943
Eskasoni	2,012	2,050	341	374	4,814
We'koqma'q	483	527	40	57	1,143
Potlotek	326	318	90	101	874
Paqtnkek	201	223	65	89	611
Pictou Landing	259	255	87	82	705
Millbrook	482	487	727	751	2,492
Glooscap	36	71	175	175	458
Sipekne'katik	652	734	775	886	3,129
Annapolis Valley	66	57	88	122	333
Bear River	50	69	141	143	404
Wasoqopa'q	148	149	891	920	2,114
Total	5,597	5,769	3,853	4,137	19,356

Source: Crown-Indigenous Relations and Northern Affairs Canada, First Nations Profiles, 2026

It is challenging to obtain a reliable breakdown of age cohorts of the Mi'kmaq population in the province because Statistics Canada includes in their 2021 tabulation of the Indigenous population all who identify as First Nations, i.e., individuals from other nations living in NS, Metis and Inuk (Statistics Canada, 2021). In general, it can be said that the Mi'kmaq population is younger than the non-Indigenous population: the average age is 37 years while that of the non-Indigenous population is 44.3; Indigenous children (aged 14 and younger) represent 20.8% of their population compared to 13.9% of the non-Indigenous population (Indigenous Services Canada, 2022). Given the age and population growth of Indigenous Peoples, this is a community that could contribute significantly to the development of a new industry in NS.

5.3.4.2 References

African Nova Scotian Road to Economic Prosperity. (2024). African Nova Scotian prosperity and well-being index 2024. Halifax Partnership. https://halifaxpartnership.com/sites/default/uploads/Documents/ANS-INDEX_May2024_FINAL.pdf

ACOA. (2026). 2026–27 departmental plan: Operating context. Government of Canada. https://www.canada.ca/en/atlantic-canada-opportunities/corporate/transparency/2026-27-departmental-plan/2026-27-departmental-plan-operating-context.html

Auclair, N., Frigon, C., & St-Amant, G. (2023). Key facts on the French language in Nova Scotia in 2021 (Catalogue No. 89-657-X2023006). Statistics Canada. https://www150.statcan.gc.ca/n1/pub/89-657-x/89-657-x2023006-eng.htm

Canadian Association of Petroleum Producers. (2020, May). Collaborating for mutual benefit: Indigenous peoples and Canada's energy industry. https://www.capp.ca/wp-content/uploads/2024/01/Collaborating-for-Mutual-Benefit-Indigenous-Peoples-and-Canadas-Energy-Industry-368891.pdf

Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia. (2025). Regional Assessment of Offshore Wind Development in Nova Scotia: Final Report. Impact Assessment Agency of Canada Registry. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

Employment and Social Development Canada. (2026). Economic Scan – Nova Scotia - 2026. Job Bank. https://ns.jobbank.gc.ca/trend-analysis/job-market-reports/nova-scotia/environmental-scan

Government of Nova Scotia, Labour Market Information. (2026, January). Labour Force Survey: 2025 annual insights. https://lmi.novascotia.ca/sites/default/files/2026-01/LFS%20Annual%202025%20Insights%20-%20final_0.pdf

Government of Nova Scotia. (2022). Census Population and Dwelling Counts, 2021. Finance and Treasury Board. https://novascotia.ca/finance/statistics/archive_news.asp?id=21657

Government of Nova Scotia. (2026). Nova Scotia Population Estimates by County and Census Subdivision – July 1, 2025. Economics and Statistics. https://novascotia.ca/finance/statistics/archive_news.asp?id=21657

Government of Nova Scotia. (n.d.). Our community. Acadian Affairs and Francophonie. https://acadien.novascotia.ca/en/community

Statistics Canada. (2023, June 21). Table 98-10-0351-01: Visible minority by gender and age: Canada, provinces and territories. https://doi.org/10.25318/9810035101-eng

Statistics Canada. (2026a, February 16). Population and demography statistics. https://www.statcan.gc.ca/en/subjects-start/population_and_demography

Statistics Canada. (2026b, September 23). Canada's population estimates: Age and gender, 2026. https://www150.statcan.gc.ca/n1/daily-quotidien/260923/dq260923a-eng.htm

5.4 Indigenous Peoples: The Mi'kmaq

The Mi'kmaq are the Indigenous People of Mi'kma'ki, the traditional territory encompassing Nova Scotia, Prince Edward Island, New Brunswick, the Gaspé region of Quebec, parts of Newfoundland, and portions of the northeastern United States. Nova Scotia lies entirely within Mi'kma'ki and remains central to Mi'kmaq culture, governance, stewardship, and harvesting practices. Mi'kmaq interests extend beyond the land boundaries to the offshore area where Mi'kmaw people have cultural, spiritual, social, and economic connections to the marine environment.

The Mi'kmaq have historical connection with coastal and marine environments through fishing, hunting, gathering, travel, trade, cultural practices, and stewardship responsibilities. These connections continue today and are reflected in the exercise of Aboriginal and Treaty rights, commercial and food fisheries, cultural activities, and the transmission of Indigenous Knowledge. Contemporary Mi'kmaw rights, interests, and knowledge systems continue to inform stewardship and resource management throughout Mi'kma'ki, including the marine environment.

5.4.1 Mi'kmaw Communities and Governance

The Mi'kmaq of Nova Scotia are represented by 13 Mi'kmaw First Nations located throughout Mi'kma'ki (Figure 5.22). These communities maintain distinct histories, cultures, and relationships with their local environments while sharing common interests related to governance, stewardship, rights, and resource management:

- Acadia First Nation
- Annapolis Valley First Nation
- Bear River First Nation
- Eskasoni First Nation
- Glooscap First Nation
- Membertou First Nation
- Millbrook First Nation
- Paq'tnkek First Nation
- Pictou Landing First Nation
- Potlotek First Nation
- Sipekne'katik First Nation
- Wagmatcook First Nation
- We'koqma'q First Nation



Source: Government of Nova Scotia, n.d.

Figure 5.22. Map of Nova Scotia Mi'kmaw First nations in Mi'kma'ki

Several regional organizations support Mi'kmaw governance, consultation, stewardship, resource management, cultural preservation, and advocacy throughout Mi'kma'ki (Table 5-19).

Table 5.19 – Summary of Mi'kmaq Regional Organizations

Organization	Role
Assembly of Nova Scotia Mi'kmaw Chiefs (ANSMC)	Political leadership body representing the 13 Mi'kmaw First Nations of Nova Scotia. ANSMC has a central role in deliberating collective decision making on issues regarding Mi'kmaq rights and governance.

Organization	Role
Atlantic Policy Congress of First Nations	The Atlantic Policy Congress (APC) Secretariat is an advocate for speaking with one voice on behalf of First Nations communities. Through research and analysis, the APC develops and tables policy alternatives for matters affecting First Nations communities in Atlantic Canada, Quebec, and Maine, USA.
Confederacy of Mainland Mi'kmaq (CMM)	Tribal organization that promotes and supports Mi’kmaw self-determination by providing advisory, technical, policy, and program support to member Mi'kmaw communities on mainland Nova Scotia.
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	Supports consultation, negotiation, engagement, and accommodation processes on behalf of the Assembly of Nova Scotia Mi'kmaw Chiefs.
Maritime Aboriginal Peoples Council (MAPC)	Represents and advocates for the rights and interests of off-Reserve Status and Non-Status Indians who remain in their traditional ancestral homeland as either Mi’kmaq, Maliseet, or Passamaquoddy Aboriginal Peoples.
Mi’kmaq Grand Council	The Mi'kmaq Grand Council serves as a vital governing body for the MI'kmaw people, promoting unity and cultural preservation. It plays a crucial role in advocating for the rights and interests of the community, ensuring that their heritage, traditions, and treaties are respected and upheld.
Nova Scotia Native Women's Association (NSNWA)	Represents and advocates for Indigenous women and 2SLGBTQQIA+ people, supporting initiatives related to culture, community well-being, environmental stewardship, and Indigenous rights.
Unama'ki Institute of Natural Resources (UINR)	Supports natural resource management, fisheries, stewardship initiatives, Indigenous Knowledge, environmental

DRAFT

Organization	Role
	monitoring, and conservation activities on behalf of the five Unama'ki First Nations in Cape Breton.
Union of Nova Scotia Mi'kmaq	The Union of Nova Scotia Mi'kmaq (UNSM) is a tribal organization established in 1969 to provide a unified political voice for the Mi'kmaq people of Nova Scotia. Evolving through the guidance of Mi'kmaq values and tradition, UNSM now works collectively with member First Nations to support governance, healthy communities, and self-determined Nationhood.
Wskijnu'k Mtmo'taqnuow Agency Ltd	Wskijnu'k Mtmo'taqnuow Agency (WMA) works on behalf of the 13 Mi'kmaw communities in Nova Scotia to advance economic opportunities through partnerships, joint ventures, and equity participation that create long-term value.

5.4.2 Mi'kmaq Rights, Treaties, and UNDRIP

5.4.2.1 Peace and Friendship Treaties

Between 1725 and 1779, British authorities and the Mi'kmaq, Wolastoqey, and Peskotomuhkati signed a series of treaties collectively known as the Peace and Friendship Treaties. The Treaties did not involve the surrender or cession of Indigenous lands and resources, but were intended to establish peaceful relations, facilitate trade, and define ongoing relationships and responsibilities between the Crown and Indigenous nations throughout what is now Atlantic Canada (Martin, 2020; Nova Scotia Archives, 2026; Government of Canada, 2010). The Treaties affirmed the continued ability of Indigenous Peoples to hunt, fish, trap, gather, and trade within their traditional territories while maintaining their distinct identities, governance systems, and connections to the land and waters (Nova Scotia Archives, 2026, Government of Canada, 2010). The marine environment holds particular importance within the context of the Peace and Friendship Treaties. For centuries, Indigenous communities have relied on coastal and marine resources for food, social, cultural, spiritual, and economic purposes. The exercise of Treaty rights continues to support community well-being, cultural continuity, and Indigenous economies through food, social and ceremonial fisheries, moderate livelihood fisheries, and participation in commercial fisheries and Indigenous stewardship responsibilities and longstanding relationships with marine ecosystems contribute to the

transmission of Indigenous Knowledge and the sustainable management of marine resources (Martin, 2020).

The Treaties provide important context for the RA, by underscoring Mi'kmaq interests and rights in the offshore environment. Although exploratory drilling activities occur offshore, potential effects on the marine ecosystem and marine species fish may affect resources relied upon by Mi'kmaq communities for the exercise of Treaty rights. The Peace and Friendship Treaties also provide an important foundation for reconciliation and support the meaningful participation of Indigenous Peoples in environmental assessment processes including opportunities to participate in decision-making, contribute Indigenous Knowledge, identify areas and species of cultural significance, and help in the development of monitoring and mitigation measures that address Indigenous rights, interests, and concerns.

5.4.2.2 Aboriginal and Treaty Rights

Section 35 of the *Constitution Act*, 1982, recognizes and affirms Aboriginal and treaty rights of the Aboriginal peoples of Canada, including First Nations, Métis, and Inuit. These rights form an important consideration in federal assessment and resource management processes where proposed activities may have the potential to adversely affect the exercise of those rights. Section 35 also outlines the Crown's duty to consult in cases where the Crown contemplates undertakings that may have adverse impact on section 35 Rights. In addition, Section 25 guarantees Indigenous Peoples rights protected under Section 35 stating that no other provision of the Charter can take away or supersede those rights.

Several landmark court decisions have further clarified the nature and scope of Aboriginal and Treaty rights in Canada, particularly with respect to fisheries resources. The Supreme Court of Canada's decision in R. v. Sparrow (1990) confirmed that Section 35 protects Aboriginal rights that existed prior to European contact, including the right of First Nations to fish for food, social, and ceremonial (FSC) purposes. In Atlantic Canada, the Supreme Court's decision in R. v. Marshall (1999) further defined Treaty-based harvesting rights for the Mi'kmaq (and the Wolastoqey and Peskotomuhkati) peoples. The Court determined that the Peace and Friendship Treaties of 1760-61 protected the right to hunt, fish, and gather in pursuit of a "moderate livelihood" and established the legal foundation for Indigenous participation in commercial fisheries and marine resource economies. While the parameters of Moderate Livelihood Fisheries continue to evolve, Indigenous participation in commercial fisheries has expanded, and is expected to continue to expand, through a variety of mechanisms, including Communal Commercial Fisheries licences and moderate livelihood fisheries initiatives, highlighting the important socioeconomic contribution that Indigenous fisheries play in Indigenous communities with ongoing growth and diversification beyond species traditionally harvested.

Within the context of the RA, Aboriginal and Treaty rights are closely connected to the continued use and stewardship of marine, coastal, and terrestrial environments for the Mi'kmaq. communities. Offshore exploratory drilling activities have the potential to interact with marine ecosystems, fish and fish habitat, culturally important species and species harvested by the Mi'kmaq, harvesting areas, or the transmission of Indigenous Knowledge and cultural practices (see section 6).

5.4.2.3 UNDRIP and Indigenous Participation in Decision-making

The *United Nations Declarations of the Rights on Indigenous Peoples (UNDRIP) Act*, enacted in 2021 in Canada, affirms the Crown's duty to consult Indigenous Peoples. UNDRIP provides a framework for advancing reconciliation between Indigenous Peoples and the Crown by recognizing Indigenous rights and promoting the meaningful inclusion of Indigenous Peoples in decisions that may affect their communities, resources, cultures, and way of life. Central to UNDRIP is the principle of Free, Prior and Informed Consent, which emphasizes transparency, meaningful engagement and incorporation of Indigenous interests in decision making processes.

Meaningful participation of Indigenous Peoples in decision-making processes is a fundamental component of reconciliation and the implementation of UNDRIP. Consultation and engagement processes should be responsive to the priorities, interests and preferences of Indigenous communities and should provide opportunities for Indigenous Knowledge, perspectives and values to inform planning and decision-making to achieve a more comprehensive understanding of environmental conditions, cumulative effects, cultural values, and long-term ecological changes (AECOM, 2024).

For this RA, offshore exploratory drilling activities have the potential to interact with marine ecosystems, fisheries resources, culturally significant areas, and the exercise of Indigenous rights and traditional practices. As many Indigenous communities maintain cultural, historical, and contemporary connections to the waters and marine resources in the offshore area of Nova Scotia, their perspectives are essential to understanding both the potential benefits and risks associated with exploratory drilling activities. The RA provides an opportunity to consider Indigenous Knowledge and Indigenous perspectives at a regional scale, allowing for the identification of issues, concerns, and opportunities that can inform and support future exploratory drilling projects. Meaningful Indigenous participation in the RA supports the identification of culturally important areas and species, traditional resource use patterns, and cumulative effects that may result from exploratory drilling activities and will inform mitigation and monitoring approaches, and RA recommendations that reflect Indigenous priorities and values. By creating opportunities for the Mi'kmaq to participate in the assessment process, the RA can help ensure that decision-making is informed by diverse knowledge systems and contributes to more effective environmental stewardship.

5.4.3 Indigenous Knowledge, Two-Eyed Seeing and Netukulimk

Indigenous Knowledge is rooted in observation, experience, and cultural practice, and is developed through generations of observation, experience, and interaction with the land, waters, ecosystems, and living beings within specific territories (Indigenous Climate Hub, 2024). Indigenous Knowledge encompasses place-based knowledge, reflecting deep connections to the land and to interrelationships, and is transmitted through oral histories, languages, teachings and ceremonies that evolve through sustainable management of lands and resources for future generations (Indigenous Climate Hub, 2024).

Mi'kmaq Ecological Knowledge reflects the interaction that the Mi'kmaq have had, and continue to have, with the environment and provides understandings that may not be reflected in Western science knowledge systems. Mi'kmaw knowledge systems are grounded in concepts such as Msit No'kmaq, which recognizes the interconnectedness of all living and non-living things and emphasizes relationships of responsibility and reciprocity. These knowledge systems contribute to understanding environmental change, species interactions, ecosystem health, and stewardship responsibilities, and continue to inform Mi'kmaw perspectives on marine management and decision-making (AECOM, 2024).

An important framework for bringing together Indigenous Knowledge and Western science is Two-Eyed Seeing (Etuaptmumk), a concept developed by Mi'kmaw Elder Albert Marshall of Eskasoni First Nation. Two-Eyed Seeing (Etuaptmumk) encourages a coexistence of two knowledge systems where one eye sees through the strengths of Indigenous lens and the other eye through the strengths of Western mainstream lens, with the goal of learning to see through both eyes for the benefit of all (Two-Eyed Seeing, n.d). The approach is increasingly applied in environmental management, research, and assessment processes to support collaboration and more holistic understandings of environmental conditions and change.

Underlying Mi’kmaw stewardship and environmental management is *Netukulimk*; an essential concept for the Mi’kmaq that encompasses ways of being and knowing, holding the guiding principles for the different spheres of life - spiritual, emotional, cognitive, and physical (Nova Scotia Department of Education and Early Childhood Development, n.d.; L’nuey, 2026). Netukulimk guides the ways a person should live in harmony, respecting Wskitqamu (Mother Earth) and emphasizes the sustainable use of natural resources while maintaining environmental integrity, diversity, and productivity for future generations (Unama'ki Institute of Natural Resources, n.d.; L’nuey, 2026). Mi’kmaw law and ways are centered in Netukulimk, which carry the responsibility to maintain balance through relationships of interdependence and interconnectivity with Wskitqamu.

These knowledge systems and stewardship principles have been generationally passed down as Elders recount changing shorelines, fish migrations, the cyclical nature of storms and tides, and other teachings, which have guided the Mi'kmaq in their ways of life and stewardship of the land and sea (Barberstock, 2025). This intergenerational knowledge contributes to ongoing understandings of ecosystem health, biodiversity, and the sustainable management of marine and coastal environments throughout Mi'kma'ki.

5.4.4 Mi'kmaq Marine Resource Use

Mi'kmaw relationships with marine and offshore environments are rooted in thousands of years of occupancy and use of Mi'kma'ki. The relationship between Mi'kmaq and the offshore area is based on marine stewardship and interconnectedness of all creation, where humans are part of nature and live in a relationship of reciprocity with nature, all beings and non-beings. The ocean is viewed not only as a source of sustenance and transportation, but also as an entity that supports cultural identity, knowledge systems, community well-being, and the exercise of Aboriginal and Treaty rights. In Mi'kmaw communities, as in many Indigenous cultures, water is recognized as a symbol of life and women have the forefront role as steward and its protectors (Native Women's Association of Canada, n.d.; Pictou, 2021).

Mi'kmaw connections to offshore environments extend beyond present-day coastlines. Historical and geological evidence indicates that present-day coastlines differ significantly from those that existed during earlier periods of Mi'kmaw occupation. As sea levels rose following the last glaciation, portions of what are now offshore banks and marine areas became submerged. These areas may contain archaeological resources, cultural landscapes, travel corridors, and locations of historical significance associated with earlier Indigenous use and occupancy. The changing relationship between land and sea remains an important consideration when understanding Mi'kmaw connections to the offshore environment.

Marine and coastal waters have historically served as travel routes connecting Mi'kmaw communities to harvesting areas, places of cultural importance, and to each other throughout Mi'kma'ki. Marine environments also serve as important ecological connections between regions of Mi'kma'ki. Indigenous fisheries and culturally important species utilize interconnected marine ecosystems that extend across the Bay of Fundy, Scotian Shelf, Gulf of St. Lawrence, Bras d'Or Lakes, and offshore waters. These marine areas support the movement of species that continue to be important to Mi'kmaw harvesting, cultural practices, and stewardship activities including FSC fisheries, Moderate Livelihood fisheries, commercial fisheries (section 5.3.1.1). The marine environment continues to support navigation, fishing, cultural practices, and the intergenerational transfer of Indigenous Knowledge.

Mi'kmaw participants have identified a variety of fish, invertebrate, and marine wildlife species as culturally important. These species support food security, livelihoods, cultural practices, stewardship responsibilities, and the transmission of Indigenous Knowledge and support the continued exercise of Aboriginal and Treaty rights. Species frequently identified by Indigenous communities include Atlantic salmon, American eel, Atlantic mackerel, gaspereau, lobster, scallop, clam, tuna species, sharks, marine mammals, and other species occupying freshwater, coastal, and offshore ecosystems. The seasonal movement of many of these species between rivers, estuaries, coastal waters, and the offshore environment reinforce the interconnected nature of Mi'kmaw relationships with marine ecosystems throughout Mi'kma'ki. While Mi'kmaw communities identified a broad range of marine species as culturally, ecologically, and economically important, certain species warrant particular attention within the RA due to their cultural significance and use of the offshore area:

Atlantic salmon are an anadromous species that spawn and rear in freshwater rivers before migrating to marine environments where they undertake extensive feeding migrations throughout the Northwest Atlantic Ocean. Populations originating from rivers in Nova Scotia, New Brunswick, Québec, Newfoundland and Labrador, and the northeastern United States use marine habitats that include portions of the Scotian Shelf and adjacent offshore waters. Although freshwater ecology and habitat requirements are relatively well understood, uncertainty remains regarding offshore migration routes, feeding locations, and factors influencing marine survival. Numerous Atlantic salmon populations in Atlantic Canada have been assessed by COSEWIC as ranging from Special Concern to Endangered, and declining marine survival has been identified as a major factor influencing population recovery (COSEWIC, 2025a, 2025b). Indigenous communities throughout Atlantic Canada continue to identify Atlantic salmon as a species of high cultural significance and have highlighted the importance of improving understanding of salmon use of offshore environments (DFO, 2023, 2024a).

American eel is a catadromous species that spawns in the Sargasso Sea and occupies freshwater, estuarine, coastal, and offshore marine environments throughout its life cycle. Mature eels from Atlantic Canadian watersheds migrate through offshore waters of the Scotian Shelf to and from spawning grounds. COSEWIC reassessed American eel as Threatened in 2012, citing substantial declines across a significant portion of its Canadian range and threats including habitat fragmentation, hydroelectric mortality, fisheries interactions, contaminants, and changing oceanographic conditions. Despite extensive research in freshwater and estuarine environments, relatively little is known regarding offshore migration routes and habitat use in Atlantic Canadian waters. (COSEWIC, 2012a).

Swordfish are highly migratory pelagic predators that seasonally occur in offshore Nova Scotia waters, particularly along the Scotian Shelf edge and in areas influenced by the Gulf Stream. They undertake extensive seasonal and vertical migrations and are

associated with productive oceanographic features, including Gulf Stream-influenced waters. Swordfish supports Indigenous communal commercial fisheries and commercial fisheries throughout Atlantic Canada and remains an important component of offshore pelagic ecosystems. Although not listed under SARA, swordfish are widely recognized as a species of ecological and socioeconomic importance (DFO, 2013).

Tuna species, including Atlantic bluefin tuna, albacore tuna, and bigeye tuna, may occur within portions of the Study Area. Atlantic bluefin tuna undertake extensive transboundary migrations between spawning areas in the Gulf of Mexico and Mediterranean Sea and feeding grounds in Atlantic Canadian waters. Offshore Nova Scotia, particularly shelf-edge waters and areas influenced by warm-core Gulf Stream features, provides important seasonal foraging habitat. COSEWIC assessed Atlantic bluefin tuna as Endangered in 2011 due to substantial declines in spawning biomass associated with decades of fishing pressure. The species remains culturally and economically important to Indigenous groups, commercial harvesters, and recreational fisheries throughout Atlantic Canada (COSEWIC, 2011; DFO, 2013).

5.4.5 References

AECOM. (2024). Nova Scotia and Newfoundland and Labrador offshore wind impacts (Project No. 6015530). Retrieved from: https://iaac-aeic.gc.ca/050/documents/p83514/160327E.pdf

Assembly of First Nations. (2025). Breathing Life into the Calls for Justice: Thematic Analysis on Human Trafficking. 2025 CFJ Progress Report. Retrieved from: https://afn.bynder.com/m/2d9148a283482600/original/Breathing-Life-into-the-Calls-for-Justice-Thematic-Analysis-on-Human-Trafficking2025-CFJ-Progress-Report.pdf

Barberstock, R. K. (2025, October 15). The waters speak: Indigenous knowledge and climate change in the Maritimes. Indigenous Climate Hub. Retrieved from: https://indigenousclimatehub.ca/2025/10/the-waters-speak-indigenous-knowledge-and-climate-change-in-the-maritimes/

DFO. (2022b). Marshall Decisions. https://www.dfo-mpo.gc.ca/fisheries-peches/aboriginal-autochtones/moderate-livelihood-subsistance-convenable/marshall-overview-apercu-eng.html

Government of Canda. (2010). Fact sheet on Peace and Friendship Treaties in the Maritimes and Gaspé. https://www.rcaanc-cirnac.gc.ca/eng/1100100028599/1539609517566

Government of Nova Scotia. (n.d.). Map of First Nations in Nova Scotia [Map]. Retrieved from: https://novascotia.ca/abor/aboriginal-people/community-info/

Indigenous Climate Hub. (2024, August 1). Bridging two worlds: Integrating Indigenous knowledge and Western science in climate policy. Indigenous Climate Hub. Retrieved from: https://indigenousclimatehub.ca/2024/08/bridging-two-worlds-integrating-indigenous-knowledge-and-western-science-in-climate-policy/

L'nuey. (2026). The concepts of Netukulimk and Two-Eyed Seeing [PDF]. https://lnuey.ca/wp-content/uploads/2026/05/Lnuey-Netukulimk-Two-Eyed-Seeing.pdf

Loppie, S., Reading, C., & de Leeuw, S. (2020). INDIGENOUS EXPERIENCES WITH RACISM AND ITS IMPACTS. National Collaborating Centre for Indigenous Health (NCCIH). Retrieved from: https://www.nccih.ca/docs/determinants/FS-Racism2-Racism-Impacts-EN.pdf

Martin, Hannah. Brief: Peace, Friendship and Fishing in Mi'kma'ki. Yellowhead Institute, 7 Oct. 2020, Retrieved from: https://yellowheadinstitute.org/2020/peace-friendship-fishing-in-mikmaki/

Native Women's Association of Canada. (n.d.). Water Carriers initiative | Indigenous water governance at NWAC. Retrieved from: https://nwac.ca/academics-policy/policy-development/environment/water-carriers/

Nova Scotia Archives. (2026). Mi'kmaw Teaching and Learning Resources. Retrieved from: https://archives.novascotia.ca/teaching-learning/mikmaq/treaties/?Search=AR5&SearchList1=all&TABLE2=on

Nova Scotia Department of Education and Early Childhood Development. (n.d.). Netukulimk. https://curriculum.novascotia.ca/sites/default/files/documents/resource-files/Netukulimk_ENG.pdf

Pictou, S. (2021). Wolastoqiyik and Mi'kmaq Grandmothers: Land/water defenders sharing and learning circle: Generating knowledge for action. KAIROS: Canadian Ecumenical Justice Initiatives. Retrieved from: https://kairoscanada.org/wp-content/uploads/2021/09/Grandmothers_Land_Defense_Report_Pictou_2021.pdf

Two-Eyed Seeing. (n.d.). Two-Eyed Seeing. https://www.2eyedseeing.ca/about-5

Unama'ki Institute of Natural Resources. (n.d.). Netukulimk. Retrieved from: https://www.uinr.ca/programs/netukulimk/

5.5 Data and Knowledge Gaps

The baseline context for this RA was developed using available scientific literature, government reports, assessments, regulatory information, and other publicly available

information. While these sources have provided a substantial amount of information for describing the environmental, social, cultural, health, and economic conditions within and adjacent to the Study Area, data availability and knowledge of the offshore environment varies across components. This may be the result of limited long-term monitoring, uneven spatial or temporal coverage (resulting from effort bias), evolving conditions, and the availability of information within the offshore area. Some information is also based on specific environmental assessments, which only covers a portion of the Study Area, so the information may not be fully relevant to the entire Study Area. Identifying these gaps, however, can help provide context for recommendations and subsequent future decision making. An overview of the identified gaps is provided in Table 5.20.

Table 5.20 – Overview of Baseline Gaps

Component	Gap Identified
Corals	**Incomplete spatial data for coral distribution:** • Historically, information on coral and sponge distributions in offshore Nova Scotia has been derived from methods that are spatially constrained and often biased toward areas of fishing activity or accessible seabed types. Current information on coral occurrence is unevenly distributed throughout the offshore area and consequently, potentially important coral habitats may remain unidentified.
	Limited information on rare coral species: • While several coral groups are relatively well documented in the offshore area, other taxa (e.g., black corals and small cup corals) known to occur in the Study Area remain poorly characterized including information on distribution, abundance, habitat requirements, and ecological functions.
	Uncertainty of coral sensitivity to exploratory drilling activities: • Although recognized as sensitive benthic organisms, there remains uncertainty regarding the extent to which coral communities in offshore Nova Scotia may be affected by exploratory drilling activities (i.e., sediment deposition, drill cuttings, anchoring systems, and accidental discharges).
Fish species (including sharks)	**Uncertainty around distribution and abundance of fish (including sharks) species:** • Gaps in spatial and seasonal data limit understanding of the distribution, abundance, and habitat use of fish, including

Component	Gap Identified
	sharks, particularly for species and offshore areas poorly represented in existing surveys.
Ichthyoplankton (fish eggs and larvae)	**Limited current information on the distribution and composition of Ichthyoplankton** • Ichthyoplankton constitute a relatively small component of the zooplankton community, and include fish eggs and larvae that are found mainly in the upper layers (top 200 m) of the water column. Information on the diversity, distribution, and temporal variability in abundance of ichthyoplankton is important for understanding the significance of habitats as spawning and nursery grounds, the status of individual stocks, and the impacts of human activity. However, much of our current knowledge on the diversity, spatial and temporal distribution of fish eggs and larvae on the Scotian Shelf has been derived from the former Scotian Shelf Ichthyoplankton Program (SSIP; 1976 to 1982), or from short-term research programs (e.g., the Ocean Productivity Enhancement Network (OPEN) larval surveys conducted from 1991 to 1992; joint Dalhousie University-DFO summer larval surveys from 1997–1998). At present, a systematic, routine monitoring program targeting ichthyoplankton is not currently conducted in the Study Area.
Marine Mammals	**Uncertainty regarding marine mammal abundance, distribution, and habitat use in offshore environments:** • Although substantial information is available from DFO surveys and monitoring uncertainties remain regarding the abundance, year-round distribution, movement patterns, and habitat use of marine mammal species in offshore and deep-water areas. Additional uncertainty exists regarding species-specific responses to multiple anthropogenic stressors, including underwater noise, vessel traffic, fisheries interactions, climate change, and offshore industrial activities. These data gaps limit the ability to fully characterize habitat importance, identify sensitive periods and areas, and assess potential cumulative effects within the Study Area.
Sea Turtles	**Uncertainty around abundance and distribution of the offshore area:**

Component	Gap Identified
	• Data gaps remain regarding the population abundance and trends of sea turtles within offshore Nova Scotia, including the frequency and duration of habitat use by different species.
	Limited Information on Seasonal Distribution: • Considerable uncertainty remains regarding seasonal patterns of habitat use, year-to-year variability in occurrence, and factors influencing the distribution of sea turtles within offshore waters. Additional uncertainty exists regarding species-specific responses to multiple anthropogenic stressors, including underwater noise, vessel traffic, fisheries interactions, climate change, and offshore industrial activities. These data gaps limit the ability to fully characterize habitat importance, identify sensitive periods and areas, and assess potential cumulative effects within the Study Area.
Aerofauna - Birds	**Incomplete understanding of offshore bird occurrence and species diversity:** • Existing information identifies a limited number of bird species in the region, and current survey coverage may not adequately capture all species that use the offshore environment. • Although many seabird and coastal bird species are concentrated nearer to shore, some species may occur farther offshore than currently documented, particularly during migration or due to attraction to offshore platform lighting. • Species associated with offshore features such as Sable Island may be underrepresented in available datasets.
	Limited understanding of migration routes, timing, and seasonal movements: • Existing survey data are constrained by temporal and spatial limitations, resulting in uncertainty regarding migration routes, migration timing, and offshore habitat use. • Information on pre-breeding, post-breeding, and migratory movements is limited for several species, reducing confidence in identifying periods of heightened sensitivity.
	Limited understanding of bird interactions with offshore infrastructure: • There is insufficient information on how birds interact with offshore platforms and the extent to which factors such as

Component	Gap Identified
	lighting, weather conditions, and operational activities influence behaviour, collision risk, or attraction. • The drivers of population decline for some species and the role of offshore activities relative to other stressors are not well understood.
Aerofauna - Bats	**Limited baseline information on offshore bat occurrence in Atlantic Canada:** • Previous offshore oil and gas assessments generally did not include bats. • While bats have been observed offshore, there is limited information on species presence, abundance, migration routes, seasonal occurrence, and offshore habitat use in the North American Atlantic region.
	Limited understanding of the potential effects of offshore exploratory drilling on bats: • Few studies have examined how offshore oil and gas activities may affect bats in Atlantic Canadian waters. • Potential effects associated with lighting, attraction to offshore structures, noise, habitat use, and collision risk remain poorly understood.
Indigenous Fisheries	**Expansion of Indigenous fisheries:** • Indigenous fisheries are evolving and expanding in some areas, resulting in uncertainty regarding the current and future spatial distribution of Indigenous fishing activities in offshore Nova Scotia. • Existing fisheries information may not fully capture the locations, timing, and seasonal use of fishing grounds by Indigenous communities, creating uncertainty regarding the potential overlap between future Indigenous fisheries and offshore exploratory drilling activities.
Recreational Fishing	**Impacts to recreational fishing:** • Recreational fishing is hard to track and a topic less studied than commercial fisheries. There is limited information regarding how recreational fishing may be impacted by offshore oil and gas exploratory drilling in the region especially in relation to potential accidental spills.

DRAFT

Component	Gap Identified
UXO Sites	**Impacts to recreational fishing:** • Recreational fishing is hard to track and a topic less studied than commercial fisheries. There is limited information regarding how recreational fishing may be impacted by offshore oil and gas exploratory drilling in the region especially in relation to potential accidental spills.
Health, Social, and Economy	**Understanding of community health and well-being:** • There is limited information regarding how offshore exploratory drilling activities may affect the health and well-being of coastal and Indigenous communities, particularly related to accidents, and potential changes to traditional marine activities.
	Insufficient information on Indigenous socio-economic values: • Current information may not fully capture the social, cultural, and economic importance of marine resources (e.g., marine species and habitats) to Indigenous communities.
Indigenous Culture	**Uncertainty remains regarding offshore migration routes, feeding areas, and the factors influencing marine survival for Atlantic salmon:** • Limitations of where Atlantic salmon may overlap with offshore exploratory drilling activities during their marine life stage creates challenges in assessing potential effects on species that are culturally, socially, and spiritually important to Indigenous Peoples.
	Relatively little is known about offshore migration routes, habitat use, and movement patterns in Atlantic Canadian waters for American eel: • Understanding eel distribution and habitat use in offshore environments constrains the ability to assess potential effects on a species that is ecologically important and holds cultural, spiritual, and harvesting significance for Indigenous Peoples.

DRAFT

6 Potential Effects of Offshore Exploratory Drilling Activities

Valued Components (VCs) are used in this RA to focus the analysis on environmental, social, cultural and economic conditions that may be affected by offshore oil and gas exploratory drilling and that have been identified as important to Indigenous groups, stakeholders, regulators, ocean users and the public. The selected VCs were informed by previous regional assessments relevant to the Nova Scotia offshore area, including the Regional Assessment of Offshore Wind Development in Nova Scotia and the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Regional Assessment Committee, 2020). In addition, feedback on the draft Terms of Reference for this RA, and previous environmental assessments and strategic environmental assessments for offshore exploratory drilling projects in the region, such as the Scotian Basin Exploration Drilling Project, the Shelburne Basin Venture Exploration Drilling Project, and the Strategic Environmental Assessment for the Middle and Eastern Scotian Slope and Sable Island Bank Areas were used (CNSOPB, 2022; Canadian Environmental Assessment Agency [CEAA], 2018, 2015). Together, these sources helped identify key features of the offshore and coastal environment (to capture offshore islands), as well as human uses and values that may interact with exploratory drilling activities, accidental events, and supporting activities including support vessels, aircraft activity, well testing, and well abandonment or suspension.

The identification of VCs provides an organizing structure for the analysis of potential effects. It does not imply that adverse effects will necessarily occur for each VC, nor does it replace the need to consider site-specific conditions for future projects. Rather, the VC framework is intended to identify the main pathways through which offshore exploratory drilling could interact with the environment and with human activities in the Study Area.

The VC sections below provide an overview of each component and identify potential key effects associated with offshore exploratory drilling. This information is intended to support consistent consideration of the potential effects as well as mitigation, monitoring, follow-up and information needs for future exploratory drilling activities in the region.

The following list of VCs has been identified for this RA:

- Atmospheric environment
- Fish, fish habitat and marine plants (including Species at Risk)
- Marine mammals and sea turtles (including Species at Risk)
- Aerofauna (including Species at Risk)
- Indigenous Peoples
    - Indigenous Peoples and Indigenous Rights

    - Current use of lands and resources for traditional purposes, physical and cultural heritage and structures, sites of historical, archaeological, paleontological or architectural significance; and health, social and economic conditions of Indigenous Peoples
- Health, social and economic conditions
- Fisheries
- Other ocean users
- Protected and special areas

Most potential effects associated with routine offshore exploratory drilling are expected to be localized due to the temporary nature of the activity, the limited number of wells typically drilled, and the relatively small physical footprint of a drilling unit. The extent of potential effects varies depending on the type of interaction with the environment. Physical disturbance of the seabed, including the placement of seabed infrastructure and the deposition of drill cuttings, is generally concentrated in the immediate vicinity of the well site. Effects associated with routine discharges, such as drilling fluids and cuttings, may extend beyond the well site through dispersion in the water column, but are typically limited to a relatively small area surrounding the drilling operation (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Some effects may occur at a broader geographic scale. Underwater sound generated by drilling-related activities, vessel traffic, or vertical seismic profiling can propagate over considerable distances and may be detectable by marine species far beyond the immediate project area. Similarly, lighting associated with offshore installations and flaring during well testing have the potential to influence migratory birds and bats over a wider area than the physical footprint of the drilling activity. While these effects may extend regionally, they arise from activities that are temporary and episodic in nature.

In contrast to routine operations, accidental events, particularly a large spill or blowout, have the potential to result in effects extending beyond the immediate vicinity of a well site. The geographic extent of such effects would depend on the nature of the event, environmental conditions (e.g., wind, waves etc.), and the effectiveness of response measures (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

The following sections discuss potential effects at a broad scale appropriate for a RA, rather than at the level of detail required for a project-specific assessment. Proponents of future offshore oil and gas exploratory drilling projects will need to evaluate risks and potential effects based on their project's specific locations and activities. The potential effects should be considered a starting point and may need to be supplemented with additional information through site-specific surveys and/or engagement with Indigenous groups, commercial fishers and other interested parties and stakeholders.

6.1 Atmospheric Environment

The atmospheric environment may be affected by routine emissions generated during offshore oil and gas exploratory drilling and associated support activities. Sources of emissions may include combustion from operating drilling units, support vessels, aircraft, and other project-related equipment (e.g. generators, boilers, engines), as well as emissions associated with well testing and flaring. These activities may release greenhouse gases and air pollutants, including nitrogen oxides, sulphur oxides, carbon monoxide, carbon dioxide, volatile organic compounds, and particulate matter.

Potential effects are expected to be influenced by the location of activities, the duration of drilling, the level of vessel and aircraft support required, the type of drilling unit used, the need for well testing, and prevailing meteorological conditions. While emissions from individual exploratory drilling programs are generally expected to be localized and temporary, they may contribute incrementally to regional air emissions and greenhouse gas totals. As a result, air emissions and climate-related considerations should be addressed through project planning, emissions estimation, mitigation, monitoring, and reporting.

In addition, recognizing concerns raised by RA participants regarding the contribution of offshore exploratory drilling to GHG emissions and effects to the atmospheric environment and contribution to climate change, a separate GHG analysis was undertaken to support the RA (Section 8.0). The GHG analysis considers the nature and magnitude of GHG emissions associated with offshore exploratory drilling activities and evaluates the potential contribution to regional, national and global emissions inventories. The results of the analysis provide additional context for understanding climate-related effects and inform the consideration of mitigation measures and emissions management practices.

The following list represents potential effects on the atmospheric environment:

- Increase in air pollutants and GHG emissions associated with combustion of fossil fuels from vessel and equipment activity.
- Local emissions resulting from the storage and flaring of hydrocarbons during well testing.

6.2 Fish, Fish Habitat, and Marine Plants (including Species at Risk)

Offshore oil and gas exploratory drilling could affect fish, fish habitat, and marine plants through several pathways related to physical habitat disturbance, sensory disturbance, changes in environmental quality, and broader ecosystem change. These effects may

occur as a result of project-related drilling and support activities such as routine drilling activities, support vessel operations, vertical seismic profiling, well abandonment or suspension, and through accidental events. Potential pathways include direct disturbance of the seabed, discharge and deposition of drilling wastes, underwater noise and vibration, light and vessel presence, changes to water and sediment quality, and the release of hydrocarbons or other deleterious substances (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Fish habitat in offshore environments occurs throughout the entire water column and can include a range of physical and biological features, such as benthic substrate, banks, slopes, canyons, coral and sponge aggregations, plankton communities, spawning and nursery areas, migration corridors, and foraging habitat. Marine plants and lower trophic-level organisms also support ecosystem productivity and provide food, shelter, or habitat structure for fish and invertebrate species. As a result, effects on habitat quality, benthic communities, or prey availability could also result in indirect effects on species' presence, abundance, distribution, health, behaviour, or productivity.

The nature and magnitude of potential effects would depend on several factors, including the location, timing and duration of drilling, the sensitivity of the receiving environment, the presence of species at risk or other species of conservation concern, the proximity of protected and special areas, and the degree of overlap with other marine activities and environmental stressors. Examples of special or protected areas within the Study Area, that may warrant particular attention if drilling activities overlap with them include sensitive benthic habitats, ecologically and biologically significant areas, coral and sponge concentrations, important fish habitat, migration pathways, important foraging and breeding areas, critical habitat for species at risk, or areas already affected by fishing, vessel traffic, climate change, or other offshore activities.

The following list represents potential effects on fish, fish habitat, and marine plants:

- Disturbance, alteration, destruction, smothering or removal of fish habitat, marine plants, benthic invertebrates, corals, sponges and other sensitive benthic communities due to physical seabed disturbance associated with pre-drilling seabed surveys, drilling, anchoring, wellhead installation, dropped objects, well abandonment or suspension activities.
- Injury or mortality of fish or alteration, disruption, fragmentation or destruction of fish habitat due to contamination or degradation of water, sediment and habitat quality due to routine discharges from drilling units and support vessels, including drilling fluids and cuttings, cement, deck drainage, bilge water, ballast water, sewage, grey water, cooling water, blowout preventer fluids and other liquid or solid wastes.
- Injury, harm, disturbance or mortality of fish, or changes to fish behaviour, (avoidance, attraction, altered communication, migration, spawning, foraging) due to the use of artificial lighting and emission of underwater noise and vibration from

drilling units, dynamic positioning systems, supply vessels, vertical seismic profiling, well abandonment activities and other project-related sources.

- Changes in integrity, biodiversity or ecosystem processes of nearby special and protected areas resulting from physical, chemical, acoustic, and light effects associated with offshore oil and gas exploratory drilling projects.
- Change in presence, abundance, or distribution of fish and marine plants due to the introduction or spread of aquatic invasive species through ballast water, biofouling, mobile offshore drilling units, support vessels, subsea equipment or other project-related infrastructure.
- Injury or mortality of fish or harmful alteration, disruption, fragmentation, or destruction of fish habitat due to accidental events, including spills or releases of hydrocarbons (dissolved and dispersed), synthetic-based drilling muds, fuel, chemicals, waste materials or other deleterious substances, as well as blowouts, dropped objects, equipment loss, anchor drag, contaminated sediments, collisions or structural failure.
- Potential injury or mortality of fish, particularly early life stages and small-bodied fish, due to changes to water temperature or local water quality and/or entrainment or impingement associated with seawater withdrawal and intake systems for the purposes of cooling machinery, engines and equipment.
- Potential acute, chronic and sublethal effects on fish, eggs, larvae, plankton and benthic invertebrates from exposure to operational discharges, including effects on growth, development, reproduction, condition, disease susceptibility and food-web relationships.
- Changes in benthic habitat quality, community composition and recovery caused by the spatial extent, thickness, persistence and repeated deposition of drill cuttings and associated substances, including uncertainty in model predictions and recovery trajectories.
- Effects on spawning aggregations, nursery functions, seasonal migrations and pelagic early-life-stage habitat where project timing or location overlaps sensitive biological periods or areas.
- Residual and cumulative effects on fish and fish habitat arising from multiple wells, repeated activities, suspended or abandoned well infrastructure, fisheries, vessel traffic, climate-driven ecosystem change and other past, present or reasonably foreseeable activities.
- Effects on the functions, features and attributes of identified critical habitat for aquatic species at risk, and on the ability to achieve applicable recovery objectives.

6.3 Marine Mammals and Sea Turtles (including Species at Risk)

Marine mammals and sea turtles, including species at risk that are listed under SARA or assessed by COSEWIC, may be affected by offshore oil and gas exploratory drilling through various pathways such as underwater noise and vibration, vessel activity, artificial lighting, habitat disturbance, entanglement risk, and accidental events. These pathways may result in direct injury or mortality, physiological and behavioural disturbance, displacement from habitat, or changes to important life functions such as navigation, communication, migration, breeding and foraging. The nature and magnitude of effects would depend on the species present and their sensitivity, the timing, duration and location of activities, the sensitivity of affected habitat, and the degree of overlap with important movement corridors, foraging areas, breeding areas or other important areas of seasonal or year-round use.

Underwater noise and vibration are likely to be a primary pathway of concern. Noise generated as a result of exploratory drilling can be continuous (i.e. drilling units, support vessels, dynamic positioning systems and other equipment used for well abandonment), or intermittent (i.e. vertical seismic profiling). There are various factors that will determine the extent of effects on marine mammals and sea turtles resulting from noise, including noise levels, duration of exposure, species sensitivity and proximity to the source (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020). While the potential for physical injury from routine drilling noise may be lower than for higher-intensity sound sources, behavioural effects may still occur including the potential to injure, harm, harass, or disturb marine mammals and sea turtles, or interfere with important biological functions. Potential effects may also include masking of all types of vocalizations (including communication and foraging calls), disruption of navigation, altered migration or foraging behaviour, localized avoidance, displacement from otherwise suitable habitat, or reduced habitat quality. Cumulative exposure to multiple sources of noise can also exacerbate the effects discussed.

Project-related vessel activity may also increase the risk of injury or mortality from vessel strikes. This risk may be greater where vessel routes or drilling locations overlap with areas used by marine mammals and sea turtles that may be present at or near the surface. Vessel traffic may also contribute to disturbance through underwater noise, including physical presence and changes in movement patterns of marine mammals and sea turtles, as well as the effects from noise discussed previously. Effects from vessels are expected to be more likely where repeated transits occur between shore bases and offshore drilling locations, however, the extent of effects will depend on project specific vessel operations (i.e. vessel routes, transit frequency, vessel speed, route changes etc.), as well as seasonal species occurrence.

Artificial lighting associated with drilling units, support vessels and other project activities can affect day-night cycles, spawning, and predator-prey dynamics and may create an additional sensory disturbance pathway. Immediate changes in the project area may alter planktonic behaviour near to the source of light, and local and regional changes may

disorient migratory species which could lead to changes to food webs, productivity and food distribution, as well as influence prey behaviour, alter migration and foraging patterns, disrupt predator–prey interactions, and navigation. These effects may be more relevant during periods of low visibility, night-time activity, or seasonal movements through the project area.

Habitat-related effects may occur where project activities alter, disrupt or reduce the quality of habitats used by marine mammals and sea turtles. Although offshore exploratory drilling does not generally involve the same scale of permanent infrastructure as some other marine developments, habitat effects could still arise from anthropogenic noise and vessel presence (both discussed above), operational or accidental discharges including release of contaminants and deleterious substances, localized seabed disturbance (i.e. drill cuttings dispersal or cuttings with residual synthetic-based drill mud), changes in prey availability and abundance, or other project-related disturbances. These effects may be of greater concern where activities overlap with important foraging habitat, migration corridors, breeding areas, SARA critical habitat, or other areas used by species at risk.

Accidental events could result in more serious effects on marine mammals, sea turtles and their habitat. Structural failure, spills, leaks, leachates, blowouts or releases of hydrocarbons, chemicals or other deleterious substances could cause injury or mortality, contaminate habitat or prey, reduce habitat quality, or displace individuals from affected areas. The severity of effects would depend on the type and volume of material released, the location and timing of the event, oceanographic conditions, species present, and the effectiveness of response and recovery measures (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

For sea turtles in particular, accidental oil releases can affect them through external oiling, which may restrict movement, cause exhaustion and increase susceptibility to predation and temperature extremes, and through ingestion of oil or contaminated prey and water, which may cause toxic effects or mortality (Mitchelmore et al., 2017; NOAA Fisheries, 2026). Physiological stress and altered hormone concentrations have also been documented in rescued oiled turtles, although these observations reflect exposure to multiple stressors, including oiling, capture and transport (Innis et al., 2024). Where substantial mortality occurs, population recovery may be prolonged because sea turtles mature slowly, while the long-term health effects of oil exposure on surviving individuals remain uncertain (NOAA Fisheries, 2026).

The following list represents potential effects on marine mammals and sea turtles:

- Injury, harm, harassment or disturbance of marine mammals and sea turtles including behavioural changes (e.g., disrupted navigation, communication, migration, breeding, foraging), and/or harmful alteration or destruction of their habitat due to underwater noise and vibration from drilling units, dynamic positioning systems, vertical seismic

profiling, support vessels, well abandonment activities and other project-related noise sources (e.g. helicopters).

- Injury, harm, harassment, disturbance or mortality of marine mammals and sea turtles from vessel strikes due to vessel activity during project activities.
- Disruption of life history functions (e.g. navigation, migration, spawning, foraging breeding), communication, and/or changes to habitat quality due to the use of artificial lighting during project activities.
- Injury, harm or mortality or harmful alteration, disruption, or destruction of marine mammal or sea turtle habitat due to accidental events, including spills or releases of hydrocarbons, synthetic-based drilling muds and drill cuttings, fuel, chemicals, waste materials or other deleterious substances, as well as blowouts, dropped objects, equipment loss, anchor drag, collisions or structural failure.

6.4 Aerofauna (including Species at Risk)

Adverse effects on birds and bats will be an important consideration for offshore oil and gas exploratory drilling projects. The presence of migrating, foraging or breeding aerofauna in the project area may interact with mobile offshore drilling units, support vessels, or other project-related activities. There are known data gaps on species distribution, abundance, and movement in the Study Area, and key time periods for birds and bats.

Several pathways may result in adverse effects on aerofauna during offshore exploratory drilling, including artificial lighting, noise, vessel activity, aircraft activity, infrastructure presence, and accidental events. Birds and bats may be attracted to or disoriented by lighting from mobile offshore drilling units and support vessels, particularly during periods of poor visibility, fog, precipitation, or nocturnal migration. This attraction may increase the potential for collisions, strandings, exhaustion, or altered movement patterns (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Project-related noise, vessel and aircraft traffic, and the presence of offshore infrastructure may also disturb birds and bats by altering normal movement, migration, foraging, breeding, or resting behaviour. Low flying aircraft can affect breeding and foraging birds (on areas such as Sable Island), and aircraft passing over nesting colonies can cause birds to panic, leave their eggs and young unprotected from predators and deplete their energy reserves. These effects may be particularly relevant where drilling activities overlap with migration corridors, offshore feeding areas, staging areas, colonies, or areas used by species at risk or species of conservation concern.

Accidental events may also pose risks to aerofauna. Spills, leaks, releases of deleterious substances, structural failures, or vessel-related incidents could result in direct injury or mortality, contamination of habitat, contaminated or reduced prey availability. Oil exposure

can be particularly harmful to seabirds because it can affect feather waterproofing, thermoregulation, buoyancy, mobility, and survival. Depending on the scale, timing, and location of an event, effects could extend beyond the immediate drilling area and affect sensitive habitats or important bird-use areas.

Special and protected areas are also an important consideration for this VC. Offshore exploratory drilling could affect the ecological integrity or conservation value of areas used by birds and bats, including colonies, migration corridors, offshore foraging areas, staging areas, marine protected areas, marine refuges, ecologically and biologically significant areas, and other sensitive areas. These areas may require additional consideration during project planning, including siting decisions, timing restrictions, lighting management, monitoring, emergency response planning, and follow-up programs.

Any potential effects due to oil and gas exploratory drilling (such as attraction to lighting and flaring, collisions with infrastructure and vessels, malfunctions and accidents and cumulative effects) that impact sensitive species that occur in the Study Area (e.g. Roseate tern, Leach's Storm-petrel, and Ipswich sparrow), could be especially harmful to those species as their populations are already facing sharp declines. This is particularly true for species whose behaviours increase their vulnerability to certain effects, such as the Leach's Storm-Petrel, whose nocturnal activities make the species highly susceptible to disruption from artificial lighting at night (Montevecchi et al., 2025). In addition, migratory landbirds may also be particularly sensitive to potential project effects. Although landbirds do not breed in offshore marine environments, many species migrate through the Study Area, use coastal islands (such as Sable Island) to feed and rest during migration, and regularly traverse offshore airspace during seasonal movements. Given Nova Scotia's geographic position on the Atlantic coast and the need for many migratory birds to undertake open-water crossings to migrate to and from the mainland, the airspace over the study area represents an important ecological feature for migratory landbirds. The consequences of potential effects of attraction, disorientation, or altered flight paths on these landbird species while undertaking offshore migratory movements, where opportunities to rest and refuel are limited, could be particularly harmful. The same is true for migratory shorebirds, including sensitive species such as Red Knot and Lesser Yellowlegs, who rely on offshore areas like Sable Island as a critical stopover location during migration periods.

The following list represents potential effects on aerofauna:

- Injury, harm or mortality of birds and bats due to vessel strikes or strandings associated with increased vessel activity during project activities.
- Changes to behaviour of birds and bats, including altered movement patterns, disrupted foraging, migration, breeding, nesting, increased collision risk, and disrupted foraging or migration due to attraction to artificial lighting during project activities and the presence of infrastructure and increased vessel activity.

- Changes to behaviour or injury, harm or mortality of birds and bats, particularly during periods of reduced visibility (e.g. fog), due to flaring during project activities.
- Changes to behaviour of birds and bats, including physiological stress, altered movement patterns and disrupted foraging or migration due to noise-generating activities during project activities.
- Disturbances to the behaviour of breeding, nesting and foraging birds due to increased aircraft traffic (e.g. helicopters) related to project activities.
- Injury, harm or mortality or harmful alteration, disruption, or destruction of aerofauna habitat due to accidental events, including spills or releases of hydrocarbons, synthetic-based drilling muds, fuel, chemicals, waste materials or other deleterious substances, as well as blowouts, collisions or structural failure.
- Loss of integrity, biodiversity or ecological function of important or sensitive areas for birds and bats, including colonies, migration corridors, offshore feeding areas, staging areas, marine protected areas, marine refuges, ecologically and biologically significant areas, and other special areas, due to sensory disturbance, vessel traffic, aircraft activity, discharges, spills or cumulative effects.
- Injury, disturbance, displacement or reduced effective habitat use due to cumulative acoustic exposure from project and non-project sources, including masking and temporary or permanent hearing effects, where applicable.
- Changes in foraging success, distribution, health or habitat use resulting from project-related effects on prey abundance, distribution, quality or availability.

6.5 Indigenous Peoples and Indigenous Rights

The IAA affirms the Government of Canada's commitment to ensure respect for the rights of Indigenous Peoples in Canada recognized and affirmed by section 35 of the Constitution Act, 1982. These rights may include, among others, rights related to harvesting, access to lands, waters and resources, the exercise of cultural practices, and the continuation of Indigenous ways of life.

As the Crown consultation lead for projects designated under the IAA, IAAC assesses potential impacts of the designated project on the exercise of Aboriginal and treaty rights of Indigenous Peoples. This assessment should be informed by Indigenous Knowledge, community perspectives, and information provided by potentially affected Indigenous groups, where available and with appropriate consent. Early engagement and collaboration with Indigenous groups should be performed to understand how rights may be exercised in the Study Area, how activity-related changes may affect those rights, and what measures could be implemented to avoid, reduce, mitigate, or accommodate potential impacts.

While potential effects on Indigenous Peoples are discussed in the following sections, potential impacts on the pathways through which those effects on the environment, health, social conditions, culture, or the economy could affect the exercise of rights, and characterize the nature, extent, duration, frequency, and significance of those impacts are dependent on the specific project context and location.

Proponents should refer to IAAC's Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples, Policy Context: Assessment of Potential Impacts on the Rights of Indigenous Peoples, and IAAC's Indigenous Advisory Committee Principles to Guide the Assessment of Impacts to Indigenous Inherent and Treaty Rights. These documents provide guidance on conducting rights-impact assessments, engaging with Indigenous groups, and incorporating Indigenous perspectives and Knowledge into the assessment process.

The following sections identify categories and examples of the kinds of effects on Indigenous Peoples that should be considered in the context of offshore oil and gas exploratory drilling projects, bearing in mind that these are broad categories and that Indigenous groups themselves are best placed to identify how a specific project might impact them or their rights.

6.5.1 Potential effects on current use of lands and resources for traditional purposes, physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance

Offshore oil and gas exploratory drilling projects have the potential to impact Indigenous use of lands, waters, and resources for traditional purposes, as well as physical and cultural heritage, particularly for Indigenous groups whose cultural practices and identity are closely connected to marine and coastal environments.

Relevant interactions and activities that could lead to potential impacts include, access restrictions, seabed disturbance, vessel and equipment activity, artificial lighting, noise and vibration, underwater sound, and accidents or malfunctions. Potential impacts from project activities could lead to changes to the availability of culturally important species as well as access to areas used for traditional activities. In addition, environmental changes associated with project infrastructure may influence cultural and spiritual practices both on land and at sea. These changes may affect access to lands, waters, and resources used for traditional purposes in the past, present, or future, alter the availability or quality of culturally important resources, influence cultural or spiritual experiences associated with particular places, or affect physical and cultural heritage resources. There may also be

risks to archaeological resources and culturally significant sites in marine and coastal areas.

The following list represents potential effects on the current use of lands, water and resources for traditional purposes by Indigenous Peoples, physical and cultural heritage, and structures, sites, or things of significance:

- Changes in the availability, abundance, distribution, quality, or perceived quality of marine species local to an activity area that are used for food, social, ceremonial, or traditional purposes e.g., Atlantic lobster, Atlantic salmon, Kataq (American eel), and Wipitamekw (shark) affecting Indigenous identity, way of life, knowledge transmission, and community well-being due to accidents and malfunctions including spills.
- Temporary loss of, or reduced access to lands, waters and resources used for traditional purposes due to safety restrictions, vessel and/or fishing gear incompatibilities, vessel traffic or increased liability and insurance costs during project activities.
- Changes to the experience and practice of cultural and spiritual, ceremonial, or land- and water-based activities affecting practices on land and at sea, and changes to Indigenous identity, way of life, knowledge transmission, and community well-being, due to soundscape, visual, or other sensory changes to the environment.
- Damage to, disturbance of, or restricted access to physical and cultural heritage resources, archaeological and culturally significant places due to project activities.

Offshore oil and gas exploratory drilling projects have the potential to affect Indigenous use of lands, waters, and resources for traditional purposes, as well as physical and cultural heritage, particularly for Indigenous groups whose cultural practices and identity are closely connected to marine and coastal environments. However, these take place in the offshore environment and potential effects on traditional use are therefore anticipated to be limited. Nevertheless, the assessment of potential interactions and effects should consider the specific project location and any associated activities in coastal communities.

Seabed disturbance, vessel and equipment activity, artificial lighting, noise and vibration, and accidents or malfunctions may affect culturally important species, alter access to and the experience of areas used for traditional activities, disrupt cultural and spiritual practices, and damage or disturb archaeological resources and culturally significant sites.

Spills and other project-related disturbances may change the availability, abundance, distribution, quality, or perceived quality of marine species used for food, social, ceremonial, or traditional purposes, including Atlantic lobster, Atlantic salmon, Kataq (American eel), and Wipitamekw (shark). Safety restrictions, incompatibility between vessels and fishing gear, vessel traffic, and increased liability or insurance costs may

temporarily prevent or reduce access to lands, waters, and resources used for traditional purposes in the past or present, or intended for future use.

Changes to soundscapes, views, and other sensory aspects of the environment may alter the experience and practice of cultural, spiritual, ceremonial, and land- and water-based activities, including connections to particular places on land and at sea. Together, changes to culturally important resources, access, and cultural experiences may affect Indigenous identity, way of life, knowledge transmission, and community well-being. Project activities may also damage or disturb physical and cultural heritage resources, including archaeological and culturally significant places, or restrict access to them.

6.5.2 Potential effects for health, social and economic conditions

Health, social and economic conditions are interconnected and may be influenced by changes to the environment, access to lands and resources, community dynamics, cultural practices, and opportunities for participation in economic activities. For Indigenous Peoples, these conditions may also be closely linked to the exercise of Indigenous rights, cultural continuity, food systems, traditional economies, and community well-being.

Offshore oil and gas exploratory drilling projects could result in potential effects to the health, social, and economic conditions through a variety of pathways. These may include changes in access to lands, waters and resources used for commercial, traditional or cultural purposes; changes to marine species and ecosystems that support Indigenous livelihoods and food systems; changes in employment, business and procurement opportunities; changes in population and workforce dynamics; and changes to the visual, acoustic and sensory environment. These pathways may result in both adverse and positive effects, depending on the project context and the circumstances of individual Indigenous groups.

Changes to marine species and ecosystems, together with restrictions or disruptions to commercial fishing, may reduce income, and economic opportunities in the fishing industry for Indigenous people. These temporary disruptions are most likely to occur as a result of safety zones and restricted access to fishing grounds at the location of drilling activities. Conversely, offshore oil and gas drilling projects may create employment, contracting, procurement, and ownership opportunities, although real or perceived employment barriers and insufficient access to training may contribute to social inequities and marginalization.

Although the work takes place in the offshore area, there may be temporary interactions with project workforces that may affect community well-being. Although unlikely, this effect should still be considered prior to initiating new projects. Changes to the visual, acoustic,

and sensory environment that influence health and social conditions are not likely to occur due to distance of activities from coastal communities.

Accidental spills, leachates, leaks, or other releases may introduce or mobilize contaminants that affect fish and other foods, with potential consequences for physical and mental health when contaminated foods are consumed. Real or perceived changes in the availability, accessibility, quality, or safety of traditional foods, including those resulting from environmental changes, restricted access to harvesting areas, or concerns about contamination, may also reduce food security and sovereignty.

In summary, the following list represents potential effects on the health, social, and economic conditions of Indigenous Peoples:

- Reduced employment, income and economic opportunities in the fishing industry due to loss of, or reduced access to fish stocks (e.g., safety zones, vessel or fishing gear incompatibilities, increased travel times, fishing gear loss).
- Reduced economic opportunities for Indigenous-owned businesses due to changes in access to lands, waters or resources used for tourism, recreation, harvesting or other economic activities. Increased social inequities and marginalization due to real or perceived employment barriers, or lack of training.
- Increased potential offshore oil and gas exploratory drilling-related economic opportunities, including employment contracts for the proposed drilling projects.
- Changes to community well-being due to temporary or permanent changes to population, and workforce interactions.
- Reduced physical and mental health and overall well-being due to ingestion of fish or other foods contaminated by the release and mobilization of contaminants from accidental spills, leachates, leaks or releases of other deleterious substances during project activities.
- Decreased food security and sovereignty due to real or perceived changes in the availability, accessibility, quality, or safety of traditional foods due to project-related environmental changes, changes in access to harvesting areas, or concerns regarding contamination.

6.6 Commercial Fisheries

Fisheries are an important VC for the RA because the Study Area supports commercial, Indigenous, communal commercial, recreational, research fisheries, and environmental monitoring surveys that may overlap spatially or temporally with offshore exploratory drilling activities. Potential interactions may occur during routine drilling activities, support vessel transits, well abandonment or suspension, and accidental events. Key pathways of effect include temporary access restrictions, displacement from fishing areas, interference

with fishing operations, damage to fishing gear, changes in the availability or quality of fisheries resources, and disruption to scientific surveys that support fisheries management.

Potential effects on fisheries are expected to relate primarily to temporary loss of access to fishing areas and resources due to the presence of safety zones around mobile offshore drilling units, support vessels, subsea equipment, or other project-related activities. These restrictions may require harvesters to avoid established fishing areas, alter fishing routes, relocate gear, increase travel distances, or compete with other vessels in alternative fishing grounds. Such disruptions could result in lost fishing time, reduced catch opportunities, increased operating costs, and decreased revenue, particularly where project activities overlap with high-value fishing areas, seasonal openings, or areas with limited alternative fishing opportunities (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Indirect effects on fisheries may occur if exploratory drilling activities affect fish habitat, fish behaviour, stock productivity, or the quality and availability of harvested resources. Routine project activities, such as underwater noise, operational discharges, drill cuttings deposition, vessel activity, and localized seabed disturbance, may influence fish distribution, catchability, or habitat use. Effects may be of greater concern where activities overlap with key biological areas, spawning or nursery areas, critical habitat, or areas that support commercially, culturally, or ecologically important species. Although effects from an individual exploratory well may be temporary and localized, uncertainty may remain where effects overlap with sensitive habitats, presence of species at risk, cumulative pressures, or important fishing areas (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Accidental events represent a potentially more serious pathway for fisheries effects. Spills or releases of hydrocarbons, synthetic-based drilling muds, fuel, chemicals, leachates, waste materials, or other deleterious substances could result in fisheries closures, gear contamination, reduced product quality or marketability, lost access to harvest areas, compensation claims, and longer-term concerns regarding fishery resources. The severity of effects would depend on the type and volume of material released, the location, duration and timing of the event, oceanographic conditions, species and fisheries present, and the effectiveness of prevention, response, communication, and recovery measures. It should also be noted that even where a spill or release is relatively small in scale and/or is contained quickly and effectively, effects on commercial, recreational, and Indigenous fisheries may still occur. Perceptions regarding the safety, quality, or desirability of seafood products can result in reduced consumer confidence, market disruptions, changes in buyer behaviour, and reputational impacts for affected fisheries and seafood harvesting regions. Such effects may arise even in the absence of measurable impacts to harvested species or seafood quality. Depending on the nature of the incident, the effectiveness of communications and response measures, and market conditions, these

socio-economic and reputational effects may be short-term or may persist beyond the period of environmental and fisheries recovery (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Overall, potential effects on fisheries would depend on the location, timing, duration, and scale of exploratory drilling activities; the type of fishery involved; the availability of alternative fishing grounds; the presence of fixed or mobile gear; and the degree of overlap with important fishing areas, survey areas, or sensitive fish habitat.

The following list represents potential effects on fisheries:

- Decreased revenue from reduced catch and fishing opportunities, including competition among vessels, due to displacement from harvest areas associated with safety zones around drilling units, support vessels or other project related activities.
- Increased operational, liability or insurance costs due to disruptions including longer travel times and reduced or restricted access to harvesting areas.
- Decreased revenue and/or increased costs resulting from accidental events, including spills or releases of hydrocarbons, synthetic-based drilling muds, fuel, chemicals or other deleterious substances, which could result in fisheries closures, gear contamination, lost access, reduced product quality, compensation claims, or longer-term effects on fishery resources.

6.7 Other Ocean Users

Other ocean users include marine and airspace activities that may overlap with offshore oil and gas exploratory drilling but are not addressed in other VC sections. These may include commercial shipping, passenger ferries, search and rescue operations, national defense activities, aviation, marine research, fisheries and environmental monitoring, aquaculture, tourism, recreation, transportation routes to and from Sable Island National Park Reserve for working personnel and supplies via air and water that could impact operations, and other coastal or offshore uses. Because the Study Area supports multiple activities, potential effects on other ocean users are an important consideration in project planning and regulatory review.

Potential project effects on other ocean users are expected to relate primarily to temporary access restrictions (e.g. establishment of safety zones), changes in vessel routing, increased marine traffic, and radio communications associated with drilling units and support vessels. Safety zones around mobile offshore drilling units, or other project-related activities may require vessels to alter routes, avoid certain areas, or coordinate movements with project operators. These changes could increase travel time, fuel use, operational costs, and navigational complexity, particularly where drilling activities overlap

with established shipping routes, ferry routes, or areas of higher marine traffic (CNSOPB, 2022; Regional Assessment Committee, 2020).

Exploratory drilling activities may also have implications for marine and airspace safety. The presence of drilling units, support vessels, aircraft, and associated safety zones may affect vessel and aircraft navigation, including during search and rescue operations. Routing changes, communication protocols, avoidance of drilling areas, and increased vessel traffic could create additional coordination requirements for operators, regulators, search and rescue agencies, and other marine users. These effects would depend on the location and timing of activities, the density of existing traffic, the proximity of established navigation routes, and the effectiveness of marine communication and notification procedures.

Other ocean users may experience changes in their use or perception of coastal and offshore areas as a result of offshore exploratory drilling activities. While exploratory drilling is temporary and localized, and unlikely to affect viewscapes, concerns regarding environmental effects, marine wildlife interactions, and the risk of accidental spills may influence public perceptions of marine industries and coastal communities. Commercial fisheries, aquaculture operations, tourism operators, recreational users, and Indigenous harvesting activities may also experience disruptions where exploration activities, safety exclusion zones, vessel traffic, or accidental events overlap spatially or temporally with existing uses of the marine environment.Marine research, environmental monitoring, fisheries science surveys, and academic studies may also experience temporary disruption where project activities restrict access to sampling areas, require changes to survey design, or introduce disturbance from vessel traffic, underwater noise, or operational activities. Interference with long-term monitoring or established survey stations may be particularly important where data are used to support fisheries management, conservation planning, climate research, or regional environmental monitoring.

Overall, effects on other ocean users would depend on the location, timing, duration, and scale of project activities; the proximity of drilling activities to shipping lanes, ferry routes, aquaculture sites, research areas, tourism areas, search and rescue routes; and the degree to which project planning incorporates early communication and coordination.

The following list represents potential effects on other ocean users:

- Increased operational costs due to disruption in marine shipping and passenger ferry routes and national park operations during project activities resulting from restricted navigational access through safety zones.
- Disruption in aircraft and vessel navigation and subsequent safety concerns due to safety zones, vessel routing, communications requirements or avoidance of drilling areas, particularly during search and rescue operations.

- Effects on tourism, recreation or coastal community interests due to perceived industrialization of offshore areas, concerns about spills, effects on marine wildlife, or reputational impacts to marine-based tourism and coastal economies.
- Interference and impacts to marine research, environmental/oceanographic monitoring, fisheries science surveys or academic studies due to:
    - restricted access to sampling areas and displacement by infrastructure;
    - impacts to statistical survey design, including re-design of survey strata and/or sampling density;
    - increased vessel transits around exclusion zones and vessel traffic, resulting in lost sampling time; and
    - changes in habitat use by fish species, including changes in species ranges and abundance.
- Exclusion zones resulting from offshore oil and gas platforms and the presence of support vessels may alter scientific survey sampling design and or sampling density, resulting in increased uncertainty and/or bias in indicators and derived science advice, particularly in areas of relevance to fisheries management.

6.8 Health, Social and Economic Environment

Offshore oil and gas exploratory drilling may affect health, social and economic conditions through interactions with coastal communities, Indigenous people, ports, fisheries, tourism, and marine research activities. Project-related use of ports for the transportation of personnel, equipment, supplies and waste could increase activity within existing port facilities and create congestion or conflicts with commercial, recreational and other users. At the same time, project spending and demand for accommodations, transportation and other local services could provide temporary economic opportunities for some businesses and communities.

Human health effects could occur if project activities disturb contaminated seabed or shoreline sediments or if accidental spills, chemical releases or marine debris enter the marine environment. Disturbance may release or mobilize contaminants such as arsenic, heavy metals, hydrocarbons, organotin compounds, polychlorinated biphenyls and pesticides. These substances could affect human health if they accumulate in fish, shellfish or other marine species that are subsequently harvested and consumed. The potential for such effects would depend on the location and extent of disturbance, the contaminants present, exposure pathways, and the effectiveness of prevention and response measures.

Effects on fish, fish habitat, harvesting access or the perceived quality and safety of seafood could also have broader economic and social consequences. Reduced harvesting opportunities, fisheries closures, contamination concerns or changes in the availability of important species could affect fishing income and the availability of locally harvested

foods. These changes may contribute to food security and food sovereignty concerns, particularly for communities that depend on marine harvesting for food, livelihoods and social or cultural well-being.

Fisheries and aquaculture are intrinsically tied to food security in the region. If the industry is negatively impacted because of direct or indirect impacts from the offshore oil and gas exploration activities, the population will be more susceptible to food insecurity with the potential of seafood scarcity, higher prices, or poorer quality. Rural and small-scale fishery communities would be more vulnerable to these impacts and potential offshore displacement and limited access to fishing areas (Andrews et al., 2021).

Contamination and oil spills can lead to food safety concerns and interruption of fishing activities for an indetermined time. Even after clean-up when fishing returns to safe conditions, prices can be affected, and population perspective and trust in food quality are difficult to predict, implying economic uncertainty for the seafood industry.

Tourism could experience negative economic effects should access to tourist destinations be restricted, or accommodation for tourists becomes unavailable due to increased presence of workforce in local areas. Concerns regarding spills, effects on marine wildlife, increased industrial activity or changes to the character of coastal and offshore areas could reduce demand for some tourism and recreational activities. Conversely, project-related travel and spending may create opportunities for accommodation, hospitality, transportation, and other local service providers. Exploratory drilling activities may also interfere temporarily with oceanographic and fisheries surveys by restricting access to survey areas, delaying fieldwork or requiring changes to survey design. Such interference could affect the collection of information used for fisheries management, ocean research, and long-term environmental monitoring.

The following list represents potential effects on health, community and economy:

- Potential for user conflicts through increased use of ports while also an increase revenue from port calls.
- Seabed disturbance from project activities may impact human health through the release and mobilization of contaminants, including arsenic, heavy metals, oil, organotin, polychlorinated biphenyls (PCBs), and pesticides.
- Economic impacts on communities resulting from decreased tourism.
- Positive economic impacts on communities resulting from vessel and crew supply needs.
- Impacts to human health due to chemical spills or marine debris from project vessels, equipment and activities if contaminated fish or other marine species are consumed.
- Decreased food security and sovereignty due to real or perceived changes in the availability, accessibility, quality, or safety of sea foods due to project-related

environmental changes, changes in access to harvesting areas, or concerns regarding contamination.

- Potential impacts to oceanographic and/or fishery surveys that support ongoing ocean research and monitoring programs.

6.9 Protected and Special Areas

Several marine and coastal areas (e.g., Sable Island) in the Study Area are legally protected under federal, provincial, or other legislation or agreements due to their ecological, historical or socio-cultural characteristics and importance. These areas have been formally identified as being special or sensitive through other relevant processes and initiatives, such as Conservation Agreements[15]. The variety of areas is substantial, ranging from MPAs, which receive maximal protection under federal law (e.g., Oceans Act), to areas identified for specific species conservation, such as fish, birds and mammals, or specific habitats, with varying levels of protection. Information regarding protected and special places is provided in Section 5.2.6.

Changes to the environment as a result of offshore oil and gas activities and their potential resulting effects on identified protected and special areas may be both direct and indirect in nature. The conduct of oil and gas exploration activities directly within[16] or near such areas may, for example, have particularly adverse implications for these locations and their important and defining ecological and sociocultural characteristics. Biophysical effects resulting from oil and gas exploration or other human activities may also spread to adjacent special areas by affecting the actual or perceived water quality and marine fish, birds, mammals or other components that move to and through these areas. Any resulting decrease in the integrity of these areas in the short or long term may also affect their ecological or societal importance, use, and value.

Important marine foraging areas extend beyond the boundaries of many protected and special areas, such as Sable Island National Park Reserve, and recent studies have shown that seabirds, such as Common, Arctic, and Roseate Terns, may regularly forage at considerably greater distances from breeding colonies (up to approximately 50 km

[15] *Species at Risk Act*, s. 11 (1) A competent minister may, after consultation with every other competent minister, and with the Canadian Endangered Species Conservation Council or any of its members if he or she considers it appropriate to do so, enter into a conservation agreement with any government in Canada, organization or person to benefit a species at risk or enhance its survival in the wild.

[16] Restrictions on activities within or adjacent to protected and special areas vary by designation and site-specific requirements (see Section 5.2.6). Oil and gas exploration is prohibited in most new federal MPAs, While marine refuges do not automatically prohibit drilling; proposed activities are assessed case by case to determine whether they would compromise conservation outcomes. EBSAs are non-regulatory designations and do not themselves prohibit drilling.

around important tern colonies) than assumed in previous regional assessments (Lamb et al., 2026).

Sable Island National Park Reserve and the Sable Island Migratory Bird Sanctuary play a particularly unique ecological role within the Study Area. This area is a sensitive receptor for project-related effects and accidental events, should they occur. Sable Island provides migratory bird habitat, seabird nesting habitat, freshwater wetlands, dune ecosystems, and habitat for species at risk in an exposed, isolated, and vulnerable location offshore within the Study Area. As discussed in section 6.4, Sable Island provides critical stopover habitat for aerofauna to rest and refuel. Due to its location offshore and with the surrounding prevailing currents, Sable Island could be highly impacted, with consequences for all its associated biodiversity, should an accidental event, such as a major spill occur. An accidental release leading to oil reaching Sable Island could result in beach oiling and shoreline contamination, with associated effects on ecological integrity, aerofauna, marine mammals, and species at risk occurring on, and around, the island.

The following list represents potential effects on special and protected areas:

- Loss of integrity, biodiversity or ecological function of special and protected areas due to drilling-related disturbance, operational discharges, artificial lighting, underwater noise, vessel traffic, accidental events or cumulative effects.
- Disturbance or degradation of sensitive benthic habitats, including coral and sponge areas, banks, slopes, canyons, spawning areas, nursery areas, and other ecologically important habitats.
- Long, and short-term effects from accidental events, including spills, blowouts, dropped objects, collisions or equipment failure, which could affect protected species, sensitive habitats, ecological processes or conservation.

6.10 Accidents and Malfunctions

Accidents and malfunctions are unplanned events that could occur during exploratory drilling, well testing, vessel and aircraft support activities, and well suspension or abandonment. Potential scenarios include fire or explosion; hazardous gas releases; vessel or aircraft incidents and collisions; dropped objects or equipment; loss of station-keeping, stability or structural integrity of a mobile offshore drilling unit; impairment of systems or equipment that are critical to safety or environmental protection; accidental releases of fuel, lubricants, hydraulic fluids, drilling fluids, chemicals or waste; and loss of well control. Although a major spill or blowout is unlikely, it remains a credible worst-case event because it could produce effects of greater magnitude, duration and geographic extent than smaller operational incidents (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Accidental releases may range from small leaks during maintenance, storage or transfer to larger batch spills from a drilling unit, support vessel or well. Potential release points include hoses, pipes, connections, flanges, valves and storage tanks; refueling or bulk-transfer systems; and marine risers, flex joints or blowout-preventer-related systems. Vessel collisions, structural or equipment failures, dropped objects and emergency disconnections could also release hydrocarbons, drilling fluids or debris into the marine environment. The fate and geographic extent of a release would depend on the substance and volume released, its release depth, rate and duration, the time of year, meteorological and oceanographic conditions.

Physical and environmental conditions can also initiate, worsen or complicate an accidental event. High winds and waves, strong currents, fog or low visibility, icing, severe storms, geohazards and seabed instability may affect station-keeping, structural loads, vessel and aircraft safety, transfer operations, evacuation, and the deployment and effectiveness of response equipment. Some conditions, however, may lead to quicker dispersion and break up of a spill. For example, a surface sheen from a small spill will break up and degrade faster in higher wind and wave scenarios.

The potential environmental consequences of an accident or malfunction would depend on the type, location, timing and duration of the event, the material released, the environmental conditions at the time, and the effectiveness of prevention and response measures. Hydrocarbons or other deleterious substances could cause injury or mortality to fish, eggs and larvae, benthic organisms, aerofauna, marine mammals and sea turtles or contaminate habitat or prey species. Aerofauna and other species that spend time at or near the sea surface may be particularly vulnerable to direct oiling, while less mobile organisms and sensitive early life stages may be unable to avoid affected areas (CEAA, 2015, 2018; CNSOPB, 2022; Regional Assessment Committee, 2020).

Accidental events could also have social, cultural and economic consequences. These may include temporary fisheries or harvesting closures; loss of access to fishing areas; contamination or damage to fishing gear, vessels, aquaculture facilities or harvested resources; reduced fishing income and efficiency; and concerns regarding seafood safety, quality and marketability. Effects on commercial, recreational and Indigenous fisheries for food, social and ceremonial fishing could have broader implications for community well-being, traditional resource use, food security and food sovereignty. Past federal impact assessment and regulatory review processes for offshore exploratory drilling in Nova Scotia identified persistent concerns regarding the consequences of accidents and malfunctions, particularly low-probability, high-consequence events such as subsea well blowouts. Indigenous communities, commercial fishers, and other stakeholders questioned whether emergency response measures could effectively contain and mitigate a major spill in a timely manner, given the reliance on specialized well-control equipment, including capping stacks, that would need to be mobilized from outside Atlantic Canada. Concerns were raised that response times could extend for several days or weeks

following a blowout, potentially increasing the duration and extent of environmental effects. Stakeholder concerns regarding accidents and malfunctions have been reinforced by actual operational incidents, including the 2018 unauthorized discharge of drilling mud during the Scotian Basin Exploration Drilling Project. Although subsequent investigations concluded that environmental effects were limited and operations resumed following corrective actions, the incident contributed to public and stakeholder scrutiny of spill prevention, incident response, and regulatory oversight measures.

Accidental releases may also affect tourism, marine transportation, scientific surveys and other ocean uses, particularly if an event reaches or is perceived to threaten coastal areas, important fisheries or protected and special areas. Should a spill occur, there would be a high likelihood of significant beach oiling and impacts to marine mammals and aerofauna occupying Sable Island National Park Reserve given its location within the Study Area and prevailing currents, even if the spill is over 100kms away.

6.11 References

Canadian Environmental Assessment Agency. (2015). Shelburne Basin Venture Exploration Drilling Project: Environmental assessment report. Government of Canada. https://iaac-aeic.gc.ca/050/documents/p80058/101799E.pdf

Canadian Environmental Assessment Agency. (2018). Scotian Basin exploration drilling project: Environmental assessment report. Government of Canada.

CNSOPB. (2022). Strategic Environmental Assessment: Middle and Eastern Scotian Slope and Sable Island Bank Areas. CNSOER. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_sea_26_may_2022_1.pdf

Innis, C. J., Graham, K. M., Stacy, N. I., Stacy, B. A., & Burgess, E. A. (2024). Endocrine data provide further evidence of physiologic derangement in sea turtles affected by the Deepwater Horizon oil spill. Endangered Species Research, 53, 533–545. https://doi.org/10.3354/esr01323

Lamb, J. S., Yakola, K., Lyons, D. E., & Paton, P. W. C. (2026). Evaluating high resolution offshore movements of marine birds: Will Common Terns (Sterna hirundo) act as a surrogate species for the sympatric endangered Roseate Tern (Sterna dougallii)? Animal Biotelemetry. Advance online publication. https://doi.org/10.1186/s40317-026-00484-y

Mitchelmore, C. L., Bishop, C. A., & Collier, T. K. (2017). Toxicological estimation of mortality of oceanic sea turtles oiled during the Deepwater Horizon oil spill. Endangered Species Research, 33, 39–50. https://doi.org/10.3354/esr00758

Montevecchi, W., S. Henry, M. Aikens, K. d'Entremont, L. McFarlane-Tranquilla and J. So. (2025). Seabird Attraction to Anthropogenic Light with Special Emphasis on Offshore Platforms, Vessels, and Leach's Storm-Petrels. Environmental Studies Research Fund Report No. 223. St. John's, NL. 64 p. https://www.esrfunds.org/sites/esrf/files/2026-03/esrf_technical_report_223_-_seabird_attraction_to_light.pdf

NOAA Fisheries. (2026, February 17). Sea turtles, dolphins, and whales—10 years after the Deepwater Horizon oil spill. https://www.fisheries.noaa.gov/national/marine-life-distress/sea-turtles-dolphins-and-whales-10-years-after-deepwater-horizon-oil

Regional Assessment Committee. (2020). Regional assessment of offshore oil and gas exploratory drilling east of Newfoundland and Labrador: Final report. Impact Assessment Agency of Canada. https://iaac-aeic.gc.ca/050/documents/p80156/134068E.pdf

7 Mitigation, Monitoring, and Follow-up

7.1 Mitigation

Under the IAA, mitigation measures are measures to eliminate, reduce, control or offset adverse effects within federal jurisdiction, direct or incidental adverse effects or adverse environmental effects, and includes restitution for any damage caused by those effects through replacement, restoration, compensation or any other means. Monitoring is a structured way of collecting, analyzing, and using information to measure the project's effects. Follow-up programs verify predictions made in assessments, test mitigation measures to determine their success at reducing harm, detect unanticipated effects, and support the development of adaptive management if required.

Offshore exploratory drilling activities in Nova Scotia can be informed by a comprehensive framework of avoidance, mitigation, monitoring and adaptive management measures established through the offshore petroleum regulatory regime, applicable federal legislation and regulations, past environmental assessment processes for exploratory drilling in both the NS offshore area (under CEAA 2012[17]) and the Newfoundland and Labrador offshore area, project-specific authorization requirements, and industry standards and best practices. Collectively, these measures are intended to prevent, reduce, or manage potential adverse effects. The adaptive management of offshore

[17] IAAC Canadian Impact Assessment Registry Shelburne Basin Venture Exploration Drilling Project (2015) and Scotian Basin Exploration Drilling Project (2018).

exploratory drilling programs in Atlantic Canada over the course of several decades has evolved into a high degree of consistency in the mitigation measures applied across projects. Many mitigation measures have become standard practice through repeated application in project assessments, regulatory approvals, Environmental Protection Plans, and operational procedures. In January 2026, IAAC published guidance on standard mitigation measures setting out commonly used measures and practices for addressing well understood adverse federal effects. These measures may inform assessments of any project type, including offshore exploratory drilling. However, their suitability must be assessed in the context of each project, and additional measures may be required to address project-specific or residual effects.

The CNSOER authorization process for exploratory oil and gas drilling in the Canada–Nova Scotia offshore area requires a package of operational, safety, environmental and emergency plans. These plans draw on the requirements of the Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations (the regulation) and provide a suite of protective measures. The plans described in the regulation are as follows:

- **Safety Plan**: sets out the procedures, practices, resources, sequence of key safety-related activities and monitoring measures that are necessary to safely carry out a proposed work or activity, as well as the target levels of safety in respect of the work or activity and measures for hazard management.
- **Environmental Protection Plan**: sets out the procedures, practices, resources and monitoring measures that are necessary to protect the environment from the effects of a proposed work or activity, the target levels of safety in respect of the work or activity and measures for hazard management.
- **Contingency Plan**: sets out the procedures, including emergency response procedures, and the practices, resources and monitoring measures that are necessary to effectively prepare for and mitigate the effects of any accidental event.

The CNSOER also requires a Canada–Nova Scotia Benefits Plan which addresses employment, procurement, training, research and opportunities for Nova Scotians and other Canadians.Mitigation measures identified through previous environmental and impact assessments of offshore exploratory drilling projects in Atlantic Canada were used as a foundation for this RA analysis. These measures were then considered alongside updated regulatory requirements, guidance documents (including the aforementioned standard mitigation measures), advances in scientific understanding, Indigenous Knowledge, evolving industry best practices, and relevant findings from a parallel offshore wind planning and assessment initiative currently being undertaken by IAAC in support of offshore wind development in Nova Scotia. The overall process resulted in the identification of a suite of potential mitigation measures for offshore exploratory drilling activities, summarized in Appendix 7-1, that address potential effects on environmental, social, economic and cultural components. Many of these measures are not always specific to a single VC or project activity but instead contribute to reducing potential effects

across multiple components. They include management of discharges and emissions, waste handling and disposal procedures, protection of sensitive benthic habitats, communication and coordination with marine users, vessel and aircraft operating procedures, environmental monitoring programs, and environmental protection and emergency response planning. These measures provide a current and comprehensive framework for managing the potential adverse effects of routine offshore exploratory drilling activities within the Study Area.

The aforementioned documents, and feedback provided by federal authorities, the public and other stakeholders, indicates that for spills and blowouts are the greatest concerns associated with offshore exploration drilling projects.

With any drilling operation, including exploratory wells there is the potential for a spill or undesired fluid discharge, either at surface or underwater. Equipment selection, testing, certification and maintenance combine to minimize the probability of these adverse events happening. Additionally. operating environments are carefully monitored and if severe weather events are anticipated, drilling operations can be suspended and wells put into a safe state to prevent potential spills or accidents. The strengthening of these safeguards, along with the mitigation measures provided in Appendix 7-1, has led to a decrease in number and consequences when spills do occur.

As part of the Shelburne Basin Venture Exploration Drilling Project, the IAAC was presented an Analysis of Probability of Potential Blowouts and Spills from Offshore Wells and Activities which examined longer-term larger scale blowouts as well as smaller scale, shorter-term spill scenarios using data reaching back to 1964. Analysis shows that; “Well-related spills occur relatively infrequently during offshore operations. Most well spills involve releases of less that 100 barrels over the course of less than one day and large-scale exploratory well blowouts are very rare events.”

While the mitigation measures presented in Appendix 7-1 have either demonstrated effectiveness in previous projects or been identified through recent engagement activities, they are not intended to represent an exhaustive list of potential mitigation measures and should be critically reviewed by future proponents to determine their applicability based on the specific context and potential effects of their offshore exploratory drilling project. Individual offshore exploration drilling projects may require additional measures, technologies, management approaches, and best practices where necessary to address effects.

Together, the aforementioned plans required by the CNSOER as part of its authorization process the measures provided in Appendix 7-1, and IAAC’s Standard Mitigation Measures for well-understood adverse effects, provide a comprehensive framework or protecting health, safety and the environment during exploratory oil and gas drilling in the Canada–Nova Scotia offshore area, while substantially reducing uncertainty regarding potential adverse effects and their management

7.2 Compliance Monitoring and Follow-up

Compliance monitoring and follow-up programs are integral components of the offshore exploratory drilling management framework. Previous project-specific EAs for proposed exploratory drilling programs have included a range of monitoring and follow-up programs, where results are used to verify effects predictions, assess the effectiveness of mitigation and identify whether additional or modified measures are required.

Reportable incidents must be reported to CNSOER as soon as reasonably practicable and no later than 24 hours after the operator becomes aware of the incident. The incident must be investigated, and an investigation report addressing root causes, contributing factors and measures to prevent recurrence must be submitted within 14 days.

7.2.1 Compliance Monitoring

Compliance monitoring provides the means by which compliance can be demonstrated and can evaluate environmental performance. Compliance monitoring is carried out within the framework established by the *Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations*, applicable conditions of authorization and environmental or impact assessment decisions, and relevant regulatory guidance, including the *Offshore Waste Treatment Guidelines*. Operators are also responsible for meeting the applicable operational measurements, monitoring, record-keeping and reporting requirements established through the Framework Regulations, CNSOER guidelines and project-specific authorization and licence conditions. Operators must submit an Environmental Protection Plan in support of an application for authorization. The plan describes the procedures, practices, resources and monitoring measures that will be used to manage environmental hazards, wastes, emissions and discharges; demonstrate compliance; measure environmental performance; and undertake environmental effects monitoring. CNSOER reviews the plan and associated procedures before authorizing offshore activities.

The Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (2020) provided monitoring measures that have been commonly proposed in previous environmental and impact assessments (under the *Canadian Environmental Assessment Act*) or required through previous authorization conditions and are provided below. These monitoring measures are dependent on the proposed activities, project location, environmental sensitivities, effects predictions and applicable assessment or authorization conditions:

1. *Drill cuttings:* Where synthetic-based drilling fluids are used and associated drill cuttings are discharged, measure the concentration of synthetic base fluid retained on discharged cuttings in accordance with the Offshore Waste Treatment

Guidelines, verify compliance with applicable performance targets and report the results to CNSOER. Where the compliance threshold is not met, discharge is not permitted and the cuttings have the be transported to shore for disposal.

2. *Underwater noise*: Where warranted by project activities, effects predictions or environmental sensitivities, develop and implement a program to verify predicted underwater-noise levels through field measurement. The monitoring approach should be provided to CNSOER before implementation and should identify whether additional or modified mitigation is required.

3. *Marine and migratory birds*: Develop and implement appropriate monitoring for marine and migratory birds for the duration of drilling activities, in consultation with CNSOER and ECCC. Monitoring may include standardized seabird observations and regular inspection of drilling units and support vessels for stranded birds, with handling, documentation and reporting undertaken in accordance with current federal guidance.

4. *Marine mammals and sea turtles*: Where vertical seismic profiling or another activity using an impulsive sound source such as an air gun is proposed, implement an operational monitoring program using qualified observers, appropriate observation and exclusion zones, and applicable delay or shutdown procedures. Record and report marine mammal and sea turtle observations in accordance with applicable regulatory requirements and guidance.

7.2.2 Follow-up

Follow-up programs are used to verify if the predictions of adverse effects are accurate and to determine whether mitigation measures are effective, and to identify appropriate adaptive management approaches if necessary. Information from follow-up programs also contributes to improving scientific understanding and informing future project assessments and management decisions. The following examples of follow-up measures that have been included in previous assessments include:

1. *Sediment deposition and benthic habitat*: Where drill-waste modelling predicts deposition that could affect sensitive benthic habitat, or where sensitive corals, sponges or other benthic features are identified near a wellsite, develop and implement project-specific follow-up in consultation with CNSOER and relevant authorities. Follow-up may include measurement of the extent and thickness of sediment deposition, benthic surveys and comparison of observed conditions with modelling predictions.

2. *Underwater noise*: Where warranted by project activities, effects predictions or environmental sensitivities, develop and implement a program to verify predicted underwater-noise levels through field measurement. The monitoring approach

should be provided to CNSOER before implementation and should identify whether additional or modified mitigation is required.

3. *Program design and adaptive management*: Provide information on required follow-up programs before implementation, including their objectives, methodology, geographic coverage, timing, frequency, duration, quality-assurance procedures and reporting requirements. Compare monitoring results with assessment predictions and modify mitigation or follow-up measures where results identify unanticipated effects, ineffective mitigation or changing environmental risks.

Follow-up programs should be reviewed and updated as appropriate in consultation with CNSOER, relevant federal authorities and, where applicable, potentially affected Indigenous groups and other parties. Operators must also submit monitoring, compliance and follow-up information in accordance with the Framework Regulations and applicable assessment and authorization conditions, including information on activities undertaken to meet those conditions, consultations conducted and how concerns were considered, follow-up results, and any additional or modified mitigation measures implemented or proposed.

7.3 Adaptive Management

IAACs Guidance for Proponents: Developing, Evaluating and Reporting on Follow-up Programs describes adaptive management as the ability to allow ongoing adjustments and improvement to projects' mitigation measures based on monitoring results before irreversible adverse effects occur.

Adaptive management can occur in two different ways; passive adaptive management (i.e. managing an effect adaptively), where a proponent is required through the Impact Assessment process to develop and implement an adaptive management plan for a given project, which is distinct from an active adaptive management plan that forms a component of a follow-up program designed by a proponent.

Given the dynamic nature of the offshore environment, variability in environmental conditions, and the evolution of scientific knowledge, mitigation measures should be implemented in a manner that allows for continual learning and improvement throughout project planning, implementation, operation, and abandonment. Regardless of whether a passive or active adaptive management plan is followed, they provide a structured approach for incorporating new information from environmental monitoring, scientific research, Indigenous Knowledge, fisheries information, operational experience, and engagement activities into decision-making and the ongoing refinement of mitigation measures. Adaptive management should therefore be supported through ongoing information gathering, monitoring, and engagement with Indigenous groups, fishers, CNSOER and relevant government departments, scientific organizations, and other ocean

users. This includes maintaining awareness of environmental conditions and fishing activity patterns; identifying emerging issues, concerns, or potential interactions; and evaluating the effectiveness of mitigation measures. Where monitoring, engagement, or operational experience identifies opportunities for improvement, mitigation measures, communication practices, operational procedures, and project planning should be adjusted, where feasible, to further avoid or reduce adverse effects.

An adaptive management approach should also support transparency and communication throughout project activities. Where possible, project developers should strive to provide advance notification of significant operational changes, maintain ongoing dialogue with affected parties, and communicate relevant monitoring results and project information, where appropriate and consistent with legislative and confidentiality requirements. This approach can help facilitate the timely identification and resolution of issues, support coexistence with other ocean users, and encourage the incorporation of new scientific information and best practices as they become available.

7.4 Regional Assessment Findings

The RA found that offshore exploratory drilling activities in Nova Scotia are supported by a comprehensive framework of mitigation, monitoring, follow-up and adaptive management measures. These measures have evolved through previous environmental and impact assessments, operational experience, regulatory oversight, scientific research, Indigenous Knowledge, and continuous improvements in offshore management practices.

The suite of standard mitigation measures identified in Appendix 7-1, together with established monitoring and follow-up requirements, provides a robust framework for managing most of the potential effects associated with routine offshore exploratory drilling activities. It is important to note that maintaining preparedness for low-probability, high-consequence accidental events remains a critical component for the management of offshore exploratory drilling activities. Opportunities identified through the RA to further strengthen mitigation, monitoring, information sharing, protection of sensitive ecological features, and preparedness and response capabilities are presented in Section 11.0 (Recommendations).

8 GHG Analysis Chapter

The focus of the chapter is to consider the extent to which the effects of exploratory drilling projects hinder or contribute to the Government of Canada's ability to meet its environmental obligations and its commitments in respect of climate change.

8.1 Explanation of GHGs

Climate change is caused by the accumulation of greenhouse gases (GHGs) in the atmosphere. Human activities have increased atmospheric concentrations of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other GHGs, changing the balance of energy entering and leaving the climate system. GHG emissions are a cumulative global effect: emissions from a particular activity add to atmospheric concentrations, while the resulting climate effects are not confined to the location where the emissions occur.

Offshore exploratory drilling requires energy-intensive equipment and transportation. Direct operational emissions can arise from fuel combustion on a MODU, supply and standby vessels, helicopter transportation, well testing and flaring, and any venting or fugitive releases of hydrocarbon gases. The amount and composition of emissions depend on the type and duration of the drilling program, the equipment used, the distance from shore, the level of vessel and helicopter support, whether well testing occurs, and the measures used to manage emissions.

The Terms of Reference directed the RA to examine the environmental, health, social and economic effects, including cumulative effects, of exploratory drilling; identify regionally appropriate mitigation and monitoring approaches; and provide information to inform whether a future exclusion regulation would be appropriate. The activities in scope include drilling, testing and flaring, abandonment, vessel and helicopter traffic, and accidents and malfunctions (IAAC, 2026a).

The GHG inventory focuses on carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), expressed as CO2e. The supporting technical model also reports selected air pollutants such as nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO), particulate matter (PM), and volatile organic compounds (VOCs). These pollutants are not included in the CO2e total and should be considered through the atmospheric environment or air-quality analysis where relevant.

8.2 Purpose and Decision Context

The GHG analysis is intended to support strategic decision-making rather than to predict a single future. It estimates and compares direct operational emissions across a range of reasonably foreseeable activity scenarios and places those estimates in current provincial and national climate context. The analysis is designed to answer five related questions:

1. What direct operational GHG emissions could reasonably arise from offshore exploratory drilling in the Study Area?
2. Which activities and assumptions are the principal drivers of those emissions?
3. How do emissions change across different levels and patterns of future activity?

4. What technically and operationally feasible opportunities are available to avoid or reduce emissions?

5. What information, conditions, monitoring and review triggers would be needed to support future project-specific or regulatory decisions, including consideration of an exclusion regulation?

No single numerical comparison determines whether an activity is consistent with Canada's climate commitments. The interpretation therefore considers absolute, annual and cumulative emissions; the timing of emissions; the trajectory of national and provincial emissions; available mitigation; uncertainty; and the ability to verify and improve performance through reporting and follow-up.

8.2.1 Scope and analytical boundaries

The quantitative model covers direct operational emissions from MODU combustion, offshore vessels, helicopters, well testing, flaring, venting and fugitive releases. It also includes separately identified shoreside diesel use and purchased electricity that directly support each modeled well. Because those shoreside sources are not direct offshore emissions, they should be reported as supporting operational emissions rather than combined without distinction with the direct offshore subtotal. Upstream fuel production, seismic exploration, field development and production, downstream combustion, embodied emissions from equipment manufacture, and accident releases are outside the numerical boundary (Table 8.1).

Table 8.1 – Quantitative GHG Analysis Boundaries

Included in the quantified operational model	Addresses separately or excluded
MODU stationary combustion and, where applicable, propulsion or dynamic-positioning fuel use	Future production facilities and their operating emissions
Supply, standby, anchor-handling, survey and other project-related vessel fuel use	Downstream refining, distribution and end use of petroleum products
Project-related helicopter transportation	Emissions from production that might follow a commercial discovery
Well testing and flaring, where applicable	Embodied emissions from manufacturing the MODU and long-lived equipment
Venting and fugitive methane or other hydrocarbon releases that are reasonably foreseeable and quantifiable	Unrelated regional vessel, aviation or industrial emissions, except as inventory context

Other significant direct operational sources identified through the technical analysis	Carbon offsets or avoided emissions not directly caused by the exploratory activity
Shoreside diesel use and purchased electricity directly supporting a modeled well (reported separately from the direct offshore subtotal)	

Exploratory drilling is undertaken to determine whether commercially recoverable petroleum resources are present. Successful exploration may lead to a later production proposal, but it does not necessarily do so. The probability, design, production profile, timing and emissions of any future production project cannot be reliably attributed to a particular regional exploration scenario at this stage. Future production and downstream emissions are therefore not included in the direct operational totals. Their broader strategic implications should be acknowledged and cross-referenced to the Sustainability section, while any future production proposal would be considered through the applicable assessment and regulatory processes.

8.2.2 Greenhouse Gases and Carbon Dioxide Equivalent

Different GHGs remain in the atmosphere for different lengths of time and differ in their capacity to affect the climate. Emissions are expressed as tonnes of carbon dioxide equivalent (t CO2e), which converts each gas to a common unit using a global warming potential over a specified time horizon.

For an activity-based estimate, emissions are generally calculated as the quantity of an activity multiplied by an emission factor, with non-CO2 gases converted to CO2e. Where fuel consumption is available, fuel-based calculations are preferred. Where it is not, operating hours, engine power, load factor and fuel-consumption rates may be used, provided that the data sources and assumptions are transparent.

8.3 Climate Change Context

8.3.1 International, federal and Nova Scotia climate commitments

Canada is a Party to the Paris Agreement, whose temperature goal is to hold the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the increase to 1.5°C (Table 8.2). Canada's current nationally determined contributions are to reduce GHG emissions by 40 to 45 percent below 2005 levels by 2030 and by 45 to 50 percent below 2005 levels by 2035. The *Canadian Net-Zero Emissions Accountability Act* establishes a legally binding process for national targets and plans and

enshrines Canada's commitment to achieve net-zero emissions by 2050 (ECCC, 2025a; ECCC, 2026a).

The Strategic Assessment of Climate Change (SACC) provides the principal federal framework for considering climate change in impact assessment. Although it applies directly to designated projects, its principles are useful for the RA: quantify direct emissions transparently; identify assumptions and uncertainty; consider mitigation and best available technologies and best environmental practices (BAT/BEP); consider how a project could be affected by a changing climate; and use follow-up, monitoring and reporting to support continuous improvement (ECCC, 2020a).

Canada's 2026 National Inventory Report estimates that national GHG emissions, excluding the land-use, land-use change and forestry sector, were 685 Mt CO2e in 2024 (Table 8.2). This was 10 percent below the revised 2005 level of 763 Mt CO2e. The oil and gas economic sector accounted for 208 Mt CO2e in 2024. Canada's inventory is revised over time as data and methodologies improve; comparisons in this chapter should therefore use the latest available inventory at the time the RA is finalized (ECCC, 2026a).

Nova Scotia has legislated a target of at least 53 percent below 2005 emissions by 2030 and net-zero emissions by 2050. The 2026 National Inventory Report estimates Nova Scotia emissions of 13.7 Mt CO2e in 2024 and approximately 22 Mt CO2e in 2005 (Table 8.2). A comparison with provincial emissions is useful to illustrate scale; however, geographic attribution of offshore fuel emissions to a provincial inventory should be confirmed under National Inventory Report accounting conventions before the final chapter presents the provincial percentage as an attributed share (Government of Nova Scotia, 2021; ECCC, 2026a).

Table 8.2 – Climate Commitments, Targets and GHG Inventory Context

Instrument or indicator	Current context	Relevance to the analysis
Paris Agreement	Limit warming to well below 2°C and pursue efforts toward 1.5°C	Establishes the international context for collective and progressively stronger mitigation.
Canada 2030 target	40-45% below 2005	Scenario emissions should be presented for target-relevant years and not only as a multi-year average.
Canada 2035 target	45-50% below 2005	Provides context for exploration activity that may occur after 2030.
Canada net-zero objective	Net-zero by 2050	Supports a declining emissions approach and consideration of

		BAT/BEP and emerging measures.
Canada 2024 inventory	685 Mt CO2e, excluding LULUCF	Provides the latest national reference total, subject to annual revision.
Nova Scotia 2030 target	At least 53% below 2005	Provides provincial scale for comparison; attribution of offshore emissions to the Nova Scotia inventory should be confirmed.
Nova Scotia 2024 inventory	13.7 Mt CO2e	Provides current provincial scale; projected target-year emissions should also be considered where the comparison basis is consistent.
Nova Scotia net-zero objective	Net-zero by 2050	Supports long-term improvement and avoidance of carbon lock-in in equipment and practices.

8.3.2 Climate Change in the Nova Scotia offshore area

The Study Area is part of a changing Atlantic marine environment. Climate change is already affecting ocean temperature, chemistry, species distributions, storm conditions, and coastal infrastructure. These changes are relevant both to the environmental setting in which drilling would occur and to the resilience of drilling operations and response systems.

8.3.2.1 Ocean warming, acidification and changing ecosystems

Nova Scotia reports that sea-surface and deep-water temperatures are increasing, ocean waters are becoming more acidic, dissolved oxygen is decreasing in some areas, and ocean circulation may change. Fisheries and Oceans Canada has reported warmer Atlantic shelf waters and decreasing pH across Atlantic bioregions. In 2020, bottom waters undersaturated with respect to aragonite reached parts of the eastern Scotian Shelf, indicating conditions that can make shell and skeleton formation more difficult for sensitive organisms (DFO, 2022; Government of Nova Scotia, 2025a).

Warming and changing ocean chemistry can alter habitat suitability, productivity, food-web relationships, and the distribution and timing of marine species. These changes may affect commercial, recreational and rights-based fisheries and may alter the baseline condition and resilience of valued components considered elsewhere in the RA. The environmental

effects chapters and the cumulative-effects assessment should therefore consider climate change as an existing and evolving regional stressor.

Canada in a Changing Climate: Synthesis Report provides complementary national evidence. It concludes that oceans surrounding Canada have warmed, become more acidic and less oxygenated, and that ocean warming and oxygen loss are expected to intensify with further greenhouse gas emissions while ocean acidification will increase with additional carbon dioxide emissions (Lulham et al., 2023). This reinforces the need to treat climate change as an evolving baseline condition rather than a static background assumption.

8.3.2.2 Storms, sea level and coastal systems

Nova Scotia's climate information indicates that warming oceans can allow tropical storms to travel farther north without losing as much strength, contributing to more frequent or intense storm conditions, high winds and storm surge. Relative sea level in Nova Scotia could rise by up to approximately one metre by 2100 under the projections used by the Province, increasing risks to coastal infrastructure and amplifying storm-surge impacts (Government of Nova Scotia, 2025a).

Sea-level rise has limited direct influence on a floating or dynamically positioned MODU far offshore, but it is relevant to shore bases, ports, airfields, roads, storage areas, emergency staging locations and other coastal infrastructure used to support drilling. Storms and changing wave conditions are directly relevant offshore and may affect operating windows, transit, personnel transfer and emergency response.

The Synthesis Report notes that relative sea level has increased along Atlantic Canada and that rates in parts of southern Atlantic Canada have exceeded the global rate where land subsidence contributes. Where relative sea level is projected to rise, the frequency and magnitude of extreme high-water events are expected to increase (Lulham et al., 2023). For the RA, this supports consideration of climate-resilient shore-base, port, and emergency logistics even though the drilling activity itself occurs offshore.

The Unama'ki Institute of Natural Resources (UINR), which represents the five Mi'kmaq communities in Cape Breton, studied the impacts of climate change and sea-level rise on communities around the Bras d'Or Lakes in 2015. UINR observed more frequent and intense storms, rising sea levels, and shorter periods of sea ice using LiDAR data to map current and projected sea levels for 2030, 2050, and 2100 (Daigle et al., 2015).

8.3.2.3 Fisheries implications

Changes in ocean temperature, acidity, oxygen and storm conditions may shift the distribution of fish and invertebrates, affect recruitment and productivity, damage coastal fisheries infrastructure, and disrupt harvesting and seafood operations. Climate change

may therefore compound other pressures on fisheries and therefore communities, including Indigenous communities, that rely on fish and marine resources. As fish populations and marine ecosystems respond to changing environmental conditions, communities that rely on fisheries may experience reduced harvesting opportunities and increased challenges in maintaining livelihoods, food security, and cultural practices. Indigenous communities may be particularly affected where fisheries play an important role in sustaining traditional ways of life.

This is particularly relevant in Atlantic Canada. The Synthesis Report identifies ocean warming as a factor affecting the distribution and abundance of fish species, including shifts in snow crab distribution, and identifies ocean acidification as affecting lobster development and health in the Gulf of Maine, Bay of Fundy and Scotian Shelf. It also notes that changes to fish species can affect Indigenous Peoples' access to traditional foods and cultural practices (Lulham et al., 2023).

The Mi’kmaq of Nova Scotia have Aboriginal and Treaty rights and long-standing relationships with the lands and waters of Mi’kma’ki. Climate-related changes to species, access, safety and cultural practices may affect the exercise of rights and community well-being. Indigenous Knowledge and Mi’kmaw perspectives may also provide important evidence about environmental change, stewardship, adaptation and regionally appropriate mitigation. This chapter should be updated to reflect information shared through consultation and engagement, subject to applicable protections for Indigenous Knowledge.

8.3.2.4 Climate change, Indigenous Peoples and the exercise of rights

Climate change affects Indigenous Peoples through interconnected environmental, cultural, health, social and economic pathways. Changes in ocean temperature and chemistry, species distribution and abundance, severe weather, coastal conditions and access can interact with existing pressures on lands, waters, communities and livelihoods. Climate-related effects should not be considered in isolation. Changes affecting marine ecosystems, harvesting opportunities, food systems, cultural practices, health, community well-being and the transmission of Indigenous Knowledge can create interconnected and cumulative effects that reinforce one another over time.

The effects of climate change may also interact with existing social, economic and historical conditions experienced by Indigenous Peoples, including the ongoing impacts of colonial policies and dispossession from traditional lands and waters. Climate-related changes may therefore compound existing pressures on the exercise of Aboriginal and Treaty rights, community well-being, food systems, cultural continuity and relationships with the lands and waters of Mi’kmaq.

Relevance to Aboriginal and Treaty rights

For this RA, a key consideration is how climate-driven changes may influence the social, cultural, ecological, and economic conditions of communities across Nova Scotia, including the Mi'kmaq of Nova Scotia. Climate change may alter the conditions in which Aboriginal and Treaty rights are exercised and relationships with the lands and waters of Mi'kma'ki are maintained, including through effects on harvesting activities, cultural continuity, stewardship responsibilities, and the intergenerational transmission of knowledge. Changes in the availability, location, timing or health of harvested species, as well as changes in safe access to harvesting areas, may affect fishing, hunting, gathering, cultural practices and the intergenerational transfer of knowledge. Project-related effects should therefore be assessed against a changing climate baseline and in combination with other regional stressors.

Food systems, health and community well-being

Climate-related shifts in marine species, weather and access can make harvesting and access to traditional foods less predictable. Traditional foods contribute not only to nutrition, but also to cultural continuity, the transmission of Indigenous Knowledge, relationships with lands and waters, and community well-being. Potential pathways include effects on food security, nutrition, physical and mental health, water security, livelihoods, emergency response, infrastructure, cultural continuity, and community well-being. These pathways should be addressed in the relevant Indigenous Peoples, fisheries, health, socioeconomic and cumulative-effects analyses rather than treated as effects of GHG emissions alone.

8.3.2.5 Indigenous Knowledge, governance and adaptation

Indigenous Knowledge Systems are living, adaptive and place-based. They include observations accumulated over generations regarding environmental conditions, ecological change and stewardship practices. They can provide important evidence about environmental change, stewardship, cumulative effects, adaptation, and regionally appropriate mitigation. Information shared through consultation and engagement may also provide important insights into observed climatic changes and their implications for rights, culture and community well-being, and should be incorporated in accordance with the preferences, protocols and protections identified by Indigenous communities and knowledge holders. Where appropriate and community-supported, Etuaptmumk (Two-Eyed Seeing) may help bring the strengths of Indigenous and Western ways of knowing together without assimilating one into the other.

Limits of the available evidence

National literature establishes plausible pathways but does not, by itself, characterize effects for Mi'kmaq communities or determine impacts on rights. Research concerning

Indigenous Peoples in Atlantic Canada is comparatively limited, and available evidence may not fully capture region-specific experiences, observations and priorities related to climate change and the exercise of rights. Findings from northern or other regions should not be transferred without explaining their relevance. The final text should distinguish literature-based context from information provided by Indigenous Peoples and should identify remaining knowledge gaps transparently.

8.4 Sources of Greenhouse Gas Emissions

The emissions inventory should be source-resolved so that the principal drivers are visible and mitigation can be targeted. At a minimum, the analysis should assess MODUs, project-related vessels, helicopters, well testing and flaring, and other significant operational sources (Table 8.3). Venting and fugitive methane should be considered explicitly rather than assumed to be zero without evidence.

Table 8.3 – Potential GHG Emission Sources, Activity Drivers and Data Sources

Source	Potential GHGs	Principal activity drivers	Potential data
MODU combustion	CO2, CH4, N2O	Rig type; propulsion or dynamic positioning; engine power and load; drilling duration; standby days; fuel type; emission-control measures	Measured fuel use from comparable campaigns; engine data; operating hours; emission factors
Supply and standby vessels	CO2, CH4, N2O	Vessel class; number and distance of trips; speed; time at sea and standby; weather; fuel; emission-control measures	Automatic Identification System or voyage assumptions; vessel specifications; fuel-use data
Helicopters	CO2, CH4, N2O	Aircraft type; flight distance; frequency; payload; weather-related changes	Flight plans; aircraft fuel-burn data; accepted aviation factors

DRAFT

Well testing and flaring	CO2; uncombusted CH4 and N2O where applicable	Whether testing occurs; gas or fluid volume and composition; duration; flare efficiency	Test program assumptions; gas composition; metered or engineering estimates
Venting and fugitive releases	Primarily CH4, with CO2 and other hydrocarbons as applicable	Gas encountered; pressure-control and handling systems; equipment leaks; purging; test operations	Measured data preferred; equipment-specific estimates; transparent conservative assumptions
Other operational sources	Source dependent	Pre-spud or ROV surveys; mobilization; generators; waste or material transport; emergency or contingency activity	Include only where within the defined boundary and material to results

8.4.1 Mobile Offshore Drilling Unit (MODU) fuel consumption

MODUs require continuous power for drilling equipment, mud circulation, hoisting, pumps, control systems, lighting, ventilation, accommodation, and other loads. Dynamically positioned units also use propulsion and thrusters to maintain station. Fuel consumption depends on the unit, operating mode, water depth, metocean conditions, drilling phase, and duration. MODU fuel combustion is expected to be a principal source in most scenarios and should be quantified by operating mode where data allow, rather than by applying a single undifferentiated daily rate.

8.4.2 Supply vessel operations

Exploratory drilling may require supply vessels and standby or emergency-response vessels, and may also require anchor-handling vessels, survey vessels and other support craft. Emissions depend on the number and class of vessels; travel distance between the drilling location and shore base; time in transit, at standby and in port; speed; fuel; sea conditions; logistics planning; and emission-control measures. The analysis should avoid double counting vessel activity already embedded in a historical whole-campaign emissions factor.

8.4.3 Helicopter transportation

Helicopters transport personnel and light cargo and may support emergency response. Emissions depend on aircraft type, flight distance, frequency, payload, routing and weather. Scenario assumptions should reflect the geographic range of the Study Area and should distinguish routine crew-change flights from contingency or medical flights where those are included.

8.4.4 Well testing and flaring

Well testing may be undertaken to evaluate a discovery. Where hydrocarbons cannot be safely retained or transported, testing can involve flaring. Flaring may be intermittent but can materially increase emissions for a well where it occurs. The scenarios should therefore identify whether testing is assumed, the probability or number of tested wells, the duration and rate of flaring, the composition and heating value of the gas, and combustion efficiency. A sensitivity case should test the influence of well testing on total emissions.

8.4.5 Venting and fugitive methane

Methane may be released intentionally through venting or unintentionally through equipment or process leaks. Exploration does not involve the continuous production and processing systems found at a producing facility, but methane sources may still be associated with gas handling, well testing, purging or unplanned releases. The analysis should identify plausible pathways, quantify them where data support a reasonable estimate, and document any source excluded as immaterial or not reasonably foreseeable.

Canada's enhanced 2025 methane regulations apply to onshore oil and gas production, processing and transmission and do not apply to the offshore oil and gas industry. The pre-existing federal regulatory framework and any offshore-specific requirements should be described in the Regulatory Context section. For this chapter, the practical implication is that methane prevention, measurement and reporting should be evaluated on their merits for future offshore exploratory programs rather than assumed to be addressed by the enhanced onshore requirements (ECCC, 2025c).

8.4.6 Accidents and malfunctions

The scenarios quantify planned activities and a defined operating delay. An accident or malfunction may cause additional fuel combustion, venting or hydrocarbon releases, but occurrence and magnitude are event-specific and are not treated as routine annual emissions. Potential GHG releases from credible accident or malfunction pathways should therefore be addressed qualitatively in this chapter and cross-referenced to the accident

and malfunction assessment, with event-specific quantities reported where sufficiently supported. Avoided accident emissions should not be credited as routine mitigation.

8.5 GHG Analysis

8.5.1 Methodology

8.5.1.1 Analytical approach

The analysis uses a scenario-based, bottom-up approach. Reasonably foreseeable patterns of future exploration activity are translated into activity data for each major emission source. Accepted emission factors and engineering methods are then used to calculate annual and cumulative emissions in tonnes of CO2e. Results are presented by scenario, year, source, and, where useful, per well.

The methodology should be reproducible. A reviewer should be able to trace each result to an activity assumption, data source, emission factor, conversion factor and calculation. Where whole-campaign emissions data from a comparable drilling program are used, the analysis should explain their representativeness and prevent overlap with separately estimated sources.

8.5.1.2 Data hierarchy and quality

The following hierarchy is preferred, subject to availability and representativeness:

1. Measured fuel, flaring, venting and emissions data from comparable offshore exploratory drilling campaigns in Canada.
2. Equipment-specific fuel-consumption, engine, vessel, aircraft or flare data supplied by manufacturers, regulators or operators and capable of independent verification.
3. Canadian government emission factors and inventory methods, followed by recognized international guidance where Canadian factors are not available.
4. Transparent engineering assumptions or conservative proxy data from comparable jurisdictions.
5. High-level per-well or per-campaign averages only where more source-specific information is unavailable, with sensitivity testing for representativeness.

All data should be assigned a quality descriptor and reference year. Where source data reflect older technology or operating practices, the analysis should explain whether and

DRAFT

how they are adjusted. The emissions inventory should not imply a level of precision greater than the underlying data support.

Where available, measured or reported operational data from historical Nova Scotia or comparable Canadian offshore drilling campaigns should be used to calibrate or validate screening assumptions, particularly drilling duration, MODU fuel use, vessel and helicopter activity, and well-testing or flaring.

8.5.1.3 Calculation methods

For combustion sources, the preferred calculation is fuel consumed multiplied by fuel-specific emission factors. If fuel data are unavailable, fuel use may be estimated from operating hours, engine power, load factor, and specific fuel consumption. For flaring, the calculation should use the quantity and composition of gas and an explicit combustion-efficiency assumption. Venting and fugitive emissions should use measurements or engineering estimates appropriate to the source. All formulas, unit conversions and global warming potentials should be documented in a calculation appendix or supporting workbook.

8.5.1.4 Exploratory drilling activity scenarios

The scenarios were developed to represent a range of reasonably foreseeable activities rather than a forecast or commitment that a particular number of wells will be drilled. They were informed by historical drilling offshore Nova Scotia, regulatory and land-tenure information, industry outlooks, geological context, rig availability and input from the CNSOER and the Province of Nova Scotia. The time period is meant to be long enough to inform target-relevant years and the potential duration of an exclusion regulation, if one is recommended and implemented following the completion of this RA.

At least three scenarios are proposed: a lower-activity case, a central or reference case, and a higher-activity case. Each specifies the number and timing of wells, geographic assumptions, MODU type, days per well, mobilization, vessel and helicopter support, the proportion of wells tested, flaring assumptions, methane assumptions and any simultaneous campaigns (Table 8.4). Sensitivity cases should isolate the variables that most affect results.

Table 8.4 – GHG Modelling Assumptions for Low, Reference and High Per-Well Operating Profiles

Scenario element	Lower activity	Reference activity	Higher activity
Number and timing of wells	CEA S1: 4 wells total (2027–2035); S2/S3: 14 wells total	Same CEA counts; 9-year S1 and 15-year S2/S3 elapsed	Same CEA counts; schedule not specified. Four-well

	(2035–2050). Up to 4 in one year only stated for S2/S3.	horizons for annualization.	annual peak is a conditional screen.
MODU type and operating mode	Jack-up (only if water depth and unit rating permit); screening low case.	Drill ship dynamically positioned; reference case.	Deepwater semi-submersible; equipment class is an analyst scenario, not a CEA commitment.
Average drilling and contingency days per well	75 days, selected within BHP Newfoundland's reported 35–115 days for drilling/evaluation; not the reported minimum.	120 days to complete a well in BP Scotian Basin EA.	150 days: 120-day NS reference + 30-day analyst contingency.
Supply and standby vessel assumptions	230 km one-way distance; fuel/trip assumptions held to model inputs and scaled by duration/distance.	300 km one-way; 43 PSV round trips per 120-day well, scaled with duration; one standby vessel at 7,800 L/day. PSV sailing fuel 12,500 L/day is a rounded Atlantic analogue.	370 km one-way distance, the outer end of BP's Scotian Basin Nova Scotia licence-distance range; model transport fuel scales with distance.
Helicopter assumptions	Fuel and rotations scale with operating days using model inputs; verify actual flight-hour logs.	120 return flights per 120-day well; 2,500 L/return flight screening burn; frequency scales with days. Verify return-flight interpretation and actual aircraft.	Same rate, scaled to 150 days.
Well testing and flaring	No formation flow test; no test flare.	0.5 expected test/well; 5 MMscf gas and 500 bbl liquid per test.	1 test/well; ~4 MMscf gas and up to 10,000 bbl surfaced liquids/test (Tilt Cove analogue); model

			conservatively assumes all liquids combusted. Confirm actual disposition.
Venting and fugitive methane	1,000 m³/well screening loss; 90% methane; no planned venting.	Same screening fugitive loss; no planned venting.	Same screening fugitive loss; no planned venting.
Simultaneous activity and peak year	CEA gives no exact annual schedule for S1; 4-well peak is only a conditional screen.	CEA permits up to 4 wells in one year.	Same CEA cap; 4-well peak uses the high per-well boundary.

The completed scenario table identifies each activity assumption, its rationale, and its source or replacement priority (Table 8.4).

8.5.1.5 Application of the CEA development scenarios

The CEA scenarios are applied to low, reference and high per-well operating profiles in the supporting workbook. Scenario 1 specifies up to four wells during 2027–2035; Scenarios 2 and 3 specify about 14 wells during 2035–2050, with up to four wells in a year (Table 8.4 and Table 8.5). Scenario 3 has the same stated drilling activity as Scenario 2 and adds climate stressors without prescribing extra days. Annual averages divide cumulative emissions by nine elapsed years for Scenario 1 and 15 for Scenarios 2 and 3. The operational campaign totals include direct offshore activity and allocated shoreside diesel and purchased electricity, identified separately in the workbook.

Table 8.5 – GHG Emission Estimates for CEA Activity Scenarios

CEA activity / test	Cumulative emissions (kt CO_2e)	Reference annual average (t/y)	Reference 4-well peak (t/y)	Annual average vs. 2024 Canada / NS	Peak vs. 2024 Canada / NS
Scenario 1: 4 wells, 2027–2035	41.1–128.3 (reference 108.9)	12,104	N/A	0.00177% / 0.0884%	0.0159% / 0.795%
Scenario 2: 14 wells, 2035–2050	143.8–448.9 (reference 381.3)	25,419	108,940	0.00371% / 0.186%	0.0159% / 0.795%

Scenario 3: reference +30 operating days per well	473.2 (reference sensitivity)	31,545	135,194	0.00461% / 0.230%	0.0197% / 0.987%

Low, reference and bundled high per-well profiles yield 10.27, 27.24 and 32.07 kt CO_2e per well. The separate reference +30-day operating sensitivity yields 33.80 kt per well and is the largest modeled per-well total. Scenario 1's four wells yield 41.1–128.3 kt across the bundled low-to-high profiles (108.9 kt reference). For 14 wells in Scenario 2 or the stated Scenario 3, the bundled range is 143.8–448.9 kt (381.3 kt reference). The separate 14-well +30-day sensitivity reaches 473.2 kt. Conditional four-well years are 108.9 kt at reference, 128.3 kt at bundled high, and 135.2 kt with +30 days per reference well. These are scheduling screens, because the CEA supplied no annual drilling dates.

The +30-day sensitivity extends each 120-day reference well to 150 operating days with the same drillship and 300 km one-way distance. Fuel use for the MODU and standby vessel, supply vessel rotations, and helicopter flights increase with operating time. The test probability and gas/liquid flare volumes remain at the reference values; this calculation does not represent a continuous 30-day flow test. Per-well CO_2e rises by 6,563 t (24.1%) from 27,235 to 33,799 t. Applied to 14 wells, the increment is 91.9 kt over the reference 381.3 kt, for 473.2 kt cumulative, a 31.5 kt annual average, and a conditional 135.2 kt four-well year. The extra days are not a stated CEA activity assumption.

Reference NO_x is approximately 442 t per well, 6,183 t for 14 wells, and 1,767 t in a conditional four-well year. The +30-day reference sensitivity rises to 549 t NO_x per well, 7,688 t over 14 wells, and 2,197 t for a four-well year. Table 6 also shows the sensitivity's CO_2, CH_4, N_2O, SO_2, CO, particulate matter, VOC and carbon mass. Pollutant totals are screening masses, not ambient concentrations or health effects; project-specific engine factors and dispersion assessment are needed.

Canada emitted 685 Mt CO_2e and Nova Scotia 13.7 Mt in 2024. Scenario 2/3's reference annual average is about 0.00371% of the Canadian inventory and 0.186% of the provincial inventory; a conditional four-well reference year is 0.0159% and 0.795%, respectively. The bundled high four-well year is 0.0187% and 0.936%. With the +30-day reference sensitivity, the annual average becomes 0.00461% of Canada and 0.230% of Nova Scotia, while the conditional four-well year reaches 0.0197% and 0.987%. These comparisons describe scale, not a target-gap share or which province records offshore emissions. They cannot alone determine consistency with Canada's 2030, 2035 and 2050 commitments (ECCC, 2026a; ECCC, 2025b).

8.5.2 Emission results

Table 8.6 reports cumulative, annual-average and conditional peak results for the stated CEA activity and for the separate +30-day operating sensitivity. The workbook retains source-specific activity assumptions and separate flaring, fugitive and shoreside calculations; engine diesel across offshore equipment is aggregated in its current results. Exact annual profiles and source-category charts require a calendar-year drilling schedule and a source-separated fuel calculation.

Table 8.6 – Cumulative, annual-average and conditional peak results

Per-well metric	Low	Reference	High	Reference +30 days
CO2e (t/well)	10,271.5	27,235.1	32,065.3	33,798.5
CO2 (t/well)	10,209.1	27,098.6	31,912.5	33,642.5
CH4 (t/well)	0.8962	2.2394	2.7710	2.4246
N2O (t/well)	0.08565	0.22340	0.22889	0.27785
N_2O (t/well)	0.08565	0.22340	0.22889	0.27785
NO_x (t/well)	165.55	441.65	450.80	549.17
SO_2 (t/well)	6.097	16.349	16.591	20.330
CO (t/well)	19.645	51.270	60.447	63.716
PM (t/well)	3.666	9.812	10.746	12.196
VOC (t/well)	3.884	10.196	10.473	12.640
Carbon from CO_2 (t C/well)	2,784.3	7,390.5	8,703.4	9,175.2

The technical workbook also reports NOx, SO2, CO, PM, VOC and carbon mass. Those values are useful for cross-reference to the atmospheric environment analysis but are not GHGs and are not included in the CO2e totals. Project-specific air-quality conclusions would require appropriate source factors and, where relevant, dispersion analysis.

8.5.2.1 Comparison with the 2020 Newfoundland and Labrador analysis

The 2020 Newfoundland and Labrador Regional Assessment provides a useful comparison of cumulative offshore exploration, activity assumptions, and follow-up reporting. Per-well rates from a different region depend on rig duty cycle, distance, depth and well testing and should not be transferred without normalizing the activity boundary. Its broader cumulative assessment does not supply unit-specific fuel data for these Nova Scotia cases (IAAC, 2020a).

This Nova Scotia screening estimate uses specified well counts and operating profiles, reports the principal gases and air pollutant masses, tests a 30-day delay separately, and gives annual averages and conditional peak-year values. The current workbook aggregates much of the combustion fuel before applying factors. Source-separated actual fuel logs, a yearly drilling schedule, and documented reduction performance are needed to publish fully source-resolved charts, calendar-year results and quantified before/after mitigation comparisons.

8.5.2.2 Uncertainty and sensitivity analysis

Uncertainty arises from the future level of exploration, equipment selection, operating conditions, data quality, and calculation methods. Scenario uncertainty should be distinguished from parameter uncertainty. A broad future activity range is not the same as uncertainty in a fuel-consumption factor, and the two should not be combined without explanation (Table 8.7).

Table 8.7 – Key Sources of Uncertainty and Recommended Treatment

Uncertainty type	Examples	Recommended treatment
Future activity	Number, timing and location of wells; simultaneous campaigns	Use distinct scenarios and disclose that they are not forecasts.
Program design	MODU type, anchoring versus dynamic positioning, well depth, testing plan	Define representative cases and project-specific review triggers.
Duration and weather	Drilling days, standby, delays, extra trips	Use ranges and sensitivity cases; avoid relying only on historical averages.
Activity data	Fuel use, vessel hours, helicopter frequency, flare gas volume	Apply a data hierarchy and quality rating; reconcile estimates with measured data when available.
Emission factors and GWPs	Factor source, fuel properties, methane conversion	Use current accepted sources and state all values.
Methane	Occurrence, volume, measurement limitations	Identify sources explicitly; use measured or conservative engineering estimates; report separately.

Model structure	Use of per-well averages versus source-resolved calculations	Compare methods where possible and explain material differences.

The low-to-high cases jointly vary with rig class, duration, offshore distance and testing. They are boundary profiles rather than independent statistical confidence limits; changing several variables together does not identify their separate contribution. A separate 30-day reference with well test due to climate change impacts adds about 6,563 t CO_2e and 108 t NO_x per well. Project assessment should additionally vary measured MODU burn, PSV and helicopter frequency, test composition and disposition, methane releases, and weather standby one factor at a time before relying on these boundaries.

8.5.3 Implications for future assessments

A regional analysis can support efficient future decisions only where a proposed program remains within the evidence and scenario envelope assessed. The GHG analysis should therefore identify which parameters can be addressed through standardized regional requirements and which would require project-specific information or additional review (Table 8.8).

Table 8.8 – Potential Review Triggers and Responses for Future Exploratory Drilling Programs

Potential trigger	Why it matters	Possible response
Activity exceeds the assessed well count, annual intensity or simultaneous-campaign envelope	Regional emissions and peak-year conclusions may no longer apply.	Requires updated regional modelling or project-specific GHG analysis.
A materially different MODU, fuel or operating mode is proposed	Per-day fuel use or methane profile may differ from the representative case.	Requires equipment-specific estimate and BAT/BEP comparison.
Well testing or flaring exceeds the scenario assumption	Intermittent flaring can materially affect total and peak emissions.	Requires testing justification, quantified estimate, and flaring minimization plan.
A material methane source cannot be quantified or controlled	Methane has a high warming effect and may be under-represented by combustion-only estimates.	Requires measurement, engineering assessment, and source-specific mitigation.

Logistics differ materially from assumed shore base, vessel distance or flight pattern	Transportation emissions may be higher than the regional estimate.	Update project-specific transportation calculations.
New climate targets, regulations, guidance or technologies materially change the context	A conclusion based on older policy or technology may become stale.	Apply an update clause and current guidance at authorization.
Climate-resilience assumptions are outside assessed conditions	Operational duration, safety, or emergency response may be affected.	Requires updated climate-risk and emergency-response review.

The triggers should be coordinated with the Regulatory Context and exclusion-regulation analysis. They are not, on their own, a recommendation to make or not make an exclusion regulation. They define the circumstances in which the regional GHG evidence may or may not be sufficient for a future program.

8.6 Consistency with Canada's Climate Commitments

8.6.1 Relationship to national and provincial emissions profiles

The scenario estimates are compared with the latest available national and provincial inventories below. Inventory shares are context for scale and do not function as a significance threshold or a test of compliance with a national target.

8.6.2 Interpretation framework

Every net addition of GHGs contributes to global climate change. At the same time, national and provincial inventories provide a necessary scale for understanding the relative contribution of a regional activity. The comparison should not be framed as a significance threshold below which emissions are irrelevant. It should be used with the following considerations:

1. Magnitude: annual, peak-year and cumulative emissions, both in absolute terms and as a proportion of current and projected inventories.

2. Timing: whether emissions occur before or after the 2030 and 2035 target years and whether the scenario masks a concentrated peak.

3. Trajectory: whether the activity adds emissions during a period in which economy-wide emissions must decline toward net-zero.

4. Performance: whether feasible measures and high-performing equipment and practices have been identified and applied.

5. Uncertainty and accountability: whether emissions can be forecasted, measured, reported and corrected through follow-up.

A finding that exploratory drilling represents a small proportion of national emissions would not, by itself, establish consistency with Canada's commitments. Conversely, the existence of emissions would not, by itself, demonstrate that a particular regional scenario prevents Canada from meeting a target. The conclusion should explain the scale, limitations, and conditions on which it depends.

8.6.3 Inventory and target comparisons

The comparison below (Table 8.9) uses the 2024 inventories as historical scale references. Annual averages divide cumulative totals by the stated horizon, while conditional peaks assume four entire well profiles in one year; neither is an exact calendar-year forecast. Table 8.9 covers the bundled low, reference and high activity profiles. The separate reference +30-day operating sensitivity reaches 33,799 t CO_2e per well, 473.2 kt over 14 wells, 31,545 t/y as a 15-year annual average and 135,194 t in a conditional four-well year, equivalent to 0.00461% and 0.0197% of Canada's 2024 inventory, respectively.

Table 8.9 – Modeled GHG Emissions Relative to 2024 Canada and Nova Scotia Inventories

Comparison metric	Lower activity	Reference activity	Higher activity
Four-well peak as % of Canada 2024 inventory (685 Mt)	0.00600%	0.01590%	0.01872%
Four-well peak as % of Nova Scotia 2024 inventory (13.7 Mt)	0.300%	0.795%	0.936%
Scenario 1 annualized emissions (t CO_2e/year; 2027–2035 horizon)	4,565	12,104	14,251
Scenarios 2/3 annualized emissions (t CO_2e/year; 2035–2050 horizon)	9,587	25,419	29,928

Comparison metric	Lower activity	Reference activity	Higher activity
Scenarios 2/3 cumulative emissions (kt CO_2e over 14 wells)	143.8	381.3	448.9

The ECCC 2025 projections report national totals excluding LULUCF and separate nature-based and agricultural measures of 625 Mt (with measures) or 583 Mt (with additional measures) in 2030, and 606 or 554 Mt in 2035. The 12.1 kt Scenario 1 reference annual average is about 0.00194–0.00208% of the projected 2030 totals. For Scenario 2/3 in 2035, the 25.4 kt reference average is 0.00419–0.00459% and the separate 31.5 kt +30-day reference average is 0.00521–0.00569%. A conditional 135.2 kt four-well +30-day year is 0.0223–0.0244% of the 2035 totals. Projection vintages and schedule uncertainties mean these are illustrative scale comparisons, not target-year forecasts or compliance tests (ECCC, 2025b).

8.6.4 Mitigation

Mitigation should follow a hierarchy that first avoids emissions, then reduces them through equipment and operational choices, and uses offsets only where allowed and after direct reduction opportunities have been considered. Mitigation measures should be broadly applicable to future programs and be distinguished from measures that depend on a specific MODU, well, location or testing plans. Table 8.10 identifies potential measures and implementation considerations for emission sources.

Table 8.10 – Potential GHG Mitigation Measures and Implementation Considerations

Emission source	Potential mitigative measures for consideration	Implementation considerations
MODU	Select lower-emitting units where technically suitable; efficient engines and generators; optimize engine loading; energy-management systems; minimize unnecessary standby; lower-carbon fuels where safe and available	Safety, harsh-environment capability, rig availability, fuel supply, equipment certification and life-cycle trade-offs
Vessels	Optimize logistics and loads; reduce trips; efficient routing and speed; minimize idling; select	Distance, weather, standby and emergency duties, marine safety, availability of

Emission source	Potential mitigative measures for consideration	Implementation considerations
	efficient or hybrid vessels where feasible; coordinate campaigns	alternative fuels and port infrastructure
Helicopters	Optimize crew-change scheduling and payload; avoid unnecessary flights; efficient aircraft where operationally suitable	Safety, emergency readiness, weather, distance and aviation requirements
Well testing and flaring	Avoid or limit testing where objectives can be met by alternatives; minimize duration and volume; efficient flare operation; meter or estimate gas and composition	Reservoir information needs, safety, regulatory requirements and technical feasibility
Venting and fugitive methane	Design to prevent routine venting; inspect and maintain gas-handling equipment; leak detection where relevant; measurement or engineering quantification; controlled disposal where safer and lower-emitting	Short duration of exploration, gas occurrence, equipment configuration, measurement feasibility and safety
Management and reporting	Pre-drill GHG management plan; emissions forecast; operating targets; fuel and flare records; actual-versus-forecast reconciliation; corrective actions	Common reporting format, commercial confidentiality, verification and regulator roles

8.6.5 Best available technologies and best environmental practices

The SACC defines BAT/BEP as the most effective technologies, techniques or practices, including emerging technologies, that are technically and economically feasible for reducing GHG emissions over a project's life. A structured assessment lists available

measures, screens technical feasibility, ranks reduction potential, considers economic and other environmental or social effects, and justifies the selected approach (ECCC, 2020a).

For short-duration exploratory programs, a full project-level BAT/BEP determination may not always be proportionate. The underlying discipline remains useful: identify material sources, compare available lower-emitting options, explain why a higher-emitting option is necessary, and document when an emerging measure could become feasible. A standardized GHG management plan could operationalize this approach for future programs.

8.6.6 Best-in-class performance

ECCC published draft technical guidance proposing a best-in-class comparison for new oil and gas projects, including exploration. The draft approach compares projected emissions performance with leading projects undertaking the same activity in Canada and internationally. As of the preparation of this draft chapter, the guidance remains a draft benchmark and should not be presented as final binding guidance. It may nevertheless help structure a transparent comparison where sufficiently comparable data are publicly available (ECCC, 2022).

For exploratory drilling, possible performance metrics include t CO2e per well, t CO2e per drilling day, MODU fuel consumption per operating day, vessel emissions per campaign and emissions associated with well testing. Metrics should not be used without context: well depth, water depth, metocean conditions, rig type, distance from shore, and testing objectives may materially affect comparability.

8.7 Monitoring, reporting and adaptive management

The value of this regional analysis will increase if future programs use common forecasting and reporting requirements. Actual data can be used to verify predictions, identify the reasons for variances, update regional emission factors and determine whether scenario assumptions remain valid.

- Before drilling: submit a source-resolved GHG forecast, and GHG management plan using the regional methodology or explain any departure; identify BAT/BEP measures; identify expected flaring and methane sources; and confirm climate-resilience assumptions.
- During operations: maintain fuel, operating-hour, vessel, aviation, flaring and methane records sufficient to estimate actual emissions; document material deviations and corrective action.

- After each well or campaign: report actual direct operational emissions by source and gas; compare them with the forecast; explain material differences; and identify lessons for future programs.
- Regional follow-up: maintain a common dataset; periodically summarize performance; update scenario inputs and emission factors; and review mitigation as technology, fuel availability, climate guidance and regulation evolve.

8.8 References

Department of Fisheries and Oceans Canada (DFO). (2022). *Canada's oceans now: Atlantic ecosystems*, 2022. Government of Canada.

Environment and Climate Change Canada (ECCC). (2020a). *Strategic assessment of climate change*. Government of Canada.

Environment and Climate Change Canada (ECCC). (2022). *Draft guidance for the submission of information demonstrating best-in-class GHG emissions performance by oil and gas projects undergoing a federal impact assessment*. Government of Canada.

Environment and Climate Change Canada (ECCC). (2025a). *Canada's 2035 emissions reduction target*. Government of Canada.

Environment and Climate Change Canada. (2025b). *Greenhouse gas and air pollutant emissions projections – 2025*. Government of Canada.

Environment and Climate Change Canada (ECCC). (2025c). *Regulations Amending the Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector), SOR/2025-280*. Government of Canada.

Environment and Climate Change Canada (ECCC). (2026a). *National inventory report 1990-2024: Greenhouse gas sources and sinks in Canada*. Government of Canada.

Daigle, R., O'Carroll, S., Young, L., & Paul, P. (2015*). Impacts of Climate Change and Sea-Level Rise on the Mi'kmaq Communities of the Bras d'Or Lakes*. Unama'ki Institute of Natural Resources.

Government of Nova Scotia. (2021). *Environmental Goals and Climate Change Reduction Act*, S.N.S. 2021, c. 20.

DRAFT

Government of Nova Scotia. (2025a). *Nova Scotia's changing climate*. Climate Change Nova Scotia.

Impact Assessment Agency of Canada (IAAC). (2020a). *Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador: Final report*. Prepared by the Regional Assessment Committee.

Impact Assessment Agency of Canada (IAAC). (2026a, July). *Terms of reference for the Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area.*

Lulham, N., Warren, F. J., Walsh, K. A., & Szwarc, J. (2023*). Canada in a changing climate: Synthesis report*. Government of Canada.

9 Cumulative Effects Assessment

9.1 Scope and Objectives

This cumulative effects assessment (CEA) was conducted in accordance with the Terms of Reference (section 3.2(i)) to evaluate “how oil and gas exploratory drilling may interact with past, existing and reasonably foreseeable activities and changes to environmental, health, social and economic conditions within the Study Area” (IAAC 2026a). The Terms of Reference define cumulative effects as “the positive and negative effects to the environment or to health, social, or economic conditions caused by interactions of human activities and natural processes that accumulate over time and space”. The CEA will be used to inform RA recommendations including whether an exclusion regulation for offshore exploratory drilling would be appropriate in the context of the Study Area. The CEA may also be used to help inform future regulatory decisions and oversight and project-specific assessments.

While this CEA is developed in consideration of marine spatial planning and other cumulative effects management initiatives in the region, it focuses specifically on the cumulative effects associated with offshore exploratory drilling and related activities, rather than providing a comprehensive planning framework for all ocean uses and management objectives across the entire marine planning region (refer to Sections 9.2.1.5 and 9.9.1 for additional information on other CEA management initiatives in the region).

The CEA builds on preceding chapters of the RA, particularly the regional overview presented in Section 5 and effects analysis presented in Section 6. Cross-referencing is used where applicable to reduce duplication.

9.2 CEA Approach and Methodology

Regional and project-level CEAs serve different but complementary purposes. A regional CEA examines broad patterns of change, key stressors, future development scenarios, trends, sensitivities, management objectives, and opportunities for regional mitigation and monitoring across a large geographic area. In contrast, project-level CEAs focus on the incremental contribution of a specific project to cumulative effects, considering the environmental, social, economic, and cultural context established through RAs and other planning processes. While RAs focus on understanding what is happening across the region, project assessments focus on the project's contribution to those regional conditions. This section describes the approach and methods used to conduct the CEA in the context of this RA.

9.2.1 CEA Framework Considerations

While there are various methods and approaches to assess cumulative effects, it is generally accepted that CEA must include, at a minimum: scoping, retrospective analysis of cumulative effects, future analysis of cumulative effects, and management of cumulative effects (Noble 2015; Willsteed et al. 2018; Transport Canada 2022; Simeoni et al. 2023).

The methods and approach for this CEA were developed in consideration of the following:

- Regulatory requirements (including federal legislation and policy, and the Terms of Reference)
- Technical guidance on CEA (including federal guidance and academic publications)
- Input received during consultation and engagement with Indigenous Peoples, regulatory agencies, and interested parties
- Indigenous Knowledge
- Lessons learned from previous regional assessments and other CEA initiatives in the region

9.2.1.1 Regulatory Context

Section 22(1)(a)(ii) of the *Impact Assessment Act* requires consideration of "any cumulative effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out". Under the Act, cumulative effects are considered in the context of sustainability and public interest, including how the combined effects of past, present, and reasonably foreseeable future activities may affect the environment, health, social and economic conditions, and Indigenous Peoples. The Act also recognizes the need to assess how these cumulative effects may affect the rights

and interests of Indigenous Peoples, with decision-making informed by Indigenous Knowledge, meaningful engagement, and the Crown's commitment to reconciliation.

The Government of Canada's Interim Message on Cumulative Effects (Government of Canada 2023) recognizes cumulative effects as an important issue that requires collaboration among all levels of government, Indigenous Peoples, industry, stakeholders, and the public. The Government of Canada also recognizes the important role of cumulative effects identification and management in supporting the continued meaningful exercise of Indigenous and treaty rights[18] and the value of Indigenous Knowledge to support more informed decision-making.

9.2.1.2 Federal Technical Guidance

This CEA has been undertaken in consideration of various federal government guidance on CEA that has been developed over the years including the following:

- Cumulative Effects Assessment Practitioner's Guide (Hegmann et al. 1999)
- Canadian Council of Ministers of the Environment's Canada-wide Definitions and Principles for Cumulative Effects (CCME 2014)
- Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* (IAAC 2018)
- Policy Framework for Assessing Cumulative Effects under the *Impact Assessment Act* (IAAC 2025a)
- Generic Requirements for Tailored Information and Studies Guidelines (IAAC 2026b)
- Cumulative Effects Assessment – IAAC's Guidance to the Nova Scotia Offshore Wind Regional Assessment Committee (IAAC 2024)
- Technical Advisory Committee on Science and Knowledge's formal advice to IAAC regarding Cumulative Effects Assessments in Regional Assessments (IAAC 2025b)

9.2.1.3 Academic Research

Key academic publications focused on CEA methods and best practices (e.g., Duinker and Greig 2007; Harriman and Noble 2008; Harriman-Gunn and Noble 2009, 2011; Noble 2015; Patrício et al. 2016; Sinclair et al. 2017; Arnold et al. 2023) and in particular, cumulative effects on marine or aquatic habitats (e.g., Dubé 2003; Halpern et al. 2008; Stelzenmüller et al. 2018; Murphy et al. 2024) were consulted to inform methodological approaches and CEA ideologies.

[18] For the purposes of this report, "Indigenous and treaty rights" refers to the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada that are recognized and affirmed under section 35 of the Constitution Act, 1982, including the rights of First Nations, Inuit, and Métis peoples.

9.2.1.4 Influence of Consultation, Engagement and Indigenous Knowledge

Information provided by Mi'kmaw organizations and communities through comments on the Draft Terms of Reference, meetings with the Impact Assessment Agency of Canada (IAAC) (refer to Section 4.1), and other available Indigenous-authored materials was reviewed for relevance to the CEA. Submissions associated with previous regional assessments for offshore oil and gas exploratory drilling and offshore wind development were also considered, where relevant. This information helped inform the assessment framework, including the selection of valued components (VCs), cumulative effects pathways, management considerations, and information gaps.

Key themes identified through Mi'kmaw input relevant to the CEA included the need to:

- assess cumulative effects through a multi-sector and rights-based lens, including interactions among offshore petroleum activities, offshore wind development, fisheries, shipping, conservation initiatives, and climate change
- evaluate effects on Indigenous and treaty rights, access to current and future harvesting areas, culturally important species, cultural practices, Mi'kmaw Knowledge systems, health and well-being, and Indigenous social and economic conditions
- recognize that cultural importance is not limited to documented archaeological sites or mapped current-use areas and that offshore and submerged landscapes may retain cultural significance
- account for the combined effects of access restrictions, underwater sound, vessel traffic, habitat disturbance, routine discharges, accidental spills, and climate-driven changes in species distributions and harvesting patterns
- avoid assuming that current fishing locations, seasons, or target species will remain static, and consider whether multiple activities could collectively constrain the ability of rights-based fisheries to adapt to changing environmental conditions
- involve Mi'kmaw communities, rights holders, harvesters, Elders, and Knowledge Holders in identifying culturally relevant pathways, indicators, baselines, thresholds, mitigation, accommodation measures, and monitoring priorities
- treat Indigenous Knowledge as a distinct knowledge system and apply appropriate Mi'kmaw protocols for information ownership, confidentiality, use, review, and validation
- consider the protection of designated and proposed protected areas, culturally important marine areas, sensitive habitats, migration corridors, critical habitat, and other recognized areas of ecological or cultural importance
- provide for meaningful and ongoing consultation, transparent reporting, and accountability for environmental protection, follow-up monitoring, Indigenous participation, and other commitments throughout the regulatory and industry lifecycle

Mi'kmaw principles of *Msit No'kmaq*[19] ("all my relations") and *Netukulimk*[20], emphasize the interconnectedness of people, lands, waters, species, and future generations, and support the sustainable use of resources in a manner that maintains environmental integrity while supporting community well-being (Denny and Fanning 2016; Warrior et al. 2022; KMK 2026a).

The CEA incorporates Mi'kmaw perspectives and publicly available Indigenous Knowledge where they have been shared and are appropriate for use. However, it does not represent an Indigenous-led CEA or a comprehensive account of Mi'kmaw Knowledge, use, values, or cultural relationships with the marine environment. Pathways, indicators, thresholds, and conclusions concerning Mi'kmaw rights and cultural connections should therefore be developed or confirmed through culturally appropriate engagement with Mi'kmaw communities and Knowledge Holders rather than inferred solely from biophysical information or the absence of documented current use. The absence of a completed Mi'kmaq Ecological Knowledge Study is viewed as a current information gap and not as evidence that an offshore area is unused or lacks cultural importance.

Among industry, public, and non-governmental organization participants, there was also broad support for a CEA that considers existing and future offshore activities, fisheries, shipping, offshore wind development, and climate-related pressures. Comments provided by the Guysborough County Inshore Fishermen's Association were particularly relevant to the scoping of commercial fisheries and other ocean uses as a VC (refer to Section 9.5.2).

9.2.1.5 Lessons Learned from Other Regional Assessments

Previous RAs undertaken in Atlantic Canada for offshore oil and gas exploratory drilling east of Newfoundland and Labrador (NL Offshore Drilling RA; Bangay et al. 2020), and offshore wind development in Newfoundland and Labrador (NL Offshore Wind RA; McDonald et al. 2025) and Nova Scotia (NS Offshore Wind RA; Daborn et al. 2025) , have highlighted several recurring challenges for CEA in the marine environment. These include assessing the combined influence of multiple human activities and environmental stressors rather than examining projects in isolation; incorporating climate change and future environmental conditions into cumulative effects predictions; addressing cumulative effects on Indigenous rights, culture, stewardship responsibilities, and well-being; evaluating effects on fisheries and other ocean users; establishing meaningful thresholds and significance criteria; and managing uncertainty associated with limited ecological,

[19] *Msit No'kmaq* is a core Indigenous principle that recognizes the interconnectedness of life.
[20] *Netukulimk* is a sustainability principle that guides the use, protection, and stewardship of land and resources provided to all by the Creator for the self-support and well-being of the individual and the community. The underlying principle of *Netukulimk* is the provision of basic community and individual needs as well as economic security, without jeopardizing the continued integrity, diversity and productivity of the environment (UINR 2020; KMK 2026b).

socio-economic, and Indigenous Knowledge information. These challenges reflect the dynamic, interconnected, and evolving nature of marine ecosystems and underscore the importance of regional-scale analyses, scenario-based approaches, monitoring, and adaptive management.

Table 9.1 summarizes key comments from reviewers on the 2020 Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador and the Regional Assessment of Offshore Wind Development in Nova Scotia as both of these RAs were considered to be especially relevant to the current CEA. Particular emphasis was placed on incorporating these lessons learned into building the framework for the current CEA (Section 9.2.2.).

Table 9.1 – Key Messages and Lessons Learned from the NL Offshore Drilling RA and NS Offshore Wind RA

RA	Key Messages/Lesson Learned
Key Messages from the NL Offshore Drilling RA[21]	• **Focus on cumulative pressures,** not just cumulative projects. Reviewers noted that the assessment tended to evaluate exploratory drilling effects separately from other activities rather than examining how multiple stressors interact. • **More fully consider Indigenous rights and cultural effects.** Indigenous reviewers expressed concern that Indigenous use was described but cumulative effects on rights, culture, stewardship responsibilities, and well-being were not sufficiently assessed. • **Evaluate future conditions, not only current conditions.** Reviewers highlighted the need to better consider how future environmental and socio-economic conditions could influence cumulative effects. • **Integrate climate change throughout the assessment.** Climate change was viewed as more than a contextual factor; it should be considered as an active cumulative stressor that influences environmental change and ecosystem resilience. • **Consider ecosystem thresholds, resilience, and recovery capacity.** Questions were raised about how cumulative effects conclusions could be reached without considering ecosystem resilience or capacity to absorb change.

[21] Summarized from comments received and posted on the Canadian Impact Assessment Registry site for the NL Offshore Drilling RA

RA	Key Messages/Lesson Learned
	• **Better integrate Indigenous Knowledge into assessment methods and conclusions.** Indigenous Knowledge was viewed as needing a more meaningful role in the analysis rather than serving as supporting context only. • **Broaden the concept of significance.** Reviewers suggested that significance should not be limited to regulatory or biophysical effects and should account for broader social-ecological considerations. • **Make greater use of regional planning and spatial tools.** The NL Offshore Dilling RA emphasized GIS-based decision-support tools and regional-scale spatial analysis to understand cumulative pressures and constraints.
Key Messages from the NS Offshore Wind RA[22]	• **Use realistic future scenarios**. Reviewers sought clearer assumptions about the scale, timing, location, and pace of future offshore development. • **Treat climate change as a cumulative effects driver.** Reviewers noted changing species distributions, fisheries, habitat suitability, storms, and ecosystem resilience. • **Assess multiple ocean sectors together.** Comments emphasized interactions among offshore wind, fisheries, shipping, cables, conservation areas, military use, and climate change. • **Centre fisheries in the cumulative effects analysis.** Fisheries submissions focused on access, displacement, safety, gear conflict, harvesting efficiency, and coastal communities. • **Integrate Indigenous rights, knowledge, and cultural continuity.** Comments emphasized harvesting, stewardship, marine relationships, and rights-based effects. • **Use a regional ecosystem approach.** Reviewers cautioned that project-by-project analysis may miss cumulative effects on species, habitats, and ecosystem function. • **Address uncertainty through monitoring and adaptive management.** Comments identified data gaps in ecological, fisheries, socio-economic, and Indigenous use information.

[22] Summarized from comments received and posted on the Canadian Impact Assessment Registry site for the NS Offshore Wind RA

RA	Key Messages/Lesson Learned
	• **Explain significance, thresholds, and sustainability.** Reviewers questioned how cumulative effects would be judged as acceptable or significant.

The CNSOER also conducts various strategic environmental assessments (SEAs) for petroleum-related exploration offshore Nova Scotia to help inform licencing processes and project-specific impact assessments and maintains a Public Registry of Strategic Environmental Assessments. Recent SEAs were reviewed in preparation of this CEA to help validate CEA inputs from the region.

9.2.1.6 Federal Government Research and CEA Initiatives

Several federal authorities are actively working on cumulative effects initiatives in support of government decision-making regarding cumulative effects management nationwide (refer to Section 9.9.1 for a summary of existing and planned federal government initiatives related to cumulative effects). Various publications and planning tools were reviewed to help inform this CEA. Key publications associated with Transport Canada's Cumulative Effects of Marine Shipping initiative (e.g., Lerner 2018; Pickard et al. 2019; Transport Canada 2022) provided insight on CEA frameworks and methodologies. Fisheries and Oceans Canada (DFO)-related publications on pathways of effects (e.g., Hannah et al. 2020), marine spatial planning (e.g., DFO 2007; Serdynska et al. 2021; DFO 2024a; Nagel et al. 2024) and cumulative impact mapping (e.g., Murray et al. 2022, 2024) also provided valuable insight and influenced development of this CEA (Section 9.2.2).

As noted in Section 9.1, this CEA is not intended to replace current and ongoing marine spatial planning initiatives. DFO-led marine spatial planning is a regional, ecosystem-based process intended to improve planning and decision-making by bringing together ecological, social, cultural, and economic information to support sustainable ocean use, reduce conflicts among activities, and better consider cumulative impacts. It is a strategic, non-regulatory framework that supports multiple sectors simultaneously, including fisheries, shipping, conservation, offshore energy, Indigenous use, and other ocean activities across the Scotian Shelf and Bay of Fundy (DFO 2024a).

This CEA is aligned with this marine spatial planning initiative because it similarly considers multiple activities, cumulative pressures, climate change, and Indigenous interests within the broader Scotian Shelf ecosystem. However, its scope is much narrower, focusing specifically on the cumulative effects associated with offshore exploratory drilling and related activities, rather than providing a comprehensive planning framework for all ocean uses and management objectives across the entire marine planning region.

9.2.2 CEA Framework

In consideration of the Terms of Reference, consultation and engagement results, Indigenous Knowledge shared, lessons learned from previous RAs, and technical guidance and academic research, this CEA:

- Considers the accumulation of past (i.e., retrospective), present, and future (i.e., prospective) changes in environmental state from human and natural stressors
- Adopts a cumulative pathways-of-effects approach within a multi-sector framework that evaluates how exploratory drilling interacts with fisheries, marine shipping, offshore wind, climate change, protected and conservation areas, submarine cables, and other marine activities (refer to Section 9.3 for the identification of drivers, pressures, and pathways of effects)
- Develops future development and climate scenarios that incorporate exploratory drilling, other petroleum activities, offshore wind, changing fisheries, expanding conservation areas, evolving shipping patterns, climate change, and emerging ocean industries (Refer to Section 9.4 for the description of scenarios)
- Incorporates climate change as a stressor and future condition driver as well as a VC
- Includes discussion of ecological integrity, vulnerability, resilience, adaptive capacity, recovery potential, and ecosystem condition even where quantitative thresholds cannot be established
- Considers Indigenous engagement input and Indigenous Knowledge, where it was made available at the time of writing, to identify VCs and cumulative effects pathways, as well as recommendations for involving the Mi'kmaq in cumulative effects management
- Assesses commercial fisheries and other ocean uses as both a VC and an active ocean-use sector, including spatial overlap and social/economic effects (Section 9.5.2)
- Assesses cumulative effects on Indigenous and treaty rights, harvesting practices, food systems, cultural continuity, Indigenous governance, stewardship roles, and intergenerational knowledge transfer (Section 9.5.3)
- Adopts a holistic view of the environment, paying attention to important connections and relationships in the ecosystem and understanding how biophysical changes can affect Indigenous Peoples and health, social, and economic effects (Section 9.7)
- Leverages tools such as the Canada Marine Planning Atlas, Scotian Shelf Human Use Atlas, Wind Energy Area Spatial Data Viewer, cumulative human impact mapping, marine spatial planning initiatives, and marine conservation planning datasets to support a regional cumulative effects analysis

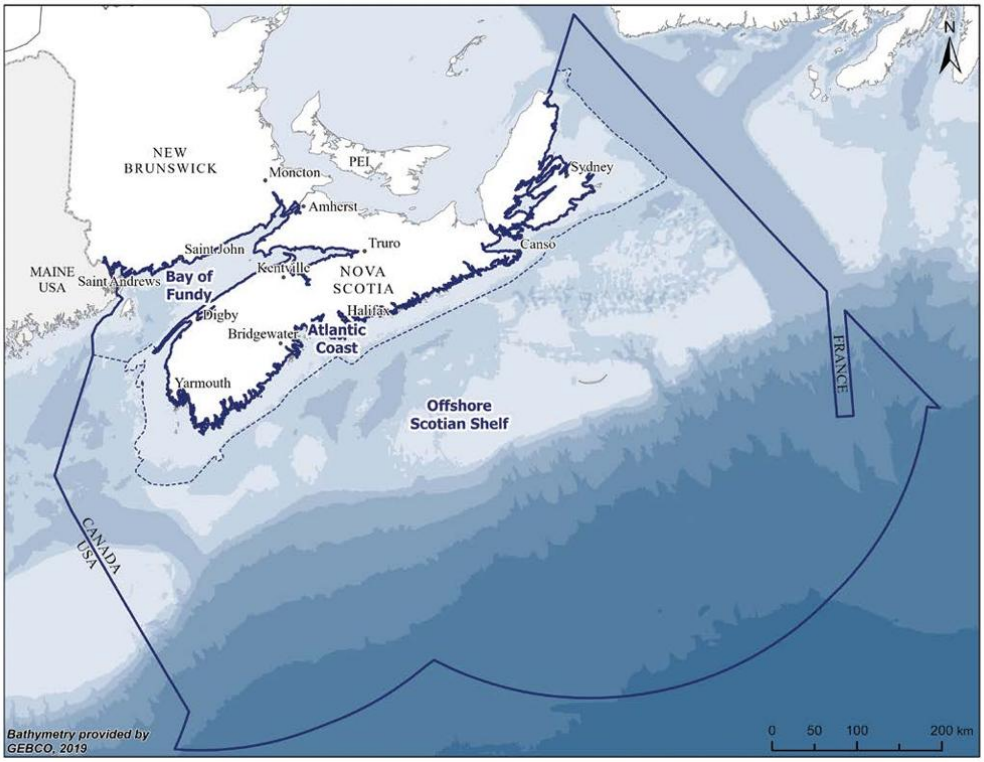
- Considers regional objectives and Indigenous-defined values (e.g. *Etuaptmumk*[23], *Netukulimk, Msit No'kmaq*)
- Documents limitations and recommends coordinated regional monitoring, indicators, data sharing, and adaptive management (Section 9.9)

9.2.3 Spatial and Temporal Boundaries

One of the primary challenges in conducting a CEA at a regional scale is accounting for the complex interactions between various stressors that accumulate over vast geographic areas and extended timeframes (McDonald et al. 2025). The Study Area, shown on Figure 2.1, was based on CNSOER jurisdictional boundaries (e.g., Canada-Nova Scotia offshore area) and on boundaries associated with previously completed SEAs by the CNSOER (Section 2.1).

The Scotian Shelf Bioregion, with a focus on the Offshore Scotian Shelf, was selected as the regional CEA boundary as it encompasses the ecological systems, oceanographic processes, species assemblages, food webs, and human uses that are most relevant to offshore exploratory drilling in the Nova Scotia offshore area and is a recognized ecological management unit used by DFO for ecosystem-based management, marine spatial planning, ecosystem assessment, biodiversity conservation, and cumulative effects analysis (e.g., Breeze et al. 2002; O'Boyle et al. 2005; Rutherford et al. 2005; DFO 2007; Serdynska et al. 2021; DFO 2024b). Figure 9.1 shows the Scotian Shelf planning area of the Scotian Shelf Bioregion as defined by DFO (2024a) which provides a visual reference for the regional CEA boundary.

[23] *Etuaptmumk* or "two-eyed seeing" is a guiding principle introduced by Mi'kmaq Elder Albert Marshall that means "learning to see from one eye with the strengths of Indigenous ways of knowing and from the other eye with the strengths of Western ways of knowing and to using both of these eyes together" (Bartlett et al. 2012).



Source: DFO 2024(a)

Figure 9.1. Scotian Shelf Planning Area as Reference for Regional CEA Boundary

VC-specific assessment boundaries are applied and adapted as necessary where effects may extend beyond the regional CEA boundary (e.g., effects on migratory marine mammals and aerofauna; socio-economic effects) or may be focused in specific areas within the regional CEA boundary (e.g., Indigenous use areas, fisheries management areas).

Temporal boundaries for the CEA must consider how far into the past and how far into the future the CEA should extend to allow for meaningful retrospective and prospective analyses. This CEA generally extends back to 1967, when the first offshore well was drilled offshore Nova Scotia, and into the future to approximately 2050. A 2050 future scenario is considered appropriate because it aligns with the Government of Nova Scotia's legislated objective to achieve net-zero greenhouse gas (GHG) emissions by 2050 under the Environmental Goals and Climate Change Reduction Act. Provincial climate, energy, and economic planning documents similarly use long-term planning horizons extending to mid-century and beyond (NSECC 2022a, 2022b). Accepted CEA practice recognizes that temporal boundaries may differ among VCs and may extend to periods before evidence of cumulative change or encompass important life-cycle processes. However, information becomes increasingly limited and uncertain further into the past and future. For this

reason, 1967 was selected as the primary historical boundary, although earlier information is considered where available and relevant.

9.2.4 Valued Components

The CEA focuses on four VCs that capture the primary pathways through which exploratory drilling may contribute to cumulative effects and consolidate closely-related receptors to reduce duplication while still reflecting issues of concern to Indigenous communities, fisheries stakeholders, public stakeholders, and regulatory agencies and meeting the Terms of Reference:

- **Marine Ecosystems** – This VC encompasses the ecological receptors most likely to experience cumulative biophysical effects from offshore activities, including fish and fish habitat, marine plants, marine mammals, sea turtles, aerofauna, and protected or special areas. These receptors are exposed to many of the same cumulative pressures, including underwater noise, vessel traffic, habitat alteration, pollution, climate change, and interactions with other marine industries. Combining these receptors within a single VC group allows the assessment to focus on common cumulative effect pathways and regional ecosystem function. The VC provides an overall understanding of ecological condition, resilience, and vulnerability within the Study Area and supports evaluation of how exploratory drilling contributes to cumulative changes in marine ecosystems relative to stressors.
- **Commercial Fisheries and Other Ocean Uses** – Commercial fisheries and other ocean uses are often affected by cumulative changes in access to marine space, resource availability, navigation patterns, and interactions among multiple marine industries. This VC focuses on the human ocean-use dimensions of cumulative effects, including commercial fisheries, marine transportation, offshore renewable energy development, tourism, recreation, and other marine activities. Consolidating fisheries and other ocean uses into a single VC allows the assessment to focus on shared issues such as access, displacement, spatial conflict, coexistence, and future ocean-use planning.
- **Indigenous Communities, Rights and Interests** – Indigenous Peoples may experience cumulative effects through interconnected environmental, cultural, social, economic, and rights-based pathways. Changes in marine ecosystems, access to harvesting areas, availability of culturally important species, marine use patterns, or the condition of culturally significant places may affect the exercise of Indigenous and treaty rights, current use of lands and resources, cultural continuity, community health and well-being, and Indigenous interests. The scope of this VC includes, but is not limited to, moderate livelihood and food, social, and ceremonial (FSC) fisheries.
- **Atmospheric Environment and Climate** – Climate change is one of the most important long-term drivers of cumulative effects in the Canada-Nova Scotia offshore area and has the potential to influence the other VCs through changes in ocean

DRAFT

temperature, species distribution, ecosystem productivity, and environmental conditions. The atmospheric environment also encompasses emissions and air quality effects associated with offshore activities. This VC provides the context for understanding how climate-related pressures interact with exploratory drilling and other regional activities. It supports evaluation of both the contribution of exploratory drilling to atmospheric emissions and the influence of broader climate change trends on future cumulative effects. With a dedicated climate-focused VC, climate change is considered explicitly rather than being treated solely as a background condition.

While assessed separately for analytical purposes, the four VCs are highly interconnected. Changes to one VC may influence the condition, function, or cumulative response of another through shared ecological, physical, social, and/or economic pathways. As a result, the cumulative effects of exploratory drilling should be considered not only within individual VC assessments (Section 9.5) but also in the context of their broader interactions and interdependencies (Section 9.7).

9.3 Regional Context and Cumulative Pressures

9.3.1 Overview

The Scotian Shelf is an intensely-used marine environment with many overlapping human activities, including: commercial, Indigenous, and recreational fisheries; shipping; recreation; research and monitoring; and, in the past, offshore oil and gas (referred to collectively in this CEA as “petroleum”) exploration and development. This section provides the regional context for the CEA by describing the principal human activities and natural processes that have shaped, and continue to influence environmental, social, cultural, and economic conditions within the Study Area and broader Scotian Shelf Bioregion. Understanding the existing cumulative effects setting is important because future effects associated with offshore exploratory drilling will occur within a marine environment that has already been influenced by historical and ongoing pressures from multiple sectors, as well as climate-related change.

The purpose of this section is to identify the key regional drivers of change, describing the activities, pressures, and pathways through which they may contribute to cumulative effects on VCs, and to provide context regarding their spatial and temporal extent.

In this CEA, cumulative effects are examined using a driver-pressure-effects pathway framework. Drivers represent the principal human activities and natural processes capable of influencing environmental, Indigenous, social, cultural, health, and economic conditions within the CEA regional boundaries. Multiple human ocean-use activities occur on the Scotian Shelf. These “drivers” exert various pressures on the marine environment and can

drive changes in marine ecosystem conditions, which can then lead to adverse environmental effects.

The following subsections describe each driver in greater detail, including its regional context, spatial and temporal characteristics, and the key pressures most relevant to the CEA. The drivers provide important context for a retrospective (i.e., how these activities/natural processes have already influenced VC conditions) and prospective (i.e., how these activities/natural processes could affect cumulative change in the future) CEA analysis.

Although offshore wind development is not a past or existing activity on the Scotian Shelf, it is a reasonably foreseeable future activity and is included as a potential future driver of cumulative effects. Although it is considered a natural process and not an “activity”, climate change is considered as an important driver affecting change in the marine environment.

Drivers and cumulative pressures are summarized in Section 9.3.9 and, along with the future scenarios presented in Section 9.4, these sections form the basis for the cumulative effects analyses presented in Section 9.5.

9.3.2 Offshore Petroleum-related Activities

The Canada-Nova Scotia offshore area has a long history of petroleum exploration and development, dating back to the first exploration licence awarded to Mobil Oil Canada in 1959. Subsequent magnetic, gravity, and seismic surveys led to the drilling of the first well (Sable Island C-67) on Sable Island in 1967 (CNSOPB 2018). Since the initiation of offshore petroleum exploration in the early 1960s, more than 401,000 km of two-dimensional (2D) seismic data and 48,000 km² of three-dimensional (3D) seismic data have been acquired offshore Nova Scotia (CNSOPB 2018). Since 1967 there have been a total of 211 wells drilled offshore Nova Scotia, of which 157 were exploration or delineation wells. The most recent well was an exploratory well drilled by BP Canada Energy Group ULC (Aspy D-11/D-11A) on the Scotian Slope in 2018 (CNSOER 2025). Figure 9.2 shows the history of wells drilled in the Canada-Nova Scotia offshore area, demonstrating the cyclical nature of exploration activity and pattern of development linked to significant discoveries.

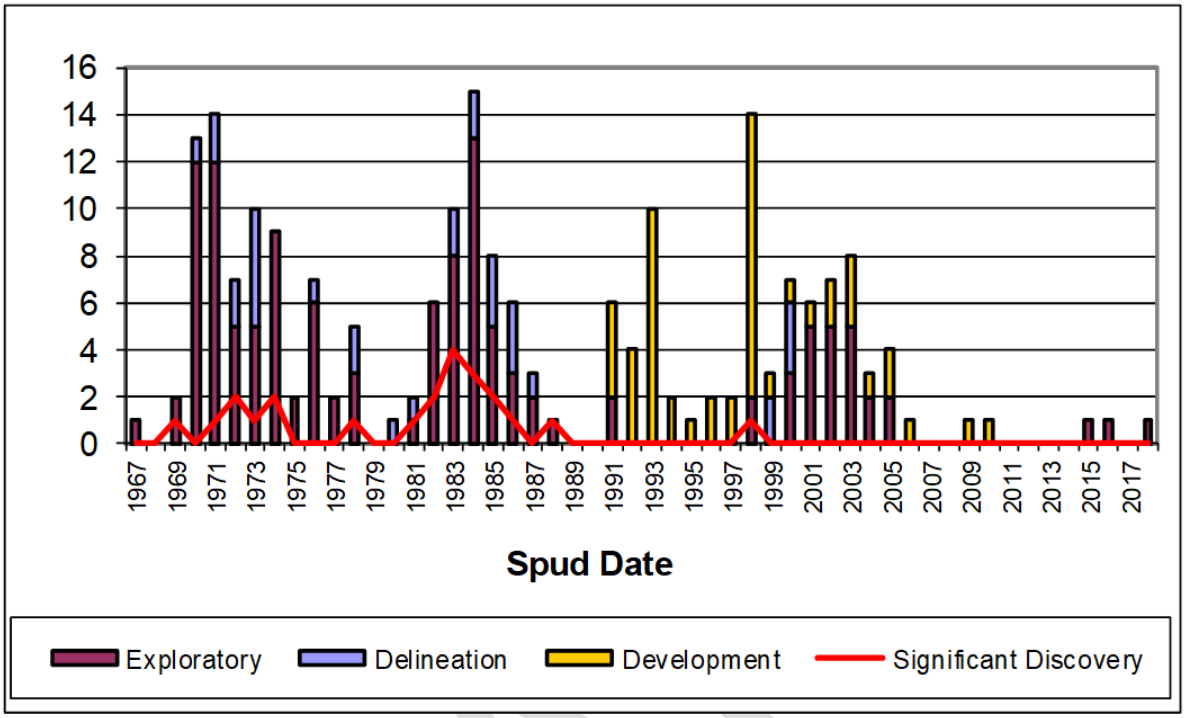


Figure 9.2. History of Wells Drilled in the Canada-Nova Scotia Offshore Area

Section 6 of this RA evaluates potential effects of exploratory drilling. This section covers a broader suite of potential effects associated with offshore petroleum-related activities including other exploratory activities and development. Geophysical and geological surveys, including seismic, geohazard, geotechnical, and seabed characterization programs, may affect the marine environment through the generation of underwater noise, vessel presence, and localized seabed disturbance. Seismic surveys have the greatest potential zone of influence due to the propagation of acoustic energy and may result in temporary behavioural responses by marine mammals, sea turtles, fish, and other marine species. Geohazard and geotechnical investigations may result in localized, short-term disturbance of benthic habitats associated with sampling or equipment deployment. SEAs conducted in the Canada-Nova Scotia Area have generally concluded that effects from geophysical and geological surveys are temporary, reversible, and localized, provided that established mitigation measures and environmental protection practices are implemented (Stantec 2019, 2021; Wood Canada Ltd. 2022).

The location of historic wells and legacy production projects that operated on the Scotian Shelf between 1992 and 2018 are shown on Figure 5.20 in Section 5. Table 9.2 provides an overview of each of the three legacy production projects: Cohasset Panuke; Sable Offshore Energy Project; and Deep Panuke Offshore Gas Development Project.

Table 9.2 – Summary of Legacy Production Projects in the Canada-Nova Scotia Offshore Area

Project/Activity	Overview
Cohasset Panuke	• Canada's first offshore oil project • Produced oil from 1992 to 1999 • Total of 14 production wells • Decommissioning and abandonment completed in 2006 • Environmental follow-up surveys completed in 2009
Sable Offshore Energy Project	• Canada's first offshore natural gas project • Produced natural gas from 1999 to 2018 • Total of 21 production wells over five fields • Gas and condensate transported through subsea pipeline to landfall near Goldboro, NS, for onshore processing • Fully decommissioned and abandoned in 2020 • Environmental follow-up surveys completed in 2023
Deep Panuke Offshore Gas Development Project	• Produced natural gas from 2013 to 2018 (seasonal production from 2015 to 2018) • Total of four production wells and one disposal well • Natural gas was processed offshore and transported through subsea pipeline to landfall near Goldboro, NS • Acid gas (hydrogen sulphide and carbon dioxide) removed from raw gas was injected into purpose-drilled disposal well • Fully decommissioned and abandoned in 2020 • Environmental follow-up surveys completed in 2021

Source: CNSOER 2026a

Collectively, these production projects contributed to the historical industrial footprint of the offshore area through the installation and operation of offshore infrastructure, marine and air traffic, routine operational discharges, and associated environmental monitoring programs. The Sable Offshore Energy Project and the Deep Panuke Offshore Gas Development Project each had a subsea pipeline that transported comingled natural gas and condensate, and processed natural gas, respectively, from their offshore production centres to landfall near Goldboro, NS. These projects also contributed to regional socio-economic conditions by supporting employment, supply chains, skills development, and offshore energy-related infrastructure, while influencing community, government, Indigenous, and industry experience with offshore petroleum development.

As part of decommissioning and abandonment of these projects, production facilities were removed, wells were permanently sealed, and post-abandonment monitoring programs

confirmed that nothing was left on the seabed that could pose a potential hazard to other ocean users (CNSOER 2026a). However, subsea export and gathering pipelines associated with the Sable Offshore Energy Project and Deep Panuke Offshore Gas Development Project were decommissioned and abandoned in place after being cleaned, flushed, and filled with seawater (Canada Energy Regulator 2019). Offshore surveys have confirmed evidence of marine life colonization along exposed sections of pipelines and protective rock mattresses (Hurley Environment Ltd. 2018). Potential snagging hazards for bottom-contact fisheries are known to exist along unburied sections of pipelines, although there have been no reports of lost or damaged fishing gear (Hurley Environment Ltd. 2018; Ovintiv 2021).

Although these past production projects may continue to influence marine benthic conditions within their physical footprint, the socio-economic legacy of these projects is considerably broad. These projects may support future offshore wind development by providing transferable workforce skills, regulatory experience, marine infrastructure, and established service networks that can facilitate the planning, construction, operation, and maintenance of new offshore energy projects.

9.3.3 Commercial Fisheries

Commercial fisheries are among the most extensive and economically important ocean uses on the Scotian Shelf, and constitute a key consideration in the CEA, both as a receptor and driver of cumulative change. Although the CEA recognizes the importance of Indigenous fisheries and their vulnerability to cumulative effects (see Section 9.5.3), from a cumulative effects driver perspective, commercial fisheries is the dominant force and the focus of this section. DFO's (2024a) marine spatial planning identifies fisheries among the major activities competing for marine space and emphasizes the need to balance ecological, economic, social, and cultural objectives through integrated marine planning.

The offshore waters of Nova Scotia support a diverse mix of commercial fisheries that vary spatially according to species distribution, oceanographic conditions, and seafloor characteristics. Offshore banks and shelf-edge areas support important groundfish, scallop, pelagic, and snow crab fisheries, while coastal and nearshore waters are dominated by lobster harvesting (Daborn et al. 2025). Refer to Section 5.3.1 for additional information on commercial fisheries occurring on the Scotian Shelf.

Nova Scotia's offshore fishing activity is conducted using both mobile and fixed gear, each interacting with the marine environment in different ways. Mobile gears, such as bottom trawls and dredges, can disturb seabed habitats, resuspend sediments, and affect benthic communities through repeated contact with the ocean floor. Fixed gears, including lobster traps, crab pots, gillnets, and longlines, generally have a smaller seabed footprint but can still affect marine species through bycatch, entanglement, gear loss, and localized habitat disturbance (DFO 2024a). Groundfish harvesting may occur using either trawl or longline

methods, while pelagic longlines target species such as tuna, swordfish, sharks, halibut, and other large migratory fish, particularly along the shelf edge. Scallop, whelk, and sea cucumber fisheries are commonly associated with the tops and flanks of offshore banks, whereas snow crab fisheries tend to occur in deeper channels. Section 5.3.1 summarizes commercial fisheries landings (all species), mobile gear fisheries, and fixed gear fisheries, respectively between 2014 and 2023. The distribution of these fisheries reflects the ecological diversity of the Scotian Shelf and results in a complex pattern of seasonal and spatial overlap among fishing sectors.

The Scotian Shelf has supported fisheries for centuries and remains a highly productive marine ecosystem, sustaining commercial fisheries by Indigenous and non-Indigenous harvesters as well as Indigenous food, social and ceremonial fisheries . Historical declines in groundfish stocks prior to the 1990s resulted in a substantial restructuring of the fishing industry, with shellfish species such as lobster, snow crab, and shrimp becoming increasingly important components of the regional fishery. Fisheries continue to evolve in response to changing environmental conditions, stock status, market demand, and management measures.

Fisheries management is also an important driver of change in the regional marine environment. Through measures such as quotas, area closures, gear restrictions, species recovery plans, and habitat protection initiatives, fisheries management influences the distribution and intensity of harvesting activities and contributes to broader ecosystem-based management objectives. Future fisheries management approaches are expected to increasingly consider climate change, ecosystem condition, cumulative effects, and MSP, which may influence future fishing patterns and interactions with offshore petroleum, offshore wind, conservation initiatives, shipping, and other ocean uses (Boyce et al. 2023; DFO 2025a, 2026a; Murphy et al. 2024).

9.3.4 Offshore Wind Development

Offshore wind development in Nova Scotia remains in the planning and regulatory approval phase, and no offshore wind projects have yet been constructed or approved. Following completion of the NS Offshore Wind RA (Daborn et al. 2025), the Province of Nova Scotia and the Government of Canada established a regulatory framework for offshore renewable energy and committed to licensing up to 5 GW of offshore wind by 2030. The Province has identified five proposed offshore wind energy areas (French Bank, Middle Bank, Sable Island Bank, Sydney Bight, and Western/Emerald Bank) for future development and is advancing a competitive licensing process through the CNSOER (Government of Canada and Government of Nova Scotia 2025) (refer to Figure 5.21, Section 5).

An Offshore Wind Land Tenure process (NS25-1R) was launched by the CNSOER in October 2025 with Call for Information and Offshore Wind Prequalification processes.

Based on a summary report prepared by the CNSOER (CNSOER 2026b), participants in the Call for Information process viewed offshore wind development in Nova Scotia as having substantial economic and clean energy potential but emphasized that development must proceed cautiously and only with meaningful engagement, robust science, and transparent decision-making.

Key concerns focused on protection of Indigenous and treaty rights, potential impacts on commercial and Indigenous fisheries, displacement of fishing activity, environmental and ecological effects, navigational safety, cumulative effects, and uncertainty arising from data gaps. Respondents called for a precautionary, phased approach to development, prioritizing avoidance and mitigation of impacts overcompensation, while ensuring co-existence with fisheries and other ocean users. There was also strong emphasis on community benefits, local employment and supply-chain opportunities, equitable distribution of benefits, clear compensation and governance frameworks, long-term monitoring, adaptive management, and regulatory transparency to maintain public confidence and social licence (CNSOER 2026b). In anticipation of an upcoming Call for Bids in late 2026 or early 2027, which is expected to focus on the French Bank, Middle Bank, and Sydney Bight Wind Energy Areas, current activities are focused on marine spatial planning, environmental and socio-economic studies, transmission planning, and industry readiness initiatives.

The CNSOER is currently undertaking a RA of offshore wind site assessment activities (e.g., metocean, geophysical, geotechnical, and biological surveys), which is expected to be completed by end of 2026. This Regional Assessment of Offshore Wind Site Assessment Activities will complement the NS Offshore Wind RA (Daborn et al. 2025) by assessing environmental and socio-economic effects of early planning activities, which would precede offshore wind development.

According to the NS Offshore Wind RA (Daborn et al. 2025), offshore wind development has the potential to provide substantial socio-economic benefits through renewable energy generation, GHG reductions, employment, supply chain development, port and infrastructure investment, and support for emerging industries such as green hydrogen. The assessment also identifies potential environmental and socio-economic effects that require careful management, including impacts on marine habitats and species (e.g., fish, marine mammals, birds, and benthic communities), underwater noise, changes to ocean use patterns, navigation, and marine safety considerations, and potential effects on commercial fisheries by Indigenous and non-Indigenous harvesters as well as Indigenous food, social and ceremonial fisheries through displacement, access restrictions, or altered fishing practices. The assessment emphasizes that these effects will depend on project location, scale, and design, and highlights the importance of precautionary planning, meaningful engagement, coexistence with other ocean users, CEA, and adaptive management throughout the offshore wind development process (Daborn et al. 2025).

9.3.5 Marine Shipping

The Scotian Shelf is traversed by major domestic and international shipping corridors that connect Nova Scotia with other regions of Canada, the eastern United States, Europe, and other international destinations (Hannah et al. 2020; DFO 2024a). Commercial shipping offshore Nova Scotia generally consists of tankers and general bulk and containerized cargo carriers. Other vessels operating within the area include cruise ships, ferries, fishing vessels, government and research vessels, and vessels supporting offshore industries, including petroleum exploration and development activities (Hannah et al. 2020; DFO 2024a). Figure 5.19 in Section 5 presents density of vessel traffic (all vessel types) offshore Nova Scotia in 2024. For the purposes of this CEA, however, fishing vessels, research and monitoring vessels, and vessels supporting offshore industries are addressed within their respective use categories and marine shipping pertains primarily to commercial shipping.

Halifax is one of Canada's largest container ports and serves as a major gateway for international trade, while other regional ports support commercial marine transportation and industrial activities (Hannah et al. 2020; DFO 2024a). Shipping activity contributes substantially to the regional economy and supports movement of commodities, passengers, and services; however, it also represents an important driver of cumulative change in the marine environment. Marine shipping generates a variety of pressures relevant to CEA, including underwater noise, the introduction of invasive species and pathogens through ballast water and hull fouling, marine discharges, artificial lighting, air contaminant and GHG emissions, vessel strikes on marine species, and potential exclusion or displacement of other marine activities (Hannah et al. 2020; Transport Canada 2022).

Shipping-related underwater noise is recognized as one of the most widespread and persistent anthropogenic pressures in marine environments (Hannah et al. 2020). Unlike many offshore activities that occur intermittently or are concentrated in specific locations, commercial shipping produces recurring noise over extensive areas and throughout the year. Vessel traffic also contributes to the risk of collisions with marine mammals and sea turtles and may facilitate the introduction of non-native species through ballast water exchange and hull fouling (Hannah et al. 2020).

9.3.6 Additional Ocean Uses

Additional ocean uses on the Scotian Shelf include aquaculture, research and monitoring, recreation and tourism, and military use. While it is recognized that these ocean uses, on their own, are relatively minor contributors to cumulative change in the marine environment, they potentially represent drivers that contribute to existing pressures on the marine environment and are considered in this CEA.

Offshore carbon capture and storage (CCS) has been identified as a potential future ocean-use activity associated with the energy transition. Environmental concerns primarily relate to the long-term containment of injected carbon dioxide, the potential for localized changes in seawater chemistry in the event of leakage, disturbance associated with offshore infrastructure development, and the need for monitoring programs to verify storage integrity and protect marine ecosystems (Blackford et al. 2014; Bui et al. 2025).

9.3.6.1 Aquaculture

As of August 2026, there were 202 aquaculture leases located in coastal waters of Nova Scotia (Government of Nova Scotia 2026a). Nova Scotia's aquaculture industry has expanded substantially since the 1990s, with finfish production, particularly Atlantic salmon, driving most of the sector's growth (Howarth et al. 2022). Although finfish aquaculture dominates production and value in Nova Scotia, there are currently many more marine aquaculture leases licensed for shellfish (less than 15% of leases are dedicated to finfish production) (Howarth et al. 2022; Government of Nova Scotia 2026b). In 2024, the Nova Scotia Department of Fisheries and Aquaculture reported a total industry production value of $114.7 million, of which $99.5 million was attributed to Atlantic salmon and rainbow trout production (Nova Government of Nova Scotia 2026b).

The aquaculture industry currently supports employment and economic activity in rural coastal communities and remains concentrated in nearshore waters. Looking forward, strategic planning initiatives and industry interest are increasingly focused on expanding aquaculture into more exposed and offshore environments as the development of offshore aquaculture is gaining momentum globally (Howarth et al. 2022).

Key environmental concerns associated with aquaculture are generally related to water quality, benthic habitat effects, wild species interactions, disease and parasites, conflicts with sensitive habitats and other marine users, and visual impacts (Howarth et al. 2022).

9.3.6.2 Research and Monitoring

Research and monitoring represent an increasingly important ocean use in offshore Nova Scotia. Long-term ecosystem monitoring programs are conducted by government, Indigenous organizations, academia, and industry throughout the region, including within the Gully and St. Anns Bank Marine Protected Areas (MPAs). Activities include oceanographic monitoring, fisheries surveys, marine mammal research, habitat mapping, acoustic telemetry, and biodiversity monitoring, reflecting a growing emphasis on ecosystem-based management, marine conservation, spatial planning, and understanding climate-driven changes in offshore ecosystems (DFO 2010b, 2023, 2024c, 2024d, 2026b).

From a cumulative effects perspective, research and monitoring activities contribute atmospheric emissions and underwater noise to the marine environment and in some

cases involve intrusive sampling (i.e., trawl surveys), mooring of equipment, and removal of fish.

9.3.6.3 Tourism and Recreation

Section 5.3.3.1 describes tourism and recreation in the province from the perspective of another ocean user that may be affected by exploratory drilling activities. However, marine tourism and recreation activities can also contribute to cumulative changes in the marine environment. Except for cruise traffic (which is accounted for under marine shipping within this CEA), most marine tourism and recreation in the province occurs seasonally (e.g., June to October) in nearshore or coastal waters. These activities may include recreational fishing, duck hunting, sailing, kayaking, seabird and whale watching, diving, surfing, and beach visits (DFO 2024a; Daborn et al. 2025).

From a cumulative effects perspective, marine vessel use associated with tourism and recreation activities is a driver of cumulative change as it contributes atmospheric emissions and underwater noise to the marine environment. In the case of recreational fisheries, removal of fish species through harvesting is another relevant pressure.

9.3.6.4 Military Use

Halifax is the home port to the Royal Canadian Navy – Atlantic Fleet and, with Canadian Forces Base (CFB) Halifax supporting approximately 11,000 Canadian Armed Forces members and civilian employees of DND. CFB Halifax is an important contributor to the economy of the city and surrounding area (Daborn et al. 2025). On occasion, the Navy conducts military training exercises in offshore areas defined as Maritime Local Operating Areas (MARLOAs) (refer to Section 5.3.3.4). During training exercises, naval ships contribute to marine vessel traffic in the area and generate underwater noise and marine emissions. Naval and merchant marine shipwrecks that may contain explosive munitions and underwater munitions dump sites are collectively referred to as unexploded ordnance (UXO) Legacy Sites. There are several UXO Legacy Sites located on the Scotian Shelf; these are considered important geohazards during marine spatial planning for offshore development and will persist in the future. Geohazard investigations prior to exploratory drilling and offshore development are conducted to identify unknown UXO Legacy Sites and other potential geohazards. Refer to Section 5.3.3.4 for additional information on military presence in Nova Scotia.

9.3.6.5 Submarine Cables

Several active and inactive submarine cables, including telecommunication and power cables, intersect the Scotian Shelf. Some inactive cables are more than 100 years old (Breeze et al. 2005).

Submarine telecommunications cables represent an established component of offshore infrastructure (Breeze et al. 2005). Numerous active and legacy cable routes cross the Scotian Shelf, linking Atlantic Canada with domestic and international communications networks. Although their footprint is generally localized, submarine cables contribute to the cumulative pattern of marine space use and may interact with other activities through routing constraints, seabed disturbance during installation, and long-term infrastructure presence. Submarine telecommunication and power cables may become a more prominent component of the region's offshore infrastructure footprint over time as offshore wind development advances in the region.

9.3.7 Conservation and Marine Management

Section 5.2.6 describes protected and special areas on the Scotian Shelf, including conservation objectives and activity restrictions for existing designated protected areas. Within the context of the CEA, conservation of the marine environment is considered primarily as an ocean space conflict to the extent that designated conservation areas restrict certain marine use activities (e.g., drilling, bottom-contact fishing) from occurring within their boundaries.

Several MPAs and Marine Refuges established to conserve ecologically significant habitats impose varying restrictions on ocean uses. MPAs such as the Gully and St. Anns Bank restrict activities that could adversely affect conservation objectives, while Marine Refuges such as Emerald Basin and Sambro Bank, Eastern Canyons, and the Northeast Channel primarily limit fishing activities that could damage sensitive benthic habitats (DFO 2017, 2023; Daborn et al. 2025).

Although not a designated protected area, the Governments of Canada and Nova Scotia enacted a moratorium on oil and gas exploration and drilling on Georges Bank in 1988 in recognition of the ecological and socio-economic significance of the area (NRCan 2025). This moratorium decision is revisited regularly and has most recently been extended to 2032 (NSDNRR 2022). In 2025, federal and provincial governments also jointly directed the CNSOER to prohibit the issuance of submerged land licences for offshore wind energy at Georges Bank (NRCan 2025).

Collectively, conservation and moratorium areas influence future spatial planning and may constrain the location and operation of offshore activities, including petroleum exploration and development, offshore wind, fisheries, and associated infrastructure.

9.3.8 Climate Change

Climate change is widely recognized as a dominant regional-scale driver of cumulative effects on the Scotian Shelf (DFO 2013; Boyce et al. 2023, 2024; Murphy et al. 2024). Climate change influences cumulative effects not only through direct ecological changes,

but also through its effects on marine infrastructure, resource management systems, and the adaptive capacity of affected sectors and communities. Contemporary climate adaptation frameworks increasingly recognize vulnerability as a function of exposure, sensitivity, and adaptive capacity across interconnected ecological and socio-economic systems, highlighting the importance of adaptive and flexible management approaches under changing environmental conditions (Boyce et al. 2023).

Key projected ecological changes include continued increases in ocean temperature, sea level, stratification, ocean acidification, and reductions in dissolved oxygen, together with changes in precipitation, storm patterns, freshwater runoff, and sea ice extent. These environmental changes are expected to alter habitat conditions, ecosystem productivity, species distributions, trophic interactions, and the abundance and availability of living marine resources (DFO 2013). These changes can influence fisheries productivity, ecosystem resilience, habitat suitability, and the effectiveness of management measures (DFO 2013; Boyce et al. 2024). These changes can interact with other human activities, including fisheries, shipping, offshore energy development, and other ocean uses, potentially increasing the vulnerability of marine ecosystems and reducing their resilience to additional stressors (Boyce et al. 2023, 2024). Recent cumulative impact mapping for marine habitats in Atlantic Canada found that climate change stressors (ocean acidification and surface and bottom temperature change) were the largest contributors to cumulative impact scores across the bioregion and had the broadest spatial footprint of any stressor sector (Murphy et al. 2024).

Climate change is also an important cumulative effects driver within Nova Scotia's broader social, economic, and environmental systems. The Province of Nova Scotia's 2025 Climate Change Risk Assessment (Government of Nova Scotia 2025) identifies increasing risks associated with extreme weather events, flooding, wildfires, drought, coastal impacts, and pressures on infrastructure, communities, critical services, and the economy. As climate change continues to affect the resilience of Nova Scotia communities, future activities in the offshore environment will occur within the context of increasing societal vulnerability and competing demands on infrastructure, emergency response capacity, natural resources, and public investment (Government of Nova Scotia 2025). Climate change should therefore be recognized as a cross-cutting cumulative effects driver that influences both marine and onshore systems.

Refer to Section 9 for more additional context on climate and climate change in the region.

9.3.9 Summary of Cumulative Pressures

As demonstrated by the description of drivers above, the activities occurring on and influencing the Scotian Shelf may be diverse, but these drivers contribute several common pressures influencing cumulative change. Table 9.3 identifies the principal drivers considered in this CEA, the activities associated with each driver, and the pressures

through which they may contribute to cumulative effects. Although not reflected in Table 9.3, it is noted that the scale, duration, intensity, and geographic extent of pressures may vary. Accidents and malfunctions are addressed separately in Section 6.

Table 9.3 – Identification of Activities and Pressures Potentially Affecting Cumulative Change on the Scotian Shelf

Driver	Activity Description	Pressures
Exploratory Drilling	• Seabed surveys • Well drilling, testing and abandonment • Vessel and helicopter traffic	• Underwater noise • Physical seabed disturbance • Marine discharges • Introduction of invasive species and/or pathogens • Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Exclusion of other marine activities • Presence of infrastructure on seabed or water column
Other Offshore Petroleum Activities	• Geophysical surveys • Well drilling, testing and abandonment • Installation and operation of offshore infrastructure • Extraction and production of petroleum resources • Installation of pipelines for resource collection and export • Vessel and helicopter traffic	• Underwater noise • Marine discharges • Physical seabed disturbance • Introduction of invasive species and/or pathogens • Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Exclusion of other marine activities

DRAFT

Driver	Activity Description	Pressures
		• Presence of infrastructure on seabed or water column
Commercial Fisheries	• Mobile gear fisheries (e.g., dredge, otter trawl, seine) • Fixed/passive gear fisheries (e.g., pots, traps, pelagic longline, gillnets) • Bycatch • Fishing vessel traffic	• Removal of biomass • Underwater noise • Physical seabed disturbance • Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Lost and/or abandoned gear • Presence of infrastructure on seabed or water column
Offshore Wind Development	• Geophysical surveys • Installation and operation of offshore infrastructure • Installation and operation of subsea cables • Vessel and helicopter traffic	• Underwater noise • Marine discharges • Physical seabed disturbance • Introduction of invasive species and/or pathogens • Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Exclusion of other marine activities • Presence of infrastructure on seabed or water column
Marine Shipping	• Commercial vessel traffic	• Underwater noise • Introduction of invasive species and/or pathogens • Marine discharges

DRAFT

Driver	Activity Description	Pressures
		• Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Exclusion of other marine activities
Other Ocean Uses	• National defense activities • Marine research and monitoring • Tourism and recreation • Other fishing • Aquaculture • Telecommunication cables • Other inshore or offshore activities	• Underwater noise • Marine discharges • Introduction of invasive species and/or pathogens • Artificial lighting • Air contaminant and GHG emissions • Vessel strikes • Entanglement/entrapment of marine species • Exclusion of other marine activities • Presence of infrastructure on seabed or water column
Conservation and Marine Management	• Protected Area establishment	• Displacement/exclusion of other marine activities
Climate Change	• Atmospheric GHG emissions • Climate change processes	• Increased air and water temperatures • Ocean acidification (reduced pH) and deoxygenation (low oxygen) • Change in climate variability and extreme events • Sea level rise

DRAFT

Driver	Activity Description	Pressures
		• Change in ocean circulation and stratification • Change in freshwater inputs and salinity

Figure 9.3 provides an overview of drivers and key pressures and their interactions with the VCs. These interactions are explored further in Section 9.5.

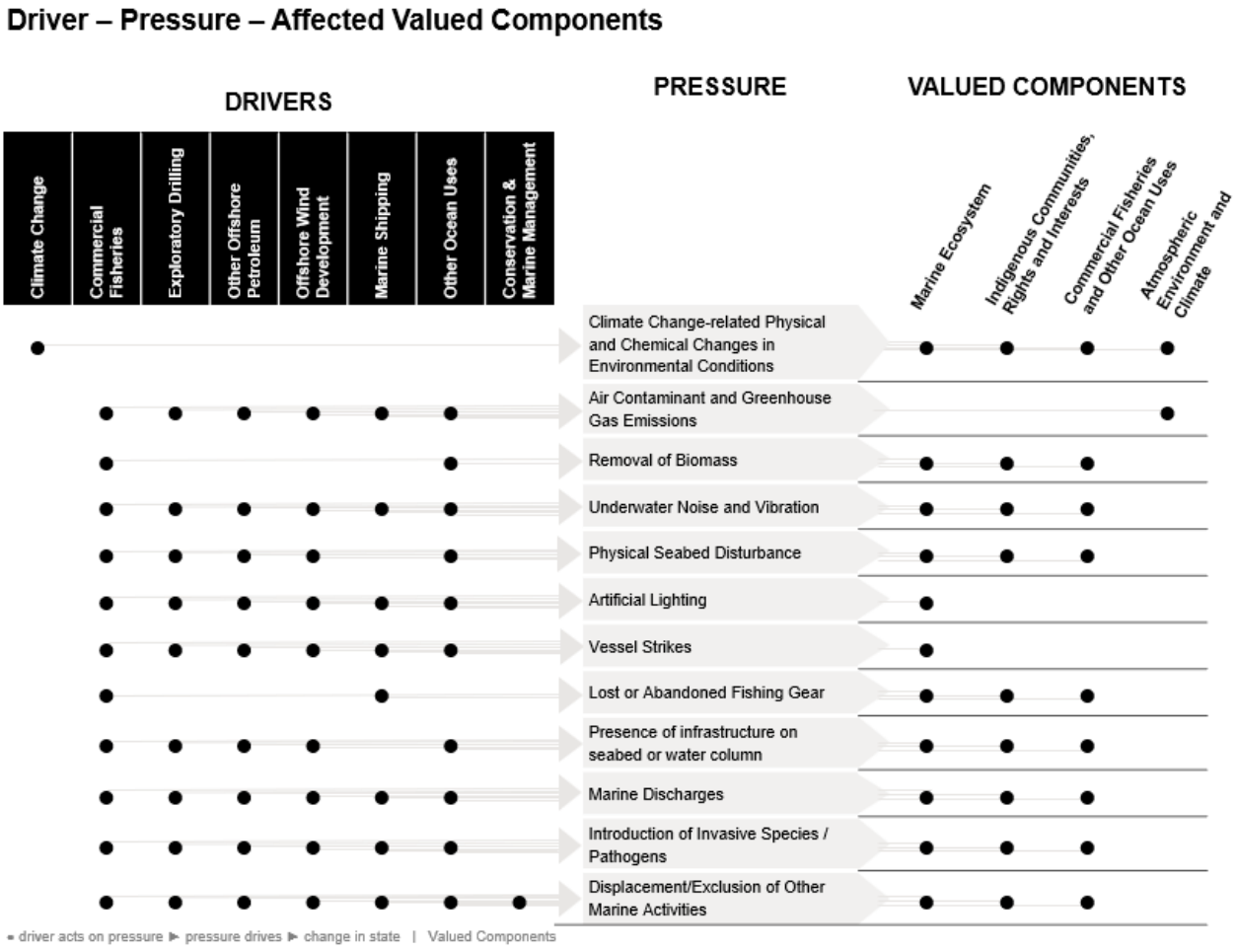


Figure 9.3. Interaction of Cumulative Effects Drivers and Pressures with Valued Components

To support marine spatial planning initiatives for the Scotian Shelf and Bay of Fundy, DFO developed a regional cumulative human impact mapping analysis that integrates the

spatial distribution of human activities with the vulnerability of marine habitats to anthropogenic stressors. Using the widely applied Halpern et al. (2008) cumulative impact mapping framework, data for 45 human activities and stressors across five sectors[24] (commercial fishing, marine-based activities, coastal activities, land-based activities, and climate change) was combined with 21 marine habitat types spanning intertidal, coastal, shelf, slope, and deep-sea environments (Murphy et al. 2024).

This cumulative impact mapping exercise provides a regional-scale depiction of where marine ecosystems are currently exposed to multiple overlapping pressures and highlights the relative contribution of different stressor sectors to cumulative impacts. Through this exercise, climate change stressors (ocean acidification and surface and bottom temperature change) were found to be the largest contributors to cumulative impact scores across the bioregion and have the broadest spatial footprint of any stressor sector. Commercial fishing was the second largest contributor to cumulative scores in the Scotian Shelf bioregion, with bottom trawling, pots, longline pelagic, and longline groundfish found to be the most impactful gear types across the region (Murphy et al. 2024). The analysis generated spatially explicit cumulative impact scores and identified regional “cold spots” and “hot spots” of cumulative pressure throughout the Scotian Shelf and Bay of Fundy (Murphy et al. 2024).

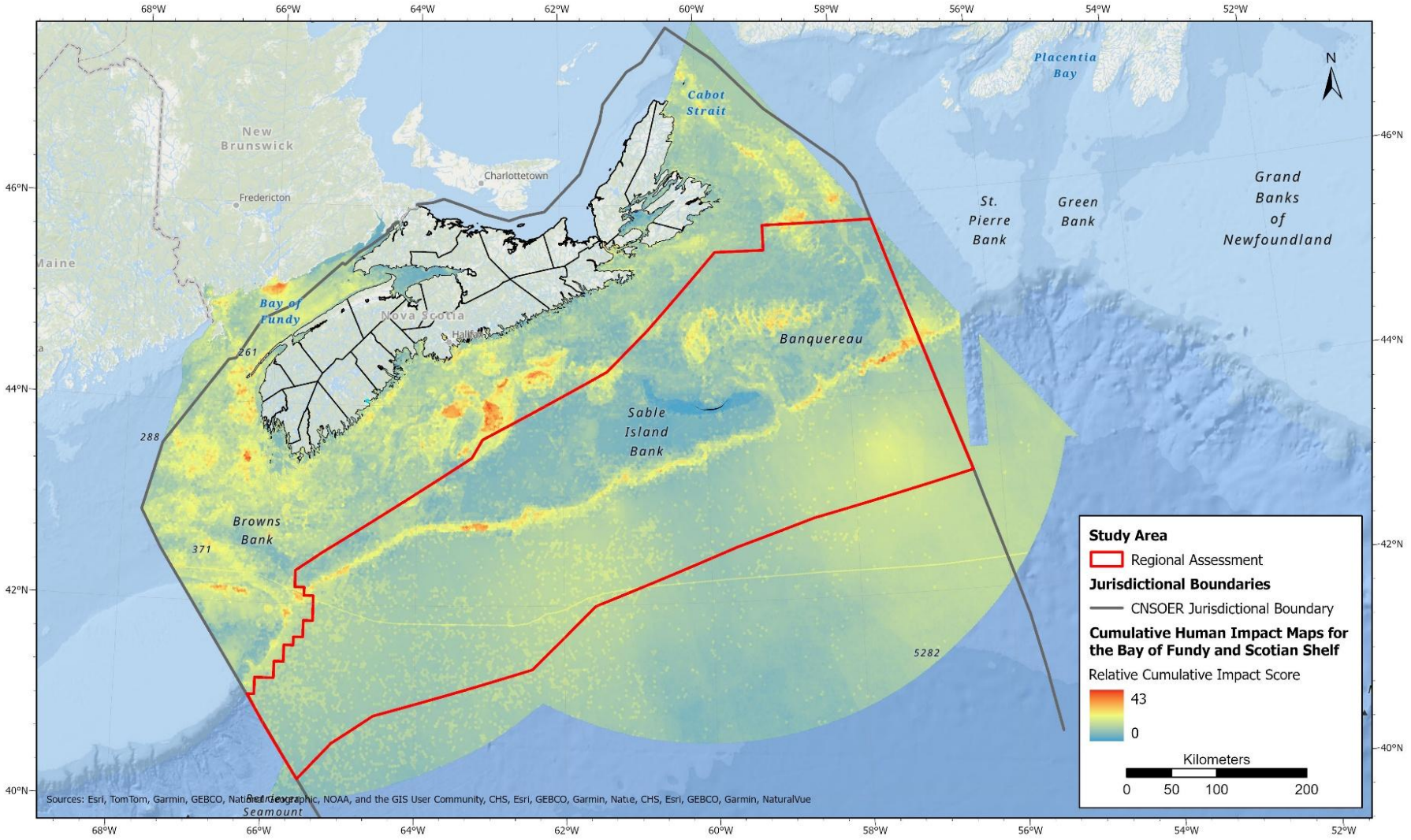
As shown in Figures 9.4 and 9.5, cumulative impacts are not evenly distributed, nor are the key contributing factors. Figure 9.4 maps the relative cumulative impact scores from commercial fishing, coast-based, land-based and marine sector activities, along with climate-based impact scores. Figure 9.5 maps the hot and cold spots when the cumulative impact scores were combined with marine habitat types (Murphy et al. 2024). Robust hot spots (i.e., areas where Murphy et al [2024] were very confident that cumulative human impacts are high) primarily exist in the coastal zones, with fewer hot spots identified offshore (Figure 9.5). Offshore habitats (>30 m deep) are dominated by climate change and commercial fishing, while nearshore habitats are influenced by a much wider range of activities (Murphy et al. 2024).

For the purposes of this CEA, the cumulative impact maps provide context regarding the existing distribution of cumulative pressures on the Scotian Shelf and help identify areas that may be particularly vulnerable to cumulative effects from anthropogenic and climate-based drivers. However, as noted by Murphy et al. (2024) the assessment represents potential cumulative impacts rather than measured ecological effects, relies on expert-derived vulnerability scores and additive modelling assumptions, and was developed primarily at habitat and regional scales. It also excludes several activities/pressures including some tourism activities and emerging activities like offshore wind. Consequently, the results are most appropriately used to identify broad patterns of relative human

[24] Offshore wind development was not included as a human activity and therefore not considered in cumulative impact mapping.

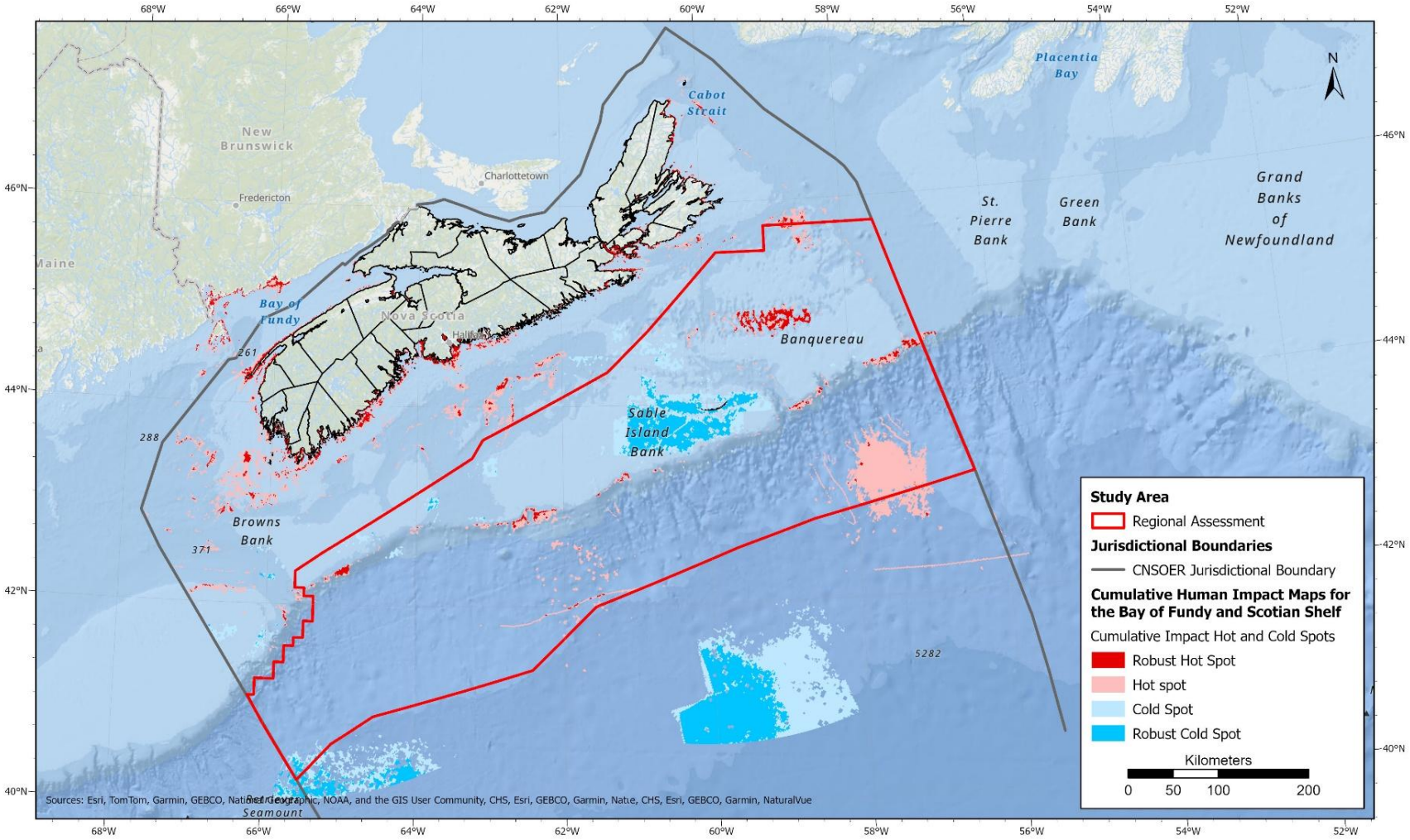
pressure and areas of potential cumulative concern, rather than to infer project-specific effects, significance, or causal relationships between individual activities and ecological outcomes.

DRAFT



Source: Modified from Murphy et al. 2024

Figure 9.4. Cumulative Human Impact Mapping: Relative Cumulative Impact Score



Source: Modified from Murphy et al. 2024

Figure 9.5. Hot and Cold Spots of Modelled Cumulative Human Impacts

9.4 Development and Climate Scenarios

Recognizing the inherent uncertainty associated with future environmental, economic, and development conditions, this CEA uses a scenario-based approach to explore how cumulative effects may differ under a range of plausible futures. Future development assumptions were based on past levels of activity and emerging government policy and prospectus studies and reviewed through engagement with federal and provincial authorities. However, these scenarios remain highly speculative. The scenarios are not intended to predict future conditions or represent specific development forecasts. Rather, they provide a structured means of examining how cumulative effects may change in response to varying levels of offshore activity and broader environmental change.

The following scenarios were developed for the CEA:

- **Scenario 1: Current Trajectory**: Continuation of Existing Trends – Represents a continuation of current offshore activity levels, existing management approaches, and anticipated development trends for a near-term (2026 to 2035) future scenario. Cumulative effects are assessed within the context of ongoing fisheries, marine transportation, emerging offshore wind development, exploratory drilling activity, and continued climate change trends.
- **Scenario 2: Expanded Offshore Development**: Increased Human Activities and Ocean Use – Represents a future (2035 to 2050) with substantial growth in offshore energy development, including increased exploratory drilling and a development project, offshore wind development, supporting infrastructure, increased marine vessel activity, and increased protected areas. Cumulative effects are assessed under greater intensity of human activity and increasing competition for ocean space and resources under continued climate change trends.
- **Scenario 3: Climate-Stressed Future**: Expanded Offshore Development under Reduced Ecosystem Resilience – Represents the same expanded offshore development future as Scenario 2, but with increasing climate-related stressors such as ocean warming, ecosystem change, and shifts in species distribution. Cumulative effects are assessed in the context of reduced ecosystem resilience and greater vulnerability to multiple interacting pressures.

Table 9.4 further defines each of these scenarios and the rationale used for assumptions.

These scenarios are applied consistently across all VC assessments to provide a common basis for evaluating future cumulative effects. For each VC, the assessment considers how cumulative pressures, pathways, vulnerabilities, and potential future conditions may differ under each scenario. The analysis also examines the relative contribution of

exploratory drilling within the broader context of other existing and reasonably foreseeable activities and stressors affecting the regional assessment area.

Scenario analysis in this CEA is intended to support consideration of future regulatory and management approaches by identifying circumstances under which exploratory drilling may contribute to cumulative effects and the factors most likely to influence future cumulative effects outcomes.

It is noted that the future scenarios (presented in Table 9.4) were developed using knowledge and experience gained from present and past offshore activities in Nova Scotia. The scenarios represent a range of reasonably foreseeable future conditions based on previous trends and provide a practical basis for assessing potential cumulative effects for this RA. However, technological advancements around offshore energy systems (e.g., floating LNG), autonomous technologies, carbon management approaches, and other emerging sectors (e.g., offshore data centres) in the marine environment continue to evolve and may alter future development in ways that cannot be fully anticipated. Accordingly, these scenarios should not be viewed as fixed predictions of future conditions, but rather as planning tools based on current knowledge.

As noted in section 9.9, effective cumulative effects management requires coordinated regional planning, information sharing, monitoring, adaptive management, and continued collaboration among all ocean users and those who regulate. Consistent with this adaptive management approach, cumulative effects predictions and associated management strategies should be periodically reviewed and updated as new information becomes available, technologies emerge, developments change, and monitoring results improve understanding of cumulative effects over time. Reassessment would help ensure that cumulative effects management remains responsive to evolving environmental, social, economic, and technological conditions.

DRAFT

Table 9.4 – Proposed Future Scenarios for Cumulative Effects Assessment

Activity	Scenario Assumptions		
	Scenario 1 (Current Trajectory)	**Scenario 2 (Growth)**	**Scenario 3 (Growth + Intensified Climate Change)**
Exploratory Drilling	• Two Exploration Licences (EL) issued on Scotian Shelf/Slope[25] • Two exploration drilling programs with up to 4 wells drilled between 2027 and 2035	• Up to 4 wells drilled in any one year, to a maximum of approximately 14 wells between 2035 and 2050 on Scotian Shelf and Slope[26] • Assume exploration concentrated on Scotian Slope/deepwater	Same level of activity as Scenario 2 plus Continued warming of the Scotian Shelf; increased frequency and intensity of marine heatwaves, ocean acidification, changing oceanographic conditions, sea-level rise, increased storm severity, and continued shifts in species distributions to 2050 and beyond[12]
Other Oil/Gas Activities	• One targeted seismic survey on Sable Island Bank and speculative survey over larger area	• Delineation and development drilling • One development project • One or more seismic/geophysical surveys every 2 to 5 years in support of offshore	

[25] Scenario is informed by results of the Petroleum-related Call for Bids NS25-1P with successful bids on Parcel 8 and 9. https://cnsoer.ca/news-resources/news-announcements/cnsoer-announces-results-petroleum-related-call-for-bids-ns25-1p. Future hypothetical scenarios assume a resurgence of exploratory drilling programs, but based on current knowledge, the level of future activity is not expected to reach historical highs as experienced offshore Nova Scotia in the 1970s and 1980s.

[26] Scenario is informed by historical activity levels in NS Offshore (1969-2026); current Active ELs (as of 2026); no future planned call for bids (as of 2026); number of wells and drilling frequency based on data since 2000; provincial mapping of top leads.

Activity	Scenario Assumptions		
	Scenario 1 (Current Trajectory)	Scenario 2 (Growth)	Scenario 3 (Growth + Intensified Climate Change)
		petroleum exploration and resource appraisal	
Offshore Wind Development	• Offshore wind licences (i.e., submerged land licences) issued for up to 5 gigawatts (GW) in French Bank, Middle Bank and/or Sydney Bight Wind Energy Areas by 2028[27] • Additional offshore wind licences issued through subsequent Call for Bids processes in French Bank, Middle Bank, Sydney Bight, Sable Island Bank, and/or Western/Emerald Bank Wind Energy Areas • Designation of new Wind Energy Areas (e.g., Canso Bank, LaHave Basin, Misaine Bank) and additional Call for Bids	• Additional offshore wind licences issued and site assessment work underway for projects in existing Wind Energy Areas and Sable Island Bank • Designation of new Wind Energy Areas and additional Call for Bids • Development and/or operation of up to 7 to 10 GW offshore Nova Scotia for domestic use, green hydrogen production, and/or export by 2050 • Construction underway for subsea export (HVDC) cable to New England	

[27] Scenario is informed by the Offshore Wind Strategic Direction from Ministers and Wind Energy Areas in Offshore Wind Call for Information NS25-1R.

Activity	Scenario Assumptions		
	Scenario 1 (Current Trajectory)	Scenario 2 (Growth)	Scenario 3 (Growth + Intensified Climate Change)
	• Site assessment and marine data collection surveys underway (e.g., wind resource assessment, geophysical, geotechnical, and/or biological surveys) • Development initiated for 1 GW for domestic use by 2035[28]	(e.g., Massachusetts, USA) and/or Quebec[29].	
Marine Transportation	• Current Levels + increased vessel traffic associated with survey and supply vessels for OSW and petroleum exploration[30] • Port upgrades underway and increased vessel activity at Ports of Halifax and Sydney	• Increased shipping associated with OSW and offshore petroleum supply and servicing • Port upgrades and expansion continue with increased port activity in Halifax and Sydney, with additional port expansion	

[28] Scenario is informed by Market Opportunities for Offshore Wind in the Atlantic Provinces
[29] Scenario is informed by the Memorandum of Understanding on Offshore Wind Energy and Infrastructure Collaboration and the Request for Information from Hydro-Quebec.
[30] Scenario is informed by the Canada Marine Planning Atlas– Atlantic (Marine Traffic and Transport Routes – Vessel Traffic Routes; Vessel Density Mapping of 2019-2022 AIS Data in the Northwest Atlantic) with shipping growth and changing marine use patterns informed qualitatively by Transport Canada's National Framework for Assessing the Cumulative Effects of Marine Shipping.

Activity	Scenario Assumptions		
	Scenario 1 (Current Trajectory)	Scenario 2 (Growth)	Scenario 3 (Growth + Intensified Climate Change)
		in Strait of Canso, Sheet Harbour and Goldboro[31]	
Fisheries	• Assume current fishing practices (including commercial fisheries by Indigenous and non-Indigenous harvesters as well as Indigenous food, social and ceremonial fisheries) with minor variations in fishing locations, gear use, and species[32]	• Redistribution of fishing effort • Expansion or contraction of fishing grounds • Changes in fishing practices and gear use • Change in fisheries management incorporating climate change considerations	
Other Ocean Uses	• Assume continuation of current levels of activity associated with the following types of activities: • National defense activities (e.g., naval training exercises) • Marine research and monitoring	• Continuation of activities identified in Scenario 1 • Development of one offshore CCS project underway[33] • New transatlantic or regional communication cables, offshore monitoring networks, and/or	

[31] Scenario is informed by Assessment of Atlantic Canada Ports to Support Offshore Wind Development (AECOM 2024).
[32] Scenario is informed by the Canada Marine Planning Atlas– Atlantic
[33] Scenario is informed by Carbon capture, Utilization and Storage in Nova Scotia briefing note from Government of Nova Scotia (2024).

Activity	Scenario Assumptions		
	Scenario 1 (Current Trajectory)	**Scenario 2 (Growth)**	**Scenario 3 (Growth + Intensified Climate Change)**
	• Tourism and recreation • Other fishing • Aquaculture • Telecommunication cables • Other coastal or offshore activities	telecommunications infrastructure corridors[34]	
Marine Conservation and Protection	• Continuation of existing conservation status of current designated areas • Designation of new conservation areas with varying conservation objectives and restrictions selected from identified Areas of Interest (Fundian-Channel-Browns Bank; Eastern Shore Islands), and proposed Tier 1 Conservation Sites[35]	• Designation of new conservation areas with varying conservation objectives and restrictions selected from proposed Tier 1 and Tier 2 Conservation Sites[36]	

[34] Scenario is informed by the Joint Statement on the Security and Resilience of Undersea Cables in a Globally Digitalized World (Global Affairs Canada 2024).
[35] Scenario is informed by the First-generation Marine Spatial Plan: Scotian Shelf and Bay of Fundy (DFO 2024a).
[36] Scenario is informed by higher-emissions climate futures considered by the Intergovernmental Panel on Climate Change and Canadian Climate Assessments (Bush and Lemmen 2019).

9.5 Valued Component Cumulative Effects Assessments

This section provides a VC-based analysis of cumulative effects focusing on the VCs identified in Section 9.2.4. However, all the VCs are interrelated and should not be considered in isolation of one another since changes to one VC may influence the condition, function, or cumulative response of another through shared ecological, physical, social, and/or economic pathways.

9.5.1 Marine Ecosystem

9.5.1.1 Scope

The scope of marine ecosystem assessment includes fish and fish habitat, marine plants, benthic invertebrates, corals and sponges, marine mammals, sea turtles, aerofauna, species at risk, and protected or special areas. These ecological receptors are considered together because they form interconnected components of the marine food web and are exposed to many of the same cumulative pressures, including underwater noise, vessel traffic, physical disturbance of the seabed, marine discharges, artificial lighting, pollution, climate change, and interactions with other marine industries.

The assessment focuses on common cumulative effects pathways and the implications of those pathways for regional ecosystem condition, ecological integrity, resilience, vulnerability, and recovery potential.

The Scotian Shelf Bioregion, with a focus on the Offshore Scotian Shelf, is used as the principal spatial boundary for the assessment because it represents an ecological scale at which key ecosystem processes, species populations, food webs, and cumulative pressures interact. Receptor-specific boundaries may extend beyond the bioregion, where appropriate, particularly for migratory fish, marine mammals, sea turtles, marine, and migratory birds whose movements connect the Study Area to other portions of the Northwest Atlantic.

9.5.1.2 Current Conditions and Trends

The Scotian Shelf supports high levels of marine biodiversity, including numerous species of fish, marine birds, marine mammals, sea turtles, benthic invertebrates, and planktonic organisms. Many species use the area seasonally or throughout their life cycles for feeding, migration, spawning, nursery, and overwintering activities. The offshore waters of

Nova Scotia also contain important habitats for species at risk and other species of conservation concern. Detailed descriptions of fish and fish habitat, marine plants, marine mammals, sea turtles, aerofauna, species at risk, and protected and special areas are provided in Section 5.2. Collectively, these components form a highly connected marine ecosystem that supports biodiversity, ecological productivity, fisheries resources, species at risk, and Indigenous and commercial use of marine resources.

The region contains a variety of ecologically important habitats and features, including fish spawning and nursery areas, migration corridors, marine mammal and seabird feeding areas, deep-water coral and sponge communities, and submarine canyon habitats that support biodiversity and ecological connectivity across the Scotian Shelf.

The Scotian Shelf also includes a network of legally protected and conserved areas, including the Gully MPA, St. Anns Bank MPA, Sable Island National Park Reserve, and several Marine Refuges established to conserve habitat for corals, sponges, commercial and non-commercial fish species, species at risk, and other ecologically important marine species. The region also contains numerous special areas identified because of their ecological importance, including Ecologically and Biologically Significant Areas, Important Bird Areas, Key Biodiversity Areas, Significant Benthic Areas, and critical habitat identified under the federal Species at Risk Act. Detailed information on these protected and special areas is provided in Section 5.2.6.

The current condition of the marine ecosystem reflects the combined influence of natural oceanographic processes, the presence of important protected and special areas, and long-standing human activities on the Scotian Shelf. Circulation, temperature, salinity, mixing, stratification, and seabed features influence nutrient supply, plankton and fish-larval transport, productivity, and species distribution (as discussed in Sections 5.1.2 to 5.1.4). These oceanographic processes support productive food webs that link plankton communities, forage species, commercially important fish populations, marine mammals, seabirds, and benthic communities across the region.

As discussed in Section 5.3.1, commercial fisheries have had a particularly important influence on the condition and structure of the Scotian Shelf ecosystem. Historical overexploitation, particularly of groundfish during the decades preceding the 1990s, contributed to declines in many long-lived groundfish species and a broader ecosystem response that included increased primary production and greater abundance of some invertebrates, including shrimp and crab (Bundy 2005; Choi et al. 2005; Wood Canada Ltd. 2022; Bernier et al. 2023). As groundfish stocks collapsed, the fishery shifted from one dominated by finfish to one based more heavily on shellfish (DFO 2007, 2010a; MacLean et al. 2013). Despite regulatory actions intended to enable recovery, some historically important stocks have not recovered.

Deep-sea canyon habitats on the Scotian Shelf support cold-water corals and sponges, which are important structure-forming components of benthic ecosystems. These taxa are

particularly vulnerable to physical impacts and environmental change, and recovery following seabed disturbance can be extremely slow (Roberts et al. 2006; Kenchington 2014). The low resilience of coral and sponge communities following bottom trawl exclusion has been demonstrated by Clark et al. (2019) and is consistent with observations from Scotian Slope canyons (Lacharité and Stanley 2019).

Past petroleum exploration and development have contributed to the existing industrial footprint of the offshore region as outlined in Section 9.3.2. Offshore petroleum exploration began in the mid-twentieth century, with the first offshore well drilled in 1967 and 210 wells subsequently drilled offshore Nova Scotia (CNSOPB 2018). Three production projects operated between 1992 and 2018 (Table 9.2). Although production facilities have been removed and the projects decommissioned, plugged and abandoned wells and subsea pipelines remain part of the existing offshore environment (Figure 5.20). Offshore surveys have documented marine life colonization along exposed sections of pipelines and associated protective rock mattresses, indicating that infrastructure associated with historical petroleum development continues to influence localized seabed habitat conditions and ecological communities (Hurley Environment Ltd. 2018).

The marine ecosystem is also experiencing measurable environmental change. Recent observations indicate that sea surface temperatures remain above long-term averages across much of the Scotian Shelf and that warming and freshening trends have altered stratification, circulation patterns, and water-mass characteristics throughout the region (see Section 5.1.4). These changes can influence habitat suitability, ecosystem productivity, species distributions, migration patterns, spawning success, and ecosystem structure, with climate-driven changes in marine ecosystems increasingly documented throughout Atlantic Canadian waters (DFO 2025b). Climate-risk assessments have also identified potential vulnerabilities for species and habitats on the Scotian Shelf under projected future climate conditions, including changes in species distributions, habitat suitability, and ecological interactions resulting from continued warming and changing oceanographic conditions (DFO 2013). Ongoing and projected climate-related changes contribute uncertainty regarding the future condition, resilience, and recovery potential of marine ecosystems, populations, and habitats.

Regional cumulative-impact mapping indicates that the marine ecosystem is already exposed to multiple overlapping pressures, with climate change and commercial fishing identified as the primary contributors across much of the Scotian Shelf (Murphy et al. 2024). The present-day Scotian Shelf is therefore not an unaffected environmental baseline but rather reflects the cumulative influence of historical and ongoing human activities and climate-driven environmental change.

9.5.1.3 Drivers of Change and Effects Pathways

The marine ecosystem is affected by multiple human activities and natural processes that operate over different spatial and temporal scales. The drivers considered in this assessment are exploratory drilling and other offshore petroleum activities, commercial fisheries, offshore wind development, marine shipping, other ocean uses, conservation and marine management, and climate change. Although these drivers differ in scale, intensity, duration, and geographic extent, they generate several common pressures and therefore have the potential to act cumulatively or interactively. As illustrated in Figure 9.6, cumulative effects may arise where multiple drivers generate the same pressure, where different pressures contribute to the same change in ecosystem condition, or where pressures overlap spatially or temporally.

DRAFT

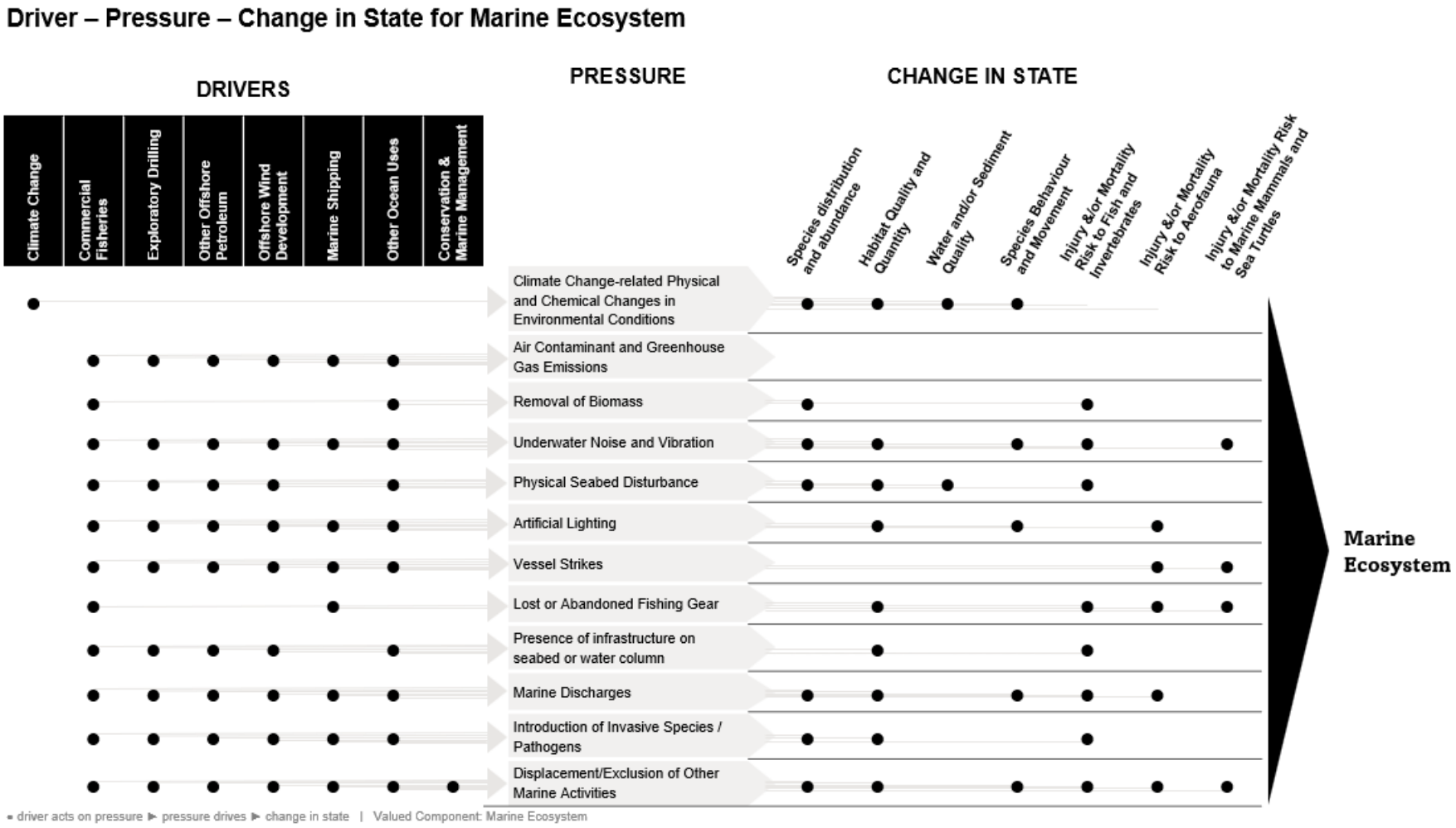


Figure 9.6. Pathways of Effects: Marine Ecosystem

Exploratory drilling may contribute underwater noise, physical seabed disturbance, marine discharges, artificial lighting, air contaminant and GHG emissions, vessel-strike risk, and the potential introduction of invasive species or pathogens. Other offshore petroleum activities and offshore wind development can generate similar pressures, with additional effects associated with longer-term infrastructure in the water column or on the seabed. Marine shipping contributes recurring and regionally-extensive underwater noise, emissions, marine discharges, artificial lighting, vessel-strike risk, and pathways for non-native species through ballast water and hull fouling. These pressures may affect marine wildlife, including marine mammals, sea turtles, and marine birds, through changes in behaviour, movement, habitat use, injury or mortality risk, access to important feeding, migration, spawning, or nursery areas, displacement from habitat, and changes in prey availability. For some marine bird species, artificial lighting may alter movement patterns or increase attraction to offshore infrastructure, increasing the potential for interactions with offshore activities. Figure 9.6 demonstrates that many of these pressures are not unique to a single driver. Their cumulative influence will depend on the nature, extent, duration, and frequency of the pressures and whether they occur in the same areas or time periods.

Commercial fisheries may affect marine ecosystems through several pressures including biomass removal, bycatch, physical seabed disturbance, underwater noise, lost or abandoned gear, and entanglement or entrapment risks. Mobile bottom-contact fishing gear may overlap with sensitive benthic habitats, while fixed/passive gear can create entanglement risks for fish, marine mammals, sea turtles, and marine birds. These pressures may act cumulatively with shipping, offshore petroleum activities, offshore wind development, and climate-driven ecosystem change, contributing to cumulative effects on marine species, habitats, and ecosystem processes.

Climate change influences marine ecosystems through multiple interacting pathways. Rising ocean temperatures may alter seasonal warming and cooling cycles, affect water-column stratification, reduce nutrient transport from deeper waters, and influence the timing and magnitude of phytoplankton blooms. Because phytoplankton form the foundation of marine food webs, changes in primary productivity may affect food-web dynamics and ecosystem productivity (DFO 2025b). Climate-related changes may also include ocean acidification, low oxygen conditions, shifts in species distributions, and the establishment or spread of invasive species. These changes may affect species survival, food-web relationships, prey availability, fisheries resources, and the distribution and abundance of marine species, while interacting with other environmental and human pressures (DFO 2025b). Climate-related effects are not expected to be uniform across Atlantic Canadian marine ecosystems, and the Scotian Shelf has been identified as a region that may experience relatively greater climate-driven change than some other areas (DFO 2013). Species with narrow thermal tolerances, specialized habitat

requirements, or key life-history stages associated with sensitive habitats may be particularly vulnerable to climate-driven change.

Many of the pathways shown in Figure 9.6 are interconnected and may occur simultaneously. Climate change may amplify the consequences of other pressures by altering baseline environmental conditions, reducing ecosystem resilience, and influencing species distributions, productivity, and habitat suitability. As a result, pressures that may be localized or temporary when considered individually could contribute to greater cumulative effects when acting in combination with climate-related environmental change. Changes in one ecosystem component may also influence other components through habitat, predator-prey, or broader food-web relationships. Collectively, these interactions may influence ecological integrity, ecosystem condition, vulnerability, resilience, adaptive capacity, and recovery potential. Conservation and marine management can help reduce the effects of human activities on the marine ecosystem and support the ability of species and habitats to recover from disturbance.

9.5.1.4 CEA Scenario Implications

In consideration of the CEA drivers and effects pathways discussed above, Table 9.5 provides additional perspectives on cumulative effects that may occur under different future development and climate scenarios.

Table 9.5 – Future CEA Scenario Implications for the Marine Ecosystem

Scenario	Implications for the Marine Ecosystem
Scenario 1: Current Trajectory: Continuation of Existing Trends	• Exploratory drilling is expected to resume at relatively modest levels, with two exploration drilling programs involving up to four wells between 2027 and 2035. Associated effects are expected to primarily be localized and temporary (e.g., less than 4 months) and may include underwater noise, physical seabed disturbance, marine discharges, artificial lighting, and increased vessel traffic. • Offshore wind development is expected to emerge as an additional driver of change, with licensing, site assessment surveys, and early development activity contributing underwater noise, vessel traffic, and localized seabed disturbance. • Existing fisheries, marine shipping, marine research, defence activities, tourism and recreation, telecommunications infrastructure, and other ocean uses are expected to continue at current levels and remain

	persistent sources of cumulative pressure on marine ecosystems. • Existing and proposed protected and conserved areas are expected to contribute to biodiversity conservation and ecosystem resilience in ecologically important locations. • Climate change is expected to continue to influence oceanographic conditions, species distributions, habitat suitability, and ecosystem productivity, but cumulative effects are anticipated to remain largely associated with existing patterns of marine use. • Marine ecosystem conditions are expected to remain variable, with localized effects or recovery depending on receptor sensitivity, activity location and timing, mitigation measures, and spatial or temporal overlap among activities.
Scenario 2: Expanded Offshore Development: Increased Human Activities and Ocean Use	• Increased petroleum and offshore wind development, marine transportation, port activity, subsea cables, and supporting infrastructure is expected to increase underwater noise, vessel traffic, seabed disturbance, artificial lighting, marine discharges, and the spatial extent and duration of habitat alteration. • Additional installation of infrastructure on the seabed and/or water column (e.g., offshore petroleum, wind, and/or subsea cable development) may change benthic and pelagic habitats and affect marine species and resource harvesting. In some cases, the infrastructure may introduce new hard substrate encouraging colonization by invertebrates, attracting fish and marine mammals that may feed in these areas. In some cases, fish, marine mammals, and aerofauna may experience increased injury or mortality risk through entanglement or collision with the infrastructure. • Fishing effort may be redistributed, fishing grounds may expand or contract, and fishing practices, gear use, and management approaches may change, altering the distribution and intensity of fisheries-related pressures on marine species and habitats. • Development of an offshore CCS project and new communications or monitoring infrastructure may

DRAFT

	introduce additional areas of seabed disturbance, infrastructure presence, and vessel activity. • Additional protected and conserved areas may reduce cumulative pressures and protect species at risk and/or important habitats, improving marine biodiversity. However, conservation outcomes will likely depend on location, objectives, restrictions, connectivity, and management effectiveness. • Sensitive marine habitats and species at risk may likely experience greater cumulative pressure where activities overlap spatially and temporally. • Potential overlap among offshore wind development, future petroleum activity, commercial fisheries and conservation areas may increase pressure on marine spatial planning processes to resolve competing ocean-use objectives.
Scenario 3: Climate-Stressed Future: Expanded Offshore Development under Reduced Ecosystem Resilience	• As activities in Scenario 2 continue at the same levels but in a climate-stressed environment, cumulative effects on the marine ecosystem may occur in the context of reduced ecosystem resilience and recovery potential. • Climate change will become the dominant driver of regional ecosystem change, while offshore development and other ocean use may contribute additional cumulative pressures to an ecosystem with reduced capacity to absorb or recover from disturbance. • Continued warming of the Scotian Shelf, increased frequency and intensity of marine heatwaves, ocean acidification, changing oceanographic conditions, sea-level rise, increased storm severity, and continued shifts in species distributions will affect ecosystem productivity, food-web relationships, habitat suitability, migration and spawning patterns, species distributions, and community composition. • Climate-sensitive species and habitats, including plankton communities, benthic ecosystems, corals and sponges, fish, marine mammals, sea turtles, and marine birds, may become increasingly vulnerable to additional disturbance. • Existing protected areas, critical habitat designations, and conservation measures may become less effective

DRAFT

	where species distributions or ecological conditions shift beyond existing management boundaries. • Interactions among climate-related stressors and human activities may increase uncertainty regarding future ecosystem condition, biodiversity, habitat quality, and recovery potential.

Overall, Table 9.5 indicates that cumulative effects on the marine ecosystem are expected to increase as offshore activity expands and climate change continues to influence environmental conditions. Existing fisheries, marine shipping, and other ocean uses will remain important contributors to cumulative change, while offshore wind and petroleum development may introduce additional pressures. Key cumulative concerns include the combined effects of multiple activities on sensitive benthic habitats, marine wildlife, species at risk, and food-web relationships, as well as interactions between human activities and climate-driven changes in ecosystem condition. Protected and conserved areas may help maintain biodiversity and ecological functions; however, their effectiveness may be influenced by changing environmental conditions over time.

9.5.1.5 Contribution of Exploratory Drilling

Exploratory drilling represents one of several drivers contributing to cumulative effects on the marine ecosystem. Individual drilling programs are generally expected to be temporary and localized, with potential effects primarily associated with underwater noise, vessel activity, artificial lighting, marine discharges, and localized seabed disturbance. At a regional scale, these pressures are expected to occur within a broader context of ongoing fisheries, marine shipping, climate change, emerging offshore wind development, and other ocean uses.

The contribution of exploratory drilling to cumulative effects will depend on the number, location, timing, and duration of future drilling programs, as well as the characteristics of the receiving environment. Contributions may be greater where drilling activities overlap with sensitive benthic habitats, coral and sponge communities, species at risk, critical habitat, migration corridors, spawning or nursery areas, or other ecologically important features. The potential for cumulative effects may also increase where exploratory drilling occurs concurrently or sequentially with other offshore activities, resulting in overlapping exposure to underwater noise, vessel traffic, artificial lighting, seabed disturbance, or marine discharges.

Compared with persistent regional drivers such as fisheries, marine shipping, and climate change, exploratory drilling is expected to represent a relatively small contribution to cumulative effects at the scale of the Scotian Shelf Bioregion. Its contribution is expected to be greatest at local scales, particularly where multiple offshore activities occur in the same area or where ecologically important features are present. Although exploratory

drilling is generally short-term in duration, repeated or overlapping activities may contribute to cumulative exposure to common pressures affecting marine species, habitats, and ecosystem processes.

9.5.1.6 Cumulative Effects Management Opportunities

Future proposed exploratory drilling programs should be planned with consideration of existing and reasonably foreseeable activities occurring within the Scotian Shelf Bioregion. This includes consideration of other activities and environmental sensitivities as early as the Call for Bids process administered by the CNSOER (Section 9.5.2.2). General mitigation and best practices that reduce the adverse environmental effects of exploratory drilling can also reduce the activity's contribution to cumulative effects.

IAAC has compiled a preliminary list of recommended mitigation measures for offshore oil and gas exploratory drilling projects in the Canada-Nova Scotia offshore area (Appendix 7-1). These measures are intended to inform project planning and assessment and would be reviewed and adapted based on each project's specific context and potential effects. Measures relevant to the marine ecosystem address project siting and scheduling, sensitive habitats and species-use areas, vessel activity, underwater noise, artificial lighting, marine discharges, seabed disturbance, aquatic invasive species, wildlife monitoring, and environmental response protocols.

Continued implementation and development of DFO's marine spatial planning program and the First-Generation Marine Spatial Plan for the Scotian Shelf and Bay of Fundy, together with other cumulative effects management initiatives and decision-support tools, will help improve consideration of cumulative effects, support coordination among ocean users, identify sensitive ecological features, and inform future ocean-use decisions. Additional information on these initiatives and tools is provided in Section 9.9.1. Ongoing monitoring, adaptive management, and consideration of climate-related ecosystem change can further support long-term ecosystem resilience and sustainability.

9.5.2 Commercial Fisheries and Other Ocean Uses

9.5.2.1 Scope

The scope of assessment for commercial fisheries and other ocean uses focuses on commercial fisheries but also considers other ocean uses such as marine shipping, renewable energy uses, petroleum development, national defence activities (military exercises), marine research and monitoring, tourism, subsea cables, aquaculture, and recreational fisheries. Indigenous fisheries are addressed in Section 9.5.3. Commercial fisheries and other ocean uses as a VC represent both a driver and receptor of cumulative effects. In some cases, sub-components of the VC may interact with each other, contributing cumulative effects to each other.

It is recognized that fisheries and other various ocean uses have occurred for hundreds of years on the Scotian Shelf and are expected to continue well beyond the temporal boundaries of this CEA. It is also recognized that the geographic scope of many of these ocean use activities extend well beyond the Scotian Shelf, where they may encounter similar or different pressures contributing to cumulative effects.

During the review of the draft Terms of Reference, the GCIFA stressed the importance of having a VC focused on commercial fisheries in consideration of the substantial fishing activity carried out in the Study Area. They acknowledged that past offshore oil and gas activities have provided economic benefits and have been performed safely with limited spatial extent of environmental impacts. However, they also cautioned that co-existence depends on adherence to safety regulations, unimpeded seafood harvesting, and compensation measures in the event of an accident. GCIFA also recommended that marine spatial planning tools (e.g., Marxan analysis) be used to highlight areas that future exploratory drilling should avoid (GCIFA 2026).

9.5.2.2 Current Conditions and Trends

The Scotian Shelf has a long-standing diversity of human uses including fishing, marine traffic, petroleum exploration and development, research, monitoring, and tourism. Ocean and coastal waters are “increasingly crowded places” where fishing, shipping, oil and gas, cultural activities, recreation and tourism, submarine cables, aquaculture, conservation, and renewable energy share space and may conflict spatially and temporally (DFO 2024a). In 2024, the marine economy contributed approximately $5,760,124,000 in direct GDP to the provincial economy (DFO 2025e).

Section 5.3 provides an overview of commercial fisheries offshore Nova Scotia. Current commercial fisheries conditions reflect effects from past fisheries overexploitation and climate-driven ecosystem changes. Following the collapse of groundfish stocks in the early 1990s, invertebrates such as shrimp, crab, and lobster increased in abundance and became key fisheries species. Changing oceanographic conditions, including rising water temperatures, have led to changes in the distribution and abundance of fisheries species, with fishing activities reflecting distribution patterns of different highly valued species (Daborn et al. 2025).

In the last decade or so, while landings have remained relatively stable, inshore lobster boats have been fishing farther from the coast and in deeper waters. Groundfish harvesting by trawl or longline has taken place farther offshore, while scallop, sea cucumber, and whelks are associated with the tops or sides of banks, and snow crab are associated with deeper channels. Longlining for larger pelagics such as tuna, swordfish, sharks, and halibut tends to be most productive along the edges of the Shelf (Daborn et al. 2025).

Indigenous organizations have also noted that fisheries conditions in the region continue to evolve with northeastward shifts in American lobster distribution, increased observations of tropical and pelagic species, and emerging fisheries opportunities that may alter future harvesting patterns (MAPC 2026).

Future fisheries conditions are expected to remain dynamic as climate-driven shifts in species distributions, emerging fisheries opportunities, evolving harvesting technologies, marine spatial planning initiatives, offshore wind development, and conservation measures influence how marine resources are accessed and harvested throughout the region (Daborn et al. 2025).

Marine transportation remains a long-standing and regionally extensive ocean use and is expected to remain an important and persistent user of offshore waters. Marine tourism and recreational activities including whale watching, boating, recreational fishing, surfing, kayaking, and beach-related activities, continue to be concentrated in coastal and nearshore areas. Demand for coastal and marine recreational opportunities is expected to remain strong. Aquaculture also remains concentrated in coastal and nearshore waters. Strategic planning initiatives are underway to identify suitable areas for future aquaculture development and improve sector coordination with other marine users (DFO 2024a). Existing submarine cable networks continue to support regional and international communications, with future growth expected through additional telecommunications, monitoring, and transmission infrastructure associated with the emerging blue economy and offshore energy sectors.

As described in Section 9.3.2, there is currently no offshore petroleum activity on the Scotian Shelf and the last exploratory drilling program concluded in 2018. Legacy offshore natural gas projects, the Sable Offshore Energy Project and the Deep Panuke Offshore Gas Project, started production in 1999 and 2013, respectively, and both were fully decommissioned and abandoned in 2020. While a petroleum-related Call for Bids was issued by the CNSOER in 2025 with two successful bids announced in April 2026 (CNSOER 2026c), there are currently no active offshore petroleum exploration licences in the Canada-Nova Scotia offshore area (refer to Section 9.3.2 for additional information on historic offshore petroleum activities).

There is currently no renewable energy activity occurring on the Scotian Shelf, although the Governments of Canada and Nova Scotia have jointly identified offshore wind energy areas as suitable potential areas for future offshore wind Calls for Bids and possible development. The first renewable energy Call for Bids is anticipated to commence by the end of 2026.

Under the *Oceans Act*, DFO is leading the development of integrated management plans in collaboration with other government departments and agencies, Indigenous groups, and stakeholders for all activities or measures in or affecting Canada's estuarine, coastal, and marine waters and has initiated marine spatial planning for the Scotian Shelf and Bay of

Fundy. *The First-Generation Marine Spatial Plan: Scotian Shelf and Bay of Fundy* (DFO 2024a) is a strategic document to help advance marine spatial planning and guide existing planning and management efforts.

9.5.2.3 Drivers of Change and Effects Pathways

Fisheries and other ocean uses are drivers of cumulative change themselves and are also receptors of cumulative effects. Cumulative effects can occur to fisheries and other ocean uses because of changes to the marine ecosystem (including removal of biomass by fishing) and also through direct interaction with the ocean use activities themselves (Figure 9.7). Marine discharges, underwater noise and vibration, physical seabed disturbance, and introduction of invasive species and/or pathogens can affect the quality and availability of marine resources (e.g., fisheries species) upon which marine users depend for sustenance, cultural activities, recreational use, and/or financial revenue.

DRAFT

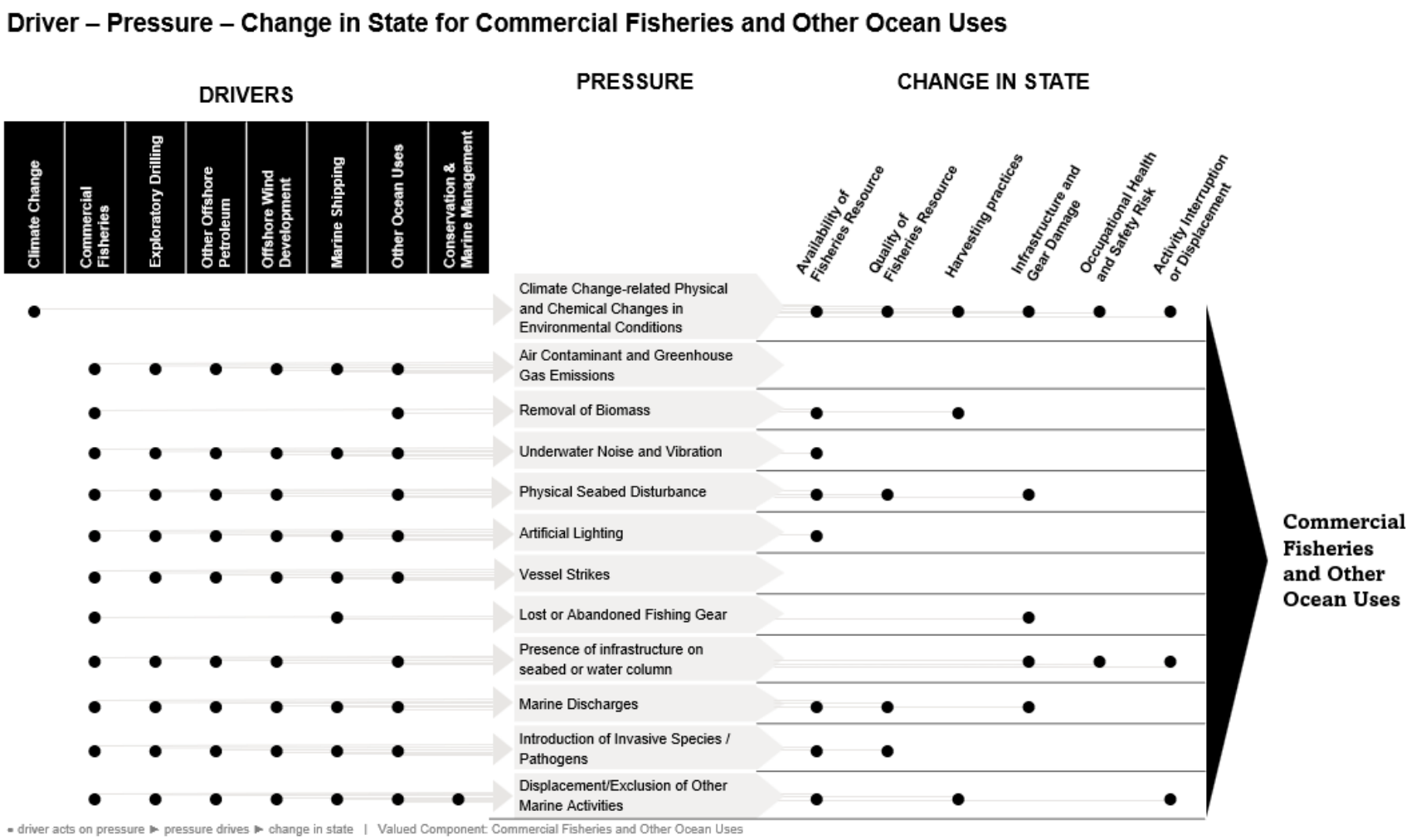


Figure 9.7. Pathways of Effects: Commercial Fisheries and Other Ocean Uses

Cumulative effects may also occur as a result of space competition, activity exclusion, and/or equipment or gear damage or loss. Regulated safety zones around drilling units or subsea infrastructure and/or the presence of infrastructure in the water column or on the seafloor may require fishing or other vessels to alter routes, avoid certain areas, or coordinate movements. In some cases, fishers or other ocean users may voluntarily choose to avoid certain areas or change harvesting practices to reduce risk of gear and equipment damage or loss. These changes could reduce access to marine harvesting areas, and increase travel time, fuel use, operational costs, and navigational complexity. Certain activities (e.g., bottom-fishing) may be restricted within designated boundaries of protected and conserved areas, further reducing access and increasing ocean space competition for some ocean uses.

Climate change-related changes in environmental conditions can further exacerbate cumulative effects caused by human activity drivers. Changes in the marine environment can change the quality and availability of fisheries resources, which can affect harvesting practices and fishing success. An increase in extreme climate events can also increase risk of infrastructure and gear damage and occupational health and safety risks. In these cases, environmental effects associated with climate change can lead to adverse social, economic, and health effects.

Given the importance of the marine economy in Nova Scotia, adverse cumulative effects on fisheries and other ocean uses could have important socio-economic consequences that extend beyond individual resource users to local, regional, and provincial levels. Cumulative effects on fisheries could lead to food security and food sovereignty issues in communities that rely heavily on fisheries.

9.5.2.4 CEA Scenario Implications

In consideration of the CEA drivers and effects pathways discussed above, Table 9.6 provides additional perspective on cumulative effects that may occur under different future development and climate scenarios.

Table 9.6 – Future CEA Scenario Implications for Fisheries and Other Ocean Uses

Scenario	Implications for Fisheries and Other Ocean Uses
Scenario 1: Current Trajectory: Continuation of Existing Trends	• Exploratory drilling activity is expected to be short-term (e.g., less than 4 months) and localized with little interaction with most ocean uses, depending on the drilling locations. Safety zones around drilling units or subsea infrastructure may require vessels to alter routes, avoid certain areas, or coordinate movements with project operators. These changes could increase travel time, fuel use, operational costs, and navigational complexity, particularly where drilling activities overlap

	with established shipping routes, ferry routes, or areas of higher marine traffic. • Offshore wind development will emerge as a new industry for the province, involving onshore, coastal, and offshore development. Offshore wind development will introduce new areas of potential ocean space activity restrictions for fisheries and add to existing vessel traffic volumes and underwater noise. • Commercial fisheries will continue to overlap spatially and temporally with moderate livelihood and FSC fisheries, competing for space and resources.
Scenario 2: Expanded Offshore Development: Increased Human Activities and Ocean Use	• Exploratory drilling and other petroleum-related activities may expand into new areas, further reducing access to marine resources and increasing underwater noise, which could affect the availability of fisheries resources and harvesting practices, and the success of marine research programs. • Additional installation of infrastructure on the seabed and/or water column (e.g., offshore petroleum, wind, and/or subsea cable development) will change benthic and pelagic habitats and affect marine species and resource harvesting. Infrastructure may introduce new areas of avoidance and/or risks of gear loss or damage for fisheries or research vessels. • Increased offshore development could potentially negatively or positively affect tourism, impacting local and provincial economies. • Additional conservation and protected areas will increase ocean-space competition among fisheries and other ocean uses, as some uses will be restricted from designated areas. • Increased employment and expenditures associated with expanded offshore development will have positive cumulative effects on local, regional, and provincial economies. Investments in coastal infrastructure and marine rescue and response services to support offshore petroleum and wind development may benefit fisheries and other ocean uses.
Scenario 3: Climate-Stressed Future:	• As activities in Scenario 2 continue at the same levels but in a climate-stressed environment, environmental

DRAFT

Expanded Offshore Development under Reduced Ecosystem Resilience	changes to marine resources will add to cumulative effects on fisheries and other ocean uses that may already be navigating changes to current activities due to increased human activity in the marine environment. • Changes to the marine ecosystem may affect the quality and availability of marine resources, impacting harvesting practices and success, and potentially affecting food security and sovereignty. • Changes in climate variability, extreme weather conditions, and sea level rise may increase health and safety risks and affect coastal infrastructure upon which fisheries and other ocean users rely.

Overall, Table 9.6 indicates that cumulative effects on fisheries and other ocean uses are likely to increase as offshore activity expands and as climate-related pressures reduce ecosystem resilience. While exploratory drilling may contribute localized and generally short-term pressures, the most important cumulative concerns relate to the combined effects of multiple ocean uses, changing access to marine resources, and potential effects on fisheries species (e.g., through removal of biomass) and harvesting practices. These adverse cumulative effects can lead to broad socio-economic effects at a local, regional, and provincial scale.

9.5.2.5 Contribution of Exploratory Drilling

Although exploratory drilling may exert various pressures on the marine ecosystem that can lead to cumulative effects on fisheries and other ocean uses, the key interaction for this VC is associated with ocean space conflict. Safety zones associated with individual exploratory drilling programs may be relatively small (e.g., 500 m radius) and temporary (e.g., less than four months) but, considered cumulatively with other drilling programs and other activities which result in activity exclusion areas, this interaction is an important contributor to cumulative effects on fisheries and other ocean uses.

9.5.2.6 Cumulative Effects Management Opportunities

Future proposed exploratory drilling programs must be planned in consideration of other offshore activities. General mitigation and best practices to reduce adverse environmental effects of exploratory drilling will reduce the activity's contribution to cumulative effects (refer to Appendix 7-1 for a preliminary list of recommended mitigation measures for offshore oil and gas exploratory drilling projects in the Canada-Nova Scotia offshore area). Engagement with fishers and other ocean uses early in project planning will provide opportunities to identify potential concerns and conflicts of use and help establish coexistence protocols and safety measures to reduce adverse cumulative effects. The

establishment of safety zones during exploratory drilling will help maintain safety while allowing fishing and navigation operations where feasible. Navigational aids, mapping, and safety information to commercial fisheries and other ocean uses will allow safe transit and gear operations within exploratory drilling areas. Establishment, communication, and implementation of a fishing gear damage or loss compensation program will also reduce adverse cumulative effects.

9.5.3 Indigenous Communities, Rights and Interests

9.5.3.1 Scope

The assessment of cumulative effects on Indigenous communities, rights and interests is informed through engagement as summarized in Section 4.1, and comments submitted by Indigenous groups on the Terms of Reference (KMK 2026a; MAPC 2026), and NS Offshore Wind RA (KMK and AECOM 2024). This CEA strives to incorporate Indigenous Knowledge where it has been made available but does not represent an Indigenous-led CEA.

The KMK, in collaboration with Confederacy of Mainland Mi'kmaq (KMK 2026a), have expressed concern that offshore exploratory drilling is likely to adversely impact Indigenous and treaty rights and negatively affect Mi'kmaw cultural continuity. Msit no'kmaq and Netukulimk are foundational principles to Mi'kmaw governance, stewardship, and the assessment of potential effects on rights, interests, use, culture, and well-being (KMK and AECOM 2024; KMK 2026a; L'nuey 2026).

The Maritime Aboriginal Aquatic Resources Secretariate of the MAPC identified documented northeastward shifts in American lobster (*jakej*) distribution, increased observations of tropical and pelagic species, and emerging fisheries opportunities that may alter future harvesting patterns (MAPC 2026). The MAPC/Maritime Aboriginal Aquatic Resources Secretariate further noted that today's fisheries structure may not reflect future conditions because species distributions, harvesting technologies, and fisheries opportunities continue to change (MAPC 2026). These observations reinforce the importance of adopting a forward-looking and scenario-based approach to CEA rather than relying solely on current patterns of marine resource use.

During review of the draft Terms of Reference, specific concerns were also raised regarding potential cumulative effects on the endangered North Atlantic right whale and key fisheries species including lobster, snow crab, and groundfish (KMK 2026a). Salmon (*plamu*) and eels (*katew*) have also been identified during previous regional assessment reviews as culturally important species that could potentially be affected by offshore activities (KMK and AECOM 2024).

9.5.3.2 Current Use, Rights, and Cultural Context

The Mi'kmaq have occupied and used *Mi'kma'ki*, their traditional territory, since time immemorial and continue to maintain cultural, spiritual, social, and economic connections to lands, waters, and marine resources throughout the region. The Peace and Friendship Treaties of 1725-1779 and subsequent court decisions (e.g., R. v. Sparrow, [1990] 1 S.C.R 1075; R. v. Marshall, [1999] 3 S.C.R. 456; R. v. Marshall, [1999] 3 S.C.R. 533) recognize and affirm Indigenous and treaty rights that remain central to Mi'kmaw culture, identity, and well-being.

Colonial policies and practices, including land dispossession, restrictions on Indigenous governance, residential schooling, cultural suppression, and systemic racism, have led to economic disparities and contributed to intergenerational effects on Indigenous health, well-being, cultural continuity, and access to lands and resources (Hanrahan 2008; KMK and AECOM 2024; Nova Scotia Human Rights Commission 2025).

Recognition of Indigenous rights and interests in Nova Scotia's offshore environment has evolved considerably since the first offshore exploratory well was drilled in 1967. The Truth and Reconciliation Commission's Calls to Action (2015), Canada's endorsement of the United Nations Declaration on the Rights of Indigenous Peoples in 2016, and implementation of the *United Nations Declaration on the Rights of Indigenous Peoples Act* in 2021 are key milestones that fundamentally changed the Indigenous-rights landscape in Canada. These milestones, along with establishment of the KMK in 2004 as an Indigenous and treaty rights organization representing Mi'kmaw communities in Nova Scotia, and ongoing negotiations for a Mi'kmaq-Nova Scotia-Canada Consultation Process, have substantially influenced the evolution of Indigenous participation in natural resource decision-making in Nova Scotia. Mi'kmaq approaches and principles such as *Etuaptmumk* and *Netukulimk* have been used increasingly in resource management applications, providing opportunities for knowledge and co-production and social learnings (Warrior et al. 2022; KMK 2025; Parks Canada 2025). The recent implementation of moderate livelihood fisheries plans by Mi'kmaw communities, although not without its challenges, has enhanced the ability for the Mi'kmaq to exercise treaty rights in a structured and sustainable manner and provided opportunities for improving relationships with DFO and commercial fishery stakeholders (KMK and AECOM 2024).

These historical and contemporary factors have influenced Indigenous vulnerability and resilience, trust in regulatory processes, and the ability of Mi'kmaw communities to exercise rights and participate in decision-making. These factors provide important context for understanding cumulative effects on Indigenous communities, rights, and interests.

Marine and coastal environments are recognized as being ecologically, spiritually, culturally, aesthetically, and economically important to the exercise of Indigenous and treaty rights and overall well-being of Indigenous communities. Many Indigenous communities participate in communal commercial fisheries, FSC fisheries, and moderate livelihood fisheries (Section 5).

A Traditional Use Study (TUS) conducted in 2016, as part of the impact assessment for the Scotian Basin Exploration Drilling Project, identified Indigenous commercial fisheries for over 30 species occurring throughout the Nova Scotia offshore area, with tuna, swordfish, snow crab, haddock, halibut, cod, and lobster being the dominant commercial fisheries. More than 20 species were identified as being harvested in the marine environment (primarily inshore) for FSC purposes, including eel (*katew*), salmon (*plamu*), cod (*peju*), mackerel (*amlamekw*), brown trout (*atoqwa'su*), flounder (*anakwe'j*), gaspereau (*kaspalaw*), tuna, lobster (*jakej*), clams, and scallops (*saqskale'sk*). As of 2016 when the TUS was conducted, the Mi'kmaq had not yet implemented a moderate livelihood fishery in Nova Scotia (MGS and UINR 2016).

Although FSC species are primarily harvested inshore, these species could potentially be affected by offshore activities (KMK and AECOM 2024). Historically, salmon was plentiful and were a staple food for the Mi'kmaq. Today, due to a lack of abundance and concern for local populations, it is often reserved for special occasions (Denny and Fanning 2016). Effects on fisheries species of importance to the Mi'kmaq could potentially have adverse effects on Indigenous and treaty rights and community well-being, which is fundamentally linked to culture, language, community relationships, self-determination, and continued access to lands, waters, and marine resources that support the exercise of Indigenous and treaty rights and traditional practices.

The Confederacy of Mainland Mi'kmaq is currently undertaking a Mi'kmaq Ecological Knowledge Study on behalf of the CNSOER to identify offshore areas of Mi'kmaq fisheries and traditional use to help inform future decision-making about future energy development in the Canada-Nova Scotia offshore area.

9.5.3.3 Drivers of Change and Effects Pathways

Indigenous communities, rights and interests could be impacted by several climate change and human activity drivers exerting pressures on the marine and coastal environment and the resources linked to Indigenous use (Figure 9.8). As identified by Indigenous groups during engagement and/or through written submissions on the Terms of Reference, changes in the quality and availability of, and access to, marine resources (e.g., fisheries resources) through cumulative effects on the marine ecosystem, as well as a change in access to lands and waters for traditional purposes, could impact food security and sovereignty, employment and income opportunities, cultural and spiritual practices, and the ability to exercise Indigenous and treaty rights. Change in access to lands and waters for traditional purposes and changes to archaeological and culturally important sites could also potentially impact cultural and spiritual practices. These pathways are reflected in Figure 9.8. As KMK has noted, if fishing access and availability of resources are adversely affected, this may further exacerbate tensions between Mi'kmaw and non-Mi'kmaw fisheries (KMK and AECOM 2024). Directly, or indirectly, these changes could lead to

impacts to health, social, and economic conditions of Mi'kmaw communities in Nova Scotia.

DRAFT



Figure 9.8. Pathways of Effects: Indigenous Communities, Rights and Interests

Indigenous communities may also experience cumulative effects through impacts on stewardship responsibilities and participation in governance of marine resources and ocean spaces. Mi'kmaw principles such as *Msit No'kmaq* and *Netukulimk* emphasize relationships among people, species, waters, and future generations, together with responsibilities for stewardship and sustainable use of marine resources. As noted during engagement and/or through written submissions on the Terms of Reference, and/or other recent submissions (e.g., KMK and AECOM 2024), changes in ecosystem condition, increased competition among ocean users, and reduced opportunities to participate in planning, monitoring, conservation, and management initiatives may affect the ability of Indigenous communities to exercise stewardship responsibilities and contribute Indigenous Knowledge to future decision-making. Indigenous participants consistently emphasized the importance of involvement in planning, monitoring, stewardship, and decision-making processes affecting marine resources. Increased participation in these initiatives may support stewardship objectives and advance reconciliation.

Historical offshore petroleum projects in Nova Scotia incorporated Indigenous consultation and engagement process and broader project benefits frameworks in a local employment, training, and economic development context. However, since that time, there has been a shift toward more substantive efforts to provide opportunities for Indigenous economic participation and decision-making in resource-based development in the province. Indigenous communities have the potential to be long-term economic participants in future offshore wind development through business development, employment, procurement, and equity ownership opportunities given the implementation of intentional policies, partnerships, capacity building, and procurement mechanisms (Marine Renewables Canada 2025; Daborn et al. 2025). If potential adverse effects on Indigenous fisheries and marine resource-based livelihoods are managed, and Mi’kmaw cultural traditions are protected, future offshore development activities could potentially result in positive cumulative economic effects on Indigenous communities.

9.5.3.4 CEA Scenario Implications

In consideration of the CEA drivers and effects pathways discussed above, Table 9.7 provides additional perspective on cumulative effects that may occur under different future development and climate scenarios.

Table 9.7 – Future CEA Scenario Implications for Indigenous Communities, Rights and Interests

Scenario	Implications for Indigenous Communities, Rights and Interests

Scenario 1: Current Trajectory: Continuation of Existing Trends	• Cumulative effects on Indigenous communities, rights, and interests are primarily influenced by past and existing activities that extend into the future. • It is assumed for this analysis that exploratory drilling activity will resume after nearly a decade of inactivity, but effects are expected to be short-term (e.g., less than 4 months) and localized. Interactions with Indigenous communities are expected to be limited due to the localized nature of physical activity and environmental effects, and the relatively low economic activity associated with exploratory drilling programs. • Offshore wind development is expected to emerge as a new industry for the province, involving onshore, coastal, and offshore development. Offshore wind development will introduce new areas of potential ocean space activity restrictions for fisheries and add to existing vessel traffic volumes and underwater noise. From a positive effects perspective, offshore wind development may generate substantial economic growth opportunities for Indigenous communities. • Commercial fisheries will continue to overlap spatially and temporally with moderate livelihood and FSC fisheries, competing for space and resources. • Other ocean uses are expected to be a minor contributor to cumulative effects, except where inshore and nearshore activities (e.g., aquaculture) may interact with Indigenous use of lands and resources for traditional and/or commercial purposes and/or affect archaeological and culturally important sites.
Scenario 2: Expanded Offshore Development: Increased Human Activities and Ocean Use	• Exploratory drilling may expand into new areas, creating additional areas of reduced access to marine resources and increased underwater noise, which could affect the availability of fisheries resources and harvesting practices, potentially impacting the ability of Indigenous Peoples to exercise Indigenous and treaty rights. • Additional installation of infrastructure on the seabed and/or water column (e.g., offshore petroleum, wind, and/or subsea cable development) will change benthic and pelagic habitats and affect marine species and resource harvesting.

DRAFT

	• Economic opportunities for Indigenous communities could potentially increase with the expansion of offshore petroleum and wind development, which could improve socio-economic conditions and community well-being. However, for these opportunities to be realized it would require concerted efforts by operatorss to involve Indigenous communities and suppliers. • Additional conservation and protected areas may protect important resources for Indigenous communities, but they may also restrict access, affecting the ability to exercise Indigenous and treaty rights. • As marine spatial planning, conservation initiatives, and offshore activities expand, Indigenous participation in planning, monitoring, stewardship, and governance processes may become increasingly important. The extent to which Indigenous communities are able to influence decisions affecting marine resources may contribute positively or negatively to cumulative effects on Indigenous rights and interests.
Scenario 3: Climate-Stressed Future: Expanded Offshore Development under Reduced Ecosystem Resilience	• Changes in climate variability, extreme weather conditions and sea level rise may increase health and safety risks, and affect coastal infrastructure and areas of cultural significance, potentially impacting harvesting and/or cultural practices. • Changes to the marine ecosystem may affect the quality and availability of marine resources, impacting harvesting practices and success and potentially adversely impacting food security and sovereignty.

Overall, Table 9.7 indicates that cumulative effects on Indigenous communities, rights and interests are likely to increase as offshore activity expands and as climate-related pressures reduce ecosystem resilience. Indigenous communities may experience differing consequences from ecological change depending on the degree of economic diversification, dependence on marine resources, and ability to adapt to changing conditions (Boyce et al. 2023).

The most important cumulative concerns relate to the combined effects of multiple ocean uses, changing access to marine resources, potential effects on culturally important species and harvesting practices, and the extent to which Indigenous communities can participate meaningfully in future offshore development, monitoring, stewardship, and decision-making.

9.5.3.5 Contribution of Exploratory Drilling

Exploratory drilling represents one of many cumulative effects drivers that could impact Indigenous communities, rights, and interests. Marine discharges from exploratory drilling are expected to dissipate rapidly in the water column and affect localized areas of benthic habitat. Given the relatively short-term and localized nature of exploratory drilling and associated noise emissions and marine discharges, there is reduced potential for cumulative effects on marine resources and Indigenous harvesting activities. Economic opportunities associated with exploratory drilling are expected to be relatively low in comparison to other future offshore development opportunities (e.g, offshore wind development) given the relative scale of activity and type of expenditures.

However, the relative contribution of cumulative effects from exploratory drilling on Indigenous communities, rights, and interests will depend on the specific location and timing of these activities and the vulnerability of receptors in the affected area. Exploratory drilling is expected to have negligible interactions with coastal and nearshore environments where sites of archaeological or cultural significance occur and where FSC fishing and cultural practices are focused. It is also assumed that drilling would be prohibited in current and future protected areas. Exploratory drilling is also not expected to overlap with most Wind Energy Areas, although based on historical well data, drilling could potentially occur in proximity to offshore wind activity in the Sable Island Bank if that Wind Energy Area is included in future calls for bids.

9.5.3.6 Cumulative Effects Management Opportunities

Future proposed exploratory drilling programs must be planned in consideration of other offshore activities and the potential for cumulative effects on Indigenous communities. IAAC has compiled a preliminary list of recommended mitigation measures for offshore oil and gas exploratory drilling projects in the Canada-Nova Scotia offshore area (Appendix 7-1).

Implementation of mitigation measures and best practices to reduce adverse environmental effects of exploratory drilling on the marine environment will help reduce the activity's contribution to cumulative effects on availability and quality of marine resources. Operator-led engagement with Indigenous groups early in project planning will provide opportunities to incorporate Indigenous Knowledge into project planning, resource management, and mitigation design to improve understanding of local ecological and cultural contexts. Engagement will also identify potential concerns and conflicts of use and help establish coexistence protocols and safety measures to reduce adverse cumulative effects. Establishment, communication, and implementation of a fishing gear damage or loss compensation program will also reduce adverse cumulative effects on Indigenous communities.

Meaningful consultation, accommodation, and the integration of Mi'kmaq knowledge systems and guiding principles into decision-making processes and Mi'kmaq participation in monitoring, stewardship and decision making related to marine spatial planning will foster alignment with principles of reconciliation, support sustainable development and protect Indigenous and treaty rights.

9.5.4 Atmospheric Environment and Climate

9.5.4.1 Scope

Atmospheric environment and climate are included in this CEA as a driver and receptor of cumulative effects. Section 5.1.5 provides regional context for the atmospheric environment while Section 8 provides additional context on climate policy and climate change trends and conducts a GHG assessment with considerations for future decision-making. This section of the CEA focuses on cumulative effects on the atmospheric environment, with a focus on exploratory drilling, and includes a qualitative discussion on how these effects can lead to climate change effects.

9.5.4.2 Current Conditions and Trends

Refer to Sections 5.1 for a description of current atmospheric and oceanographic conditions in the Scotian Shelf region.

Long-term monitoring and climate research indicate that the Scotian Shelf is experiencing ongoing environmental change associated with a warming climate. Observed trends include increasing air and ocean temperatures, changes in ocean circulation and stratification, ocean acidification, declining dissolved oxygen concentrations in some areas, sea-level rise, and associated changes in marine ecosystem structure and species distributions (DFO 2013; Boyce et al. 2023, 2024; Murphy et al. 2024; MAPC 2026).

These trends are monitored through long-term programs such as DFO's Aquatic Climate Change Adaptation Services Program, which conducts research and monitoring to identify climate change impacts and vulnerabilities, improve ocean forecasting capabilities, and support adaptation planning for fisheries, ecosystems, and coastal infrastructure. Aquatic Climate Change Adaptation Services Program research focuses on monitoring ocean chemistry, assessing the vulnerability of fish stocks and coastal systems, and refining ocean and climate models to improve projections of future environmental change (DFO 2018).

9.5.4.3 Drivers of Change and Effects Pathways

Fuel combustion associated with marine shipping, offshore petroleum activities, fisheries, offshore wind development, and other ocean-use activities emits air contaminants (e.g.,

nitrogen oxides, sulphur oxides, particulate matter, carbon monoxide, volatile organic compounds) which can affect air quality, as well as greenhouse gases (e.g., carbon dioxide, methane, nitrogen dioxide) which contribute incrementally to climate change (Figure 9.9).

Exploratory drilling will result in an increase in air pollutants and GHG emissions associated with combustion of fossil fuels from vessel and equipment use, as well as from the storage and flaring of hydrocarbons during well testing.

Marine shipping represents a continuous, region-wide source of air contaminant and GHG emissions, with emissions distributed across numerous vessels operating throughout the Scotian Shelf Bioregion. Past offshore petroleum projects such as Sable Offshore Energy Project and Deep Panuke would have contributed emissions primarily concentrated in specific locations on the Scotian Shelf (comparable to emissions expected from a hypothetical future petroleum development offshore Nova Scotia). Both marine shipping and petroleum development activities contribute incrementally to the cumulative atmospheric burden of GHGs and therefore represent relevant drivers of cumulative effects on the atmospheric environment and climate.

Although not generally considered as “marine shipping”, vessels used for commercial and Indigenous fisheries, or to support offshore wind, exploratory drilling, petroleum development or other ocean uses also represent continuous, region-wide sources of air contaminant and GHG emissions.

DRAFT

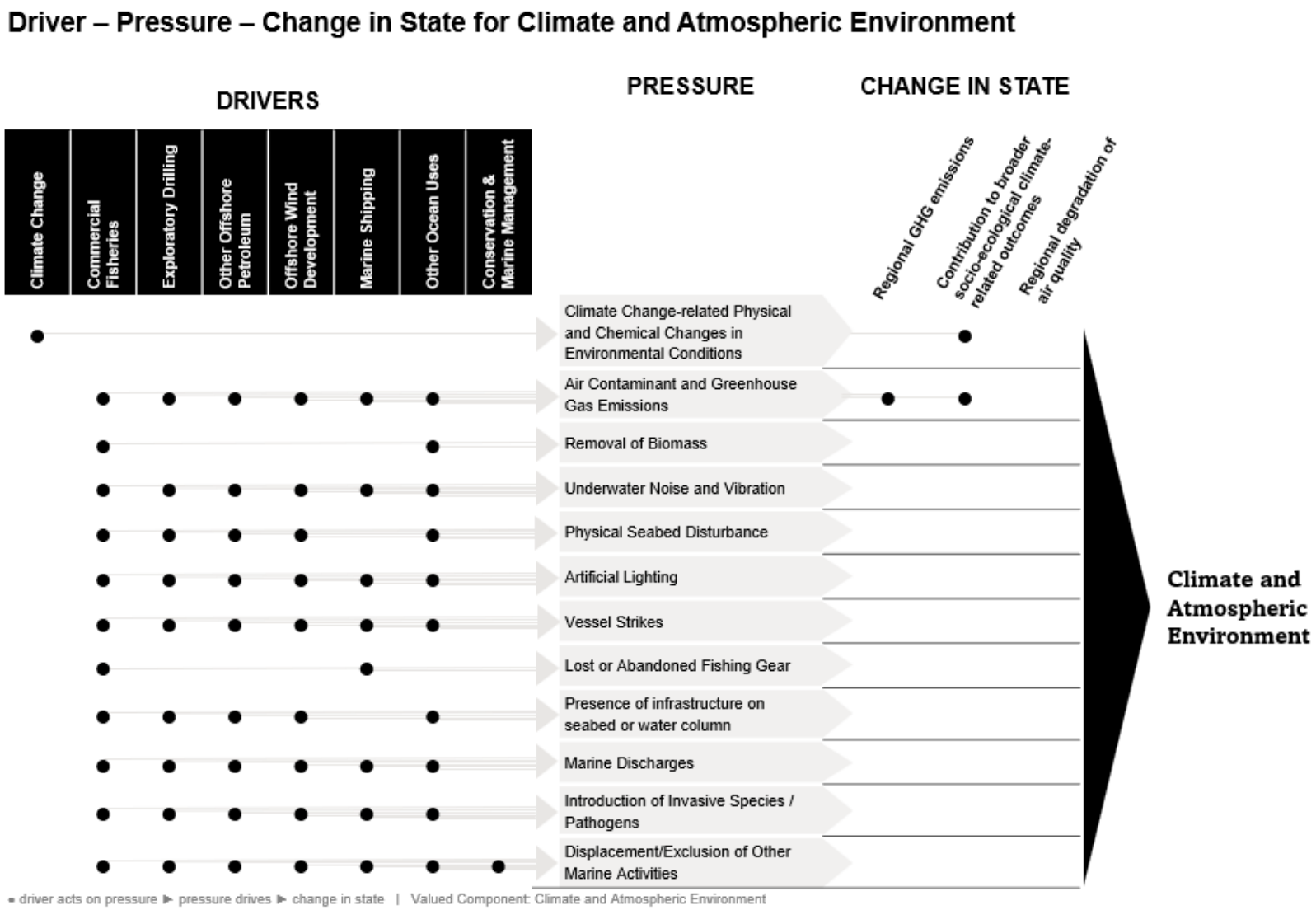


Figure 9.9. Pathways of Effects: Atmospheric Environment and Climate

Although use of vessels and equipment during construction, maintenance, and decommissioning of offshore wind projects will require fossil fuel combustion and contribute localized air contaminant and GHG emissions, offshore wind development will displace fossil-fuel based sources of energy and is expected to provide a net benefit to the global environment by reducing CO2 emissions.

Climate change, as a driver itself, will cause physical and chemical changes in environmental conditions, which may lead to broader socio-ecological climate-related outcomes. Physical and chemical changes may include increased air and water temperatures, ocean acidification (reduced pH) and deoxygenation (low oxygen), changes in climate variability and extreme events, sea level rise, changes in ocean circulation and stratification, and changes in freshwater inputs and salinity (Intergovernmental Panel on Climate Change 2021; Murphy et al. 2024).

9.5.4.4 CEA Scenario Implications

In consideration of the CEA drivers and effects pathways discussed above, Table 9.8 provides additional perspective on cumulative effects that may occur under different future development and climate scenarios.

Table 9.8 – Future CEA Scenario Implications for Atmospheric Environment and Climate

Scenario	Implications for Atmospheric Environment and Climate
Scenario 1: Current Trajectory: Continuation of Existing Trends	• Cumulative effects on Atmospheric Environment and Climate are primarily influenced by past and existing activities that extend into the future. • Exploratory drilling and offshore wind development will increase marine vessel traffic and therefore contribute additional air contaminant and GHG emissions, although these emissions will be relatively short-term, localized, and temporary and not expected to affect regional air quality conditions or affect GHG targets. • Operation of combustion engines, gas turbines, and boilers on drilling units as well as emissions from flaring of hydrocarbons during well testing are expected to have a localized, transient effect on air quality and, due to the distance from shore, effects on onshore areas and receptors are unlikely. GHG emissions will be low and minor in comparison to GHG targets.

Scenario 2: Expanded Offshore Development: Increased Human Activities and Ocean Use	• Offshore petroleum development would represent a new source of air contaminant and GHG emissions, contributing incrementally to regional atmospheric emissions and global accumulation of GHGs. Local air quality effects are expected to be limited and dispersed offshore, although GHG emissions may contribute cumulatively to climate change. • Where fossil fuel sources of electricity are replaced by offshore wind energy development, there will be a net reduction in GHG emissions.
Scenario 3: Climate-Stressed Future: Expanded Offshore Development under Reduced Ecosystem Resilience	• Direct emissions from vessel traffic, exploration drilling, and offshore petroleum development continue to add incrementally to regional and global atmospheric emissions. Although these emissions represent a relatively small contribution to global climate change, they occur within a climate system already experiencing increasing stress and variability, • The cumulative importance of GHG emissions increases as climate-related thresholds and adaptation challenges become more significant. Consequently, managing emissions, improving energy efficiency, and supporting climate adaptation become increasingly important components of cumulative effects management. • Greater climatic uncertainty may also affect future planning, environmental predictions, monitoring programs, infrastructure design, emergency preparedness, and long-term management decisions associated with offshore development.

In summary, cumulative effects on the atmospheric environment and climate are not simply additive. While emissions from individual projects and activities may be temporary and localized and not directly interact with onshore receptors, cumulative effects on the atmospheric environment and climate would arise from the interaction of air contaminants and GHG emissions with ongoing regional and global climate change. Individual “project” emissions would contribute incrementally to the atmospheric burden of GHGs. When this occurs within an environment already experiencing climate-driven changes such as warming temperatures, ocean acidification, deoxygenation, and increased climate variability, the effects on climate change are magnified. As climate change alters baseline environmental conditions, the resilience of ecological and human systems may be reduced, increasing their susceptibility to additional stressors.

DRAFT

9.5.4.5 Contribution of Exploratory Drilling

Section 8 includes a quantitative analysis of GHG emissions anticipated from exploratory drilling and places these emissions in the context of existing policies.

9.5.4.6 Cumulative Effects Management Opportunities

IAAC has compiled a preliminary list of recommended mitigation measures for offshore oil and gas exploratory drilling projects in the Canada-Nova Scotia offshore area (Appendix 7-1). Management of cumulative effects on the atmospheric environment and climate are directly linked to the reduction of air contaminants and GHG emissions. Use of vessels with engines designed to reduce air pollution (e.g., hybrid/electric, low carbon fuels) where practicable; adhering to air quality guidelines by using high-quality fuel that contains low sulfur levels; maintaining emissions control technologies; and limiting engine idling are standard measures that can be implemented for exploratory drilling and other ocean use activities to manage cumulative effects on the atmospheric environment and climate change.

Future offshore exploratory drilling proposals should consider the Government of Canada's *Strategic Assessment of Climate Change* (ECCC 2021) and related technical guidance, where applicable, to estimate project-level GHG emissions, identify feasible emission-reduction measures, and document residual emissions and uncertainties. Applying this guidance would support transparent and consistent management of the incremental contribution of exploratory drilling to cumulative GHG emissions and broader climate change objectives.

9.6 Accidents and Malfunctions

Accidental events are low-probability, infrequent events, the consequences of which can vary dramatically depending on location, timing, and scale. Because their occurrences and consequences are uncertain, accidental events are generally addressed separately in a CEA.

Section 6.10 describes potential accidental events that can occur during the course of exploratory drilling. Accidents and malfunctions that can occur from other marine activities and interact with the marine environment relate primarily to accidental spills or releases, fire, and equipment failure or loss. Depending on the severity, location, and timing of these events, they could have minor or major consequences to the marine ecosystem and human activities tied to the marine environment.

Potential consequences of accidental events may be magnified where affected species, habitats, or ecosystem functions are already experiencing pressures from climate change or other human activities. Cumulative vulnerability of marine species and habitats can

affect their capacity to recover from disturbance. Likewise, cumulative vulnerability of Indigenous communities, commercial fishers, and other ocean users can also exacerbate effects from accidental events.

Marine transportation, offshore oil and gas, commercial fisheries, and other ocean industries in Canada operate within a mature regulatory framework designed to prevent accidental events and reduce their consequences should they occur. Multiple federal statutes, including the *Canada Shipping Act*, 2001, *Fisheries Act*, *Oceans Act*, *Canadian Environmental Protection Act*, 1999, *Canadian Navigable Waters Act*, and sector-specific offshore energy legislation, establish requirements intended to reduce the likelihood of spills, collisions, equipment failures, and other unplanned events. These requirements are supported by vessel standards, navigational controls, fisheries management measures, environmental protection provisions, monitoring and reporting obligations, and enforcement mechanisms administered by Transport Canada, DFO, the Canadian Coast Guard, ECCC, and offshore energy regulators (i.e., CNSOER).

In addition to regulatory oversight, marine industries are required to implement project- and activity-specific risk management measures, including safety management systems, emergency response plans, incident reporting procedures, spill prevention and response measures, crew training, equipment inspection and maintenance programs, and operational restrictions designed to protect sensitive environmental and socio-economic receptors. Offshore energy activities are typically subject to rigorous safety, environmental protection, and emergency preparedness requirements, while commercial fisheries are managed through licensing, gear restrictions, seasonal closures, and area-based conservation measures. Marine shipping is further supported by vessel traffic management systems, pilotage requirements, navigational aids, and search and rescue capabilities. Collectively, these regulatory and operational safeguards substantially reduce the likelihood and severity of accidental events, although residual risks remain and can contribute to cumulative vulnerability where marine ecosystems or ocean users are already experiencing pressures from climate change and other human activities.

Consequently, while accidental events remain a low-probability source of potential cumulative effects, the extensive regulatory framework, industry standards, emergency preparedness requirements, and adaptive management practices in place across marine sectors provide multiple layers of risk reduction intended to prevent incidents and mitigate environmental and socio-economic consequences should they occur.

Although accidental events are generally managed separately from routine cumulative effects because of their low probability and uncertain occurrence, the consequences of such events may be influenced by existing ecosystem conditions, cumulative pressures, and the resilience of affected ecological and human systems. These relationships reinforce the need to consider cumulative vulnerability and adaptive capacity when implementing measures to reduce risks associated with accidental events, particularly spill response and contingency measures.

9.7 Integrated Discussion of Cumulative Effects

A regional CEA requires consideration of how multiple drivers and pressures interact across ecological, social, cultural, economic, and governance systems. Although the preceding sections assess cumulative effects on individual VCs, these components are highly interconnected. Changes in marine ecosystem conditions can affect fisheries productivity, ocean-use activities, Indigenous harvesting practices, cultural continuity, community well-being, and economic opportunities. Similarly, decisions regarding marine management, conservation, and development influence how cumulative pressures are distributed across the Scotian Shelf and the ability of ecological and social systems to adapt to change.

This concept of interconnectedness is consistent with ecosystem-based management approaches (Bundy et al. 2021, 2025; DFO 2024a) and with Mi'kmaw concepts such as *Msit No'kmaq*, which recognize relationships among people, species, lands, waters, and future generations. From this perspective, cumulative effects are not isolated environmental, social, or economic issues but represent connected changes occurring within a broader social-ecological system.

Although the VC assessments are presented separately for organizational purposes, several consistent themes emerge across the CEA. These themes reflect the principal drivers of cumulative change, the pathways through which cumulative effects occur, and the factors most likely to influence future cumulative effects outcomes on the Scotian Shelf. Collectively, these findings help explain how exploratory drilling may contribute to cumulative effects within the broader context of ongoing environmental change, existing ocean-use activities, and future offshore development.

- **Climate Change is a Dominant Long-term Driver of Cumulative Effects** – Climate change represents the most pervasive and influential cumulative effects driver affecting the Scotian Shelf. Climate-related changes, including ocean warming, ocean acidification, changes in circulation patterns, altered species distributions, and changing ecosystem productivity, occur across the entire region and interact with virtually all other human activities. Unlike many human activities that occur in discrete locations or over limited time periods, climate change affects ecological conditions continuously and at regional scales.

  The importance of climate change is reinforced by cumulative human impact mapping undertaken for Atlantic Canada, which identified climate-related stressors as the largest contributors to cumulative impact scores across the Scotian Shelf and Bay of Fundy (Murphy et al. 2024). Consequently, future cumulative effects management will increasingly require adaptation to changing environmental conditions in addition to the management of individual human activities.

- **Existing Cumulative Pressures are Already Influencing the Scotian Shelf** – Potential Future exploratory drilling will occur within a marine environment that is not static or unaffected. The Scotian Shelf has been influenced by centuries of fisheries activity, decades of offshore petroleum exploration and development, ongoing marine shipping, changing ocean-use patterns, and climate-driven ecosystem change. Evidence of ecological change is already apparent through changing species distributions, altered ecosystem productivity, shifts in fisheries resources, and changing oceanographic conditions. Similarly, fisheries, Indigenous harvesting activities, and other ocean uses continue to adapt to evolving ecological, regulatory, and socio-economic conditions. Cumulative effects cannot be considered solely as the future accumulation of project effects. Future activities must be evaluated within the context of an ecosystem and marine-use environment that is already experiencing cumulative change.
- **Ocean-Space Competition is an Emerging Cumulative Effects Issue** – A recurring theme throughout the CEA is the increasing competition for marine space. Existing fisheries, marine transportation, military activities, conservation initiatives, submarine cables, marine research programs, and emerging offshore wind development all require access to the marine environment. Proposed future conservation measures (e.g., MPAs, marine refuges), a factor that has both positive and adverse consequences, will further influence where activities can occur.

  As offshore petroleum activity resumes and offshore wind and other emerging marine industries develop, cumulative effects may increasingly arise not only from environmental pressures but also from the interaction among ocean users competing for access to marine space and resources. These interactions can affect commercial fisheries by Indigenous and non-Indigenous harvesters as well as Indigenous food, social and ceremonial fisheries , other Indigenous harvesting practices, navigation, research activities, and future development opportunities. Marine spatial planning is therefore an increasingly important mechanism for avoiding and managing future cumulative effects.
- **Ecological Change Can Result in Cascading Effects on People and Communities** – Many cumulative effects pathways identified in this assessment operate indirectly through changes in marine ecosystem conditions. Activities that affect species abundance, habitat quality, ecosystem productivity, biodiversity, or ecological resilience may also affect fisheries resources, Indigenous harvesting opportunities, cultural practices, community well-being, food systems, and economic activity. Changes to marine ecosystems therefore have the potential to create cascading consequences across environmental, social, cultural, and economic systems.

  This relationship is particularly important for Indigenous communities and fisheries-dependent communities whose connections to marine resources extend beyond economic benefits and include cultural, social, food-security, stewardship, and rights-based dimensions. Understanding cumulative effects therefore requires consideration

of both ecological change and the societal values and activities linked to marine ecosystems.

- **Exploratory Drilling Represents One Component of a Broader Cumulative Effects Context** –Exploratory drilling generates many of the same pressures as other marine activities, including underwater noise, vessel traffic, air emissions, marine discharges, and localized seabed disturbance. However, exploratory drilling typically occurs over relatively short periods and within limited geographic areas compared with broader regional drivers such as climate change, fisheries, or marine shipping.

  The contribution of exploratory drilling to adverse cumulative effects is therefore expected to depend largely on where and when activities occur relative to sensitive ecological features, Indigenous use areas, fisheries activities, and other marine development. Under future climate-stressed conditions, even localized disturbances may become more important where ecological resilience or adaptive capacity has been diminished. While exploratory drilling is not expected to be a dominant driver of adverse cumulative effects at the scale of the Scotian Shelf, it nevertheless contributes to the cumulative pressure burden experienced by VCs and should continue to be managed within a broader cumulative-effects framework.
- **Exploratory Drilling May Have Positive Cumulative Effects** – Recognizing that exploratory drilling itself may make only a minor and indirect contribution at the regional scale, if exploration results in discovery of a hydrocarbon reservoir, it can potentially lead to further testing and development which could lead to broader, more substantial benefits. Exploratory drilling and related offshore activities could be leveraged to support regional workforce capacity, supply-chain readiness, Indigenous participation, shared monitoring, and cross-sector collaboration to provide broader benefits for offshore energy, marine research, and ocean management.
- **Management of Cumulative Effects Cannot be Achieved through Project-level Mitigation Alone** – From a collective perspective, cumulative effects management on the Scotian Shelf should focus on maintaining ecosystem resilience, protecting important ecological functions, supporting Indigenous rights and stewardship objectives, reducing conflicts among ocean users, improving the capacity of ecological and social systems to adapt to changing environmental conditions, and strengthening regional economic capacity to enhance potential positive cumulative effects. Effective cumulative effects management requires coordinated regional planning and monitoring, adaptive management, marine spatial planning, Indigenous participation, and information sharing, with cross-sector collaboration among governments, regulators, Indigenous Peoples, industry, stakeholders, and other ocean users. Although it is beyond the scope and mandate of this CEA to conduct marine spatial planning for the Scotian Shelf bioregion, cumulative effects considerations presented in this analysis may help to inform future marine planning and effects management initiatives (refer to Section 9.9).

DRAFT

9.8 Challenges, Data Gaps, and Limitations

Cumulative effects assessment is widely recognized as challenging because it requires consideration of multiple activities, stressors, and pathways across spatial and temporal scales that often exceed the scope of individual project assessments. Cumulative effects literature identifies several persistent challenges, including scientific uncertainty, complex interactions among stressors, difficulties accounting for future development patterns, and the need for collaboration among multiple decision-makers (Duinker and Greig 2006; Canter and Ross 2010). These challenges become particularly pronounced in RAs, where larger spatial and temporal scales increase uncertainty and require coordination across multiple jurisdictions and sectors (Gunn and Noble 2009, 2011; Blakley et al. 2020; Daborn et al. 2025; McDonald et al. 2025). Regional CEA in marine ecosystems adds another layer of complexity assessing multiple stressors and complex interactions across large, dynamic ecosystems where species distributions, oceanographic conditions, productivity, and community composition change seasonally and annually and shifting baselines are compounded by climate change (Stelzenmüller et al. 2018; Willsteed et al. 2018; Simeoni et al. 2023).

An additional challenge for this CEA relates to understanding how ecological change translates into social, cultural, economic, and rights-based outcomes. Many cumulative effects pathways are indirect and occur through changes in marine ecosystem condition, species abundance, species distribution, or access to marine resources. These ecological changes may influence commercial fisheries by Indigenous and non-Indigenous harvesters as well as Indigenous food, social and ceremonial fisheries, other Indigenous harvesting activities, tourism, community well-being, cultural practices, and economic opportunities; however, the magnitude and distribution of these effects are often difficult to predict and quantify. Human communities and industries may also adapt to changing environmental conditions through shifts in harvesting locations, fishing practices, technologies, target species, market conditions, or management approaches. As a result, there is often considerable uncertainty in establishing clear cause-and-effect relationships between ecological change and socio-economic outcomes, particularly at a regional scale and over long time horizons.

A common fundamental challenge in any CEA is the identification of appropriate spatial and temporal boundaries for the assessment. Marine ecological processes extend beyond administrative boundaries, although jurisdictional boundaries remain highly relevant as it relates to spatial planning, regulatory approval processes, and cumulative effects management. This CEA recognizes multiple ecological scales and jurisdictional boundaries (e.g., CNSOER jurisdiction, fisheries management areas) and adopts a marine spatial planning boundary (Scotian Shelf Bioregion) as the overall regional CEA boundary.

With respect to temporal boundaries, CEA must consider the implications of retrospective (past) and prospective (future) activities. While it may be desirable to define temporal

boundaries on an individual VC basis, with past temporal boundaries dating back to before a VC showed evidence of cumulative effects, the availability and quality of comparable baseline data may be limited. Similarly, the further into the future that an assessment looks, the more uncertainty increases.

Plausible future scenarios were developed to identify reasonably foreseeable future activities and help guide the assessment of potential future cumulative effects. Future development assumptions were based on past levels of activity and emerging government policy and prospectus studies and reviewed through engagement with federal and provincial authorities. With no current exploratory drilling licenses or offshore wind calls for bids, there remains considerable uncertainty around the extent of future development. Adding to this uncertainty of future predictions is the extent of climate change and biophysical and socio-economic changes that may occur over longer timeframes (i.e., shifting baselines).

The assessment is also limited by the availability of Indigenous Knowledge and stakeholder-specific information relevant to cumulative effects. Indigenous Knowledge and perspectives were considered where information was available through submissions, engagement records, publicly available reports, and Indigenous-authored documents; however, this CEA does not represent an Indigenous-led CEA and should not be interpreted as fully reflecting the perspectives, knowledge systems, priorities, or concerns of Indigenous communities with interests in the Study Area. Similarly, although comments received through the RA process informed the development of the CEA framework and VCs, the level of participation and detail provided varied among stakeholder groups. Additional engagement, Indigenous Knowledge studies, community-led research, and future monitoring initiatives may improve understanding of cumulative effects pathways, regional priorities, and indicators of concern. A Mi'kmaq Ecological Knowledge Study is currently being undertaken on behalf of the CNSOER to identify offshore areas of Mi'kmaq fisheries and traditional use which will help inform future decision-making about future energy development in the Canada-Nova Scotia offshore area.

A recurring theme in CEA literature is the need to progress beyond CEA to the management of cumulative effects (Canter and Ross 2010). As noted in Section 9.1, the objective of this CEA is to understand how exploratory drilling may interact with past, existing, and reasonably foreseeable activities and changes to environmental, health, social, and economic conditions within the Study Area. This CEA is intended to support strategic decision-making related to exploratory drilling and is not intended to manage and mitigate the marine-based activities occurring offshore Nova Scotia. Cumulative effects arise from multiple sectors, with management responsibilities divided among different agencies and jurisdictions. This CEA assesses cumulative effects within a multi-sector framework but cannot implement mitigation on its own, instead relying on governance arrangement and coordination among decision-makers. Section 9.9.1 provides an

overview of other ongoing and planned cumulative effects initiatives that may be effective in improving cross-sector coordination and management of cumulative effects.

9.9 Management of Cumulative Effects

Responsibility for managing cumulative effects is shared among governments, Indigenous Peoples, industry, stakeholders, and ocean users. As demonstrated in this CEA, many cumulative effects are driven by multiple activities and broader environmental change rather than any single activity acting alone. Consequently, effective cumulative effects management requires coordinated regional planning, information sharing, monitoring, adaptive management, and continued collaboration among rights holders and stakeholders.

Section 9.9.1 summarizes ongoing and planned cumulative effects initiatives that may be relevant to managing cumulative effects of exploratory drilling on the Scotian Shelf. Recommendations for mitigating and managing cumulative effects of exploratory drilling are presented in Section 9.9.2.

9.9.1 Federal Government Initiatives Relevant to Cumulative Effects

Federal government initiatives relevant to cumulative effects are provided in Table 9.9, along with suggested application for the management of cumulative effects related to exploratory drilling. Many of the tools and initiatives listed in Table 9.9 are described in DFO's *First-Generation Marine Spatial Plan: Scotian Shelf and Bay of Fundy* (DFO 2024a).

DRAFT

Table 9.9 – Federal Government Initiatives Relevant to Cumulative Effects

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
Policies and Frameworks		
DFO, Fish and Fish Habitat Protection Program - Position Statement on Cumulative Effects for Fisheries Act Authorizations[37]	Position statement explains how cumulative effects on fish and fish habitat are considered before decisions to issue or refuse *Fisheries Act* authorizations. Status: Published in 2025.	Directly relevant where activities may cause death of fish or harmful alteration, disruption or destruction of fish habitat requiring authorization. Can support consistent project-level consideration of existing pressures, regional habitat condition, and other authorized activities.
DFO, Maritimes Region – Ecosystem-Based Management Framework[38]	A structured framework for integrating ecological, economic, social and cultural, and governance objectives in transparent, evidence-based decision-making across sectors. Status: The framework has been developed and documented through 2020, 2021, and 2025 publications.	Provides an organizing framework for evaluating exploratory drilling within broader ecosystem and human-use objectives, including trade-offs, cumulative pressures, and governance responsibilities. Particularly relevant to identifying management objectives and indicators that extend beyond individual project effects.
DFO - Marine Spatial Planning Program – Scotian Shelf and Bay of Fundy[39]	Marine spatial planning integrates ecological, economic, social, and cultural information to support coordinated planning among sectors	Highly relevant as the principal cross-sector planning context for siting and coordinating exploratory drilling with fisheries, shipping, conservation,

[37] DFO 2025d
[38] DFO 2024a; Daly et al. 2020; Bundy et al. 2021, 2025
[39] DFO 2024a

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
	and identify areas of compatibility, conflict or special protection. Status: The First-generation Marine Spatial Plan for the Scotian Shelf and Bay of Fundy was published in 2024; regional planning, data development, and engagement are ongoing.	offshore wind, Indigenous use, and other ocean activities. Can support avoidance of sensitive or heavily used areas, identify information gaps, and provide a platform for adaptive regional management.
Environment and Climate Change Canada (ECCC) (with Bird Research Institute [BRI]) – Conceptual Framework for Cumulative Effects on Aerofauna[40]	A population- or species-centered framework for assessing cumulative effects of offshore wind and other pressures on birds and bats, including a hierarchy of exposure and effects metrics adaptable to available information. Status: Framework was released as a 2024 preprint/research product. ECCC and BRI are now applying the framework to case studies in a research context.	Methods could be adapted to assess cumulative exposure of marine birds and bats to exploratory drilling pressures such as lighting, vessel traffic, noise and accidental events alongside other activities.
Transport Canada – Cumulative Effects of Marine Shipping Initiative and National Framework[41]	An initiative launched in 2017 to improve understanding of cumulative effects of vessel-related activities in assessment areas across Canada. A national framework and supporting methodological reports have been produced.	Directly relevant to drilling-related supply and survey vessel traffic, which adds to regional underwater noise, emissions, collision risk, discharges, and potential user conflicts. Research can inform assessment methodologies. Framework can

[40] ECCC 2024; Ferguson et al. 2025
[41] Lerner 2018; Doucette et al. 2019; Pickard et al. 2019; Transport Canada 2022, 2024, 2025

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
	Status: The National Framework was published in 2022. As of July 2025, Transport Canada is working with Indigenous partners and stakeholders in eight Cumulative Effects of Marine Shipping Initiative assessment areas across Canada, including the Bay of Fundy in New Brunswick and Nova Scotia.	support assessment of vessel pathways and regional mitigation.
DFO and Parks Canada – MPAs and Other Protected Areas[42]	Existing and proposed protected areas use legal and policy measures to conserve ecological features and can reduce some cumulative pressures by restricting incompatible activities. Status: designation, management planning, monitoring, and network development are ongoing for federal activities.	Protected-area boundaries, conservation objectives, and restrictions provide clear constraints for planning exploratory drilling licensing.
Research Tools and Applications		
Natural Resources Canada (NRCan) – Open Science and Data Platform[43]	A public platform that integrates government datasets and scientific publications relevant to cumulative effects. Status: Operational and continually updated; records for the Nova Scotia	Supports transparent access to RA findings, baseline information, and cumulative-effects science that can be used to help understand cumulative effects of human activities to support decision-making.

[42] Government of Canada 2011
[43] NRCan 2024; Government of Canada 2026

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
	offshore regional assessments are available or identified for inclusion.	
DFO – Canada Marine Planning Atlas, Atlantic[44]	An interactive mapping platform that compiles published ecological, ocean-use, and planning data for marine spatial planning and management. Status: The Atlantic Atlas is available as a functional platform and continues to be updated and refined with partner and stakeholder input.	Provides a common spatial evidence base for screening proposed drilling locations, identifying overlap with ecological features and human uses, and communicating regional context.
CNSOER – Wind Energy Area Spatial Data Viewer[45]	An interactive mapping platform that compiles published ecological, ocean-use, and planning data from Open Data Canada and other open data platforms. Status: The WEA Spatial Data Viewer is available as a functional platform and continues to be updated and refined with partner and stakeholder input.	Similar to the Marine Planning Atlas, provides a common spatial evidence base for screening proposed drilling locations, identifying overlap with ecological features and human uses, and communicating regional context.
DFO (Maritimes Region) - Cumulative Human Impact Mapping for the Scotian Shelf and Bay of Fundy[46]	Spatial analysis combines 45 human activities and stressors across five sectors with the vulnerability of 21 marine habitats to generate relative	Provides regional context on areas already exposed or vulnerable to multiple pressures and can help prioritize avoidance, monitoring, and additional assessment for drilling.

[44] DFO 2025c
[45] CNSOER 2026d
[46] Murphy and Kelly 2023; Murphy et al. 2024; Murray et al. 2024

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
	cumulative impact scores and identify hot spots and cold spots. Status: Mapping products and supporting research are available.	
DFO (Maritimes Region) – Marxan with Zones Spatial Analysis[47]	Multi-sector decision-support analysis developed for the Regional Assessment of Offshore Wind Development in Nova Scotia to identify areas capable of meeting wind-development targets while reducing overlap with ecological features and human uses. Status: Analysis completed for offshore wind planning and available as a regional decision-support product.	Although developed for offshore wind, the data layers and optimization approach can inform strategic screening of drilling areas and identify locations where new activity could add to existing spatial conflict or ecological pressure. Application to drilling would require objectives and constraints tailored to petroleum exploration.
DFO, Maritimes Region - Ocean Use Compatibility Analysis[48]	High-level assessment of potential compatibility between pairs of marine activities in the Scotian Shelf-Bay of Fundy planning area. Component scores are combined to produce average compatibility ratings. Status: Technical report was published in 2024.	Can provide an initial screen for potential conflicts between exploratory drilling and fisheries, shipping, conservation, offshore wind, and other uses and inform engagement planning.

[47] Nagel et al. 2024
[48] Serdynska et al. 2024

Federal Authority – Initiative	Initiative Summary and Current Status	Relevance to Managing Cumulative Effects on the Scotian Shelf
DFO, Maritimes Region - Spatial Reproducible Reporting Tool[49]	An open-source web-based tool that automatically summarizes DFO and non-DFO spatial datasets for selected areas using transparent and updateable processes. Status: Documented in 2022 and reported to summarize more than 30 data sources.	Can rapidly generate consistent regional profiles for proposed drilling areas, support comparative site screening and improve documentation of the evidence used in regulatory decisions.

DRAFT

[49] Stoyel et al. 2022

9.9.2 Managing Cumulative Effects at a Regional Scale

The following measures are recommended to help manage cumulative effects on the Scotian Shelf. While the ability to implement individual measures may vary among governments, Indigenous Peoples, regulators, industry, stakeholders, researchers, and other ocean users, each has opportunities to contribute to cumulative effects management through their respective roles, responsibilities, decisions, and activities. Collectively, these contributions can support improved coordination, planning, monitoring, adaptive management, and stewardship of the marine environment.

- **Promote regional-scale planning and coordination among offshore sectors**, including fisheries, shipping, offshore energy development, marine conservation initiatives, military uses, and other ocean activities, to reduce potential conflicts and cumulative pressures on VCs.
- **Establish a regional cumulative effects monitoring framework with measurable thresholds and indicators for key environmental, socio-economic, cultural, and rights-based conditions, developed collaboratively with Mi'kmaw organizations, federal and provincial regulators, and ocean users**. Indicators should be linked to valued components and cumulative effects pathways, include both western science and Indigenous Knowledge where shared, and support adaptive management by identifying when cumulative change is approaching levels that may affect ecosystem integrity, Indigenous and treaty rights, harvesting access, cultural continuity, or community well-being. Results from project-specific monitoring programs (e.g., underwater noise and vibration monitoring) should feed into the regional monitoring framework as applicable.
- **Apply adaptive management approaches** that incorporate new scientific information, Indigenous Knowledge, monitoring results, and emerging understanding of cumulative effects into future planning, mitigation, and decision-making.
- **Support collaborative regional data collection and sharing** among government agencies, Indigenous groups, fishing organizations, industry, academia, and other ocean users to address key information gaps and improve CEAs.
- **Incorporate climate change considerations into cumulative effects management**, recognizing that changing ocean conditions, species distributions, ecosystem productivity, and socio-economic conditions may alter the nature and magnitude of cumulative effects over time. Climate vulnerability assessments that periodically reassess regional vulnerabilities can support more informed long-term decision making under changing conditions and enable progress toward adaptation and resilience.
- **Continue to apply best management practices and mitigation measures at the project level**, including measures related to vessel operations, underwater noise,

discharges, waste management, spill prevention and response, avoidance of sensitive ecological features, and protection of species at risk and **implement follow-up and effectiveness monitoring programs** capable of evaluating whether mitigation measures are achieving intended outcomes and identifying emerging cumulative effects requiring additional management responses. Refer to Appendix 7-1 for recommended monitoring for drilling proponents.

- **Strengthen consideration of Indigenous rights, interests, use, culture, and well-being in CEA and management**, including integration of Indigenous Knowledge in establishment of indicators and thresholds and Indigenous-led monitoring where appropriate.
- **Support fisheries coexistence and conflict avoidance measures**, including early engagement with commercial, Indigenous, and recreational fisheries participants, information sharing, and implementation of measures intended to reduce interference with fishing activities.
- **Develop and periodically update regional cumulative effects information products**, such as cumulative pressure mapping, activity inventories, sensitivity mapping, and ecosystem condition indicators, to support future assessments and regulatory decision-making.

While exploratory drilling is expected to represent only one component of future cumulative pressures within the Study Area, implementation of the measures identified above can help reduce its contribution to cumulative effects and support broader sustainability objectives for the offshore region. Additional measures recommended to address the contribution of exploratory drilling to cumulative effects are discussed below (Section 9.9.3).

9.9.3 Managing Cumulative Effects from Exploratory Drilling

As evidenced by past experience on the Scotian Shelf, when conducted responsibly, exploratory drilling can occur without significant adverse effects on the marine ecosystem, commercial fisheries and other ocean uses, Indigenous communities, and the atmospheric environment. Effects from exploratory drilling are primarily managed through the CNSOER as the lifecycle regulator and authorized operators of drilling programs (i.e., drilling operators).

Future proposed exploratory drilling programs must be planned in consideration of other offshore activities. Marine spatial planning tools are increasingly being developed to support siting decisions and reduce potential conflicts among offshore industries, fisheries, conservation interests, and Indigenous rights and interests (Nagel et al. 2024). Through proactive spatial planning including participating in marine spatial planning initiatives led by DFO and the conduct of SEAs to inform Call for Bids and licensing processes, the CNSOER may reduce adverse cumulative effects of exploratory drilling.

Licencing areas for exploratory drilling should avoid national park reserves (i.e., Sable Island), MPAs (i.e., The Gully; St. Anns Bank), Areas of Interest (i.e., Eastern Shore Island; Fundian Channel-Browns Bank), Marine Refuges, National Marine Conservation Areas, Indigenous Protected and Conserved Areas, and Georges Bank Moratorium Area (refer to Section 5).

Licensing within Other Effective Area-Based Conservation Measures areas and Ecologically and Biologically Significant Areas should be considered on a case-by-case basis (e.g., through SEA including Indigenous and stakeholder engagement) and proceed only if a review determines that drilling activity would not pose unacceptable risks to conservation objectives. Similarly, licensing within areas of high use (e.g., fishing intensity, shipping lanes, offshore wind) and cumulative effects "hot spots" (see Figure 9.5 and Murphy et al. 2024) should be considered through SEA with Indigenous and stakeholder engagement and identification of site-specific conditions as applicable (e.g., monitoring programs) to confirm drilling activity would not pose unacceptable risks to fisheries and other ocean uses, and that resulting cumulative effects would not compromise ecosystem integrity or sustainable use of ocean space and resources.

Implementation of mitigation measures and monitoring programs (refer to Appendix 7-1) by drilling operators, will reduce the contribution of exploratory drilling to cumulative effects in the region. In particular, operators can substantially reduce cumulative effects of exploratory drilling through early engagement with Indigenous communities, fishers, and other ocean users. Engagement with Indigenous groups early in project planning will provide opportunities to incorporate Indigenous Knowledge into project planning, resource management, and mitigation design to improve understanding of local ecological and cultural contexts. Engagement with Indigenous groups, fishers, and other ocean users will identify potential concerns and conflicts of use and help establish co-existence protocols and safety measures. Establishment, communication, and implementation of a fishing gear damage or loss compensation program will also reduce adverse cumulative effects in the event of an accident.

At the regional scale, exploratory drilling is expected to make a minor positive contribution to cumulative socio-economic conditions by maintaining offshore expertise, supporting marine service industries, and providing information necessary for future resource development decisions. These benefits must be considered alongside the potential adverse cumulative effects and uncertainties associated with future offshore activities.

While exploratory drilling itself is not expected to contribute substantially to positive cumulative environmental effects, it may make a minor positive contribution to regional socio-economic outcomes by supporting employment, skills development, supply chain activity, and the maintenance of offshore operational capacity in Atlantic Canada. Exploratory drilling also serves an enabling function within the offshore petroleum lifecycle. Information obtained through exploration programs improves understanding of offshore petroleum resources and informs future development decisions. In the absence of

exploratory drilling, future offshore petroleum development opportunities would not proceed because the existence, extent, and commercial viability of resources could not be confirmed. If exploratory drilling results in the discovery of a hydrocarbon accumulation that warrants further evaluation, the discovery may ultimately progress to development and production which could have substantially greater positive and adverse cumulative effects to be managed.

Exploratory drilling may also create indirect synergies with other offshore industries. Experience gained through offshore operations, marine logistics, environmental monitoring, emergency response, workforce training, and regulatory oversight may contribute to knowledge, infrastructure, and capacity that are relevant to emerging sectors such as offshore wind development. Although these synergies are expected to be limited and indirect, they may support a more coordinated and efficient offshore economy over time.

Opportunities to enhance the positive cumulative effects of exploratory drilling are primarily associated with strengthening regional economic capacity, knowledge development, and collaboration among offshore sectors. Measures that support workforce development, Indigenous participation, local procurement, and knowledge sharing can increase regional benefits while contributing to a more resilient offshore economy. In particular, coordination among offshore industries, including offshore petroleum, offshore wind, marine transportation, ocean technology, and scientific research, may create efficiencies through shared infrastructure, services, environmental information, and workforce capacity. Continued participation in marine spatial planning and multi-sector governance initiatives can further support sustainable economic development while promoting the efficient and responsible use of ocean space.

9.10 Application of this CEA to Future Regulatory Decision-Making

This CEA is intended to support future decision-making concerning offshore exploratory drilling, including consideration of whether an exclusion regulation is appropriate and, if implemented, the conditions and management measures needed to support its continued application. It identifies the regional cumulative effects context, the relative contribution of exploratory drilling, areas and conditions of greater sensitivity, management priorities, information gaps, and regional monitoring needs that should inform future decisions.

In the event that an exclusion regulation under the *Impact Assessment Act* may apply, exploratory drilling would remain subject to applicable regulatory and authorization requirements administered by the CNSOER. Project-specific review and oversight would continue to address matters such as environmental protection, spill prevention and response, marine discharges, species protection, fisheries communication, emergency

preparedness, mitigation, and operational monitoring. The findings of this CEA can provide regional context for those processes.

Where a future exploratory drilling program requires a project-specific impact assessment, this CEA can provide the regional baseline and cumulative effects context for evaluating the program's incremental contribution to cumulative effects. Project-level assessment would still need to consider the proposed location, timing, activities, environmental setting, Indigenous and stakeholder input, and the other activities and pressures relevant at that time.

Regardless of the applicable assessment pathway, regional monitoring, information sharing, Indigenous engagement, and adaptive management will remain important. Cumulative effects information, environmental conditions, offshore activity levels, and the assumptions supporting an exclusion regulation should be reviewed periodically to determine whether exploratory drilling continues to represent a relatively minor regional contributor and whether additional assessment or management measures are required.

9.11 References

AECOM (AECOM Canada Ltd.) 2024. Assessment of Atlantic Canada Ports to Support Offshore Wind Development. Prepared for Net Zero Atlantic. https://netzeroatlantic.ca/sites/default/files/2025-08/250813%20Final%20Report%20Assessment%20Atlantic%20Canadian%20Ports%20Support%20Offshore%20Wind%20Development.pdf

Arnold, L., K. Hanna, C. Fell, J.P. LaPlante, J. Nishima-Miller, J. Wade. 2023. Incorporating Social Impacts into Cumulative Effects Assessment: Lessons and Best Practices. 59 p.

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

Bartlett, C., M. Marshall and A. Marshall. 2012. Two-eyed seeing and other lessons learned within a co-learning journey of bringing together Indigenous and mainstream knowledges and ways of knowing. J. Environ Stud Sci 2: 331-340.

Bernier, R.Y., R.E. Jamieson, N.E. Kelly, C. Lafleur and A.M. Moore (Editors). 2023. State of the Atlantic Ocean Synthesis Report. Can. Tech. Rept. Fish. Aquat. Sci. 3544: v + 219 p.

Blackford, J., H. Stahl, J.M. Bull, J.M., B. Berges, M. Cevatoglu Bayrakli, A. Lichtschlag, D. Connelly, R. James, J. Kita, D. Long, K. Shitashima, D. Smith, P. Taylor, I. Wright, M. Akhurst, B. Chen, T. Gernon, C. Hauton and S. Widdicombe. 2014. Detection and impacts of leakage from sub-seafloor deep geological carbon dioxide storage. Nature Climate Change, 4, 1011-1016.

Blakley, J., B. Noble, K. Vella, J. Marty, K. Nwanekezie and A K. Fedoroff. 2020. Lessons Learned, Best Practices and Critical Gaps in Regional Environmental Assessment. A synthesis of Canadian and international literatures. Social Sciences and Humanities Research Council Canada.

Boyce, D.G., N. Shackell and B. Greenan. 2024. A climate risk index for marine life across the Canadian exclusive economic zone. Can. Tech. Rep. Fish. Aquat. Sci. 3568: iv + 40 p.

Boyce, D.G., N. Shackell, P. Greyson and B. Greenan. 2023. A prospective framework to support climate-adaptive fisheries in Canada. FACETS 8: 1-15.

Breeze, H., D. Fenton, R.J. Rutherford and M.A. Silva. 2002. The Scotian Shelf: an ecological overview for ocean planning. Canadian Technical Report of Fisheries and Aquatic Sciences 2393E. x + 259 p. https://publications.gc.ca/site/eng/9.616104/publication.html

Breeze, H., D.G. Fenton, R.J. Rutherford, and M.A. Silva. 2005. The Scotian Shelf: An Atlas of Human Activities. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/321387.pdf

Bui, T.V., H.H. Dao, H.T. Nguyen, Q.D. Ta, H.N. Nguyen Le 2, P. Kieu, C.L. Mai, T.D. Tran, H.S. Nguyen, H.D. Nguyen and T.T. Huynh. 2025. A Critical Review on the Opportunities and Challenges of Offshore Carbon Capture, Utilization, and Storage. Sustainability, 17(20): 9250.

Bush, E. and D.S. Lemmen (eds). 2019. Canada's Changing Climate Report. Government of Canada, Ottawa, ON. 444 p.

Bundy, A. 2005. Structure and functioning of the eastern Scotian Shelf ecosystem before and after the collapse of groundfish stocks in the 1990s. Can. J. Fish. Aquat. Sci. 62: 1453-1473.

Bundy, A., J. Daly, C. Thompson and M. Westhead. 2021. DFO Maritimes Region Ecosystem Based Management (EBM) Framework. Can. Tech. Rep. Fish. Aquat. Sci. 3440: vi + 73 p.

Bundy, A., S. Eger, R. Stephenson and M. Westhead. 2025. Fisheries and Oceans Canada's Maritimes Region Ecosystem-Based Management Framework for Sustainable Management. Can. Tech. Rep. Fish. Aquat. Sci. 3716: vii + 175 p.

Canada Energy Regulator. 2019. National Energy Board approves applications to abandon sub-sea pipelines. https://www.cer-rec.gc.ca/en/about/news-room/news-releases/2019/national-energy-board-approves-applications-abandon-sub-sea-pipelines.html

Canter, L.W. and B. Ross. 2010. State of practice of cumulative effects assessment and management: The good, the bad, and the ugly. Impact Assessment and Project Appraisal, 28 (4): 261-268.

CCME (Canadian Council of Ministers of the Environment). 2014. Canada-wide Definitions and Principles of Cumulative Effects. https://ccme.ca/en/res/cedefinitionsandprinciples1.0e.pdf

Choi, J.S., K.T. Frank, B.D. Petrie and W.C. Leggett. 2005. Integrated assessment of a large marine ecosystem: a case study of the devolution of the Eastern Scotian Shelf, Canada. Oceanography and Marine Biology: 43: 47.

Clark, M.R., D.A. Bowden, A.A. Rowden and R. Stewart. 2019. Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years. Frontiers in Marine Science, 6: 63. https://doi.org/10.3389/fmars.2019.00063

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2025. Directory of Wells.

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2026a. Legacy Production Projects. https://cnsoer.ca/oil-gas-energy/legacy-production-projects

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2026b. Offshore Wind Call for Information NS25-1R What We Heard Report. April 2026. https://cdn.cnsoer.ca/sites/default/files/2026-04/Offshore%20Wind%20Call%20for%20Information%20NS25-1R%20-%20What%20We%20Heard%20Report_0.pdf

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2026c. Canada-Nova Scotia Offshore Energy Regulator Announces Results of Petroleum-Related Call for Bids NS25-1P.

CNSOER (Canada-Nova Scotia Offshore Energy Regulator). 2026d. WEA Spatial Data Viewer. https://experience.arcgis.com/experience/ed5d79c7dcaf473aaaad4675fd5a8d13

CNSOPB (Canada-Nova Scotia Offshore Petroleum Board). 2018. Exploration and production history of the Nova Scotia offshore area. https://cdn.cnsoer.ca/sites/default/files/2025-01/exploration_production_history_of_ns_offshore_-_december_2018_0.pdf

Daborn, G., S. Parsons, L. Whitman, A. Wilkie and J. Wooder. 2025. Regional Assessment of Offshore Wind Development in Nova Scotia. Final Report. January 2025. https://iaac-aeic.gc.ca/050/documents/p83514/160595E.pdf

Daly, J., A. Bundy and R.L. Stephenson. 2020. Maritimes Region Workshop to Develop a Consensus EBM Framework to Assess the Cumulative Impacts of Fishing. Can. Tech. Rep. Fish. Aquat. Sci. 3368: vi + 59 p.

Denny, S.K., and L.M. Fanning. 2016. A Mi'kmaw Perspective on Advancing Salmon Governance in Nova Scotia, Canada: Setting the Stage for Collaborative Co-Existence. International Indigenous Policy Journal 7(3): 27 p.

DFO (Fisheries and Oceans Canada). 2007. Fisheries Management in the Maritimes Region (1990 – 2005). https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40572146.pdf

DFO (Fisheries and Oceans Canada). 2010a. Canadian Marine Ecosystem Status and Trends Report. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/030 (Revised): 38 p.

DFO (Fisheries and Oceans Canada). 2010b. Gully Marine Protected Area Monitoring Indicators, Protocols and Strategies. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/066: 17 p.

DFO (Fisheries and Oceans Canada). 2013. Risk-based assessment of climate change impacts and risks on the biological systems and infrastructure within Fisheries and Oceans Canada's mandate - Atlantic Large Aquatic Basin. DFO Can. Sci. Advis. Sec. Sci. Resp. 2012/044: 43 p.

DFO (Fisheries and Oceans Canada). 2017. The Gully Marine Protected Area Management Plan. Fisheries and Oceans Canada.

DFO (Fisheries and Oceans Canada). 2018. Canada's Aquatic Climate Change Research Priorities. Canada's aquatic climate change research priorities.

DFO (Fisheries and Oceans Canada). 2023. St. Anns Bank Marine Protected Area Management Plan 2023. Fisheries and Oceans Canada.

DRAFT

DFO (Fisheries and Oceans Canada). 2024a. First-generation Marine Spatial Plan: Scotian Shelf and Bay of Fundy. 77 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41270526.pdf

DFO (Fisheries and Oceans Canada). 2024b. Marine Spatial Planning Areas – Scotian Shelf and Bay of Fundy. Fisheries and Oceans Canada. Available at: https://www.dfo-mpo.gc.ca/oceans/planning-planification/areas-aires/scotian-shelf-bay-fundy-plate-forme-neo-ecossaise-baie-fundy-eng.html

DFO (Fisheries and Oceans Canada). 2024c. The Gully Marine Protected Area Annual Report 2024. Fisheries and Oceans Canada.

DFO (Fisheries and Oceans Canada). 2024d. Review of St. Anns Bank Marine Protected Area Monitoring: Selected Research Activities, Indicators, and Guidance on Next Steps. Can. Sci. Advis. Sec. Sci. Adv. Rep. 2024/059: 16 p.

DFO (Fisheries and Oceans Canada). 2025a. Ecosystem Approach to Fisheries Management (EAFM). Government of Canada. Ecosystem approach to fisheries management (EAFM).

DFO (Fisheries and Oceans Canada). 2025b. Impacts on Ecosystems and Fisheries. https://www.dfo-mpo.gc.ca/science/oceanography-oceanographie/accasp-psaccma/impacts/index-eng.html

DFO (Fisheries and Oceans Canada). 2025c. Canada Marine Planning Atlas. https://egisp.dfo-mpo.gc.ca/apps/atlantic-atlas-atlantique/?locale=en

DFO (Fisheries and Oceans Canada). 2025d. Position Statement on the Consideration of Cumulative Effects in Support of Decision Making on Fisheries Act Authorizations Concerning Fish and Fish Habitat Protection. 12 pp. https://publications.gc.ca/collections/collection_2025/mpo-dfo/Fs23-766-2025-eng.pdf

DFO (Fisheries and Oceans Canada). 2025e. Gross Domestic Product and Employment by Province, 2024. https://www.dfo-mpo.gc.ca/stats/maritime/tab/mar-tab6-eng.htm#tablep-fna

DFO (Fisheries and Oceans Canada). 2026a. Fisheries and Oceans Canada Maritimes Region Overview. https://www.mar.dfo-mpo.gc.ca/en/Oceans-Maritimes-Region-Overview

DFO (Fisheries and Oceans Canada). 2026b. Atlantic Zone Monitoring Program (AZMP). https://www.dfo-mpo.gc.ca/science/data-donnees/azmp-pmza/index-eng.html

Doucette, P., D. Cliche, D., M. Renaud and D. Pickard. 2019. Cumulative Effects Assessment: Technical Workshop Report. Transports Canada. Canada. Available at: https://canadacommons.ca/artifacts/37538647/cumulative-effects-assessment/38437841/

Dubé, M.G. 2003. Cumulative effect assessment in Canada: A regional framework for aquatic ecosystems. Environmental Impact Assessment Review 23: 723-745.

Duinker, P.N. and L.A. Greig. 2006. The impotence of cumulative effects assessment in Canada: ailments and ideas for redeployment. Environ Manage. 37(2): 153-161.

Duinker P.N. and L.A. Greig. 2007. Scenario analysis in environmental impact assessment: Improving explorations of the future. Environmental Impact Assessment Review 27: 206-219.

ECCC (Environment and Climate Change Canada). 2021. Strategic Assessment of Climate Change. Revised October 2020.

ECCC (Environment and Climate Change Canada). 2024. Presentation to the Committee: Cumulative effects. Regional Assessment of Offshore Wind Development in Newfoundland and Labrador Registry. Government of Canada, Environment and Climate Change Canada (ECCC). https://iaac-aeic.gc.ca/050/evaluations/document/158396

Ferguson, M.C., K.A. Williams, M.W. Goodale, E.M. Adams, P. Knaga, K. Kingdon and S. Avery-Gomm. 2025. A flexible framework for species-based cumulative effects assessments to support offshore wind energy planning and management. Environmental Impact Assessment Review. https://www.sciencedirect.com/science/article/pii/S019592552500109X

GCIFA (Guysborough County Inshore Fishermen's Association). 2026. Comments on the draft Terms of Reference. https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-90228/comment-66989/comments%20on%20TOR%20for%20oil%20and%20gas%20exploratory%20drilling%20NS%20GCIFA%20.pdf

Global Affairs Canada. 2024. Joint Statement on the Security and Resilience of Undersea Cables in a Globally Digitalized World. Government of Canada.

Government of Canada. 2011. National Framework for Canada's Network of Marine Protected Areas. Fisheries and Oceans Canada, Ottawa, ON. 31 pp. https://publications.gc.ca/collections/collection_2011/mpo-dfo/Fs23-573-2011-eng.pdf

Government of Canada. 2023. Government of Canada interim message on cumulative effects. Government of Canada. https://www.canada.ca/en/services/environment/cumulative-effect/interim-messaging.html

Government of Canada. 2026. Open Science and Data Platform. https://osdp-psdo.canada.ca/dp/en

Government of Canada and Government of Nova Scotia. 2025. Offshore Wind Strategic Direction Letter to the Canada-Nova Scotia Offshore Energy Regulator. September 18, 2025. Canada-Nova Scotia Offshore Energy Regulator. Offshore Wind Strategic Direction Letter.

Government of Nova Scotia. 2025. Powering the Transition: Nova Scotia 2025 Climate Change Risk Assessment. https://climatechange.novascotia.ca/sites/default/files/uploads/climate-change-risk--assessment-2025.pdf

Government of Nova Scotia. 2026a. Nova Scotia Marine Aquaculture Leases | Open Data | Nova Scotia, https://data.novascotia.ca/Fishing-and-Aquaculture/Nova-Scotia-Marine-Aquaculture-Leases/h57h-p9mm/about_data

Government of Nova Scotia. 2026b. Nova Scotia 2024 Aquaculture Production. https://novascotia.ca/finance/statistics/news.asp?id=21838

Gunn, J. and Noble, B.F. 2009. A conceptual and methodological framework for regional strategic environmental assessment (R-SEA). Impact Assessment and Project Appraisal, 27(4): 258-270.

Gunn, J. and B.F. Noble. 2011. Conceptual and Methodological Challenges to Integrating SEA and Cumulative Effects Assessment. Environmental Impact Assessment Review, 31: 154-160.

Halpern, B.S., S. Walbridge, K.A. Selkoe, C.V. Kappel, F. Micheli, C. D'Agrosa, J.F. Bruno, K.S. Casey, C. Ebert, H.E. Fox, R. Fujita, D. Heinemann, H.S. Lenihan, E.M.P. Madin, M.T. Perry, E.R. Selig, M. Spalding, R. Steneck and R. Watson. 2008. A Global Map of Human Impact on Marine Ecosystems. Science 319(5865): 948-952. https://doi.org/10.1126/science.1149345.

Hannah, L., K. Thornborough, C.C. Murray, J. Nelson, A. Locke, J. Mortimor and J. Lawson. 2020. Pathways of Effects Conceptual Models for Marine Commercial Shipping in Canada: Biological and Ecological Effects. Can. Sci. Advis. Sec. Res. Doc. 2020/077: viii + 193 p.

Hanrahan, M. 2008. Resisting Colonialism in Nova Scotia: The Kesukwitk Mi'kmaq, Centralization and Residential Schooling.

Harriman, J. and B. Noble. 2008. Characterizing project and strategic approaches to regional cumulative effects assessment in Canada. Journal of Environmental Assessment Policy and Management 10(1): 25-50.

Harriman-Gunn J. and B.F. Noble 2009. Integrating cumulative effects in regional strategic environmental assessment frameworks: Lessons from practice. Journal of Environmental Assessment Policy and Management 11(3): 267-290.

Hegmann, G., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, L. Kingsley, W. Ross, H. Spaling, and D. Stalker and AXYS Environmental Consulting Ltd. 1999. Cumulative Effects Assessment Practitioner's Guide. https://publications.gc.ca/collections/Collection/En106-44-1999E.pdf

Howarth, L., L. Lewis-McCrea and G.K. Reid. 2022. Supporting the development of Offshore Aquaculture in Nova Scotia. Nova Scotia Department of Fisheries and Aquaculture.

Hurley Environment Ltd. 2018. Commercial Hazard Risk Mitigation: Potential Fisheries Interactions – Sable Offshore Energy Project (SOEP) Abandoned Offshore Pipelines. Prepared for ExxonMobil Canada Properties. December 2018. https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90550/327915/3546272/3575801/3737852/A96862%2D3_Appendix_I_%2D_Commercial_Hazard_Risk_Mitigation_%2D_Potential_Fisheries_Interactions_%2D_Hurley_Environment_Ltd_%2D_A6Q3V1.pdf?nodeid=3737855&vernum=-2

IAAC (Impact Assessment Agency of Canada). 2018. Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html

IAAC (Impact Assessment Agency of Canada). 2024. Cumulative Effects Assessment – IAAC's Guidance to the Nova Scotia Offshore Wind Regional Assessment Committee. https://iaac-aeic.gc.ca/050/documents/p83514/158582E.pdf

IAAC (Impact Assessment Agency of Canada). 2025a. Policy Framework for Assessing Cumulative Effects under the Impact Assessment Act. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/policy-framework-assessing-cumulative-effects-under-impact-assessment-act.html

IAAC (Impact Assessment Agency of Canada). 2025b. Technical Advisory Committee on Science and Knowledge's formal advice to IAAC regarding Cumulative Effects Assessments in Regional Assessments. https://open.canada.ca/data/en/dataset/c990c1b4-d64d-438d-b003-9bf823e5ffe2/resource/7b6b5a13-dee0-4dac-b950-ef3ee0419693

IAAC (Impact Assessment Agency of Canada). 2026a. Regional Assessment of Oil and Gas Exploratory Drilling in the Canada-Nova Scotia Offshore Area Terms of Reference. https://iaac-aeic.gc.ca/050/documents/p90228/167070E.pdf

IAAC (Impact Assessment Agency of Canada). 2026b. Generic Requirements for Tailored Information and Studies Guidelines. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/generic-requirements-tailored-information-studies-guidelines.html

Intergovernmental Panel on Climate Change. 2021. Climate Change 2021: The Physical Science Basis. Chapter 9: Ocean, Cryosphere and Sea Level Change.

Kenchington, E. 2014. A General Overview of Benthic Ecological or Biological Significant Areas (EBSAs) in Maritimes Region. Can. Tech. Rep. Fish. Aquat. Sci., 3072: iv + 45 p. https://publications.gc.ca/collections/collection_2014/mpo-dfo/Fs97-6-3072-eng.pdf

KMK (Kwilmu'kw Maw-klusuaqn). 2025. The Mi'kmaq of Nova Scotia and the Government of Canada Sign Co-management Arrangement https://mikmaqrights.com/?p=4465

KMK (Kwilmu'kw Maw-klusuaqn). 2026a. Consultation – Regional Assessment of Offshore Exploratory Oil and Gas Drilling in Nova Scotia. June 11, 2026. https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-90228/comment-67573/2026-06-11%20KMK%20to%20IAAC%20re%20Regional%20Assessment%20on%20Offshore%20Oil%20and%20Gas%20.pdf

KMK (Kwilmu'kw Maw-klusuaqn). 2026b. Forestry. https://mikmaqrights.com/?page_id=1701

KMK (Kwilmu'kw Maw-klusuaqn) and AECOM Canada Ltd. 2024. AECOM Report for KMK on the Regional Assessment of Offshore Wind in Nova Scotia and Newfoundland and Labrador. Submitted to the Impact Assessment Agency of Canada. December 11, 2024.

Lacharité, M. and R.R.E. Stanley. 2019. Protecting the deep sea in Canadian waters: A rationale based on the Eastern Canyons area (Eastern Scotian Shelf, Atlantic

Canada). Can. Tech. Rep. Fish. Aquat. Sci., 3347: vi +35. https://publications.gc.ca/collections/collection_2019/mpo-dfo/Fs97-6-3347-eng.pdf

Lerner, J. 2018. Review of cumulative effects management concepts and international frameworks. Prepared for Transport Canada. January 2018. Lerner. J. 2018. Review of cumulative effects management concepts and international frameworks. https://tc.canada.ca/en/corporate-services/review-cumulative-effects-management-concepts-international-frameworks

L'nuey. 2026. The Concepts of Netukulimk and Two-Eyed Seeing. https://lnuey.ca/wp-content/uploads/2026/05/Lnuey-Netukulimk-Two-Eyed-Seeing.pdf

MacLean, M., H. Breeze, J. Walmsley and J. Corkum (Editors). 2013. State of the Scotian Shelf Report. Can. Tech. Rep. Fish. Aquat. Sci. 3074: xvi + 352 p.

Maritime Aboriginal Peoples Council. Comments on Regional Assessment of Oil and Gas Exploratory Drilling. June 10, 2026. https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-90228/comment-67574/202060610%20MAPC%20Comments%20-%20Exploratory%20Offshore%20Oil%20and%20Gas%20RA.pdf

Marine Renewables Canada. 2025. Atlantic Wind Energy Supply Chain Assessment. Atlantic Wind Energy Supply Chain Assessment & Pathways for Supply Chain Development

McDonald, S., G. Blackwood, L. Grattan, B. Power and P.W. Saunders. 2025. Final Report: Regional Assessment of Offshore Wind Development in Newfoundland and Labrador. January 23, 2025. https://iaac-aeic.gc.ca/050/documents/p84343/160594E.pdf

MGS and UINR (Membertou Geomatics Solutions and Unama'ki Institute of Natural Resources). Traditional Use Study Mi'kmaq and Wolastoqiyik Fisheries. Scotian Basin Exploration Drilling Project. April 22, 2016.

Murphy, G. and N. Kelly. 2023. Cumulative human impact maps for the Bay of Fundy and Scotian Shelf. Published September 2023. Coastal Ecosystems Science Division, Fisheries and Oceans Canada, Dartmouth, N.S. https://open.canada.ca/data/en/dataset/37b59b8b-1c1c-4869-802f-c09571cc984b

Murphy, G.E.P., A. Stock and N.E. Kelly. 2024. From land to deep sea: A continuum of cumulative human impacts on marine habitats in Atlantic Canada. Ecosphere.15(9): e4964. https://doi.org/10.1002/ecs2.4964.

Murray, C.C., N.E. Kelly, J.C. Nelson, G.E.P. Murphy and S. Agbayani. 2022. Cumulative impact mapping and vulnerability of Canadian marine ecosystems to anthropogenic activities and stressors. DFO Can. Sci. Advis. Sec. Res. Doc. 2022/XXX: vi. + 52 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41251556.pdf

Murray, C.C., N.E. Kelly, J.C. Nelson, G.E.P. Murphy and S. Agbayani. 2024. Cumulative Impact Mapping and Vulnerability of Canadian Marine Ecosystems to Anthropogenic Activities and Stressors. DFO Can. Sci. Advis. Sec. Res. Doc. 2024/024: vi + 46 p.

Nagel, E.J., G. Pardy, K. Gordon and M.-A. Long. 2024. Application of Marxan with Zones as a marine spatial planning decision-support tool: a case study for offshore wind planning in Nova Scotia. Can. Tech. Rep. Fish. Aquat. Sci. 3601: xi + 91 p.

Noble, B.F. 2015. Introduction to Environmental Impact Assessment: A Guide to Principles and Practice. Third Edition. Oxford University Press, ON.

Nova Scotia Department of Fisheries and Aquaculture. No Date. Coastal communities. Government of Nova Scotia. https://dfa-climate-change.novascotia.ca/adapting-to-climate-change/coastal-communities

NRCan (Natural Resources Canada). 2024. Presentations to the Committee – Cumulative effects. Regional Assessment of Offshore Wind Development in Newfoundland and Labrador Registry. Government of Canada, Natural Resources Canada. https://iaac-aeic.gc.ca/050/evaluations/document/158231

NRCan (Natural Resources Canada). 2025. Moratorium on Offshore Wind Development in Georges Bank. https://www.canada.ca/en/natural-resources-canada/news/2025/03/moratorium-on-offshore-wind-development-in-georges-bank.html

NSDNRR (Nova Scotia Department of Natural Resources and Renewables). 2022. Government of Nova Scotia News Releases Georges Bank Moratorium Extended to 2032. https://news.novascotia.ca/en/2022/04/27/georges-bank-moratorium-extended-2032

NSECC (Nova Scotia Environment and Climate Change). 2022a. Our Climate, Our Future: Nova Scotia's Climate Change Plan for Clean Growth. Halifax, NS.

NSECC (Nova Scotia Department of Environment and Climate Change). 2022b. Weathering What's Ahead: Climate Change Risk and Nova Scotia's Well-Being. Halifax, NS.

Nova Scotia Human Rights Commission. 2025. Annual Report 2024-2025.

O'Boyle, R., M. Sinclair, P. Keizer, K. Lee, D. Rickard and P. Yeats. 2005. Indicators for ecosystem-based management on the Scotian Shelf: bridging the gap between theory and practice. ICES Journal of Marine Science 62(3): 598-605.

Ovintiv. 2021. Abandoned Pipeline Monitoring Report. DCEN-P21-RP-PL-74-0002.02U. https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90550/189912/3575543/3781561/4161857/C15672%2D2_DCEN%2DP21%2DRP%2DPL%2D74%2D0003.02U_%2D_Deep_Panuke_Abandoned_Pipeline_Monitoring_Report_%282021%29_%2D_A7X8Q5.pdf?nodeid=4161858&vernum=-2

Parks Canada, 2025. The Toqi'maliaptmu'k Arrangement https://parks.canada.ca/voyage-travel/promotion/nouvelle-ecosse-nova-scotia/toqimaliaptmuk

Patrício J., M. Elliott, K. Mazik, K-N. Papadopoulou and C.J. Smith. 2016. DPSIR—two decades of trying to develop a unifying framework for marine environmental management?. Front. Mar. Sci. 3: 177.

Pickard, D., P. de la Cueva Bueno, E. Olson and C. Semmens. 2019. Evaluation of Cumulative Effects Assessment Methodologies for Marine Shipping. Report prepared by ESSA Technologies Ltd. for Transport Canada. 118 pp. + Appendices. https://tc.canada.ca/sites/default/files/2024-03/evaluation-ceam-marine-shipping-en_0.pdf

Roberts, J.M., A.J. Wheeler and A. Freiwald. 2006. Reefs of the Deep: The Biology and Geology of Cold-Water Coral Ecosystems. Science, 312(5773): 543-547. https://doi.org/10.1126/science.1119861

Rutherford, R.J., G.J. Herbert and S.S. Coffen-Smout. 2005. Integrated ocean management and the collaborative planning process: the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative. Marine Policy 29: 75-83.

Serdynska, A.R., Pardy, G.S., and M.C. King. Offshore Ecological and Human Use Information Considered in the Marine Protected Area Network Design in the Scotian Shelf Bioreion. Can. Tech. Rep. Fish. Aquat. Sci. 3382: xi + 100 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40943318.pdf

Serdynska, A.R., E.J. Nagel, C. Kleinknecht, L.N. Baxter and L. Dykun. 2024. Ocean Use Compatibility Analysis for the Scotian Shelf-Bay of Fundy Planning Area. Can. Tech. Rep. Fish. Aquat. Sci. 3613: v + 40 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40943318.pdf

Simeoni, C., E. Furlan, H. Vuong Phama, A. Critto, S. de Juan, E. Trégarot, C.C. Cornet, E. Meesters, C. Fonseca, A.Z. Botelho, T. Krause, A. N'Guetta, F. Espinoza

Cordova, P. Failler and A. Marcominia. 2023. Review: Evaluating the combined effect of climate and anthropogenic stressors on marine coastal ecosystems: Insights from a systematic review of cumulative impact assessment approaches. Science of the Total Environment 861(2023): 160687.

Sinclair, A.J., M. Doelle and P.N. Duinker. 2017. Looking up, down and sideways: reconceiving cumulative effects assessments as a mindset. Environmental Impact Assessment Review 62: 183-94.

Stantec Consulting Ltd. 2019. Middle Scotian Shelf and Slope Strategic Environmental Assessment. Prepared for the Canada-Nova Scotia Offshore Petroleum Board, Halifax, NS. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_middle_scotian_shelf_sea_%20%281%29.pdf

Stantec Consulting Ltd. 2021. Western Scotian Shelf and Slope Strategic Environmental Assessment. Prepared for the Canada-Nova Scotia Offshore Petroleum Board, Halifax, NS. https://cdn.cnsoer.ca/sites/default/files/2025-01/western_scotian_shelf_and_slope_sea_-_march_2021.pdf

Stelzenmüller, V., M. Coll, A.D. Mazaris, S. Giakoumi, S. Katsanevakis, M.E. Portman, R. Degenh, P. Mackelworth, A. Gimpel, P.G. Albano, V. Almpanidou, J. Claudet, F. Essl, T. Evagelopoulos, J.J. Heymans, T. Genov, S. Kark, F. Micheli, M. Grazia Pennino, G. Rilov, B. Rumes, J. Steenbeek and H. Ojaveer. 2018. A risk-based approach to cumulative effect assessments for marine management. Science of the Total Environment 612: 1132-1140.

Stoyel, Q., S. Finnis, C. Gomez, G. Lazin, R. Daigle, L. Brager, A. Hamer, C. Smith, D. Beauchesne, K. Cazelles and S. Butler. 2022. An open, efficient, and transparent spatial reproducible reporting tool for data discovery and science advice. Can. Tech. Rep. Fish. Aquat. Sci. 3495: vi + 27. https://publications.gc.ca/collections/collection_2022/mpo-dfo/Fs97-6-3495-eng.pdf

Transport Canada. 2022. National Framework for Assessing the Cumulative Effects of Marine Shipping. Transport Canada, Ottawa, ON. 73 p. https://tc.canada.ca/sites/default/files/2023-03/tc_marineshipping_en.pdf

Transport Canada. 2024. Cumulative Effects of Marine Shipping: A Transport Canada Oceans Protection Plan Initiative. Available at: https://storymaps.arcgis.com/stories/90679653f4bf4425ae910e405d7c173b

Transport Canada. 2025. Assessing the Cumulative Effects of Marine Shipping. Available at: https://tc.canada.ca/en/campaigns/protecting-our-coasts-oceans-protection-plan/better-protected-coastal-ecosystems/assessing-cumulative-effects-marine-shipping

Unama'ki Institute of Natural Resources. 2020. Netukulimk. https://www.uinr.ca/programs/netukulimk/

Warrior, M., L. Fanning and A. Metaxas. 2022. Indigenous peoples and marine protected area governance: A Mi'kmaq and Atlantic Canada case study. FACETS, 7(1). 13 October 2022. https://www.facetsjournal.com/doi/10.1139/facets-2021-0128

Willsteed, E.A., S. Jude, A.B. Gill and S.N.R. Birchenough. 2018. Obligations and aspirations: A critical evaluation of offshore wind farm cumulative impact assessments. Renewable and Sustainable Energy Reviews 82(3): 2332-45.

Wood Canada Ltd. 2022. Strategic environmental assessment: Middle and Eastern Scotian Slope and Sable Bank areas. Report to the Canada-Nova Scotia Offshore Petroleum Board, Dartmouth, NS. xii + 364 p. https://cdn.cnsoer.ca/sites/default/files/2025-01/final_sea_26_may_2022_0.pdf

10 Gender-Based Analysis Plus

Intersectional gender-based analysis plus (GBA Plus) is an analytical approach that can assess the different impacts of projects on diverse population groups. It seeks to identify barriers to benefits in order to remove them and create more inclusive, responsive, and equitable outcomes. It considers how institutions, systems of power and socio economic and political practices intersect with aspects of a person's identity to shape their experiences, and it leads us to ask critical questions about social context, relationships, relative power in communities, and intersections among these. For example, using GBA Plus can help to consider the intergenerational impacts of colonization and racism, including widespread trauma among Indigenous Peoples, and how these affect who is most likely to benefit from, or be left behind during, new economic opportunities.

GBA Plus considers various identity and social factors, including age, economic status, education, ethnicity, gender, geography, language, racialization, ability, religion, sex, and sexual orientation. Most individual experiences are shaped by multiple factors, and these should be considered in an intersectional, or combined way (e.g., looking at gender, racialization and economic status). At a societal level, systems of oppression, such as colonization, racism and patriarchy, work together to produce and reproduce systemic inequities. These systemic inequities are experienced by individuals and populations differently depending on their particular social location -- or the intersection of particular systems of oppression and identity factors. How these intersections play out also depends on where individuals and groups live in specific communities and regions.

Understanding the intersections of identity and systems of power can help explain why people experience resource development projects and their effects differently. When we understand the why, we can better plan solutions. For example, recognizing and addressing the barriers that some groups of people (e.g., Indigenous people, women, Two-Spirited people, people with disabilities) experience in workplace or accessing jobs can ensure the development of planning and mitigation measures to create more equitable outcomes.

Implementing GBA Plus requires both disaggregated data[50] and the perspectives of diverse individuals to shed light on the range of experiences, barriers, and inequalities experienced. This dual approach ensures that the analysis of potential problems, issues, solutions, and monitoring is culturally relevant and rooted in the lived experiences of diverse populations.

10.1 Benefits of Doing GBA Plus

The IAA requires that regional assessments consider "the intersection of sex and gender with other identity factors" (Section 22(1)(s)) to prevent or mitigate significant adverse effects. GBA Plus is how the federal government applies intersectionality.

GBA Plus in assessment processes creates:

- Better science by providing more complete and rigorous assessment of potential positive and negative impacts of future projects on diverse community members.
- Better evidence by identifying whether future projects have positive or adverse impacts for diverse populations and for whom and proposing mitigation measures to create more equitable benefits where possible.
- Better engagement by considering "who is at the table" and addressing barriers for those not "at the table," which creates more meaningful and comprehensive engagement that is representative of community members (IAAC, 2023).

More inclusive initiatives are the outcome.

GBA Plus is not a one-time analysis nor is it limited to specific issues, such as employment. It should be integrated into all aspects of a regional and project-based

[50] Disaggregated data is information that has been broken down into smaller, more detailed sub-categories, such as by gender, age, race, ethnicity, income, disability, or geographic location, rather than presented as a single, broad summary. By using disaggregated data, policymakers are able to design more appropriate and effective policies that meet the needs of each diverse and unique community or population subgroup (such as by gender, age, ethnocultural or Indigenous identity, disability, and geography (Statistics Canada, 2024)

assessments, including planning, engagement, knowledge gathering, analysis, decision-making, and monitoring.

Applying GBA Plus in this RA is important to identify regional-scale social, economic, and community considerations associated with offshore exploratory drilling and to highlight how potential effects may vary among different groups and individuals. Identifying these potential effects during the RA will inform future planning for the industry. GBA Plus can provide critical information for governments and decision makers when evaluating project paths and trying to understand potential implications for diverse populations. GBA Plus is also needed to mitigate risks for those likely to be adversely affected and to support more widespread and equally distributed benefits.

Identifying potential issues, effects, and concerns at this stage also means that data to assess and track issues in the future can be identified, gathered, and created if needed. Plans for addressing data gaps can be made early enough to ensure that data is available when needed and that specific effects or effects on particular populations are not minimized because data does not exist.

10.2 Approach and Scope

This chapter discusses potential issues associated with oil and gas exploratory drilling, highlights data gaps that may need to be filled to apply GBA Plus and monitor issues in the future and informs recommendations that will support GBA Plus in future decisions related to offshore exploratory drilling. It is based on relevant information raised during the conduct phase of the RA, which was gathered through meetings and from responses received to specific questions around concerns and issues related to GBA Plus.

The analysis in this chapter also drew upon information from the GBA Plus analysis completed for the Regional Assessment of Offshore Wind Development in Nova Scotia (CRIAW, 2024a), which contained a literature review including government reports, a review of Statistics Canada and regional data, input from data experts, and relevant key issues related to offshore resource development for a similar Study Area raised in interviews with community organization representatives. It also drew from relevant information in the GBA Plus analysis completed for the Regional Assessment of Offshore Wind Development in Newfoundland and Labrador (CRIAW, 2025) as many participants contributed important perspectives based on the Newfoundland and Labrador experience with offshore resource development.

The scope of this RA is offshore exploratory drilling. However, it is also meant to consider “cumulative effects of exploratory drilling activities in combination with other past, existing, and reasonably foreseeable activities in the region.” Considering some of these foreseeable future activities, such as multiple exploration projects, can help to ensure that data gaps are understood early so that they can be addressed and GBA Plus can be fully

applied in the future. Additional information on cumulative effects is provided in Section 9.0. This approach supports taking a more precautionary approach, the need for which was specifically highlighted by KMKNO (pers. comm., 2026), who represent the Mi'kmaq people of Nova Scotia in negotiations and consultations with the provincial and federal governments. KMKNO also emphasized the need for a Mi'kmaw GBA Plus that would consider potential effects specifically on Mi'kmaw women and 2SLGBTQIA+people, to address the structural inequities they face resulting from colonialism and to capture the overlapping systems of power and identities of Mi'kmaw women, girls, Two-Spirit, and gender diverse people. While outside the scope of exploratory drilling projects, this approach may be important to consider at an industry-wide level as projects move into development, to ensure that future projects do not lead to disproportionate harm, equitably share benefits, and can accurately track specific effects to Indigenous Peoples.

10.3 Analysis

This section provides information on potential effects associated with exploratory oil and gas drilling, how these effects are likely to be uneven (i.e., worse for whom), and measures to address these potential effects. The main areas where differentiated effects could arise are outlined below and include employment; education and training; and community well-being including personal and relational safety, human trafficking, gender-based violence, and substance use and food security. It is important to consider these potential effects early to ensure that harms are avoided, benefits are distributed widely, and data is available to track changes over time.

10.3.1 Workforce Diversity, Equity and Inclusion

Planning and preparatory work for offshore exploratory oil drilling typically takes place for more than a year according to the Canadian Association for Petroleum Producers, (2026a) and a single exploratory drilling project in Nova Scotia is expected to take one to four months to complete.

Planning for an offshore exploratory drilling project may include onshore activities such as preparing and carrying out a site survey, logistical planning (e.g., waste management), well planning, contracting services, engagement with stakeholders etc., as explained in a 2022 exploratory drilling project benefits plan for NL (BP Canada Energy Group, 2022). The Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (2020) also notes that offshore exploratory drilling will result in "the creation of contracting opportunities for the supply of goods and services throughout their planning and implementation phases, with associated employment, revenue and taxation benefits". These goods and services could include logistics, warehousing, supplies, and food.

Even if onshore employment effects are limited, there is still the potential for effects on some populations, which should be understood for planning future activity and monitoring effects over time, especially if multiple drilling projects take place. Understanding the potential gendered and intersectional dimensions of oil and gas exploratory drilling can help anticipate inequitable impacts, inform strategies to address them, and support a more diverse workforce with more distributed benefits.

For example, men are most likely to gain direct employment in highly paid oil and gas exploratory drilling, servicing, and as related labourers. They accounted for 95% of employees in this National Occupational Classification in NL in 2021 (Government of NL, n.d.). NS has less specific data, but mainly men (81.5% in 2024) work in the goods producing sector (Nova Scotia Government n.d.), which includes oil and gas, as well as mining, utilities, construction, and manufacturing (Statistics Canada, 2026c). Women employed in the oil industry are in a small minority and are primarily in lower paying administrative and clerical positions (ExxonMobil Canada Properties, 2025). As well, there were very few Indigenous people or people with disabilities in the large NL Hebron project and none of the Indigenous employees were reported as being in managerial and supervisory roles. This is consistent with Statistics Canada research that found Indigenous people are less likely than non-Indigenous people to be in management positions (Bleakney et al., 2024).

Many skilled trades are needed to support offshore oil exploration, including welders, electricians, and mechanics. Women are significantly under-represented in skilled trades, particularly those that would be needed directly or indirectly as part of offshore oil development. In NS in 2024, for instance, females made up 1,002 of 11,394 total apprenticeship registrants (Statistics Canada, 2026a). In 2025 in NS, women+[51] represented only 6.5% of those employed in trades, transport and equipment operators and related occupations, except management (Statistics Canada, 2026b), which is below the Canada-wide average of 7.3%. In Canada more broadly, Indigenous men are more likely than women to hold journeyperson qualifications as electricians, carpenters, or welders while women are more likely to be hair stylists or cooks than men (Khanam et al., 2024). Gendered employment differences also exist for men and women with disabilities in Canada, with women far less likely to have a trades certificate compared to men (8% vs. 14%) (Schimmele et al., 2021). These are important distinctions as skilled trades often offer high paying jobs with benefits (Gill, 2024).

More broadly, STEM (science, technology, engineering and mathematics and computer sciences), which can lead to well-paying jobs in the oil industry, including those needed to plan and carry out oil and gas exploratory drilling, are less likely to attract women and even among those women who have STEM training there are significant differences (Leclerc, 2022). Visible minority women, for instance, are the most likely to have a STEM

[51] “"Women＋" includes women (and/or girls), as well as some non-binary persons.”

postsecondary degree (17%), compared with the 10.6% average of all Canadian women, and 5.8% for Indigenous women.

Offshore oil exploration could contribute to the growth of low-wage services particularly in accommodation and food services. Women made up 55.8% of NS service sector employees in 2024 (Nova Scotia Government n.d.) and wages in accommodations and food services were among the lowest in NS in 2025 (Statistics Canada, 2026c).

The extent and gendered nature of unpaid care work is an important factor to consider in efforts to diversify the workforce. Women perform more unpaid care work than men, which includes providing care for children, people with disabilities, older adults, or people from each of these groups at the same time (Wray, 2024). This added about 10 hours of unpaid care work to paid hours worked by women in 2022, and 6 hours unpaid care work to paid hours worked by men. Women with disabilities are more likely to provide unpaid care than women without disabilities (Reinders, 2026). The need to provide unpaid care work can be a major barrier to working offshore. Many caregivers need to work less than full-time hours to accommodate caregiving (Canadian Centre for Caregiving Excellence, 2026) with women more likely to report negative effects on their mental health and well-being than men (StatsCAN Plus, 2023).

Access to full-time, regular employment related to offshore oil exploration could benefit groups that tend to work part-time for various reasons. For example, Indigenous people, women and people with disabilities are more likely to work part time involuntarily compared to non-Indigenous people in Canada as a whole and over 10% of Indigenous people were more likely to work irregular hours or shifts than non-Indigenous people (Bleakney, 2024). Women are more likely to have multiple jobs (Bleakney, 2024), which can be the result of needing more flexibility due to unpaid care work, or of not being able to secure well-paying full-time jobs. People with disabilities who work, specifically women, are also more likely to work part time and get paid less than people without disabilities and for people with less severe disabilities, the gender wage gap was significant (Schimmele, 2021).

10.3.2 Offshore Workplace Culture and Safety

Addressing barriers to training and recruitment are important to diversify the workplace; however, efforts also must be made to keep women, Indigenous women, and 2SLGBTQIA+ people safe at work. Incidents of harassment, bullying, racism, and sexual assault occur in the workplace in Canada and may be heightened in offshore settings. Indigenous people report experiencing sexual harassment at work three times more than non-Indigenous people (Bleakney, 2024). Women and people with disabilities are also overrepresented among people reporting experiencing workplace harassment and sexual assault (Government of Canada, 2024).

Issues experienced in offshore oil may be similar to those experienced in other remote extractive industries, including onshore oil and mining. Research and the Missing and Murdered Indigenous Women and Girls (MMIWG) report explains that harassment can be heightened for Indigenous women in extractive industries (Nightingale et. al., 2017; National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019; Moodie et al., 2021; Pauktuutit Inuit Women of Canada, 2021). For instance, findings in the MMIWG report state that in the extractive industries, "there are elevated rates of workplace racism, sexual harassment, and violence" (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019). Moody et. al., (2021) also find that Indigenous and racialized women in northern mining work camps experience high levels of discrimination, harassment, and violence.

People who identify as 2SLGBTQIA+ also face challenges in workplaces with a heteronormative[52] status quo where gendered language is used, pronouns are assumed based on appearance, as well as more purposeful discriminatory experiences such as continuing to misgender someone despite repeatedly being told their pronouns or "deadnaming" (continuing to use someone's birth name rather than a chosen one) (Brennan et al., 2022). These experiences can make individuals feel uncomfortable, unsafe, unwelcome, and unsupported in the workplace. These effects may be heightened in resource development, which is known to have hypermasculine culture (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019). Brennan et al., (2022) noted that participants in a study reported that significant effort was put into avoiding discriminatory people or experiences at work, including changing their work schedules. This would be particularly difficult in an offshore setting, where offshore crews live and work together.

Reporting incidents of harassment offshore also pose challenges similar to experiences of women and 2SLGBTQIA+ folks in other remote extractive industries. For instance, research by Pauktuutit Inuit Women of Canada (2021) explained some of the reasons participants did not report harassment, included embarrassment, fear of losing employment, not wanting to relive the experience, and not having anyone to report to who they felt would understand. They emphasized the importance of having another woman present when a woman reports an incident due to safety concerns about reporting, especially in an isolated location where it is not possible to leave the workplace, and when there is a lack of confidence in complaints remaining anonymous (CRIAW, 2025). Temporary foreign workers or new Canadians who don't hold Canadian citizenship may also be less inclined to report incidents of harassment or discrimination for fear of losing their status in Canada (CRIAW, 2025).

[52] Heteronormative ideology refers to the belief that there are two separate and opposing genders with associated natural roles that match their assigned sex, and that heterosexuality is a given.

All of this can contribute to or exacerbate existing mental health issues, particularly in offshore settings away from communities of support. For instance, Statistics Canada data shows that nearly 30% of Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer (or Questioning) (2SLGBTQ)+[53] individuals rated their mental health as fair, or poor compared to only about 9% for non-f 2SLGBTQ+ individuals (Statistics Canada, 2024). This highlights the need for mental health support offshore.

10.3.3 Inclusiveness of offshore operations

Offshore drilling rigs are unique workplaces that present distinct safety and inclusion challenges for minority workers. As isolated and self-contained environments, offshore installations require workers to live and work in close quarters for extended periods, typically working 12-hour shifts for two or more consecutive weeks at a time. The combination of physically demanding work, heavy equipment, adverse weather conditions, and shared living accommodations can create significant stress for workers and their families (Burke et al., 2008). While these conditions affect all offshore workers, they can create additional challenges for individuals from underrepresented groups. Factors such as workplace culture, accommodations, and equipment design may not always reflect the diverse needs of the modern workforce. As a result, some workers may face barriers that affect both their safety and their sense of inclusion in offshore environments.

Physical safety for offshore workers has been a central focus of the offshore industry, with the Canadian Association of Petroleum Producers (CAPP) providing extensive guidance and training to reduce risks, accidents, and injuries (CAPP, 2026b). However, safety measures do not always account for the diverse needs of the workforce. For example, personal protective equipment (PPE) has traditionally been designed around male body dimensions, which may not adequately accommodate woman or other workers. As a result, these workers may experience additional safety risks associated with uncomfortable, poorly fitting, or inappropriately sized equipment. Women are sometimes provided with smaller versions of PPE designed for male bodies. However, as the Canadian Standards Association (CSA) notes, women are not simply “scaled-down versions of men” (Keefe, 2022). Differences in body proportions, such as smaller hands and narrower facial features, can affect the fit of equipment including gloves and respirators. Poorly fitting PPE may compromise its effectiveness and increase the risk of injury or exposure to hazards (CCOHS). A survey done by the CSA of nearly 3000 women in Canada who regularly use PPE as part of their jobs found that 50% of respondents said that their PPE did not fit properly and 43% said that it was uncomfortable. The survey also

[53] This acronym represents Two-Spirit, lesbian, gay, bisexual, transgender, queer, intersex, and additional people who identify as part of sexual and gender diverse communities. The “2S” at the front recognizes Two-Spirit people as the first 2SLGBTQI+ communities. The “I” for intersex considers sex characteristics beyond sexual orientation, gender identity and gender expression. The “+” is inclusive of people who identify as part of sexual and gender diverse communities, who use additional terminologies.

found that 58% of respondents reported using PPE that was the wrong size, 28% reported not wearing PPE because due to a wrong fit, and 38% reported using a workaround such as duct tape or safety pins, in order to improve the fit (Keefe, 2022). The survey also found that women were not given PPE that fit their bodies at different times of life with different needs, including pregnancy, breastfeeding, and menopause (Keefe, 2022). Some respondents also reported paying out of pocket for better fitting and more comfortable gear and 40% reported experiencing an injury that they attribute to PPE (Keefe, 2022).

Safety implications of improperly fitting PPE include clothing that is too big getting caught in machinery, gloves with excess space reducing grip quality, and large footwear increasing trips and falls (Millin et al., 2026). Furthermore, safety equipment, such as respirators or eye and hearing protection, that are too large can compromise the seal, leading to less effective protection. This gendered issue can overlap with existing known issues related to occupational health and safety offshore, such as noise, thus leaving women and diverse bodies more at risk (Millin et al., 2026).

PPE that doesn't fit properly or doesn't meet an individuals' needs can also contribute to mental health issues, including feeling unwelcome or less important that other employees (Safety4Sea, 2020). However, the hypermasculine culture of offshore work can also make it difficult for women and gender diverse folks to ask for specific clothing and equipment. A participant in interviews for the NL offshore wind report noted that it can be difficult for gender diverse people to ask for gender affirming clothing or gear, including binders or gaffs that shape the body and would be comfortable under work and safety gear. Providing gender affirming clothing and support for it will contribute to mental and physical health and potentially better retention of gender diverse workers.

Millin et al. (2026) also explain that it is not only clothing and equipment that is biased toward men but that "the fixed environment of the ship encodes gendered assumptions". This includes designs that "presuppose male reach envelopes and grip strength" which can increase chances of injury for those with smaller bodies. Furthermore, accommodations and bathrooms may not take women's bodies and needs into consideration, including the need for using and disposing of menstrual products.

More has been written on women's safety in remote camps than on offshore oil rigs, but the issues are very similar. Minorities in those workplaces, like women, Indigenous and racialized people, 2SLGBTQIA+ and people with disabilities, need special measures to ensure their safety. Conditions such as shared sleeping quarters, bathrooms and bathing facilities, faulty locks, poorly lit corridors and isolated locations increase risks for these workers.

Several measures have been proposed to make offshore living accommodation safer for women and others. This includes providing separate sleeping quarters, bathrooms, and bathing facilities. There is also a need for women-only workout facilities and spaces for socializing to improve a feeling of safety for women and 2SLGBTQIA+2 folks who do not

feel welcome or comfortable in these spaces. Not getting regular exercise could contribute to or exacerbate feelings of isolation and other mental health issues while working offshore. The need for an increased security presence has also been noted, including security personnel walking throughout the facility to provide extra visibility, localized personal alarms for lone working housekeeping and janitorial staff; (Sodexho, 2024), security cameras, and access to a communication system (Moodie, 2021).

10.3.4 Education and Training

Historical and ongoing systemic barriers related to gender, Indigenous identity, race, disability, income, caregiving responsibilities, age, culture, sexual orientation, and other intersecting factors can limit access to education and training opportunities, which can then influence recruitment and retention outcomes, and affect workplace experiences. Understanding these barriers is essential to supporting a more diverse, inclusive, and representative offshore workforce and can help operators, contractors, and industry organizations and regulators develop targeted measures that improve access to opportunities, foster safe and respectful workplaces, and enhance participation and long-term career success for under-represented and equity-deserving groups.

The preceding sections identified a range of factors that may influence equitable participation in education, training, employment, retention, advancement, and workplace safety within the offshore oil and gas sector. These factors are often interconnected and can affect individuals differently based on identity, geography, socioeconomic circumstances, disability, gender, Indigenous identity, caregiving responsibilities, or other characteristics. Table 10.1 summarizes these key barriers and provides examples of actions that could help support more diverse, inclusive, accessible, and culturally safe participation in offshore oil and gas-related education, training, and employment opportunities.

10.3.5 Community Well-Being and Personal and Relational Safety

Most exploratory drilling activities occur offshore, and onshore effects are expected to be limited given the temporary nature of these activities. However, if offshore oil and gas activity expands in the future through multiple drilling programs or project development, it will be important to consider potential effects on coastal and Indigenous communities, including community readiness, capacity constraints, social well-being, safety, and cultural continuity.

Personnel working offshore typically travel through onshore communities when rotating on and off drilling installations. Workers often fly home immediately following their offshore rotation, while others may remain temporarily in local communities during travel or shore leave periods. During previous exploration programs, support vessels and helicopters

have primarily operated through Halifax, although other locations such as Sydney and the Strait of Canso, Point Tupper, and Mulgrave area may also be used. As a result, workers may access local accommodations, transportation services, and recreational facilities during their time ashore.

Understanding how offshore workforces, even for relatively short-term activities, may interact with and affect communities can support proactive planning and decision-making. Early consideration of potential community effects can help identify and address risks before they occur and ensure that social, cultural, and economic considerations are incorporated into future planning processes. This is particularly important given the substantial data gaps that currently limit a fulsome GBA Plus assessment of community-level effects and needs.

A key consideration is personal and relational safety, a concept that recognizes both individual well-being and the relationships between people, communities, culture, and the land. Relational safety aligns with Indigenous worldviews that emphasize interconnectedness, collective well-being, and relationships with the natural environment. This perspective was reinforced by the NSNWA, which highlighted the importance of assessing potential effects through a lens that recognizes the interconnected nature of environmental, cultural, social, familial, and economic systems.

Particular consideration should be given to the experiences of Indigenous women, girls, Two-Spirit, and gender-diverse people. The National Inquiry into Missing and Murdered Indigenous Women and Girls identified heightened risks associated with resource development contexts, including human trafficking, violence, substance use, and gender-based violence. While effects associated with exploratory drilling are expected to be limited, any future expansion of offshore oil and gas activities should be assessed using a precautionary approach that considers the potential for disproportionate effects on Indigenous Peoples and other equity-deserving groups.

The following sections discuss key community well-being considerations that could arise in the context of offshore oil and gas development, as well as the importance of baseline information, monitoring, and data collection to understand and respond to changing community conditions over time.

10.3.5.1 Human Trafficking

The NSNWA highlighted the significant issue of human trafficking[54] in NS and emphasized the need for this to be considered in future planning. Trafficking can happen at a variety of scales and locations, including within a specific community and is often done through

[54] Human trafficking “involves recruiting, transporting, sheltering or controlling the movements of a person for the purposes of exploitation, usually for sexual reasons or forced labour” (Sutton-Preddie, 2025).

unequal power relations, which makes certain populations more at risk. Trafficking can include “migrants, youth in care, Indigenous women and girls, and those experiencing poverty” and most (93%) instances of police-reported trafficking are women and girls under 25 (Sutton-Preddie, 2025). Nova Scotia has the highest rate of reported human trafficking in Canada, significantly higher than the national average (4.1 incidents per 100,000 population vs. 1.2) and this rate is higher in Halifax at 6.4 incidents/100,000, the second highest metropolitan rate in Canada (Sutton-Preddie, 2025). Identifying human trafficking and knowing the extent can be challenging, and victims may be fearful to report it to authorities.

10.3.5.2 Gender-based violence (GBV) and family violence

For crew working on offshore rigs, the irregular hours, rotational work, and time away from home related to offshore work can increase stress and substance use and can lead to an increase in gender-based and family violence. Indigenous women and girls may face an increased risk of this, as discussed in the MMIWG report (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019), and women with disabilities are also at a higher risk (Savage, 2021).

The location of potential offshore exploration-related activity and its onshore effects is an important factor when considering the risk of gender-based and family violence in NS. Crime is higher in rural areas, including GBV and intimate partner violence, in particular (Heidinger, n.d.). For instance, police-reported intimate partner violence in rural areas of NS in 2023 was 29% higher than urban areas (Heidinger, n.d.). Low income or lack of income could prevent seeking help, particularly if there is inadequate support in the community, such as alternative housing. Even when services exist in rural areas, it may be harder to make use of them anonymously and police response times may be slower, both of which may increase the risk of reporting violence. The need for long term planning and understanding where changes are most likely to occur will help with planning supports and services in affected communities. The NSNWA suggested mapping these changes, including where onshore effects may be experienced.

10.3.5.3 Substance use

Employment in offshore oil and gas exploration can significantly increase personal income, which has been associated with higher levels of alcohol and drug consumption, particularly in the trades, where substance use has been identified as a concern (Manning et al., 2018; Stienstra et al., 2016; Gibson et al., 2017; CAF, 2023). The use of alcohol and drugs is also prevalent in the oil and gas industries, including its use on the job (McIlwaine et al., 2025). Substance use can strain family and personal relations and affect the overall community. National data indicates that a significant proportion of employed individuals who died from opioid toxicity worked in trades-related occupations and that opioid-related

deaths are more common among men than women in Canada (Government of Canada, n.d.).

10.3.5.4 Food security

It is critical to assess the potential effects of oil and gas exploratory drilling on food security for diverse populations, especially Indigenous people, given how deeply food is connected to all aspects of peoples' lives and their physical and mental well-being. Oil and gas exploratory drilling may change fish behaviour and reduce the supply or access of fish and/or affecting its safety and consumption. This could increase the time and costs associated with fishing, which may decrease the ability to harvest. Oil spills, or the release of other contaminants into the water, could also affect food safety and perceptions of food safety and decrease the utilization of fish as food. Reduced access to harvesting can disrupt participation in Indigenous cultural practices and knowledge transfer as well as affect mental and physical health (Canadian Institutes of Health Research, 2020).

Rates of food insecurity are on average higher in NS than Canada overall, with women, visible minorities, Indigenous people, and recent immigrants experiencing higher rates (Statistics Canada, 2026d). National data on food insecurity notes it is particularly high when a lone parent is female or when the major income earner is racialized (particularly Black) or Indigenous (living in a province off reserve) (Uppal, 2023). People with disabilities are also more likely than those without to live in a household experiencing food insecurity (Gupta et al., 2024), and people living in poverty are more likely to experience food insecurity if there are changes in their access to offshore food supplies. With a provincial poverty rate of 12.9% in 2022, this could affect many Nova Scotians particularly females living alone (Government of NS, 2025) visible minorities and Indigenous peoples (Statistics Canada, 2026e) and children (Frank et al., 2026).

Addressing the potential for impacts on food security requires understanding the cultural importance of food and how it is secured, economic and financial aspects, and formal and informal social and economic support available.

10.3.6 Summary

The preceding sections identified a range of GBA Plus considerations relevant to offshore oil and gas exploratory drilling, including factors that may influence participation in education, training, and employment opportunities, as well as broader community well-being, personal and relational safety, and food security. Although the temporary and offshore nature of exploratory drilling is expected to limit many potential effects, the analysis highlighted the importance of understanding how effects may be experienced differently across populations and communities, particularly by Indigenous Peoples and other equity-deserving groups. Table 10.1 provides a synthesis of the key considerations identified through the GBA Plus analysis and examples of approaches that could support

inclusive planning, monitoring, and decision-making should future offshore activity or development proceed.

Table 10.1 – Key GBA Plus Considerations for Offshore Oil and Gas Exploratory Drilling and Examples of Measures to Address Potential Barriers and Risks

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
Education, Training and Career Awareness	Limited awareness of offshore career opportunities; underrepresentation of women, Indigenous Peoples, persons with disabilities, racialized groups, and other equity-deserving groups in STEM, skilled trades, and marine occupations; financial barriers to training and certification.	• outreach and awareness programs • partnerships with Indigenous organizations • training supports • mentorship and career development programs
Recruitment and Hiring Practices	Barriers in recruitment processes; limited representation of equity-deserving groups in the workforce; unconscious bias in hiring; limited local employment opportunities.	• inclusive recruitment and hiring practices • bias-awareness training • transparent hiring criteria • support for local and Indigenous employment initiatives
Childcare and Caregiving Responsibilities	Offshore rotations, travel requirements, and training schedules may create challenges for individuals with caregiving responsibilities, particularly women.	• flexible training and work arrangements where feasible • childcare supports • scheduling flexibility
Transportation and Geographic Constraints	Distance from training centres, airports, ports, and employment hubs may limit access for rural, remote,	• community-based or remote learning opportunities

DRAFT

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
	and Indigenous communities.	transportation assistance programs • regional delivery of training programs • improved access to transportation services
Workplace Culture, Harassment and Discrimination	Experiences or concerns related to harassment, discrimination, bullying, exclusion, or lack of cultural safety may affect recruitment, retention, job satisfaction, and advancement.	• respectful workplace policies • anti-harassment and anti-discrimination measures • confidential reporting mechanisms • cultural competency • Indigenous awareness • diversity and inclusion training
Inclusion of Indigenous Knowledge and Cultures	Workplace environments and training programs may not adequately recognize Indigenous cultures, values, perspectives, and community priorities.	• culturally safe workplaces • incorporation of Indigenous Knowledge and perspectives into planning and decision-making processes
Accessibility and Accommodation	Physical, sensory, cognitive, or other accessibility barriers may limit participation in training programs, workplaces, transportation systems, accommodations, or offshore facilities.	• accessible infrastructure and training materials • accommodation policies • adaptive equipment and technologies
Personal Protective Equipment (PPE) and Facility Design	PPE, living quarters, sanitary facilities, change rooms, and emergency	• provision of diverse PPE • inclusive facility design

DRAFT

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
	equipment may not meet the needs of all workers.	• appropriate accommodations and privacy measures
Mental Health, Wellness and Substance Use	Isolation, long rotations, workplace stressors, and mental health challenges may affect worker well-being and retention. Individuals in recovery from substance use disorders may face additional barriers.	• employee assistance and wellness programs • mental health supports • peer support initiatives • recovery-supportive workplace policies • training for supervisors and managers
Career Advancement and Leadership Opportunities	Underrepresentation of equity-deserving groups in supervisory, management, and leadership positions; limited access to networking and mentorship opportunities.	• mentorship and sponsorship programs • equitable promotion processes • professional development opportunities
Monitoring, Data Collection and Accountability	Limited availability of disaggregated workforce and training data may constrain understanding of participation trends and outcomes for different groups.	• collect and report disaggregated data, where appropriate • establish diversity and inclusion objectives • monitor workforce participation and retention trends • support continuous improvement through regular evaluation and reporting
Community Readiness and Capacity	Increased demand on accommodations, transportation, recreation facilities, and community services in locations	• Engage communities early; assess community capacity and infrastructure needs; monitor

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
	supporting offshore operations; potential effects may increase if offshore activity expands in the future.	community-level effects; collaborate with local and Indigenous communities on planning.
Personal and Relational Safety	Potential disproportionate effects on Indigenous women, girls, Two-Spirit and gender-diverse people; importance of considering community safety, cultural continuity, and Indigenous perspectives on well-being.	• Apply a relational safety lens in planning and assessment; engage Indigenous communities and organizations; consider impacts on vulnerable populations when evaluating future development.
Human Trafficking and Exploitation Risks	Resource development activities may contribute to increased concerns regarding human trafficking and exploitation, particularly in regions already experiencing elevated rates. Certain groups may be at higher risk, including Indigenous women and girls, youth, and people experiencing poverty.	• Increase awareness and training; establish reporting and referral mechanisms; collaborate with community organizations, Indigenous organizations, and service providers; monitor community concerns and trends.
Gender-Based and Family Violence	Rotational work schedules, workforce mobility, stress, and substance use may contribute to increased risks of gender-based violence and family violence. Impacts may be greater in rural communities where supports are limited.	• consider community support capacity during planning • engage organizations specializing in gender-based violence prevention • monitor community indicators

DRAFT

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
Substance Use and Community Health	Increased income, rotational work schedules, isolation, and workplace stressors may contribute to substance use and associated effects on workers, families, and communities.	• promote mental health and wellness programs • support substance use prevention and recovery programs • provide education and employee assistance programs • monitor community health trends
Food Security and Food Sovereignty	Potential changes to access, availability, harvesting, consumption, or perceptions of safety of country foods and commercially harvested seafood; potential impacts may disproportionately affect Indigenous Peoples and lower-income households.	• consider food security and Indigenous food systems in future assessments • monitor fisheries and food access indicators • support Indigenous Knowledge and Indigenous harvesting activities • assess potential effects on food availability and cultural practices
Community-Level Monitoring and Data Collection	Limited baseline information and disaggregated socio-economic data make it difficult to assess community-level effects and identify disproportionate impacts on specific groups.	• establish baseline conditions • collect disaggregated social and economic data where appropriate • monitor community well-being indicators over time • adapt management approaches as new

DRAFT

Barrier Category	Examples of Barriers	Examples of Actions to Address Barriers
		information becomes available

10.4 Data for GBA Plus: Gaps and Limitations

The analysis in this chapter offers a starting point to ensure that GBA Plus is considered for proposed oil and gas exploration drilling projects. Current gaps in quantitative and qualitative data mean that it is not possible to get a complete picture of the potential differing impacts on diverse populations in Nova Scotia at this time. This hampers the ability to:

- develop a comprehensive baseline that takes into account differing realities for different populations;
- develop effective mitigation measures to ensure a broad distribution of benefits while minimizing harms; and
- track and monitor changes, especially for diverse, marginalized populations.

Previous sections describe potential issues that should be taken into consideration when planning future offshore exploratory drilling projects. These considerations could be used as a starting point for identifying potential indicators to track and monitor effects, fill data gaps, and inform offshore resource development. However, indicators and monitoring programs need to target the specific population and geographic aspects that could be affected. Indicators and programs should be based on the understandings and needs of the people who will be affected and should be tailored for the specific place and histories experienced by those people. Ongoing engagement with communities is therefore key to understanding how to measure and monitor effects as well as how to collect, store, and use data.

An assessment of publicly available statistical data that could inform a GBA Plus was conducted in 2024 for the Regional Assessment of Offshore Wind Development in Nova Scotia (CRIAW, 2024b) as well as for the NL Regional Assessment of Offshore Wind (CRIAW, 2025). Those reports provided a detailed description of the data reviewed, noting the extent of disaggregated data that could be used for GBA Plus to identify data for baseline studies and to measure changes for diverse populations. Little has changed since those reviews in the type of data available. The reports also noted the serious limitations of Statistics Canada data for GBA Plus. The key findings are summarized below.

10.4.1 Data Sources, Strengths and Limitations

Four key data sources used to inform GBA Plus in NS include: Statistics Canada, the Community Well-Being Index, the Accessibility Statistics Hub, and Engage Nova Scotia. Table 10.2 summarizes the strengths and data limitations and gaps with each of these sources. Identifying gaps in available data is important for understanding the current limitations of the analysis and for informing future baseline studies, monitoring programs, and data collection efforts that could support future analyses of potential social, economic, cultural, and health effects associated with offshore oil and gas exploratory drilling and development activities.

Table 10.2 – Key data sources for GBA Plus in NS

Data Source	Strengths	Data Limitations and Gaps
Statistics Canada	• Most extensive data for GBA Plus assessment. • Often disaggregating the data by province, age and sex; in some cases, by Indigenous identity, Disability, Race and/or Ethnicity, Sexual Orientation (Fusco et al. 2024) • Labour force planning data is most extensive (e.g., population data, demographics, training and education, employment, migration and mobility, etc.). • Data hubs (specifically the Gender, Diversity and Inclusion hub and the Sex, Gender and Sexual Orientation Statistics) provide some intersectional data reports on	• Data disaggregated by only a few factors (age, sex, province). • Other factors that shape peoples' experiences, such as disability, Indigenous identity, and race, cannot be fully understood. • No data on specific regions or communities outside Halifax. • Little disaggregated data to help understand and monitor community effects. • Disaggregated data on community wellness services and supports often not available. • Critical gap in community data on

DRAFT

Data Source	Strengths	Data Limitations and Gaps
	gender, ethnicity, and disability. • Data source for NS Open-Source Data Portal, NS Accessibility Directorate and NS Advisory Council on the Status of Women. • Customized surveys, data runs and analysis can be requested for more detailed, intersectional information for NS.	gender-based violence and racial harassment, especially for Indigenous women and girls. • Data is collected separately and 'siloed' – not connected to other data sources for intersectional analysis. • Data from several surveys need to be combined for a holistic picture. • Gender, Diversity and Inclusion Statistics Hub do not often provide data by province or by regions or communities within a province.
The Community Well-Being index	• Provides a systematic tracking of: education, labour force activity, income and housing. • Illustrates gaps in well-being between Indigenous and non-Indigenous communities, and variations across First Nations and Inuit communities. • Produced by Indigenous Services Canada.	• Little disaggregated data. • Most recent data available is for 2021. • Survey method rather than relationship building over time to develop trust and understanding of experiences of Indigenous people.

DRAFT

Data Source	Strengths	Data Limitations and Gaps
Accessibility Statistics Hub	• Provides data on people with disabilities from the 2022 Canadian Survey on Disability. • Data is related to the priority areas of the *Accessible Canada Act*, one of which is employment. • Employment-related data includes information on labour market opportunities, work potential, and workplace accommodations for people with disabilities, and on Employment Equity. • Data reports can be desegregated and tailored to select geography, age group, gender, and disability.	• Data lags. Survey conducted every 5 years. Most recent data available is for 2022. • Only federally regulated entities (Parliament, Government of Canada, Crown Corporations, Canadian Armed Forces, RCMP, and industries that cross provinces (e.g., banking, transportation). • Does not include data from First Nations Band Councils exempted until 2026. • Does not include children and youth under age 15. • Consistency varies across provincial and municipal jurisdictions with separate regulatory frameworks.
Engage Nova Scotia	• Quality of Life survey is a promising data source. • Provides community-based data every 5 years (community vitality, leisure and culture, overall health	• Data lags. Survey conducted every 5 years. Early 2025 survey results not public until Fall 2026 or early 2027. • Limited set of questions.

DRAFT

Data Source	Strengths	Data Limitations and Gaps
	and well-being, healthy populations, democratic engagement, living standards, time use, environment and education • Can be disaggregated by several factors (e.g., age, income, single parents, those with disability or chronic illness). • 2025 survey aims to strengthen intersectional analysis by targeting2SLGBTQIA+, Black and African Nova Scotians, and low-income Nova Scotians.	• Funding relies on three levels of government (federal, provincial, municipal) and private funding • Deep intersectional cross-tabulations in very small, remote, or historically marginalized rural/semi-rural communities (such as some historic African Nova Scotian settlements) with small sample sizes risks to individual privacy.

Overall, these data sources can provide useful information for attending to oil and gas exploratory drilling pressures and planning for future offshore oil development. However, they fall far short of what is needed for an intersectional, gender-based plus analysis. Some of the major data gaps relate to the absence of regional and community level data for understanding the effects of offshore oil exploration; the absence of disaggregated data that could provide a comprehensive, holistic picture of impacts for diverse and intersecting population groups; and the absence of comprehensive, up-to-date data to understand the experiences of Indigenous people; little disaggregated data to help understand and monitor community effects including wellness services and supports and no comprehensive data on gender-based and racialized violence and trafficking.

10.4.2 Addressing Data Gaps

A first step towards systemic data collection is to fill holes in disaggregated data needed for effective, inclusive, and equitable employment. The CNSOER can play an important role in meeting this goal by expanding the data collected in its standardized reporting system for offshore employers. Currently offshore energy operators must submit plans to

CNSOER for environmental protection and safety. This should be expanded to include demographic information on employment broken down by occupation, noting the number and percentage of Indigenous, female, disabled, and Two-spirited employees. As well, the CNSOER should expand and update its Codes of Practice and 2018 Incident Reporting Guidelines to recognize racial and sexual harassment and bullying as a workplace hazard that must be reported and require all employees to take DEIA training and sign a code of conduct to contribute to workplace wellness for all employees.

10.5 Conclusion

This chapter has explained the importance and benefits of intersectional gender analysis plus, highlighting some of the potential effects that offshore exploratory drilling could have on diverse populations in NS. Specific attention was paid to barriers for historically marginalized groups to access education, training, and employment in offshore drilling and related industries. The potential impact of offshore oil exploratory drilling on community well-being was also considered, paying particular attention to personal and relational safety, human trafficking, gender-based violence, substance use, and food security. This analysis informs recommendations to support GBA Plus in future decisions related to offshore exploratory drilling.

Anticipating some of these effects on systemically marginalized groups early will support making informed decisions about future project proposals, ensuring that if projects move forward, steps are taken to support diverse and inclusive employment and community well-being. The chapter has also highlighted some key data gaps that can be addressed to ensure that if exploratory drilling takes place, the effects on diverse populations can be tracked and monitored for appropriate mitigation measures.

10.6 References

Bleakney, A., F. Khanam and M.B. Kumar. 2024. Indigenous Peoples Thematic Series: Quality of employment among First Nations people living off reserve and Métis, 2022. Statistics Canada Report. Retrieved at: https://www150.statcan.gc.ca/n1/pub/41-20-0002/412000022024002-eng.html

Brennan, K., Halpenny, C., and Pakula, B. 2022. LGBTQ2S+ voices in employment: Labour market experiences of sexual and gender minorities in Canada. Report submitted to Women and Gender Equality Canada.

Burke, Ronald J., Stig Berge Matthiesen, Stale Einarsen, Lisa Fiskenbaum, and Vibeke Soiland. 2008. Gender Differences in Work Experiences and Satisfactions of Norwegian Oil Rig Workers. *Gender in Management: An International Journal* 23, no. 2 (March 14, 2008): 137–47. doi:10.1108/17542410810858330.

Canadian Centre for Caregiving Excellence. 2026. Caring in Canada 2026: Survey insights from care givers and care providers across Canada. Retrieved from https://canadiancaregiving.org/wp-content/uploads/2026/05/Caring-in-Canada_web.pdf

BP Canada Energy Group. 2022. Canada-Newfoundland and Labrador Benefits Plan Orphan Basin Exploration Project. Retrieved at https://www.bp.com/api/files/6cqieuqhq4no/master/2l5uACF54eMbxX2nb2kOqM/46481cad5f9ec18a8dfce1f68aa85c5a/bp-canada-benefits-plan-2022-en.pdf

CAF (Canadian Apprenticeship Forum). n.d. Understanding substance use among apprentices in the skilled trades. Retrieved at https://caf-fca.org/research_reports/understanding-substance-use-among-apprentices-in-the-skilled-trades/

CAPP (Canadian Association of Petroleum Producers). 2026a. Canada's Offshore Oil and Natural Gas Industry. Retrieved at https://www.capp.ca/wp-content/uploads/2026/08/Canadas-Offshore-Oil-Gas-Industry-July-24-2026.pdf

CAPP (Canadian Association of Petroleum Producers). 2026b. Atlantic Canada Offshore Petroleum Industry: Code of Practice for the Training and Qualifications of Offshore Personnel. Retrieved at https://cnsoer.ca/regulatory-framework/legislation-and-regulatory-instruments

Canadian Institutes of Health Research. 2020. Mental Health Outcomes and Impact Assessment. Retrieved at https://www.canada.ca/content/dam/iaac-acei/documents/research/Best-Brains-Exchange-Report-February-2020.pdf.

Canadian Centre for Occupational Health and Safety (CCOHS). 2023. Personal Protective Equipment - Body Type and Gender Considerations. https://www.ccohs.ca/oshanswers/prevention/ppe/CCOHS_personal-protective-equipment-body-type-and-gender-considerations.pdf

CRIAW (Canadian Research Institute for the Advancement of Women). 2025. CRIAW Report to Committee: Applying Gender-Based Analysis Plus to Offshore Wind Development. Regional Assessment of Offshore Wind Development in Newfoundland and Labrador. Retrieved at https://iaac-aeic.gc.ca/050/evaluations/proj/84343/document/160544.

CRIAW (Canadian Research Institute for the Advancement of Women). 2024a. Gender-based analysis plus in offshore wind development: Data and community engagement strategies for a more equitable future for Nova Scotians. Retrieved at https://iaac-aeic.gc.ca/050/evaluations/proj/83514/document/159201.

CRIAW (Canadian Research Institute for the Advancement of Women). 2024b. Report on Publicly Available Data to Support Gender-Based Analysis Plus in Nova Scotia For the Impact Assessment Agency of Canada Regional Assessment of Offshore Wind Development in Nova Scotia. Retrieved at https://iaac-aeic.gc.ca/050/documents/p83514/159199E.pdf.

ExxonMobil Canada Properties. 2025. Hebron Project Canada-Newfoundland and Labrador Benefits Report for the Period January 1, 2025 to December 31, 2025. Retrieved at: https://www.hebronproject.com/uploads/pdfs/reports/PUBLIC-2025-Annual-Hebron-C-NLOPB-Benefits-Report.pdf

Frank, Lesley, Ruby Harrington, and Christine Saulnier. 2026. 2025 report card on child and family poverty in Nova Scotia. Retrieved at https://www.policyalternatives.ca/news-research/2025-report-card-on-child-and-family-poverty-in-nova-scotia/.

Gibson, G., Yung, K., Chisholm, L., Quinn, H., and Lake Babine Nation and Nak'azdli Whut'en. (2017). Indigenous communities and industrial camps: Promoting healthy communities in settings of industrial change. The Firelight Group.

Gill, S. 2024. Sexual and Gender-Based Harassment in the Skilled Trades in Nova Scotia: Key Findings 2024. YWCA Halifax. Retrieved at: https://www.ywcahalifax.com/wp-content/uploads/2024/03/YWCA-Halifax-SGBH-Key-Findings-Report-2024-with-recomendations.pdf

Government of Canada. 2024. Gender Results Framework: A new data table on workplace harassment. Retrieved at https://www150.statcan.gc.ca/n1/daily-quotidien/240212/dq240212a-eng.htm.

Government of Canada. n.d. Men in trades and substance use. Retrieved at https://www.canada.ca/en/services/health/campaigns/men-construction-trades-overdose-crisis-canada/men-trades-substance-use.html

Government of NL, Labour Market Information, n.d. Oil and gas drilling, servicing and related labourers. Retrieved at https://www.gov.nl.ca/labourmarketinformation/career/biological-technologists-and-technicians-10/

Government of Nova Scotia, Finance and Treasure Board. 2025. Canadian Income Survey: Poverty, 2023. Retrieved at https://novascotia.ca/finance/statistics/topic_news.asp?id=20966andfto=23wandrdval=2025-05.

Gupta, Shikha, Daphne Fernandes, Nicole Aitken and Lawson Greenberg. 2024. Household food insecurity among persons with disabilities in Canada: Findings from the 2021 Canadian Income Survey. Retrieved at https://www150.statcan.gc.ca/n1/pub/82-003-x/2024008/article/00002-eng.htm?utm_source=chatgpt.com.

Heidinger, Loanna. n.d. Rural crime fact sheets, 2023: Nova Scotia. n.d. Retrieved at https://www150.statcan.gc.ca/n1/pub/85-002-x/2025001/article/00006/ns/ns-eng.htm?utm_source=chatgpt.com.

IAAC (Impact Assessment Agency of Canada). 2023. IAAC GBA Plus Presentation to NS RA Committee. GBA Plus and Impact Assessment.June 16, 2023. https://iaac-aeic.gc.ca/050/documents/p83514/152517E.pdf

Keefe, A. 2022. Canadian Women's Experiences with Personal Protective Equipment in the Workplace. Canadian Standards Association. Retrieved https://www.csagroup.org/article/research/canadian-womens-experiences-with-personal-protective-equipment-in-the-workplace/

Khanam, F., A. Racine, I. Alonso, J. Miller and M.B. Kumar. 2024. Indigenous journeypersons: Trends and socioeconomic characteristics, 2010 to 2020. Statistics Canada Report. December 2024. Retrieved at: https://www150.statcan.gc.ca/n1/pub/41-20-0002/412000022024004-eng.pdf

KMKNO (Kwilmu'kw Maw-klusuaqn Negotiation Office). Personal communication. October 8, 2026.

Leclerc, K. 2022. Studies on Gender and Intersecting Identities: Portrait of Women by the Relative Remoteness of their Communities, Series 2: Educational Attainment. Statistics Canada Report. February 2022. Retrieved at: https://www150.statcan.gc.ca/n1/pub/45-20-0002/452000022022001-eng.htm

Manning, S., Nash, P., Levac, L., Stienstra, D., and Stinson, J. (2018). A literature synthesis report on the impacts of resource extraction for Indigenous women.

McIlwaine, S., Appleton, J., Meister, S., Barker, B., Dassieu, L., Noorbakhsh, S., Panesar, B., and Beirness, D. 2026. Workplaces and substance use: Exploring gender-related factors (Brief). Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. Retrieved at: https://www.ccsa.ca/sites/default/files/2026-04/Workplaces-and-Substance-Use-Exploring-Gender-Related-Factors-en.pdf

McIlwaine, S., Meister, S., Barker, B., Dassieu, L., Noorbakhsh, S., Panesar, B., and Beirness, D. 2025. Workplaces and substance use: Oil and gas industry (Brief).

Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. Retrieved at https://www.ccsa.ca/en/workplaces-and-substance-use-oil-and-gas-industry

Millin, Vice, Zaloa Sanchez Varela, Dario Medić, and Paško Ivančić. 2020. Safety at Sea Is Not Gender-Neutral: A Study on Human-Factors, Protective-Equipment-Anthropometry, Occupational-Safety and Well-Being Gaps for Women Seafarers. Applied Sciences. 16(15), 816. https://doi.org/10.3390/app16157816

Moodie, S., A. Mason and L. Moorcroft. 2021. Never Until Now. Liard Aboriginal Women's Society. https://www.liardaboriginalwomen.ca/index.php/never-until-now-laws-mining-report

National Inquiry into Missing and Murdered Indigenous Women and Girls. 2019. Reclaiming Power and Place: The final report of the National Inquiry into Missing and Murdered Indigenous Women and Girls. Volume 1a. Retrieved at: https://www.mmiwg-ffada.ca/wp-content/uploads/2019/06/Final_Report_Vol_1a-1.pdf

Nova Scotia Government. n.d. Employment Statistics on overall employment including breakdowns by age, gender, and employment type. Retrieved at: https://lmi.novascotia.ca/employment

Nightingale, E., Czyzewski, K., Tester, F., and Aaruaq, N. 2017. The effects of resource extraction on Inuit women and their families: evidence from Canada. Gender and Development, 25(3), 367–385. https://doi.org/10.1080/13552074.2017.1379778

NSNWA (Nova Scotia Native Women's Association). 2026. Personal communication. September 16, 2026.

Pauktuutit Inuit Women of Canada. 2021. Addressing Inuit Women's Economic Security and Prosperity in the Resource Extraction Industry.

Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador. 2020. Submitted February 2020. Retrieved at: https://iaac-aeic.gc.ca/050/evaluations/exploration?projDocs=80156andsearch=final+report

Reinders, Kathryn Currie. 2026. Invisible Care: Four quantitative snapshots of disabled women caregivers in Canada. Paper presented to the Canadian Political Science Association.

Safety4Sea. 2020. Key health and safety concerns for women seafarers. Retrieved at https://safety4sea.com/cm-key-health-safety-concerns-for-women-seafarers/

Savage, L. (2021). Intimate partner violence: Experiences of women with disabilities in Canada, 2018. Statistics Canada. Retrieved at https://www150.statcan.gc.ca/n1/pub/85-002-x/2021001/article/00006-eng.htm

Schimmele, C., J. Sung-Hee, and R. Arim. 2021. Economic and Social Reports: Work experiences of women with disabilities. Statistics Canada Report. October 2021. Retrieved at: https://www150.statcan.gc.ca/n1/pub/36-28-0001/2021010/article/00004-eng.htm

Sodexho, 2024. Empowering Women: Sodexo's Safety Measures for Remote Workforce Lodging. Retrieved at https://ca.sodexo.com/blog/energy-and-resources/articles/sodexo-ensures-safety-for-women

StatsCAN Plus. 2023. More than half of women in Canada are caregivers. Article: January 5, 2023. Retrieved at: https://www.statcan.gc.ca/o1/en/plus/2649-more-half-women-canada-are-caregivers

Statistics Canda. 2024. Statistics Canada and Disaggregated Data. Retrieved at: https://www.statcan.gc.ca.

Statistics Canada. 2026a. Table 37-10-0219-01: Apprenticeship programs by age groups, major trade groups, sex and registration status. Retrieved at: https://doi.org/10.25318/3710021901-eng

Statistics Canada. 2026b. Table 14-10-0416-02: Proportion of women and men employed in occupations, annual. Retrieved at: https://doi.org/10.25318/1410041601-eng

Statistics Canada. 2026c. Employee wages by industry, annual. Retrieved at: https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1410006401

Statistics Canada 2026d. Food insecurity by selected demographic characteristics. Retrieved at https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1310083501.

Statistics Canada 2026e. Poverty and low-income statistics by selected demographic characteristics. Retrieved at https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1110009301.

Statistics Canada. 2024. Socioeconomic profile of the 2SLGBTQ+ population aged 15 years and older, 2019 to 2021. Retrieved at https://www150.statcan.gc.ca/n1/en/daily-quotidien/240125/dq240125b-eng.pdf?st=-Rqc5J-9

Stienstra, D., Levac, L., Baikie, G., Stinson, J., Clow, B., and Manning, S. (2016). Gendered and Intersectional Implications of Energy and Resource Extraction in

Resource-Based Communities in Canada's North. Canadian Research Institute for the Advancement of Women.

Sutton-Preddie, D. 2025. Trafficking in persons in Canada, 2024. Statistics Canada Report. December 2025. Retrieved at: https://www150.statcan.gc.ca/n1/pub/85-002-x/2025001/article/00008-eng.htm

Uppal, Sharanjit. 2023. Food insecurity among Canadian families. Retrieved at https://www150.statcan.gc.ca/n1/pub/75-006-x/2023001/article/00013-eng.htm.

Woodfibre LNG. 2024. Gender and Cultural Safety Plan - Woodfibre LNG Project. May 13, 2024.

Wray, Dana. 2024. "Sandwiched" between Unpaid Care for Children and Care-Dependent Adults: A Gender-Based Study.

YESAB (Yukon Environmental and Socio-economic Assessment Board). 2023. Personal and Relational Safety Working Group.

DRAFT

11 Recommendations

Based on the work undertaken for the RA, the information and analyses compiled, the knowledge and perspectives shared through engagement activities, and the input received from federal and provincial government departments, Indigenous Peoples, stakeholders, industry representatives, and other interested parties and organizations, IAAC makes the following recommendations for the future of offshore exploratory drilling within the Study Area. These recommendations are intended to support informed planning and decision-making for offshore exploratory drilling activities within the Study Area and to enhance the efficiency and effectiveness of future impact assessment and regulatory processes.

Offshore exploratory drilling has played, and is expected to continue to play, an important role in understanding the petroleum resource potential of the Canada-Nova Scotia offshore area and supporting economic activity in Nova Scotia. At the same time, engagement and consultation conducted throughout the RA highlighted the importance of the environment, recognition of Indigenous rights and interests, transparency and meaningful engagement, advancing science and monitoring, and ensuring that offshore activities continue to coexist with other ocean uses. The recommendations that follow address key issues and challenges and identify opportunities that are intended to support a co-ordinated, adaptive, and evidence-based approach to offshore exploratory drilling that protects the marine environment, incorporates new information and technologies, and contributes to the sustainable management of offshore resources.

It should be noted that many of the recommendations here can support and inform future offshore activities within the same Study Area under the regulatory authority of the CNSOER including oil and gas production projects and offshore wind.

Recommendations are grouped under eight themes as follows:

Theme 1: Exclusion Regulation

Recommendation: Implement an Exclusion Regulation

> By assessing issues collectively, this RA sought to improve regulatory efficiency, increase predictability, support informed decision-making, and reduce duplication in future assessment processes. The RA recognized that many of the issues and mitigation measures associated with offshore exploratory drilling are common across projects and are well understood. As a result, the use of standard mitigation measures, industry best practices, and established guidance may reduce the repetition and duplication often encountered in project-specific assessments, thereby supporting a more efficient and predictable regulatory process.

IAAC recommends that the Minister consider that a regulatory approach similar to the *Regulations Respecting Excluded Physical Activities (Newfoundland and Labrador Offshore Exploratory Wells)* be implemented for the NS RA Study Area, taking into account the findings of this RA and the specific context for Nova Scotia. The Exclusion Regulation does not reduce environmental protection or accountability. Rather, it recognizes that certain mitigation and follow-up measures have become understood and well-established through previous project environmental assessments and can be applied consistently across exploratory drilling projects in the Study Area.

As part of this recommendation, relevant sub-recommendations from the *Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador* were reviewed and adapted for inclusion in this RA, taking into consideration the specific environmental, social, and regulatory context of the NS RA Study Area. In addition, IAAC has developed additional recommendations specific to the Nova Scotia Study Area that reflect issues, concerns, opportunities, and information gaps identified during the RA process in relation to discussions around a potential Exclusion Regulation with Indigenous groups, government departments, stakeholders, rights holders, industry representatives, and the public.

Sub-Recommendation 1.1A – Regulatory process

IACC to consult with the CNSOER, applicable government departments and agencies, Indigenous and stakeholder groups and the public as part of the regulatory development process for the above referenced Exclusion Regulation including determination of the area of application for the Exclusion Regulation.

Sub-Recommendation 1.1B – Mitigation measures

IAAC recommends that all mitigation provided in Appendix 7.1 of this report be considered as a standard list of conditions to be implemented for exploratory drilling projects in the Study Area and should be incorporated into the resulting Exclusion Regulation. Follow-up measures required of operators as conditions of previous environmental assessment approvals for past exploratory drilling projects in the Study Area (under CEAA 2012) should also be considered as conditions for the above referenced Exclusion Regulation.

Sub-Recommendation 1.1C – Conditions

It is recommended that the conditions of the Exclusion Regulation for an offshore exploratory drilling project in the Study Area of this RA, include and address the following, but not be limited to:

a. The operator whose project meets the conditions of the Exclusion Regulation be required to provide a written notification that includes a description of its proposed exploratory drilling activities to IAAC 90 days before its project begins.

b. In that notification, the operator must provide details clearly demonstrating its planned compliance with the conditions outlined in the Exclusion Regulation.

c. The operator must also demonstrate that it has undertaken engagement with Indigenous and stakeholder groups on the planned exploratory drilling program, including describing the nature and outcomes of that engagement.

Should the Minister decide to pursue an Exclusion Regulation, additional conditions may be developed through engagement and consultation with Indigenous groups, government departments, and other stakeholders. The process may also consider relevant conditions currently included in the *Regulations Respecting Excluded Physical Activities (Newfoundland and Labrador Offshore Exploratory Wells)*, taking into account any findings or recommendations arising from the ongoing review, where applicable

Sub-Recommendation 1.1D – Review of the regulation

IAAC will review the Exclusion Regulation, including the assumptions supporting the conditions, after five years, or sooner, of the regulation coming into force, including consultation with the Mi'kmaq, as warranted by new information, analysis, or significant updates to the RA. The review should include federal and provincial government departments, Indigenous groups, stakeholders, the CNSOER, industry, and the public, and should be conducted in collaboration with the Mi'kmaq of Nova Scotia to ensure that opportunities for Indigenous participation in offshore planning or assessment are not reduced under the Exclusion Regulation.

Sub-Recommendation 1.1E – Sable Island National Park Reserve

While it is recognized that a prohibition on work/activity related to drilling, including exploratory drilling, currently exists under the *Canada-NS Accord Act*[55], Parks Canada and ECCC will be engaged as part of the regulatory development process for the above referenced Exclusion Regulation to discuss the application of an Exclusion Regulation in relation to Sable Island National Park Reserve,

[55] Section 140.1 of the *Canada-NS Accord Act* 140.1 notes that no work/activity related to the drilling for petroleum, including exploratory drilling for petroleum, in Sable Island National Park Reserve of Canada or can take place within one nautical mile seaward of its low-water mark.

including consideration of additional setbacks and mitigation measures, protection objectives, and any site-specific management requirements, to align the exclusion framework with Parks Canada's mandate and the ecological and cultural values of Sable Island.

Sub-Recommendation: 1.1F – Incorporation of study results

Results of studies (i.e., spill risk assessment, noise studies) should be incorporated into review and decisions regarding the location, boundaries, and applicability of the Exclusion Regulation. Areas determined to present an elevated risk should be considered before being included in the area of application of the Exclusion Regulation.

Sub-Recommendation: 1.1G – Mi’kmaq consultation

IAAC recommends that, federal and provincial governments, in consultation with the CNSOER, should clarify with the Mi’kmaq how Crown consultation will be carried out for exploratory drilling exclusions. This should include which procedural aspects may be delegated to operators, how the results of operator engagement will be reported to and considered by the Crown, and the CNSOER, and how concerns that cannot be resolved at the operator level will be addressed. The approach should be consistent with the Mi'kmaq–Nova Scotia–Canada Consultation Terms of Reference. Expectations for operator engagement (timing, information to be shared, incorporation of Indigenous Knowledge into mitigation design, and reporting on how input was considered) should be set out in the CNSOER’s guidance or authorization conditions.

Sub-Recommendation: 1.1H – Timely notification process

The Exclusion Regulation should require operators to commence the notification process at least two months prior to starting drilling activities and provide subsequent updates and information as these become available. Operators should also be required to demonstrate that (and how) they will provide more timely notifications to these parties regarding planned rig movements.

Sub-Recommendation: 1.1I – Modelling requirements for excluded exploratory drilling projects

For any proposed exploratory drilling projects in the Study Area that do not require project-specific impact assessment under the IAA as a result of an Exclusion Regulation, it is recommended that the CNSOER continue to ensure that adequate and appropriate modelling is completed or otherwise in place regarding:

- drill cuttings and their dispersion, and
- the predicted fate and behaviour of potential petroleum spills, and that these be included as part of its authorizations and approvals processes for the drilling program in question.

Theme 2: Spill Prevention and Response

Recommendation 2.1: Develop regional spill scenarios and sensitivity analyses

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER continue to work with ECCC and DFO to undertake spill trajectory modelling. Spill modelling results should be considered alongside the likelihood of a spill occurring, the characteristics of the released product, prevention and response measures, and other risk-management factors. Recognizing that spill behaviour and potential effects vary depending on the location, characteristics, and scale of a release, the approach should evaluate a range of credible spill scenarios representative of offshore exploratory drilling activities and regional environmental conditions and should:

a. identify marine and coastal areas where accidental spills could pose elevated risks to ecologically, culturally, or socio-economically important receptors, including marine protected areas, sensitive marine ecosystems, Indigenous harvesting areas, Sable Island National Park Reserve, and other areas of recognized conservation or cultural importance;

b. evaluate the potential pathways, likelihood, timing, and extent of spill exposure under a range of environmental conditions and spill scenarios;

c. identify areas where additional planning considerations, mitigation measures, monitoring requirements, or operational restrictions may be warranted to reduce spill-related risks; and

d. assess regional spill response capacity, including response times, logistical constraints, and factors that may influence response effectiveness;

e. support periodic updates as new modelling techniques, and planning priorities become available.

DRAFT

Recommendation 2.2: Ensure continuous improvement in spill prevention, response and science

In recognition of the potential outcomes if a spill event was to occur and the concerns heard throughout the RA process, should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER follow and report on the ongoing advancement and application of spill prevention, preparedness, response, monitoring, and scientific research to strengthen the management of accidental spill events associated with offshore exploratory drilling. This should include:

a. monitoring and sharing lessons learned, best practices, and emerging knowledge from spill incidents, response exercises, scientific research, conferences, workshops, and other technical forums;

b. reviewing advancements in spill prevention, preparedness, response, monitoring, and restoration technologies and practices, including improvements in spill modelling, detection, environmental monitoring, and response capabilities; and

c. periodically evaluating opportunities to incorporate new knowledge, technologies, and lessons learned into regulatory requirements, guidance, emergency preparedness, and spill response planning.

Recommendation 2.3: Enhance communication on spill prevention and response

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER enhance public and Indigenous communications and transparency regarding its spill prevention, preparedness, response, and recovery requirements for offshore exploratory drilling. This should include:

- providing clear and accessible information on regulatory requirements, oversight activities, and response expectations;
- improving public understanding of the roles and responsibilities of the CNSOER, operators and other response organizations; and
- sharing information on spill response planning, exercises, lessons learned, and continuous improvement initiatives, as appropriate.

As part of the notification to Indigenous communities, coastal communities, and stakeholder groups in the event of an offshore spill, it is recommended that the

CNSOER require operators to include any associated details around the nature and extent of the spill, and information on any affected marine biota.

Improved communication will support transparency, informed participation, and improve public confidence in the offshore regulatory regime.

Theme 3: Governance, Adaptive Management, and Planning

Recommendation 3.1: Establish a Regional Offshore Environmental Advisory Group

Should exploration drilling projects be proposed in the future, an advisory body be established to promote co-ordination among governments, Indigenous groups, industry, researchers, and other interested parties. Where feasible, this function should build upon, leverage, or be integrated with existing advisory, governance, and research co-ordination mechanisms to avoid duplication and promote efficiency.

The advisory body could serve as a forum for:

- coordinating monitoring activities;
- facilitating data sharing and transparency among organizations;
- reviewing new scientific and Indigenous Knowledge relevant to the offshore area;
- tracking cumulative effects and emerging issues in the offshore area;
- reviewing the effectiveness of mitigation, monitoring, and follow-up programs;
- identifying priorities for future research and information collection;
- providing advice regarding updates to the RA and appropriateness of any associated Exclusion Regulation;
- identifying and discussing approaches for addressing data gaps; and
- identifying opportunities to coordinate with and build upon existing advisory and research forums, including the Environmental Studies Research Fund (ESRF) management board, fisheries advisory committees, and other relevant offshore governance and engagement mechanisms, to support information sharing and avoid duplication of effort.

DRAFT

Recommendation 3.2: New information

Should exploration drilling projects be proposed in the future, any new review conducted by the CNSOER should take into account relevant new information related to technological innovations and relevant advances in scientific knowledge, environmental monitoring and follow-up results, oil spill modelling and analysis, disaggregated socio-economic and demographic data (when and where relevant), as well as Indigenous Knowledge and other studies related to the biophysical and socio-economic conditions of the Study Area and the potential effects of offshore exploratory drilling. Updates should also consider lessons learned regarding the effectiveness of mitigation and follow-up measures implemented as part of any offshore exploratory drilling projects. Ongoing integration of new information and evolving knowledge supports an adaptive management approach. This is consistent with the Accord Acts regulatory framework which applies a risk and performance-based approach under which operators are required to identify and manage risks through appropriate preventative and mitigative measures that are subject to monitoring, performance evaluation, and adaptation in response to new information. The continuous cycle of risk evaluation and adaptive management informs future decision-making, and helps ensure that mitigation, monitoring, and follow-up requirements remain effective and responsive to changing conditions and emerging issues.

Theme 4: Indigenous Engagement and Knowledge

Recommendation 4.1: Support Indigenous Knowledge and marine use information for offshore planning and assessment

Should exploration drilling projects be proposed in the future, the CNSOER, in collaboration with the Mi'kmaq, should support the collection and application of Indigenous Knowledge relevant to the offshore area, including Indigenous fisheries, harvesting activities, culturally important species and areas, and perspectives on environmental change.

Where appropriate, Indigenous-led mapping and knowledge-sharing initiatives should be supported to inform regional planning, project assessments, mitigation, and spill response planning. Information should be collected, managed, and shared in accordance with Indigenous data sovereignty and governance principles, with Indigenous communities retaining authority over its ownership, control, access, use, and disclosure.

Recommendation 4.2: Fisheries communication and adaptive mitigation

Should exploration drilling projects be proposed in the future, operators should implement fisheries communication and compensation measures in collaboration with Mi'kmaw fisheries organizations and Indigenous harvesters, to address gear loss or damage and disruptions to harvesting activities.

Theme 5: Regional Monitoring, Research, and Information Management

Recommendation 5.1: Establish a regional monitoring and data-sharing platform

Should exploration drilling projects be proposed in the future, IAAC recommends that federal and provincial governments, the CNSOER, Indigenous communities and organizations, offshore operators, researchers, and other relevant organizations collaborate to develop and maintain a regional monitoring and data-sharing platform for the Study Area. The platform should:

- serve as a centralized repository for environmental, social, cultural, economic, monitoring, and regulatory information relevant to offshore activities;
- support marine spatial planning, environmental assessment, and regulatory decision-making;
- incorporate scientific information, Indigenous Knowledge (where shared and consistent with Indigenous data governance principles), monitoring results, and climate-related information; and
- facilitate collaboration, transparency, and information sharing among governments, Indigenous groups, researchers, industry, and the public.

The platform should be supported through long-term collaborative funding arrangements and be regularly updated to support future planning, monitoring, and environmental assessment by the CNSOER, where applicable.

The platform should be designed to align with and, where appropriate, integrate existing offshore data management (e.g., offshore wind), monitoring, and information-sharing initiatives to enhance consistency, interoperability, and accessibility across the offshore area.

DRAFT

Recommendation 5.2: Improve understanding of marine wildlife including species at risk

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER work with federal and provincial governments, industry, and researchers to improve the information available to support the assessment and management of potential effects of offshore exploratory drilling on marine wildlife and species at risk. Information generated should be used to inform planning, mitigation requirements, operational practices, and adaptive management measures.

In implementing this recommendation, the CNSOER should consider leveraging existing collaborative research mechanisms, including the ESRF, to identify, prioritize, and address key knowledge gaps. As an established partnership among governments, regulators, industry, researchers, and other partners, ESRF is well positioned to support timely, co-ordinated, and responsive research that informs offshore decision-making and environmental management.

Key considerations for this approach include:

Migratory Birds and Seabirds

- improving understanding of the distribution, abundance, habitat use, migration corridors, biologically important areas, and seasonal sensitivities of migratory birds and seabirds within the Study Area;
- improving understanding of seabird interactions with offshore exploratory drilling activities, with particular emphasis on Leach's Storm-Petrel and other species susceptible to attraction to offshore lighting and flaring;
- improving understanding of the influence of offshore lighting and other offshore activities on bird behaviour, mortality risk, displacement, and population trends;
- supporting the use of emerging monitoring technologies and survey methods, where appropriate, to improve understanding of bird movements and interactions with offshore activities; and
- using new information to develop, evaluate, and refine mitigation measures and best practices to reduce adverse effects on migratory birds and seabirds.

Bats

- addressing knowledge gaps regarding bat occurrence, distribution, migration, and habitat use within the Study Area, including movements between Sable Island and the mainland coast;

DRAFT

- improving understanding of seasonal patterns of bat activity, migration corridors, and areas where bat movements may overlap with offshore exploratory drilling activities; and
- improving understanding of bat interactions with offshore infrastructure, including potential effects associated with lighting, flaring, offshore structures, and other project-related activities.

Marine Mammals

- maintaining and periodically updating information on marine mammal distribution, habitat use, seasonal occurrence, biologically important areas, and sensitive periods within the Study Area;
- improving understanding of the potential interactions between marine mammals and offshore activities, including underwater sound, vessel traffic, and cumulative effects;
- considering the best available scientific information when establishing mitigation, monitoring, and operational requirements for exploratory drilling activities; and
- identifying and addressing key information gaps related to offshore and deep-water habitats and species that are less frequently observed.

Species at Risk

- maintaining and periodically updating information on species at risk, critical habitat, and other areas of ecological importance;
- improving understanding of species distributions, habitat use, and ecological sensitivities, including changes related to climate change and other environmental stressors;
- identifying periods and areas of elevated sensitivity that may warrant additional mitigation, monitoring, or management measures; and
- adapting mitigation and monitoring requirements, as appropriate, where new information identifies increased risks or sensitivities.

The CNSOER should periodically review new information and update mitigation and monitoring expectations, as appropriate.

Recommendation 5.3: Consider marine conservation objectives in offshore decision making

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER applies established marine conservation objectives and

management measures within its regulatory decision-making and authorization processes, in consultation with relevant authorities as appropriate. This approach should:

- consider areas identified through marine conservation and marine spatial planning initiatives, including Areas of Interest (AOIs), Marine Refuges, critical habitat and areas important to species at risk, coral and sponge communities, other vulnerable marine ecosystems;
- improve understanding of the distribution, ecological function, sensitivity, and recovery potential of vulnerable benthic habitats, including coral and sponge communities, and the potential effects of exploratory drilling activities such as sediment deposition, drill cuttings, anchoring systems, and accidental discharges;
- consider the objectives and management considerations of applicable conservation and management plans, including the Scotian Shelf-Bay of Fundy Bioregional Marine Refuge Management Plan (2024).
- consider changes in habitat use, critical habitat, species distributions, and ecological conditions that may occur over time, including those resulting from climate change; and
- support a risk-based approach to decision-making by informing the application of avoidance measures, enhanced mitigation, monitoring requirements, operational restrictions, or other management measures, as appropriate.

Where additional mitigation, monitoring, operational restrictions, or other protective measures are warranted, these should be considered through existing regulatory and authorization processes to ensure marine conservation objectives continue to be advanced through established conservation processes while allowing the CNSOER to consider and apply those measures within its existing regulatory mandate.

For exploratory drilling activities proposed within a Marine Refuge or other identified sensitive marine area, operators should demonstrate, in consultation with DFO as appropriate, how potential risks to conservation objectives and sensitive ecological features will be avoided or mitigated. Additional assessment, mitigation, monitoring, or management measures should be applied where warranted based on the ecological, cultural, or conservation values of the area.

The information used to support this approach should be periodically updated as new scientific information, monitoring results, and marine planning outcomes become available.

Theme 6: Climate Change and Greenhouse Gas Management

Recommendation 6.1: Improve consistency and comparability of GHG emissions information

Should exploration drilling projects be proposed in the future, IAAC recommends that the province and the CNSOER work with operators to support consistent assessment, reporting and sharing of GHG emissions information. Improved understanding of emissions sources, effectiveness of mitigation measures, and areas for improvement can support continuous learning, inform future environmental assessments by the CNSOER, and help identify opportunities to improve emissions management over time.

Where appropriate, information can be shared with the Canada-Newfoundland and Labrador Offshore Energy Regulator to support a consistent approach to the assessment and reporting of project-related GHG emissions in Atlantic offshore petroleum jurisdictions.

This approach could consider:

a. identifying proposed best available technologies and best environmental practices (BAT/BEP) that may contribute to avoiding or reducing GHG emissions;
b. identifying anticipated sources of operational GHG emissions, including fuel combustion, vessel and aviation activities, flaring, and venting, and describing measures intended to reduce emissions where feasible;
c. documenting post-activity emissions information, including mitigation measures implemented, lessons learned, and opportunities to inform future project planning and assessment; and
d. periodically reviewing available information on emissions performance, mitigation approaches, technologies, alternative fuels, climate science, policy developments, and relevant regulatory practices to support continuous improvement in assessment methodologies and emissions management.

Theme 7: Cumulative Effects

Recommendation 7.1: Integrate cumulative effects into strategic offshore planning and licensing

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER, in collaboration with federal and provincial governments, Indigenous groups, industry, fisheries representatives, and other ocean users, establish and maintain a regional cumulative effects management approach that integrates cumulative effects considerations into marine spatial planning, regional and Strategic Environmental Assessments conducted under the Accord Acts, Calls for Bids, licensing decisions, and offshore exploratory drilling activities. This approach should:

a. identify and address cumulative effects early in planning and licensing processes, including consideration of areas of high ecological, cultural, and socio-economic importance, areas where multiple activities may interact, and areas that may be particularly vulnerable to cumulative pressures;

b. support coordinated regional planning, monitoring, and information sharing among governments, Indigenous groups, regulators, industry, and other ocean users, including the development of indicators, thresholds, and regional information products to inform decision-making;

c. incorporate climate change, Indigenous Knowledge, and scientific information into cumulative effects assessment and management; and

d. apply adaptive management by using monitoring results, new information, and technological advances to inform mitigation measures, future planning, and regulatory decision-making.

Recommendation 7.2: Support early engagement and co-existence planning

Early engagement with Indigenous Peoples, fisheries interests, and other ocean users can help identify potential cumulative effects, conflicts, and shared-use concerns before they occur. Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER promote early, meaningful, and ongoing engagement among operators, Indigenous Peoples, fisheries representatives, and other ocean users during the planning of offshore exploratory drilling activities to support regional cumulative effects management, reduce conflicts among ocean uses, and enhance the co-existence of offshore activities.

Engagement approaches should include:

- engaging Indigenous Peoples early in project planning to identify potential cumulative effects in the ocean space, improve understanding of ecological, cultural, and community values, and incorporate Indigenous Knowledge;

- engaging commercial, Indigenous, and recreational fisheries participants, as well as other ocean users, to identify potential conflicts, co-ordinate activities, and support coexistence and conflict avoidance with fisheries interests;
- developing and implementing communication and co-existence measures to support safe and effective co-ordination among offshore activities; and
- establishing and communicating processes for preventing, reporting, responding to, and compensating for fishing gear interactions, damage, or loss, should they occur.

Theme 8: Gender-Based Analysis Plus

Offshore exploratory drilling can generate employment, training, and economic opportunities throughout Nova Scotia, but the benefits and risks of development may not be experienced equally across populations. A regional approach to GBA Plus can help identify and address systemic barriers faced by Indigenous Peoples, women, persons with disabilities, LGBTQ2I+ individuals, and other underrepresented groups, while promoting more equitable participation in the offshore economy.

Performance indicators related to workforce participation, retention, workplace culture, and community well-being should be monitored and periodically reviewed to inform future policy, regulatory, and program improvements.

Recommendation 8.1: Promote GBA+ and Inclusive Workforce Practices in Offshore Activities

Should exploration drilling projects be proposed in the future, IAAC recommends that the CNSOER, in collaboration with federal and provincial governments and industry, promote the application of GBA+ and inclusive workforce practices in offshore activities to support culturally safe, respectful, and accessible workplaces and address barriers and disproportionate risks that may be experienced by Indigenous Peoples and other underrepresented groups, including women, persons with disabilities, racialized individuals, and 2SLGBTQI+ people.

Where sustained or increased offshore activity occurs across one or more sectors of the Canada-Nova Scotia offshore area, the CNSOER should consider developing a broader GBA+ and Inclusive Workforce Strategy to support long-term workforce development, retention, and equitable participation.

The approach should consider:

a. training, employment, and workforce development measures that support diversity, inclusion, cultural safety, and equitable participation in offshore exploratory drilling activities;

b. guidance for operators and contractors to strengthen diversity, equity, inclusion, accessibility, workplace conduct, and anti-harassment policies and practices;

c. workplace design and operational measures that accommodate diverse workforce needs, including appropriate PPE, accommodations, and safe and private living and sanitary facilities; and

d. reporting and monitoring requirements to evaluate workforce diversity, workplace culture, employee well-being, complaints and incident trends, and the effectiveness of measures implemented to support inclusive and respectful workplaces, while protecting privacy and confidentiality.

Information collected through reporting and monitoring should be used to identify emerging issues and inform continual improvement of workplace policies, practices, and outcomes.

DRAFT

Annexes

Appendix 1-1: Terms of Reference – Table of Concordance

Table 1-1A – Table of Concordance

Objective Noted in the RA Terms of Reference	Section of the Report
Regional context for the Study Area including summaries of: • ecological and biophysical context; • Indigenous context, including traditional and current use and cultural aspects; • human activities and uses; and • socio-economic context.	Section 5.0 specifically: 5.1, 5.2, 5.3, 5.3.1.1, 5.4, 6.5
Description of the purpose and rationale for the RA.	Section 1.1
Description of the existing regulatory regime for oil and gas exploratory drilling.	Section 1.3
Description of the activities for offshore exploratory drilling, including accidents and malfunctions, for which the Regional Assessment would apply.	Sections 3.0 Section 6.10
Description of valued components to consider for exploratory drilling in NS.	Section 6.0
Description of positive and adverse environmental, health, social and economic effects from works and activities on valued components relevant to offshore exploratory drilling in NS.	Section 6.0
Identification of regionally appropriate mitigation measures and monitoring approaches, including: • measures informed by Indigenous Knowledge; • established practices and newly developed or emerging mitigation measures that could enhance environmental protection, and operational safety; and	Section 7.0

• conditions or measures that could inform a potential future proposed exclusion regulation or project-specific oversight requirements.	
Identification of information and knowledge gaps and potential opportunities to address them.	Section 5.5
Completion of a cumulative effects assessment that evaluates how oil and gas exploratory drilling may interact with past, existing and reasonably foreseeable activities and changes to environmental, health, social, and economic conditions within the Study Area.	Section 9.0
Completion of a Gender Based Analyses Plus that will examine how the regional environmental, health, social, and economic effects of offshore exploratory drilling may be experienced differently by diverse groups of people, based on gender and other intersecting identity factors.	Section 10.0
Provide information and analyses to inform a recommendation on whether an exclusion regulation for offshore exploratory drilling would be appropriate in the context of the Study Area	Section 1.3 and throughout the RA Report Also discussed in Section 11.0

Note: Although not specifically noted in the Terms of Reference, this RA also completed a GHG analysis for offshore exploratory drilling. That analysis can be found in Section 8.0.

Appendix 4-1: RA Meeting Summary Tables

Tables 4-1A and 4-1B summarize the meetings between the RA Team and RA participants and Indigenous Peoples, respectively. Each table also provides a high-level summary of the topics discussed throughout the RA. Meeting minutes were approved by the participants prior to posting to the Registry.

Table 4-1A – Meeting Summaries with RA Participants

Date	Meeting Participants	High-level Summary of Main Topics Discussed
April 21, 2026	CNSOER – Fisheries	• Presentation with an overview of the RA, including pre-planning, approach, timeline and next steps

Date	Meeting Participants	High-level Summary of Main Topics Discussed
	Advisory Committee	
April 30, 2026	East Coast Environmental Law	• Scope of the RA and timeline • Potential exclusion regulation • Cumulative effects • Technical Advisory Groups
July 7, 2026	CNSOER – Fisheries Advisory Committee	• Discussed fisheries issues, mitigation and best practices • Discussed knowledge gaps and future research • Discussed engagement and a potential exclusion regulation
July 7, 2026	Environment and Climate Change Canada	• Presentation with an overview of the RA, approach and timeline • Discussed environmental considerations, standards and information gaps • Discussed the review of draft report sections and coordination with ECCC • Discussed a potential exclusion regulation and next steps
July 8, 2026	Fisheries and Oceans Canada	• Presentation with an overview of the RA, approach and timeline • Discussed protected areas, fisheries and marine species considerations • Discussed the review of draft report sections and coordination with DFO • Discussed a potential exclusion regulation and next steps
July 24, 2026	C. Milley (Dalhousie University)	• Presentation with an overview of the RA • Discussed socioeconomic effects and Indigenous Knowledge • Discussed marine spatial planning and cumulative effect • Discussed a potential exclusion regulation
July 24, 2026	Parks Canada	• Presentation with an overview of the RA approach and timeline

DRAFT

Date	Meeting Participants	High-level Summary of Main Topics Discussed
		• Discussed potential effects on Sable Island and marine life • Discussed a potential exclusion regulation and possible conditions • Discussed spills, mitigation and next steps
July 28, 2026	NS Department of Fisheries and Aquaculture	• Discussed potential exclusion regulation and lessons learned from Newfoundland and Labrador exploratory drilling regional assessment • Discussed cumulative effects and fisheries considerations • Discussed the study area, marine protected areas and potential effects on fishing activity
August 13, 2026	Seafood Producers Association of Nova Scotia	• Discussed the RA process, engagement and a potential exclusion regulation • Discussed fisheries interests and important fishing areas • Discussed accidents, spills and cumulative effects • Discussed access to information and next steps
August 18, 2026	Canadian Association of Petroleum Producers	• Discussed lessons learned from the Newfoundland and Labrador exploratory drilling regional assessment and exclusion regulation • Discussed existing knowledge, mitigation measures and fisheries engagement • Discussed climate conditions, GHG emissions, emergency response and emerging technologies • Discussed opportunities for continued engagement on the draft report
August 18, 2026	Parks Canada and Fisheries and Oceans Canada	• Discussed potential effects of exploratory drilling on Sable Island and sensitive species • Discussed DFO science advice and information needs

DRAFT

Date	Meeting Participants	High-level Summary of Main Topics Discussed
		• Discussed future studies, mitigation and potential exclusion regulation conditions
August 21, 2026	Ian Stewart (Dalhousie University)	• Discussed key knowledge gaps and concerns for coastal communities • Discussed spill preparedness, fisheries interactions and socioeconomic effects • Discussed lessons from other jurisdictions and coexistence with fisheries • Discussed community engagement and public understanding
August 24, 2026	Parks Canada and Environment and Climate Change Canada	• Discussed potential effects of exploratory drilling on birds associated with Sable Island • Discussed mitigation and monitoring lessons from Newfoundland and Labrador exploratory drilling regional assessment • Discussed spill modelling, sensitive areas and future research • Discussed potential exclusion regulation requirements and follow-up
August 31, 2026	NS Department of Environment and Climate Change	• Discussed the RA process, objectives, and timelines. • Discussed the role of the CNSOER • Discussed the potential exclusion regulation • Discussed the role of the NS Department of Environment and Climate Change
September 1, 2026	NS Federation of Municipalities	• Discussed municipal interests in the RA • Discussed a potential exclusion regulation • Discussed fisheries, municipal services and local economic effects
September 4, 2026	NS Department of Communities, Culture,	• Discussed archaeological and cultural heritage considerations • Discussed cultural heritage in mitigation and the RA report • Discussed Mi'kmaw consultation and provincial data sources

DRAFT

Date	Meeting Participants	High-level Summary of Main Topics Discussed
	Tourism, and Heritage	
September 8, 2026	Employment and Social Development Canada	• Discussed economic and socio-economic considerations • Discussed workforce, labour mobility and seasonal employment • Discussed community-service pressures and future project planning
September 10, 2026	Health Canada	• Discussed human health and socio-economic considerations • Discussed spills, blowouts and chemical exposure • Discussed mitigation and a potential exclusion regulation • Discussed review of draft RA material
September 21, 2026	Parks Canada and the CNSOER	• Discussed potential exclusion regulation requirements and implementation • Discussed federal coordination and spill-response roles • Discussed Parks Canada recommendations related to Sable Island • Discussed spill modelling and future studies
September 29, 2026	Parks Canada	• Discussed recommendations related to Sable Island • Discussed sensitive areas, mitigation and information gaps • Discussed lessons from Newfoundland and Labrador • Discussed conditions for a potential exclusion regulation
September 29, 2026	Environment and Climate Change Canada	• Discussed ECCC feedback on draft RA material • Discussed mitigation, information gaps and future studies • Discussed potential exclusion regulation conditions • Discussed coordination on emergency response and recommendations

DRAFT

Table 4-1B – Meeting Summaries with Indigenous Communities and Organizations

Date	Indigenous Community / Organization	Meeting Summary
June 3, 2026	NSNWA	• Discussed the RA process • Discussed offshore exploratory drilling vs. offshore development • Discussed the draft Terms of Reference and comment period • Discussed environmental and marine concerns • Discussed Indigenous rights and interests, and gender-based considerations
June 3, 2026	Sipekne'katik First Nation	• Discussed the RA process • Discussed offshore exploratory drilling vs. offshore development • Discussed the draft Terms of Reference, including requested language from the Nation • Discussed environmental and marine concerns • Discussed socioeconomic concerns • Discussed Indigenous rights and interests
June 4, 2026	MAPC / MAARS	• Discussed the RA process • Discussed offshore exploratory drilling vs. offshore development • Discussed the draft Terms of Reference • Discussed concerns regarding short timelines • Discussed exclusion regulations • Discussed marine concerns • Discussed data gaps and cumulative effects • Discussed Indigenous rights and interests Discussed Indigenous Knowledge and Indigenous protocols

DRAFT

June 4, 2026	KMKNO and CMM	• Discussed the RA process • Discussed offshore exploratory drilling vs. offshore development • Discussed RA timelines and concerns regarding short timelines • Discussed exclusion regulations • Discussed Indigenous Knowledge, Two-Eyed Seeing, and their integration into the RA • Discussed environmental, marine, and data concerns • Discussed Indigenous rights and interests.
July 14, 2026	Sipekne'katik First Nation	• Discussed feedback incorporated into the IEPP and Terms of Reference • Discussed conduct phase funding • Discussed presentation by Sipekne'katik First Nation on archaeology, Mi'kmaq history, and culture • Discussed purpose of the RA (recommendations) • Discussed environmental and cultural concerns • Discussed exclusion regulations • Discussed socioeconomic and risk management concerns • Discussed meaningful consultation • Discussed Mi'kmaq Ecological Knowledge Study (MEKS) data gaps.
July 22, 2026	KMKNO	• Discussed KMKNO's comments on the Terms of Reference and how they were addressed • Discussed the study area and marine protected area concerns • Discussed the consultation approach • Discussed RA timelines • Discussed draft RA sections and chapters • Discussed gender-based analysis plus • Discussed cumulative effects

DRAFT

		• Discussed consultant-led analysis • Discussed registry postings of key documents
September 16, 2026	NSNWA	• Discussed GBA Plus, employment and training considerations • Discussed community safety, well-being and Indigenous representation • Discussed cumulative effects, monitoring and accountability • Discussed a potential exclusion regulation and future consultation

DRAFT

Appendix 4-2: Issues Tracking Table

Summary of Issues Raised in the Engagement of the Regional Assessment.

Table 4-2A – Summary of issues raised during engagement and consultation for RA and relevant RA report sections.

Summary of Issues Raised	Indigenous Groups	Stakeholder / Government Public	RA Report Section(s)
Concerns regarding the Regional Assessment timeline and whether sufficient time was available for meaningful participation, review of information, and consideration of findings.	X	X	Section 4
Questions regarding the purpose of the Regional Assessment, its relationship to future project-specific assessments, and the potential use of an exclusion regulation.	X	X	Section 1
Need for meaningful, transparent, and ongoing engagement throughout the Regional Assessment process.	X	X	Section 4
Recognition and protection of Indigenous rights, interests, treaty rights, cultural practices, and Indigenous Knowledge.	X		Sections 5.3.1.1, 5.4, 6.5, 7
Opportunities for Indigenous participation in decision-making, monitoring, follow-up activities, and environmental stewardship.	X		Section 7
Potential effects on fish, fish habitat, fisheries resources, and access to important fishing areas.	X	X	Sections 6.2, 6.5.2, 6.6

Summary of Issues Raised	Indigenous Groups	Stakeholder / Government Public	RA Report Section(s)
Interactions and potential conflicts between offshore oil and gas activities and commercial, Indigenous, and recreational fisheries.	X	X	Sections 6.5, 6.5.1, 6.5.2
Protection of marine protected areas, ecologically significant areas, and sensitive marine ecosystems.	X	X	Section 5.2.6
Potential effects on marine mammals, marine birds, species at risk, and other wildlife.	X	X	Sections 6.2, 6.3, 6.4
Potential effects associated with underwater noise, seismic activities, vessel traffic, lighting, and flaring.	X	X	Sections 6, 6.1, 6.2, 6.3, 6.4, 6.5.1, 6.6, 6.7, 6.9
Risks related to oil spills, blowouts, accidental releases, spill response capacity, and long-term environmental effects.	X	X	Sections 3.2, 6.10, 7
Potential effects on human health and food security associated with contaminants and environmental accidents.	X	X	Sections 6.5.2, 6.8
Climate change implications, greenhouse gas emissions, and alignment with federal and provincial climate commitments.	X	X	Sections 1.5, 4.3.1, 6.1, 8
Assessment and management of cumulative effects resulting from existing and future marine activities.	X	X	Sections 4.3.3., 9
Need for effective mitigation measures, monitoring programs, adaptive management approaches, and follow-up requirements.	X	X	Sections 7, 8.6.4, 8.7

DRAFT

Summary of Issues Raised	Indigenous Groups	Stakeholder / Government Public	RA Report Section(s)
Data gaps, scientific uncertainty, baseline information needs, and the need for additional research and monitoring.	X	X	Sections 5.5, 6.3, 7.1
Availability, accessibility, quality, and integration of scientific data, socioeconomic information, and Indigenous Knowledge.	X	X	Sections 4, 5.4
Potential socioeconomic effects, including employment, training, procurement opportunities, community well-being, and local economic benefits.	X	X	Sections 6.5, 6.5.1, 6.5.2, 6.6, 6.7, 6.8
Potential impacts of environmental accidents on seafood markets, industry reputation, and coastal communities that depend on fisheries resources.	X	X	Section 6.6
Consideration of Gender-based Analysis Plus (GBA+) and potential effects on diverse populations and communities.	X	X	Sections 4.3.2, 5.3
Protection of cultural heritage resources, archaeological sites, shipwrecks, and culturally significant areas.	X	X	Sections 6.5.2, 7
Regulatory oversight, accountability, roles and responsibilities of governments and regulators.	X	X	Section 1

DRAFT

Appendix 5-1: Marine Mammals Occurring in/near the Study Area

Table 5-1A – Marine Mammals Occuring in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
Baleen Whales				
Baleen whales in the Study Area are most commonly observed during the spring, summer, and autumn when prey concentrations increase on the Scotian Shelf and slope. Shelf-break habitats, oceanographic fronts, and submarine canyons are important feeding areas for many species. Most undertake seasonal migrations between lower-latitude wintering areas and higher-latitude feeding areas, though all species have been reported in eastern Canadian waters throughout the year.				
Blue Whale (Atlantic population) (*Balaenoptera musculus*)	Endangered	Endangered	• Knowledge of distribution and movement varies with location, and migratory routes are not well known. • In general, distribution is driven largely by food availability with observations in water with high abundance of krill. • In the North Atlantic Ocean, their range extends from the subtropics to the Greenland Sea and they have been sighted and acoustically detected throughout waters off eastern Canada the eastern United States.	• Year-round presence in the offshore waters of Nova Scotia including coastal waters and open ocean: Eastern Scotian Shelf Canyons, with high sighting rates at The Gully/ the Emerald Basin. • Potential offshore foraging areas include the continental shelf edge of Nova Scotia. • Typically breed in winter in the western North Atlantic although location of breeding grounds is not well known.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			• Some individuals remain in northern latitudes year-round. • Calving grounds are further south, possibly in the Mid-Atlantic Bight.	• Wintering areas may include the Scotian Shelf. • The Study Area includes some of the areas that have been identified as important habitat for the Atlantic blue whale population.
Fin whale (Atlantic population) (*Balaenoptera physalus*)	Special Concern	Special Concern	• Typically found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes but occur throughout eastern Canadian waters, including in coastal waters, on-shelf waters, and slope waters. • Occur year-round in a wide range of locations, but the density of individuals in any one area changes seasonally. • Most migrate from the Arctic and Antarctic feeding areas in the summer to tropical breeding and calving areas in the winter; however location of winter breeding grounds is not known.	• Present around a variety of bathymetric features from the continental shelf to deep canyons in the Gulf of St. Lawrence to shallow areas with high topographic relief in the Bay of Fundy; also common throughout the year in the Gully and throughout the Study Area. • Present year round off the Atlantic coast of Canada, which suggests that courtship, mating and potentially calving occur here (a high number of fin whale mating calls heard in this area during the winter supports this). • Scotian Shelf suggested to be an important wintering area for this species;

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			• Travel mainly in the open seas, away from the coast. • Occurrence is associated with productive oceanic fronts and high densities of schooling fish and crustaceans (especially krill).	allowing for foraging outside of the typical feeding season (Spring to fall).
Humpback whale (Western North Atlantic population) (*Megaptera novaeangliae*)	Not at Risk	Not at Risk	• Coastal with observations offshore throughout the Scotian Shelf and slope areas. • Movements regularly linked to prey availability (krill and small schooling fish). • Undertake yearly migration from southern wintering/breeding/calving grounds in the summer (Gulf of Maine, Atlantic Canada, Greenland). • Breeding occurs near the Antilles.	• June through to October (peak occurrence in July – August). • Singing and mating behaviour has been observed in feeding grounds throughout Atlantic Canada in late summer as well as fall and winter.
Minke whale (North Atlantic species) (*Balaenoptera acutorostrata*)	No Status	Not at Risk	• Mainly distributed over the continental shelf (especially Middle Bank), sometimes congregating in large groups.	• Sighted year-round in the eastern coastal waters off Nova Scotia.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			• Winter migration to southern Atlantic temperate and tropical waters to mate and have calves.	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Endangered	• Range from the southeastern United States up to Atlantic Canada, including New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland, and Québec. • In eastern Canada, NARW sightings occur year-round, with the exception of March, and NARW upcalls are detected through acoustic monitoring efforts in all months, though infrequently from December through March • The important habitat for feeding, reproduction, rearing, socializing and socialization is comprised of the southern and northwestern Gulf of St. Lawrence, including the Jacques-Cartier Strait and entrance to Chaleur Bay;	• Present year-round (presence is lowest in winter, increases in spring and summer, and peaks in the fall). • Scotian Shelf and adjacent offshore habitats form part of the broader seasonal range and migratory corridor. • Found mainly coastal waters: particularly Outer Bay of Fundy and Roseway Basin EBSA. There is strong evidence that mating grounds for this species are the Gulf of Maine (November – January). • The adjacent Bay of Fundy (near Grand Manan Island) and Roseway Basin had been identified as critical habitat. A shift in the distribution of NARW has been observed since 2015,

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			the Scotian Shelf, especially Emerald and Roseway Basins; the Bay of Fundy; and the Canadian portions of Georges Bank and the Gulf of Maine. The important habitat also includes corridors for migratory movements and habitat connectivity, namely, the Laurentian Channel, Cabot Strait, and the eastern portion of the Scotian Shelf. • Calving grounds are further south; near Florida, Georgia and possibly Carolinas.	with individuals being sighted more frequently in the southern Gulf of St Lawrence during spring, summer, and fall, due to changes in their preferred prey. Consequently, historical distribution may not be reflective of current and future distribution.
Sei whale (Atlantic population) (*Balaenoptera borealis*)	Under Consideration for Addition to Schedule 1	Endangered	• Found in pelagic (open sea) waters • Unlike other large whales with highly reliable migratory habits, sei whales show an unpredictable distribution. • Widely distributed in subtropical, temperate, and subpolar offshore waters, migrating between high-latitude summer feeding	• Common both along the Scotian Shelf and in the Bay of Fundy, based on reported sightings and acoustic detections. • Present seasonally, peaking in summer • Some individuals occur year-round in Atlantic Canada.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			grounds and low-latitude winter areas. • Spatially associated with major mixing zones and eddies formed at oceanographic fronts, topographic features and major ocean currents. • Calving occurs in warmer waters in winter; no clear breeding/calving aggregations have been identified for this species.	
Toothed Whales (Odontocete)				
Odontocete distribution varies according to habitat preference. Dolphins and harbour porpoises are generally associated with shelf and slope waters, whereas sperm whales, northern bottlenose whales, and beaked whales are more closely associated with deep-water habitats along the Scotian Slope, shelf edge, and submarine canyons.				
Beluga whale (St. Lawrence Estuary population) (*Delphinapterus leucas*)	Endangered	Endangered	• Isolated population found specifically in the St. Lawrence River Estuary • Mating and calving grounds are located in the St. Lawrence Estuary.	• Rare though sometimes sighted close to NS.
Blainville's beaked whale (*Mesoplodon densirostris*)	No Status	Not at Risk	• Located in deep waters. • Distribution around Atlantic Canada is poorly understood; appear to reach	• One sighting by DFO in The Gully. • Rare in Nova Scotia.

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			their northern range limit in the Western North Atlantic.	
Cuvier's beaked whale (*Ziphius cavirostris*)	No Status	Not at Risk	• Deep water species. • Inhabit deep offshore waters across tropical, subtropical, and temperate zones of the Atlantic Ocean. • In the western North Atlantic, strandings have been reported from Nova Scotia but distribution around Atlantic Canada is poorly understood.	• Common in the Gully and in deep slope waters throughout the region year-round, and present more sporadically in shallow waters.
Killer whale (Northwest Atlantic and Eastern Arctic population) (*Orcinus orca*)	No Status	Special Concern	• Located in inshore waters usually in mixed family groups. • Specific habitat requirements for the Northwest Atlantic population are not well known.	• Occasional sightings between NS and NL.
Long-finned pilot whale (*Globicephala melas*)	No Status	Not at Risk	• Widespread off Nova Scotia, commonly occurring throughout the waters of the Scotian Shelf and slope.	• During winter and spring, or outside of inshore seasonal aggregations, this species moves into deeper offshore oceanic waters and along the continental slope where they are known to inhabit

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			• Cape Breton Trough is a known calving ground for this species. • Travel in large groups in in both nearshore and pelagic waters.	the shallower portions of the Gully.
Northern bottlenose whale (Scotian shelf population) (*Hyperoodon ampullatus*)	Endangered	Endangered	• Lives almost exclusively in deep waters along the edge of the continental slope off Nova Scotia. • Continental slope waters ranging between 400-3,200 m deep have been identified as important habitat for the species.	• Present year-round (peak in spring – summer) in deep water habitats of the eastern Scotian Shelf, including The Gully, Shortland Canyon, and the Haldimand Canyon which constitute designated critical habitats. Additional habitat between and adjacent to these canyons has also been identified as important habitat.
Pygmy sperm whale (*Kogia breviceps*)	No Status	Not at Risk	• Deep water species found on continental slopes. • Prefers temperate and tropical waters.	• Uncommon, occasional visitor in Nova Scotia waters, with northernmost western Atlantic records documented primarily through rare strandings on Sable Island and other coastal areas, as well as acoustic detections of

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
				assumed Kogia clicks on deep-water recorders.
Sperm whale (*Physeter macrocephalus*)	No Status	Group 2 – Mid Priority Candidate	• In Nova Scotia, primarily inhabit deep waters along the edge of the continental shelf and large submarine canyons (with occasional on-shelf sightings). • Found generally in waters deeper than 1,000 m along the continental slope, with occasional movements into shallower shelf regions. • Individuals seen around the Scotian Shelf region are almost exclusively males.	• Sightings concentrated on the shelf edge and the Gully. • Acoustically detected throughout the year.
Sowerby's beaked whale (Mesoplodon bidens)	Special Concern	Special Concern	• Range in Eastern Canada stretches from southern Nova Scotia up to Newfoundland and Labrador. • Preference for deeper, offshore waters. • Breeding and calving areas are not known. • Known to frequent waters near southern NS, off Georges Bank and just	• Deep waters along the continental shelf edge and slope, particularly the Eastern Scotian Shelf Canyons (Gully, Shortland and Haldimand canyons). • High sighting rates in the Gully and the Scotian Slope. • Present year-round.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			south of the Fundian Channel. • Sighting rates in Canadian waters (specifically in submarine canyons of the eastern Scotian Slope) have been increasing since the early 2000s; suggesting increased use of submarine canyons by this species.	
True's beaked whale (Mesoplodon mirus)	No Status	Group 3 – Low Priority Candidate	• Found in temperate waters. • Distribution around Atlantic Canada is poorly understood; the species appears to reach their northern range limit in the Western North Atlantic.	• In Nova Scotia the species inhabits deep, warm temperate offshore waters, with their presence primarily documented through rare strandings and acoustic detections along the Scotian Shelf.
Atlantic spotted dolphin (Stenella frontalis)	N/A	N/A	• Found in warm, temperate areas. • The northernmost point of their range is off the coast of New England but can potentially move into the lower Bay of Fundy.	• Rare in Nova Scotia waters, as they prefer warm temperate, subtropical, and tropical regions. • If present usually seasonally (summer and fall) when warm-core rings from the Gulf Stream push north toward the Scotian Shelf.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
Atlantic white-sided dolphin (Lagenorhynchus acutus)	No Status	Group 3 – Low Priority Candidate	• Span from Georges Bank to the lower Bay of Fundy from June – September; may represent multiple genetically distinct populations. • Only found in the North Atlantic; • Often associated with other toothed and baleen whale species.	• Present year-round throughout the region.
Common bottlenose dolphin (Tursiops truncatus)	No Status	Not at Risk	• Found in coastal waters and over continental shelves in areas with concentrations of fish and squid. • Nova Scotia marks the northern boundary for the offshore ecotype of this species in the western Atlantic.	• Found primarily in deep, offshore waters at the northern limit of their western North Atlantic range. • Occasionally sighted in Gully and other areas within the Study Area. • Frequently observed during warmer summer and autumn months when surface water temperatures rise into their preferred temperate range although this could be biased by survey efforts that occur

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
				largely in the summer and fall.
Harbour porpoise (Northwest Atlantic population) (Phocoena phocoena)	No Status	Special Concern	• Range from Bay of Fundy to Baffin Island although densities are notably lower along Nova Scotia's open southern Atlantic coast compared to the inner and lower Bay of Fundy. • Found in shallow coastal waters and continental shelves; occasionally in deeper waters.	• Present year-round with concentration in summer (July to September) in shallow coastal waters.
Risso's dolphin (Grampus griseus)	No Status	Not at Risk	• Found in deep waters, along the continental shelf and the continental slope off the coast of Nova Scotia • Considered rare (at the northern limit of their range)	• When present, most frequently sighted during the summer and autumn months (when almost all search effort occurs) in offshore Canadian Atlantic waters
Short-beaked common dolphin (*Delphinus delphis*)	No Status	Not at Risk	• Widely distributed in sub-tropical to temperate waters and range from nearshore to far offshore. • In the western North Atlantic, they are often associated with the Gulf Stream current.	• Found in coastal waters and offshore areas of Nova Scotia , especially in warmer months. • Known to inhabit areas within the Study Area, such as the Gully where they are

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			• Usually associated with warm water temperatures.	mainly in deeper waters to the south of the canyon.
Striped dolphin (*Stenella coeruleoalbalI*)	No Status	Not at Risk	• In Canadian waters are found in the western North Atlantic ranging from Nova Scotia south toward Jamaica and the Gulf of Mexico, though they are considered uncommon in Canadian waters • Primarily located in offshore waters.	• In NS, the species is typically found far offshore in deep continental slope waters and warm currents. • Occasionally sighted in areas of the Study Area, such as the Gully.
Seals (Pinnipeds)				
Hooded seal (Cystophora cristata)	N/A	Group 1 – High-Priority Candidate	• Deep-water seasonal visitors in Nova Scotia's coastal waters rather than permanent residents or primary breeding population • Not usually found south of the Gulf of St. Lawrence but more common on the Atlantic coast of NS (particularly Sable Island). • Nova Scotia sits at the outer/southern edge of the range for this species, but it is noted that they are migrating northward in	• Present seasonally in late winter and spring as they migrate past Atlantic Canada.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			search of food due to changes in water temperature due to climate change. • Do not maintain regular breeding colonies or permanent resident populations on Nova Scotia's shores or on Sable Island	
Ringed seal (Pusa hispida)	N/A	N/A	• Rare but occasionally observed on Sable Island. • Life cycle is closely linked to available sea ice. • Circumpolar distribution, with occasional vagrant sightings south of the seasonal ice zone.	• Past scientific records note occasional observations of ringed seals on Sable Island
Harp seal (Phoca groenlandica)	N/A	High-Priority Candidate	• Not usually found south of the Gulf of St. Lawrence but more common along the Atlantic coast of NS (particularly Sable Island) in the 1990s. • Seals from the Northwest Atlantic population—which breed off Newfoundland, Labrador, and the Gulf of St.	• Seasonal visitors in Nova Scotia waters, appearing mostly offshore and along the northern Scotian Shelf during winter and spring.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			Lawrence—travel south into the cooler offshore waters of the Scotian Shelf in winter and spring. • Prefer deep, cold, offshore marine areas. r	
Grey seal (Halichoerus grypus)	N/A	N/A	• Found along the shores of the North Atlantic Ocean. • Preference for areas where water depths are less than 100m deep.	• Concentrated heavily on Sable Island, which hosts the largest breeding colony in the world • Present year-round. • Outside the winter breeding season (December to February), seals disperse widely across the Scotian Shelf and into surrounding Atlantic waters.
Harbour seal (Atlantic and Eastern Arctic subspecies) (Phoca vitulina)	N/A	N/A	• Found along temperate and Arctic marine coastlines of the Northern Hemisphere • Widely distributed along the coastal waters, islands, and estuaries of Nova Scotia. • Most common seal species along the mainland coast of Nova Scotia • Normally associated with coastal areas, isolated	• Present year-round. • Sable Island is a breeding ground and home to a distinct, localized sub-population of harbour seals.

DRAFT

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
			sandy beaches, small islets, rocks and reefs exposed at low tide.	

Note: Table adapted from the Regional Assessment of Offshore Wind Development in Nova Scotia Committee (2025)

Sources: Bartha et al., 2011; Beauchamp et al., 2009; Bowen et al., 2003; Bowen and Harrison, 2007; Breeze et al., 2002; Bundy et al., 2014; Cole et al., 2013; Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia, 2025;COSEWIC, 2006c, 2008b, 2018, 2019b, 2019c, 2019d, 2019e, 2023, 2026; Davis et al., 1998, Delarue et al., 2018; DFO, 1998, 2011a, 2011b, 2012b, 2014, 2016, 2017, 2018c, 2019, 2026a; Duengen et al. 2022; Feyrer et al., 2024; Gowans and Whitehead, 1995; Hammill et al., 2010; Ingram et al., 2007; Jourdain et al., 2019; Keller et al., 2012; Kennedy et al., 2013; King et al., 2016; Lawson and Stenson, 1995; Lawson and Stevens, 2013; Lesage et al., 2017; Lucas et al., 2003; McAlpine et al., 2024; Moors-Murphy et al., 2025; NOAA, 2007b, 2014, 2015, 2016a, 2016b, 2017, 2020a, 2020b, 2020c, 2020d, 2020e, 2022a, 2022b; NOAA, 2026a, 2026b; Olson, 2009; Ottensmeyer and Whitehead, 2003; Ramp et al., 2024; Ratelle et al., 2025; Servidio et al., 2019; Stanistreet et al., 2026; Vacquié-Garcia et al., 2024; Vanderlaan and Moors-Murphy, 2025; Waring et al., 2011; Westgate and Read, 2007; Whitehead et al., 1992; Whitehead, 2013; Wingfield et al., 2022; Zwamborn and Whitehead, 2016.07; Whitehead et al., 1992; Whitehead, 2013; Wingfield et al., 2022; Zwamborn and Whitehead, 2016.

DRAFT

Appendix 5-2: Sea Turtles Occurring in/near the Study Area

Table 5-2A – Sea Turtles Occuring in/near the Study Area

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
Leatherback Sea Turtle (Atlantic population) (*Dermochelys coriacea*)	Endangered	Endangered	• Extensive geographic range spanning open ocean and coastal waters from sub-polar regions to tropical nesting beaches • Does not nest in Canada.	• Frequently occurs offshore Nova Scotia during summer and fall (June to November with peak occurrence July to October), where it forages on jellyfish. • Commonly observed along the Scotian Shelf edge, slope, Laurentian Channel, Georges Bank, and St. Anns Bank.
Loggerhead Sea Turtle (*Caretta caretta*)	Endangered	Endangered	• Worldwide in subtropical and temperate waters across the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea.	• Regular seasonal visitor (June - November) • Typically found offshore along the shelf break and slope in waters warmer than ~18°C.
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	Not listed	Not listed but globally considered critically endangered	• Primarily in the Gulf of Mexico and along the Atlantic coast of the United States up to Nova Scotia.	• Rare and infrequent in Nova Scotia waters, usually occurring further south • Juveniles occasionally observed and sometimes stranded in Atlantic Canada

Species Name	SARA Status	COSEWIC Status	Distribution	Presence in/near the Study Area
				• Summer and fall (July to October)
Green Sea Turtle (*Chelonia mydas*)	Not listed	Not listed but globally considered critically endangered	• Throughout tropical, subtropical, and temperate waters across the globe.	• Rare in Nova Scotia waters • Occasional observations recorded on the Scotian Shelf, primarily juveniles during the warmer months • Summer and early fall (July to October).

DRAFT

Appendix 7-1: Mitigation Measures

Table 7-1A – Mitigation measures for offshore oil and gas exploratory drilling in the Study Area

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
GENERAL ACTIVITIES			
1	Project siting and layout	Implement the following mitigation measures to site project infrastructure in ways that avoid adverse effects to fish, fish habitat, marine plants,[56] Indigenous groups, commercial fisheries, birds and bats and other ocean users: • Avoid or minimize disturbance to sensitive species, sensitive habitats, and high-use areas through project siting, routing, and design to the extent possible. The following habitats and species to consider are discussed in Section 5 and should be identified during pre-planning through collection of baseline data:	Sensitive habitats may include: • Ecologically Significant Areas (ESAs), • Ecologically and Biologically Sensitive Areas (EBSAs), • Significant Benthic Areas (SiBAs), • Marine Protected Areas (MPAs), • National Marine Conservation Areas (NMCAs), • Areas of Interest (AOIs) for future Oceans Act MPAs, • Marine Refuges (MRs), • Indigenous Protected and Conserved Areas (IPCAs), • Important Bird Areas (IBAs) and Key Biodiversity Areas (KBAs), • Other Conserved and Protected Areas,

[56] For clarity, the terms fish, fish habitat, and marine plants used in this table, have the same respective meanings as defined in the *Fisheries Act.* Unless otherwise specified, 'fish' includes parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		○ important or sensitive benthic habitats, corals, sponges, sea grass beds and other submerged aquatic vegetation, ○ important and critical habitat for species at risk, ○ important commercial fish habitat, ○ important fish spawning, feeding, and migration areas, ○ important bird and bat foraging, staging, and migrations areas. • Perform a seabed investigation study prior to well drilling to determine if the above listed habitats are present. • Meet the outcomes and specific requirements established by the Accord Acts and Framework Regulations[57], using appropriate standards, equipment, procedures and controls.	• Areas identified in the Draft Scotian Shelf–Bay of Fundy Network Plan, including areas whose boundaries are confidential, preliminary or unpublished • Bird and bat migration or movement corridors and staging, moulting, roosting, foraging and breeding areas, • Identified important and critical habitat for species listed under the SARA. Habitat sensitivity analysis may include: • species density, distribution, and habitat modeling, • pre-spud wellsite surveys (to avoid corals and sponges), • conduct an imagery-based seabed survey in the vicinity of well sites to identify potential environmental sensitivities, • high-resolution seafloor mapping (e.g., multibeam bathymetry, backscatter) • collecting oceanographic data, • interpretating seabed geology and characterizing habitat,

[57] Framework Regulations refer to Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		• Monitor meteorological, oceanographic and ice conditions constantly and consider forecasting in planning and decision-making throughout the life of an offshore exploratory drilling project. • Prior to any drilling activity, operators will conduct a comprehensive regional geo hazard baseline review, followed by a detailed geo-hazard assessment for each proposed wellsite, to satisfy the requirements of the Framework Regulations. • Position wellhead where it will have the least impact on sensitive marine life of concern–avoiding shallow geological hazards (Oak, 2020).	• assessing benthic community structure (based on seabed photos and grab samples), • bottom current and sediment dynamics modeling, • cumulative exposure modelling. Although prepared for Newfoundland and Labrador the Regional guidance on measures to protect corals and sponges during exploratory drilling - Canada-Newfoundland and Labrador Offshore Area and the Coral and Sponge Mitigations in Relation to Exploratory Drilling Programs in the Newfoundland and Labrador Region provides guidance on protection methods for corals and sponges, regulatory requirements, investigatory surveys, avoidance and mitigation, and follow up and monitoring options.
2	Project schedule	Schedule site activities, where possible, in coordination with commercial fishers, Indigenous groups, relevant federal authorities such as ECCC and DFO, scientific surveyors and other ocean users, to minimize effects to other ocean activities and to avoid sensitive	See Measure ID 3 below

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		periods for fish, birds, and bats, to the extent possible. To the extent possible, maintain buffers around sensitive habitats and periods, including: • important fish, invertebrate, marine mammal, and sea turtle migration, spawning, breeding, or foraging windows, • important bird and bat migration, breeding, staging, moulting, or marine mammal pupping periods, • important fishing and harvesting seasons, for Indigenous groups and commercial fishers, including for communal commercial, food, social and ceremonial (FSC) and moderate livelihood fisheries.	
3	Personnel safety zones	Define and manage safety zones in consultation with the CNSOER, CCG, and TC to maintain safety while allowing fishing and navigation operations where feasible. Provide navigational aids, mapping, safety information, and notifications,	In collaboration with the CNSOER, TC, CCG, DND, DFO, and IAAC, discuss and coordinate spatial configuration of well locations, vessel transit routes, and safety zones. Consider:

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure

		including training, upon request, to Indigenous groups, commercial fishers and all other ocean users to ensure safe operations and navigation in the vicinity of the project area. and, upon request, provide training.	• safety zones that are managed by:
			  o guard / safety vessels,
			  o virtual and physical automatic identification system transmission, monitoring and alerts,
			  o alarms, and
			  o buoyed project activity area.
			• Navigational aids may include:
			  o virtual and physical automatic identification systems,
			  o radar,
			  o obstruction charts,
			  o fog signals,
			  o very high frequency communication,
			  o lighting and marking,
			  o enhanced cell coverage,
			  o guard zones,
			  o early warning systems,
			  o buoyed project activity areas.
			
			More information can be found at Navigational Warnings and Notices.
			Safety information may include:

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
			• notices and communication to vessel operators of changes in navigation, • training and information for Indigenous and commercial fishers on safe operations in proximity to project activity areas, including navigation, gear handling, and emergency procedures. More information can be found in CCG's Notices to Mariners 1 to 46.
4	Vessel activity	Implement, at a minimum, the following mitigation measures to control vessel and aircraft activity from the project, as appropriate, to mitigate adverse effects to fish, birds, and bats as well as to reduce conflict with Indigenous fishers, commercial fishers, and other ocean users: • Plan vessel routes to avoid high-use areas and sensitive marine mammal and sea turtle habitats, migratory corridors, and breeding or foraging areas, to the extent possible. • Plan vessel and aircraft routes (e.g., ships, marine drones, aircraft, aerial drones) to avoid areas with high bird densities,	More information can be found in CCG's Notices to Mariners 1 to 46.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		seabird colonies, and known migration routes and bottlenecks, to the extent possible. • Avoid low-level aircraft operations and specify minimum heights/distances near important bird areas (e.g., Sable Island). • Implement vessel management measures that include speed restrictions in areas or periods of elevated risk (i.e. to marine mammals and sea turtles, high concentration of birds and bats), minimize non-essential traffic, nighttime trips and/or artificial lighting, • Minimize vessel traffic and operate at low speeds during periods of high concentrations of sensitive marine mammals and sea turtles, birds or bats by: o maintaining minimum approach distances (e.g., 400–500 m) and o limiting vessel activity to defined areas where feasible.	

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		• Coordinate project activities to reduce vessel trips and interaction risks. • Routinely inspect navigational systems to confirm system is working as intended.	
5	Communication and coexistence plans	Through engagement with Indigenous groups, commercial fishers, scientific surveyors and other ocean users, integrate Indigenous Knowledge and knowledge from the fishing industry, identify potential conflicts of use between other users and the project, and establish a clear communication plan and safety measures to minimize effects. The plans shall include: • Plans and protocols to be developed with Mi'kmaw fisheries organizations that reach communal commercial, FSC and moderate livelihood harvesters, not only licence holders represented through commercial fishing associations. • Development of a *Fisheries Communication Plan* to share project information, schedules, and safety updates with	Engagement with relevant groups will be an important factor for the successful implementation of this mitigation measure. The CNSOER will require communication, and engagement plans as part of their authorizations.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		Indigenous groups, commercial fishers, and other ocean users throughout drilling, testing and abandonment. • Develop an ongoing engagement plan with Indigenous groups and commercial fishers throughout the drilling program, including timely mechanisms for addressing concerns, including loss or damage of fishing gear attributed to the activity and adjusting mitigation strategies.	
6	Economic compensation	Adhere to the applicable CNSOER Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity.	Any damage or loss associated with oil and gas activities should be reported as per the CNSOER's Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity. These guidelines are for petroleum-related activities and assist property owners and those working in the fishing industry who may experience economic loss resulting from a spill or debris.
7	Well abandonment	Per the Framework Regulations, development and implementation of a well and wellhead abandonment plan and submission to the CNSOER for	Approval to Alter the Condition of a Well before any operator can re-enter, workover, complete, suspend, or abandon an offshore well is required by the CNSOER.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		acceptance at least 30 days prior to abandonment of each well. If wellhead abandonment may interfere with fisheries, the plan must be developed considering the views of commercial fishers and Indigenous groups, including Mi'kmaw communal commercial, FSC and moderate livelihood harvesters.	
FISH, FISH HABITAT, AND MARINE PLANTS			
8	Artificial Lighting	• Use light types with reduced penetration through water to lessen adverse effects on fish migration, spawning, and foraging where safe and practicable. • Limit lighting during operations to the minimum levels required for safety and regulatory compliance (e.g., removing excess lights, using directional fixtures, and applying controls to reduce light intensity) to reduce attraction or disorientation of marine species. • Consider using lighting with long-wavelength sources that	

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		have reduced effects on sea turtles where safe and practicable.	
9	Drill cuttings	Return of synthetic-based drilling mud (SBM) drill cuttings to the drill rig for treatment in accordance with relevant guidelines and requirements before their below surface discharge to the marine environment. Dispose of spent or excess sSBMs that are not re-used at an approved onshore facility. Measure the concentration of SBM retained on discharged drill cuttings for each well as described in the *Offshore Waste Treatment Guidelines* to verify that this meets the relevant performance targets and report the results to the CNSOER.	Complete adequate and appropriate modelling of drill cuttings dispersion to inform monitoring program design.
10	Underwater noise	Implement the following mitigation measures to avoid disturbance, harassment, harm, injury or mortality of fish (including marine mammals and sea turtles), including physiological and behaviour changes (e.g., deterrence, disruption of communication, migration, spawning, and foraging distributions) due to	If vertical seismic operations are occurring, follow the most recent available version of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment as well as any applicable enhanced measures described in the reviews conducted in 2015 and 2020. Options for reducing underwater noise may include:

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		underwater noise generated from the project: • reduce underwater noise from vessels by limiting non-essential vessel traffic. • Plan and coordinate drilling, vessel and other noise-generating activities to minimize, where practicable, the duration and intensity of underwater noise and unnecessary concurrent noise-generating activities, without compromising operational or safety requirements. • During vertical seismic profiling (VSP), establish and monitor an appropriate safety zone around the seismic air-source array. Where the applicable shutdown criteria are met, including the detection of marine mammals or sea turtles, for which shutdown is required within the safety zone, cease operations of the seismic air-source array, where it is safe to do so.	• setting operational noise limits, • using vibration isolators and quiet machinery, • reducing vessel speeds during sensitive times of the year. Refer to DFO's Canada's Ocean Noise Strategy and Transport Canada's Understanding Anthropogenic Underwater Noise. Follow guidance and thresholds based on the current state of scientific knowledge and the best available information sources (e.g. Popper et al. 2014; Southall et al. 2019; NOAA 2024), other international best practices, or the most current Canada approaches to compare against ecological data on species distribution and important habitats.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		• Use a soft-start/ramp-up procedure before commencing VSP air-source operations and when restarting the air-source array following a shutdown or interruption, in accordance with applicable seismic-survey mitigation requirements. • Prior to conducting VSP, develop and implement a marine mammal and sea turtle monitoring and mitigation plan that establishes applicable safety zones; visual and, where appropriate, passive acoustic monitoring requirements; air-source start-up/ramp-up and shutdown procedures; and procedures for documenting marine mammal and sea turtle observations and implementation of mitigation measures.	
11	Seawater withdrawal and water intakes	Where a drilling unit, vessel or support facility withdraws seawater and there is potential for the entrainment or impingement of fish, install and operate fish screens or equivalent protective technology	Refer to DFO's Water intake end-of-pipe fish screens standards.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		throughout water withdrawal, where technically applicable.	
12	Introduction or propagation of exotic and invasive species	Implement the following mitigation measures to avoid the introduction or propagation of exotic or invasive species within the project area: • ensure all watercraft and equipment, including ballast water, are clean and free from plants, animals, sediment, or slime before entering Canadian waters. • inspect and, to the extent possible, remove any hitchhiking organisms and dispose of them safely before entering Canadian waters. • provide training for all vessel operators and staff on identification, prevention, and reporting of aquatic invasive species to ensure consistent implementation and best practices. • maintain records of watercraft and equipment use, cleaning, and exotic and aquatic invasive	Per DFO advice, options to avoid the introduction or propagation of exotic or invasive species within the project area may include: • clean, drain, dry, and decontaminate watercraft and equipment with high-pressure, hot-water spray (i.e., 68 °C at 1600 psi for 15 seconds) or use disinfectants. Cleaning and draining should be completed on land, away from any waterbody. Watercraft and equipment should be completely clean and dry before entry into a different waterbody. • small pieces of equipment can be cleaned and decontaminated by being submerged in: o hot water (60 °C for 5 min). o sodium hypochlorite (0.25% concentration for 20 min.); o Virkon (4% for 90 min.); o or quaternary ammonium compounds (0.4% for 10 min.) • use of logbooks.

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		species observations to support compliance and traceability. • implement applicable ballast-water and biofouling management measures to minimize the introduction and spread of aquatic invasive species by project vessels, drilling installations and equipment, and establish procedures for documenting and reporting suspected introductions to the appropriate authority.	
13	Marine mammal, sea turtle, and shark collisions	To prevent and reduce risks of collisions between all project vessels with marine mammals, sea turtles, and sharks: • require all project vessels to use established shipping lanes, where they exist • during VSP surveys, use trained Marine Mammal Observers, infrared detection, and/or passive acoustic monitoring to detect marine mammals, sea turtles, and sharks to maintain	See Smith et al. 2026 for guidance and information: Smith H.R., Moors-Murphy, H.B, and Lawson, J.W. 2026. Recommended standards for marine MMOs and PAM operators engaged during offshore geophysical surveys in Canada: qualification, training, data collection, and reporting. Available at https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41330730.pdf MMOs and PAM operators should adhere to the standards outlined in *Recommended standards for marine mammal observers (MMOs) and passive acoustic monitoring (PAM) operators*

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		safety zones, except if not feasible for safety reasons, and guide shutdown or avoidance actions during low visibility or night operations. • require all project vessels to reduce speeds to maximum 12 knots during transit to/from the project; maximum 10 knots within the project area; and to 7 knots when a whale or sea turtle is observed or reported within 400 m of the vessel (except if not feasible for safety reasons) unless alternative measures are indicated by DFO.	*engaged during offshore geophysical surveys in Canada: qualification, training, data collection, and reporting.*
14	Marine mammal, sea turtle, and shark observations	Implement, to the extent possible, near real-time vessel-based reporting and data sharing on marine mammal, sea turtle and shark sightings to enhance situational awareness among vessels and share sighting and monitoring results with Mi'kmaw communities in accessible forms.	
AEROFAUNA (BIRDS AND BATS)			
15	General activities that	Plan and coordinate drilling and associated activities to minimize, where practicable, the spatial extent,	Focus on project activities, components, stressors, and periods with the greatest potential for adverse effects to birds and bats.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
	may disturb birds and bats	duration, and intensity of disturbances to birds and bats during activities, including: • Consider the seasonal presence and distribution of birds and bats when planning project activities. • Where practicable, avoid or minimize disturbance during sensitive periods and in areas supporting significant concentrations or birds. • Implement appropriate measures to minimize attraction of birds and bats to project lighting and other project infrastructure, where a potential interaction has been identified.	Coordinate with relevant federal authorities and experts regarding timing project activities to avoid and minimize effects on birds and bats. Scheduling of work should consider bird and bat migration windows, weather and abiotic conditions that increase risk, and relevant nocturnal versus diurnal activity patterns for species expected at the project site.
16	Flaring	Implement, at a minimum, the following mitigation measures to avoid adverse effects to migratory birds when flaring: • Avoiding or minimizing flaring (frequency and duration), and the use of high efficiency burners where flaring is required. • Notification of the appropriate authorities (i.e. CNSOER) of any plans to flare, including to	Refer to IAAC's standard mitigation measure for Migratory birds – Scheduled maintenance flaring.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		determine whether the flaring would occur during a period of migratory bird vulnerability and to determine how to avoid adverse environmental effects on migratory birds. • Flaring as early as possible during daylight hours, and installation and operation of a water curtain around the flare. • When flaring occurs, have a dedicated Seabird Observer monitor and document bird behaviour around the flare, and assess the effectiveness of flare shields and water curtains in mitigating flare-bird interactions, as applicable. • Minimize the number of flaring events, to the extent feasible, during nighttime and poor weather conditions, as well as during seasonal periods of bird vulnerability.	
17	Lighting design and operation	Refer to IAAC's standard mitigation measure for Migratory birds – lighting and design operation, as applicable to offshore exploratory drilling. In	Light reduction options include: • Aircraft Detection Lighting Systems,

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		addition, implement the following measures to reduce the attraction and disorientation of marine and migratory birds and, where relevant, bats associated with lighting on the drilling unit and project vessels, while meeting applicable regulatory, navigational, operational, health, and safety requirements. • Limit non-essential lighting on the drilling installation and project vessels and, where practicable, direct, shield or otherwise manage lighting to minimize attraction and disorientation while maintaining lighting required for navigation, safe operations, and regulatory compliance. Implement monitoring and reporting procedures to document bird attraction, strandings, and mortality and inform adaptive management where appropriate. Where Leach's Storm-Petrel, or other light sensitive birds are known or reasonably expected to occur, consider periods of	• flashing aviation lights with reduced flash durations and increased intervals between flashes, • use of integrated timers, • use of passive infrared devices, radar sensors, • weather-responsive lighting reduction protocols, • limiting use of lighting within 400 m of high concentrations of birds and bats. Alternative lighting colour regimes should be used only where supported by evidence for the focal taxa and project context or explicitly characterized as an emerging or experimental measure, as evidence of effectiveness is variable and differs between birds and bats.

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		increased susceptibility to light attraction when planning discretionary nighttime activities that require additional lighting and, where practicable, minimize non-essential nighttime lighting and discretionary activities requiring additional lighting during these higher risk periods. • Limit lighting during operations to the minimum levels required for safety and regulatory, navigational, operational, health and safety requirements and, where possible, minimize non-essential nighttime lighting during periods of elevated bird attraction risk. • Develop and implement stranded bird and bat response procedures, including protocols for the collection, handling, release, documentation, and reporting of stranded individuals, in accordance with applicable regulatory guidance and permit requirements • Where potential interactions with bats have been identified,	

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		establish appropriate procedures for documenting and reporting bat observations, strandings or mortality.	
18	Seabird Monitoring	Operators should be required to assign experienced seabird observers to monitor seabirds. All observers must be trained to ECCC/CWS standards and will have the primary responsibility of observations and collection of seabird survey data during exploratory drilling activities. Stationary surveys should occur at the platform/drilling installation and/or any stationary vessels that are in the vicinity, and moving surveys are to occur on any steaming vessels travelling between 4 and 19 knots. It is recommended that operators include general awareness regarding seabird strandings as part of their overall training / orientation programs for offshore workers.	Follow the CWS Eastern Canada Seabirds at Sea (ECSAS) standardized protocol for pelagic seabird surveys from moving and stationary platforms
19	Anthropogenic noise	Implement, at a minimum, the following mitigation measures to reduce airborne noise that could alter	Options to reduce airborne noise may include: • noise-insulating materials, • minimizing vessel traffic, and

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		bird and bat behaviours (e.g., mask communication, create disorientation): Plan noisy activities to avoid critical breeding, foraging, or migration periods (late summer and fall periods), to the extent possible.	• soft start ramp-up procedures during project activities. It is anticipated that noise thresholds, or equivalent, could be determined during a project-specific impact assessment, as needed.
HEALTH, SOCIAL AND ECONOMIC CONDITIONS OF INDIGENOUS PEOPLES			
20	Employment, procurement, and contracting processes	In addition to IAAC's standard mitigation measure for health, social and economic conditions of Indigenous Peoples – Employment, procurement, and contracting processes, and in collaboration with Indigenous groups, implement the following mitigation measures: • prioritize Indigenous hiring and supplier development and maximize local supply benefits, where feasible (e.g., local vessels and equipment). • support Mi'kmaw participation in activity related monitoring programs (i.e. marine mammal observers and passive acoustic monitoring operators), including training opportunities for community members where feasible.	Options to facilitate economic opportunities may include: • offering structured development programs, such as internships, job-shadowing and collaboration on leadership initiatives.

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		• improve, where needed, diversity, equity, inclusion, and accessibility (DEIA) strategies. • provide DEIA training for all staff. • set out, as part of benefits plans required by the CNSOER, specific measures for Mi'kmaw employment, training and procurement.	
21	Workforce management and community integration	In addition to IAAC's standard mitigation measure for health, social and economic conditions of Indigenous Peoples – workforce management and community integration, implement the following mitigation measures: • Implement proactive inclusion measures, including workplace accommodations, childcare and family supports, and spaces that reflect Indigenous values and traditions. • Require that all personnel and contractors working on drilling programs, including vessel crews and onshore support staff, complete Indigenous-led cultural	Engagement with relevant groups will be an important factor for the successful implementation of this mitigation measure. Broader measures such as childcare and family supports, transportation, and flexible and inclusive workplace policies may be less suited to short-term exploratory drilling programs and may be better addressed as suggested practices or through benefits plans.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		awareness and worker conduct training before mobilization. • Maintain clear and confidential health and safety incident reporting pathways for employees and community members, and report on training completion and on how reported incidents were addressed.	
CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES			
22	Ground- and seabed-disturbing activities	In addition to IAAC's standard mitigation measures for physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance – ground- and seabed-disturbing activities, implement the following mitigation measures: • Avoid or minimize disturbance to areas, species and periods of cultural importance, and current and future harvesting areas, identified by the Mi'kmaq. • Prior to drilling, screen proposed well site locations for potential submerged archaeological sites and cultural landscapes with	Options to protect and manage chance finds may include: • buffers, • avoidance zones, and • on-site monitoring. Engage with Indigenous groups, KMKNO's Archaeology Research Division, provincial regulators, coastal municipalities, and local experts to inform protocols for assessment of cultural resources including the reporting and management of any unexpected finds of archaeological features. Sipekne'katik First Nation has their own Archaeology department, and they oversee their own Governance. KMKNO has monitors along

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		particular attention to coastal areas surrounding Sable Island • In the unlikely event of a disturbance of cultural resources, including shipwrecks and sacred or traditional sites, and which cannot be avoided, develop mitigation plans collaboratively with regulators and Indigenous representatives, incorporating controlled excavation, documentation, and data sharing agreements to respect governance and cultural ownership of information. • Ensure that data and findings are shared with regulators and Indigenous organizations	with other organizations such as the Confederacy of Mi'kmaq Nations, Millbrook First Nation, and Acadia First Nation. This could include local experts, such as Knowledge Holders, Elders, or trappers. These groups could share knowledge that is not written but passed along through oral stories/traditions.
MALFUNCTIONS AND ACCIDENTS			
23	Malfunction and accident response planning	Refer to IAAC's standard mitigation measures for effects of the environment on the project and accidents and malfunctions – Accident and malfunction response planning and the Framework Contingency Plan	Consider exposure via the consumption of harvested fish and other country foods, as well as sampling and monitoring for all contaminants of concern, including any dispersant used. Refer to the Contingency Plan requirements in the Canada–Nova Scotia Offshore Area Petroleum Operations Framework Regulations

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		Establishment of a fire and spill prevention plan including the following: • Establishing an emergency response plan (accidents, malfunctions, explosions, spills) o to be developed in conjunction with Indigenous peoples, ECCC, DFO and CCG and, o be approved by the CNSOER, reviewed and updated as necessary. • Maintain well-control measures to prevent and respond to a loss of well control, including blow-out preventers (BOPs), capping and containment equipment, and relief-well capability. • Maintain plans and arrangements for the rapid deployment of a capping stack if needed. • Undertake a Spill Impact Mitigation Assessment prior to drilling to identify spill response options that will be implemented in the case of a spill, informed by	Operational discharges to be managed in compliance with the Offshore Waste Treatment Guidelines Consider Health Canada's Guidance for Evaluating Human Health Effects in Impact Assessment: Country Foods Consider Health Canada's Guidance for the Environmental Public Health Management of Crude Oil Incidents • Report the incident based on Canada's Spill Response Procedures. • Selection and screening of chemicals under the Offshore Chemical. Selection Guidelines for Drilling and Production Activities on Frontier Lands. • Installation and use of oil water separators to treat contained deck drainage, with collected oil stored and disposed of properly. • Appropriate handling, storage, transportation and onshore disposal of solid and hazardous wastes. • The selection of non-toxic drilling fluids, including the use

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		Mi'kmaw input on culturally important species, areas and harvesting periods. • Report the incident based on Canada's Spill Response Procedures. • Develop communication protocols to contact federal, provincial and municipal agencies, Indigenous peoples (including direct communication with Mi'kmaw harvesters) and stakeholder organizations. • Support Mi'kmaw participation in post-spill sampling and monitoring, including of country foods, and in communicating results to communities. • Incorporate Environment and Climate Change Canada's National Wildlife Emergency Response Framework. Operators would be required to develop project-specific operating procedures and emergency response protocols addressing severe weather conditions. These procedures may establish weather thresholds that	of WBMs wherever possible and technically feasible. • Treatment of any significant amounts of produced water encountered prior to its discharge, in accordance with relevant regulatory requirements.

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		trigger operational warnings, suspension of activities, or, where necessary, disconnection of the drilling unit from the well and activation of emergency response measures.	
24	Emergencies and incident response	Implement clear monitoring, shutdown and response protocols, including reports to relevant regulators and affected Indigenous groups and stakeholders when thresholds for adverse effects to fish, birds, and bats are exceeded. Where thresholds relate to species harvested by the Mi'kmaq, identify them with Mi'kmaw organizations.	Applications for the CNSOER authorizations will require environmental protection and emergency response plans to be included. Engagement with relevant groups will be an important factor for the successful implementation of this mitigation measure. Thresholds may include: • mass mortality events, • spill/debris events, • bird or bat stranding or collision events, • noise exceedances, or • other incidents requiring immediate response. Shutdown and response plans may include: • wildlife emergency response plans, • area response plan,

DRAFT

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
			• for fish, follow DFO's "Measures to protect fish and fish habitat" with reference to spill response plans and habitat disturbance prevention. Response plans should identify roles, reporting pathways, thresholds, specimen handling procedures, and adaptive management triggers.
ATMOSPHERIC ENVIRONMENT			
25	Atmospheric Emissions	Reduce GHG and air pollutants where possible through implementation of the following: • Develop air contaminant emission inventories and report to the national registry, as appropriate. • Select vessels with systems designed to reduce air pollutant emissions, such as hybrid-electric or fully electric vessels, to the extent practicable. • Adhere to air quality guidelines by using high-quality, low-sulphur fuel and ensuring that emission control technologies for marine vessels and backup generators are properly installed and maintained.	Consider the guidance provided in the Government of Canada's *Strategic Assessment of Climate Change* and related technical guides when assessing emissions and identifying mitigation measures. Consider the guidance provided in Health Canada's Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality

Measure ID	Project Activity	Mitigation Measure	Potential frameworks or technologies that could support the objective of the mitigation measure
		• Minimize unnecessary operation of project-vessel engines when vessels are stationery and engine operation is not required for navigation, station keeping, operational readiness, or safety. • Considering the use of low-carbon fuel types such as hydrogen or biofuels. • Ensure that vessel emissions and air quality standards are aligned with regional and international best practices. Implement good practices and new technologies for managing the effects of flaring. Additional potential mitigation measures related to GHGs are provided in Section 8.	
HEALTH, SOCIAL AND ECONOMIC ENVIRONMENT			
26	Social and Economic Considerations	• Maintain communication with communities to keep them informed of what to expect as the project(s) progress (e.g., Communications Plans).	Refer to Analyzing Health, Social and Economic Effects under the *Impact Assessment Act* which provides guidance on performing Health, Social and Economic Impact Assessments.

DRAFT

DRAFT