EXXONMOBIL CANADA LTD.
EASTERN NEWFOUNDLAND OFFSHORE EXPLORATION DRILLING PROJECT (2018-2029)

Environmental Impact Statement Addendum: Addition of EL 1134

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1 INTRODUCTION

ExxonMobil Canada Ltd. (ExxonMobil), herein referred to as "the Operator", and its co-venturers are planning to conduct a program of petroleum exploration / delineation / appraisal drilling and associated activities in the eastern portion of the Newfoundland offshore area over the period 2018 to 2029 (hereinafter also referred to as the Project).

The Project requires review and approval pursuant to the requirements of the Canadian Environmental Assessment Act (CEAA 2012) as it has been determined that the drilling of a well on the various Exploration Licences (ELs) in question constitutes a "designated project" under Section 10 of the Regulations Designating Physical Activities (SOR/2013-186, s4). In addition, the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) requires a project-specific environmental assessment (EA) be completed for offshore oil and gas activities, pursuant to the Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act (Section 134.1 of the Accord Acts) and the Canada-Newfoundland Atlantic Accord Implementation Act (the Accord Acts). It is intended that the EA review process for the Project will satisfy the requirements of CEAA 2012 and the C-NLOPB's Accord Acts EA processes.

In December 2017, ExxonMobil submitted the Environmental Impact Statement (EIS) for the Project, which was prepared in accordance with requirements of CEAA 2012, the Project-specific Environmental Impact Statement (EIS) Guidelines issued by the Canadian Environmental Assessment Agency (the Agency) in December 2016, and other generic EA guidance documents as referenced throughout. The EIS was subsequently made available for review and comment by government departments and agencies, Indigenous groups, stakeholder organization and the public. A series of resulting "Information Requirements" were provided to ExxonMobil by the Agency in March and April 2018, which are in the process of being responded to by the Operator.

1.1 Original Project and EIS Scope

The Project includes the drilling, testing, and eventual decommissioning of exploratory wells within the various ELs identified in the EIS (originally ELs 1135 and 1137), using one or more drilling installations, which may include semi-submersibles and/or drill ships. Over the course of the anticipated duration of the Project, it is estimated that up to 35 wells could be drilled, with specific wellsite locations being selected as planning and design activities progress. The Project also includes various supporting activities or techniques that are often associated with offshore exploration drilling, including: delineation/appraisal drilling in the case of a hydrocarbon discovery, geophysical / geohazard / wellsite surveys, vertical seismic profiling (VSP) surveys, batch drilling, formation flow test, geotechnical surveys, environmental surveys, ROV / video surveys, and eventual wellhead decommissioning / removal, as well as associated supply and service activities.

Offshore marine facilities and support craft to support the various exploration activities described above will be required throughout the duration of the Project, and will include drilling installations, supply / stand-by and support vessels, helicopters, well intervention vessels, vessels for the conduct of geotechnical, geological, environmental, and geophysical surveys, and those involved in ice management operations. Project-related supply and support activities will take place at existing, established onshore facilities operated by a third-party service provider, which have been previously approved under applicable regulatory processes and currently provide services to multiple offshore and other industrial operators. No Project-specific construction or expansion of such facilities or other on-

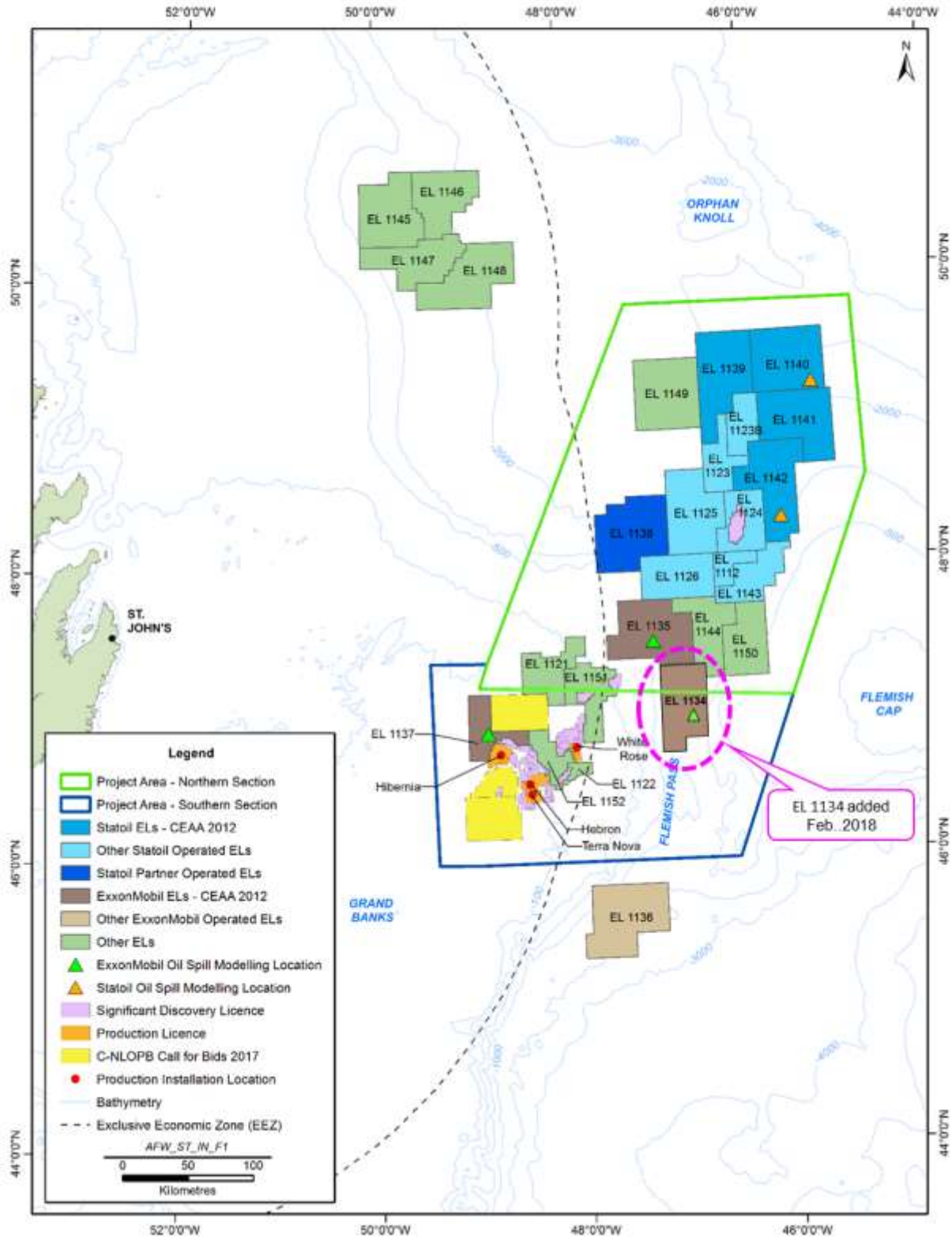
shore infrastructure is required or planned. Support vessel and aircraft services and their transits to and from the Project Area from these supply bases and airport facilities will likewise be contracted from third party suppliers and will take a direct route to active drill sites in the Project Area. This will include using a number of existing and well-established routes off eastern Newfoundland that have been used for decades.

The planned temporal scope of the Project covers a period of 12 years (from 2018 to 2029), which has been selected to generally align with the terms of the various ELs described above, as well as to provide an adequate and conservative timeframe within which planned Project activities (including well drilling, testing, abandonment, and associated activities) may occur. Within this 12-year period, the planned exploration activities that comprise this Project may occur at any time throughout the year.

In addition to ELs 1135 and 1137 (which are operated by ExxonMobil), ExxonMobil and Equinor Canada Limited (Equinor, previously Statoil) are co-venturers in a number of ELs (ELs 1135, 1139, 1140, 1141 and 1142) off Eastern Newfoundland, and both Operators have worked together on a variety of petroleum activities offshore Newfoundland and Labrador. Equinor's Flemish Pass Exploration Drilling Project (2018-2028), which is undergoing separate but concurrent EA review under CEAA 2012, includes proposed exploration drilling and associated activities on those ELs listed above for which Equinor is the designated Operator. As a result of these integrated and overlapping interests, and given the inherent commonalities between the planned exploration activities by each of these operators, the existing environmental settings involved, and the potential environmental effects and required mitigation measures associated with exploration activities related to these licences, ExxonMobil and Equinor have collaborated in the planning and completion of the required EISs for their planned exploration drilling programs. The EIS documents therefore reflect a consolidated effort by both operators to provide an EIS report that has the same information, structure and content (with some Project-specific variances) for both projects.

As described in the EIS (Section 2.3), the Project Area for EA purposes was defined so as to encompass all of the ELs and activities outlined above, and comprises the overall geographic area within which all Project-related components and activities will take place. As illustrated in Figure 1.1, the Project Area includes "CEAA 2012-designated project" ELs currently operated by ExxonMobil (EL 1135 and EL 1137) where exploration drilling activities may be conducted between 2018 and 2029. In addition, EL 1134, which was acquired by ExxonMobil in February 2018 is added to this figure. The Project Area also encompasses the other ELs noted above in which ExxonMobil is a co-venturer, as well as a surrounding area to account for planned and potential ancillary and support activities at and around the wellsites themselves (for a total area of 100,800 km^2). With respect to Project Area related terminology, the EIS uses the term "Project Area – Northern Section" to refer to that component of the overall Project Area shown in Figure 1.1 that covers Equinor's planned project-related activities and a portion of ExxonMobil's, while the "Project Area – Southern Section" covers ExxonMobil activities only. The assessment also considers related supply and support vessel and aircraft traffic to and from the Project Area.

Figure 1.1 Project Area (Figure 1-1 from EIS, December 2017) with EL 1134 Added



It should also be noted that ExxonMobil holds other licenses in the Project Area on which drilling activities may occur (i.e., existing ELs, co-venturer-operated ELs, and/or significant discovery licences). For transparency to stakeholders and clarity in terms of the total exploration activity that may be undertaken by the Operator in the Project Area, these licenses are also included. Although the effects assessment and conclusions are relevant to these licenses, it is the Operator's understanding that the Ministerial EA decision will be limited to the "designated Project" defined as exploration drilling and associated activity in ELs 1135 and 1137. EA review for licences that are not 'designated Projects' are considered under a separate regulatory process through the Accord Acts, administered by the C-NLOPB.

1.2 Nature and Purpose of the EIS Addendum (Proposed Addition of EL 1134)

Subsequent to the completion and filing of the EIS in December 2017, on February 1, 2018, ExxonMobil acquired Husky Oil Operations Limited's (Husky's) 65 percent working interest in EL 1134 in the eastern Newfoundland offshore area. That EL was issued as part of the C-NLOPB's 2012 Call for Bids to Husky (65 percent interest) and its co-venturer Suncor Energy Inc. (35 percent). EL 1134 covers an area of approximately 208,899 ha, and is effective from January 15, 2013 (with Period 1 expiring on January 15, 2019, and Period 2 on January 15, 2022).

Although EL 1134 was not, due to the timing of its acquisition by ExxonMobil, described and included in the EIS, it is located within the Project Area described (Figure 1.2), and the exploration activities that are planned to be conducted on and pursuant to this licence are in keeping with the nature and scope of those covered in the EIS. On March 1, 2018, ExxonMobil wrote to the Agency and requested the inclusion of EL 1134 in the scope of the ongoing EA for the Project.

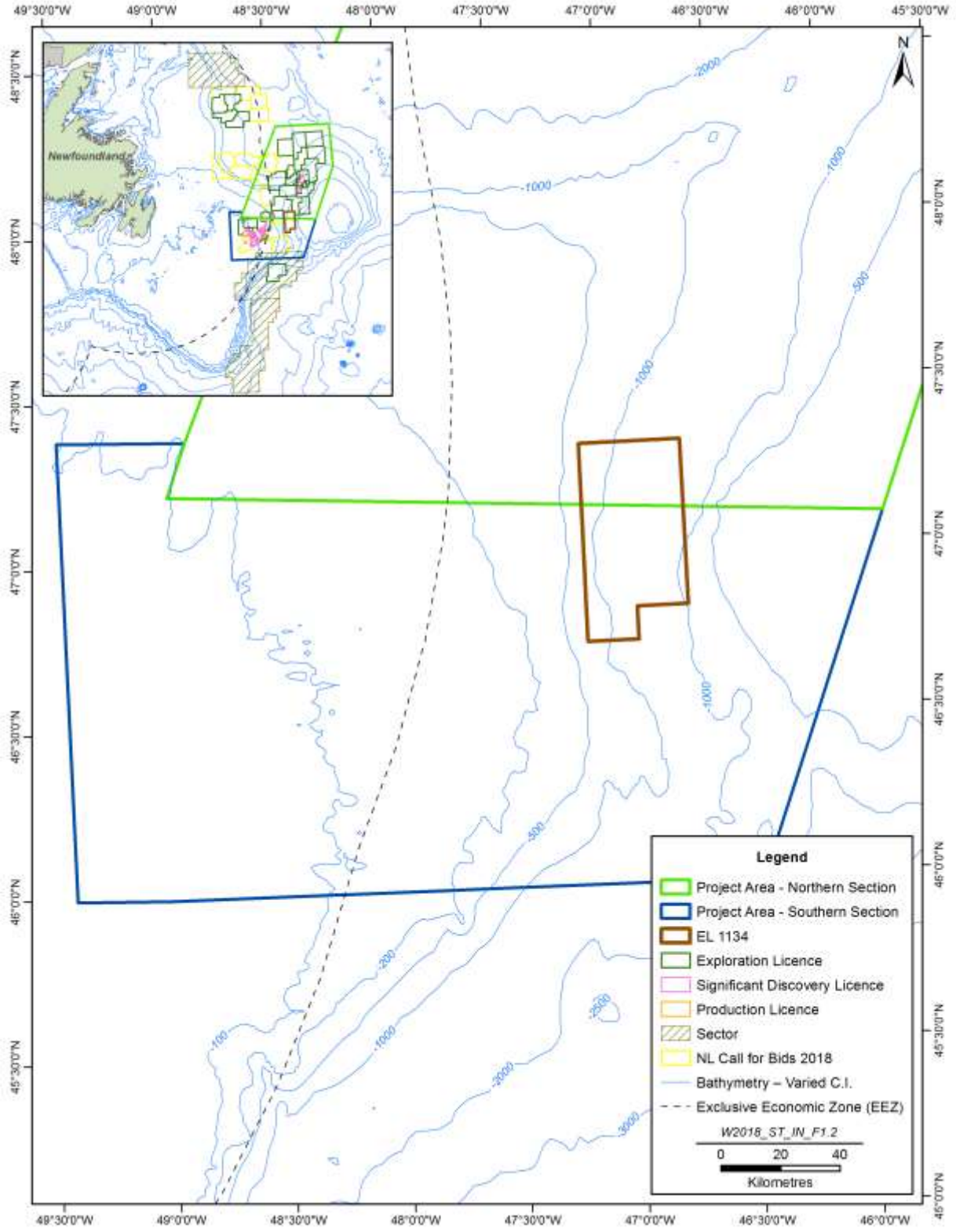
On March 23, 2018 the Agency responded to that request and outlined a series of information requirements to be included in an "EIS Addendum" to facilitate the EA review of ExxonMobil's planned exploration drilling and associated activities on EL 1134, and issued amended EIS Guidelines for the Project.

The remainder of this EIS Addendum document provides a description of this proposed amendment to the scope of the Project (namely, the addition of EL 1134), and a discussion and evaluation of any resulting implications of that addition for the content and findings of the EIS. In doing so the document provides the following information and is structured as follows:

a) *Project Description*: A brief summary of the original Project description (as background and context), followed by a description of the proposed addition of EL 1134 and the implications of this for the nature and scope of the planned components and activities that comprise the Project, and for which EA approval is being sought.

b) *Engagement*: This Chapter provides an overview of ExxonMobil's recent and on-going discussions with key government departments and agencies, Indigenous groups and stakeholders regarding the planned addition of EL 1134 and its proposed exploration activities pursuant to this licence, as well as any associated questions or concerns raised.

Figure 1.2 EL 1134 and its Location within the Project Area



c) *Existing Environment*: An overview of the environmental setting, with a focus on the existing environment within and around EL 1134 itself. In certain cases, this description provides additional or updated information that has become available since the EIS was completed that is of relevance to the addition of EL 1134. It also includes identifying and generally describing those aspects of the existing environment of the overall Project Area that occur within EL 1134, and where relevant, highlighting whether and how the information and analysis included in the EIS (Chapter 5-7) remain relevant to this particular part of the Project Area as well.

   This overview summary is provided as general background and context for the subsequent assessment of the possible implications of the proposed Project modification for the original EA results, but the detailed environmental baseline information included in the EIS should also be consulted for further details as required.

d) *Environmental Effects Assessments*: An analysis and description of any implications of the proposed addition of EL 1134 for the EIS's predicted environmental effects (project-specific and cumulative) and the mitigation measures that have been identified and proposed by ExxonMobil.

   This includes a particular focus on the Valued Components (VCs) that were considered in the EIS namely:

   - Marine Fish and Fish Habitat (including Species at Risk)
   - Marine and Migratory Birds (including Species at Risk)
   - Marine Mammals and Sea Turtles (including Species at Risk)
   - Special Areas
   - Indigenous Communities and Activities
   - Commercial Fisheries and Other Ocean Users

e) *Summary and Conclusion*: An overview of the implications of the proposed inclusion of EL 1134 to the findings and conclusions of the EIS.

This EIS Addendum has thus been planned and is presented as a focused description of the planned changes to the Project (through the addition of EL 1134) and a discussion and analysis of any implications of this for the content and findings of the EIS. In the interests of efficiency and brevity, it does not repeat all of the detailed information and analysis provided in the EIS and EIS Addendum (IR Responses) submitted by ExxonMobil, which should also be referred to as required.

2 PROJECT DESCRIPTION

The following provides a brief overview of the Project Description (as provided in the EIS) for background and context, followed by a description of ExxonMobil's planned inclusion of, and activities within, EL 1134.

2.1 Overview of the Original Project Description

As described in the EIS (Section 2.2), the purpose of this Project is to determine the potential for oil and gas resources through an exploratory drilling program on various Operator-held land holdings within the Project Area.

The Project includes the drilling, testing, and eventual decommissioning of exploratory wells (including delineation and appraisal wells) within the various ELs identified previously, using one or more drilling installations, which may include semi-submersibles, and/or drill ships. Over the course of the anticipated duration of the Project, it is estimated that up to 35 wells could be drilled, with specific wellsite locations being selected as planning and design activities progress.

The total number of exploration/delineation wells that could be drilled in the Eastern Newfoundland Offshore Drilling project is 35. These 35 wells would include up to 5 on each of EL 1134, EL 1135 and EL 1137 (for a total of 15). The additional 20 wells were included in the event that ExxonMobil were to become operators of EL's in which they are co-venturers but do not operate or in the event that additional EL's were acquired in this project area. Should either situation occur ExxonMobil may request that CEAA consider an addendum to the Eastern Newfoundland Offshore drilling Project. By including the maximum number of 35 wells, ExxonMobil believes it would not be changing the number of wells for the initial scope of the Project.

A possible scenario for well type designation would be an exploration well on a licence followed up by an additional exploration well or delineation well. The classification of the well is proposed by the Operator but is confirmed by the C-NLOPB. The methods and equipment required to drill an exploration well and a delineation well are the same, therefore there are no additional environmental effects to consider in the EIS.

The Project also includes various supporting activities or techniques that are often associated with offshore exploration drilling, including: possible delineation drilling in the case of a hydrocarbon discovery, geophysical surveys (geohazard / wellsite surveys, vertical seismic profiling (VSP)), batch drilling, formation flow testing, geotechnical surveys, environmental surveys, remotely operated vehicle (ROV) / video surveys, and eventual wellhead decommissioning / removal, as well as associated supply and service activities.

Offshore marine vessels to support the various exploration activities described above will be required throughout the duration of the Project, and will include drilling installations (semi-submersibles and/or drill ships), supply / stand-by and support vessels, helicopters, well intervention vessels, vessels for the conduct of geotechnical, geological, environmental and geophysical surveys, construction vessels for wellhead removal, and those involved in ice management operations. Project-related supply and support activities will take place at existing, established onshore facilities operated by a third-party contractor, which have been previously approved under applicable regulatory processes and currently provide services to multiple offshore and other industrial operators. No Project-specific construction or expansion of such facilities or other onshore infrastructure is required or planned. Support vessel and

aircraft services and their transits to and from the Project Area from these supply bases will likewise be contracted from third party suppliers and will use a number of existing and established routes off eastern Newfoundland that have been used for decades.

The planned temporal scope of the Project covers a period of 12 years (from 2018 to 2029), which has been selected to generally align with the terms of the various existing and potential ELs, as well as to provide an adequate and conservative timeframe within which planned Project activities (including well drilling, testing, abandonment and associated activities) may occur. Within this 12-year period, the planned exploration activities that comprise this Project may occur at any time throughout the year.

2.2 Evaluation of Planned EL 1134 Activities in Relation to the Overall Project and EA Scope

Chapter 2 of the EIS provides a detailed description of the Project, including each of its planned components and activities, as summarized in Table 2.1. The Table below also provides an overview of the implications of the proposed addition of EL 1134 for the nature and scope of the Project description presented and considered in the EIS.

Table 2.1 Project Description Information as Presented in the EIS

EIS Section	Project Component / Activity	Implications of EL 1134 Addition
2.1	Project Description	• None
2.2	Purpose of the Project	• None. • As described in the EIS, the purpose of this Project remains to determine the potential for oil and gas resources through an exploratory drilling program on various Operator-held land holdings within the Project Area. • The inclusion of ExxonMobil's planned exploration activities within EL 1134 will "add" these activities and their associated benefits to the scope of the Project that is the subject of this EA review.
2.2.1	Environmental, Economic, and Social Benefits	
2.3	Project Location and Designated Project Area	• None. • EL 1134 is located within the current Project Area. • Coordinates for EL 1134 provided in the table below • Water depths in EL 1134 (730 to 1,250 m) remain in the range considered in the EIS
2.4	Resource Use and Environmental Features	• None • EL 1134 is located within the current Project Area.
2.5	Project Components and Activities	• None
2.5.1	Drilling Installation	• None. • No change to proposed Project components or activities. • Water depths in EL 1134 (730 to 1,250 m) remain in the range considered in the EIS • Scope of the Project will not increase from that considered in the EIS, namely the drilling of up to 35 wells within the various ELs that comprise the Project over its 12-year duration
2.5.1.1	Drilling Installation Selection and Regulatory Approval Process	
2.5.1.2	Semi-submersible Drilling Unit	
2.5.1.3	Drill Ship	
2.5.2	Project Activities	• None. • No change to proposed Project components or activities.
2.5.2.1	Wellsite Surveys – Drill Planning	
2.5.2.2	Mobilization of the Drilling Installation	
2.5.2.3	Offshore Well Drilling	
2.5.2.4	Formation Flow Testing with Flaring	

EIS Section	Project Component / Activity	Implications of EL 1134 Addition
2.5.2.5	Geophysical, Environmental and Geotechnical Surveys	• Water depths in EL 1134 (730 to 1,250 m) remain in the range considered in the EIS
2.5.2.6	Supply and Servicing	
2.5.2.7	Well Suspension, Abandonment, Decommissioning and Demobilization	
2.6	Project Personnel	• None. • No change to proposed Project components or activities.
2.7	Project Schedule	• None. • Planned activities within EL 1134 will take place with the timeframes (potentially year round) and for the duration outlined in the EIS. • They will also occur within the temporal scope included in the EIS, 2018-2029 (EL 1134 expires in January 2022)
2.8	Summary of Changes to the Project	• None
2.9	Waste Discharges and Emissions	• None. • No change to proposed Project components or activities. • Scope of the Project will not increase from the drilling of up to 35 wells
2.9.1	Air Emissions	
2.9.1.1	Criteria Air Contaminants	
2.9.1.2	Greenhouse Gas Emissions	
2.9.1.3	Summary and Potential for Accumulation and Interactions of Air Emissions (Cumulative Effects)	
2.9.2	Hazardous and Non-hazardous Wastes	
2.9.3	Drilling Waste	
2.9.3.1	Drill Mud and Cuttings	
2.9.3.2	Cement	
2.9.4	Liquid Wastes	
2.9.5	Heat, Light, and Sound Emissions	
2.9.5.1	Light and Heat Emissions	
2.9.5.2	Sound Emissions	
2.10	Alternative Means of Carrying Out the Project	• No change to proposed (or alternative) Project components or activities
2.10.1	Identification and Evaluation of Alternatives	
2.10.1.1	Drilling Fluids Selection	
2.10.1.2	Drilling Installation Selection	
2.10.1.3	Drilling Waste Management	
2.10.1.4	Water Management and Location of Final Effluent Discharge Points	
2.10.1.5	Offshore Drilling Installation Lighting	
2.10.1.6	Formation Flow Testing and Nighttime Flaring	
2.10.1.7	Chemical Selection	
2.11	Environmental Planning and Management	• None
2.12	Environmental Planning	• None
2.12.1	Project Planning, Assessment, and Implementation: Application of the Precautionary Principle	
2.12.2	Environmental Management	
2.12.3	Environmental Monitoring	

Table 2.2 Project Exploration Licence 1134 - Corner Point Coordinates

Longitude (DMS)	Latitude (DMS)
46°30'W	47°20'N
46°45'W	47°20'N
47°00'W	47°20'N
46°30'W	47°10'N
46°45'W	47°10'N
47°00'W	47°10'N
46°30'W	47°00'N
46°45'W	47°00'N
47°00'W	47°00'N
46°45'W	46°50'N
47°00'W	46°50'N
Notes: Coordinates provided by C-NLOPB Land Registry Water depth ranges from 730 m to 1,250 m	

As noted above, the proposed addition of EL 1134, and each of the planned exploration activities that will be carried out by ExxonMobil pursuant to this licence, are in keeping with the nature and scope of the Project as described and assessed in the EIS.

As outlined in the preceding table, Chapter 2 (Project Description) of the EIS included and described the equipment and associated activities that would be associated with the completion of wellsite surveys, mobilization of the drilling installation, offshore well drilling, formation flow testing and flaring, geophysical, environmental and geotechnical surveys, supply and servicing activities, and well suspension, abandonment, decommissioning and demobilisation. It also outlines the associated schedule and logistics, and associated environmental discharges, emissions and environmental management systems, each of which will not change with the addition of EL 1134. Each of these components and activities were also considered and addressed through the associated environmental effects assessment in the EIS (Chapters 8-15), including the identification and proposal of associated mitigation measures to avoid or reduce any negative environmental effects resulting from these activities.

The EIS noted that the scope of the Project will involve the drilling of up to 35 wells within the various ELs that comprise the Project Area over its 12-year duration. With the planned addition of EL 1134, this number of wells is not proposed to increase, and the scope of the Project will remain within the upper limit of 35 wells described and assessed in the EIS.

The Project description provided in the EIS will therefore remain applicable to the nature and scope of the planned Project activities on EL 1134, which will be implemented in accordance with the Operator's commitments and obligations pursuant to any eventual EA approval and other applicable legislative and regulatory requirements.

3 REGULATORY, INDIGENOUS AND STAKEHOLDER ENGAGEMENT

Engagement is considered to be the cornerstone of the EA process, and is a key component of ExxonMobil's approach to the planning and implementation of its oil and gas exploration programs and other business activities. A number of engagement initiatives have been undertaken, are in progress, or are being planned in relation to the Project, including discussions with relevant government departments and agencies, Indigenous groups and stakeholder organizations.

As described in Chapter 3 of the EIS, ExxonMobil's engagement activities for this Project and its EIS have been designed and implemented using various mechanisms to share and receive information and perspectives about the Project. This approach has provided interested and potentially affected groups and individuals with information on the Project, and has allowed them to formulate informed questions and concerns and to provide feedback. A key objective of ExxonMobil's engagement program to date has been to provide Project information, and to identify any comments, questions, or issues related to the Project and its potential environmental effects that require consideration in the EIS. This feedback also provides valuable input to support on-going and future Project planning.

A detailed description of the governmental and stakeholder consultation and Indigenous engagement initiatives related to the Project and its EIS was provided in Chapter 3 of the original EIS document. This includes identifying the groups involved, the nature / format and timing of each engagement, as well as any questions or comments raised regarding the Project and its potential effects, including where and how these are addressed. For the purposes of efficiency and brevity, these details are not repeated here.

In the time period since EIS submission in late 2018, ExxonMobil and its co-ventures have carried out additional follow-up engagement with each of the Indigenous groups engaged as part of EIS development (see EIS Section 3.3) and with other organizations. This included providing notification of the submission of the EIS and its availability for public review and comment, as well as reiterating the Operator's availability and willingness to meet with these groups to discuss any questions or issues, including discussion of any available and applicable Indigenous Knowledge for consideration in the EA and/or in future Project planning. Details on these post-EIS submission engagement activities have been provided to CEAA through a summary of engagement initiatives, which provide an overview of previous and on-going engagement activities related to Project. Communication has taken place through a variety of mechanisms (phone calls, emails, personal meetings).

Related specifically to this EIS Addendum, this also included writing to all of the Indigenous groups in late June and early July 2018 to inform them of the proposed inclusion of EL 1134 as part of the scope of the Project and the EIS, and the process through which this would occur through the on-going EA review (Table 3.1). To date no group has responded to that correspondence, nor otherwise indicated any particular issues or questions to the Operator related to this EIS Addendum.

Table 3.1 Indigenous Engagement Activities and Key Outcomes

Engagement Activities with Newfoundland and Labrador Indigenous Groups			
Engagement Activities with Nunatsiavut Government			
June 29, 2018	Email/letter	Nunatsiavut Government	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.

Engagement Activities with Innu Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with NunatuKavut Community Council			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with Miawpukek First Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with Qalipu Mi'kmaq First Nation Band			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with Prince Edward Island Indigenous Groups			
Engagement Activities with Prince Edward Island Indigenous Groups - Mi'kmaq Confederacy of Prince Edward Island (MCPEI) - Aggregate body for the Abegweit First Nation and Lennox Island First Nation with regard to consultation and engagement.			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with Nova Scotia Indigenous Groups			
Kwilmu'kw Maw-Klusuaqn Negotiation Office (KMKNO) Nova Scotia - Supports/represents the Assembly of Nova Scotia Mi'kmaq Chiefs in consultation and engagement for the following communities: Acadia First Nation, Annapolis Valley First Nation, Bear River First Nation, Potlotek First Nation, Eskasoni First Nation, Glooscap First Nation, Membertou First Nation, Paqtnkek First Nation, Pictou Landing First Nation, Wagmatcook First Nation, and We'koqma'q First Nation.			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Sipekne'katik First Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Millbrook First Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.

Engagement Activities with New Brunswick Indigenous Groups			
Mi'gmawe'l Tplu'taqnn Inc. (MTI) – Aggregate body for Pabineau First Nation, Esgenoopetitj First Nation, Buctouche First Nation, Indian Island First Nation, Eel River Bar First Nation, Metepenagiag Mi'kmaq Nation, Fort Folly First Nation, and Eel Ground First Nation with regards to engagement. For any engagement with MTI, the Operators understand that MTI is acting on behalf of the groups listed above.			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Wolastoqey Nation in New Brunswick (WNNB) – Aggregate coordinating body for Kingsclear First Nation, Madawaska First Nation, Oromocto First Nation, St. Mary's First Nation, and Tobique First Nation – direct engagement with communities. For any engagement with WNNB, the Operators understand that WNNB is acting on behalf of the groups listed above.			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Passamaquoddy of New Brunswick			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Woodstock First Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Elsipogtog First Nation			
June 29, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Engagement Activities with Quebec Indigenous Groups			
Innu First Nation of Ekuanitshit			
July 3, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Innu First Nation of Nutashkuan			
July 3, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.
Mi'gmawei Mawiomi Secretariat (MMS) – aggregate body for La Nation Micmac de Gespeg, Listuguj Mi'gmaq Government and Micmacs of Gesgapegiag with regard to engagement**.**			
July 3, 2018	Email/Letter	ExxonMobil	Notification of the inclusion of EL1134 into the existing Eastern Newfoundland Offshore Exploration Drilling Program Environmental Impact Statement.

Key Comments, Questions and Issues Raised	**Where Addressed in the EIS and/or Follow up from ExxonMobil**
No concerns identified to Operators to date.	n/a

ExxonMobil understands that the EIS Addendum and EIS Addendum summary will be posted on the Eastern Newfoundland Offshore Exploration Drilling Program Page on the Canadian Environmental Assessment Registry, located online at https://www.ceaa-acee.gc.ca/050/evaluations/document/exploration/80132?culture=en-CA

4 EXISTING ENVIRONMENT

The EIS provides a detailed overview of the existing (baseline) environment within and around the proposed Project and Assessment Areas (Local Study Area (LSA) and Regional Study Area (RSA), including relevant aspects of the existing physical (Chapter 5), biological (Chapter 6) and socioeconomic (Chapter 7) environments.

This Chapter of the EIS Addendum provides an overview of the existing environmental setting, with a particular focus on EL 1134 itself. Chapter 5 then provides an analysis of any implications of this information and the specific nature and scale of the planned activities on EL 1134 for the EIS's predicted environmental effects, the mitigation measures that have been identified and proposed by ExxonMobil for the Project, and thus, for the overall findings and conclusions of the EIS.

In the interests of efficiency and brevity the sections that follow do not repeat all of the detailed environmental information and analysis provided in the original EIS, which should therefore also be referred to as required and relevant. Where available and applicable to the proposed Project amendment that is being assessed herein, the description that follows includes any new or additional information for EL 1134 and surrounding area that has become available since the EIS was completed and submitted.

4.1 Existing Physical Environment

Chapter 5 of the EIS provides an overview of relevant components of the physical environment within the Project Area and its surrounding environment, including aspects of its geology, bathymetry, climatology, air quality, oceanography, ambient noise, and ice conditions. The effects of climate change on the physical components is also discussed.

Table 4.1 below summarizes the various environmental components and features that are described in this Chapter of the EIS (by section number), and evaluates the relevance of this information to the proposed addition of EL 1134 to scope of the Project. As noted, the description of the existing physical environment included in the EIS is inherently regional in nature, and does not present "EL-specific" information and analysis. Rather, it presents information, datasets and analysis that were intended to provide an appropriate, regional understanding of the existing environmental conditions within and across the overall Project Area (Northern and Southern Sections) as a whole. This description is therefore considered relevant to EL 1134, and adequate for providing an appropriate understanding of the existing physical environment in that part of the Project Area as well.

Table 4.1 Existing Physical Environment Description in the EIS

EIS Section	Environmental Component	Implications of EL 1134 Addition
5.1	Geology and Geomorphology	• None • The geological and geomorphological information and mapping provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.1.1	Bedrock Geology	
5.1.2	Geomorphology and Surficial Geology	
5.1.3	Seismicity	
5.1.4	Geohazards	
5.2	Bathymetry	• None • The bathymetric information and mapping provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.

EIS Section	Environmental Component	Implications of EL 1134 Addition
		• The EIS (Section 5.2) states that overall, depths range from approximately 100 m at the southwest corner to as deep as 3,800 m at the northeastern corner of the Project Area • Water depths in EL 1134 range from 730 m to 1,250 m.
5.3	Climatology	• None, see below.
5.3.1	Wind Speed and Direction	• A primary characterization of the wind and wave climatology of the Project Area is provided in the EIS with statistics derived from the MSC50 wind and wave hindcast, along with other available sources. • To provide a characterization over the Project Area, five sample locations were selected to cover a range of depths and distance offshore which can influence such conditions. • Three grid point nodes were selected for the Project Area – Northern Section, while two nodes were selected for the Project Area – Southern Section (see Figure 5-7 and Table 5.1 of the EIS). • Analysis of the location of EL 1134 compared to the five MSC50 nodes used for the EIS indicates that the boundaries of this EL are within 50-60 km of two of the nodes (M6013091 and M6010089), and from 110-260 km of each of the other three nodes. This is comparable to the distances of these nodes from each of the other ELs considered in the EIS (see Figure 5.7). • Moreover, as stated in the EIS (e.g., Section 5.3.1.1) inspection of both wind and wave statistics and directional roses for the MSC50 nodes examines indicates that there is little variation in wind and wave conditions between these locations.
5.3.2	Air Temperature	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area. • In the EIS, conditions for the Project Area as a whole were characterized by selecting all ICOADS observations within the Project Area for the period January 1960 to February 2017, inclusive.
5.3.3	Precipitation	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area. • In the EIS, conditions for the Project Area as a whole were characterized by selecting all ICOADS observations within the Project Area for the period January 1960 to February 2017, inclusive.
5.3.3.4	Lightning	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.3.4	Fog and Visibility	• None

EIS Section	Environmental Component	Implications of EL 1134 Addition
		• The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area. • In the EIS, conditions for the Project Area as a whole were characterized by selecting all ICOADS observations within the Project Area for the period January 1960 to February 2017, inclusive.
5.4	Air Quality	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.5	Oceanography	• None, see below
5.5.1	Waves	• See above under “Wind Speed and Direction”
5.5.2	Ocean Currents	• None. • For this description in the EIS, current statistics for all current meter data around the Project Area are reported. • The primary data source is the Bedford Institute of Oceanography (BIO) Ocean Data Inventory (ODI) the database was queried for the area extending from 45.8°N to 50°N, 44.7°W to 49.7°W. • A total of 1,245 monthly current statistic records were returned for the Project Area, from 371 mooring stations at different depths (see EIS Table 5.19 and Figure 5.31). • As shown in Figure 5.31, this includes ODI measurement locations both within and near EL 1134. • The information provided in the EIS therefore fully covers EL 1134 in the southeastern part of the Project Area.
5.5.3	Extreme Events	• None • To estimate extreme wind and wave conditions, extremal analysis was performed to determine the highest expected values for wind speed, and significant wave height, based on the data sets and locations described above.
5.5.4	Seawater Properties (Temperature, Salinity, pH, Turbidity)	• None. • As described in the EIS, statistical summaries of sea temperature and salinity were derived from the Hydrographic Database of the ODI for a rectangular area surrounding the Project Area, querying the period 1900 to 2017 for depths down to 3,000 m. • The information provided in the EIS is therefore regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.5.4.3	pH and Turbidity	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.5.5	Tides	• None

EIS Section	Environmental Component	Implications of EL 1134 Addition
		• As described in the EIS, using the WebTide model, based on tidal modeling studies conducted by DFO, tidal water levels were computed for both sections of the Project Area at the same locations of the referenced MSC50 nodes (used for wind and wave analysis).
5.5.6	Storm Surge	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.6	Ambient Noise	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area. • The ambient noise data presented in the EIS are based on JASCO year-long acoustic recorders deployed as part of an ESRF program (see EIS Figure 5-44). • One of these data collection sites is within 100 km of EL 1134, and in general the location of EL 1134 in comparison to these sites is compatible to the other ELs considered in the EIS.
5.7	Ice Conditions	• None, see below
5.7.1	Sea Ice	• To characterize overall conditions in the EIS, the sea ice is described for four representative “quadrants” over the Project Area – Northern Section and a west and east portion of the Project Area – Southern Section. An approximate midpoint of each quadrant or half was selected (as illustrated in Figure 5-52), which was overlaid on each of the weekly atlas charts. • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.7.2	Icebergs	• The summary of iceberg sightings for the Project Area presented in the EIS is based primarily on the comprehensive NRC-PERD Iceberg Sighting Database. • To provide a characterization of iceberg conditions, rectangular areas that contain the Project Area – Northern Section (four sub-regions: northwest, northeast, southwest, southeast) and Project Area – Southern Section (two sub-regions: west and east), as defined in EIS Table 5.35 and shown in Figure 5-59, were queried for the past 30 years (1985-2014) and summary statistics are reported. • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.7.3	Marine Icing	• Existing algorithm was used to derive estimates of icing potential in the Project Area by using concurrent air and sea temperature and wind speed data from ICOADS (see above)

EIS Section	Environmental Component	Implications of EL 1134 Addition
		• The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.
5.8	Climate Change	• None • The information provided in the EIS is regional in nature, and fully covers EL 1134 in the southeastern part of the Project Area.

4.2 Existing Biological Environment

Chapter 6 of the EIS provides a description of the existing biological environment, with a focus on the various biological VCs that have been identified as key areas of focus for the EIS, including Marine Fish and Fish Habitat, Marine and Migratory Birds, Marine Mammals and Sea Turtles, and Special Areas, each of which are addressed in separate sections of the chapter. Discussion of species at risk are included for each VC, as applicable. These components of the biological environment and subcomponents therein are described at differing levels of detail in the EIS, depending on the type and level of available information and their relevance to the Project and its EA**.**

4.2.1 Marine Fish and Fish Habitat (Including Species at Risk)

Marine ecosystems are comprised of biological and physical elements that interact to form complex and variable patterns across a seascape. Biological ecosystem elements span primary producers such as phytoplankton to consumers such as zooplankton, benthic invertebrates and fish. Many of these species are of ecological, cultural, commercial and/or of conservation importance and may rely on specific habitats to fulfil parts of their life cycle. The EIS presented a detailed overview of marine fish and fish habitat within the Project Area and RSA, including plankton, algae, benthic invertebrates and fish (Section 6.1 – Marine Fish and Fish Habitat), based on existing and applicable information that was available at the time of writing.

A summary of the existing environment is presented in the following sections that focuses on area within and surrounding EL 1134. For the most part, the information and datasets that were used in the EIS represent the most recent and relevant information on marine fish and fish habitat in this area. In some instances, new information has become available on important commercial species or species of conservation concern (SOCC) within the region. Key data sources used in this EIS Addendum are presented in Table 4.2, which are summarized in the subsections that follow.

Table 4.2 Marine Fish and Fish Habitat: Key Information Sources Used in the EIS Addendum

Environmental Component	Information Sources
Assemblages	Nogueira et al. (2017, 2018)
Photosynthetic Organisms (Phytoplankton, Plants, and Macroalgae).	Mathieson and Dawes (2017)
Marine Invertebrates (Zooplankton, Benthic	Murillo et al 2016a; Kenchington et al. (2017)

Environmental Component	Information Sources
and Pelagic Invertebrates)	
Marine Fish (Ichthyoplankton, Demersal and Pelagic Fish)	OBIS 2018; Oceach 2018; Nogueira et al. (2017,2018); Vaudo et al. (2017)
Species at Risk	COSEWIC (2016); Simpson et al. (2016); Government of Canada (2017, 2018)

4.2.1.1 Assemblages and Taxonomic Groups

Marine assemblages represent an amalgamation of organisms whose form and function are adapted to coexist within a specific environment in an ecosystem. Regional key marine assemblages are detailed in Section 6.1.3 – Key Marine Assemblages in the EIS.

Environmental conditions including habitats are key drivers in the presence, distribution and abundance of flora and fauna, as organisms persist in and seek out conditions that suit their physiology and maximize their ecological fitness. Often such environmental preferences cause species to be associated with particular areas and times, and overlap and interact with other species, forming an assemblage (Amec 2014). These assemblages are associated with particular habitats resulting from a combination of environmental parameters including depth, temperature, pressure, light levels, oceanographic processes, productivity, and substrate type (Gomes et al. 1992; Mahon et al. 1998; Murillo et al. 2016a; Nogueira et al. 2017, 2018). Assemblages for the Flemish Pass across much of the Project Area (730-1,250 m), as detailed in the EIS and the eastern Newfoundland Strategic Environmental Assessment (SEA) (Amec 2014), remain relevant. However, since the EIS was completed and submitted there have been updated descriptions of certain fish (Nogueira et al. 2017, 2018) depth assemblages across the Project Area, as described below. Information is also summarized below from the EIS to provide more focussed characterizations on the area in and around EL 1134.

4.2.1.2 Photosynthetic Organisms (Phytoplankton, Plants and Macroalgae)

Photosynthetic organisms, including phytoplankton, plants, and macroalgae, convert sunlight into food for growth and nourishment. These organisms are often the most basal level of the marine food web as demonstrated by phytoplankton that are consumed by planktivores, who in turn are often prey items for larger organisms.

Phytoplankton

The phytoplankton community is comprised of small, free-floating microscopic marine plants. The majority of primary plankton productivity occurs in the light-infused epipelagic zone (0-200 m water depth) (Licandro et al. 2015) but this productivity is also transferred to the benthos on the ocean's bottom through sinking biomass and waste (Legendre and Rassoulzadegan 1995). Regional seasonal patterns of surface irradiance from chlorophyll a (a photosynthetic pigment used as a measure of photosynthetic activity) are detailed in Section 6.1.4 – Plankton, Plants and Macroalgae of the EIS. In the winter (December to February), chlorophyll a levels are higher south of the Project Area with some higher concentrations on the slopes of the Flemish Cap in and adjacent to the Project Area. There is a spring phytoplankton bloom resulting from ocean layer mixing and nutrient upwelling as with regional

conditions. This is shown by elevated chlorophyll a levels during the spring (March to May). In the summer (June to August), the spring blooms dissipate with elevated chlorophyll abundance north of the Project Area. In the fall, there is a second, smaller phytoplankton bloom, particularly over upwelling slope regions, with slightly elevated chlorophyll a concentrations (September to November).

Plants and Macroalgae

Macroalgae and sea grasses are important habitats for marine biota in coastal areas of Newfoundland where they provide enhanced productivity, and refuge to various species (Amec 2014). However, as plants and macroalgae are dependent on sunlight, their distribution is typically limited to depths shallower than 50 m (Amec 2014). In Newfoundland waters, the depth boundary where various macroalgae species will not grow is approximately 75 m (Mathieson and Dawes 2017), much shallower than the depths of the Project Area. Therefore, occurrence of plants and macroalgae in the Project Area – including in EL 1134 - is considered unlikely.

4.2.1.3 Marine Invertebrates (Zooplankton, Benthic and Pelagic Invertebrates)

Marine invertebrates include a range of species groups including zooplankton, benthic invertebrates and pelagic invertebrates. Various life history stages of marine invertebrates may also inhabit different areas of the water column or the sea floor. An overview of the biology, ecology, and distribution of key benthic and pelagic invertebrate species in the Project Area and RSA were detailed in the EIS (Section 6.1) and in the Eastern Newfoundland SEA (Amec 2014).

Zooplankton

The invertebrate zooplankton community in the vicinity of the Newfoundland Shelf region is dominated by three large species of copepod in terms of biomass. Regional zooplankton communities are detailed in Section 6.1.4 – Plankton, Plants and Macroalgae of the EIS. The largest and most abundant is a boreal species *Calanus finmarchicus,* which is ubiquitous throughout the North Atlantic from the Gulf of Maine to the Barents Sea (Melle et al. 2014; Wang and Greenan 2014). Two other prevalent species, *Calanus glacialis* and *Calanus hyperboreus,* are found in association with influxes of Arctic water such as the Labrador Current (Wang and Greenan 2014). All three species spend the winter at depth in a pre-adult stage, and trillions of copepods migrate below the depth of the permanent thermocline into deep ocean basins (600-1,400 m) and overwinter in a state of diapause (Jónasdóttir et al. 2015). All three species migrate towards the surface to mature and reproduce in late winter or spring so that that early larval stages can feed during optimal phytoplankton growth season. As reproduction of these organisms is coupled to spring bloom dynamics and temperature, inter-annual differences in timing or abundance of these species are also influenced by changes in these physical and biological processes (Wang and Greenan 2014). Recent studies also indicate that bathymetry, likely as a proxy for other environmental factors, influences zooplankton community distribution, with a shift in community composition from the continental shelf to the shelf edge (Pepin et al. 2015). In Atlantic Canada, zooplankton communities in deeper waters are dominated by *Oithona atlantica, Microcalanus spp, C. finmarchicus* and Ostracods (Pepin et al. 2015).

Pelagic Invertebrates

Pelagic macroinvertebrates include animals that live exclusively in the pelagic environment or swim up from the benthos to feed. Information on pelagic macroinvertebrates in the area are largely from trawls on the Flemish Cap (Vázquez et al. 2013) as detailed in section 6.1.5 – Pelagic Macroinvertebrates in

the EIS. Molluscs (squid and octopus), arthropods (shrimp and mysids) and scyphozoans (jellyfish), were the primary pelagic species groups captured in trawls (Vázquez et al. 2013). Similar groups were observed in Canadian Research Vessel (RV) trawls in the Project Area.

Analysis of Canadian RV survey data indicate that shrimp species, primarily *Eusergestes arcticus*, and *Acanthephyra pelagica*, were the dominant pelagic species (Table 4.3). These pelagic shrimp species are important components of the ecosystem and are prey for a variety of fish species (Vestheim and Kaartvedt 2009, Burukovsky et al. 2015). Other species observed included mysids, amphipods, octopus, squid, and jellyfish. Although octopus and squid were not commonly captured in the trawls in the Project Area, they were dominant species of the pelagic macroinvertebrate community on the Flemish Cap (Vázquez et al. 2013), and were a common prey item of Greenland halibut captured in the Flemish Pass (Rodríguez-Marín et al. 1995). Jellyfish were not enumerated as part of the multi-species trawl surveys, however, the species group was a large component of the biomass of invertebrates in the area (Table 4.3). Jellyfish accumulate phytoplankton detritus and may be an important contributor to the biological pump processes (Sweetman and Chapman 2015) in the deep waters of the Flemish Pass.

Table 4.3 Dominant Pelagic Invertebrate Species Groups in EL 1134 from Canadian RV Surveys (2011-2015)

Depth Zone	Group Name	Dominant Species	Abundance (no./tow)	Abundance Cont. to Surv. (%)	Biomass (kg)	Biomass Cont. to Surv. (%)
Middle to Deep Slope (941-1,163 m)	Arthropoda (9)	*Eusergestes arcticus* (shrimp), *Acanthephyra pelagica* (shrimp)	28	19	3.2	3
	Cnidaria (1)	Scyphozoan	10	7	0.6	1
	Mollusca (2)	Squid, octopus	84	58	1.7	1

Based on three trawls inside EL 1134 from Canadian RV Surveys (2011-2015)
[1] Number of species captured in each group is noted in brackets
nr: not reported

Benthic Invertebrates

Benthic invertebrates represent a very broad group of animals that associate with the seafloor for at least part of their life cycle. These taxa play a variety of ecological and socioeconomic roles in the ecosystem, and collectively form an important part of the food chain (Templeman 2010), generate habitat heterogeneity (Hasemann and Soltwedel 2011), are part of important commercial fisheries (Dawe et al. 2012). Their limited mobility and sensitivity to anthropogenic disturbance makes benthic communities particularly relevant to assessing potential effects related to offshore developments (DeBlois et al. 2014; Barrio Frojàn et al. 2015; Bell et al. 2015; Cordes et al. 2016; Clark et al. 2016; Murillo et al. 2016a, 2016b).

Information on benthic invertebrates in the Project Area were previously detailed in the EIS (Section 6.1.6.3 – Flemish Pass and Flemish Cap (Project Area – Northern and Southern Sections). Murillo et al. (2016a) recently assessed the composition and distribution of benthic assemblages on the Flemish Cap and associated slopes. Deepwater invertebrate assemblages on the lower slopes (800-1200 m) of

the Flemish Cap were characterized by various species of sea pens (*Anthoptilum grandiflorum*, *Halipteris finmarchica*, *Pennatula aculeata*), sea urchins (*Phormosoma placenta*) and seastars (*Bathybiaster vexillifer* and *Zoroaster fulgens*) (Murillo et al. 2016a). Deep-sea sponge assemblages were also observed at depths between 700-1400 m depth and was characterized by high biomass of Astrophorid sponges (Murillo et al 2016a). Photo surveys of the Flemish Pass and western Flemish Cap, identified some 527 epifaunal species / morphotypes from 400-1,400 m depths (Beazley et al. 2015, Greenan et al. 2016). Sponges and cnidarians represented the highest number of taxa, followed by arthropods echinoderms and molluscs (Beazley et al. 2015). Infaunal assemblages in the Flemish Pass are characterized by polychaetes, nematodes, brittle stars, sponges, and hydrozoans (Barrio Frojàn et al. 2015).

Canadian RV trawl surveys showed similar results to with echinoderms, comprised mainly of the sea urchin *P. placenta* and the rigid pink star, as the most abundant organisms captured (Table 4.4). Sponges were not enumerated in the trawl surveys, but had the highest biomass of all captured benthic invertebrates. Arthropods, comprised mainly of flatback lobster, and molluscs, comprised mainly of bivalves and whelks, were also important groups in the region's benthic communities. Cnidarians, comprised mainly of soft corals and sea pens were not as common as other species in the trawls.

Table 4.4 Dominant Benthic Invertebrate Species Groups in EL 1134 from Canadian RV Surveys (2011-2015)

Depth Zone	Group Name[1]	Dominant Species	Abundance (no./tow)	Abundance Cont. to Surv. (%)	Biomass (kg)	Biomass Cont. to Surv. (%)
Middle to Deep Slope (941-1,163 m)	Echinodermata (7)	*Phormosoma placenta (sea urchin), rigid pink star*	84	58	1.7	1
	Arthropoda (2)	Flatback lobster	28	19	3.2	3
	Mollusca (3)	Bivalves, whelk	22	15	0.1	<1
	Cnidaria (4)	Soft corals, sea pens	10	7	0.6	1
	Porifera (1)	Sponges	nr	nr	113.6	95

Based on three trawls inside EL 1134 from Canadian RV Surveys (2011-2015)
[1] Number of species captured in each group is noted in brackets
nr: not reported

Corals and Sponges

Deep-sea corals, sea pens and sponges are a subset of benthic invertebrates that are of particular conservation interest due to their habitat-forming capacity and their relative sensitivity to certain types of anthropogenic stressors (Murillo et al. 2011; Beazley et al. 2013). There are at least 57 species of corals and sea pens distributed within and around the Project Area on the Flemish Cap, Flemish Pass and the Grand Banks based on bottom trawling and video surveys (Gilkinson and Edinger 2009; Wareham 2009; Murillo et al. 2012; Beazley et al. 2013, Vázquez et al. 2013; Baillon et al. 2014a, 2014b; Kenchington et al. 2014, Beazley and Kenchington 2015). Depth, which is a proxy for other associated environmental parameters, is considered the greatest predictor for coral presence as determined by distribution models (Guijarro et al. 2016). This supports the association of coral species to specific depth ranges, particularly on shelf slopes. Soft corals are mainly distributed on shelf areas, whereas black wire corals, gorgonian corals and stony cup corals are distributed on the shelf slopes

(Murillo et al. 2011). Sea pens are also well distributed in the Flemish Pass outside the Canadian Economic Exclusion Zone (EEZ).

There are also at least 60 sponge species found within the Project Area, including in and around EL 1134 (Murillo et al. 2012; Beazley et al. 2013; Knudby et al. 2013; Beazley and Kenchington 2015; Beazley et al. 2015, Murillo et al. 2016b). Due to their fragile nature, sponges are not always identifiable to species from such surveys, and therefore sponge diversity may be under represented in published reports (Knudby et al. 2013). Sponges exhibit a wide depth range (100-1,500 m) with the higher sponge biomass being located on the Flemish Cap, followed by the Flemish Pass and the Tail of the Grand Banks. Sponges are well distributed on shelf areas east of Newfoundland with lower distributions on the southern Grand Banks (Guijarro et al. 2016). Murillo et al. (2016b), for example, identified deep areas of the Flemish Cap and the Grand Bank as areas of high biomass for *Geodia sp*. Distribution modelling indicates that summer primary production minimum, silicate concentration, temperature, depth and particular organic carbon availability were the primary parameters in predicting sponge distribution (Guijarro et al. 2016, Howell et al. 2016).

A number of environmental components and associated indicators, including sea pens, large gorgonian corals and small gorgonian corals, have been evaluated to determine areas of key ecological importance and to identify associated Vulnerable Marine Ecosystems (VMEs, see later Section 4.2.4) (Kenchington et al. 2014) based on EU Spanish and Canadian survey data. The summary data from the EU Spanish trawl survey (Kenchington et al. 2017) has been utilized here to further evaluate coral presence inside the particular areas of interest (EL 1134) inside the Project Area (Table 4.5), and is supplemented with Canadian RV survey information from relevant publications.

Within EL 1134 itself, sea pens have been the main coral group observed, with higher densities on the slopes and bottoms of the Flemish Pass (Figure 4.1, Figure 4.2). Key species in this group included *A. grandiflorum, H. finmarchica,* and *P. aculeata* (Murillo et al. 2011; Kenchington et al. 2014). This coral group was present in 77 percent of trawls in EL 1134 (Table 4.5).

Gorgonian corals were not well distributed across EL 1134 based on the EU-Spanish and Canadian RV trawl data (Table 4.5, Figure 4.1 and 4.2). In EL 1134, small and large gorgonian corals were present in 19 percent and 16 percent of trawls, respectively. The primary occurrence of small (*Acanella arbuscular* and *Radicipes gracilis*) (Figure 4.2) and large (*Acanthogorgia spp, Keratoisis spp, Paragorgia aborea, P. johnsoni, Paramuricea spp,* and *Primnoa resedaeformis*) gorgonian corals were on the bottom and lower slopes of the Flemish Pass in EL 1134 (Murillo et al. 2011; Kenchington et al. 2014) (Figure 4.2).

Canadian RV surveys indicate the occurrence of soft corals, comprised of *Gersemia sp., Duva sp.* and *Nephtheidae* species, were not well distributed on the bottom of the Flemish Pass in EL 1134. Soft corals were more prevalent on the slopes and shelf of the Grand Bank (Figure 4.2). There was also observed occurrences of stony cup corals in EL 1134, however distribution was limited (Murillo et al. 2011).

Table 4.5 Coral Percent Presence in Trawls in EL 1134 based on EU Spanish Surveys (2004-2013)

Coral Species	Total Trawls: 81 Depth Range: 732-1,252 m	
	No. of Trawl Species present	% of Trawls Species Present
Large Gorgonian	13	16
Small Gorgonian	15	19
Sea pen	62	77
Adapted from Kenchington et al. (2017).		

Sponges were relatively well distributed in EL 1134 based on EU-Spanish data (Table 4.6, Figure 4.3) with fewer observations in the Canadian RV survey (Figure 4.4). Although sponges were not consistently identified to species, the observed and identified species were primarily from the families Geodiidae and Ancorinidae (Murillo et al. 2012; Kenchington et al. 2014). Sponges were present along the bottom and slopes of the Flemish Pass in EL 1134. These species were present in 83 percent of trawls in EL 1134.

Table 4.6 Sponge Percent Presence in Trawls in EL 1134 based on EU Spanish Surveys (2004-2013)

Sponge Species	Total Trawls: 81 Depth Range: 732-1,252 m	
	No. of Trawl Species present	% of Trawls Species Present
Sponge Species	67	83
Adapted from Kenchington et al. (2017).		

Figure 4.1 Coral Distributions Based on European Union-Spanish (2004-2013) RV Surveys

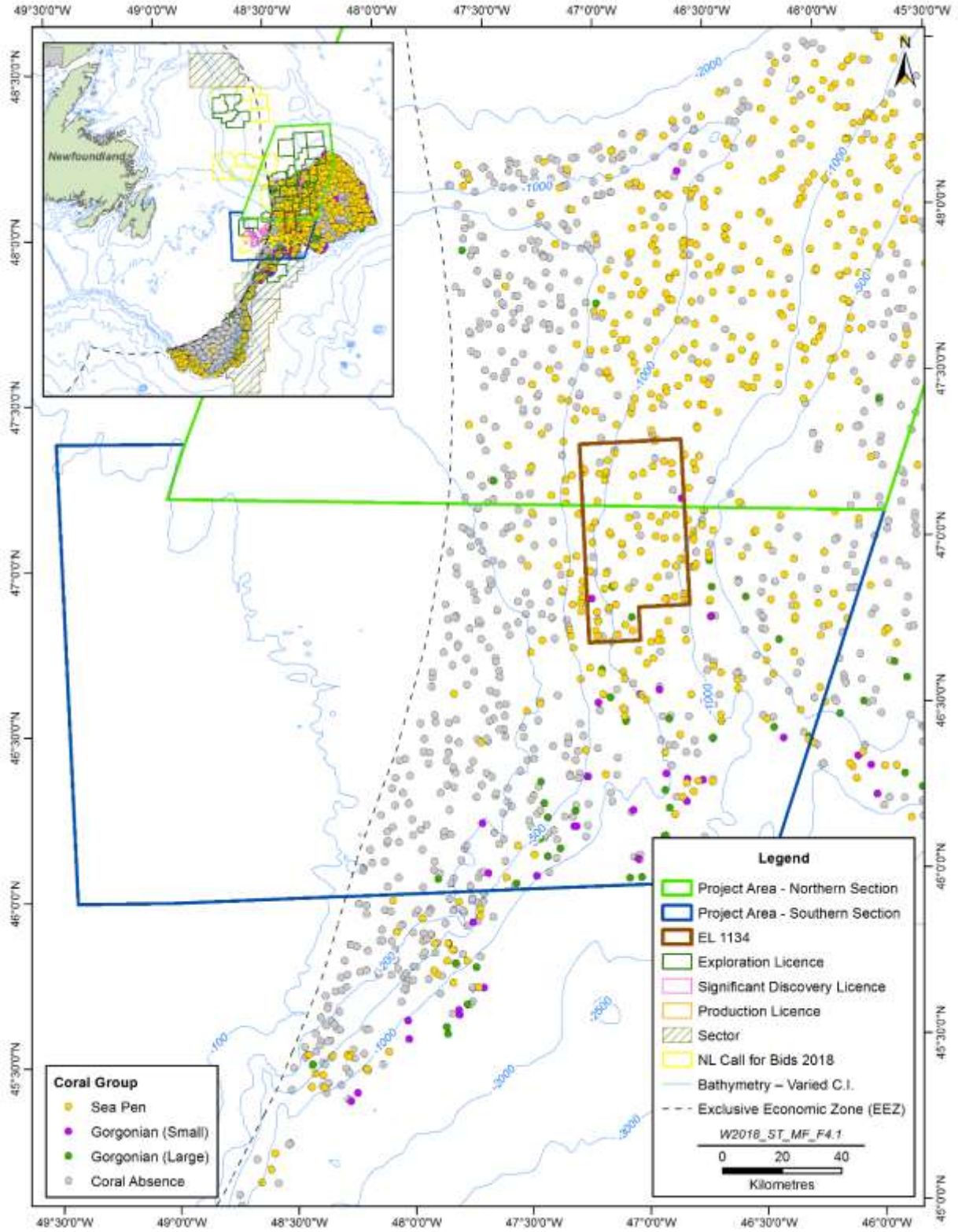


Figure 4.2 Coral Distributions based on Canadian (2000-2015) RV Surveys

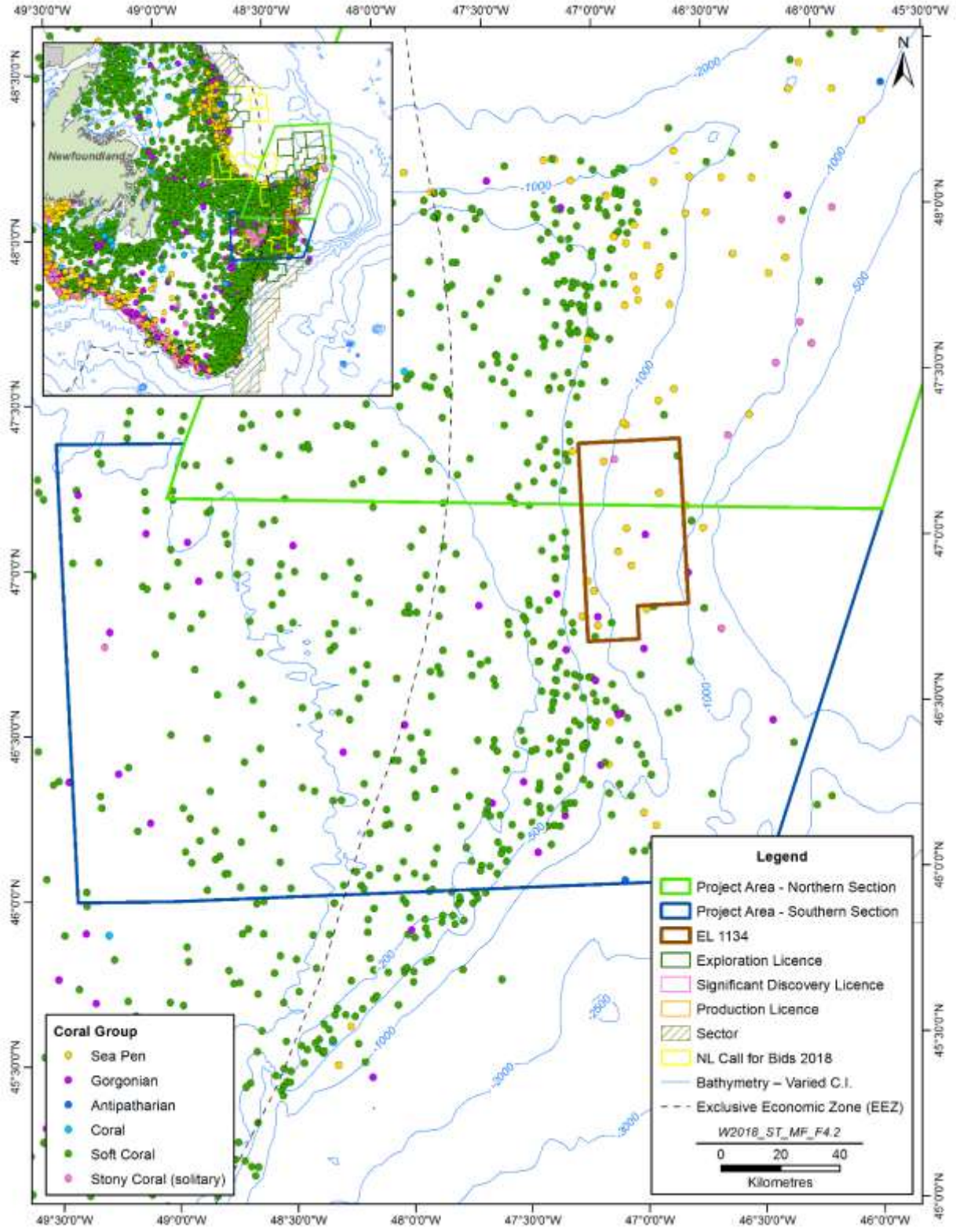


Figure 4.3 Sponge Distribution based on European Union-Spanish (2004-2013) RV Surveys

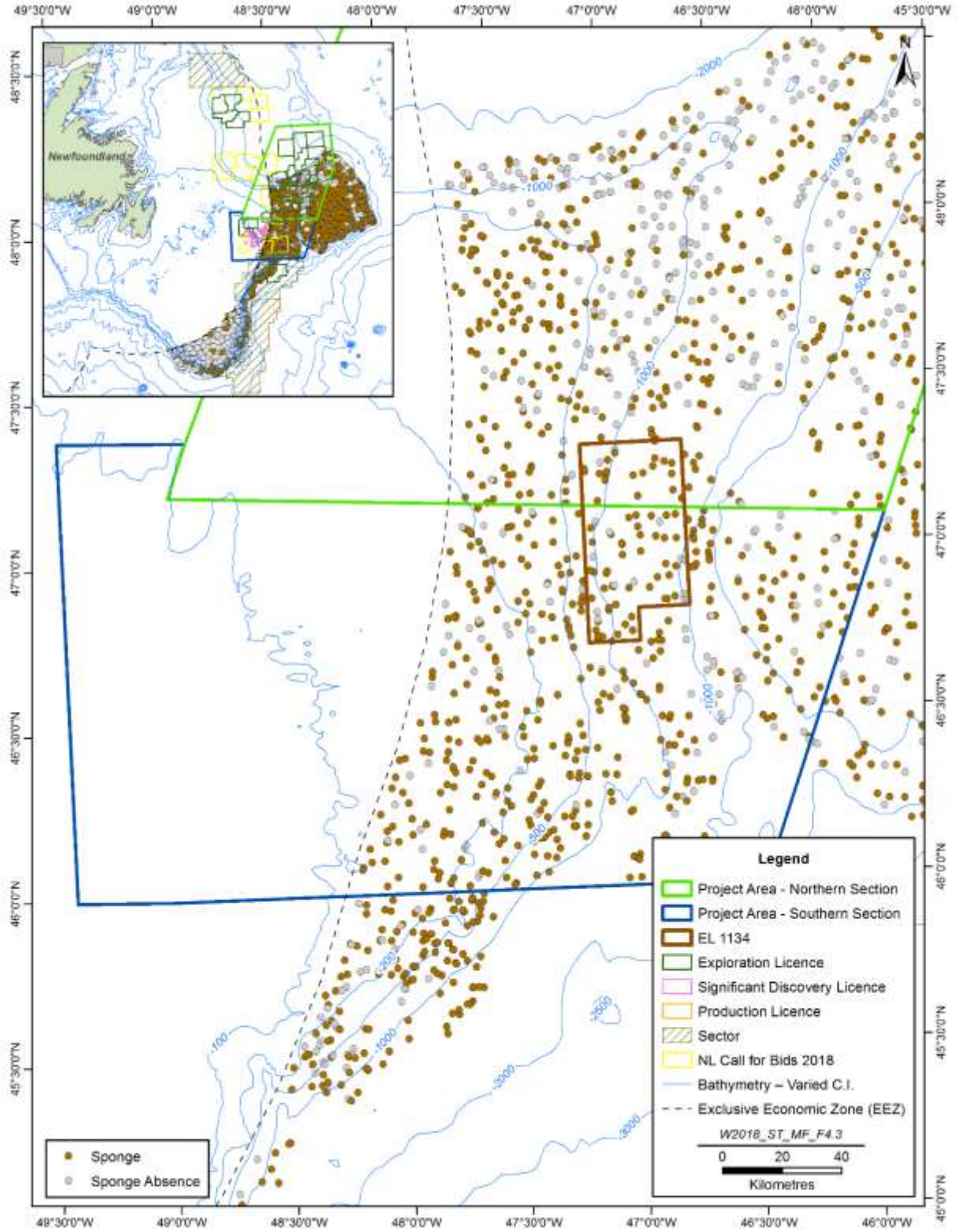
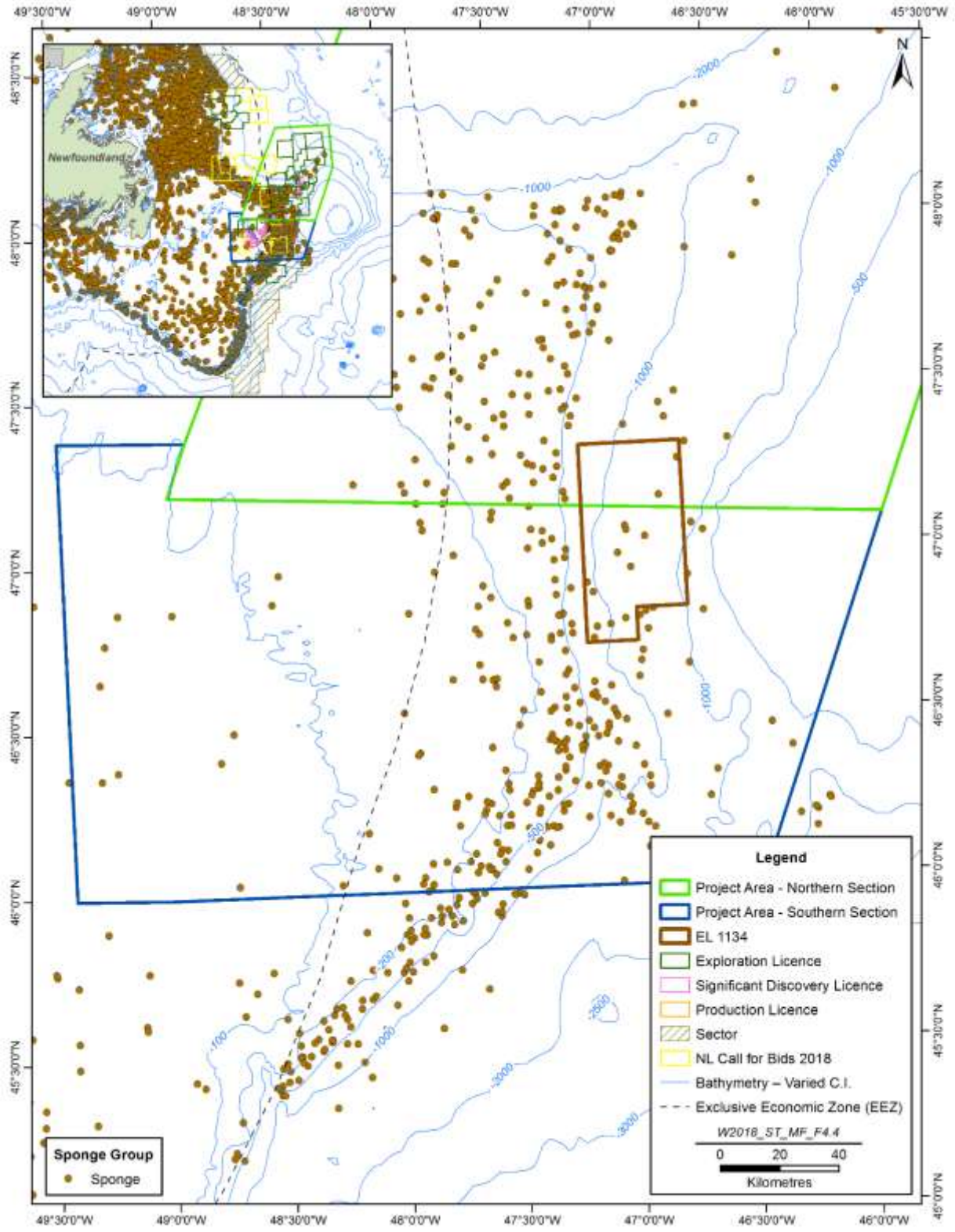


Figure 4.4 Sponge Distribution based on Canadian (2000-2015) RV Surveys



4.2.1.4 Marine Fish (Ichthyoplankton, Demersal and Pelagic Fish)

Marine fish are found throughout the Project Area and RSA, and of the 188 species known to occur in Newfoundland waters (Templeman 2010), many are of ecological, commercial, conservation and/or cultural importance. These species collectively reflect a diversity of morphologies, life histories, habitat requirements and their presence within the Project Area – and in EL 1134 itself - varies according to environmental conditions, habitat, and life history stage. Fish presence is based on their environmental requirements and preferences which results in distinct assemblages of fish species. An overview of the biology, ecology, and distribution of key demersal and pelagic fish species in the Project Area is detailed in the EIS (Section 6.1.7 – Finfish (Demersal and Pelagic Species)) and in the Eastern Newfoundland SEA (Amec 2014).

Ichthyoplankton

Ichthyoplankton includes the eggs and larvae of fish species that are found in the water column at less than 200 m and is described in Section 6.1.4 – Plankton, Plants and Macroalgae of the EIS. Ichthyoplankton distribution is generally affected by environmental variables such as temperature and salinity, therefore, they are more evenly distributed across pelagic habitats (Pepin and Anderson 1997). Different species of corals can also host eggs and/or larvae of redfish and other fish species (Baillon et al. 2012). Ocean currents facilitate dispersion of eggs and larvae, including between inshore and offshore areas (Pepin and Helbig 1997). Sources of variability for transport between regions include oceanographic features, such as topographically induced gyre-like circulations and other hydrodynamic features that can potentially act as retention mechanisms for eggs and larvae (Ruzzante et al. 1998). For example, the anti-cyclonic gyre on the Flemish Cap facilitates retention of redfish eggs and larvae within the area (Anderson 1984, Dalley and Anderson 1998; Pérez-Rodríguez et al. 2012). Ichthyoplankton are also dependent on the availability of copepods as a critical food source during their pelagic development periods. Redfish release their larvae in association with the spring reproductive timing of the copepod *C. finmarchicus*. The developmental stages of *C. finmarchicus* (from eggs through to juveniles) are the preferred prey item of *Sebastes* larvae, as indicated by gut content analysis (Anderson 1994).

Pelagic Fish

Pelagic fish species in the Project Area undertake extensive seasonal migrations to spawning, nursery and foraging areas (Trenkel et al. 2014). This includes seasonal spawning migrations between freshwater and marine habitats (e.g. Atlantic salmon, American eel), summer feeding migrations from southerly latitudes by migratory warm water pelagic fishes (e.g., tunas, swordfish, sharks), and seasonal inshore offshore migrations (e.g., Atlantic cod, capelin) as detailed in the EIS (Section 6.1.7) and in the Eastern Newfoundland SEA (Amec 2014). Temperature is considered a key environmental parameter for controlling distributions of various small to medium pelagic species (e.g., herring, mackerel, capelin) (Trenkel et al. 2014). In large pelagic species such as tuna and swordfish, temperature, oxygen levels, population density, and oceanographic processes are important for determining spatial distributions (Trenkel et al. 2014). Atlantic salmon have been identified as a key species of concern by Indigenous groups and has been addressed in detail in the EIS (Chapter 6 – Section 6.1.7.4 and Chapter 8 – Section 8.4.4) as well as in recent Information Request (IR)16-a and 16-b. This information can be located online at https://www.ceaa-acee.gc.ca/050/evaluations/document/exploration/80132?culture=en-CA

Although various species may migrate through the Project Area, it does not appear to be a high traffic area for various shark, tuna and swordfish species (Ocearch 2018, OBIS 2018). In Canadian waters

Western Atlantic resident tuna are mainly distributed on the Scotian Shelf whereas trans-Atlantic tuna occupy habitat areas from the Grand Banks, Flemish Pass, Flemish Cap and areas off the continental shelf (Walli et al. 2009; COSEWIC 2011; OBIS 2018). Similarly, swordfish may pass through the Project Area, however they are primarily observed in waters off the continental shelf (OBIS 2018). Swordfish associate with thermal fronts indicating they follow the warm Gulf Stream into Canadian waters similar to other large pelagic fishes (Podestá et al. 1993; Sedberry and Loefer 2001). Shark migration and areas of aggregation are generally outside of the Project Area (Ocearch 2018). Early, juvenile and adult life stages of porbeagle sharks are abundant on or near the continental shelf in Canadian waters and are rarely captured at the surface or at depths greater than 200 m (COSEWIC 2014a). Shortfin mako migration routes are mainly in offshore areas outside the continental shelf, including the Newfoundland Shelf and Flemish Cap in summer to winter seasons (Vaudo et al. 2017). White sharks have seasonal distribution ranges, where in winter months they frequent areas off the southeastern United States and in spring to summer months expand to northern parts of their range (Curtis et al. 2014), as evidenced by female white sharks that have been tracked to the southern Newfoundland shelf and slopes and to the Flemish Cap (Ocearch 2018).

Demersal Fish

Key groundfish assemblages in the Project Area in general – including in EL 1134 - have been characterized with European Union Research Vessel (RV) data for the Flemish Cap and the tail of the Grand Banks (Nogueira et al. 2014, 2016, 2017, 2018) (Table 4.8). Groundfish assemblages have been observed to associate with depth, but this may be a proxy for other associated environmental parameters including temperature, productivity, oceanographic processes and oxygen levels (Nogueira et al. 2017). In groundfish assemblages, biomass and abundance was observed to decline with depth and diversity was observed to increase with depth (Nogueira et al. 2016, 2017). Therefore, at shallower depths the areas are often dominated by a few species with high abundance, whereas deeper water fish assemblages are dominated by several species with low abundance. The lower medium assemblage, at depths similar to the Project Area, was characterized by a variety of species including Greenland halibut, blue hake, grenadier species and black dogfish (Table 4.8) (Nogueira et al. 2014, 2016, 2017, 2018). Longline surveys on the Flemish Cap and slopes of the Grand Bank, including sampling within EL 1134, show similar results with roughhead grenadier, blue hake, and Greenland halibut as dominant species in the middle to deep slopes (800-1,500 m) (Murua and de Cárdenas 2005) as detailed in the EIS.

Black dogfish, smalleyed rabbitfish and skate species were also characteristic species in the middle to deep slopes, but had lower abundance (Murua and de Cárdenas 2005). Further analysis of the Canadian RV survey data indicate that roughhead grenadier, roundnose grenadier, black dogfish and Greenland halibut comprised more than 95 percent of fish captured in Canadian RV trawls (Table 4.8). Other species observed in EL 1134, but with lower abundance included Greenland halibut, deepsea cat shark and various skate species.

Distribution information on key species at these depths indicate that roughhead grenadier (Figure 4.5), roundnose grenadier (Figure 4.6), blue hake (Figure 4.7) and black dogfish (Figure 4.8) have areas of higher aggregation in bottom areas of the Project Area around EL 1134. While Greenland halibut (Figure 4.9) are distributed across depths, they are more prevalent on slope areas of the continental shelf and Flemish Cap.

Table 4.7 Generalized Fish Assemblages According to Depth for the Tail of the Grand Banks and Flemish Cap

Tail of the Grand Banks	Flemish Cap
Lower-medium Assemblage (601-1,460 m)	**Lower-medium Assemblage (601-1,460 m)**
• Greenland halibut, *Reinhardtius hippoglossoides* • Blue hake, *Antimora rostrata* • Roughhead grenadier, *Macrourus berglax* • Marlin-spike, *Nezumia bairdii* • Black dogfish, *Centroscyllium fabricii* • Roundnose grenadier, *Coryphaenoides rupestris* • Northern cutthroat eel, *Synaphobranchus kaupii* • Arctic skate, *Amblyraja hyperborea* • Snubnosed spiny eel, *Notacanthus chemnitzii* • Spinytail skate, *Bathyraja spinicauda* • Longnose chimera, *Harriotta raleighana*	• Greenland halibut, *Reinhardtius hippoglossoides* • Blue hake, *Antimora rostrata* • Roughhead grenadier, *Macrourus berglax* • Marlin-spike, *Nezumia bairdii* • Black dogfish, *Centroscyllium fabricii* • Roundnose grenadier, *Coryphaenoides rupestris* • Northern cutthroat eel, *Synaphobranchus kaupii* • Arctic skate, *Amblyraja hyperborea* • Snubnosed spiny eel, *Notacanthus chemnitzii* • Sloane's viperfish, *Chauliodus sloani* • Vahl's eelpout, *Lycodes vahlii* • Scaly dragonfish, *Stomias boa* • Bean's sawtoothed eel, *Serrivomer beanii* • Threadfin rockling, *Gaidropsarus ensis* • Demon catshark, *Apristurus* sp. • Lanternfish, *Lampanyctus* sp.
Source: Adapted from Nogueira et al. (2014, 2016, 2017, 2018).	

Table 4.8 Dominant Demersal Fish Species Groups in EL 1134 from Canadian RV Surveys (2011-2015).

Depth Zone	Group Name	Dominant Species	Abundance (no./tow)	Abundance Contribution to Survey (%)
Middle to Deep Slope (941-1,163 m)	Roughhead grenadier	*Macrourus berglax*	180	57
	Roundnose grenadier	*Coryphaenoides rupestris*	68	21
	Black dogfish	*Centroscyllium fabricii*	42	13
	Greenland halibut	*Reinhardtius hippoglossoides*	20	6
	Deepsea cat shark	*Apristurus profundorum*	3	1
	Spinytail skate	*Bathyraja spinicauda*	3	1
	Jensen's skate	*Amblyraja jenseni*	2	1
Based on three trawls inside EL 1134 from Canadian RV Surveys (2011-2015)				

Figure 4.5 Roughhead Grenadier Distribution and Abundance as Compiled from Canadian RV Trawl Survey Data (2008-2012)

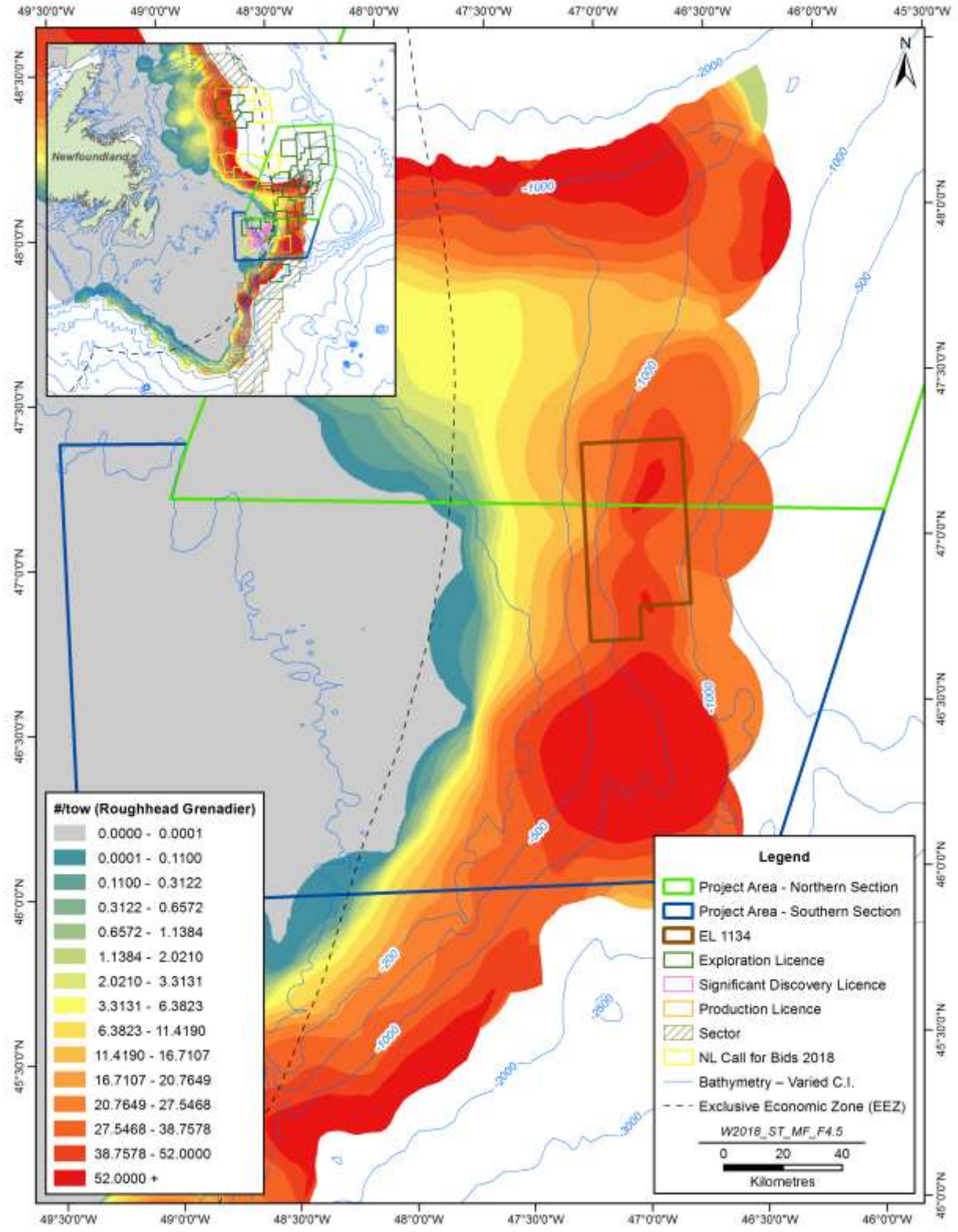


Figure 4.6 Roundnose Grenadier Distribution and Abundance as Compiled from Canadian RV Trawl Survey Data (2008-2012)

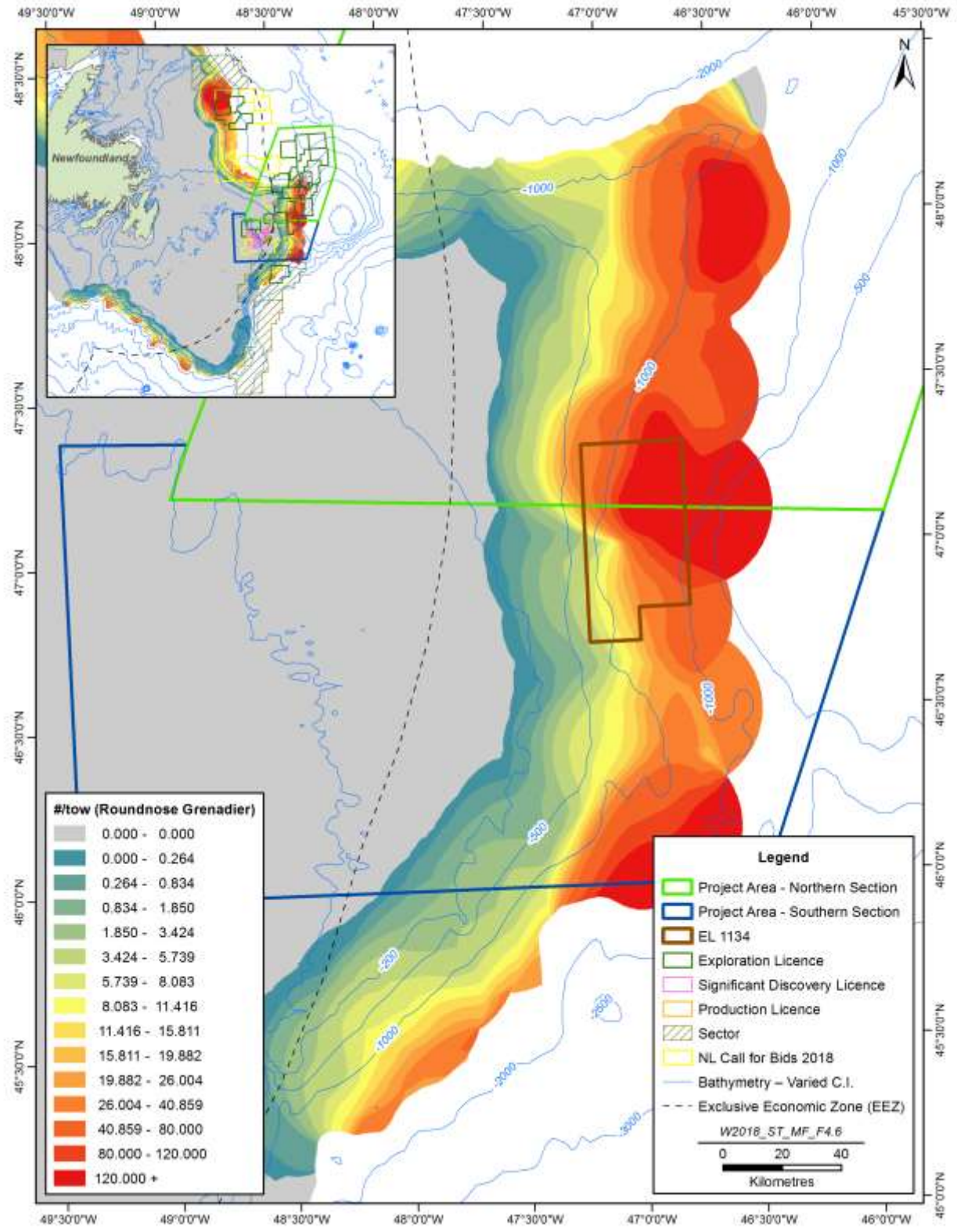


Figure 4.7 Blue Hake Distribution and Abundance as Compiled from Canadian RV Trawl Survey Data (2008-2012)

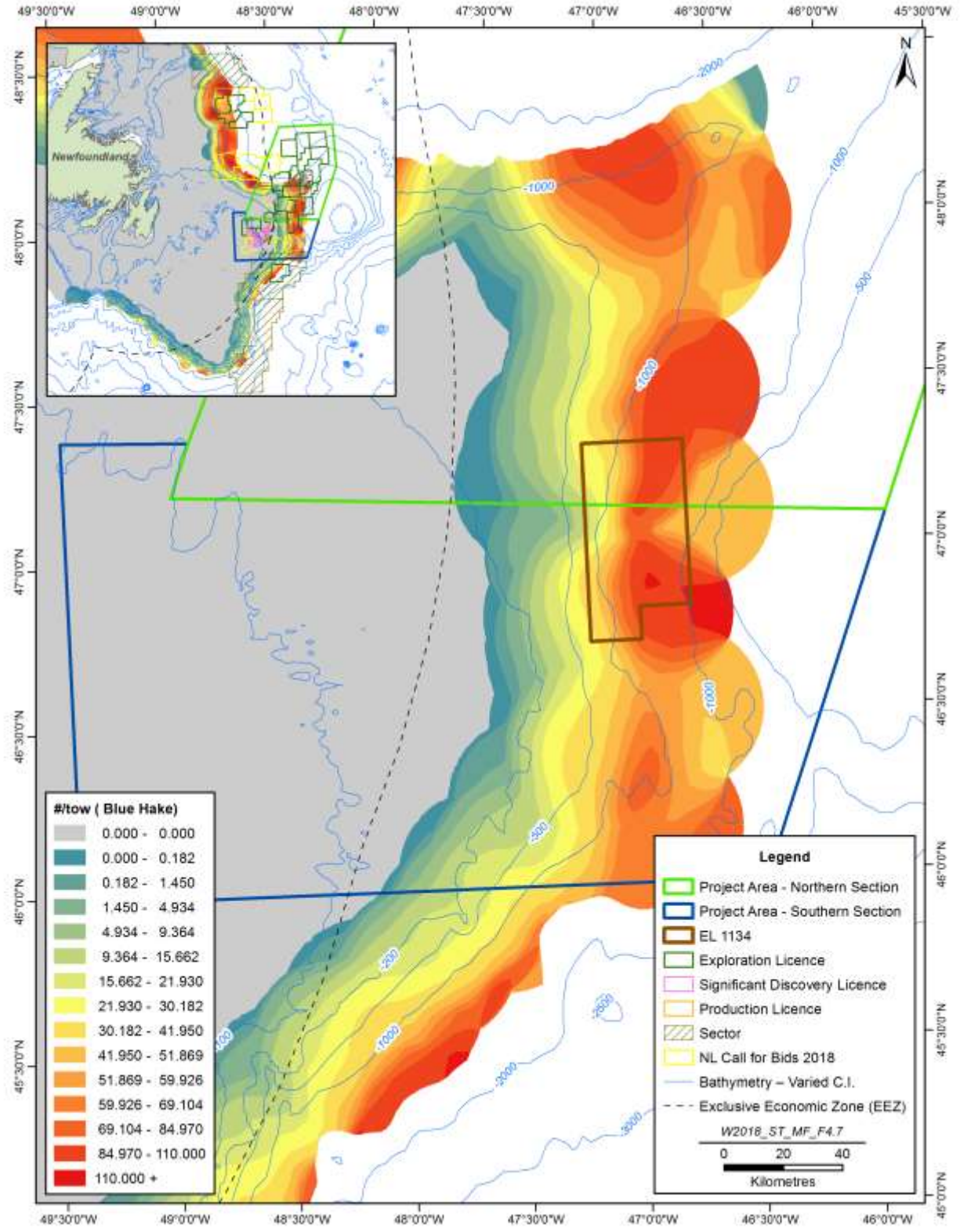


Figure 4.8 Black Dogfish Distribution and Abundance as Compiled from Canadian RV Trawl Survey Data (2008-2012)

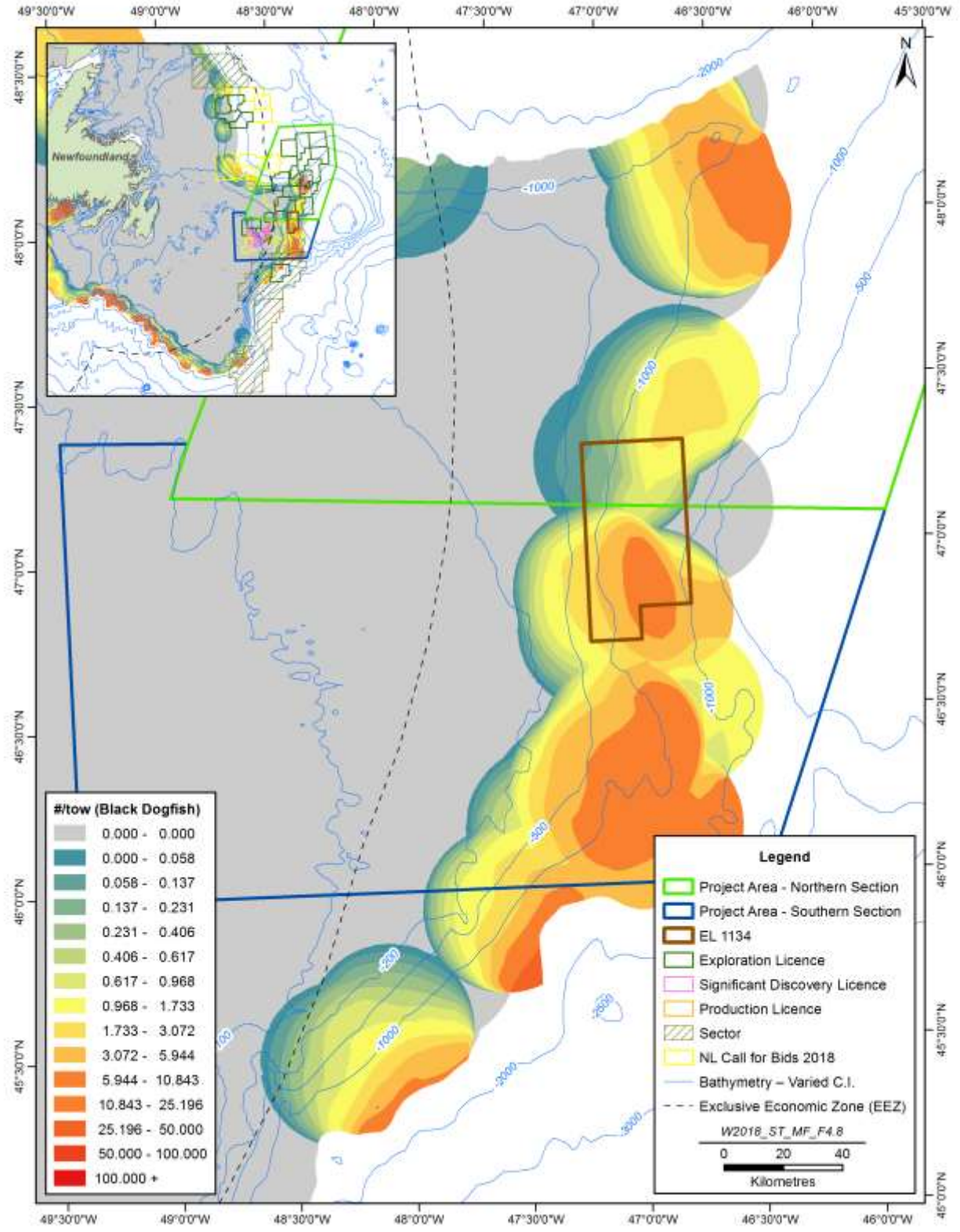
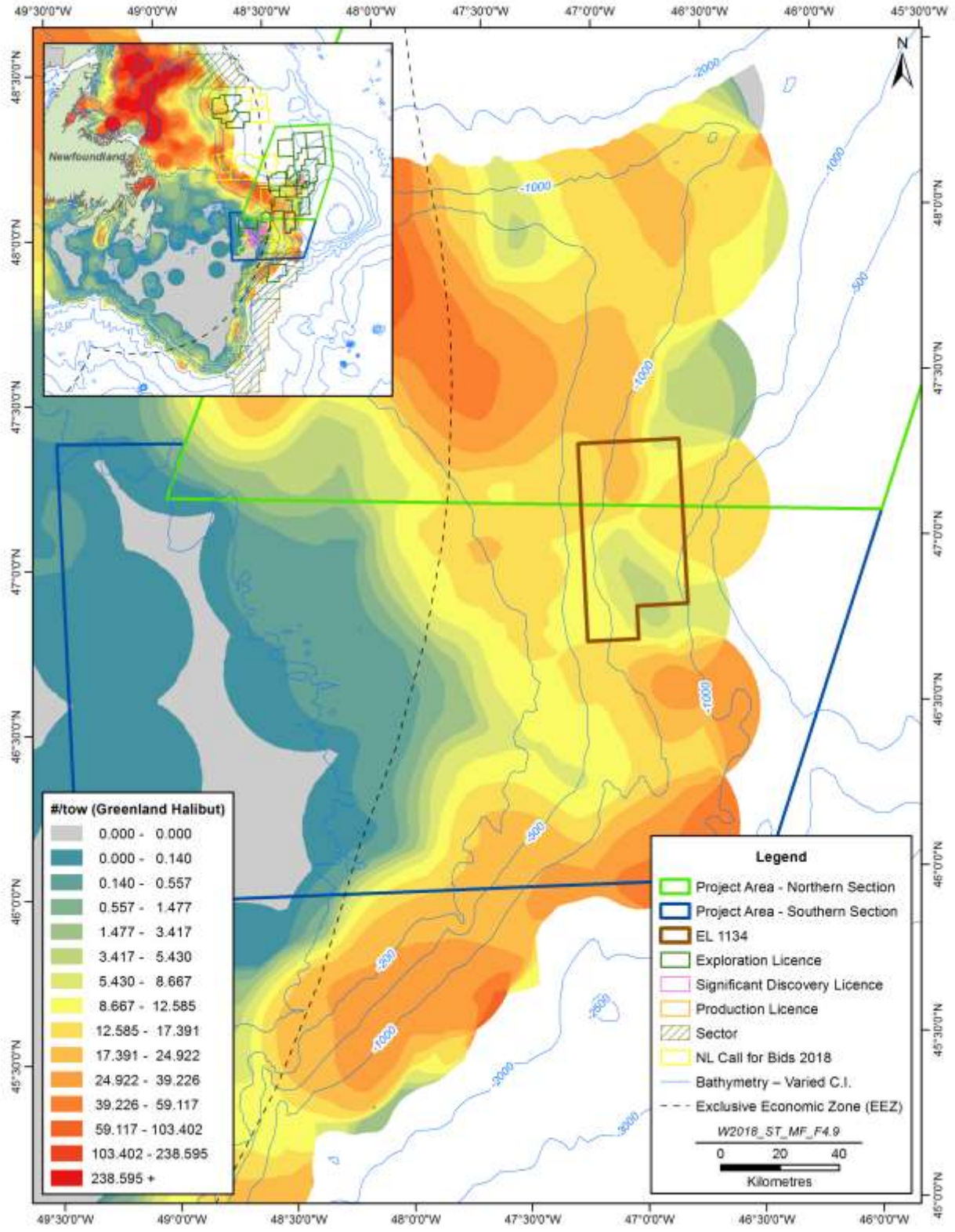


Figure 4.9 Greenland Halibut Distribution and Abundance as Compiled from Canadian RV Trawl Survey Data (2008-2012)



4.2.1.5 Species at Risk

As outlined in Section 6.1.8 of the EIS, there are a number of fish species that have been designated as being at risk, or which have otherwise been identified as being of special conservation concern, that are known or likely to occur in the Project Area, including several that are designated and formally protected under the federal *Species at Risk* Act (SARA) and/or the Newfoundland and Labrador *Endangered Species Act* (NL ESA) (Table 4.9).

Table 4.9 Fish Species at Risk or Otherwise of Special Conservation Concern

Species		Status / Designation [1,2]				Relevant Population (Where Applicable)
Common Name	Scientific Name	*NL ESA*	*SARA*	COSEWIC	IUCN	
Atlantic wolffish	*Anarhichas lupus*		SC	SC		
Northern wolffish	*Anarhichas denticulatus*		T	T		
Spotted wolffish	*Anarhichas minor*		T	T		
American eel	*Anguilla rostrata*	V		T	E	Global (IUCN)
Blue shark	*Prionace glauca*			NR	NT	Atlantic (COSEWIC); Global (IUCN)
Basking shark	*Cetorhinus maximus*			SC	V	Atlantic (COSEWIC); Global (IUCN)
Common lumpfish	*Cyclopterus lumpus*			T		Atlantic (COSEWIC)
Alewife	*Alosa pseudoharengus*				LC	Global (IUCN)
Black dogfish	*Centroscyllium fabricii*				LC	Global (IUCN)
Atlantic cod	*Gadus morhua*			E	V	Newfoundland and Labrador (COSEWIC); Global (IUCN)
Cusk	*Brosme brosme*			E		
Haddock	*Melanogrammus aeglefinus*				V	Global (IUCN)
White hake	*Urophycis tenuis*			T		Atlantic and Northern Gulf of St. Lawrence (COSEWIC)
Porbeagle	*Lamna nasus*			E	V	Global (IUCN)
Shortfin mako	*Isurus oxyrinchus*			SC	V	Atlantic (COSEWIC); Global (IUCN)
White shark	*Carcharodon carcharias*		E	E	V	Atlantic (COSEWIC/SARA); Global (IUCN)
Roughhead grenadier	*Macrourus berglax*			SC		
Roundnose grenadier	*Coryphaenoides rupestris*			E		
Lanternfish	Myctophidae				LC	Global (IUCN)
Atlantic hagfish	*Myxine glutinosa*				LC	Global (IUCN)
American plaice	*Hippoglossoides platessoides*			T		Newfoundland and Labrador (COSEWIC)
Atlantic halibut	*Hippoglossus hippoglossus*			NR	E	Global (IUCN)
Barndoor skate	*Dipturus laevis*				E	Global (IUCN)

Species		Status / Designation [1,2]				Relevant Population (Where Applicable)
Common Name	Scientific Name	*NL ESA*	*SARA*	COSEWIC	IUCN	
Smooth skate	*Malacoraja senta*			E	E	Funk Island Deep (COSEWIC); Global (IUCN)
Spinytail skate	*Bathyraja spinicauda*				NT, V	Global, Northwest Atlantic (IUCN)
Thorny skate	*Amblyraja radiata*			SC	V	Canada, Global (IUCN)
Winter skate	*Leucoraja ocellata*			E	E	Eastern Scotian Shelf – Newfoundland (COSEWIC); Global (IUCN)
Atlantic salmon	*Salmo salar*			NR, T, SC, E	LC	South Newfoundland, Quebec Eastern North Shore, Quebec Western North Shore, Anticosti Island, Inner St. Lawrence, Gaspe-Southern Gulf of St. Lawrence, Eastern Cape Breton, Nova Scotia Southern Upland, Inner/Outer Bay of Fundy (COSEWIC); Global (IUCN)
Albacore tuna	*Thunnus alalunga*				NT	Global (IUCN)
Atlantic bluefin tuna	*Thunnus thynnus*			E	E	Global (IUCN)
Bigeye tuna	*Thunnus obesus*				V	Global (IUCN)
Acadian redfish	*Sebastes fasciatus*			T	E	Atlantic (COSEWIC); Global (IUCN)
Deepwater redfish	*Sebastes mentella*			T	LC	Northern (COSEWIC); Global (IUCN)
Greenland shark	*Somniosus microcephalus*				NT	Global (IUCN)
Spiny dogfish	*Squalus acanthias*			SC	V	Atlantic (COSEWIC); Global (IUCN)

[1] Not at Risk (NR), Least Concern (LC), Vulnerable (V), Near Threatened (NT), Special Concern (SC), Threatened (T), Endangered (E)
[2] Multiple designations refer to multiple populations or sub-populations

There have been no new management plans for species recovery for any at risk marine fishes in the Project Area since the EIS was completed (Government of Canada 2018).

4.2.2 Marine and Migratory Birds (Including Species at Risk)

As stated in the EIS (Section 6.2), marine and migratory birds are important aspects and indicators of ecosystem health, and are of socioeconomic importance in Newfoundland and Labrador both in terms of tourism (e.g. the Witless Bay and Cape St. Mary's Ecological Reserves) and as a food source (murres, known locally as "turrs", are hunted locally). The coastline of Eastern Newfoundland and the

waters offshore provide important habitat for various species of marine-associated birds. The Grand Banks and Flemish Cap regions are important feeding areas for dozens of marine bird species, and are of particular importance to planktivorous seabirds such as storm-petrels, shearwaters and Dovekies (Barrett et al 2006; Fort et al 2012, 2013). Nesting grounds for tens of millions of seabirds representing some 20 species are found along the coast of Eastern Newfoundland, including some of the largest seabird colonies in eastern North America south of the Hudson Strait (Lock et al 1994). Several Important Bird Areas (IBAs) and other sites of regional significance to migratory birds have been designated in Eastern Newfoundland because they provide important habitat for large numbers of birds for at least part of the year and/or because they support avian species of conservation concern.

Marine-associated birds may be classified as: 1) seabirds, 2) waterfowl and divers, and 3) shorebirds. As well, a number of landbird species may also interact with planned Project activities, as they are associated with coastal habitats and/or migrate nocturnally over marine waters.

Information on marine and migratory birds obtained for the EIS from the Canadian Wildlife Service (CWS) branch of Environment and Climate Change Canada was reviewed for the EL 1134 area, including data on seabird colonies in Eastern Newfoundland and on seasonal and spatial trends in seabird abundance from the Eastern Canadian Seabirds at Sea (ECSAS) program. Records from the Atlantic Canada Shorebird Survey (ACSS) and the IBA of Canada programs were also used to provide further information on species presence, and to identify areas and times of particular importance to avifauna in and around the Project Area.

4.2.2.1 Seabirds

Seabirds are relatively long-lived species with low fecundity, delayed recruitment and relatively low rates of population growth. Fifield et al (2009) explored seasonal trends in abundance of seabirds off Eastern Canada and found that the largest concentration of seabirds in the offshore waters off Eastern Newfoundland was from March to August, while seabirds were least abundant in the area in the fall (September - October). Within the Project Area, including EL 1134, data are relatively sparse for the fall months due to lack of survey coverage, but seabird abundance was consistent throughout the rest of the year with an average of approximately 18 to 25 birds / km^2 (Fifield et al 2009). The seasonal trends observed largely correspond with earlier PIROP (Programme Intégré des Recherches sur les Oiseaux Pélagiques) seabird survey data summarized in Lock et al (1994). In both of these data sets, the geographical survey coverage was considerably greater in the spring and summer months than in the fall and winter, as the survey program relies heavily on the use of vessels of opportunity rather than dedicated survey vessels.

As detailed in the EIS (Section 6.2), a diverse assemblage of seabirds can be found in the marine waters off Eastern Newfoundland, many of which nest along the coastline of Eastern Newfoundland. Detailed accounts of seabirds of Eastern Newfoundland (including general life history information) can be found in the EIS (Section 6.2.2) and in the Eastern Newfoundland SEA (Amec 2014), with a brief overview being provided below.

For the purpose of this EIS Addendum, ECSAS data within the Project Area (covering 2006 to 2017) were obtained from CWS. While these survey data cannot be used to calculate densities as they have not been corrected for detectability (unlike the data in Fifield et al 2009), they provide valuable information on seasonal and spatial trends in abundance for the different seabird groups. Table 4.10 summarizes the sightings for each group, reported as number of observations per unit of survey effort (i.e., per transect), and number of individuals per unit effort.

Table 4.10 Marine and Migratory Birds: Observations within EL 1134 and in the Overall Project Area

Species / Groups	EL 1134			Project Area		
	Observations/ Unit Effort	Individuals/ Unit Effort	Months Sighted	Observations / Unit Effort	Individuals/ Unit Effort	Months Sighted
Northern Gannets	0.005	0.007	Apr, Oct	0.002	0.003	Apr-Nov
Phalaropes	0.000	0.000	n/a	0.000	0.001	Sept-Oct
Kittiwakes	0.100	0.424	Apr-May, Nov-Dec	0.083	0.467	Jan-Jun, Oct-Dec
Large Gulls	0.096	0.171	Apr-May, Nov-Dec	0.080	0.229	Jan-Sept, Nov-Dec
Dovekies	0.123	2.551	Apr-May, Oct-Dec	0.054	0.373	Jan-Jun, Oct-Dec
Murres	0.096	0.260	Apr-May, Jul, Nov-Dec	0.092	0.219	Jan-Dec
Other Alcids	0.018	0.025	Apr-May, Oct-Nov	0.026	0.047	Jan-Dec
Jaegers and Skuas	0.011	0.021	Apr-May, Jul	0.008	0.009	Mar-Dec
Northern Fulmars	0.178	0.485	Apr-May, Jul, Oct-Dec	0.175	1.007	Jan-Dec
Shearwaters	0.096	0.435	Apr-May, Jul, Oct	0.109	0.448	Apr-Dec
Storm-Petrels	0.016	0.021	Apr, Jul	0.073	0.140	Apr-Nov
Waterfowl	0.000	0.000	n/a	0.000	0.001	Nov

Source: ECSAS (2017)

Cormorants

Cormorants generally feed within a few kilometers of their colony or roost location and rarely venture far from the coast at any time of year, and so their abundance in the Project Area is low, and none were observed in the Northern and Southern parts of the Project Area.

Gannets

Gannets are most likely to be present in the Project Area from March to November, as the majority of the population overwinters in the Gulf of Maine and further south (Mowbray 2002; Montevecchi et al 2012); however, they have been observed in the waters off Newfoundland at all times of year. ECSAS sightings of Northern Gannets within the Project Area and EL 1134 were uncommon in the spring to fall months, as shown in Table 4.10.

Phalaropes

Phalaropes breed in Arctic tundra during the summer months and typically overwinter south of Canada, occurring most frequently in the Project Area during migration. The Red-necked Phalarope has been assessed by COSEWIC as a species of Special Concern. ECSAS sightings of phalaropes within the Project Area were very uncommon in the fall months, as shown in Table 4.10, and none were observed

in EL 1134. Although most of the sightings in offshore Newfoundland were not identified to species level in the ECSAS data set, of those that were identified, most were Red Phalarope which is known to be the more pelagic of the two species (Tracy et al 2002).

Gulls

Herring, Great Black-backed and Ring-billed Gulls and Black-legged Kittiwakes occur in temperate areas year-round, while Sabine's, Ivory, Iceland and Glaucous Gulls nest in the Arctic and are found in the Project Area only outside the breeding season. Newfoundland supports more than two-thirds of Atlantic Canada's breeding gull population, with Black-legged Kittiwakes accounting for almost half of this number (Cotter et al 2012). Laughing, Black-headed and Lesser Black-backed Gulls may occur infrequently in the Project Area. The Ivory Gull is listed as Endangered under both NL ESA and SARA. Gulls breeding in the region have suffered population declines due to reduced food availability associated with fisheries collapse and closure of municipal dumps, although recent census data indicates that populations are showing some signs of recovery (Cotter et al 2012). Outside of the breeding season, most gull species are associated with coastal areas, while Sabine's Gull, Ivory Gull and Black-legged Kittiwake are more pelagic.

A tracking study of Black-legged Kittiwakes has shown that the northwest Atlantic, particularly the shelf edge off Newfoundland, is a particularly important wintering area for kittiwakes, with most of the Atlantic population overwintering in this region (Frederiksen et al 2012).

ECSAS sightings for Black-legged Kittiwakes and Large Gulls (i.e., all other gull species) within the Project Area and EL 1134 are shown in Table 4.10; both groups were commonly observed in the area year-round except for EL 1134 from January to March, which may be a reflection of the limited seasonal coverage in the EL itself. Most of the large gulls identified to species level were Great Black-backed Gull, Herring Gull, and in the winter months, Iceland Gull and Glaucous Gull. No endangered Ivory Gulls were identified in the ECSAS surveys within the Project Area.

Terns

All three species of terns found in the Project Area are migratory, and are present only during the breeding season. Terns are typically found in coastal environments and seldom seen far from shore, except for Arctic Terns which tend to be highly pelagic during migration (Cuthbert and Wires 1999; Hatch 2002; Nisbet 2002). No tern sightings were reported in the ECSAS surveys within EL 1134 and the Project Area overall.

Alcids

Five of the six alcid species found in the Project Area breed in Eastern Newfoundland, while the Dovekie is a largely arctic-nesting species. Among seabirds, murres and Dovekies spend a particularly large proportion of their time on the water relative to more aerial species (Wiese and Ryan 2003; Wilhelm et al 2007; Fifield et al 2009) and congregate over relatively small, productive areas such as around the Grand Banks (Gaston et al 2011; Hedd et al 2011; Montevecchi et al 2012). The core winter distribution of the world's Dovekie population lies within the waters off Eastern Newfoundland (Fort et al 2013). Most of the Eastern Canadian population of Common Murres and over a third of the region's Thick-billed Murres also congregate in this region in the winter months (McFarlane Tranquilla et al 2013). Alcids are rendered flightless for several weeks each year during the fall moulting period (Gaston and Hipfner 2000; Ainley et al 2002; Lavers et al 2009; Montevecchi and Stenhouse 2002). Atlantic Puffins

tend to disperse widely and well offshore in the winter months (Fifield et al 2009), while Razorbills are believed to concentrate in the Bay of Fundy in winter (Huettman et al 2005), and Black Guillemots tend to be associated with coastal environments year-round (Butler and Buckley 2002).

ECSAS sightings for alcids within EL 1134 and the Project Area are presented in Table 4.10. Abundance of murres and other alcids was similar in EL 1134 and in the Project Area overall, while Dovekies were far more abundant in EL 1134 than in the overall Project Area. According to Table 4.10, there were no alcid observations in EL 1134 during the winter months; however, this is a reflection of the low survey effort in the Project Area in winter and does not likely reflect actual abundance. All six species have been reported in ECSAS surveys off eastern Newfoundland year-round, although Black Guillemots (a more coastal species) are relatively infrequently observed offshore.

Jaegers and Skuas

Jaegers and skuas do not breed in Newfoundland and Labrador; however, non-breeding individuals are found offshore year-round. In the winter months, the waters off Eastern Canada support a large proportion of the Icelandic population of Great Skuas (Magnusdottir et al 2012). ECSAS sightings for jaegers and skuas within EL 1134 and the Project Area are presented in Table 4.10; sightings in EL 1134 were concentrated in the spring and summer, while in the Project Area overall, they were observed throughout most of the year. While most sightings could not be identified to species level, all five have been observed in the waters of Eastern Newfoundland. Great Skuas were much more numerous than South Polar Skuas, and Pomarine Jaegers were identified more often than Parasitic or Long-tailed Jaegers.

Fulmars and Shearwaters

Outside the breeding season, fulmars and shearwaters are highly pelagic and spend most of their time in the air, at or near the water's surface. The Northern Fulmar is common year-round in the offshore waters of Eastern Newfoundland, while shearwaters are most common in offshore Newfoundland in the summer and fall months, particularly on the east and northeast Grand Banks (Fifield et al 2009). Northern Fulmar and Manx Shearwater nest in Newfoundland (Lee and Haney 1996; Mallory et al 2012), while the other three species of shearwater (Great, Sooty and Cory's) do not. Most of the world's population of Great Shearwaters is found in the northwest Atlantic in the summer months, outside of their austral breeding season (Brown 1986).

ECSAS sightings for fulmars and shearwaters within EL 1134 and the Project Area are presented in Table 4.10; both groups were commonly observed in the area year-round except for EL 1134 from January to March, which is a reflection of the limited seasonal coverage in EL 1134. Of the shearwaters that could be identified in the surveys, Great Shearwater was the most commonly identified species in the Project Area, followed by Sooty, Manx and Cory's.

Storm-petrels

Storm-petrels are highly pelagic, often following ships and fishing boats, and are attracted to artificial light sources (Huntington et al 1996). The Leach's Storm-petrel is the most abundant breeding seabird in Newfoundland, while the Wilson's Storm-petrel is an Antarctic breeder and uncommon visitor in the northwest Atlantic. The largest Leach's Storm-petrel colony in the world, Baccalieu Island, supports approximately one third of the species' population (Huntington et al 1996; Barrett et al 2006; CWS 2017). ECSAS sightings for storm-petrels within EL 1134 and the Project Area overall are presented in

Table 4.10. Storm-petrels they are commonly observed in the summer months and regularly seen in the spring and fall but are uncommon in winter. Storm-petrel abundance in EL 1134 was considerably lower than in the overall Project Area (Table 4.10).

4.2.2.2 Waterfowl

Broadly, waterfowl may be categorized as geese and ducks; the latter includes dabbling ducks (primarily inland breeders), diving ducks, and sea ducks. Although divers (loons and grebes) are not closely related to waterfowl, they are behaviourally and functionally similar, and have therefore been considered together with ducks and geese. Waterfowl and divers spend much of their time on the water's surface. Waterfowl occur in large numbers in marine habitats off Eastern Newfoundland, especially during the winter months; however, they tend to prefer more coastal habitats and are unlikely to occur frequently in the Project Area. More than 30 species of waterfowl and divers occur in the province during at least part of the year (see Section 6.2.3.1 of the EIS), including two species of conservation concern, the Barrow's Goldeneye and Harlequin Duck.

The most abundant species of waterfowl in coastal Newfoundland waters throughout the year is the Common Eider, which breeds in several small colonies along the coast (Locke et al 1994). Common Eiders and other sea ducks such as scoters and Long-tailed Ducks occur in large flocks ("rafts") off the coast from autumn to spring. Large wintering congregations occur at Witless Bay IBA, between the Cape Freels coastline and nearby Wadham Islands, Grates Point, Cape St. Francis, Mistaken Point, Cape St. Mary's and Placentia Bay (Bird Studies Canada 2017). Small numbers of Barrow's Goldeneye have been reported wintering in eastern Newfoundland at Port Blandford and Newman Sound in Terra Nova National Park, as well as Traytown Bay, St. Mary's Bay, and Spaniard's Bay (Schmelzer 2006).

The most frequently observed species in offshore Newfoundland is Common Eider, followed by Long-tailed Duck; loons (Common and Red-throated), scoters (White-winged, Surf and Black) and a handful of other duck species were infrequently observed. Within the Project Area, ECSAS sightings of waterfowl and divers were scarce, with none observed within EL 1134 (Table 4.10).

4.2.2.3 Shorebirds

More than 25 species of shorebirds occur in the province for at least part of the year (see Section 6.2.3.2 of the EIS). On the eastern coast of Newfoundland, shorebirds are most abundant during their fall migration, when many species move southward from their Arctic breeding grounds, utilizing marine shoreline habitats such as sandy mudflats and coastal barrens. In the winter months, generally from November to April, Purple Sandpipers are present along rocky shorelines and offshore ledges and islands of southern and eastern Newfoundland, and at Mistaken Point (well north of the rest of the species' usual wintering range), a small number of Ruddy Turnstones regularly overwinters (Bird Studies Canada 2017). Least Sandpiper, Spotted Sandpiper, Greater Yellowlegs, Piping Plover, Semipalmated Plover and Killdeer nest in Newfoundland (Warkentin and Newton 2009).

Due to the great distance of EL 1134 from the coastline, it is unlikely that shorebirds will occur there with any regularity (other than phalaropes, which are taxonomically shorebirds but due to their pelagic habitat preferences have been discussed along with the seabirds in this report). Shorebirds are very infrequent visitors in the offshore waters of Newfoundland, primarily in the fall months during migration.

4.2.2.4 Other Marine-Associated Avifauna

Many passerines, raptors and other landbirds breed in Newfoundland; most do not regularly occur in the marine environment, but some species of landbirds are associated with coastal habitats. Bank Swallow (*Riparia riparia*), Savannah Sparrow (*Passerculus sandwichensis*) and Short-eared Owl (*Asio flammeus*) typically nest along the coast, while some raptor species such as the Peregrine Falcon (*Falco peregrinus*) prey upon concentrations of shorebirds during fall migration. Further, many landbirds fly long distances over water during migration, and nocturnal migrants (including most passerines) may be attracted to artificial light sources at sea, particularly in foggy conditions during the late summer to fall months (July to early November). Landbirds are considered to be very infrequent visitors in the Project Area, including EL 1134.

4.2.2.5 Species at Risk

Very few avian species at risk or species of conservation concern are likely to occur in the Project Area, including EL 1134. The Ivory Gull is found almost exclusively in marine environments, and although its breeding distribution (and critical habitat) is in the Arctic, it regularly occurs in small numbers in the waters off Eastern Newfoundland, typically around pack ice. Barrow's Goldeneye and Harlequin Duck both occur in the marine environment, particularly outside of the breeding season; however, like other waterfowl species, they prefer coastal areas and so are unlikely to occur in the Project Area. Red-necked Phalaropes, assessed by COSEWIC as a species of conservation concern, were seen in small numbers during ECSAS surveys in offshore waters from April to December, with no sightings in EL 1134 and very few within the Project Area overall (Table 4.11). Other avian SAR that occur in Newfoundland are shorebirds and landbirds, and are unlikely to be found in EL 1134 except potentially on a transient basis during the fall months.

A summary of avian species that occur in the province, including information on their habitat preferences and potential to occur in the Project Area (including EL 1134), is provided in Table 4.11.

Table 4.11 Avian Species at Risk and their Likelihood of Occurrence in the Project Area

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
Barrow's Goldeneye (Eastern pop.)	Vulnerable	Special Concern	Special Concern	• May breed in Newfoundland. Moults and winters in small numbers off the coast of Eastern Canada, often in groups with Common Goldeneye. Small numbers have been reported wintering at Port Blandford and Newman Sound in Terra Nova National Park, as well as Traytown Bay, St. Mary's Bay, and Spaniard's Bay (Schmelzer 2006). • Known to congregate in relatively small geographic areas	Unlikely, due to their affinity for coastal habitats.

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
				in important shipping corridors, therefore considered to be particularly vulnerable to being affected by accidental spills (Schmelzer 2006).	
Harlequin Duck (Eastern pop.)	Vulnerable	Special Concern	Special Concern	• Breeds in fast-flowing streams, and congregate in moulting sites in the late summer to fall. May breed in Bay du Nord River in southeastern Newfoundland (Bird Studies Canada 2017). • Found in coastal marine environments throughout fall and winter along rocky coastlines, subtidal ledges, and exposed headlands. Non-breeding individuals may be found year round at Cape St. Mary's, one of few known moulting sites in the province (Bird Studies Canada 2017; NLDEC 2017).	Unlikely, due to their affinity for coastal habitats.
Ivory Gull	Endangered	Endangered	Endangered	• Breeds in the far north and winters offshore. • Spend almost all of their time in the marine environment, including within the Project Area. • Present in small numbers in the waters off Eastern Newfoundland, usually among pack ice. • Rarely seen on the coast of the Northern Peninsula and ashore (Stenhouse 2004; NLDEC 2017).	Potentially present. Because they are typically found among pack ice, interactions with Project activities are unlikely.
Piping Plover (*Melodus* ssp.)	Endangered	Endangered	Endangered	• During the nesting season, found on sandy beaches along the coast. • In Newfoundland, breeding population is concentrated in the southwest and western portions of the Island (NLDEC 2017); major breeding areas include Grand Bay West to Cheeseman Provincial Park and Big Barasway, and nesting has also been observed in Codroy Valley	Unlikely, due to their affinity for coastal habitats.

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
				Estuary (Bird Studies Canada 2017). Has been reported at Deadman's Bay near the Cape Freels Coastline IBA in northeastern Newfoundland. • Unlikely to be affected by typical project activities, although accidental spills near breeding habitat could potentially be harmful.	
Red Knot (*Rufa* ssp.)	Endangered	Endangered	Endangered	• Found on open sandy inlets, coastal mudflats, sand flats, salt marshes, sandy estuaries and areas with rotting kelp deposits during fall migration, from August 1st to October 30th (Garland and Thomas 2009; NLDEC 2017). • Sightings have been reported around almost the entire coast of Newfoundland, mostly on the west coast (Baker et al 2013). • In Atlantic Canada Shorebird Survey, they are considered regular or occasional species during fall migration at Bellevue Beach, Cape Freels, and around the Codroy Valley Estuary, and they are rare visitors at other survey sites (Environment Canada 2009).	Unlikely, due to their affinity for coastal habitats.
Buff-breasted Sandpiper	none	none	Special Concern	• Arctic breeders; during fall migration, considered to be a rare migrant in the province (COSEWIC 2012a). • Occasionally observed in Atlantic Canada Shorebird Surveys at St. Shott's Sod Farm near the southern shore of the Avalon Peninsula and at Cape Bonavista. Reported in small numbers at other survey sites (Environment Canada 2009).	Unlikely, due to their affinity for coastal habitats.
Red-necked Phalarope	none	none	Special Concern	• Outside the breeding season, found in coastal marine environment (Rubega et al 2000).	Potentially present. Seen in small

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
				• Surface feeders, often congregating in areas such as upwellings with higher prey densities. • In the Atlantic Canada Shorebird Survey, considered rare visitors at Cape Spear and at Bonavista/ Cape Bonavista (Environment Canada 2009).	numbers during ECSAS surveys of offshore Newfoundland. none observed in EL 1134 (ECSAS 2017).
Peregrine Falcon	Vulnerable	Special Concern	Not At Risk	• Migrates along the coast of Newfoundland during the fall (particularly the west coast), preying on concentrations of migrating shorebirds. • Peregrine Falcon sightings have been reported in the fall near Port-aux-Basques, St. Pierre et Miquelon, and on the Bonavista Peninsula, and year-round (most frequently during the fall) on the Avalon Peninsula (White et al 2002).	Unlikely to occur regularly in the Project Area. May be an occasional vagrant during fall migration.
Common Nighthawk	Threatened	Threatened	Threatened	• Nests in open areas (e.g. coastal sand dunes and beaches, logged or slashburned areas of forest sites, woodland clearings, grassland habitat, farm fields, open forests, rock outcrops, and flat gravel rooftops). • Does not breed in insular Newfoundland (Brigham et al 2011), but migrates through province.	Unlikely to occur regularly in the Project Area. May be an occasional vagrant during fall migration.
Bank Swallow	none	Threatened	Threatened	• Bank Swallows are colonial, often nesting in sandy banks created through coastal erosion; therefore, potentially in close proximity to the marine environment during the breeding season. • Diurnal migrants (Garrison 1999). • Within the province, breeds primarily in southwestern	Unlikely, due to their affinity for coastal habitats. As diurnal migrants, they are less susceptible to

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
				Newfoundland (Warkentin and Newton 2009); however, sightings have also been reported in eastern Newfoundland (Garrison 1999).	disorientation from offshore artificial light sources.
Gray-cheeked Thrush (*minimus* ssp.)	Threatened	none	Candidate Species (low priority)	• Nests in dense coniferous forest habitat throughout insular Newfoundland and overwinters in South America, migrating nocturnally (Lowther et al 2001). • Most common on the Northern Peninsula and along the northeast coast, as well as the northern Avalon Peninsula (Endangered Species and Biodiversity Section 2010). • Has also been reported in Placentia Bay (Endangered Species and Biodiversity Section 2010) and breeds in Terra Nova National Park (Bird Studies Canada 2017). • An inland species, therefore unlikely to be affected by offshore activities at most times of year.	Unlikely to occur regularly in the Project Area. May be an occasional vagrant during fall migration.
Olive-sided Flycatcher	Threatened	Threatened	Threatened	• Found in boreal forest habitat, particularly open areas such as wetlands with tall trees and snags. • Migrates to south and central America to overwinter (Altman and Sallabanks 2012). • Breeds throughout insular Newfoundland and Southern Labrador (COSEWIC 2007), and in Eastern Newfoundland it has been reported at several locations on the Avalon Peninsula as well as at Terra Nova National Park (Altman and Sallabanks 2012).	Unlikely to occur regularly in the Project Area. May be an occasional vagrant during fall migration.

Species	Provincial Status	Federal Status		Habitat and Distribution in Newfoundland	Potential Presence in Project Area
		SARA Schedule 1 Listing	COSEWIC Assessment		
Bobolink	Vulnerable	Threatened	Threatened	• Nests in agricultural and natural grasslands, and migrates to South America in the fall (Renfrew et al 2015). • Breeding has been reported at Codroy Valley (Bird Studies Canada 2017), and there have been sightings on the Avalon Peninsula and Terra Nova National Park (Renfrew et al 2015).	Unlikely to occur regularly in the Project Area. May be an occasional vagrant during fall migration.
Short-eared Owl	Vulnerable	Special Concern	Special Concern	• Typically nests in coastal barrens and grasslands (Wiggins et al 2006), and suitable habitat occurs in much of coastal Newfoundland. • Sightings have been reported throughout the eastern portion of the Island from Wadham Islands to the Avalon and Burin Peninsulas, and near Port-aux-Basques and Codroy Valley in southwestern Newfoundland, mostly in the summer months (Schmelzer 2005; Wiggins et al 2006).	Unlikely, due to their affinity for coastal habitats.

4.2.2.6 Key Times for Marine and Migratory Birds

Although seabirds utilize the offshore waters of Eastern Newfoundland throughout the year, the abundance, distribution and species composition vary considerably. Some taxa such as large gulls and kittiwakes, many alcid species, fulmars and shearwaters are abundant year-round, while other groups are absent or scarce during part of the year. Areas of importance for marine and migratory birds include designated key habitats and breeding colonies (see Section 6.2.5 of the EA); these are found in coastal areas and inland, far from EL 1134, although birds that use these areas may forage in the Project Area. Figure 6-64 in the EIS illustrates the overall seasonal presence of marine-associated bird species in the Project Area; the seasonal trends in the overall Study Area apply to EL 1134.

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

As detailed in the EIS (Section 6.3), the waters off Eastern Newfoundland support a diverse assemblage of marine fauna including more than 20 marine mammal species and as many as five sea turtle species

reported in and near the Project Area. Many of these are considered to be at risk or of conservation concern.

This section provides an updated overview of marine mammals and sea turtles (including species at risk) that have potential to occur in EL 1134. Detailed life history and habitat information for these species, as well as information about key areas and times of year, can be found in the EIS (Section 6.3) and the Eastern Newfoundland SEA (Amec 2014). New data, as well as key information specific to the Project Area, is summarized in the following subsections.

Although useful and informative at a regional scale, there are several caveats associated with the marine mammal sightings data presented below which must be noted. Because the data collection is not standardized across surveys, and the sightings effort is not quantified, the data cannot be used to estimate species abundance or density. A lack of sightings may reflect a deficiency of survey effort in a given area and cannot be interpreted as absence of a particular species; similarly, a cluster of sightings may reflect high survey effort rather than a large number of individuals in a particular area. As well, observers may have varying degrees of experience and expertise in marine mammal identification, and the data have not been completely error-checked and the quality of some of the information is therefore unknown. Most sightings are collected on an opportunistic basis and observations may come from individuals with varying degrees of experience and expertise in marine mammal identification. Also, most data have been gathered from platforms of opportunity that were vessel-based, and the possible negative or positive reactions by cetaceans to such vessels have not yet been factored into the data. Numbers sighted have not been verified, especially in light of the significant differences in detectability between species. For completeness, these data represent an amalgamation of sightings from a variety of years and seasons; the effort is not necessarily consistent among seasons, years, and areas, and there are gaps between years. Finally, many sightings could not be identified to the species level, and these have been assigned to the smallest taxonomic group possible.

4.2.3.1 Mysticetes

Sightings of mysticete species obtained from OBIS and the DFO Marine Mammals Sightings database are shown in Figure 4.10. Six species of baleen whales regularly occur in the waters off Eastern Newfoundland, with the most common being humpback, fin, minke and sei (Figure 4.10; Section 6.3.3 of the EIS); the blue and North Atlantic Right whales are less frequently observed and the bowhead whale (*Balaena mysticetus*) is primarily an Arctic species seldom observed in offshore Newfoundland.

Baleen whales may be found in coastal as well as offshore areas, typically foraging at depths of 100 m to 150 m; blue whales and common minke whales may be found in the area throughout the year, while the other four species are absent in the winter months.

4.2.3.2 Odontocetes

In the waters off Eastern Newfoundland, 14 species of odontocetes, or toothed whales (including dolphins and porpoises), have been regularly observed (Section 6.3.4 of the EIS). The Atlantic spotted dolphin has been reported in the area (OBIS 2017), but this species is generally found in tropical and subtropical waters and is considered very unlikely to occur in the Project Area. Sightings of odontocetes obtained from OBIS and the DFO Marine Mammals Sightings database are shown on Figures 4.11 (dolphins and porpoises) and 4.12 (other odontocetes). There were no dolphin or porpoise sightings within EL 1134, but harbour porpoise, Atlantic white-sided dolphin, and white-beaked dolphin were the most commonly observed species, typically in shallower waters; in deeper areas, the common

bottlenose dolphin was more frequently observed (Figure 4.11). The most commonly observed large toothed whales in deeper waters of the Project Area included the sperm whale, long-finned pilot whale and northern bottlenose whale, while killer whales were typically seen in shallower waters (Figure 4.12).

Odontocetes vary in habitat preferences; belugas and harbour porpoises favour coastal/estuarine habitats, some dolphins may be found in both coastal areas and open ocean, and other dolphins as well as beaked whales and sperm whales are seldom observed close to shore (Amec 2014). Typical foraging depths range from 20 m for belugas to 1,000 m for Sowerby's beaked whale and Risso's dolphin (Perrin et al 2002). Most of these species are thought to be present in offshore Northwest Atlantic waters year-round, but belugas are a rare winter visitor to the area, and common bottlenose dolphin and Risso's dolphin are only seen in the summer months (Amec 2014).

4.2.3.3 Pinnipeds

Four pinniped species are known to occur regularly in the offshore waters of Eastern Newfoundland, including EL 1134 (see EIS, Section 6.3.5). Two additional seal species, the bearded seal and ringed seal, are typically Arctic dwellers that are known to occasionally occur in the area in the winter months, and a single extralimital sighting of walrus has been reported off Eastern Canada (OBIS 2017). Pinnipeds, or seals, may be found in coastal environments (e.g. harbour seal and occasionally grey seal), but generally prefer open ocean habitats. Harp and hooded seals are most common in the Project Area from December to April, while harbour and grey seals may be present year-round. The populations of all four seal species regularly found in the Project Area are considered secure or even increasing (Hammill et al 2012).

4.2.3.4 Sea Turtles

Sea turtles are rarely seen in coastal areas, preferring offshore habitats (COSEWIC 2010, 2012b). They spend much of their time at the ocean surface, and foraging depths are typically less than 100 m (Wyneken et al 2013). Five species of sea turtles have been reported in the waters of the Northwest Atlantic; however, of these, only the Leatherback Turtle and to a lesser extent the Loggerhead Sea Turtle are regularly found in the Project Area (see EIS, Section 6.3.6). The Green Sea Turtle, Hawksbill Sea Turtle and Kemp's Ridley Sea Turtle frequent tropical and subtropical waters, but have occasionally been found in the waters off Eastern Canada in the summer months. Sea turtles, primarily Leatherbacks, may be found in the EL 1134 area from April to December, but are absent in the winter months.

Figure 4.10 Baleen Whale Sightings

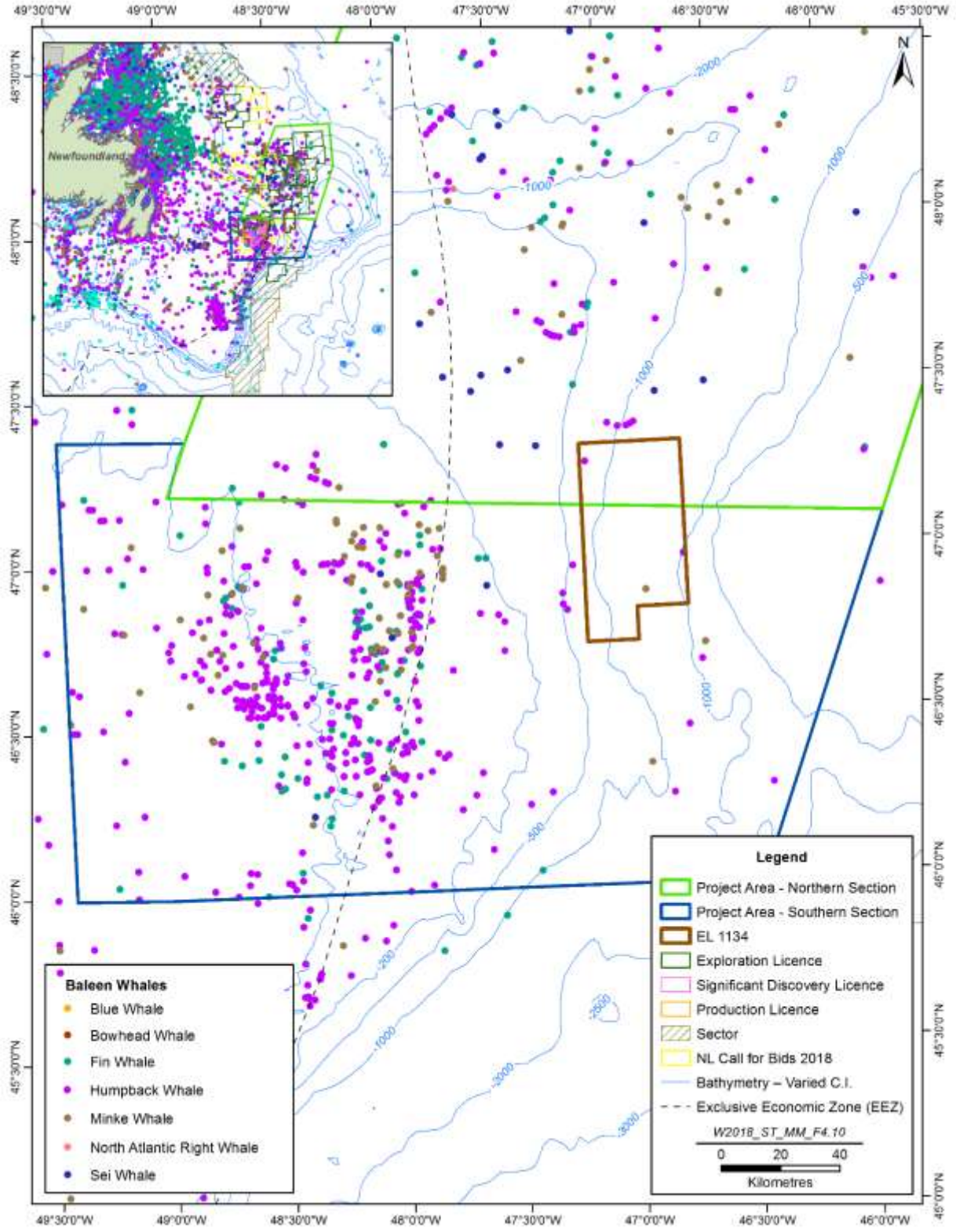


Figure 4.11 Dolphin and Porpoise Sightings

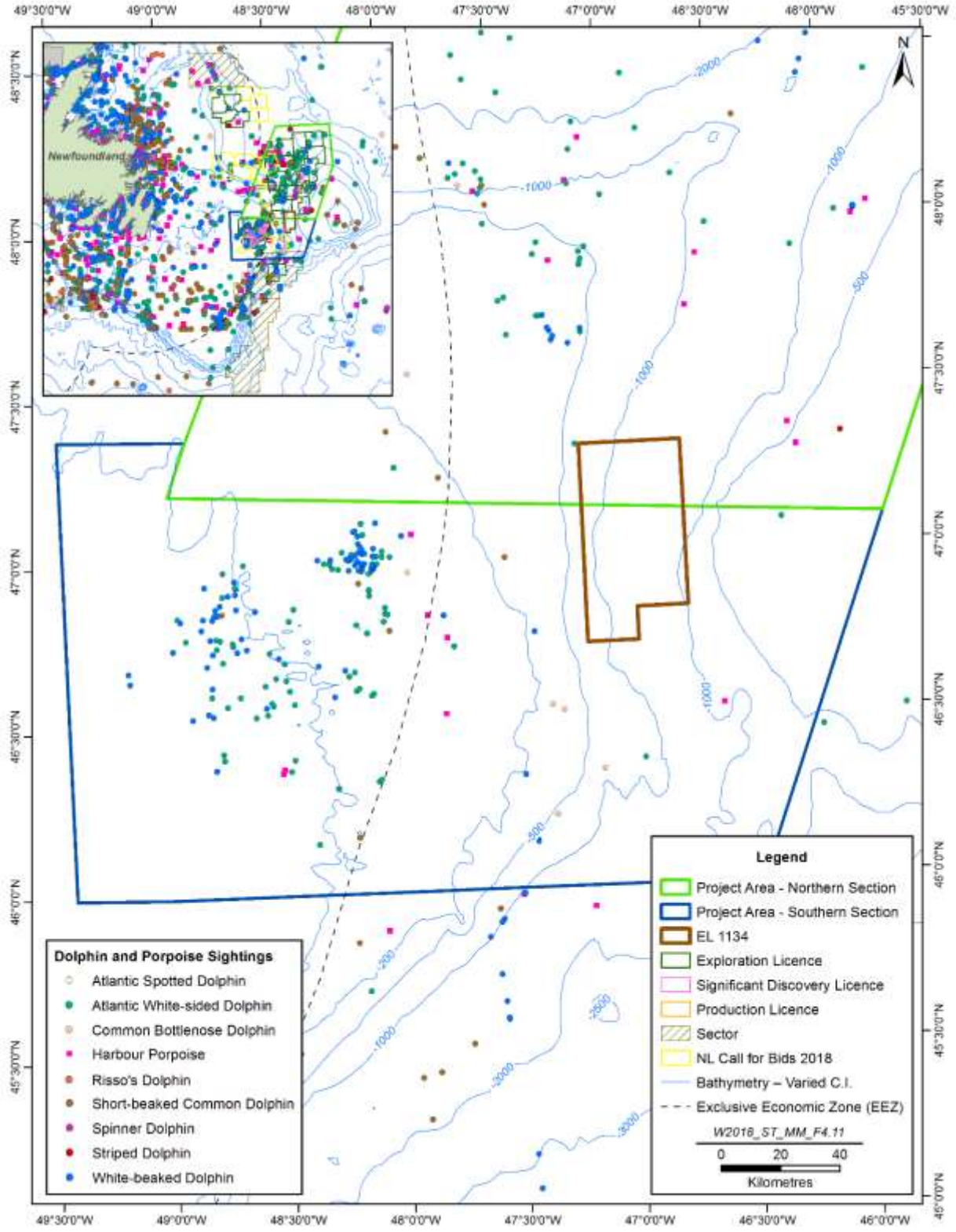
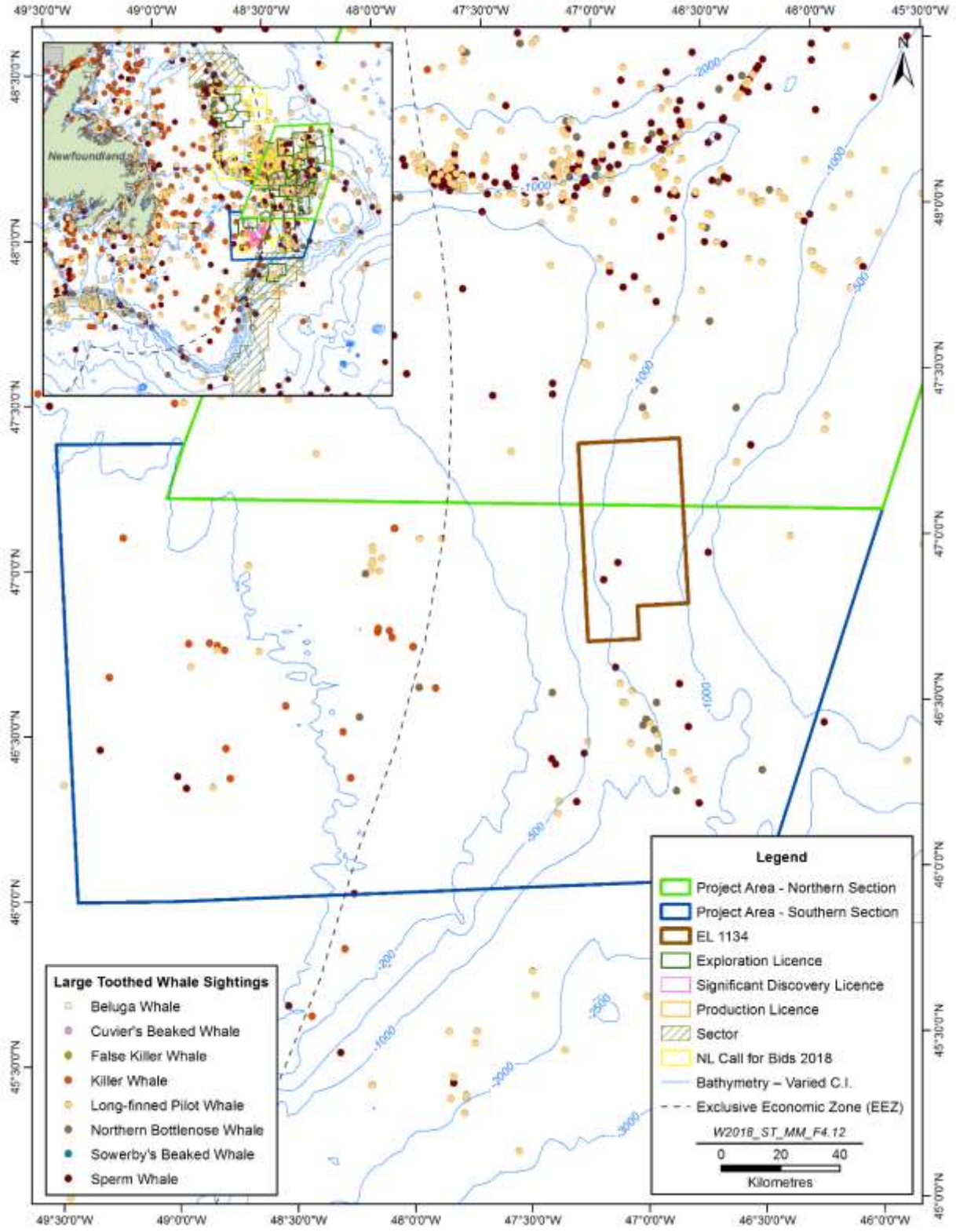


Figure 4.12 Other Large Toothed Whale Sightings



4.2.3.5 Species at Risk

As described in Section 6.3.7 of the EIS, a number of marine mammal and sea turtle species at risk protected under *SARA*, as well as species assessed by COSEWIC as being of conservation concern, occur in the waters offshore Eastern Newfoundland (Table 4.12). The provincial *NL ESA* does not list any marine mammals or sea turtles.

Table 4.12 Marine Mammal and Sea Turtle Species at Risk and their Likelihood of Occurrence in the Project Area

Species	Federal Status		Habitat and Distribution	Potential Presence in Project Area
	SARA Schedule 1 Listing	COSEWIC Assessment		
Blue Whale (Atlantic Population)	Endangered	Endangered	• Found in coastal and pelagic waters, frequently at shelf edge where food production is high (Schoenherr 1991). • Present in all oceans except the Arctic (Reilly et al 2008). • Critical habitat in the estuary and Gulf of St. Lawrence is currently being identified for the species (DFO 2016a).	Present in small numbers throughout the year; most common in the winter and early spring.
Fin Whale (Atlantic population)	Special Concern	Special Concern	• Coastal shelf edge and offshore (COSEWIC 2005). • World-wide distribution; most abundant at temperate and polar latitudes (Reeves et al 2002). • Typically found in areas with high prey concentration (e.g., the Grand Banks) in the summer months.	Present year-round, most common in the summer months.
North Atlantic Right Whale	Endangered	Endangered	• Prefers waters 100 – 200 m deep with surface temperatures between 8 and 15°C (Kenney 2001). • Distribution related to presence and abundance of prey species. • Aggregate in five seasonal habitat areas along the east coast of North America, including two designated critical habitat areas in Canada: the lower Bay of Fundy and Roseway Basin on the Scotian Shelf (Brown et al 2009).	Uncommon in area; most likely to be present in the summer months.
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea population; Scotian Shelf population)	none (Davis Strait-Baffin Bay-Labrador Sea population)	Special Concern (Davis Strait-Baffin Bay-Labrador Sea population)	• Deep-diving species found in waters 800 - 1500 m deep. • In western North Atlantic, occur from Baffin Island to New England (Taylor et al 2008a). • It is unclear to which population individuals observed in the Project Area belong; however, a recent	Potentially present in small numbers in the area year round; most sightings have been in the spring and summer.

Species	Federal Status		Habitat and Distribution	Potential Presence in Project Area
	SARA Schedule 1 Listing	COSEWIC Assessment		
	Endangered (Scotian Shelf population)	Endangered (Scotian Shelf population)	observation of 50 individuals in the Sackville Spur area suggest there may be potentially a previously unknown population (CBC 2016). • Davis Strait population seemingly tends to migrate north to south, although patterns are not consistent (Reeves et al 1993), whereas Scotian Shelf population is apparently non-migratory. • Three marine canyons, all along the Scotian Shelf, have been identified as critical habitat for the Scotian Shelf population (DFO 2010).	
Sowerby's Beaked Whale	Special Concern	Special Concern	• Deep-diving species found at continental edges and slopes in depths of 550 - 1500 m or more. • Seasonal movements unknown. • Found in cold North Atlantic waters, from Massachusetts to Labrador (Taylor et al 2008b).	May be present year round in deep water habitats.
Beluga Whale (St. Lawrence Estuary population)	Endangered	Endangered	• Coastal species (ACS 2006). • Concentrated near the outlet of the Saguenay River in summer; in the winter months, they disperse from estuarine habitats, regularly occurring as far downstream as the western end of Anticosti Island (COSEWIC 2014). • Critical habitat has been identified in the St. Lawrence Estuary and lower reaches of the Saguenay River (DFO 2012a).	Very rare in the Project Area; seldom range far from the St. Lawrence estuary.
Killer Whale (Northwest Atlantic / Eastern Arctic population)	none	Special Concern	• Nearshore and pelagic environments. • Cosmopolitan distribution, concentrated in areas of high productivity (Forney and Wade 2006).	Likely present; small numbers have been observed in the area at all times of year.
Harbour Porpoise	none	Special Concern	• Coastal shelf, bays and estuaries, but occasionally offshore (Hammond et al 2008). • Found in cold waters throughout the northern hemisphere (Hammond et al 2008). • Seasonal movements poorly known.	Fairly common in the Project Area, possibly present year round.

Species	Federal Status		Habitat and Distribution	Potential Presence in Project Area
	SARA Schedule 1 Listing	COSEWIC Assessment		
Atlantic Walrus (Central - Low Arctic population)	none	Special Concern	• Require shallow open areas with substrate supporting a productive bivalve community, and suitable ice or land nearby upon which to haul out (COSEWIC 2017a). • Nova Scotia-Newfoundland-Gulf of St. Lawrence population extinct; species is now restricted to Arctic to sub-Arctic regions.	Extremely unlikely. Single extralimital report in Study Area (OBIS 2017).
Leatherback Sea Turtle (Atlantic population)	Endangered	Endangered	• Typically in coastal shelf waters with depths of less than 200 m. • Ranges from tropical to sub-polar regions (COSEWIC 2012), and undertakes extensive migrations between feeding areas and to tropical nesting areas (Wallace et al 2013). • To date, critical habitat has not been identified; however, DFO (2012b) observed three high-use feeding areas in Canadian waters, none within the Project Area.	Likely present in small numbers in the Project Area from April to December.
Loggerhead Sea Turtle	Endangered	Endangered	• Found in oceanic and near-shore zones of temperate and tropical Atlantic, Pacific and Indian Oceans, and nest on beaches in subtropical and tropical climates (COSEWIC 2010). • In Atlantic Canada, most abundant in spring to fall, and generally associated with the Gulf Stream.	Potentially present in small numbers in the spring and summer months.

While not assessed by COSEWIC, the Kemp's Ridley, Green and Hawksbill sea turtle are all considered to be of conservation concern by the IUCN (IUCN 2017). All three of these sea turtle species are unlikely to be present within EL 1134, as they are associated with tropical and sub-tropical areas; however, vagrants may occur in the summer months.

No critical habitat has been identified for marine mammals and sea turtles within or adjacent to EL 1134 or elsewhere in the Project Area.

4.2.3.6 Key Times for Marine Mammals and Sea Turtles

As described in the EIS, baleen whales (mysticetes) are present in the Project Area (including potentially within and around EL 1134) throughout the year but are most abundant in the summer months; most species are migratory and absent from the Project Area in winter, but common minke whale and blue whale may occur in the area year-round. Most toothed whales are thought to be year-round residents

of the Project Area, with the exception of Risso's and common bottlenose dolphins, which are found only in the summer months, and beluga, which is only observed in the winter months. Pinnipeds are most abundant in the winter months, although grey and harbour seals may be present year-round. Sea turtles are most abundant in the area during the summer months, when the Grand Banks and surrounding waters provide important feeding habitat, and they are absent from the area between December and April.

4.2.4 Special Areas

A number of marine and coastal areas in Newfoundland and Labrador have been designated as protected under provincial, federal and/or other legislation or agreements due to their ecological, historical or socio-cultural characteristics and importance. Other areas have been formally identified as being special or sensitive through other relevant processes and initiatives. Special areas in Eastern Newfoundland coastal and marine areas were described in the EIS. Additional details are provided in the Eastern Newfoundland SEA (Amec 2014). This section provides additional information, identified since submission of the EIS in 2017, with a focus on the areas in and around EL 1134 itself.

4.2.4.1 Canadian (Federally) Identified and Designated Areas

Various processes are used to identify and potentially protect marine and coastal ecosystems in Canada, as described in the sections that follow. These protective measures are led by various federal government departments and agencies including DFO, Parks Canada and Environment and Climate Change Canada. The EIS presents the Newfoundland and Labrador Shelves marine bioregions and the Placentia Bay-Grand Banks (PB/GB) Large Ocean Management Area (LOMA) as the context for special areas off Eastern Newfoundland. The EIS report also provides detailed information on Marine Protected Areas (MPA) and Areas of Interest (AOI), various fisheries closure areas within the Canadian Exclusive Economic Zone (EEZ), Canadian Ecologically and Biologically Significant Areas (EBSAs), Preliminary Representative Marine Areas, Migratory Bird Sanctuaries and National Parks and Historic Sites. These special areas, none of which intersect with EL 1134, are illustrated in Figure 4.14 and Figure 4.15. The following sections discuss changes to Canadian special areas since the EIS submission particularly in relation to EL 1134.

Ecologically and Biologically Significant Areas

A number of ecologically and biologically significant areas (EBSAs) have been identified in marine areas of Eastern Newfoundland. In 2007, DFO identified 11 EBSAs within the PB/GB LOMA using a ranking process based on criteria for fitness consequence, aggregations, uniqueness, naturalness and resilience (Templeman 2007). Using a refined process, DFO identified 15 additional EBSAs in the Newfoundland and Labrador Shelves Bioregion north of the PB/GB LOMA in 2013 (DFO 2013). The 2007 PB/GB LOMA and NL Shelves Bioregion EBSAs are discussed in the 2017 EIS and the Eastern Newfoundland SEA. None are located near EL 1134.

In 2017, DFO undertook a process to re-evaluate the PB/GB LOMA EBSAs to align with the rest of the Newfoundland and Labrador Shelves Bioregion EBSAs. The 2017 revised PB/GB LOMA EBSA areas are available in draft and detailed descriptions of these sites have not been releases publicly (N. Wells pers comm 2018). Based on the available draft information, the existing PB/GB LOMA EBSAs have generally increased in area, five new EBSAs have been delineated, two areas are no longer listed as EBSAs and the total combined EBSA area has been increased by 26 percent (Table 4.13).

Figure 4.13 shows the draft revised boundaries and new EBSAs in the PB/GB LOMA, along with the NL Shelves Bioregion EBSAs in Eastern Newfoundland. Portions of the PB/GB LOMA EBSAs that extended beyond the Canadian EEZ into the NAFO regulatory area are no longer considered to be within EBSA boundaries (although they may still be identified and/or protected through international processes). The Southeast Shoal EBSA has been reduced in area as a large portion was outside of the EEZ prior to the refinement exercise. Portions of the Northeast Slope and the Lilly Canyon-Carson Canyon EBSAs, beyond the EEZ, are now also considered to be outside of the EBSA boundaries although the overall areas of these EBSAs have been increased within the EEZ. Descriptive information is not yet available for the newly identified EBSAs: Haddock Channel Sponges, St. Mary's Bay, Bonavista Bay, Baccalieu Island and South Coast, the latter of which is off southwest Newfoundland. None of these EBSAs intersect with EL 1134.

Table 4.13 Refined PB/GB LOMA EBSAs in Eastern Newfoundland

EBSA	Approximate Delineated Area	
	2007	**2017**
Northeast Slope	13,885 km^2	19,731 km^2
Virgin Rocks	6,843 km^2	7,294 km^2
Lilly Canyon-Carson Canyon	1,145 km^2	2,180 km^2
Southeast Shoal	30,935 km^2	15,402 km^2
Eastern Avalon	1,683 km^2	5,948 km^2
Southwest Slope	16,644 km^2	25,181 km^2
Smith Sound	148 km^2	547 km^2
Placentia Bay	7,693 km^2	13,539 km^2
Laurentian Channel	17,140 km^2	19,545 km^2
Haddock Channel Sponges	n/a	490 km^2
South Coast	n/a	6,876 km^2
St. Mary's Bay	n/a	3,989 km^2
Bonavista Bay	n/a	3,141 km^2
Baccalieu Island	n/a	6,922 km^2
Source: Templeman (2007); DFO (2016); N Wells pers comm (2018)		

Figure 4.13 Newfoundland and Labrador Shelves Bioregion and Placentia Bay/Grand Banks Large Ocean Management Area

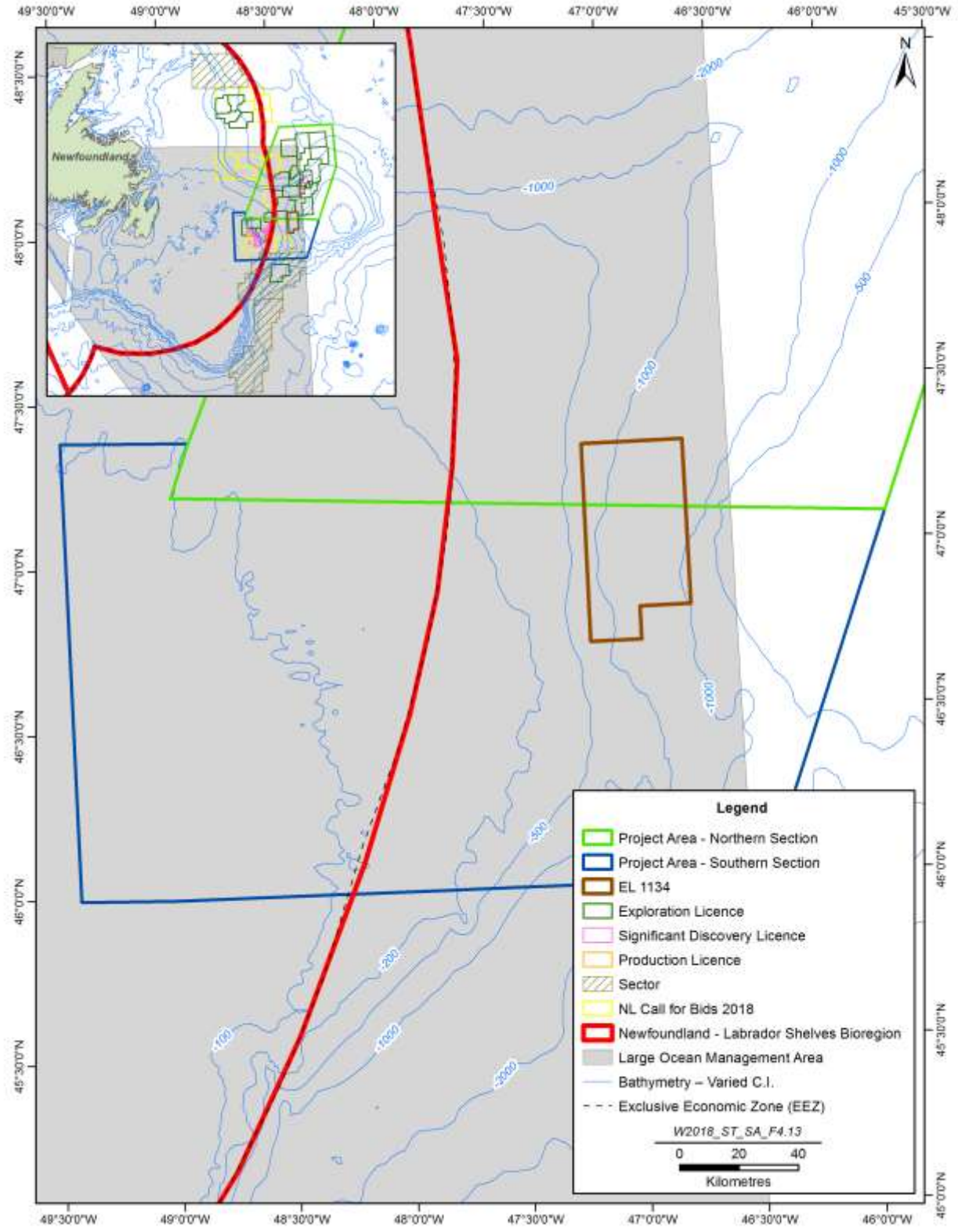


Figure 4.14 Canadian Marine Protected Areas, Preliminary Representative Marine Areas, Migratory Bird Sanctuaries, National Parks and National Historic Sites

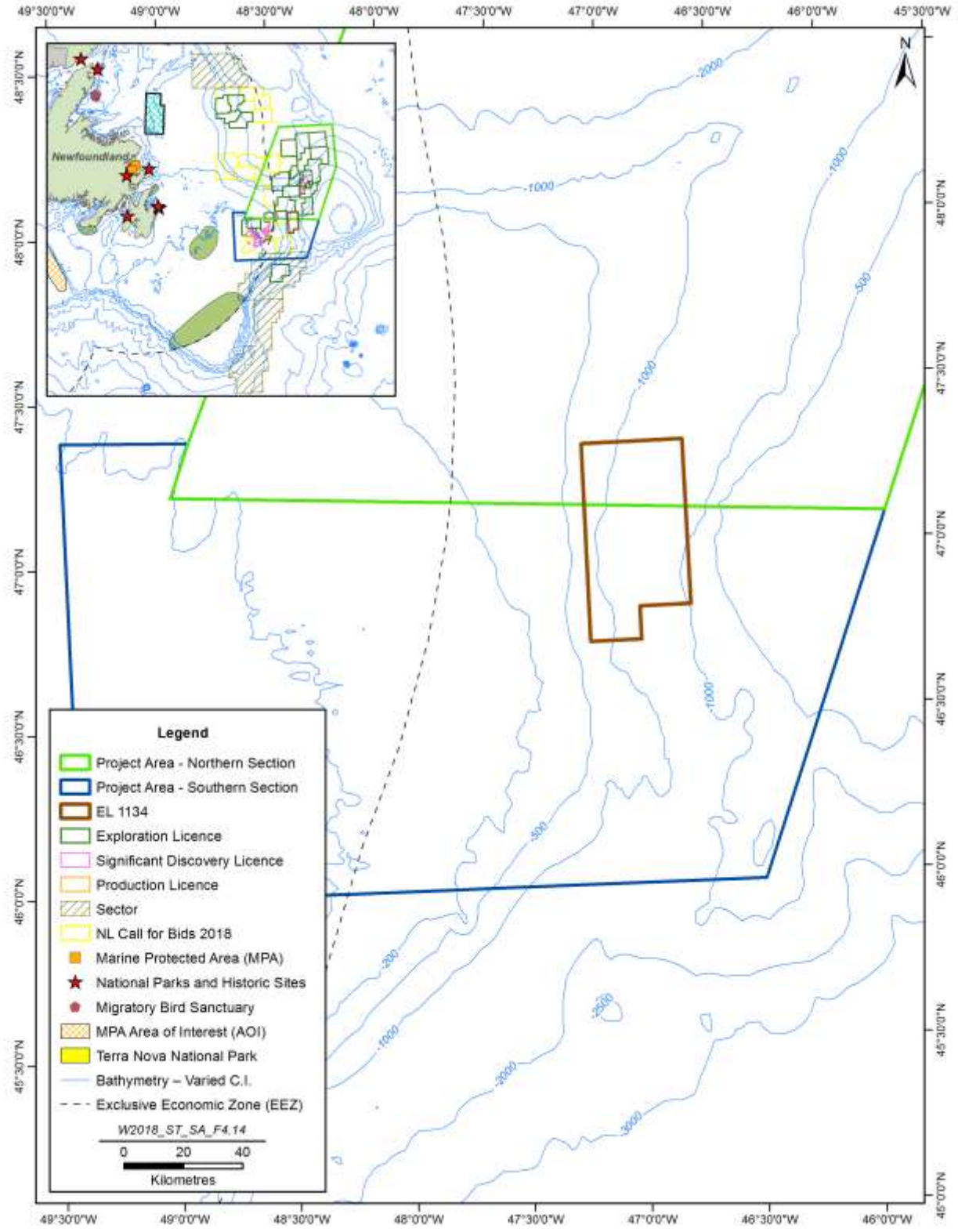
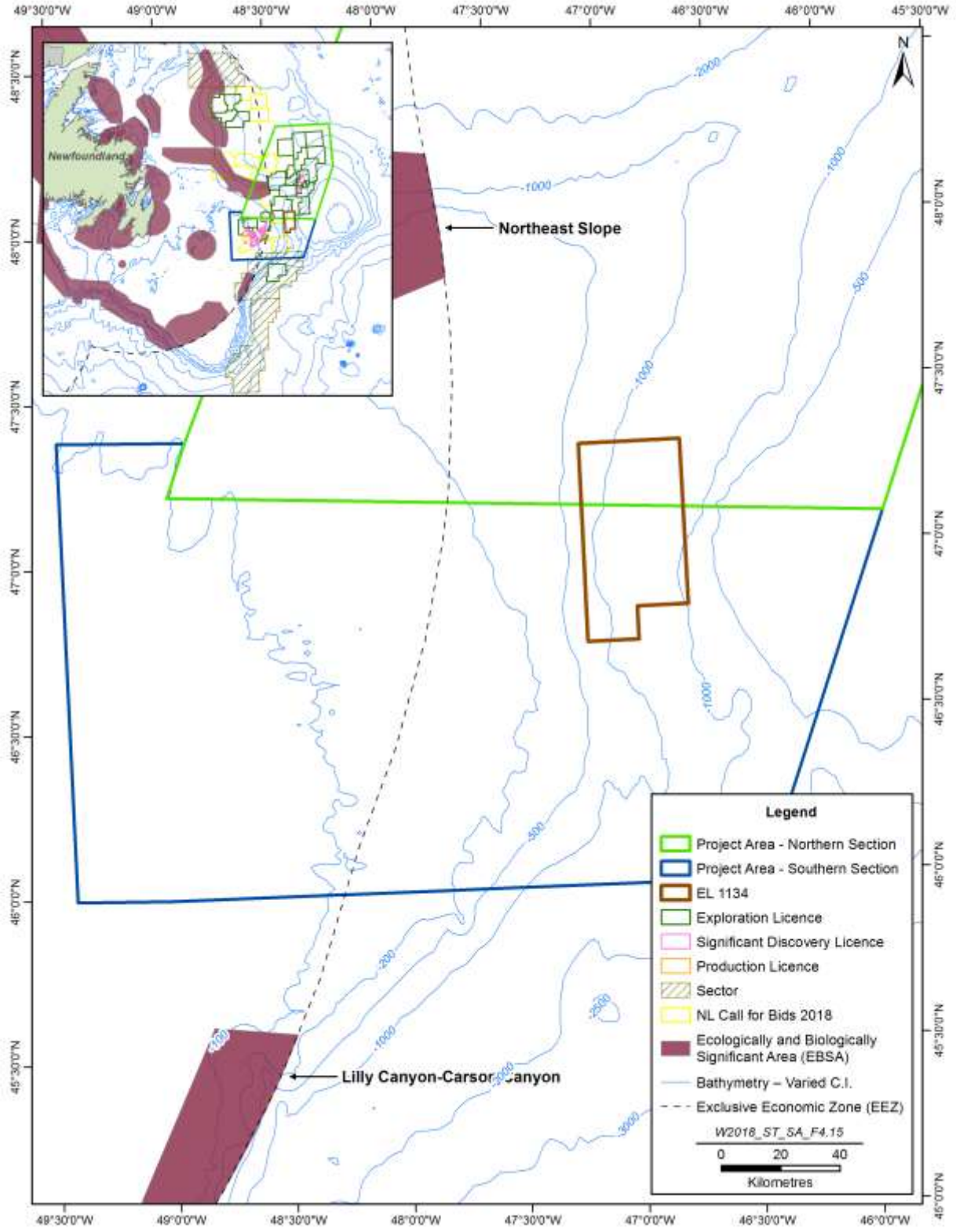


Figure 4.15 Canadian Ecologically and Biologically Significant Areas



Marine Refuges

In December 2017, DFO designated seven Marine Refuges off the coast of Nunavut and Newfoundland and Labrador to protect portions of sensitive and productive habitat (DFO 2018). Three of these Marine Refuges are located off Eastern Newfoundland (Table 4.14 and Figure 4.16). None of these Marine Refuges intersect with EL 1134.

Table 4.14 Marine Refuges off Eastern Newfoundland

Marine Refuge	Rationale for Identification/Designation	Area
Northeast Newfoundland Slope Closure (formerly known as Tobin's Point)	Dense aggregations of large, structure-forming cold-water corals provide niche space for other organisms. Prohibitions for all bottom contact fishing activities.	46,833 km^2
Hawke Channel Closure	The Hawke Channel seafloor is an important habitat for ground fish including Greenland halibut. The Refuge also protects habitat of depleted species such as Atlantic wolffish. Bottom trawl, gillnet and longline fishing activities are prohibited.	8,837 km^2
Funk Island Deep Closure	Conserves seafloor habitat important to Atlantic cod. Bottom trawl, gillnet and longline fishing activities are prohibited.	7,274 km^2
Source: DFO (2018)		

Lobster Closure Areas and Snow Crab Stewardship Exclusion Zones

Within the Canadian EEZ, various marine areas off Eastern Newfoundland have been closed to specific types of fishing activities through various means including voluntary closures, co-management approaches, licencing restrictions and/or under the *Fisheries Act* to protect and conserve productive fish and shellfish habitat for commercially important species (Figure 4.16). These fisheries closures were discussed in the EIS (Section 6.4). None intersect with EL 1134.

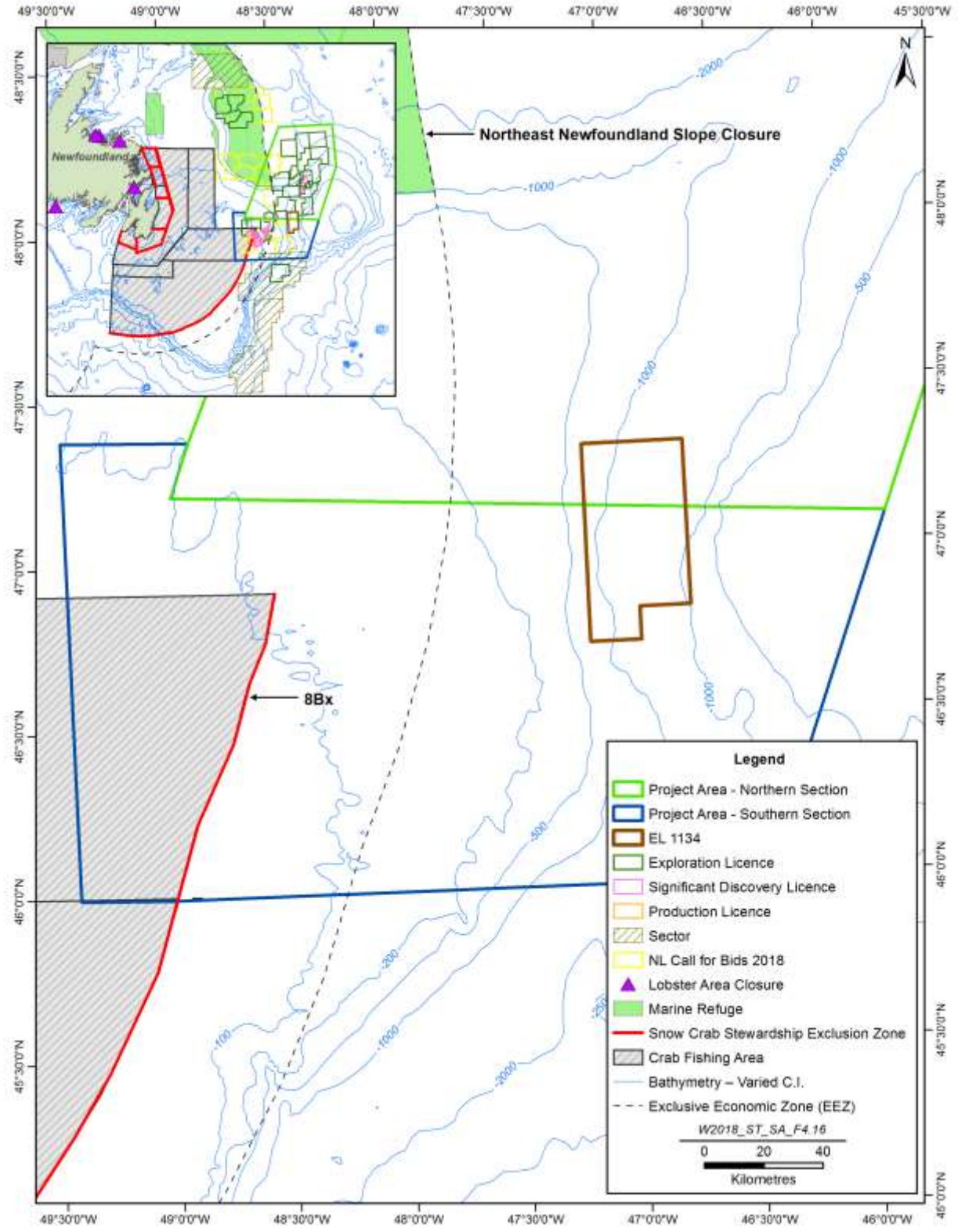
In addition, other areas have been closed to lobster and snow crab fishing (Figure 4.16 and Table 4.15). DFO has closed seven lobster fishing areas in Eastern Newfoundland and the Gulf of St. Lawrence (DFO 2017). Snow Crab Stewardship Exclusion Zones, which have been established off Eastern Newfoundland, are 0.5 or 1.0 nautical mile (NM) wide corridors along the length of various crab fishing area boundaries to delineate fishing areas and provide a refuge area for snow crab (DFO 2015). None of these lobster or crab conservation areas intersect with EL 1134.

Table 4.15 Federal Fisheries Closure Areas in Eastern Newfoundland

Closure Area	Rationale for Identification/Designation
Mouse Island	Lobster fishing has been prohibited in 7 areas (totaling 94 km^2) around coastal Newfoundland to protect lobster spawning habitat and increase egg production. Five of these Lobster Area Closures are located in Eastern Newfoundland.
Glover's Harbour	
Gander Bay	
Gooseberry Island	
Penguin Islands	
Crab Fishing Area 5A (2 zones)	Snow crab fishing is currently not authorized in various Stewardship Exclusion Zones including portions of Bonavista Bay, Trinity Bay, Conception
Crab Fishing Area 6A (2 zones)	
Crab Fishing Area 6B	

Closure Area	Rationale for Identification/Designation
Crab Fishing Area 6C	Bay, the Eastern Avalon and St. Mary's Bay as well as in mid shore fishing areas.
Crab Fishing Area 8A	
Crab Fishing Area – 8BX	
Crab Fishing Area 9A (2 zones)	
Near Shore (2 zones)	
Source: DFO (2015, 2017)	

Figure 4.16 Marine Refuges, Lobster Closure Areas and Snow Crab Stewardship Exclusion Zones



4.2.4.2 Newfoundland and Labrador Special Areas

Provincially identified and/or protected special areas are presented in the EIS. These areas include coastal ecological reserves, provincial parks and historic sites. These areas are all located in coastal and marine areas near the shoreline (Figure 4.17). None of these areas intersect with EL 1134.

4.2.4.3 Internationally Identified Special Areas

In addition to areas identified and designated under applicable Canadian (federal and/or provincial) legislation and processes, various areas have also been identified under international jurisdictions and processes. In addition, some coastal and inland areas of Eastern Newfoundland have been identified as globally, continentally or nationally significant. The EIS discusses vulnerable marine ecosystems (VMEs), Northwest Atlantic Fisheries Organization (NAFO) FCAs. EL 1134 overlaps with Southern Flemish Pass to Eastern Canyons VME and NAFO FCA Flemish Pass/Eastern Canyon (2), the latter of which is closed to bottom fishing to protect benthic habitat (Figure 4.18).

Various areas in Newfoundland and Labrador have been recognized by non-governmental agencies as special due to their ecological and/or societal importance. Canada is signatory to international conventions, some of which identify important special areas. A number of these are important bird habitats in coastal and marine areas that may be protected in whole or in part through applicable provincial and/or federal legislation (e.g., Ecological Reserves or MBS). These special areas include Important Bird Areas (IBAs), UNESCO World Heritage Sites (WHSs) and a Ramsar site, which have been identified and/or designated in Newfoundland and Labrador. None of these special areas intersect with EL 1134 (Figure 4.19). The following section identifies EBSAs that have been identified in the NAFO regulatory area.

UN Convention on Biological Diversity EBSAs

In 1992 Canada ratified the United Nations Convention on Biological Diversity, which came into effect in December 1993. The Convention is an important step towards conservation of global biodiversity and identified EBSAs include ocean habitat areas off eastern Newfoundland and Labrador (Table 4.16, Figure 4.20). EL 1134 overlaps with the Slopes of the Flemish Cap and Grand Bank EBSA.

Table 4.16 Convention on Biological Diversity EBSAs

EBSA	Rationale for Identification/Designation	Area
Labrador Sea Deep Convection Area	The only North-West Atlantic site where winter convection exchanges surface and deep ocean waters. Provides mid-water overwintering refuge for pre-adult Calanus finmarchicus, a key species for zooplankton populations of the Labrador Shelf and downstream areas. Annual variability in convection results in significant yearly change through ecosystems of the North-West Atlantic.	Not a fixed geographic area but delineated annually by physical oceanographic properties
Seabird Foraging Zone in the Southern Labrador Sea	Supports globally significant populations of marine vertebrates, including an estimated 40 million seabirds annually. Important	152,841 km^2

EBSA	Rationale for Identification/Designation	Area
	foraging habitat for seabirds, including 20 populations of over-wintering black-legged kittiwakes (Rissa tridactyla), thick-billed murres (Uria lombia) and breeding Leach's storm-petrels (Oceanodroma leucorhoa). Encompasses the pelagic zone of the Orphan Basin, continental shelf, slope and offshore waters inside and outside the Canadian EEZ.	
Orphan Knoll	Seamounts typically support endemic populations and unique faunal assemblages. This seamount is an island of hard substratum with uniquely complex habitats that rise from the seafloor of the surrounding deep, soft sediments of the Orphan Basin. Although close to the adjacent continental slopes, Orphan Knoll is much deeper and appears to have distinctive fauna. Fragile and long-lived corals and sponges have been observed and a Taylor Cone circulation provides a mechanism for retention of larvae.	12,742 km^2
Slopes of the Flemish Cap and Grand Bank	Contains most of the aggregations of indicator species for VMEs in the NAFO Regulatory Area. Includes NAFO closures to protect corals and sponges and a component of Greenland halibut fishery grounds in international waters. A high diversity of marine taxa, including threatened and listed species, are found within the EBSA.	87,817 km^2
Source: UNCBD (2017)		

Figure 4.17 Provincial Protected and Special Areas

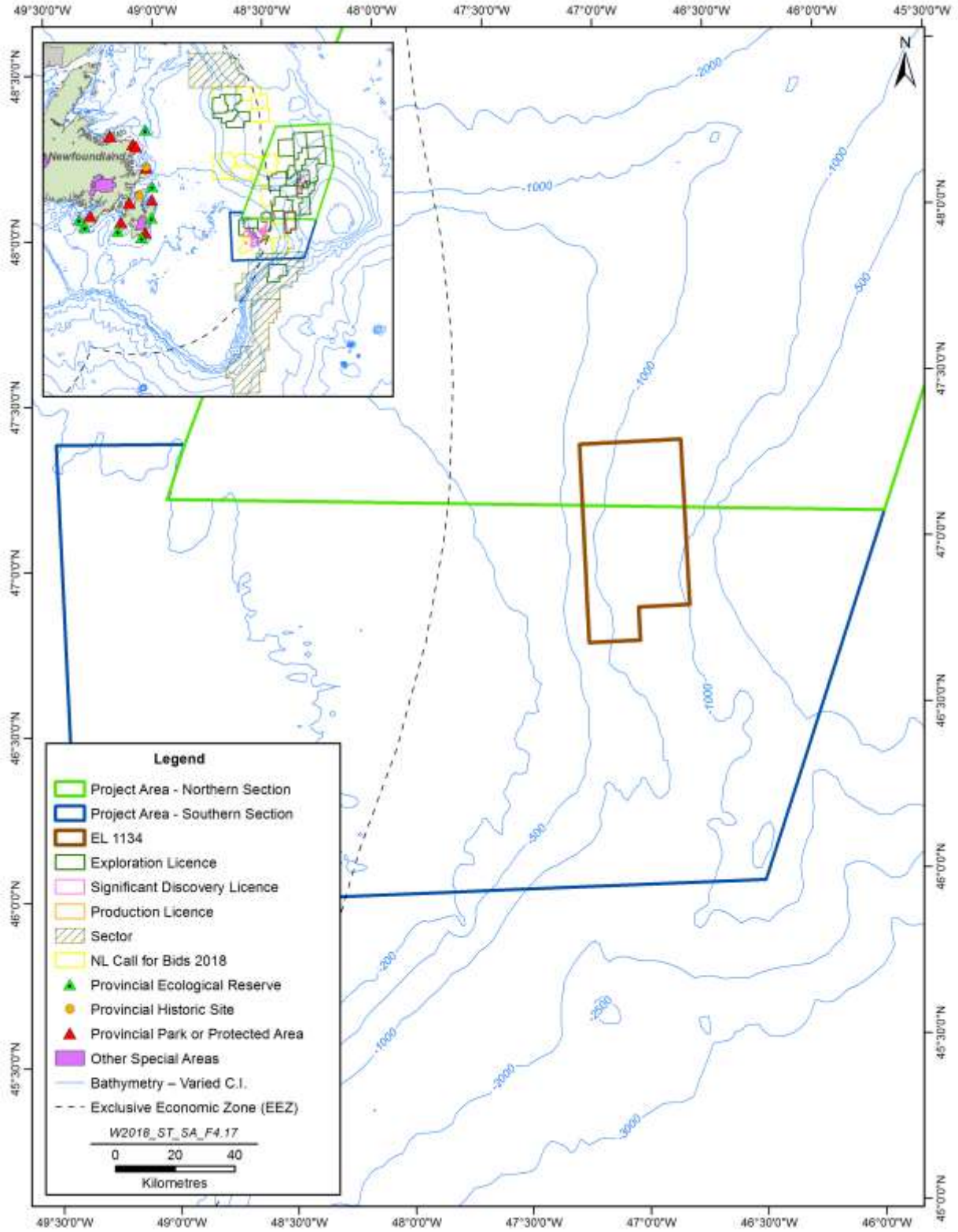


Figure 4.18 Vulnerable Marine Ecosystems and NAFO Fisheries Closure Areas

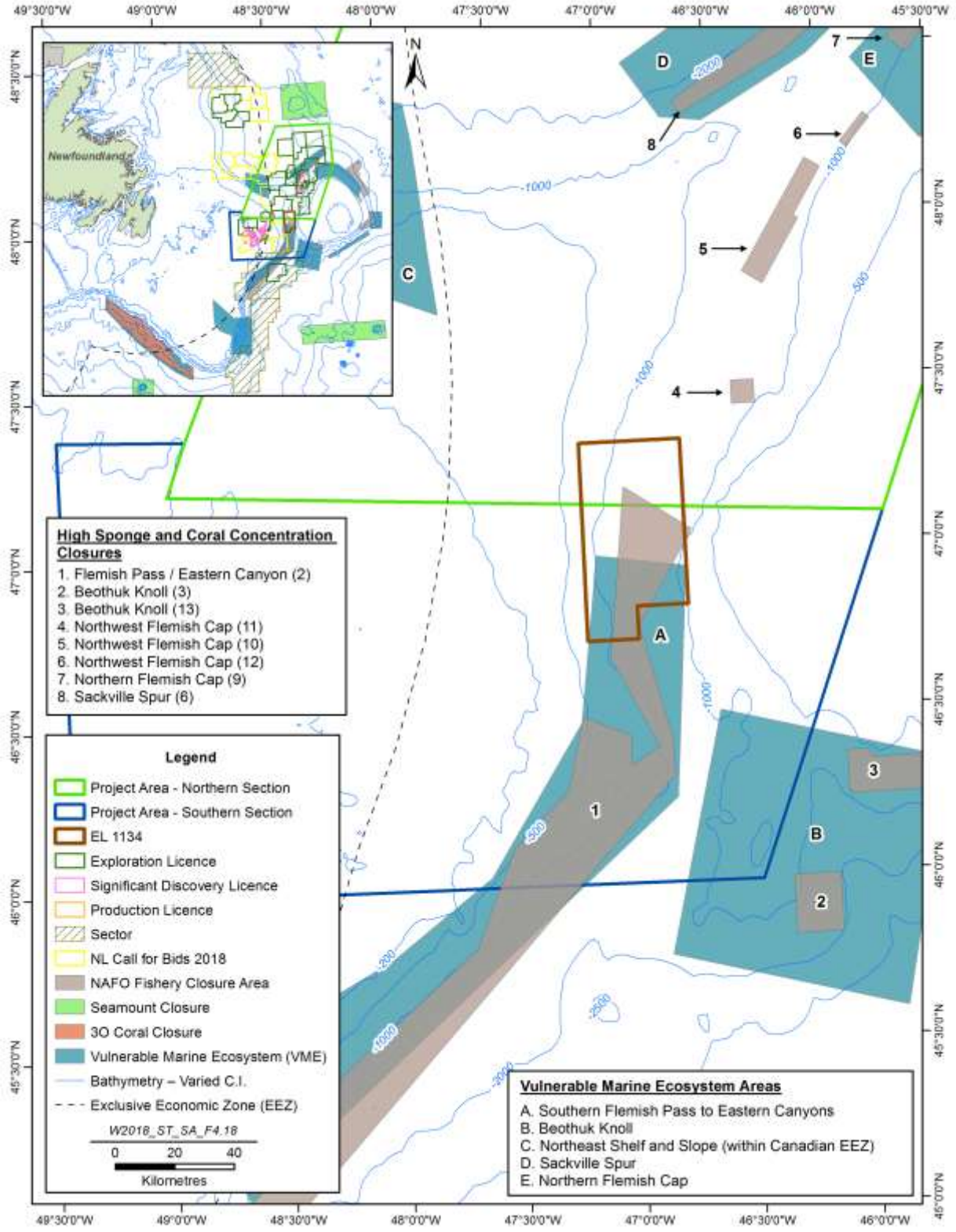


Figure 4.19 Important Bird Areas and UNESCO World Heritage Sites

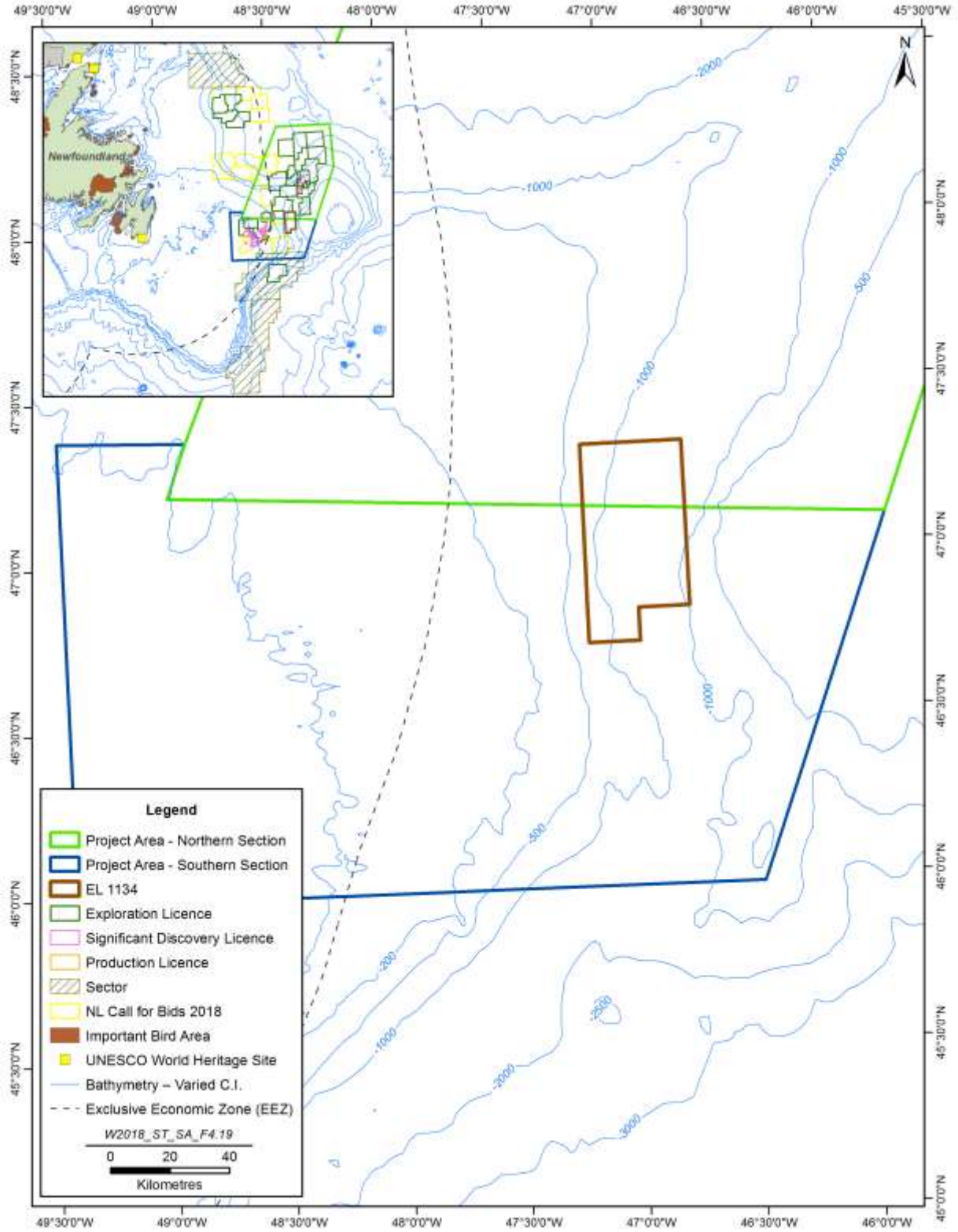
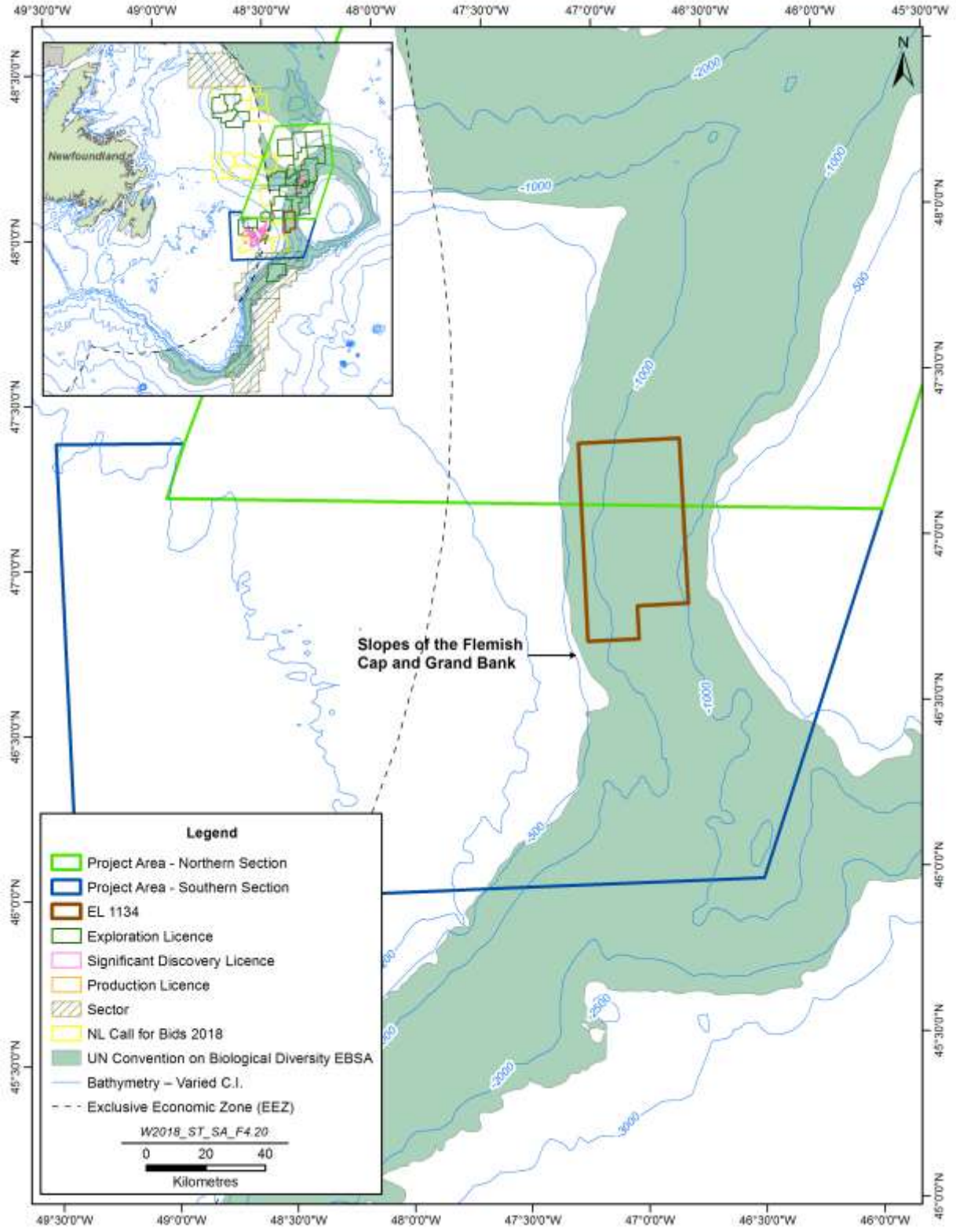


Figure 4.20 UN Convention on Biological Diversity EBSAs



4.2.4.4 Proximity of Special Areas to EL 1134

Table 4.17 below provides a summary of the minimum distance between the edge of EL 1134 and the various special areas identified and mapped in the previous subsection of 4.2.4. As illustrated, EL 1134 will not directly interact with any of the existing provincially-designated special areas (i.e., Ecological Reserves, Parks and Protected Areas, Historic Sites), which are all located at distances of at least 300 km in coastal and nearshore marine areas of Newfoundland and Labrador (Table 4.17). Most of the federally identified or designated areas (e.g., MPAs and AOIs, FCAs, MBSs, National Parks and Historic Sites) are also located in coastal areas. Sites identified by international agencies (i.e., IBAs and UNESCO WHSs) are also located along the coast. Some of the Canadian EBSAs, PRMAs and Marine Refuges, as well as international EBSAs, VMEs and NAFO FCAs, are located in the offshore area.

EL 1134 intersects with three identified special areas. These include the Southern Flemish Pass to Eastern Canyons VME, the Flemish Pass / Eastern Canyons NAFO FCA and the Slopes of the Flemish Cap and Grand Bank UN Convention on Biological Diversity EBSA. Oil and gas exploration and production activities are not prohibited in these areas.

Table 4.17 Special Areas: Summary of Minimum Distances from EL 1134

Special Area	Minimum Distance (km)
Marine Protected Areas (MPAs) and Areas of Interest (AOI)	
Eastport – Duck Islands MPA	512
Eastport – Round Island MPA	517
Laurentian Channel AOI	733
Gilbert Bay	861
Marine Refuges	
Northeast Newfoundland Slope Closure	98
Funk Island Deep Closure	473
Hawke Channel Closure	723
Canadian Fisheries Closure Areas (FCAs) within the EEZ	
Eastport Peninsula Lobster Management Area	498
Funk Island Deep Box	473
Hawke Channel	723
Lobster Area Closures	
Mouse Island	666
Glover's Harbour	655
Gander Bay	587
Gooseberry Island	501
Penguin Islands	748
Snow Crab Stewardship Exclusion Zones	
Crab Fishing Area 5A (2 zones)	435
Crab Fishing Area 6A (2 zones)	404
Crab Fishing Area 6B	385
Crab Fishing Area 6C	370
Crab Fishing Area 8A	393

Special Area	Minimum Distance (km)
Crab Fishing Area – 8BX	106
Crab Fishing Area 9A (2 zones)	492
Near Shore (2 zones)	367
Canadian Ecologically and Biologically Significant Areas (EBSAs)	
Newfoundland and Labrador Shelves Bioregion EBSAs	
Orphan Spur	280
Notre Dame Channel	475
Fogo Shelf	489
Grey Islands	593
Southern Pack Ice	Not Applicable
Refined PB/GB LOMA EBSAs	
Northeast Slope	72
Virgin Rocks	225
Lilly Canyon-Carson Canyon	165
Southeast Shoal	306
Eastern Avalon	367
Southwest Slope	485
Smith Sound	469
Placentia Bay	503
Laurentian Channel	706
Haddock Channel Sponges	523
St. Mary's Bay	477
Bonavista Bay	484
Baccalieu Island	374
Preliminary Representative Marine Areas (RMAs)	
Virgin Rocks	229
South Grand Bank Area	251
Northwestern Conception Bay	423
Southern Coast of Burin Peninsula and Southeastern Placentia Bay	618
Migratory Bird Sanctuaries (MBSs)	
Terra Nova	526
Île aux Canes	722
Shepherd Island	728
Coastal National Parks and Historic Sites	
Cape Spear National Historic Site	414
Signal Hill National Historic Site	418
Ryan Premises National Historic Site	468
Castle Hill National Historic Site	516
Terra Nova National Park	506
Coastal Provincial Ecological Reserves	
Witless Bay Seabird Ecological Reserve	427

Special Area	Minimum Distance (km)
Baccalieu Island Seabird Ecological Reserve	433
Mistaken Point Fossil Ecological Reserve	463
Funk Island Seabird Ecological Reserve	520
Cape St. Mary's Seabird Ecological Reserve	537
Lawn Bay Seabird Ecological Reserve (Middle Lawn, Swale, and Colombier Islands)	643
Fortune Head Fossil Ecological Reserve	660
Coastal Provincial Parks and Protected Areas	
Marine Drive Provincial Park Reserve	428
Chance Cove Provincial Park	449
Dungeon Provincial Park	467
Bellevue Beach Provincial Park Reserve	499
Gooseberry Cove Provincial Park	527
Windmill Bight Provincial Park Reserve	521
Deadman's Bay Provincial Park	533
Frenchman's Cove Provincial Park	625
Dildo Run Provincial Park	611
Coastal Provincial Historic Sites	
Cape Bonavista Lighthouse Historic Site	468
Heart's Content Cable Station Historic Site	472
UN Convention on Biological Diversity EBSAs	
Labrador Sea Deep Convection Area	~1,000
Seabird Foraging Zone in the Southern Labrador Sea	250
Orphan Knoll	293
Slopes of the Flemish Cap and Grand Bank	Intersects
UN FAO Vulnerable Marine Ecosystems (VMEs)	
Northeast Shelf and Slope (within Canadian EEZ)	64
Sackville Spur	107
Northern Flemish Cap	130
Southern Flemish Pass to Eastern Canyons	Intersects
Beothuk Knoll	36
Deep Water Coral Area	138
Flemish Cap East	239
South East Shoal and Adjacent Shelf Edge / Canyons	295
Division 3O Coral Closure	524
NAFO Fisheries Closure Areas (FCAs)	
High Sponge and Coral Concentration Area Closures	
Tail of the Bank (1)	293
Flemish Pass / Eastern Canyon (2)	Intersects
Beothuk Knoll (3)	95
Eastern Flemish Cap (4)	203
Northeast Flemish Cap (5)	215

Special Area	Minimum Distance (km)
Sackville Spur (6)	109
Northern Flemish Cap (7)	154
Northern Flemish Cap (8)	174
Northern Flemish Cap (9)	151
Northwest Flemish Cap (10)	59
Northwest Flemish Cap (11)	21
Northwest Flemish Cap (12)	113
Beothuk Knoll (13)	73
Eastern Flemish Cap (14)	205
Seamount Closures	
Orphan Knoll Seamount	298
Newfoundland Seamounts	305
Fogo Seamounts (1)	634
30 Coral Area Closure	524
Important Bird Areas (IBAs)	
Quidi Vidi Lake	417
Witless Bay Islands	423
Cape St. Francis	422
Baccalieu Island	430
Grates Point	436
Mistaken Point	453
The Cape Pine and St. Shotts Barren	486
Placentia Bay	506
Terra Nova National Park	506
Funk Island	514
Cape Freels Coastline and Cabot Island	507
Cape St. Mary's	527
Wadham Islands and adjacent Marine Area	546
UNESCO World Heritage Sites (WHSs)	
Mistaken Point Ecological Reserve	461
Red Bay National Historic Site	830
L’Anse aux Meadows National Historic Site	767

4.3 Existing Human Environment

The EIS (Chapter 7) provides an overview of the existing human environment of the Project Area, LSA and RSA, including marine fisheries and a number of other anthropogenic components and activities that occur in these regions and which may potentially interact with the Project.

4.3.1 Commercial Fisheries

Fisheries were a key area of focus of the EIS, and on-going Project planning and its eventual implementation will continue to place a high degree of emphasis on addressing the potential for interactions with commercial fishing activity within and near the Project Area and LSA.

4.3.1.1 Administrative Areas and Key Information Sources

As described in the EIS (Section 7.1.1), there are several regulatory jurisdictions associated with marine fisheries within the Project Area, LSA and RSA. The Government of Canada has jurisdiction over fish stocks and fishing activities within the 200 nautical mile limit (EEZ) and for benthic invertebrates across the continental shelf. Beyond that 200 mile limit, the North Atlantic Fisheries Organization (NAFO) manages groundfish and other resources and activities.

For administrative purposes, the Northwest Atlantic is divided into a series of NAFO Divisions, Subdivisions and Unit Areas (Figure 4.21), and although fish harvesting activities and fisheries management responsibilities do extend across these areas and their boundaries, they are generally used to regulate and manage fishing activity. EL 1134 overlaps with a portion of NAFO Division 3L, and specifically, with NAFO Unit Areas 3Li and 3Lt (Figure 4.21).

Commercial fisheries data are provided by Fisheries and Oceans Canada (DFO) Statistical Services in Ottawa, ON, including mapping information on the location of recorded fishing activity. The mapping information is currently provided by DFO as an aggregated data set which gives a general indication of fishing areas (by species, gear types, fleet and other pre-determined categories and data classes) for individual grid “cells” that are approximately 6 x 4 nautical miles in size. The DFO datasets record and report domestic and foreign fish harvests that are landed in Canada.

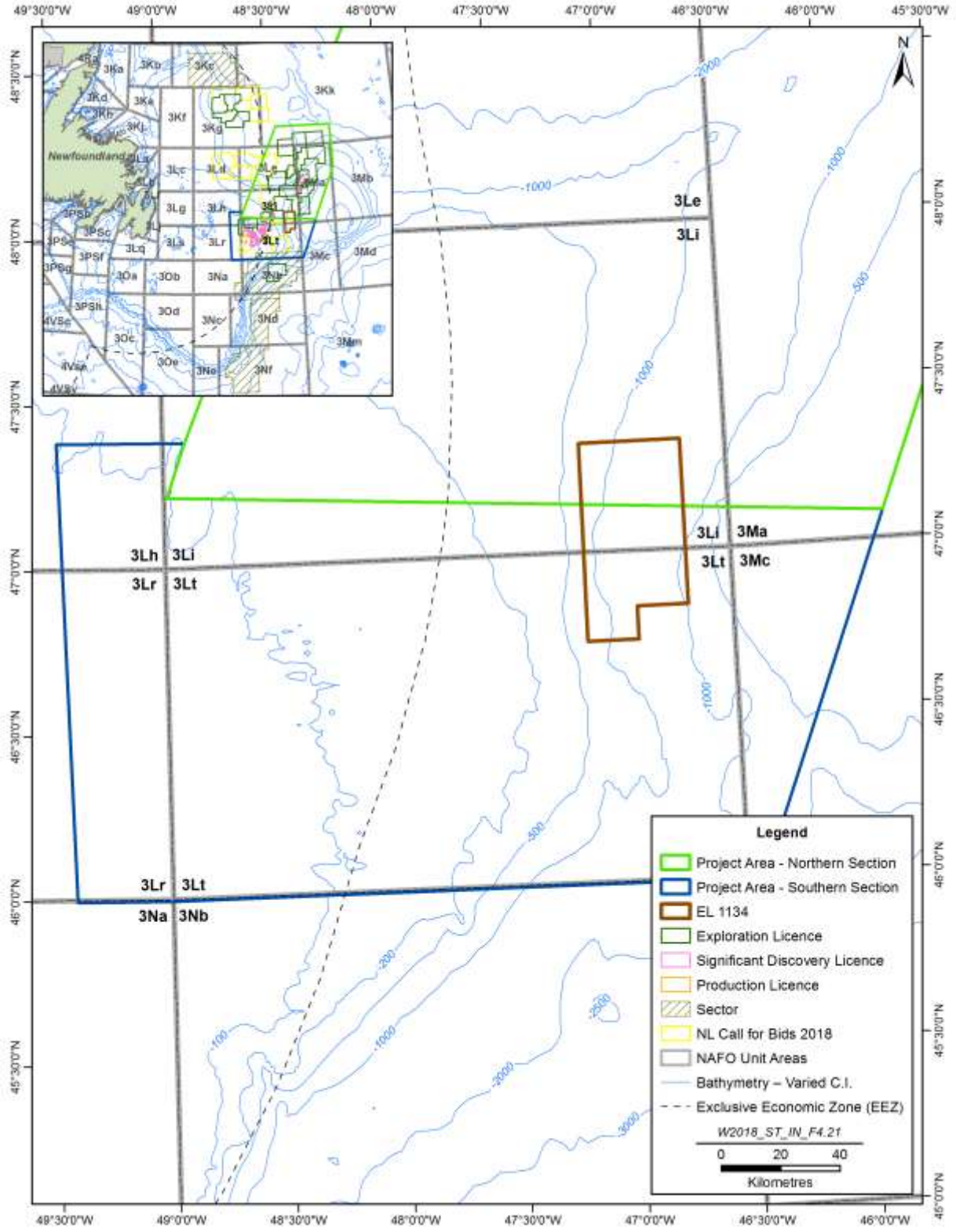
The EIS included a detailed description of commercial fisheries in the Project Area and RSA, based on existing data sources and other information that was available as of the time of EIS preparation and submission. Fisheries data (landings statistics) for 2015 remain the most current available from DFO as of the time of writing of this EIS Addendum. In April 2018, DFO provided 2016 fisheries geospatial data, but requests for the associated landings statistics (weight and value) for 2016 are still pending[1].

The sections (and associated tables, graphs and figures) that follow are therefore based on the following data to provide an overview of commercial fisheries in the NAFO Unit Areas that overlap with EL 1134:

1) The DFO provided 2011-2015 fisheries data (landings statistics) are used to provide a summary of commercial fisheries in NAFO Unit Areas 3Li and 3Lt;

[1] It should also be noted that data provided for the most recent years have been substantially redacted by DFO for confidentiality reasons. They are therefore not able to fully describe some important fisheries, nor to provide accurate and complete totals or facilitate direct comparison with similar fisheries data between years.

Figure 4.21 NAFO Divisions / Subdivisions and Unit Areas



2) NAFO (2017) Data Extraction Tool (Statlant 21A) data are available up to the 2016 period, and are used to provide an updated summary (to 2016), of commercial fish landings in NAFO Division 3L that overlaps EL 1134; and

3) The DFO (2018) provided 2014-2016 fisheries geospatial data are used to provide mapping of commercial fisheries in waters in and near EL 1134.

4.3.1.2 Current Domestic Fisheries

The available DFO data indicate that the average annual commercial fish harvest (finfish and shellfish) within EL 1134 (namely, in NAFO Unit Areas 3Li and 3Lt as referenced above) for the 2011 – 2015 period totalled approximately 7,000 tonnes, and had a landed value of almost 30 million (Tables 4.18 and 4.19).

Table 4.18 Fish Harvests by Weight and Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

Year	Weight (kg)	Value ($)
2011	10,808,730	32,906,585
2012	7,658,633	26,903,782
2013	5,463,469	23,365,972
2014	5,383,473	26,862,095
2015	5,348,171	29,123,061
Total	34,662,476	139,161,495
Average	6,932,495	27,832,299

Table 4.19 Fish Harvests (All Species) by Weight and Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

Unit Area	2015 Weight	2015 Value	Average Weight 2011-2015	Average Value 2011-2015	% Weight	% Value
3Li	3,367,207	18,335,833	4,839,424	17,808,526	69.8	63.7
3Lt	1,980,964	10,787,228	2,093,071	10,151,015	30.3	36.3
Total	5,348,171	29,123,061	6,932,495	27,959,541	100	100

4.3.1.3 Location and Timing of Harvest

Domestic Commercial Fish Harvests: Overall Geographic Distribution

Figure 4.22 provides a general illustration of the overall geographic distribution of commercial fishing for the 2011-2016 period. As indicated previously, the information provided in the maps that follow is based on the geospatial data received from DFO, and shows the general presence of recorded fishing activity for a series of 6 x 4 nautical mile “cells” that together comprise a map grid that covers the region. For these multi-year fishing maps, where fishing activity occurred within a single cell in both years the Figure indicates only the most recent year in which fishing activity occurred within that cell (i.e. the later year’s data overlays that from an earlier year). Further information on commercial fishing activity by species, season, gear type and other parameters is provided in the sections that follow.

Figure 4.22 Fish Harvests (All Species) by Weight by Year (2011-2015, NAFO Unit Areas 3Li and 3Lt)

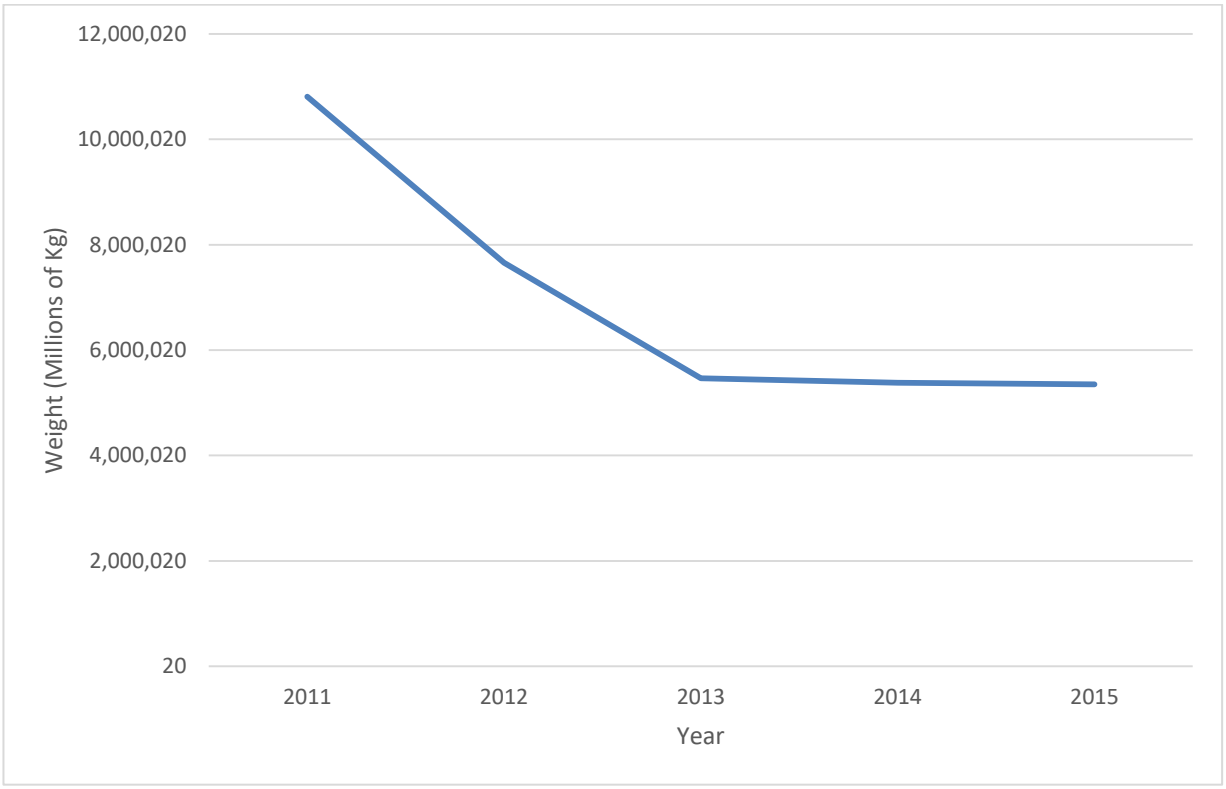


Figure 4.23 Fish Harvests (All Species) by Value by Year (2011-2015, NAFO Unit Areas 3Li and 3Lt)

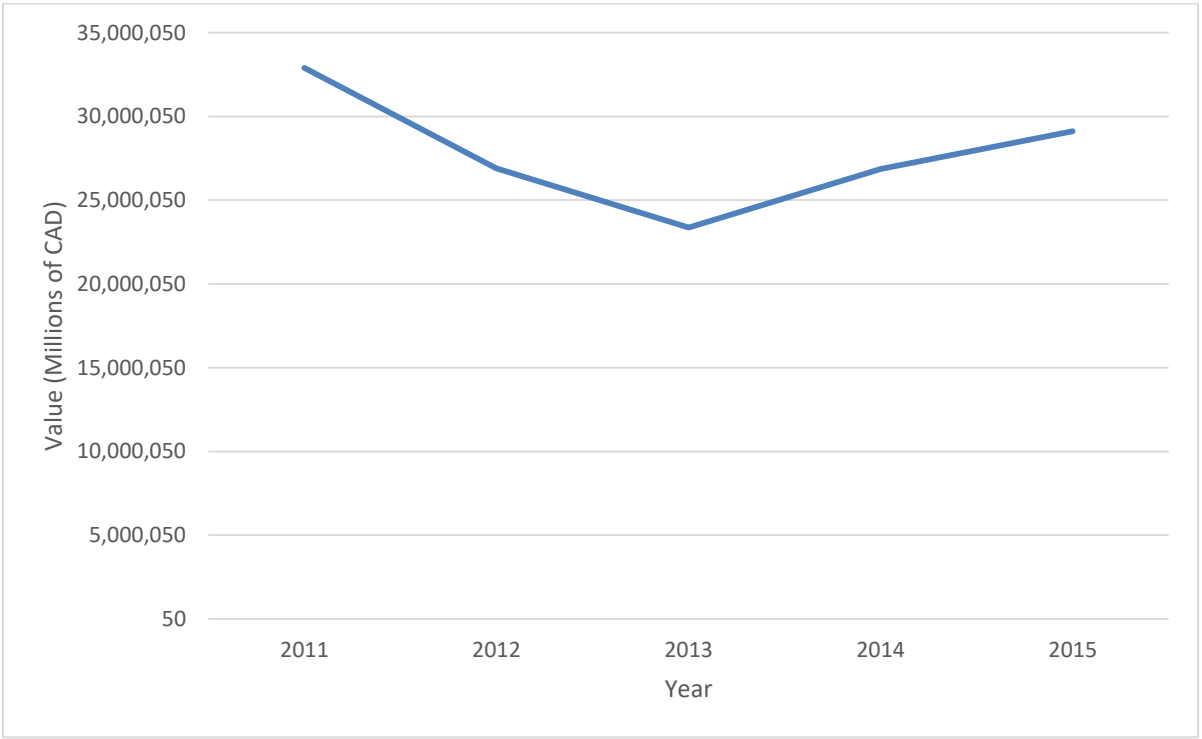
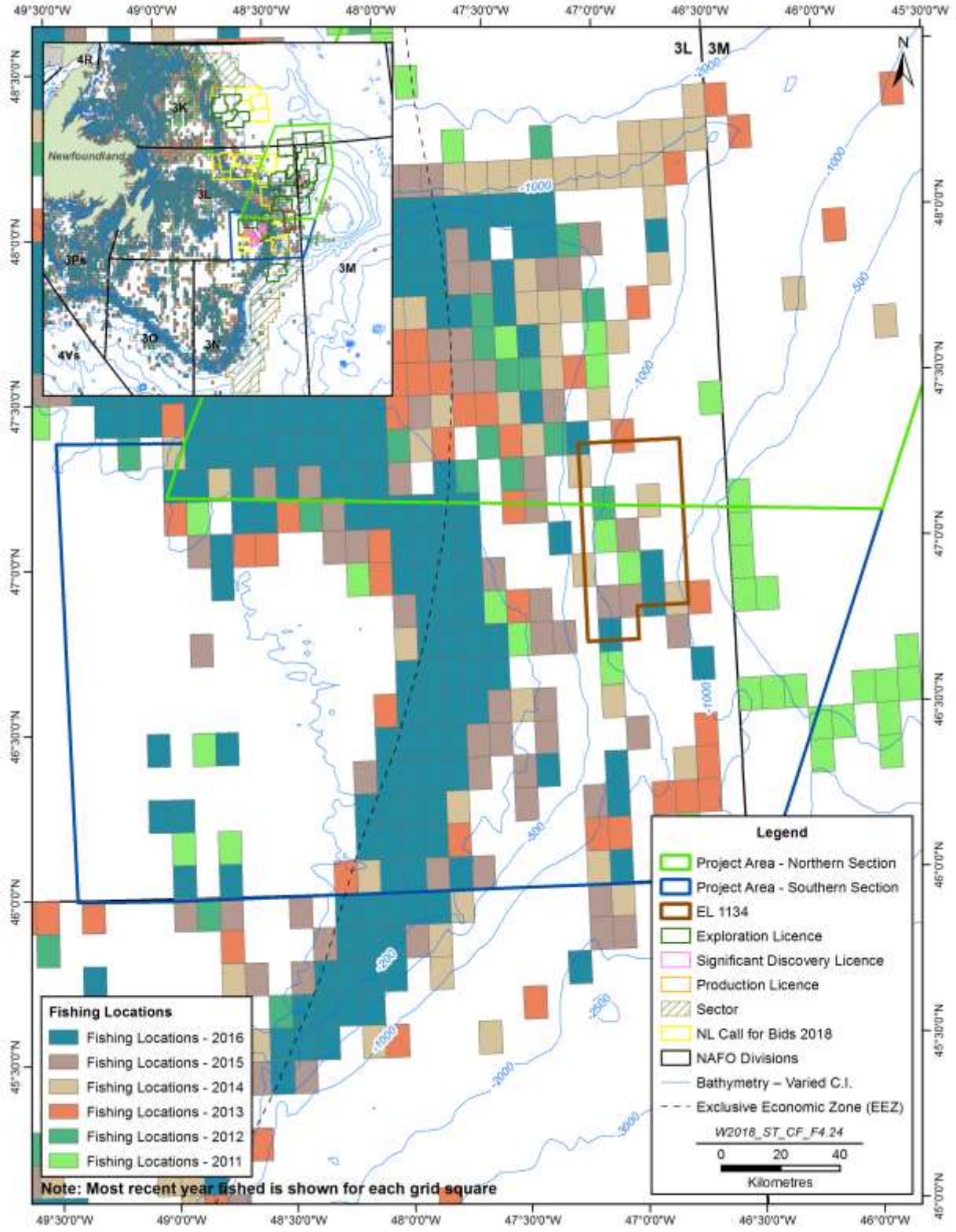


Figure 4.24 Commercial Fishing Locations, All Species, 2011-2016



Commercial Fish Harvests - Seasonality

Fishing activity during the 2011 to 2015 period occurred generally within the April to December timeframe, with the highest landings by weight and value occurring in the April – July period (Table 4.20, Figures 4.25 and 4.26).

Table 4.20 Fish Harvests by Month by Weight and Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

Month	2011	2012	2013	2014	2015	Total
Weight						
J	0	0	0	0	0	0
F	0	0	0	0	0	0
M	0	0	0	0	0	0
A	535,476	1,188,950	305,562	651,011	400,550	3,081,549
M	2,201,963	2,458,441	2,816,524	2,839,077	2,204,223	12,520,228
J	2,854,624	2,697,227	2,120,833	1,755,381	2,075,372	11,503,437
J	4,125,742	1,314,015	220,550	138,004	668,026	6,466,337
A	664,182	0	0	0	0	664,182
S	74,758	0	0	0	0	74,758
O	0	0	0	0	0	0
N	118,580	0	0	0	0	118,580
D	233,405	0	0	0	0	233,405
Total	10,808,730	7,658,633	5,463,469	5,383,473	5,348,171	34,662,476
Value						
J	0	0	0	0	0	0
F	0	0	0	0	0	0
M	0	0	0	0	0	0
A	2,538,140	5,111,365	1,324,405	3,358,456	2,181,156	14,513,523
M	10,437,103	10,488,202	12,207,629	14,646,307	12,002,962	59,782,203
J	9,194,424	8,462,142	8,878,016	8,145,410	11,301,280	45,981,272
J	8,440,342	2,842,073	955,921	711,922	3,637,664	16,587,922
A	1,297,687	0	0	0	0	1,297,687
S	200,009	0	0	0	0	200,009
O	0	0	0	0	0	0
N	199,492	0	0	0	0	199,492
D	599,388	0	0	0	0	599,388
Total	32,906,585	26,903,782	23,365,972	26,862,095	29,123,061	139,161,495

Figure 4.25 Total Monthly Fish Harvests, All Species, by Weight (2011-2015, NAFO Unit Areas 3Li and 3Lt)

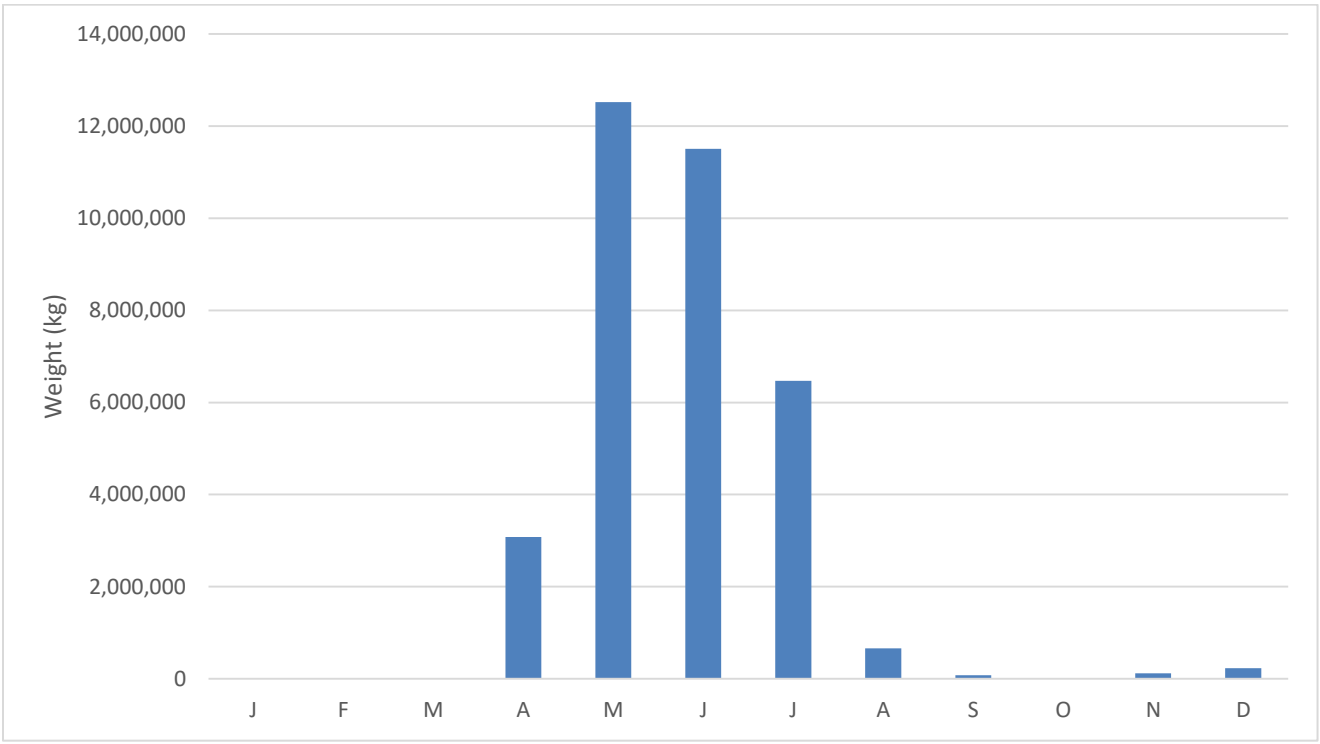


Figure 4.26 Total Monthly Fish Harvests, All Species, by Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

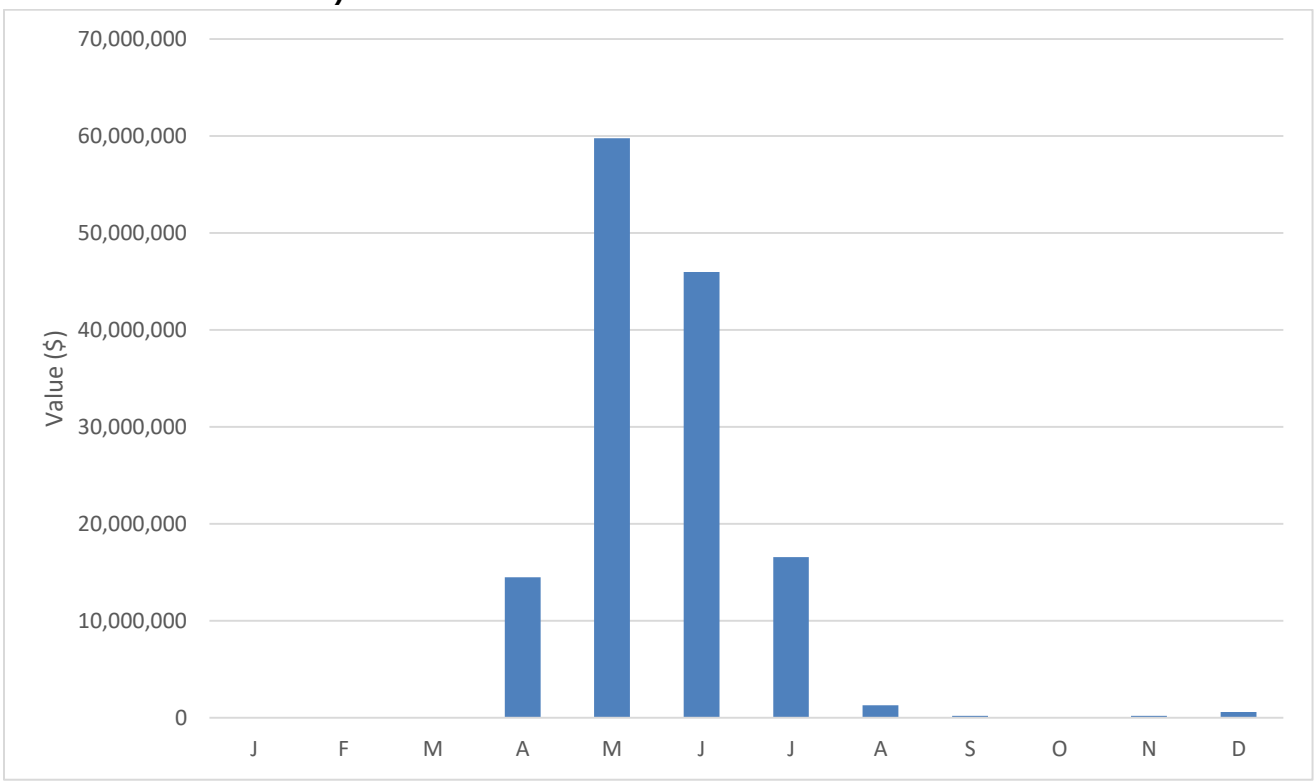


Figure 4.27 Commercial Fishing Locations, All Species: January (2011-2016)

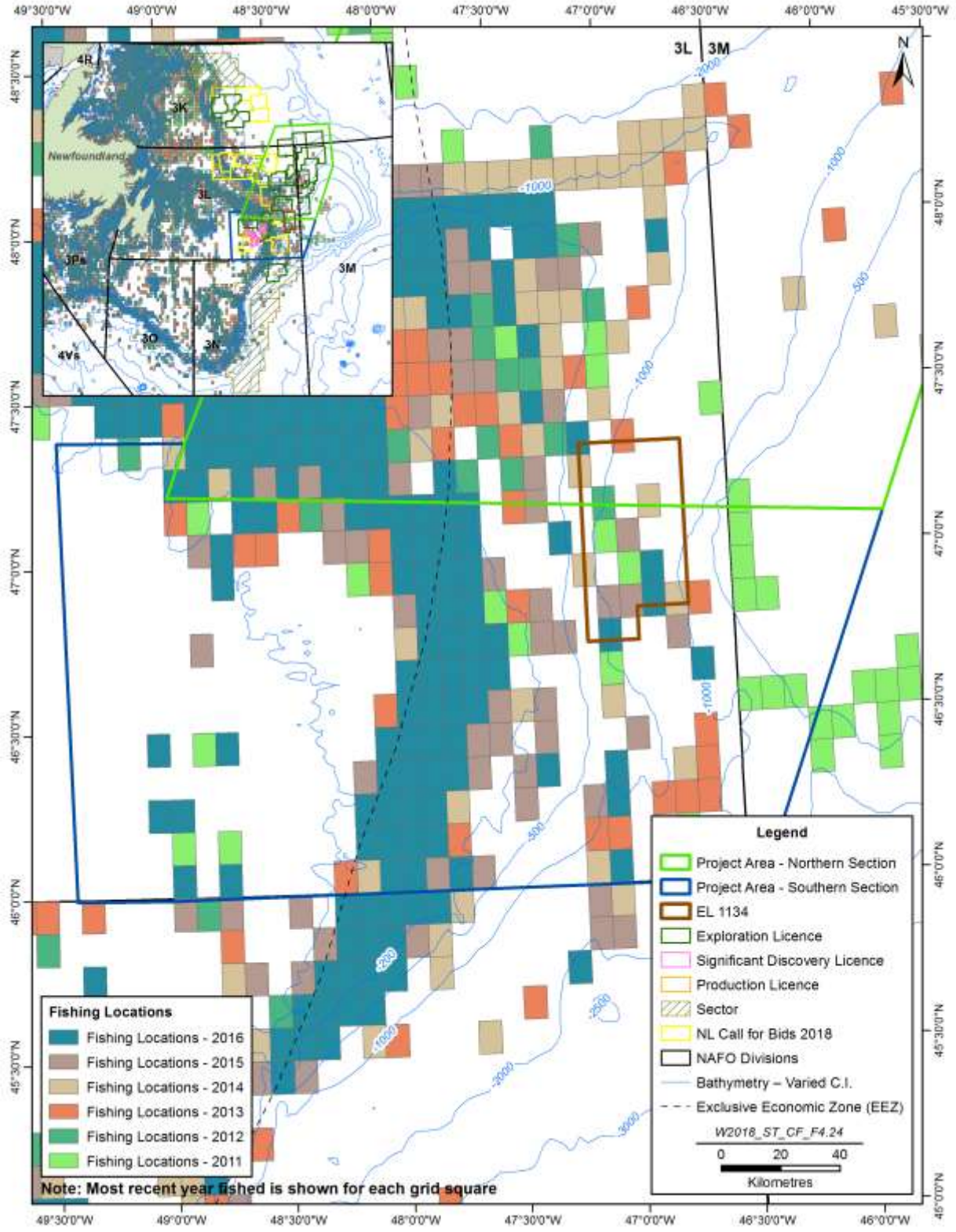


Figure 4.28 Commercial Fishing Locations, All Species: February (2011-2016)

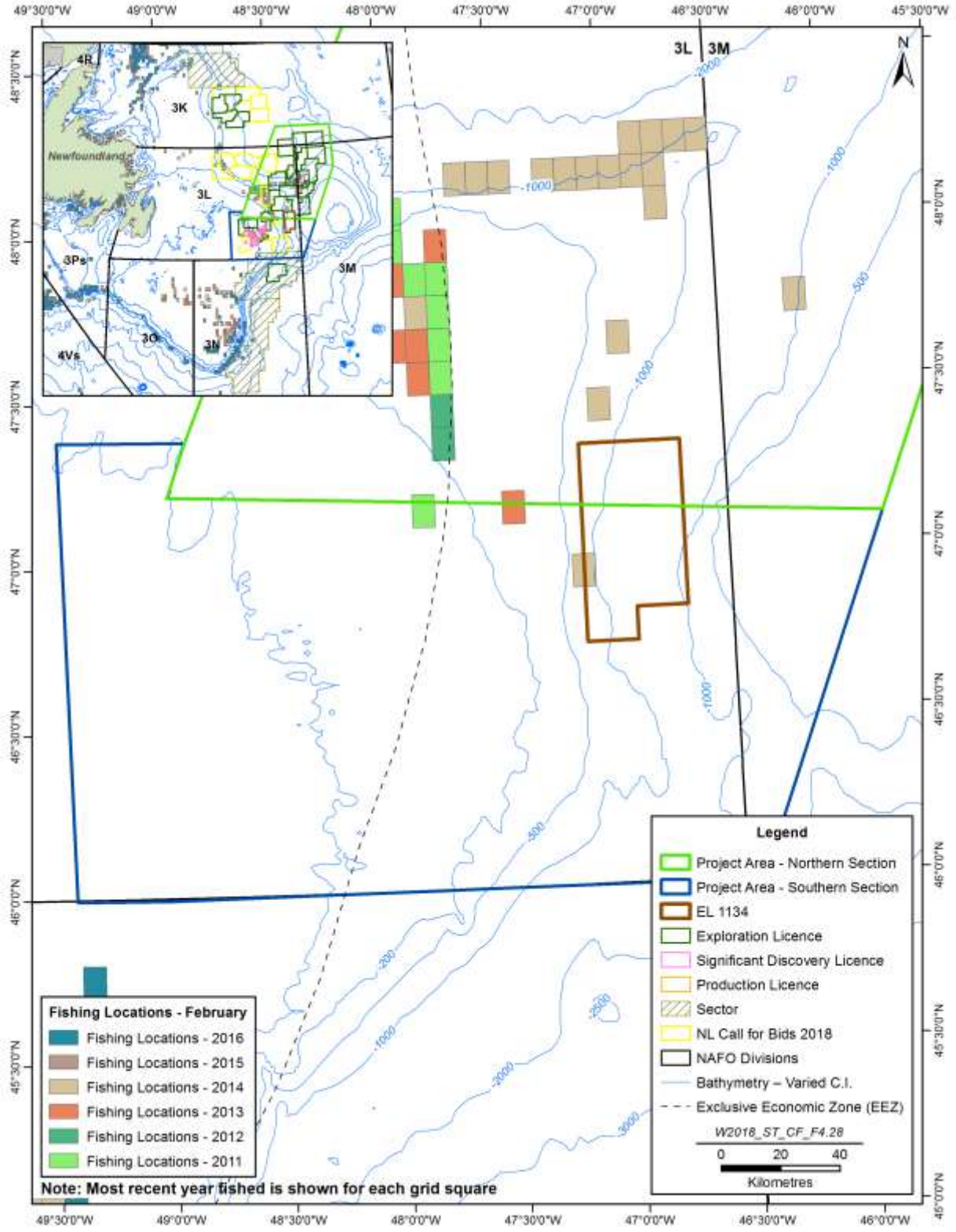


Figure 4.29 Commercial Fishing Locations, All Species: March (2011-2016)

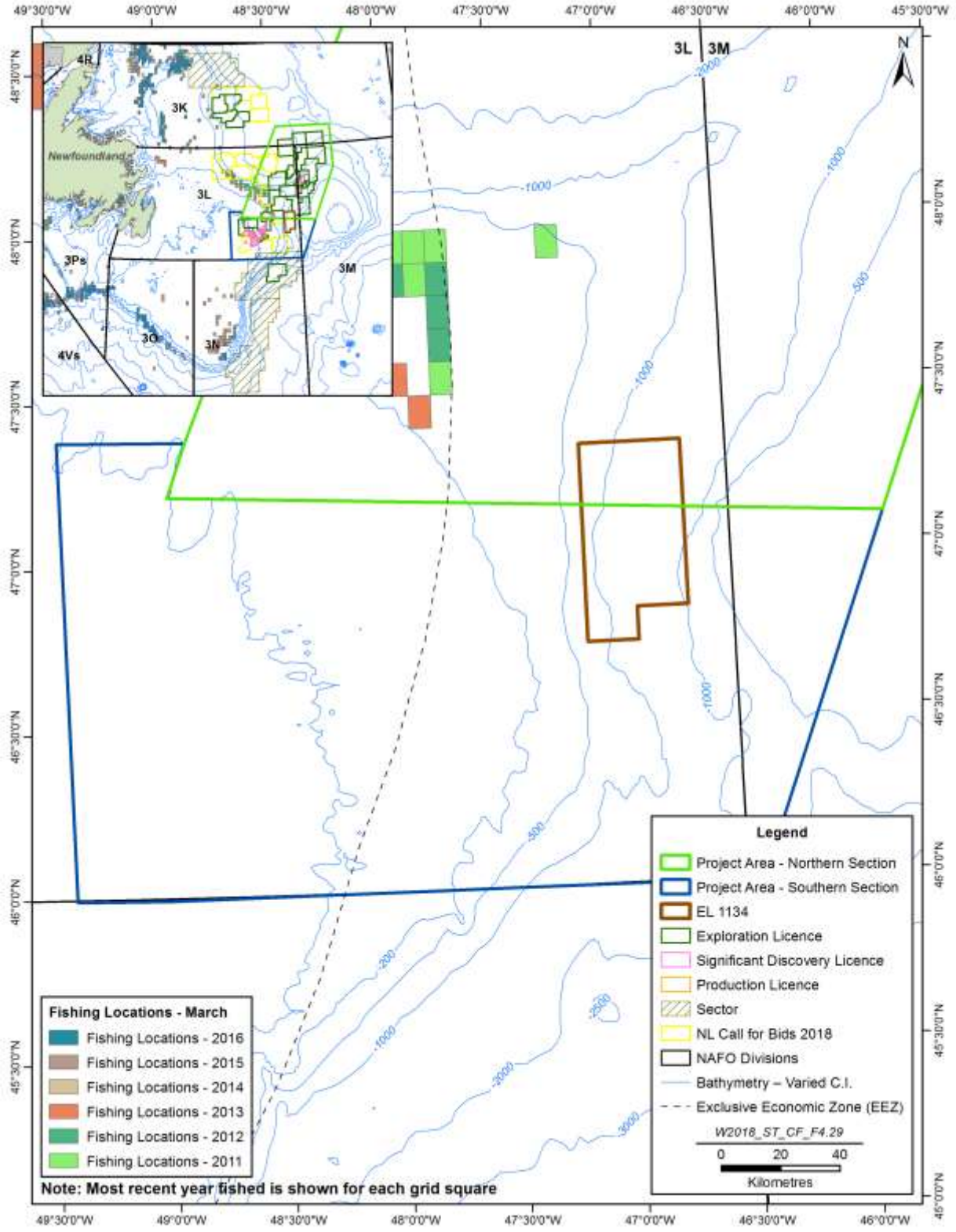


Figure 4.30 Commercial Fishing Locations, All Species: April (2011-2016)

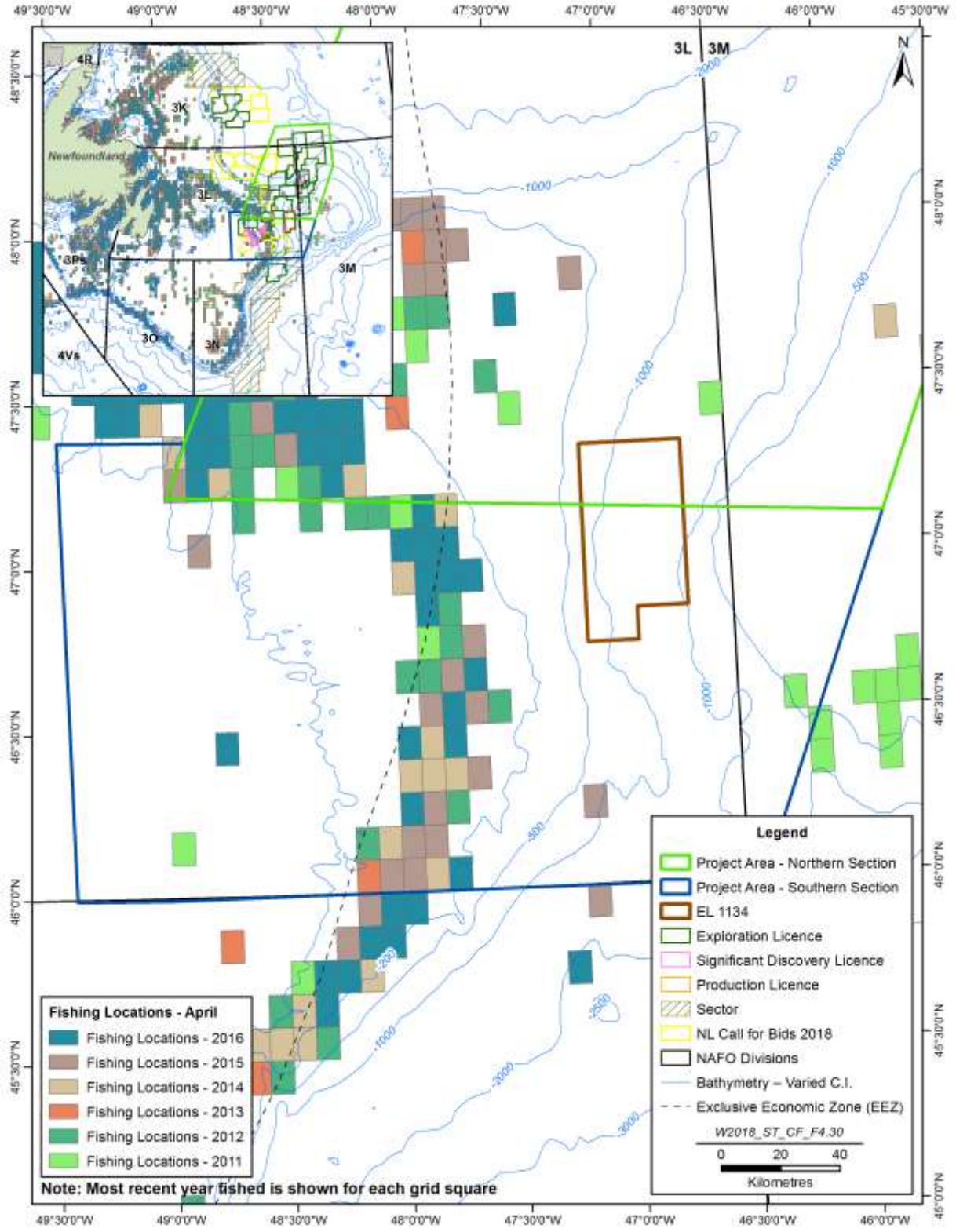


Figure 4.31 Commercial Fishing Locations, All Species: May (2011-2016)

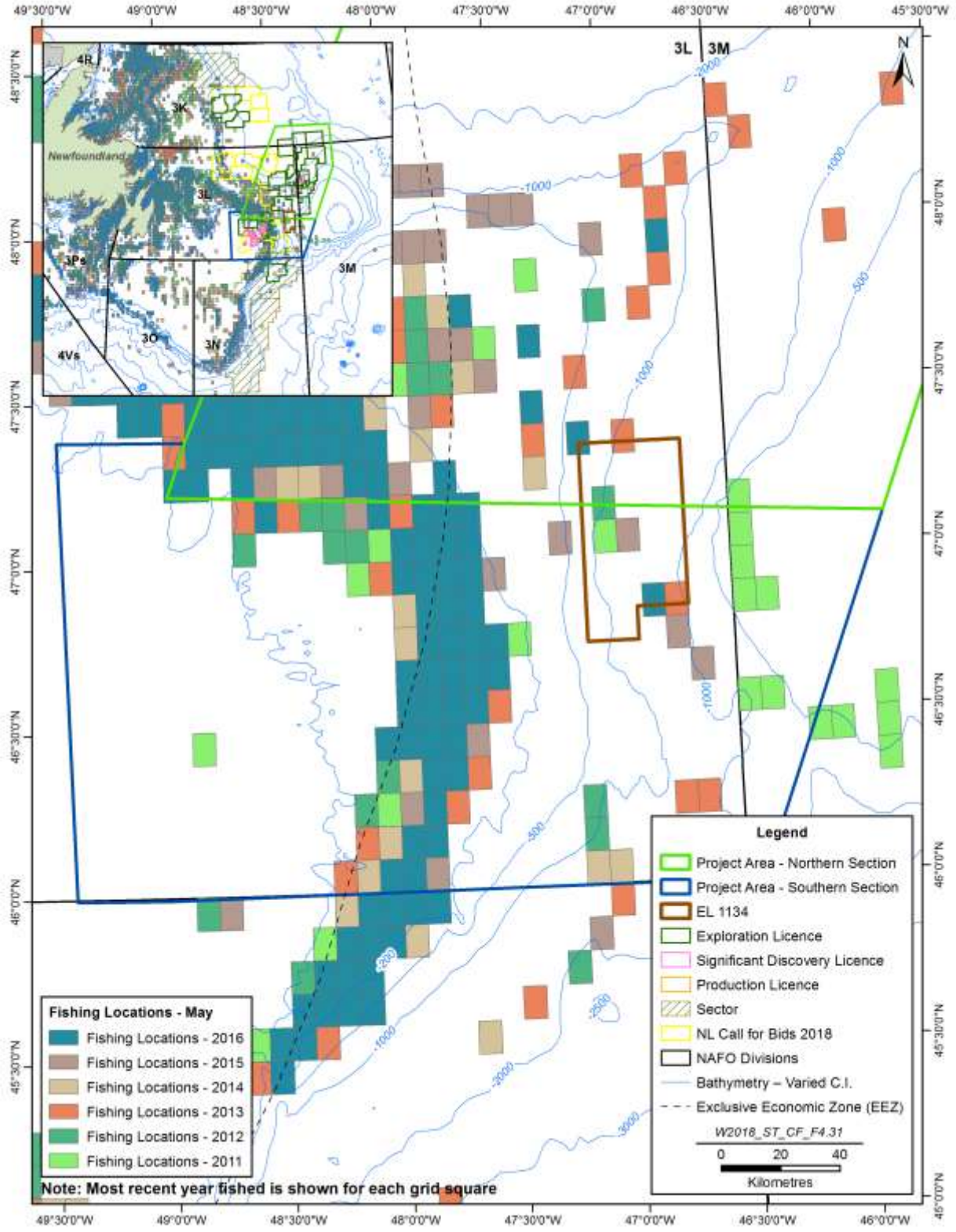


Figure 4.32 Commercial Fishing Locations, All Species: June (2011-2016)

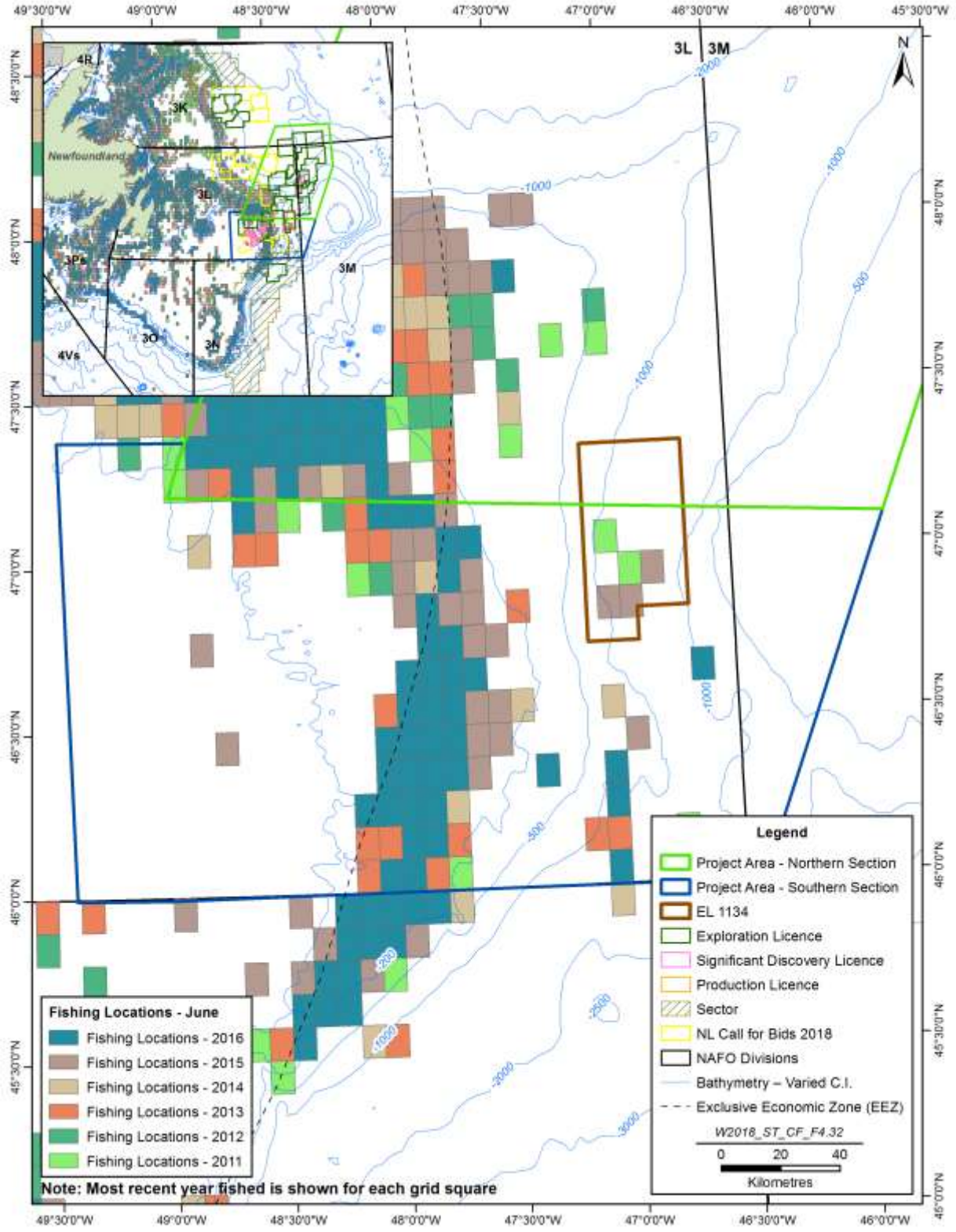


Figure 4.33 Commercial Fishing Locations, All Species: July (2011-2016)

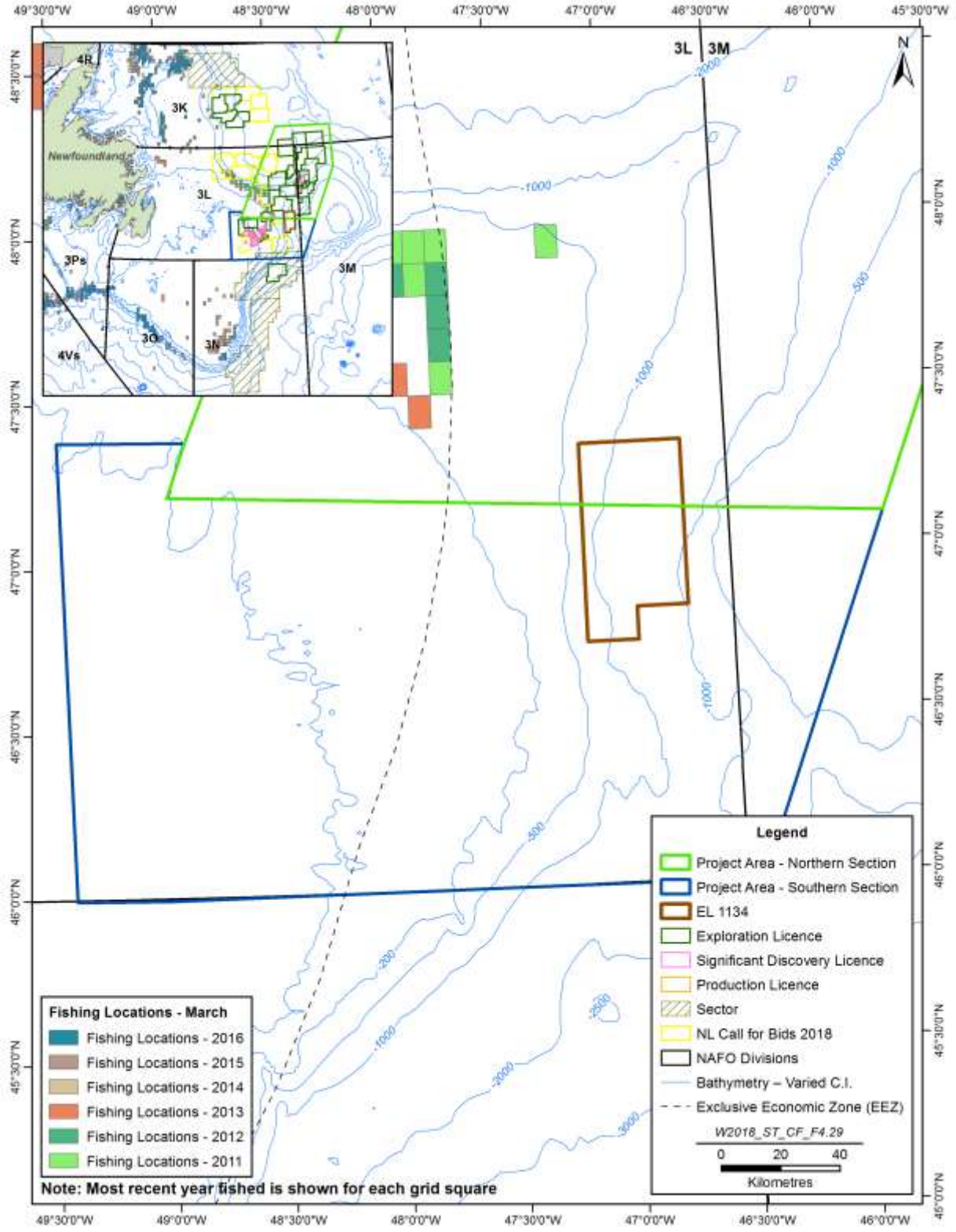


Figure 4.34 Commercial Fishing Locations, All Species: August (2011-2016)

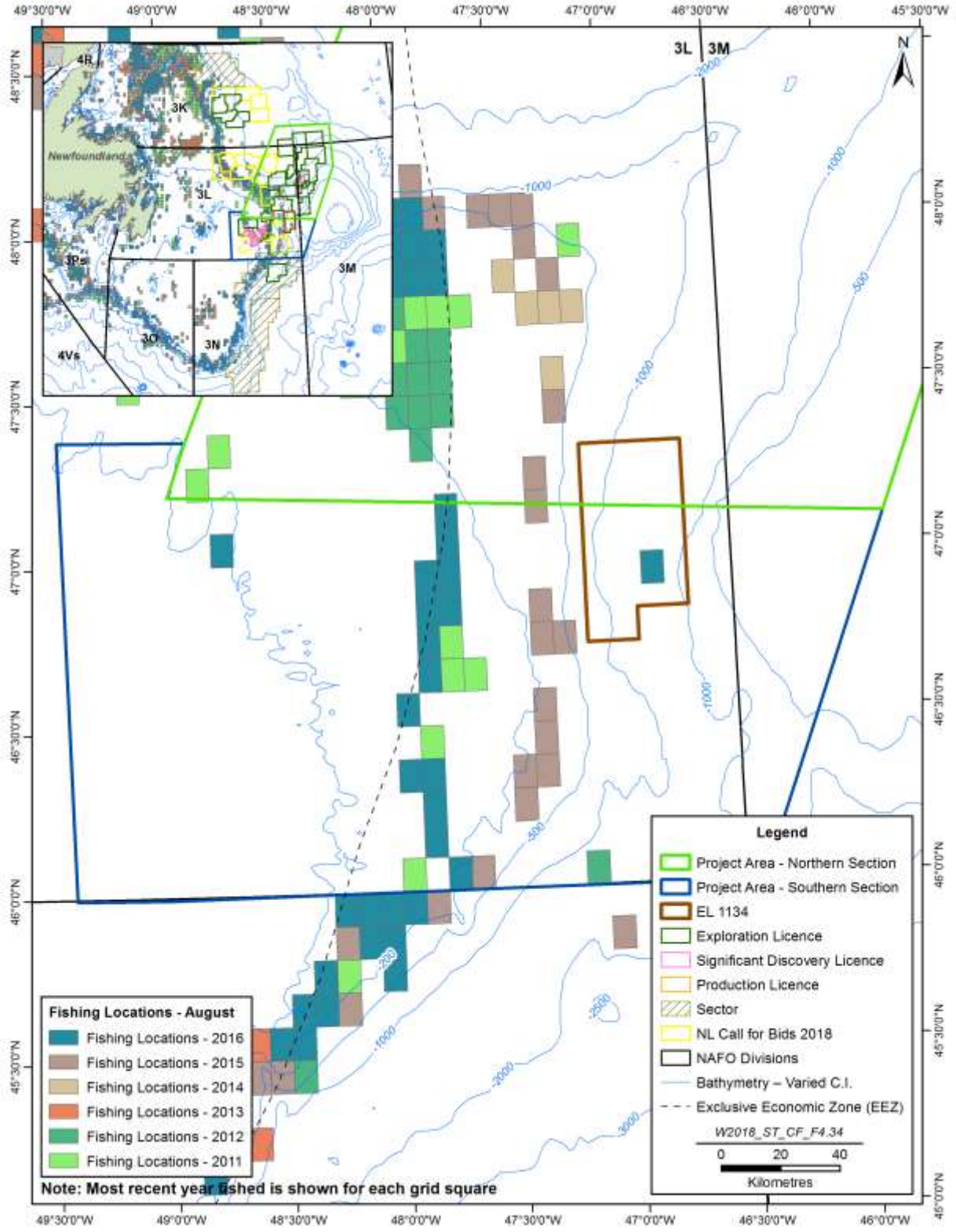


Figure 4.35 Commercial Fishing Locations, All Species: September (2011-2016)

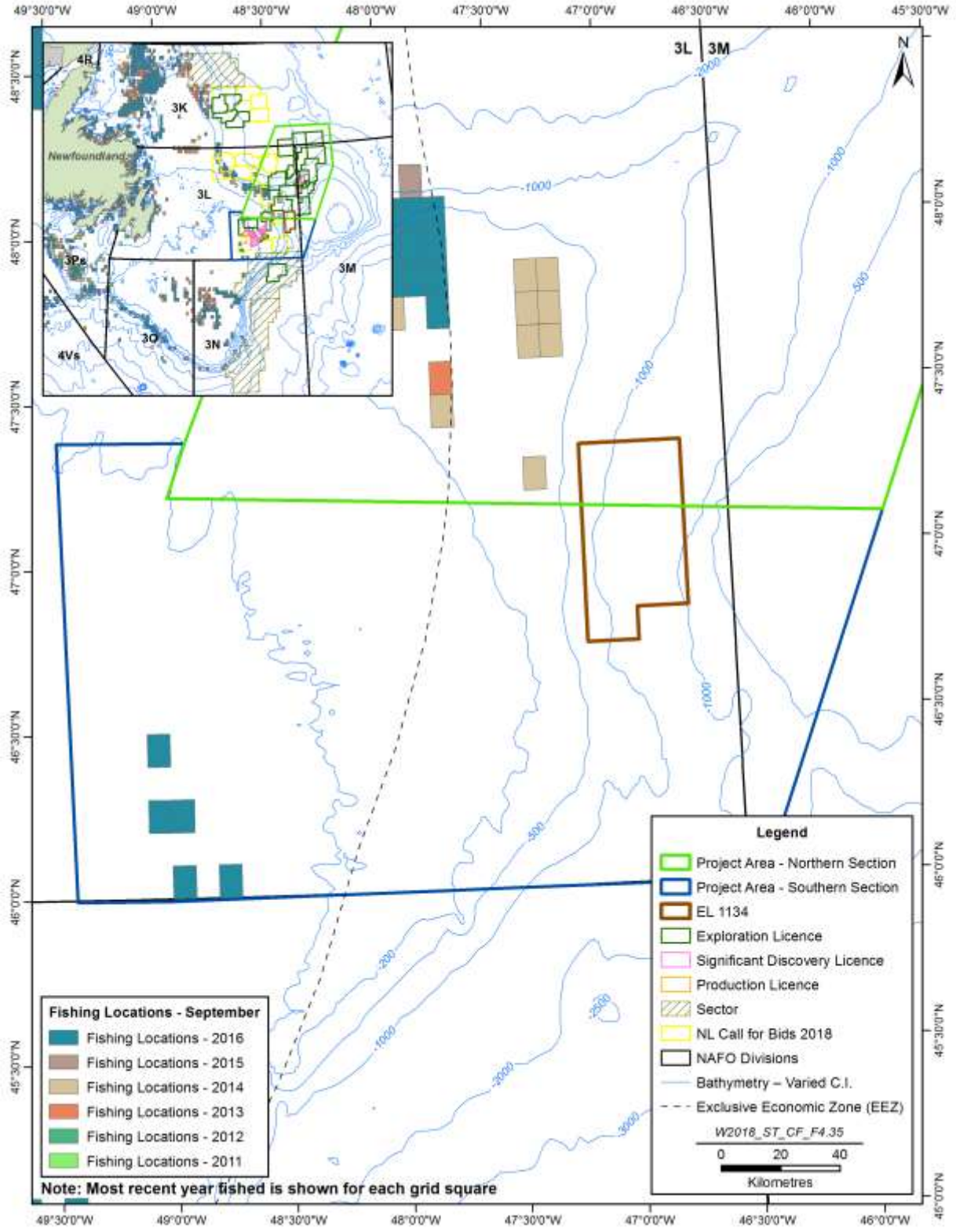


Figure 4.36 Commercial Fishing Locations, All Species: October (2011-2016)

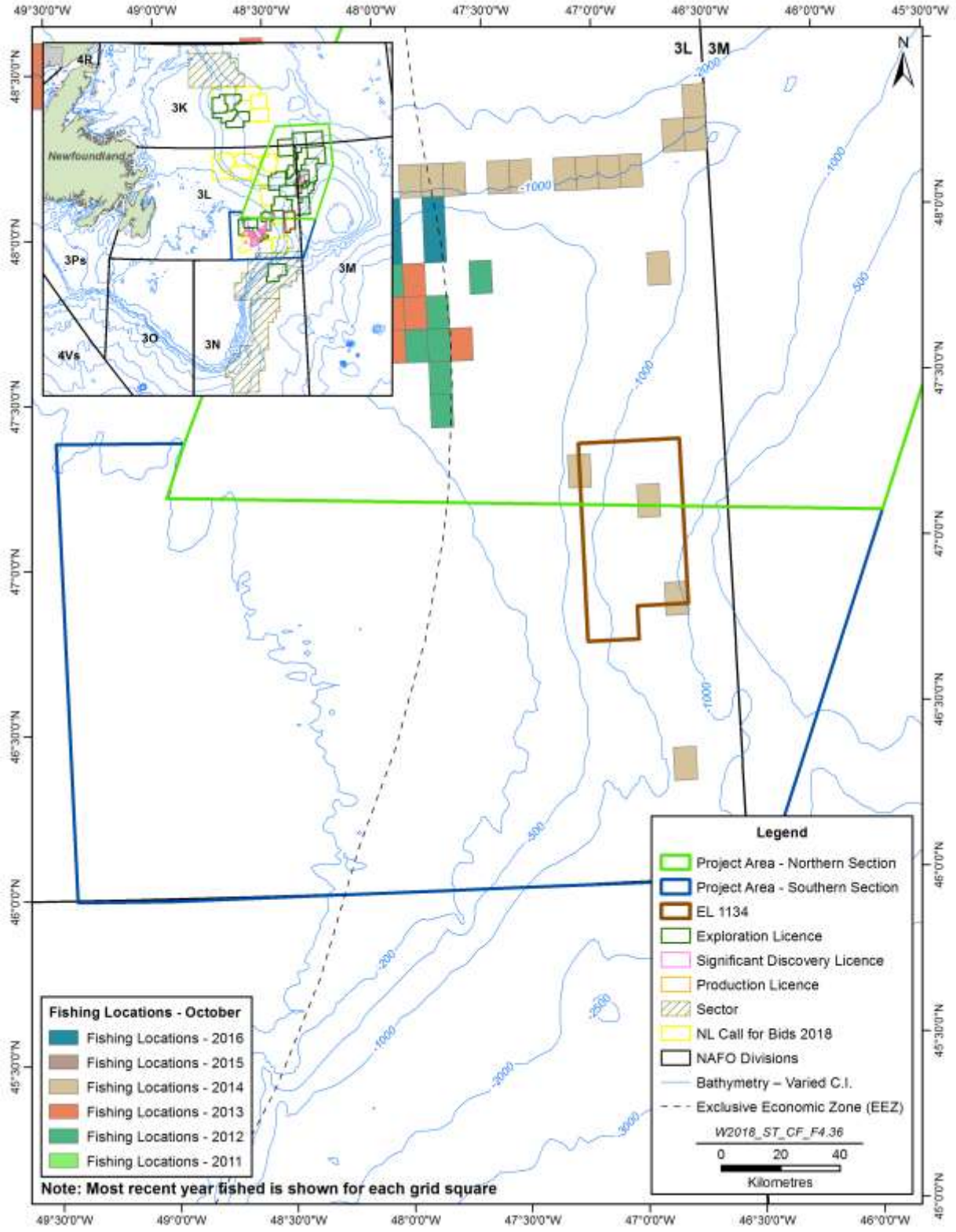


Figure 4.37 Commercial Fishing Locations, All Species: November (2011-2016)

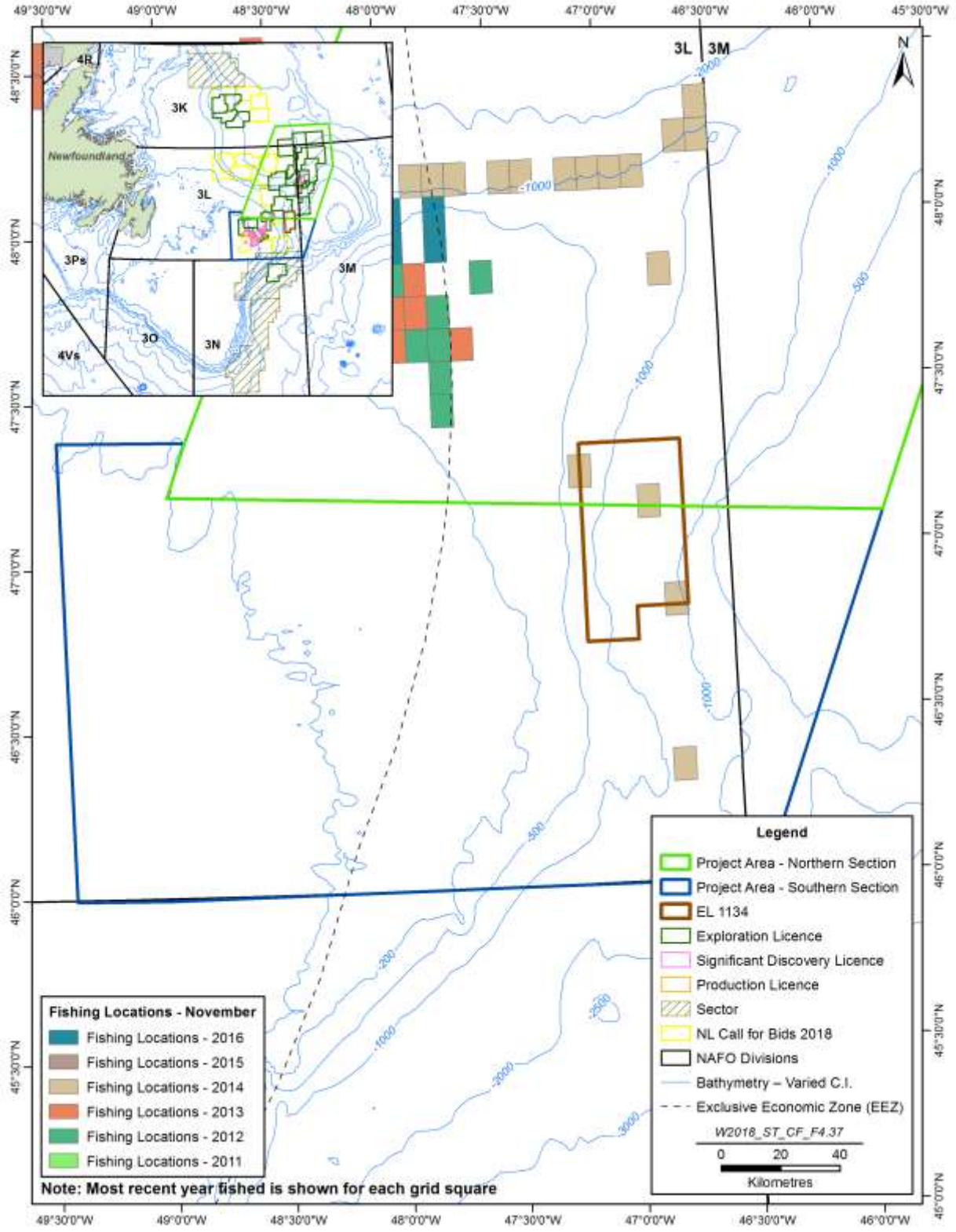
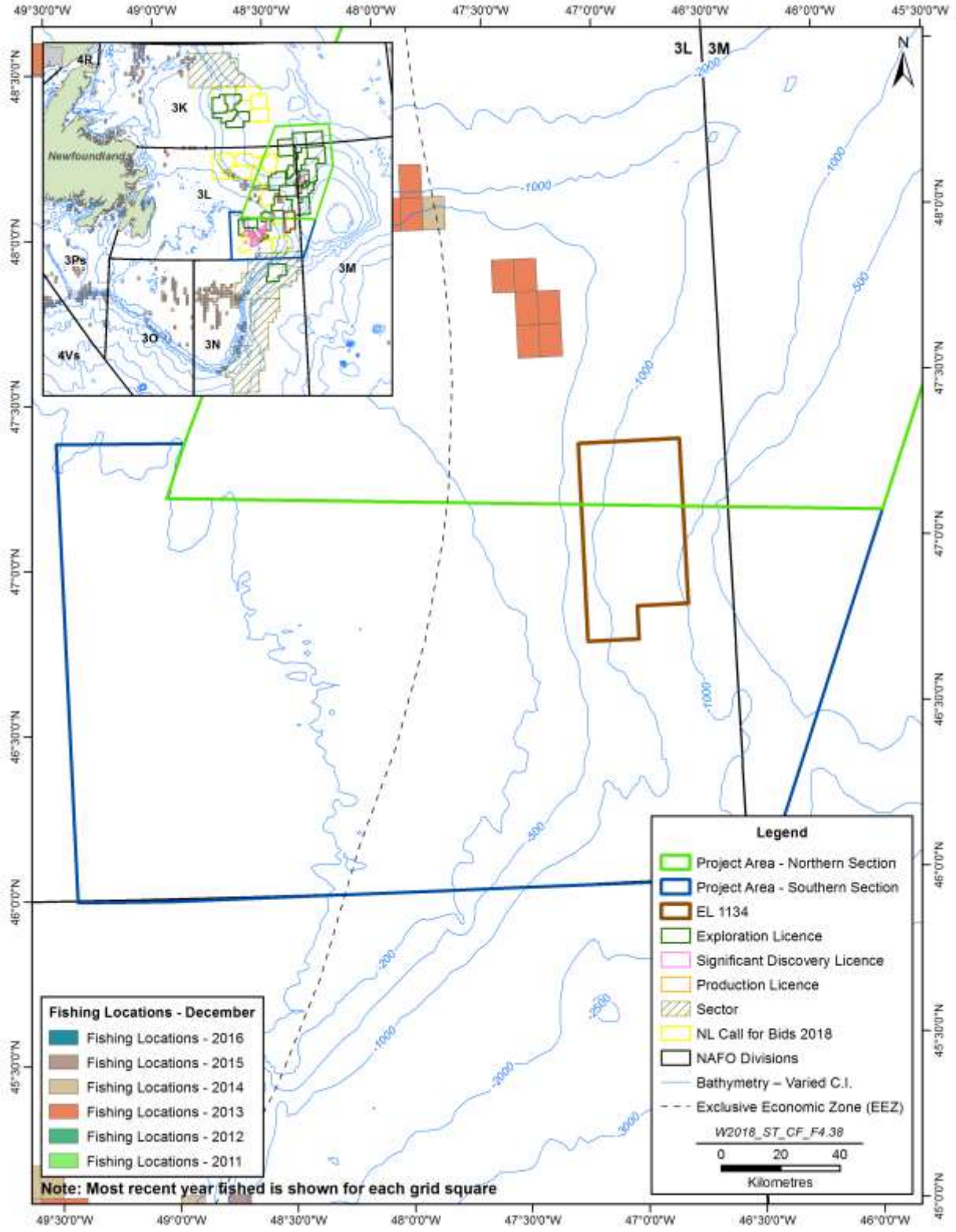


Figure 4.38 Commercial Fishing Locations, All Species: December (2011-2016)



4.3.1.4 Description of Key Fisheries by Species

In recent years, the fishery has been strongly dominated by queen / snow crab in terms of both landed weight and value (Table 4.21, Figures 4.39 and 4.40). This is well reflected in the DFO fish landings statistics (2011-2015), as summarized below.

Queen / snow crab comprised approximately 74 percent of the total fish landings by weight in this region over the 20111-2015 period (Figure 4.39). Until 2013- 2014, the Northern shrimp fishery had been one of the most important commercial species harvests in the area, as it continues to be in more northern fishing areas. However, recent quota reductions and closures have significantly reduced commercial shrimp fishing off Eastern Newfoundland, including in the Project Area.

In terms of landed value in 2011-2015 (Figure 3.19), queen / snow crab accounted for 88 percent of the area's recorded fish landings overall, followed by Northern shrimp (12 percent).

Figures 4.41 to 4.46 show the overall geographic distribution of recorded commercial fishing activity for key fish species in the 2011-2016 period, based on the DFO geospatial databases described above. This includes those species that comprised the highest proportion of the area's fishery over that period, as well as other species with recorded fishing activity in EL 1134.

Table 4.21 Fish Harvests by Species by Weight and Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

Species by Year (2011 - 2015)	Weight (kg)	Value ($)
2015	5,348,171	29,123,061
Crab, Queen/Snow	5,348,171	29,123,061
Shrimp, Pandalus Borealis	0	0
2014	5,383,473	26,862,095
Crab, Queen/Snow	5,089,401	26,255,373
Shrimp, Pandalus Borealis	294,072	606,722
2013	5,463,469	23,365,972
Crab, Queen/Snow	5,180,617	22,454,296
Shrimp, Pandalus Borealis	282,852	911,676
2012	7,658,633	26,903,782
Crab, Queen/Snow	5,036,095	21,650,317
Shrimp, Pandalus Borealis	2,622,538	5,253,464
2011	10,808,730	32,906,585
Crab, Queen/Snow	4,831,745	22,902,158
Shrimp, Pandalus Borealis	5,976,985	10,004,427
Total	34,662,476	139,161,495

Figure 4.39 Fish Harvests by Weight by Species (2011-2015, NAFO Unit Areas 3Li and 3Lt)

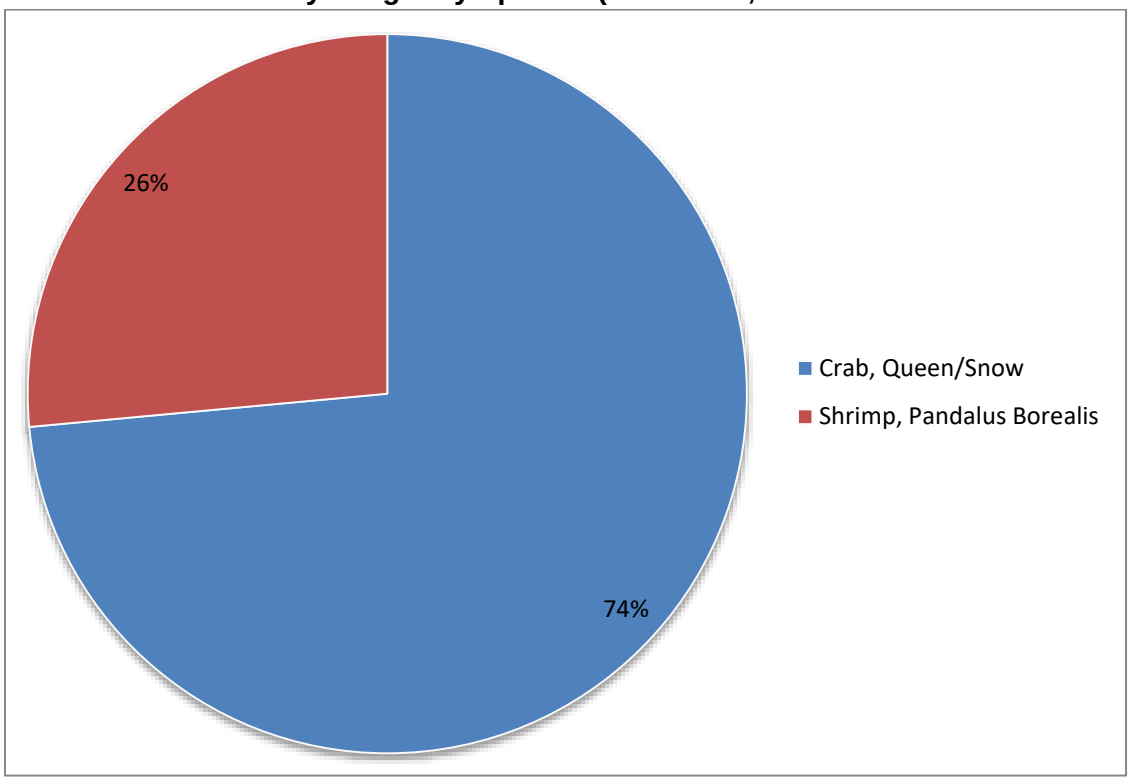


Figure 4.40 Fish Harvests by Value by Species (2011-2015, NAFO Unit Areas 3Li and 3Lt)

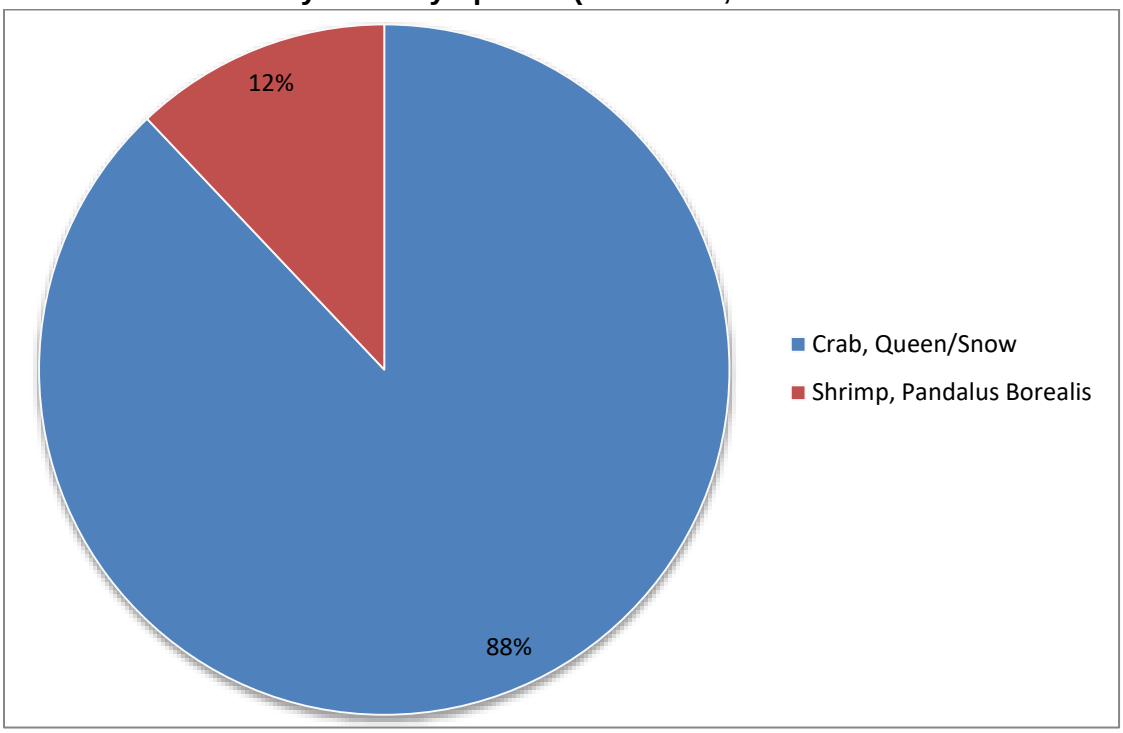


Figure 4.41 Fishing Locations –Snow Crab (2011-2016)

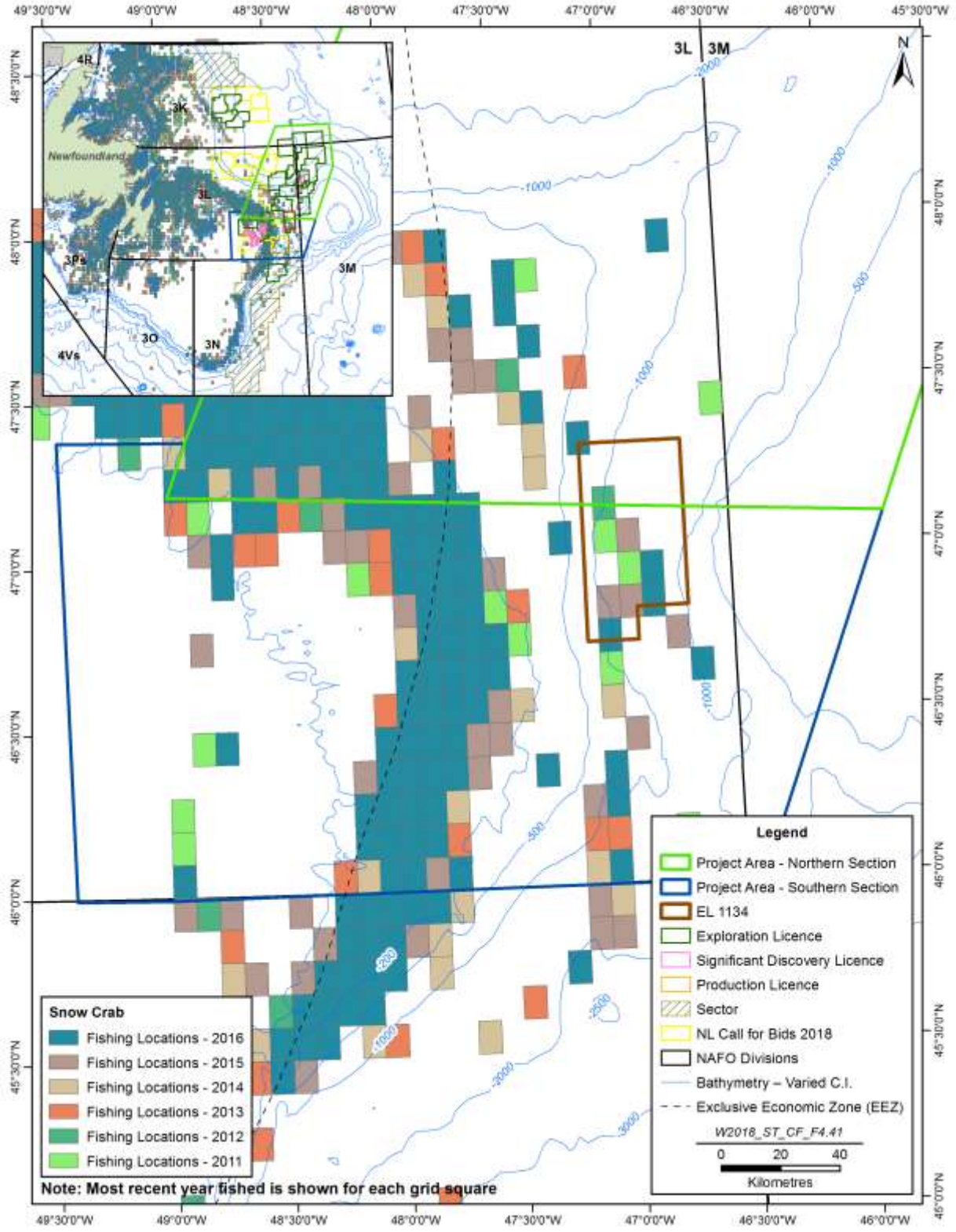


Figure 4.42 Fishing Locations – Turbot / Greenland Halibut (2011-2016)

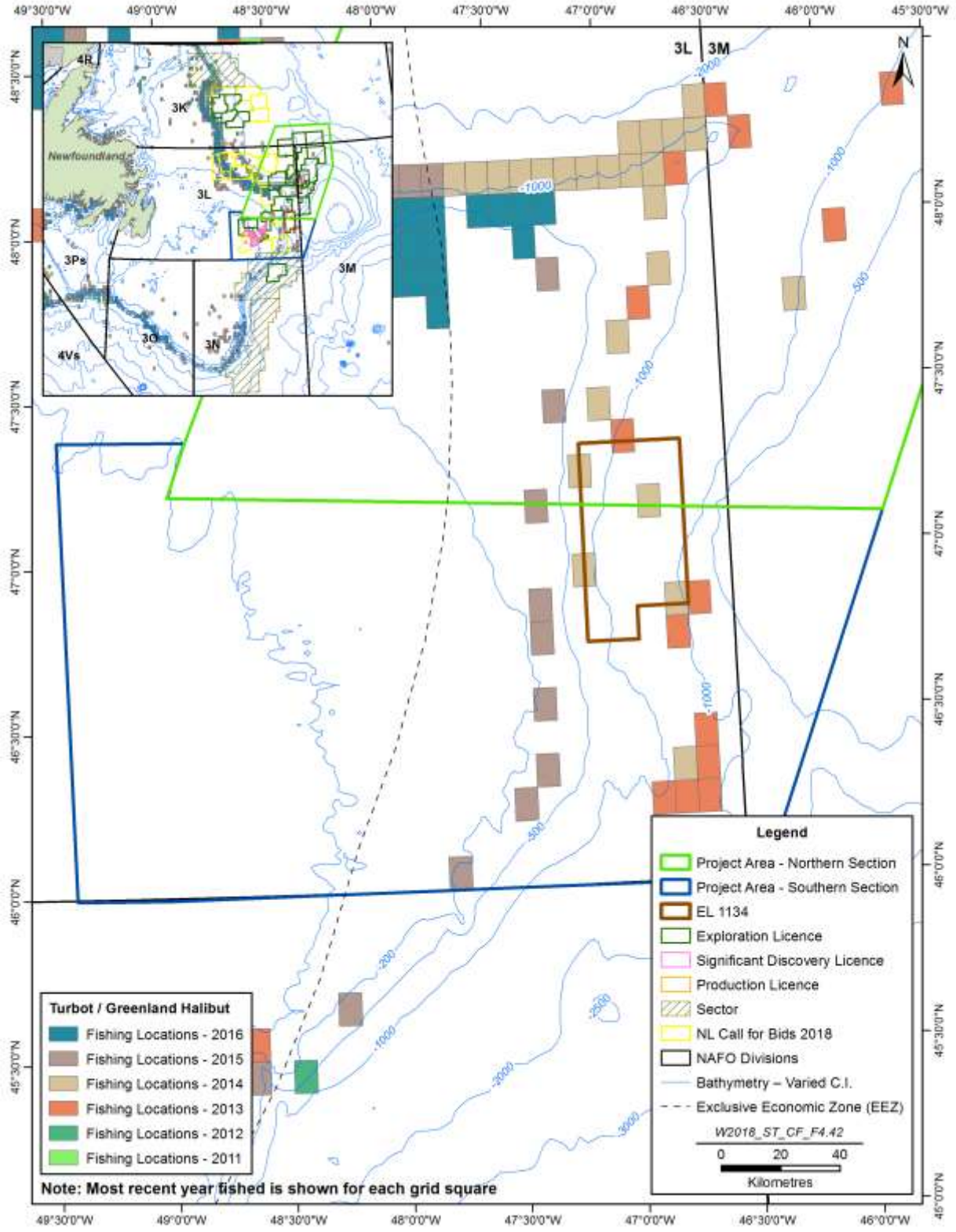


Figure 4.43 Fishing Locations – American Plaice (2011-2016)

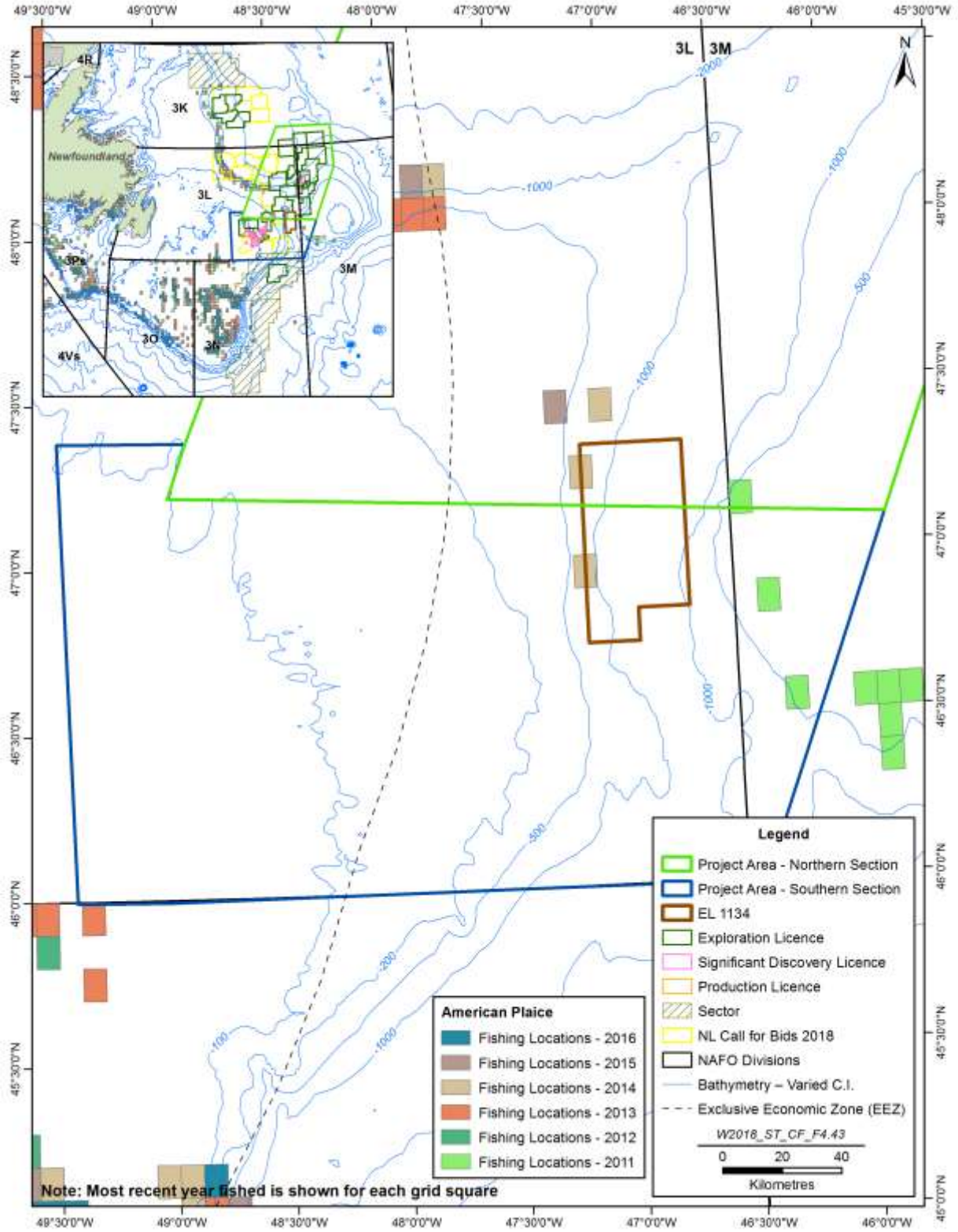


Figure 4.44 Fishing Locations – Greysole / Witch Flounder (2011-2016)

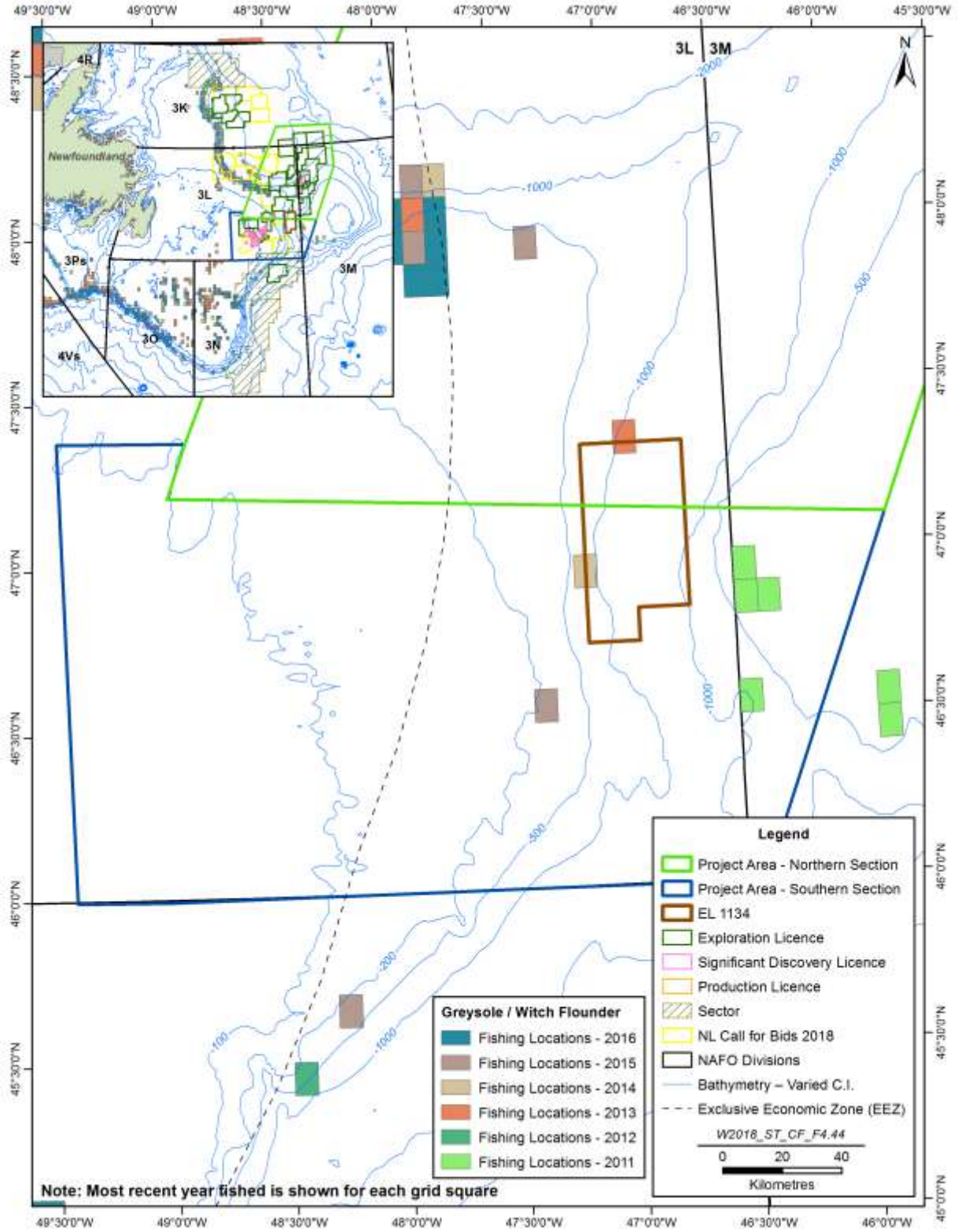


Figure 4.45 Fishing Locations – Atlantic Halibut (2011-2016)

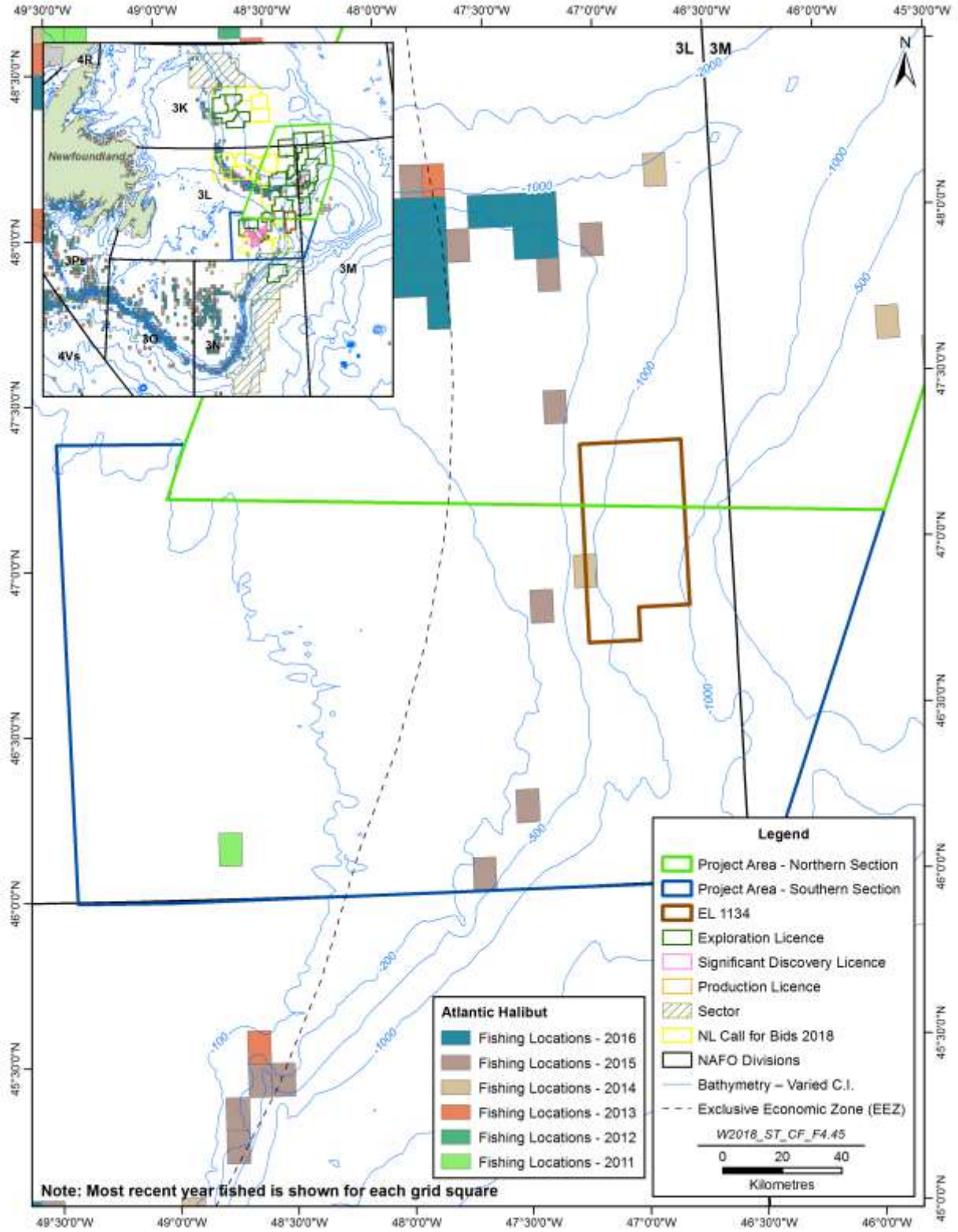
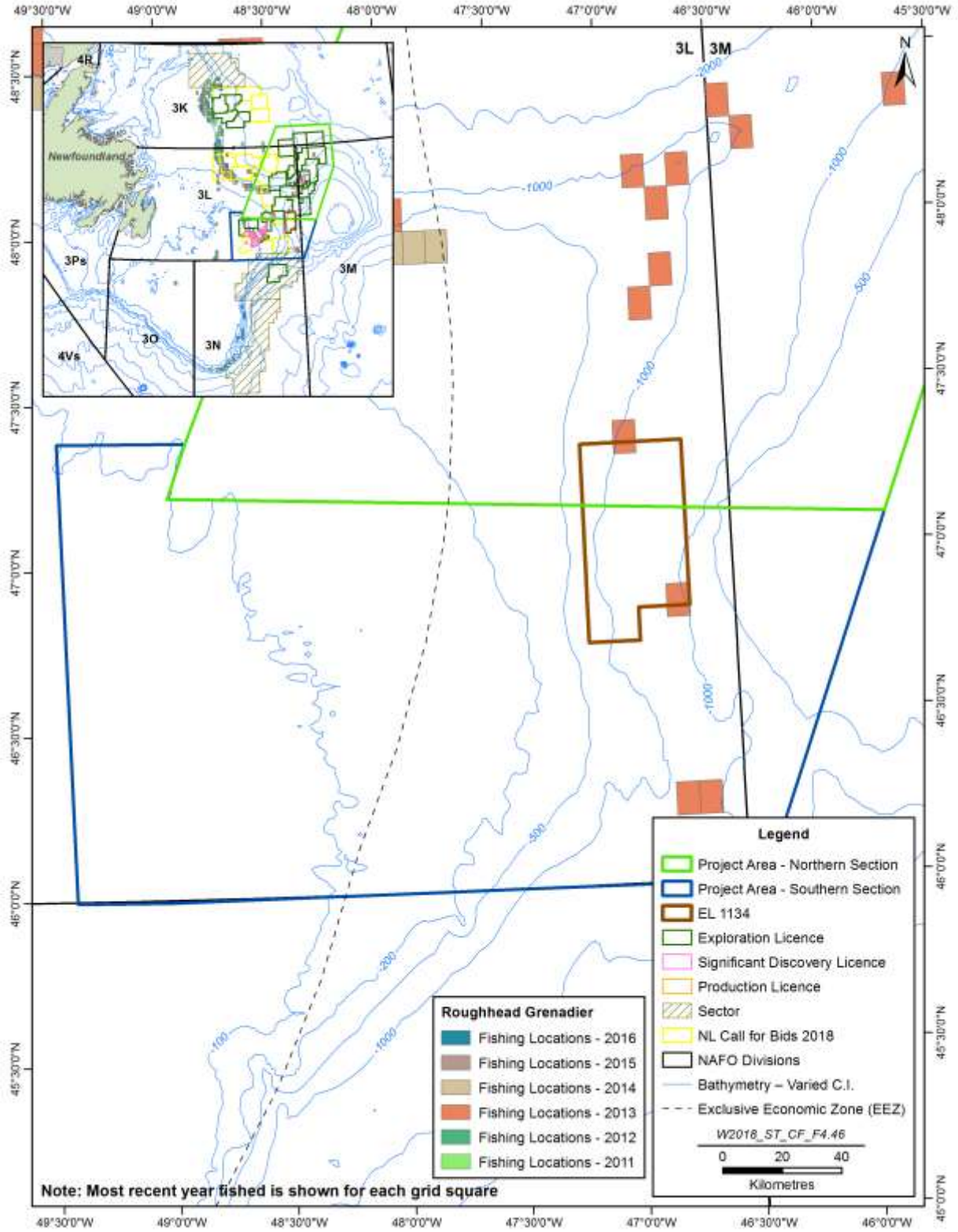


Figure 4.46 Fishing Locations – Roughhead Grenadier (2011-2016)



4.3.1.5 Fishing Gear

The available DFO datasets also reflect that a variety of fishing gear types were used as part of the commercial fishery within these NAFO Unit Areas from 2011 to 2015 (Table 4.22).

Of all the gear types, pots (unspecified) accounted for approximately 74 percent of the total fish landings over that period by weight, followed by shrimp trawls (Figure 4.22).

In terms of landed value, pots used in the shellfish (especially crab) fisheries accounted for the large majority (88 percent) of the total value of the fishery in that area over that time period (Figure 4.48).

Table 4.22 Fish Harvests by Gear Type by Weight and Value (2011-2015, NAFO Unit Areas 3Li and 3Lt)

Weight						
Gear Type	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Shrimp Trawl	5,976,985	2,622,538	282,852	294,072	0	9,176,447
Pot (Unspecified)	4,831,745	5,036,095	5,180,617	5,089,401	5,348,171	25,486,029
Total	**10,808,730**	**7,658,633**	**5,463,469**	**5,383,473**	**5,348,171**	34,662,476
Value						
Gear Type	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
Shrimp Trawl	10,004,427	5,253,464	911,676	606,722	0	16,776,289
Pot (Unspecified)	22,902,158	21,650,317	22,454,296	26,255,373	29,123,061	122,385,206
Total	**32,908,596**	**26,903,782**	**23,365,972**	**26,862,095**	**29,123,061**	139,163,506

Figure 4.47 Fish Harvests by Gear Type by Weight of Catch (2011-2015, NAFO Unit Areas 3Li and 3Lt)

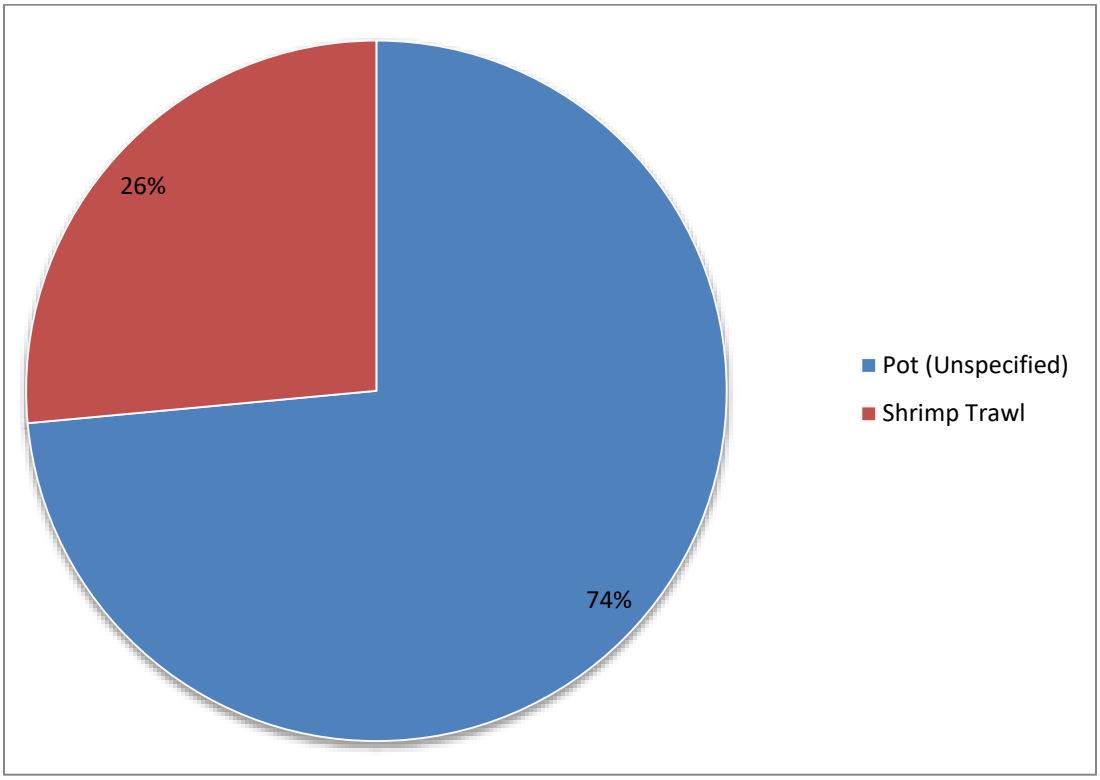


Figure 4.48 Fish Harvests by Gear Type by Value of Catch (2011-2015, NAFO Unit Areas 3Li and 3Lt)

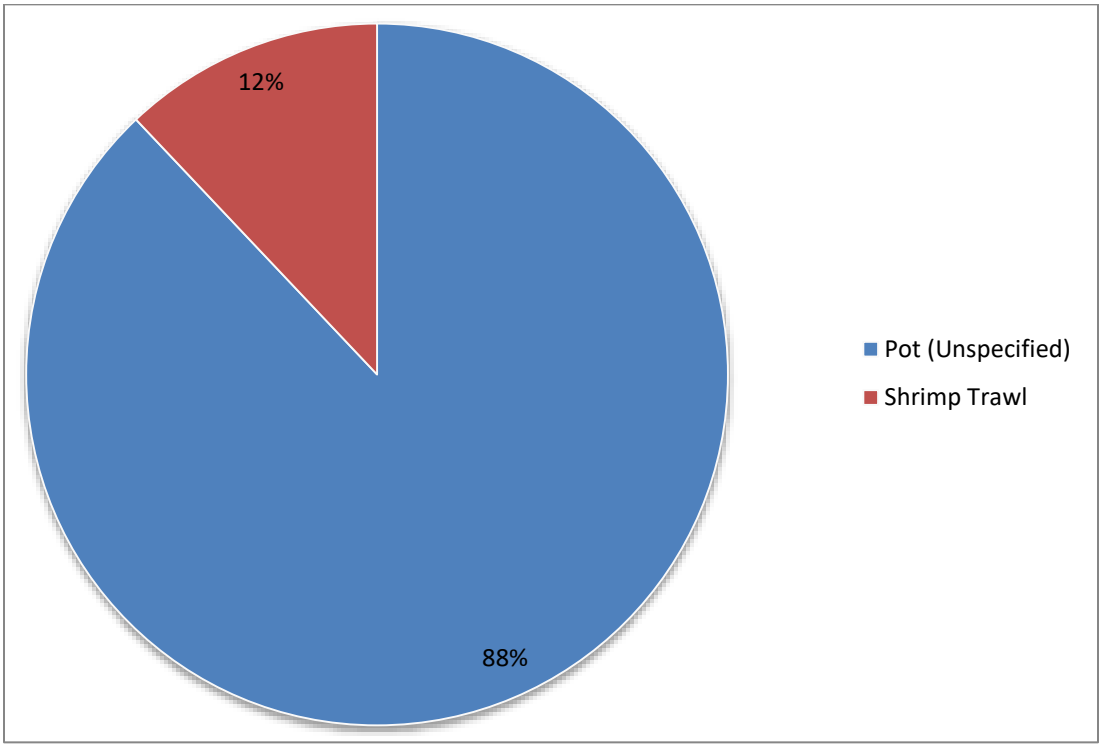


Figure 4.49 Fish Harvests Using Fixed Gear Types (2011-2016)

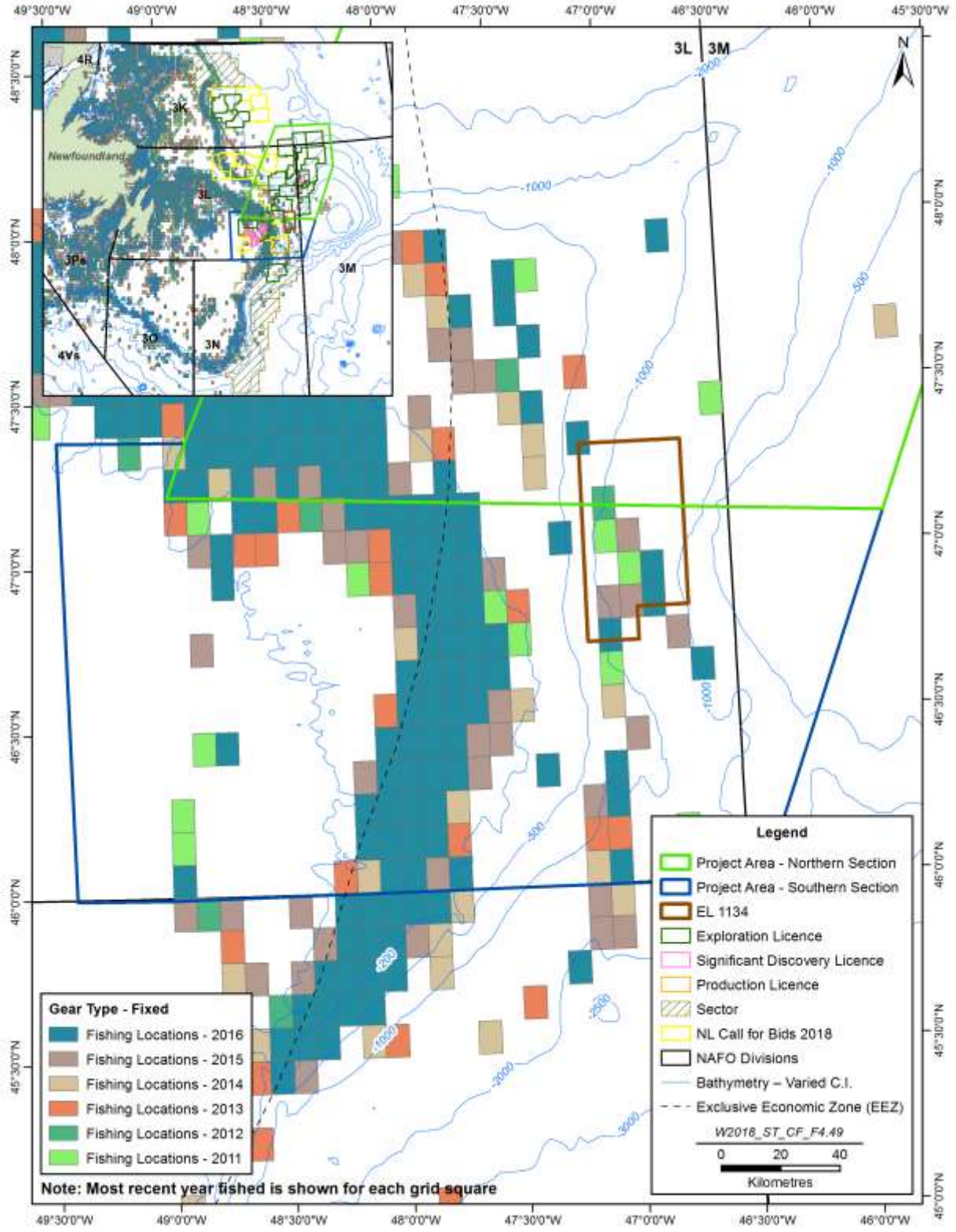


Figure 4.50 Fish Harvests Using Fixed Gear Types (By Season – 2011-2016)

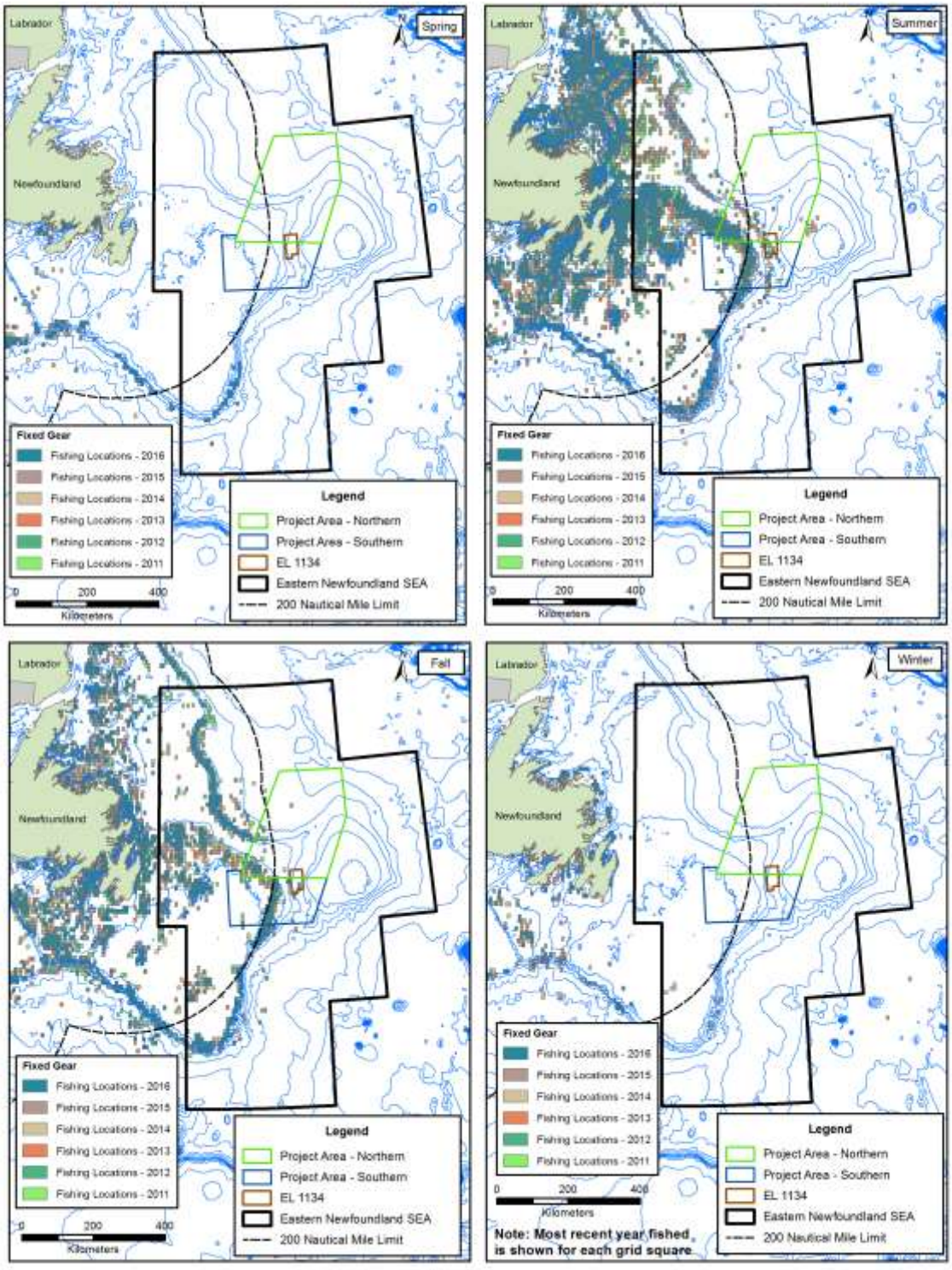


Figure 4.51 Fish Harvests Using Mobile Gear Types (2011-2016)

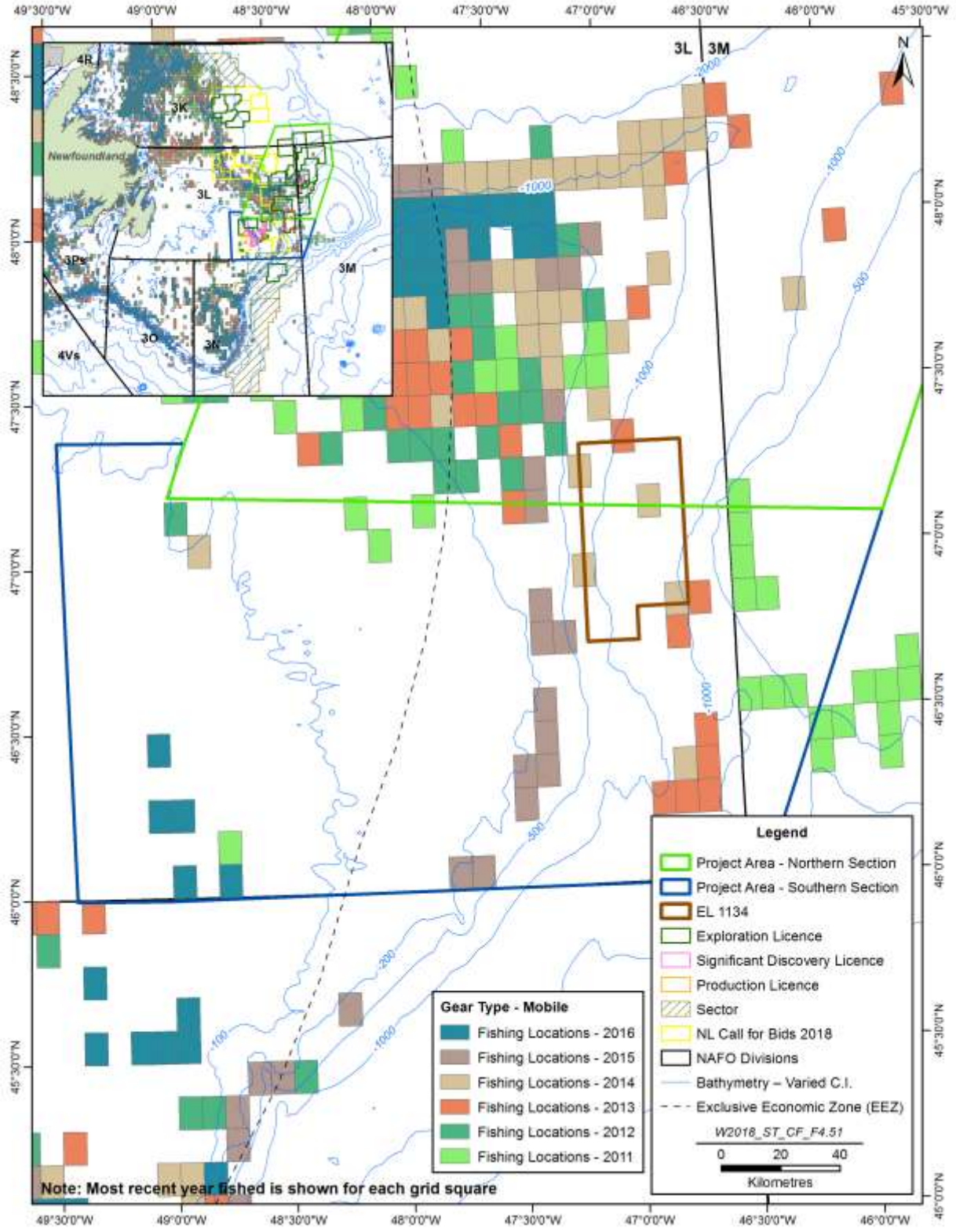
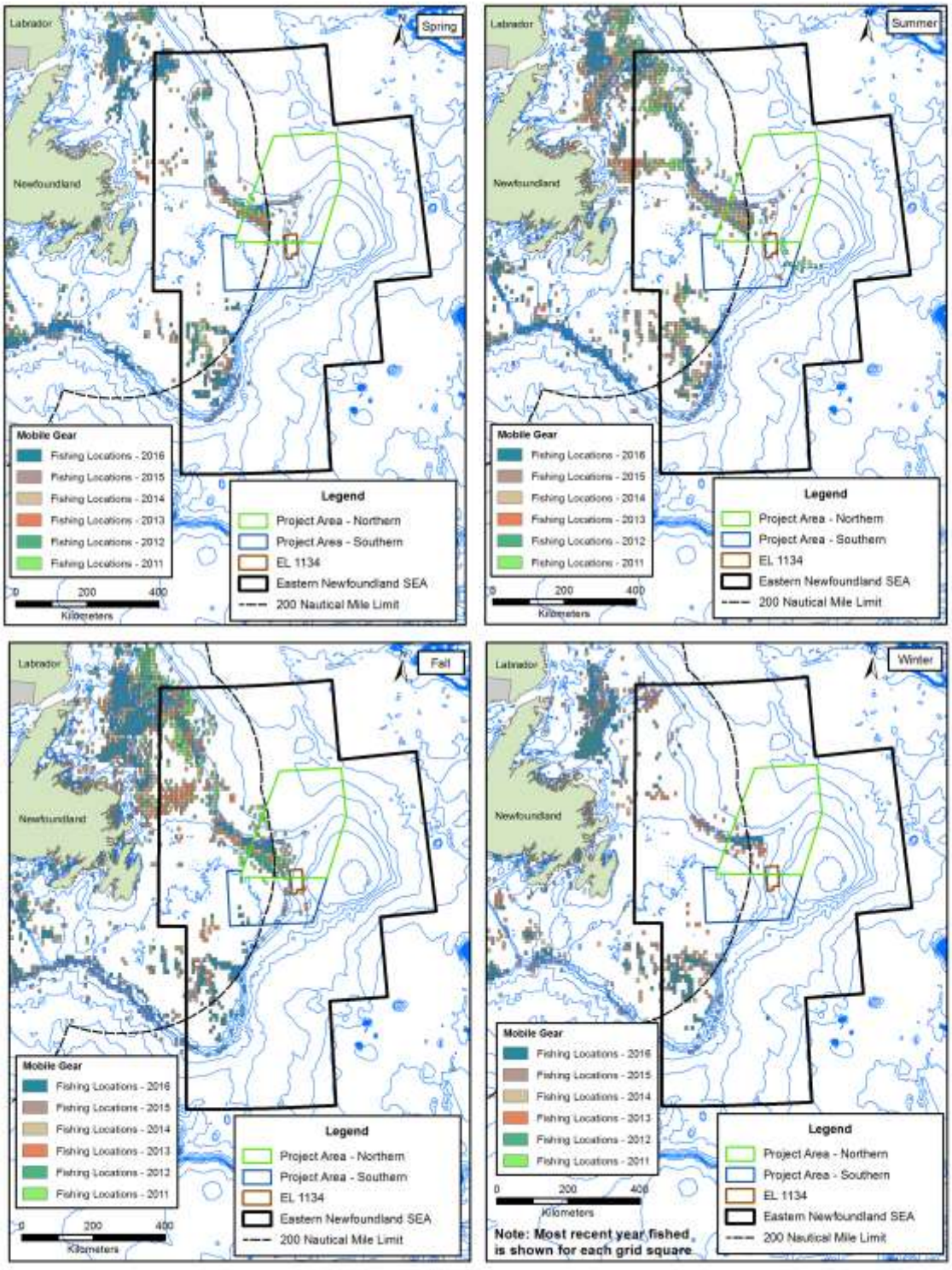


Figure 4.52 Fish Harvests Using Mobile Gear Types (By Season – 2011-2016)



4.3.1.6 Commercial Fishing Activity by Canadian and Foreign Fishers in NAFO Division 3L

As described at the beginning of this section, the NAFO Data Extraction Tool (Statlant 21A) fish landings data are available for the period up to 2016, and are used to provide an updated summary of commercial fish landings in the overall NAFO Division 3L. As noted previously, there are several regulatory jurisdictions that pertain to marine fish and fisheries within this region. The Government of Canada has jurisdiction over fish stocks and fishing activities within the 200 nautical mile limit and for benthic invertebrates (such as crab) across the entire continental shelf, with NAFO managing groundfish activities and other resources beyond that 200-mile limit. NAFO manages some 19 commercial stocks consisting of 11 species, and reported that in 2011 there were vessels from 13 flag states fishing in the Northwest Atlantic (Amec 2014). Other international agreements and conventions also apply to fishing and other human activities in international waters.

The preceding discussion has focussed upon recent (2011-2015, where data are available) commercial fishing activity within the various NAFO Unit Areas that overlap EL 1134. The datasets used to conduct these analyses were obtained through DFO and record only the domestic and foreign harvests that are landed in Canada. The following tables and figures provide updated summaries of the Canadian and foreign fishing activity in NAFO Division 3L for the period 2011 to 2016. The Division level is the highest resolution for which such data are available from the NAFO (Statlant 21A) dataset (Table 4.23). It should be noted that Canadian landings in this dataset are also captured in the DFO data, above.

As indicated, queen crab is the most commonly caught species of fish in this overall region, representing 43 percent of the total landed catch over the 2011-2016 period (Table 4.23, Figure 4.53, with other key species including capelin (inshore / nearshore), Greenland halibut, Northern shrimp and others. A variety of countries carried out fishing activity in the area over that period (Table 4.25, Figure 4.54).

Table 4.23 Canadian and International Fishing Activity NAFO Division 3L (tonnes) (2011 – 2016)

NAFO Division	2011	2012	2013	2014	2015	2016	Total
3L	68,429	66,443	69,712	65,733	65,285	51,140	386,742
Source: NAFO Data Extraction Tool (Statlant 21A)							

Table 4.24 Canadian and International Fishing Activity by Species in NAFO Division 3L (2011-2016)

Species	Total Catch (tonnes)
Queen Crab	166,164
Capelin	76,925
Greenland Halibut	43,044
Northern Prawn	32,476
Atlantic Redfish species (ns)	29,113
Atlantic Herring	16,529
Atlantic Cod	10,666
Sea Urchin	2,145
Other	9,680
Total	386,742
Source: NAFO Data Extraction Tool (Statlant 21A)	

Figure 4.53 Canadian and International Fishing Activity by Species in NAFO Division 3L (2011-2016)

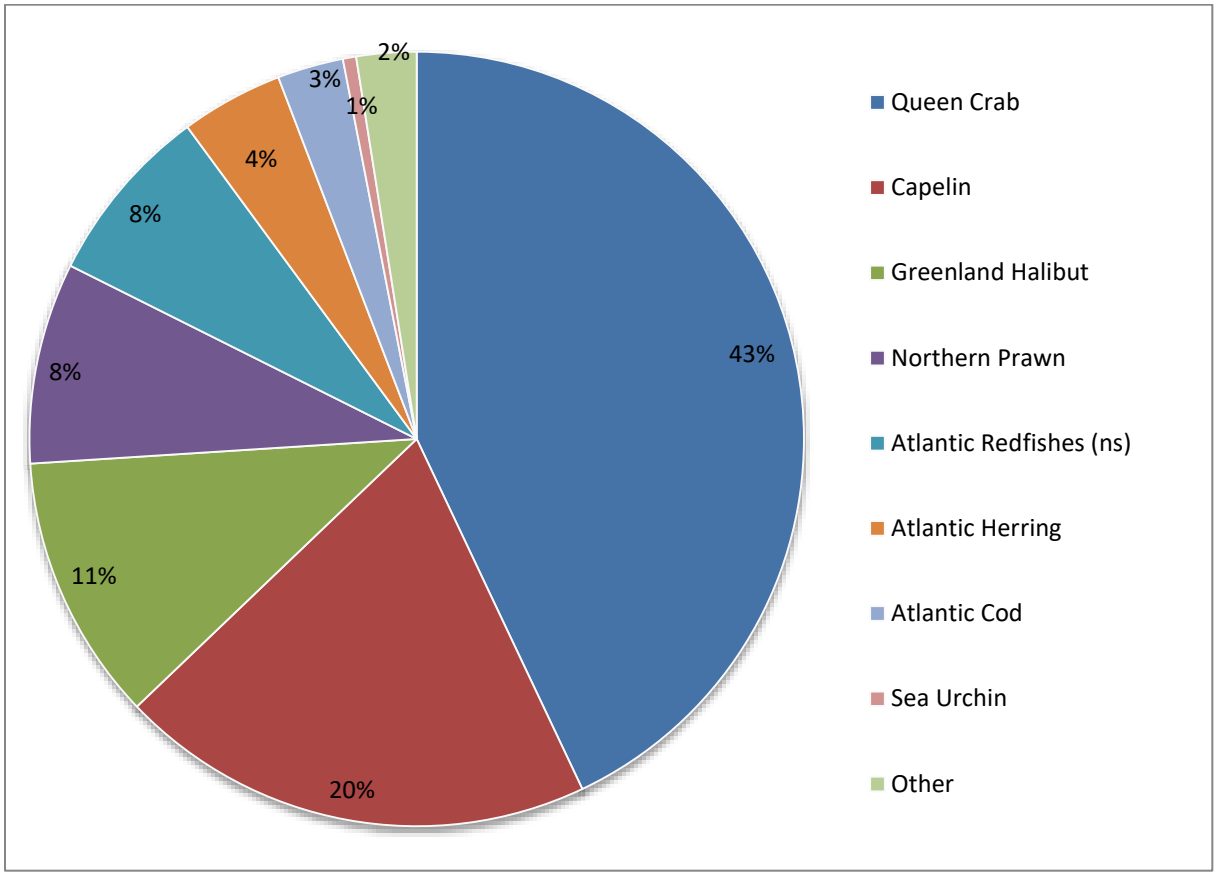
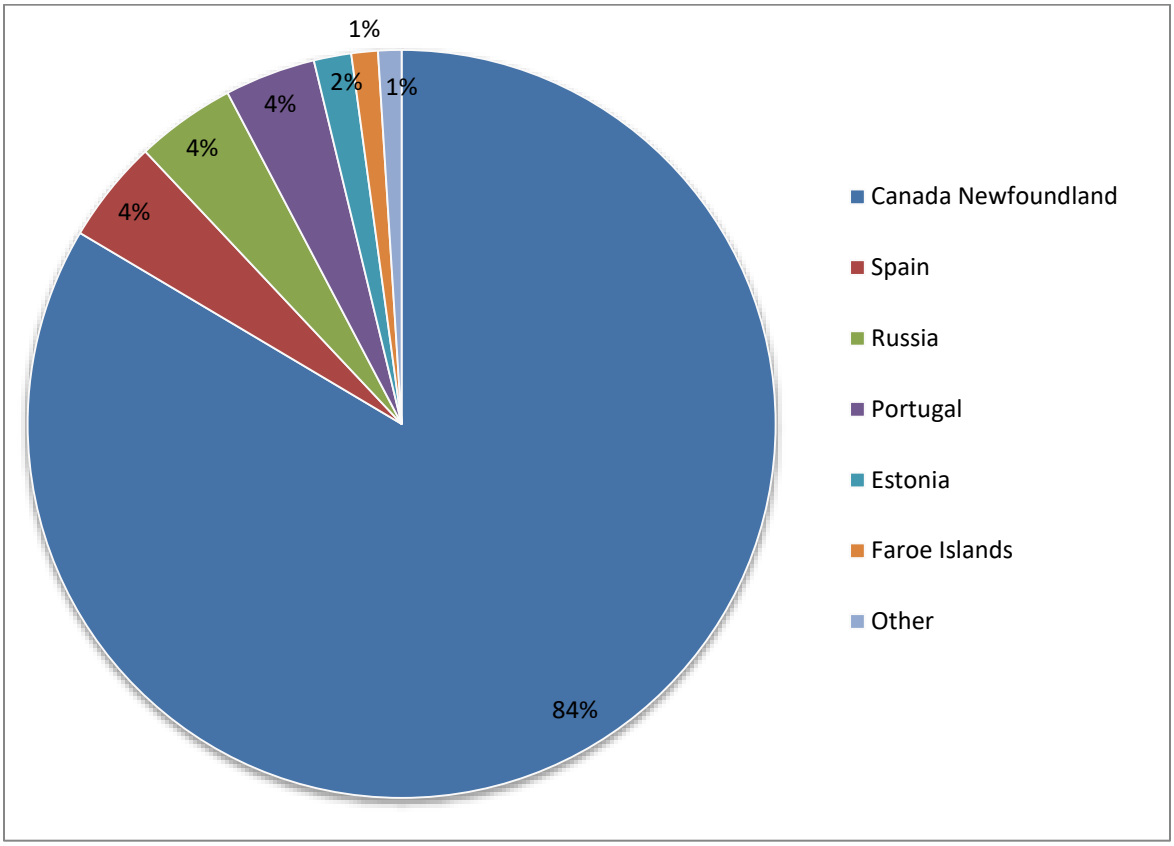


Table 4.25 Canadian and International Fishing Activity by Country in NAFO Division 3L (2011-2016)

Country	Total Catch (tonnes)
Canada Newfoundland	323,040
Spain	17,235
Russia	16,673
Portugal	15,201
Estonia	6,266
Faroe Islands	4,426
Other	3,901
Total	386,742
Source: NAFO Data Extraction Tool (Statlant 21A)	

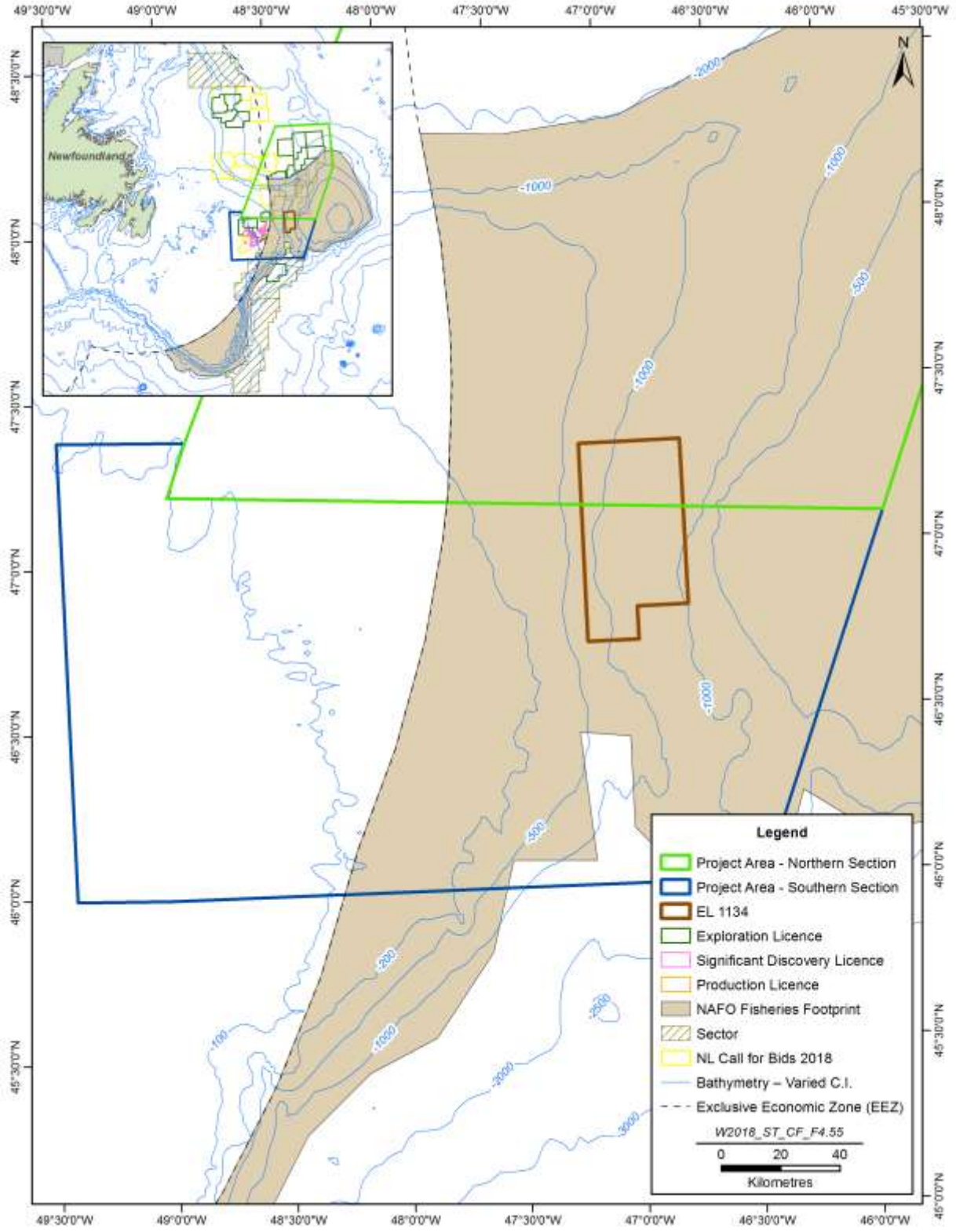
Figure 4.54 Canadian and International Fishing Activity by Country in NAFO Division 3K (2011-2016)



The NAFO Regulatory Area (NRA) is some 2,707,895 km^2 in size (or 41 percent of the total NAFO Convention Area) and comprises that part of the Northwest Atlantic high seas located adjacent to Canada's 200 mile EEZ. Fishing activity in the NRA targets a range of species, including cod, redfish, Greenland halibut, shrimp, skates, and other finfish, and has an approximate landed value of $200 million annually across all members. There are approximately 160 fishing vessels that are authorized to fish in the NRA, which are primarily large vessels (30-100 m), and in 2013 a total of 64 vessels fished in the region (NAFO 2014, cited in Amec 2014).

As a result of the 2007 United Nations General Assembly (UNGA Res. 61/105, paragraph 83) request that Regional Fisheries Management Organizations regulate bottom fisheries that cause a significant adverse impact on VMEs, NAFO undertook an exercise to identify bottom fishing areas in the NRA, and in doing so, to identify and map NAFO's bottom fishing footprint in the area. The NAFO fisheries footprint is 120,048 km^2 in size (NAFO 2009, 2014, cited in Amec 2014), and its location and relationship to the EL 1134 is illustrated in Figure 4.18.

Figure 4.55 NAFO Fisheries "Footprint" and its Proximity to EL 1134



4.3.2 Other Human Components and Activities

The following sections describe various other human activities and components that occur or exist within the offshore area of Eastern Newfoundland. Additional information about the socioeconomic environment of the Project Area was provided in the EIS and in the Eastern Newfoundland SEA (Amec 2014), along with associated background information. This information is not repeated in this section, which is only intended to update the relevant information since the previous EIS.

4.3.2.1 Marine Research

Fisheries survey programs by government and/or industry also occur in parts of the Canada-NL Offshore Area, including DFO Multispecies Research Vessel (RV) Trawl Surveys, which comprise annual (spring and fall) standardized bottom-trawl surveys to collect information for managing and monitoring fish resources in the Newfoundland and Labrador Region. Table 4.26 shows the 2018 schedule for DFO's surveys as obtained from DFO representatives. ExxonMobil will obtain and verify 2018 survey plans with DFO as they are available, and will consider these and will continue associated consultations and communications with DFO in planning and undertaking its activities, as applicable.

Table 4.26 2018 DFO RV Surveys off Eastern Newfoundland

Survey / RV	Start	End	NAFO Division
R/V CCGS Needler			
NL Spring Survey	23 May	17 June	3L + 3N
Shellfish Survey	30 August	11 September	2J + 4R
NL Fall Survey	25 September	9 October	3O + 3N
NL Fall Survey	10 October	23 October	3N + 3L
NL Fall Survey	23 October	6 November	3L
NL Fall Survey	7 November	1 December	3K + 3L
R/V CCGS Teleost			
NL Summer AZMP[1]	8 July	29 July	Grand Banks
NL Fall Survey	20 Nov	4 December	3K
NL Fall Survey	5 December	19 December	3K

[1] Atlantic Zone Monitoring Program
Source: L. Mello, DFO-NL (2018)

There is also an annual Industry - DFO Collaborative Post-season Trap Survey for snow crab in NAFO Divisions 2J3KLOPs4R, which is conducted using commercial and modified snow crab traps at established trap stations starting in late August or early September after the commercial snow crab season has ended. The survey continues until all the stations selected for the year are finished, sometimes into late November. The station locations are determined by DFO, selected from a set of pre-established locations and up to 1,500 are surveyed annually. Each survey station is fixed and follows a general grid pattern. Figure 4.56 shows the locations of the longstanding stations, which have been the principal focus of this survey, in relation to EL 1134. For 2018 and beyond, it is expected that 50 percent of the stations surveyed will be selected from these locations. The remaining station coordinates will be part of a stratified random design (R. Lee pers comm 2018; K. Baker, pers comm 2018).

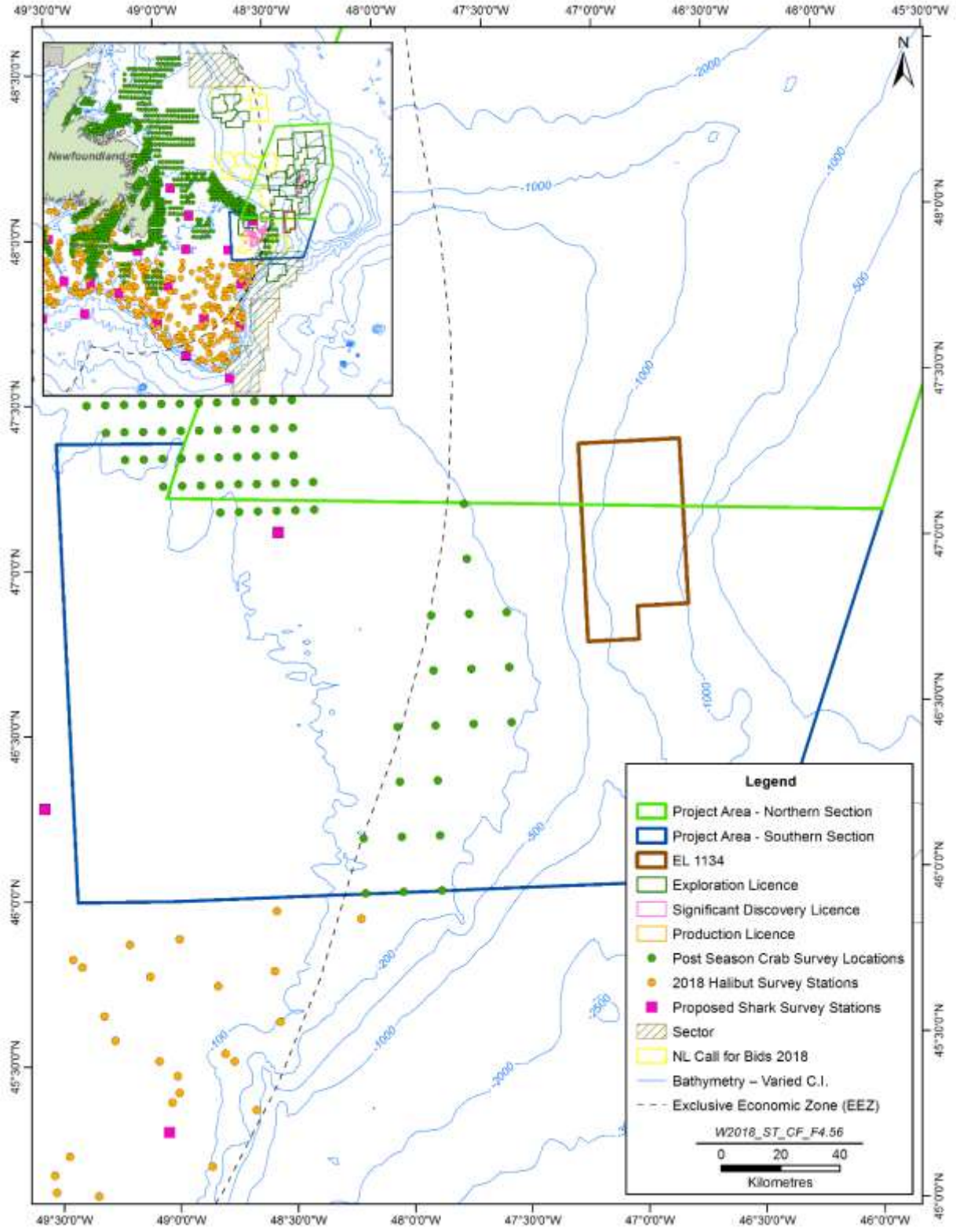
The Canadian Association of Prawn Producers (CAPP), a national Canadian organization representing the interests of at-sea producers of coldwater shrimp which conducts research and marketing activities on their behalf, and Northern Coalition have established the Northern Shrimp Research Fund (NSRF), a non-profit initiative that provides funding and a vessel for shrimp surveys from Northern Shrimp Fishing Areas. However, for the foreseeable future no related surveys are planned in areas south of SFA 4 (northern Labrador Shelf) (B. Chapman, pers comm 2017).

Groundfish Enterprise Allocation Council (GEAC) and DFO-GEAC surveys occurred annually from 1997-2001 and biannually after 2001, using bottom trawls and a commercial trawler. In 2018 the only survey planned is for redfish in Unit 2, which does not extend east of NAFO 3Ps, so it will be outside of EL 1134 (K. Vascotto, pers comm 2018).

DFO (Bedford Institute, Halifax), in cooperation with Nova Scotia swordfish harvesters, conducted a survey of sharks in set locations from Georges Bank to the eastern Grand Banks in 2017, but the survey will not be conducted in 2018 (H. Bowlby pers comm 2018).

The annual Atlantic halibut abundance survey is a collaborative effort involving the FFAW-Unifor, the Eastern Shore Fisherman's Protective Association, the Shelburne County Quota Group and the Atlantic Halibut Council working with DFO. It occurs each summer from the end of May to the end of July, across the Scotian Shelf and southern Grand Banks Atlantic halibut management unit (3NOPs4VWX+5Zc). For 2017 and following years, the survey has expanded its coverage in 3NOPs. The survey consists of fixed stations which are fished every year and additional random stratified stations that are chosen annually. Figure 4.56 also shows the locations of both the fixed stations and the 2018 randomly chosen stations. The survey methodology varies slightly for the fixed vs. random sets, but both use halibut longlines approximately 5-km long on the sea floor, with about 1,000 hooks per line. Soak time is six to twelve hours, and the gear must be set between 0400 and 1200 local time. As the figure shows, the planned survey area does not overlap any of the 2018 stations (locations supplied by DFO) (B. Wringe pers comm 2018; C. den Heyer, pers comm 2017, 2018).

Figure 4.56 Location of Industry – DFO Survey Stations



4.3.2.2 Marine Shipping

The Eastern Newfoundland region is host to a wide variety of transportation activities including small boat movements, ferry services, marine shipping and other general vessel traffic, most of which occur in inshore and nearshore areas and to a much lesser extent in the offshore. Large scale marine shipping is mainly limited to sea ports with the required infrastructure and services for larger vessels. A number of marine shipping routes, particularly those on trans-Atlantic voyages, cross the Project Area.

St. John's is the primary supply centre for the offshore oil and gas industry, a container terminal, fishing port and a cruise ship port-of-call. Other operations include the Canadian Coast Guard (CCG), military activity, ship repair, industrial fabrication and seafood landing. Cargo shipping includes goods moved in and out of Oceanex's container ship facility, which operates weekly sailings to and from Halifax and Montreal (SJPA 2016). Given the routes typically taken, these container ships are not likely to cross the Project Area or Study Area. Various marine ferries operate in Eastern Newfoundland. These include ferry services to islands and remote communities, none of which cross the Project Area. Eastern Newfoundland has several hundred small craft harbours. Core fishing harbours, including Prosser's Rock at St. John's, are maintained in support of the fishing industry (DFO 2017).

4.3.2.3 Other Offshore Oil and Gas Activity

The Eastern Newfoundland offshore is subject to considerable oil and gas exploration activity, including geophysical surveys and drilling programs, with many thousands of kilometres of seismic survey data collected and several hundred wells drilled to date. Offshore production projects include four oilfields: Hibernia, Terra Nova, White Rose and Hebron (Amec 2014, EMCL 2017) These offshore oil and gas exploration and development activities also include a variety of ancillary and supporting activities including supply bases at Bay Bulls and St. John's. Vessels travelling to and from the existing projects in the offshore area do not intersect with the Project Area.

4.3.2.4 Military Operations

The Royal Canadian Navy's Atlantic facilities include Canadian Forces Station St. John's, NL. The reservist fleet HMCS Cabot is mainly responsible for coastal surveillance and patrol, including search and rescue, law enforcement and natural resource (including fisheries) protection in Newfoundland and Labrador (DND 2016). Military activities including fisheries surveillance and Search and Rescue (SAR) operations may occur within the Project Area.

4.3.2.5 Other Marine Infrastructure

Unexploded Ordnances and Legacy Sites

Various known unexploded ordnances (UXO) legacy sites and shipwrecks exist within the Newfoundland and Labrador offshore. These include legacy sites and explosive dumpsites, but the majority are shipwrecks (Amec 2014; DCC 2017). The current information indicates that none of these known sites are located within the Project Area including EL 1134.

Subsea Cables

A number of active, abandoned and proposed marine cables transect the waters off Eastern Newfoundland as discussed in the EIS and the Eastern Newfoundland SEA. In 2016, ExxonMobil Canada Properties (EMCP) installed the Grand Banks Offshore Optical Cable (GBOOC) fibre-optic cable system to connect the Hibernia and Hebron projects off Eastern Newfoundland. The new cables are located within the Project Area and the landing sites are at Cape Broyle and Logy Bay (EMCP 2017).

4.3.3 Indigenous Communities and Activities

A key focus of the EIS includes assessing and evaluating the potential for the Project, and the various changes to the environment that may be associated with it, to interact with and affect Indigenous peoples, including each of the socio-cultural aspects identified in Section 5(1)(c) of CEAA 2012.

Section 7.3 of the EIS provides baseline socioeconomic information related to each of the Indigenous groups in Newfoundland and Labrador, Nova Scotia, New Brunswick, Prince Edward Island and Québec outlined in Section 5.1 of the EIS Guidelines (Table 4.27).

Table 4.27 Indigenous Groups in Eastern Canada Included in the EIS Guidelines

Province	Indigenous Groups
Newfoundland and Labrador	Labrador Inuit (Nunatsiavut Government)
	Labrador Innu (Innu Nation)
	NunatuKavut Community Council
	Miawpukek First Nation
	Qalipu Mi'kmaq First Nation Band
Nova Scotia	11 Mi'kmaq First Nation groups represented by KMKNO:
	- Acadia First Nation
	- Annapolis Valley First Nation
	- Bear River First Nation
	- Eskasoni First Nation
	- Glooscap First Nation
	- Membertou First Nation
	- Paqtnkek Mi'kmaw Nation
	- Pictou Landing First Nation
	- Potlotek First Nation
	- Wagmatcook First Nation
	- Waycobah First Nation
	Millbrook First Nation
	Sipekne'katik First Nation
New Brunswick	Eight Mi'gmaq First Nations groups represented by MTI
	- Fort Folly First Nation
	- Eel Ground First Nation
	- Pabineau First Nation
	- Esgenoôpetitj First Nation
	- Buctouche First Nation
	- Indian Island First Nation
	- Eel River Bar First Nation
	- Metepnagiag Mi'kmaq First Nation
	Elsipogtog First Nation

Province	Indigenous Groups
	Five Maliseet First Nation groups represented by WNNB:
	- Kingsclear First Nation
	- Madawaska Maliseet First Nation
	- Oromocto First Nation
	- Saint Mary's First Nation
	- Tobique First Nation
	Woodstock First Nation
	Peskotomuhkati Nation at Skutik (Passamaquoddy)
Prince Edward Island	Abegweit First Nation
	Lennox Island First Nation
Quebec	Three Mi'gmaq First Nation groups represented by MMS
	- Micmas of Gesgapegiag
	- La Nation Micmac de Gespeg
	- Listuguj Mi'gmaq Government
	Les Innus de Ekuanitshit
	Montagnais de Nutashkuan

This includes providing a brief overview of the background and current socioeconomic conditions of each group, including each of the items specified in the EIS Guidelines, specifically:

- Health and socio-economic conditions;
- Physical and cultural heritage;
- Current use of lands and resources for traditional purposes; and
- Structures, sites or things of historical, archaeological, paleontological or architectural significance

The existing environment description in the EIS focusses primarily on those socioeconomic components with potential for Project-related interactions and effects, in particular, any current use of (marine-associated) lands and resources for traditional purposes. EL 1134, like EL 1135 and EL1137, is located within the boundary of NAFO Division 3L, which represents the finest disaggregation of Commercial-Communal fishing licence data provided by DFO. Thus no additional fishing licences were identified as overlapping with EL1134.

There are no Indigenous communities of activities located within or near EL 1134. The information provided in the EIS is regional in nature, and remains relevant to the proposed addition of EL 1134 to the scope of the Project.

4.3.4 Other Aspects of the Human Environment

The EIS (Section 7.4) also provides an overview of the rural and urban setting of the Project Area and RSA, as well as an overview of human health and physical and cultural heritage, as required by the EIS Guidelines.

The information provided in the EIS is regional in nature, and remains relevant to the proposed addition of EL 1134 to the scope of the Project.

5 ENVIRONMENTAL EFFECTS ASSESSMENT

This Chapter provides an analysis and description of any implications of the proposed addition of EL 1134 for the EIS's predicted environmental effects and the mitigation measures that have been identified and proposed by ExxonMobil. This includes a particular focus on, and is structured according to, the VCs that were considered in the EIS, namely:

- Marine Fish and Fish Habitat (including Species at Risk)
- Marine and Migratory Birds (including Species at Risk)
- Marine Mammals and Sea Turtles (including Species at Risk)
- Special Areas
- Indigenous Communities and Activities
- Commercial Fisheries and Other Ocean Users

It should also be reiterated that this component of the EIS Addendum has been planned and is presented as a focused discussion and analysis of the proposed inclusion of EL 1134. In the interests of efficiency and brevity it does not repeat the detailed environmental information and analysis provided in the original EIS, which should therefore also be referred to as required and relevant for further information, and for the sources of any information that is summarized herein.

5.1 Marine Fish and Fish Habitat (Including Species at Risk)

The key potential environmental interactions between planned offshore oil and gas activities and marine fish and their habitats include the following:

- Possible damage, contamination or alteration of marine habitats and benthic organisms due to the discharge and deposition of drill cuttings and/or fluids, the deployment and use of other Project equipment, and possibly the introduction and spread of aquatic invasive species
- Potential contamination of fish / invertebrates and their habitats due to other environmental discharges during planned oil and gas exploration drilling and other associated survey and support activities
- The attraction of marine fish to the drilling installation and vessels, with increased potential for injury, mortality, contamination, or other interactions
- Possible temporary avoidance of areas by marine fish due to underwater noise or other disturbances, which may alter their presence and abundance as well as disturbing movements / migration, feeding, or other activities
- Possible changes in the availability, distribution, or quality of feed sources and/or habitats for fish and invertebrates as a result of planned activities and their associated environmental emissions
- Possible injury, mortality, or other disturbances to marine fish as a result of exposure to noise within the water column during wellsite surveys or VSP survey activity

As a result of these identified environmental interactions, issues identified in the EIS Guidelines, and concerns raised through consultation and engagement, the assessment of Project-related environmental effects on Marine Fish and Fish Habitat is focused on the following potential environmental effects:

- Change in Habitat Availability and Quality

- Change in Fish Mortality, Injury, Health
- Change in Fish Presence and Abundance (Behavioural Effects)

5.1.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 8.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

5.1.1.1 Presence and Operation of Drilling Installation

The potential environmental effects of presence and operation of the drilling installation are primarily related to underwater noise and vibrations, light emissions and other environmental discharges, interactions with the benthic environment, and aquatic invasive species.

The presence of the drilling installation in combination with lighting effects will have localized positive effects on fish abundance and diversity by creating a “reef effect” that aggregates plankton and increases invertebrate colonization, resulting in increased local productivity and food sources. Continuous operation noises or dynamic positioning may result in localized area avoidance; however, fish may remain in the area for relatively higher foraging opportunities. Safety zones around drilling operations may also afford localized, short-term protection to species that are otherwise exposed to overfishing. Direct contact with the seabed will occur if anchoring is used rather than dynamic positioning; however, underwater surveys will be conducted prior to anchoring operations to confirm that anchors are not set in sensitive coral or sponge habitats. As the Project Area is within an area of low seabed complexity, the introduction of subsea infrastructure may provide opportunities for colonization and increased distribution of benthic species that have pelagic eggs or larvae. This effect would be temporary for the length of drill operations, but the combination of increased colonization opportunities and local enrichment may support faster recovery in an otherwise slow recovering environment. Lighting and other environmental discharges (including organic waste material) associated with the drilling installation may also result in the short-term and localized attraction of some individual fish. There is the potential for temporary positive effects from the creation of increased availability of shelter and food for juveniles around the drilling installation and decreased fishing pressure on adults within the safety zone. There is also a potential for short-term exposure and subsequent potential uptake of contaminants from waste discharge.

The interactions described above may result in changes to habitat availability and quality, fish mortality / injury risk and fish health, and fish presence and abundance. These changes are predicted to be adverse, low in magnitude, localized and certainly within the Project Area, short to medium term duration, occurs regularly and reversible with a high level of confidence.

5.1.1.2 Drilling and Associated Marine Discharges

The primary interactions from discharge of drill cuttings include cuttings deposition and potential seabed disturbance (smothering habitat), chemical toxicity, and bioaccumulation (uptake of contaminants by fish and the presence or perception of taint). Drilling waste discharges will adhere to the requirements for cuttings treatment and discharge guidelines in the Offshore Waste Treatment Guidelines (OWTG).

Discharge of drilling fluids and associated drilling cuttings may affect the benthic environment, with immobile or sessile bivalve and infaunal species being particularly sensitive to burial or drilling mud

deposition. However, the high dispersal of the low toxicity and non-bioaccumulating drill cuttings has relatively low potential for adverse environmental effects.

As reported in the EIS, drill cuttings dispersion modelling was originally conducted for this Project at three locations in the Northern Section and one location in the Southern Section. In the Project Area – Northern Section, approximately 99 percent of water-based mud (WMB) drill cuttings settle less than 2 km from the drill centre under all season scenarios. Treated SBM drill cuttings released under the water surface become well dispersed, with greater than 97 percent of SBM drill cuttings settling outside the 32 km model area. In the modelled Project Area-Northern Section, relatively lower currents results in settling of discharged cuttings within 5-31 km of the wellhead for three of four seasonal scenarios with the synthetic-based mud (SBM) drill cuttings drifting beyond the 32 km model in the June scenario. Due to the distance settled away from the well site, overall accumulation thicknesses are relatively low. In the Project Area – Southern Section, areas of accumulation for WBMs will occur within 2 km of the wellhead indicating that any physical or chemical effects on fish habitat will be relatively localized. Where SBMs are discharged at relatively shallower depths in comparison to other modelled areas, overall average thickness is minimal (0.4 mm or less). However, there are some areas of accumulation that reach up to 3 mm within the model boundary indicating some potential localized disturbances to fish habitat The physical and chemical effects of this volume of WBM and SBM drill cuttings over this area are anticipated to only have localized habitat disturbances, if any. Because overall sedimentation is low, there is low potential for smothering effects or the creation of oxygen depletion conditions, reducing potential recovery and recolonization times.

The use and eventual release of seawater and WBMs are not predicted to result in adverse environmental effects related to toxicity or bioaccumulation. When SBM is used (i.e., drilling the lower portions of each well), fluids and cuttings will be returned to the drilling installation for treatment before cuttings discharge below the water surface. It is not likely that the treated released SBM and SBM-associated drill cuttings will result in adverse effects associated with contamination of marine biota or habitats, as these materials have low toxicity, and localized biological effects.

These interactions may result in potential changes to habitat availability and quality, fish mortality / injury risk and fish health, and fish presence, and abundance. These changes are predicted to be adverse, low in magnitude, localized and certainly within the Project Area, medium to long term in duration, occurring on a regular basis and reversible, with a high level of confidence.

5.1.1.3 Formation Flow Testing with Flaring

The predicted environmental effects of formation flow testing with flaring are primarily related to short-term light and atmospheric emissions, and produced water discharge that may result in change in fish presence and abundance. Due to the low emission quantities, the temporary and short-term nature of air and light emissions, there will be limited potential interactions with fish or their habitat. These changes are predicted to be adverse, low in magnitude, localized, short term, occurring sporadically and reversible. These predictions have been made with a high level of confidence.

5.1.1.4 Wellhead Decommissioning

Wellhead decommissioning will be conducted by cutting off the wellhead rather than blasting for environmental and safety reasons. Wellhead removal will be conducted using either the drilling installation or by an ROV and result in short term, low-magnitude emissions of noise and light. Fish will

likely temporarily avoid the area during activities. The remaining seabed infrastructure may add small quantities of habitat heterogeneity to the existing environment and potentially aid in recolonization of benthic species and overall recovery. These changes are predicted to be adverse, negligible to low in magnitude, localized, short-term, occurring sporadically, and reversible, with a high level of confidence.

5.1.1.5 Geophysical / Geohazard / Wellsite / Seabed Surveys and Vertical Seismic Profiling

The predicted environmental effects of geophysical, geohazard, wellsite, and VSP surveys are primarily related to seismic noise that may result in changes to fish mortality / injury risk, fish health, and fish presence and abundance. The possible effects from the use of seismic sound energy in the marine environment may be behavioural (avoidance, other changes in distribution or activities) or involve injury to or mortality of individual fish. However, operations will be short-term and localized, and have reversible, low-magnitude effects. Noise and seismic emissions from VSP activities are mainly directed downwards into the well, with limited horizontal range. Mobile fish and invertebrate species are predicted to temporarily avoid areas of survey operations, minimizing potential interactions. The geophysical sound source will go through a “ramp up” phase to increase initial fish and invertebrate avoidance to limit potential effects. Eggs, larvae and benthic invertebrates adjacent to the sound source may be affected. However, due to the highly-localized effects and short-term nature of operations, it will not have population effects.

While there may be some short-term behavioural effects to individual fish in the immediate vicinity of the survey activity, it is unlikely that fish will be displaced from key habitats or disrupted over extended areas or periods, or be otherwise affected in a manner that causes negative and detectable effects to fish populations in the region. These changes are predicted to be adverse, low in magnitude, occurring within the Project Area, short-term, occurring sporadically and reversible, with a high level of confidence.

5.1.1.6 Geological, Geotechnical and Environmental Surveys

Most of these geological, geotechnical and environmental survey activities will not result in physical contact with the seabed, and will therefore not directly interact with or disturb benthic animals or their habitats. When used, sediment sampling equipment will be in direct contact with the seabed and potentially injury or cause mortality in fish, change habitat quantity or quality, and indirectly affect distribution and abundance; however, the small footprint of this temporary activity is not likely to cause any effects on population scales. Water sampling activities are not likely to have interactions with the seabed or fish. Underwater video surveys may have lighting and noise emissions; however, the temporary nature of the activity limits any potential effects on the environment. Fish may also migrate away from the area while the short-term activity is ongoing. These changes are predicted to be adverse, negligible to low in magnitude, localized, short-term, occurring sporadically and reversible, with a high level of confidence.

5.1.1.7 Supply and Servicing

Helicopter use will have no direct interactions with fish and fish habitat. With respect to offshore supply vessels, all exhaust emission levels will follow air quality regulations and guidelines. Similar to the drilling installation, all offshore supply vessel wastewaters will be treated to reduce contaminant or hydrocarbon levels prior to discharge under MARPOL. Due to the transitory nature of vessels, discharges are not likely to accumulate in any area and the low volumes would likely become highly dispersed in the marine environment. The continuous noise and lighting from vessels would also be relatively low and result in temporary avoidance by fish. As with other emissions, the temporary

interaction with any one area limits potential noise and light interactions with fish. These changes are predicted to be adverse, low in magnitude, localized, short-term, occurring on a regular basis and reversible, with a high level of confidence.

5.1.2 Implications of the Addition of EL 1134

As noted previously, EL 1134 is entirely within the overall Project Area, LSA and RSA considered in the original EIS, being located in the south-central portion of the current Project Area and within the Study Area for the Eastern Newfoundland SEA. While the marine area that is encompassed by EL 1134 itself may be expected to contain fish species and habitats that are characteristic of its relative location within the overall Project Area and EA Study Areas (see Section 4.2.1 above), it is not known or considered likely to contain new or different species, habitats - and thus, potential environmental issues or interactions – that were not considered and addressed in the original EIS. This includes no likely increases or other changes in the Project's potential to interact with, or have negative effects upon, key or particularly sensitive species (including any that are designated as being species at risk) or habitats.

5.1.2.1 Drill Cutting Modelling Specific to EL1134

Model Methods and Results

Drill cuttings dispersion modelling (Appendix A) was completed for one location at a water depth of 1,175 m, near the middle of EL 1134 about 35 km northeast of the southwestern corner of EL 1134. The same modelling approach, including drill cuttings characterization, applied in the Drilling EIS for the modelled location at Jeanne d'Arc Basin was employed. Again, with the potential to drill a well at any time during the year, four model simulation runs or 'scenarios' (for March, June, September, December) were considered to capture the associated seasonal variation in ocean currents. One year of measurements from current-meter moorings in the Flemish Pass about 14 km west of the scenario location were employed as inputs to the modelling.

As for the Drilling EIS, cuttings from drilling the upper two well sections with WBM are released close to the seafloor. There is little time for the cuttings to be transported any large distances by the ambient currents. Conversely SBM cuttings will be treated as per the Offshore Waste Treatment Guidelines and released near the sea surface.

Consistent with the predominant current directions in this region of the Flemish Pass, discharged WBM and SBM cuttings drift primarily to the south and southwest in each of the four months simulated.

In each month about 56% of the total cuttings material is predicted to initially settle within about 1 km of the wellhead. This includes all WBM cuttings, while, given the water depth of 1,175 m at EL 1134, from 1.2% (December) to 2.5% (June) of the SBM cuttings - the total SBM cuttings volume is about 44% of the total cuttings volume - settle within 4 km. With modelling over a larger domain out to 32 km the percentages are slightly higher, with from 2.5% (December) to 5.8% (June) of SBM cuttings predicted to initially settled. As a result total cuttings reported primarily consist of the WBM cuttings material.

Mean total cuttings thicknesses within 200 m of the wellhead are predicted to range from about 0.5 to 8 mm in all months (Table 5-1). Corresponding maximum thicknesses within 200 m range from 8 to 31 mm for the March, June and September scenarios while the December maximum thickness at 150 m away is 80 mm. From 200 m to 2 km away from the wellhead mean total cuttings thicknesses are predicted to range from about 0.01 mm or less farther than 1 km away in all months (excluding

December when the mean is 1 mm) to 4 mm. Corresponding maximum thicknesses within 1 km range from 24 to 97 mm and are located between 250 and 410 m out from the wellhead.

The footprint accumulations are primarily to the south. One exception is seen in March with some of the footprints located about 700-900 m directly to the northeast. This sort of reversal is confirmed with the measured currents – with evidence of coherence at other depths in the vertical - and is briefly also seen in the December measurements. These reversals may be due to topographic wave motions associated with variable wind forcing upstream; eddies or other fluctuations also seem like a possibility (J. Loder, pers. comm.). As evident in the monthly current roses presented in the report these reversals are an infrequent occurrence.

The locations of footprints with thicknesses above the predicted no effect thresholds (PNET) of 1.5 mm are confined to within about 800 to 900 m of the wellhead. These patches are primarily to the south with the exception of March where there is also a patch 900 m to the northeast.

Relationship to Previous Modelling and EIS Implications

The estimated cuttings volumes from one well are 430 m^3, slightly less than the 469 m^3 for the Jeanne d'Arc Basin modelled in the Drilling EIS. With the deeper location at EL 1134 – 1,175 m compared with 89 m at Jeanne d'Arc Basin – released SBM cuttings from the MODU would be subject to much longer settling times and become very widely dispersed. Mean near-bottom current speeds (as would affect primarily the seabed release of the WBM cuttings) are expected to be quite comparable between these two locations, with maximum speeds at EL 1134 about one third those at Jeanne d'Arc Basin, with the effect that near-bottom materials will be dispersed not quite as far. Mean cuttings thicknesses out to 1 km are consistent between the two locations ranging from about 2 to 8 mm (Table 5.1 and Table 5.2). Maximum cuttings thicknesses range from 80 to 97 mm for EL 1134 compared with 55 to 108 mm at Jeanne d'Arc Basin.

With the exception of the above described inclusion of EL 1134, no other aspect of the Project is planned to change as compared to that which was described and assessed in the original EIS documentation. Moreover, all of the mitigation measures and commitments outlined in the EIS would remain applicable and will continue to be implemented and adhered to by ExxonMobil in planning and implementing this Project.

This proposed amendment (inclusion of EL 1134) therefore does not change the results of the environmental effects assessment for this VC (see Table 5.3), and the Project is still not likely to result in significant adverse environmental effects on marine fish and fish habitat.

Table 5.1 EL1134 Cuttings Thickness by Distance

EL1134		Distance from Well Site									
		0-10m	10-100m	100-200m	200-500m	500m-1km	1-2km	2-4km	4-5km	5-31km	>31km
Cuttings Type		**Cuttings Thickness (mm)**									
	March										
Total	**Mean**	5	0.5	0.4	2	2	0.01	0.01	0.01	-	-
	Maximum	12	13	8	86[1]	26	1	0.05	0.07	-	-
	June										

Total	**Mean**	7	1	0.5	4	2	<0.01	0.01	<0.01	-	-
	Maximum	31	20	8	97 [2]	25	0.05	0.07	0.01	-	-
	September										
Total	**Mean**	5	1	1	3	3	0.01	0.01	<0.01	-	-
	Maximum	22	22	9	95 [3]	24	1	0.01	<0.01	-	-
	December										
Total	**Mean**	8	1	2	3	3	0.8	0.01	0.01	-	-
	Maximum	22	15	80[4]	69	26	1	0.07	0.04	-	-

[1] at (0.25 km, 190°); [2] at (0.41 km, 184°); [3] at (0.37 km, 193°); [4] at (0.15 km, 141°)

Table 5.2 JDB Cuttings Thickness by Distance

JDB		**Distance from Well Site**									
		0-10m	**10-100m**	**100-200m**	**200-500m**	**500m-1km**	**1-2km**	**2-4km**	**4-5km**	**5-31km**	**>31km**
Cuttings Type		**Cuttings Thickness (mm)**									
	March										
WBM	**Mean**	4	1	0.3	3	2	2	-	-	-	-
	Maximum	12	10	1	101[1]	20	16	-	-	-	-
SBM	**Mean**	-	0.1	0.1	0.1	-	0.3	0.4	0.02	0.05	-
	Maximum	-	0.3	0.6	0.5	-	2.8	2.4	0.5	0.7	-
	June										
WBM	**Mean**	8	4	4	3	3	-	-	-	-	-
	Maximum	21	108 [2]	25	61	19	-	-	-	-	-
SBM	**Mean**	<0.1	0.1	0.1	0.1	<0.1	0.1	0.2	0.04	0.04	-
	Maximum	0.1	0.5	0.6	0.3	0.1	0.7	2.9	1.2	0.5	-
	September										
WBM	**Mean**	4	1	2	2	2	0.4	-	-	-	-
	Maximum	14	14	48	55 [3]	13	1	-	-	-	-
SBM	**Mean**	<0.01	0.1	0.1	0.3	0.2	0.3	0.2	0.05	0.04	-
	Maximum	<0.01	0.8	1.6	2.8	0.4	2.0	2.5	2.8	0.6	-
	December										
WBM	**Mean**	7	4	3	3	1	3	-	-	-	-
	Maximum	17	22	23	102 [4]	1	22	-	-	-	-
SBM	**Mean**	<0.01	0.1	0.1	0.1	0.3	0.1	0.3	0.08	0.04	-
	Maximum	<0.01	0.3	0.4	0.4	2.5	1.6	2.4	2.4	0.5	-

[1] at (0.45 km, 265°); [2] at (0.09 km, 118°); [3] at (0.26 km, 38°); [4] at (0.21 km, 349°)

Table 5.3 Environmental Effects Assessment Summary: Marine Fish and Fish Habitat – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY

Summary of Existing Conditions and Ecological and Social Context: EL 1134

- Water depths within EL 1134 range from approximately 730 m to 1,250 m
- Within EL 1134 itself, sea pens have been the main coral group observed, with higher densities on the slopes and bottoms of the Flemish Pass Key species in this group included A. grandiflorum, H. finmarchica, and P. aculeate.
- Sponges were relatively well distributed in EL 1134 based on EU-Spanish data. The observed and identified species were primarily from the families Geodiidae and Ancorinidae. Sponges were present along the bottom and slopes of the Flemish Pass in EL 1134.
- Distribution information on key species indicate that roundnose grenadier, roughhead grenadier, blue hake and black dogfish have areas of higher aggregation in bottom areas of the Project Area around EL 1134.

Summary of Key Mitigation

- Use of existing and common vessel and aircraft travel routes for vessels and helicopters will be used where possible and practicable
- Low-level aircraft operations will be avoided where it is not required per Transport Canada protocols
- Operational discharges will be treated prior to release in accordance with the OWTG and other applicable regulations and standards
- The selection and screening of chemicals to be discharged, including drilling fluids, will be in accordance with the Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands
- During formation flow testing with flaring, produced hydrocarbons and produced water will be flared. If there is a large amount of produced water encountered, it will be treated in accordance with the relevant regulatory requirements prior to ocean discharge, or shipped to shore for appropriate disposal
- Appropriate handling, storage, transportation, and on-shore disposal of solid and hazardous waste
- Maceration of sewage and kitchen waste, in accordance with the OWTG to 6 mm particle size.
- Prior to the start of a drilling campaign, a pre-drill coral survey will be undertaken. A report summarizing the coral mapping, risk assessment and planned mitigation measures (if corals are identified) will be prepared and submitted to the C-NLOPB / DFO for review and acceptance. Potential mitigation may include relocation of the well and/or relocation of cuttings discharge through a subsea cuttings transport system
- Relocation of well and/or redirection of WBM cuttings discharge in the event that the pre-drill coral survey and risk assessment identifies mitigation required to protect sensitive benthic habitat (i.e., corals and sponges)
- SBM-related drill cuttings will be returned to the drilling installation and treated in accordance with the OWTG before being discharged to the marine environment. WBM-related drill cuttings will be discharged without treatment
- Use of explosives will not be employed for removal of wellheads
- At the time of decommissioning a well, the well will be inspected in accordance with applicable regulatory requirements

Project Component or Activity	Potential Environmental Effects	Residual Environmental Effects Summary Descriptors						
		Nature	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Certainty
Presence and Operation of Drilling Installation	• Change in habitat availability and quality • Change in fish mortality, injury, health	A	L	L-PA	S-M	R	R	H

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
	• Change in fish presence and abundance							
Drilling and Associated Marine Discharges	• Change in habitat availability and quality • Change in fish mortality, injury, health • Change in fish presence and abundance)	A	L	L-PA	M-L	R	R	H
Formation Flow Testing with Flaring	• Change in fish mortality, injury, health • Change in fish presence and abundance	A	L	L	S	S	R	H
Wellhead Decommissioning	• Change in habitat availability and quality • Change in fish presence and abundance	A	N-L	L	S	S	R	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys	• Change in fish mortality, injury, health • Change in fish presence and abundance	A	L	PA	S	S	R	H
Geological, Geotechnical and Environmental Surveys	• Change in habitat availability and quality • Change in fish mortality, injury, health • Change in fish presence and abundance	A	N-L	L	S	S	R	H
Supply and Servicing	• Change in fish mortality, injury, health • Change in fish presence and abundance	A	L	L	S	R	R	H
Evaluation of Significance • Based on the nature and characteristics of the Project and the existing environment for this VC within the LSA and RSA, and with the planned implementation of mitigation, the Project is not likely to result in significant adverse effects on Marine Fish and Fish Habitat.								

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY

- Although Project-related components, activities and emissions may result in some localized, short-term interactions with fish and fish habitat in parts of the LSA, the number of individuals and habitat areas that may be affected, and the temporary and reversible nature of these interactions, means that the Project will not have overall ecological or population-level effects, and particularly, will not result in detectable decline in overall fish abundance or changes in the spatial and temporal distributions of fish populations within this area.
- For fish species at risk, the potential for interactions between individuals of these species and the Project is limited, and no identified critical habitat is present in the LSA or RSA. The Project will therefore not have implications for the overall abundance, distribution, or health of such species nor its eventual recovery. The Project is not predicted to result in significant adverse effects on marine fish species at risk.

NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.

KEY

Nature / Direction:

P	Positive
A	Adverse
N	Neutral (or No Effect)

Magnitude:

N	Negligible
L	Low
M	Medium
H	High

Geographic Extent:

L	Localized, In Immediate Vicinity of Activity
PA	Within Project Area
LSA	Within LSA
RSA	Within RSA or Beyond

Frequency:

O	Occurs once
S	Occurs sporadically
R	Occurs on a regular basis
C	Occurs continuously

Duration:

S	Short term (For duration of the activity)
M	Medium term (Beyond duration of the activity – weeks or months)
L	Long term (Beyond duration of the activity – years)
P	Permanent (Recovery unlikely)

Reversibility:

R	Reversible (Will recover to baseline)
I	Irreversible (Permanent)

Certainty in Predictions:

L	Low level of confidence
M	Moderate level of confidence
H	High level of confidence
N/A	Not Applicable

5.2 Marine and Migratory Birds (Including Species at Risk)

The key potential environmental interactions between planned offshore oil and gas activities and Marine and Migratory Birds, include the following:

- Potential attraction of birds to offshore drilling installations and vessels, including their lights, flares or other light emissions, and waste discharges, resulting in possible injury or mortality (strikes, strandings, incineration, disorientation, increased energy expenditure)
- Exposure to atmospheric noise during flaring and helicopter operations causing disruptions to and changes in their distribution and behaviours
- Possible injury of avifauna (particularly diving birds) due to exposure to noise within the water column during VSP or wellsite surveys using seismic sound sources or disruptions to and changes in their distributions and behaviours
- Changes in the presence, abundance, distribution, and/or health of birds (individuals and populations) resulting from direct exposure to waste discharges from installations or vessels (physical exposure, ingestion)
- Possible indirect effects due to changes in the availability, distribution, and/or quality of food sources or habitats for marine and migratory birds due to disturbances (noise, light) and/or Project-related waste discharges (such as drilling fluids, other liquid and solid waste materials).

As a result of these identified environmental interactions, issues identified in the EIS Guidelines, and concerns raised through consultations and engagement, the assessment of Project-related environmental effects on Marine and Migratory Birds (including SAR and SOCC) is focused on the following potential environmental effects:

- Change in Mortality / Injury Levels and Bird Health (Individuals or Populations)
- Change in Avifauna Presence and Abundance (Behavioural Effects)
- Change in Habitat Availability and Quality
- Change in Food Availability or Quality

5.2.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 9.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

5.2.1.1 Presence and Operation of Drilling Installation

The predicted environmental effects associated with the presence and operation of the drilling installation are primarily related to lighting and emissions that may result in changes in mortality / injury levels, presence and abundance of avifauna, and food and habitat availability and quality. This includes the possible attraction of birds to lighting, avoidance of the drilling installation due to sensory disturbance, and the creation of new foraging opportunities for predator species (e.g., through prey attraction due to organic waste disposal, creation of new “artificial reef” habitat). There may also be a slight increase in mortality / injury levels due to collisions, disorientation, and potential predation; however, the mortality rate is anticipated to be low as most stranded birds encountered on platforms and vessels are released successfully. Some localized and short-term behavioural effects (change in presence and abundance) are also likely to occur from the operation of the drilling installation; however,

these effects will be localized, transient, and short-term in nature. Changes in habitat and food availability and quantity, if any, will also be on a localized scale and for a short-term duration. These changes are predicted to be adverse, low in magnitude, localized and certainly within the Project Area, short to medium term, regular in frequency, and reversible, with a moderate level of confidence.

5.2.1.2 Drilling and Associated Marine Discharges

The predicted environmental effects of drilling and associated marine discharges are primarily related to release of organic wastes, which may result in changes in mortality / injury levels, presence and abundance of avifauna, and food availability and quality. Organic waste will be reduced prior to discharge in accordance with the OWTG. Discharge of organic wastes (sewage and food scraps) may result in enhancement of the local food supply and attraction of birds to vessels and platforms. However, this potentially positive effect may be offset by increased exposure to risk of collision / strandings or predation as well as energetic costs due to deviation from normal movement / migration patterns. Proper waste management will reduce such effects of discharges of organic waste on birds. These potential effects are predicted to be adverse, low in magnitude, localized, short-term, sporadic in frequency, and reversible, with a moderate level of confidence.

5.2.1.3 Formation Flow Testing with Flaring

The predicted environmental effects of formation flow testing with flaring are primarily related to attraction of birds to flares, which may result in changes in mortality / injury levels, and in presence and abundance of avifauna. Any flaring events conducted during the Project will occur several hundred kilometres offshore, far away from coastal breeding sites and IBAs and well beyond the foraging range of almost all species that nest in Newfoundland. Therefore, breeding birds are unlikely to be affected by this activity, with the potential exception of the Leach's storm-petrel, which may forage thousands of kilometres from the nest site during the breeding season. Although there is some potential for the attraction of migratory landbirds, it is unlikely that large numbers of landbirds will be affected. Any such effects are predicted to be adverse, low in magnitude, localized and certainly within the Project Area, short-term, sporadic in frequency, and reversible, with a moderate level of confidence.

5.2.1.4 Wellhead Decommissioning

No effects on Marine and Migratory Birds as a result of wellhead decommissioning are anticipated. Wellhead decommissioning is conducted underwater, at depth, and in adherence to the requirements set out under the *Newfoundland Offshore Petroleum Drilling and Production Regulations*. Decommissioning activities will be conducted well below diving depths for even the deepest-diving seabirds.

5.2.1.5 Project-Related Surveys

The predicted environmental effects of survey activities are primarily related to noise exposure from geophysical testing, which may result in changes in presence and abundance of avifauna, and potentially short-term injury. Deep-diving birds such as alcids (including murres, dovekies, and puffins), as well as other bird species that forage underwater, may be at somewhat higher risk of injury or disruption due to exposure to underwater noise such as that generated by seismic sound sources. VSP and geophysical, geohazard, wellsite and/or seabed surveys using 2D seismic arrays or other equipment will be conducted as part of the Project as required. However, these surveys will be short-term and localized in nature, and Marine and Migratory Birds are unlikely to be affected by the

underwater sound energy that is associated with these activities. These changes are predicted to be adverse, negligible in magnitude, localized and certainly within the Project Area, short-term, sporadic in frequency, and reversible, with a high level of confidence.

5.2.1.6 Supply and Servicing

The primary environmental effects of supply and servicing activities are related to potential disturbance due to vessel movements, release of organic wastes leading to increased food availability, and attraction / disorientation of birds due to lighting. The various bird species that occupy the Project Area and potential vessel and aircraft traffic routes will not likely be disturbed by Project-related vessel activity or associated aircraft use due to its short-term transitory nature, and because it will generally be in keeping with the overall marine traffic that has occurred throughout the region for years. The release of organic wastes by offshore vessels and activities can attract birds, which may increase the potential for interactions including risk of predation, collision and exposure to contaminants. However, this will be reduced with proper waste management practices and adherence to associated MARPOL requirements (e.g., food and sewage waste will not be discharged within 5.5 km (3 nautical miles) of the coast). Potential effects due to lighting on supply vessels, will be highly transient in nature. Overall, the presence of these Project-related vessels in the Canada-NL Offshore Area as part of this Project would result in a negligible addition of night lighting in this region. These changes are predicted to be adverse, low in magnitude, localized in extent, short-term, regular in frequency, and reversible, with a high level of confidence.

5.2.2 Implications of the Addition of EL 1134

EL 1134 is located in the southcentral portion of the current Project Area and the LSA for this VC, and is located beyond Canada's 200 nautical mile EEZ and hundreds of kilometers from any coastline. Section 4.2.2 of this Report describes the occurrence and seasonal distributions of seabird observations based on data from the Eastern Canada Seabirds at Sea (ECSAS) program and other sources. Although a number of taxa have been observed to occur in this portion of the Project Area at least seasonally, the area within and around EL 1134 itself is again not known or likely to be used by species or to contain particularly important or sensitive habitats that were not considered and addressed in the original EIS. Many seabird groups such as cormorants and terns tend to have a more coastal distribution, and are therefore rarely observed this far offshore. Waterfowl occur in large numbers in marine habitats off eastern Newfoundland, especially during the winter months, but they prefer open water in coastal areas and are thus not likely to frequent this part of the Project Area and RSA. Due to the great distance between this area and the coastlines of Newfoundland and Labrador, this area is unlikely to be utilized by most shorebirds or by migrating landbirds. Also, Important Bird Areas and breeding colonies are found in coastal areas and inland far from the offshore environment that is found within this part of the Project Area.

Again, with the exception of the above described inclusion of planned Project activities within EL 1134, no other aspect of the Project is planned to change as compared to that which was described and assessed in the original EIS. All of the mitigation measures and commitments outlined in the EIS remain applicable and will continue to be implemented and adhered to by ExxonMobil in planning and implementing this Project. This proposed amendment (addition of EL 1134) therefore does not change the results of the environmental effects assessment for this VC (Table 5.4), and the Project is still not likely to result in significant adverse environmental effects on marine and migratory birds.

Table 5.4 Environmental Effects Assessment Summary: Marine and Migratory Birds – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY	
Summary of Existing Conditions and Ecological and Social Context: EL 1134 • A variety of avifauna species occur within the marine and coastal environments off Eastern Newfoundland at various times of the year, including seabirds and other avifauna that inhabit the region at particular or extended periods for breeding, feeding, migration and other activities according to their individual life histories and habitat requirements. • Birds are highly mobile, and so information on their presence and distribution (spatially and temporally) is inherently regional in nature. • A number of important habitats for birds have also been identified at locations along the coastline of Newfoundland and Labrador, well outside of the area within which exploration drilling and associated activities are planned to occur.	**Summary of Key Mitigation** • Low-level aircraft operations will be avoided where it is not required per Transport Canada protocols • Operational discharges will be treated prior to release in accordance with the OWTG (2016) and other applicable regulations and standards. • The selection and screening of chemicals to be discharged, including drilling fluids, will be in accordance with the Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands • During formation flow testing with flaring, produced hydrocarbons and produced water will be flared. If there is a large amount of produced water encountered, it will be treated in accordance with the relevant regulatory requirements prior to ocean discharge, or shipped to shore for appropriate disposal • The Operator will avoid, where possible, established bird colonies. Helicopters will avoid known coastal seabird colonies per requirements of the NL Seabird Ecological Reserve Regulations, 2015 • During drilling operations, routine observations of seabirds, following the CWS protocols will be undertaken from the drilling installation • Routine searches for stranded birds will be conducted on the platform and supply vessels, and appropriate programs and protocols for the collection and release of marine and migratory birds will be implemented for birds that become stranded (i.e., "ECCC-CWS's Oiled Birds Protocol and Protocol for Collecting Dead Birds from Platforms. Best Practices for Stranded Birds Encountered Offshore Atlantic Canada (Draft 2)" and Williams and Chardine (n.d.): The Leach's storm-petrel: General Information and Handling Instructions) • The Operator will obtain a Seabird Handling permit from ECCC-CWS • Maceration of sewage and kitchen waste, in accordance with the OWTG to 6 mm particle size • Operators are required to notify the C-NLOPB for plans to flare associated with formation flow testing for exploration drilling. The C-NLOPB then consults with ECCC-CWS to determine a safe timeline to proceed to reduce effects on migrating birds

Project Component or Activity	Potential Environmental Effects	Residual Environmental Effects Summary Descriptors						
		Nature / Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Certainty
Presence and Operation of Drilling Installation	• Change in mortality / injury levels and bird health	A	L	L-PA	S-M	R	R	M

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
	• Change in avifauna presence and abundance • Change in habitat availability and quality • Change in food availability or quality							
Drilling and Associated Marine Discharges	• Change in mortality / injury levels and bird health • Change in food availability or quality	A	L	L	S	S	R	M
Formation Flow Testing with Flaring	• Change in mortality / injury levels and bird health	A	L	L-PA	S	S	R	M
Wellhead Decommissioning	• None expected	N	-	-	-	-	-	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys	• Change in mortality / injury levels and bird health • Change in avifauna presence and abundance • Change in habitat availability and quality	A	N	L – PA	S	S	R	H
Geological, Geotechnical and Environmental Surveys	• None expected	N	-	-	-	-	-	H
Supply and Servicing	• Change in mortality / injury levels and bird health • Change in avifauna presence and abundance	A	L	L	S	R	R	H
Evaluation of Significance • Based on the nature and characteristics of the Project and the existing environment for this VC within the LSA and RSA, and with the planned implementation of mitigation, the Project is not likely to result in significant adverse effects on Marine and Migratory Birds.								

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY

- Although Project-related components, activities and emissions may result in some localized, short-term interactions with marine-associated avifauna in parts of the LSA, including bird attraction to offshore lighting and other components, the number of individuals that may be affected, and the temporary and reversible nature of these interactions, means that the Project will not have any overall ecological or population-level effects, and particularly, will not result in a detectable decline in overall bird abundance or changes in the spatial and temporal distributions of bird populations within this area
- With regard to avifauna species at risk, ivory gull and red-necked phalarope are the only such species that are likely to be found in the Project Area. During fall migration, there is some potential for Peregrine Falcons and nocturnally migrating landbird species at risk to be present and to be attracted to the Project. However, the potential for interactions between individuals of these species and the Project is limited, and no identified critical habitat is present in the LSA or RSA. The Project will therefore not have implications for the overall abundance, distribution, or health of such species at risk nor its eventual recovery. The Project is therefore not likely to result in significant adverse effects on avian species at risk.

NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.

KEY

Nature / Direction:

P	Positive
A	Adverse
N	Neutral (or No Effect)

Magnitude:

N	Negligible
L	Low
M	Medium
H	High

Geographic Extent:

L	Localized, In Immediate Vicinity of Activity
PA	Within Project Area
LSA	Within LSA
RSA	Within RSA or Beyond

Frequency:

O	Occurs once
S	Occurs sporadically
R	Occurs on a regular basis
C	Occurs continuously

Duration:

S	Short term (For duration of the activity)
M	Medium term (Beyond duration of the activity – weeks or months)
L	Long term (Beyond duration of the activity – years)
P	Permanent (Recovery unlikely)

Reversibility:

R	Reversible (Will recover to baseline)
I	Irreversible (Permanent)

Certainty in Predictions:

L	Low level of confidence
M	Moderate level of confidence
H	High level of confidence
N/A	Not Applicable

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

The key potential environmental interactions between offshore oil and gas activities and marine mammals and sea turtles include the following:

- Temporary hearing impairment or permanent injury or mortality from exposure to loud underwater noise after coming into close contact with a Project-related underwater sound source (e.g., drilling, VSP) at or above threshold levels for onset of injury derived from published scientific literature or those used in relevant legislation
- Behavioural effects due to Project-related sound sources or other disturbances at or above threshold levels for onset of behavioural disturbance derived from published scientific literature or those used in relevant legislation. These may include alterations in the presence, abundance, and overall distribution (including avoidance) of marine mammals and sea turtles as well as modifications to their movements, feeding, communication patterns and other activities
- Interference with (and the masking of) sounds within the marine environment that originate from and/or are used by marine biota, such as in communication between individuals, the identification and detection of predators and prey, echolocation, and other activities and requirements
- Potential for injury or mortality through collisions or other interactions with offshore survey and supply vessels, including possible attraction of individual animals
- Possible changes in the availability, distribution, or quality of feed sources and/or habitats for marine mammals and sea turtles

As a result of these potential effects, identified environmental interactions, issues identified in the EIS Guidelines, and concerns raised through consultations and engagement, the assessment of Project-related environmental effects on Marine Mammals and Sea Turtles (including SAR) is focused on the following potential environmental effects:

- Change in Mortality or Injury (Underwater Noise)
- Change in Habitat Quality or Use (Behavioural Effects)
- Change in Mortality or Injury (Vessel Strikes)
- Change in Food Availability or Quality
- Change in Health (Contaminants)

5.3.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 10.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

5.3.1.1 Presence and Operation of Drilling Installation

The predicted environmental effects associated with presence and operation of a drilling installation are primarily related to increase in underwater noise that may result in a change in mortality or injury and change in habitat quality or use (behavioural effects). However, in this case, marine mammals or sea turtles are not expected to be injured or killed as a result of underwater noise introduced during presence and operation of a drilling installation, nor is the quality or availability of their prey expected to be adversely affected. Some degree of change in habitat use in response to underwater noise is expected

of individuals that occur within tens of kilometres of the drilling installation at the time of operation. The exact nature of behavioural response cannot be predicted but could include interference in communication, minor alterations in activity, or localized avoidance responses. The number of individuals affected is expected to be minimal relative to overall population sizes, effects will be of moderate duration (less for transient individuals), and there are no known concentration or critical habitat areas in the RSA. These changes are predicted to be adverse, low to medium in magnitude, within the Project Area and LSA, short- to medium-term, regular to continuous in frequency, and reversible, with a moderate level of confidence.

5.3.1.2 Drilling and Associated Marine Discharges

The predicted environmental effects to marine mammals and sea turtles associated with drilling and associated marine discharges is change in health (contaminants) related to routine discharges of drilling muds, drilling fluid, and cuttings associated with drilling activities. Chemicals used for drilling operations will be screened in accordance with a chemical management system that adheres to the C-NLOPB requirements. With the application of mitigation measures, the potential for Project-related changes in health and in food availability or quality as a result of drilling and marine discharges is predicted to be adverse but negligible. This conclusion has been determined with a high level of confidence, based on the implementation of industry-standard guidelines and best management practices and the limited potential for exposure of marine mammals and sea turtles to marine contaminants or contaminated prey. These changes are predicted to be adverse, low in magnitude, within the Project Area, short-term, regular in frequency, and reversible, with a high level of confidence.

5.3.1.3 Formation Flow Testing with Flaring

In cases where a formation flow test is carried out, Project interactions with marine mammals and sea turtles will be similar to those discussed above. Given compliance with OWTG requirements, the potential for Project-related changes in health and food availability or quality as a result of drilling and marine discharges is predicted to be adverse but negligible. These changes are predicted to be adverse, negligible to low in magnitude, localized and within the Project Area, short-term, sporadic in frequency, and reversible, with a high level of confidence.

5.3.1.4 Wellhead Decommissioning

During wellhead decommissioning, disturbance during mechanical removal of wellheads and presence of the ROV may result in temporary, localized avoidance by marine mammals and sea turtles within the immediate area surrounding the wellhead. Underwater noise will be produced by either the drilling installation or an alternative vessel capable of carrying out the decommissioning activity. Changes in marine fish health (and thus changes in marine mammal and sea turtle prey quality) are not expected. As such, potential interactions with marine mammals associated with this activity will be limited to change in habitat quality or use due to an increase in underwater noise during vessel transit and change in mortality or injury from vessel strike risk. At water depths greater than 1,500 m, it is planned that the wellhead will remain in place and will not be removed, and therefore no interactions with marine mammals or sea turtles are anticipated during or after the activity. These changes are predicted to be adverse, negligible to low in magnitude, localized with some extension into Project Area, short-term, sporadic in frequency, and reversible, with a high level of confidence.

5.3.1.5 Project-related Surveys

Underwater noise produced during VSP and other geophysical surveys have the potential for injury or mortality or behavioural changes in marine mammals and sea turtles. However, in this case, and particularly with the implementation of mitigation measures, injury or mortality is not predicted for marine mammals or sea turtles as a result of underwater noise from VSP and other geophysical surveys, nor is the quality or availability of their prey expected to be adversely affected. Some degree of change in habitat use in response to underwater noise is expected for individuals that occur within a few kilometres of the surveys at the time of operation. The exact nature of behavioural response cannot be predicted but could include, for example, interference in communication, minor alterations in activity, or localized avoidance responses. Avoidance responses, where they occur, will further reduce the potential for injury. The number of individual marine mammal and sea turtles affected is expected to be minimal relative to overall population sizes, effects will be localized and of short-term duration, and there are no known concentration or critical habitat areas in the Project Area. Geological, geotechnical, and environmental surveys have a low potential to affect Marine Mammals and Sea Turtles, resulting from changes in habitat quality or use, change in mortality / injury (vessel strikes), and change in food availability and quality. The changes associated with Project-related surveys are predicted to be adverse, negligible to low in magnitude, localized with some extension into the LSA, short to medium-term, sporadic in frequency, and reversible, with a high level of confidence.

5.3.1.6 Supply and Servicing

Marine transportation associated with support / supply / survey vessels will result in an increase in marine vessel traffic to, from and within the LSA and within the RSA overall, and an associated increase in underwater noise and vessel strike risk. Despite the lack of Project-specific underwater sound modelling and uncertainty regarding noise thresholds for different species of marine mammals and sea turtles, potential for exposure is expected to be brief and transient in nature. While vessel strikes can and do have serious consequences for individuals involved, these events are rare on a per-vessel basis and the Project will add only a small number of vessels relative to current vessel traffic volumes in the RSA. Helicopter support will be used for crew transfers out of St. John’s International Airport. Routine transportation activities associated with helicopter support have the potential to result in change in habitat quality or use for marine mammals and sea turtles as a result of sensory disturbances from the introduction of visual cues and noise. These changes are predicted to be adverse, low in magnitude, within the LSA, short-term, regular in frequency, and reversible, with a high level of confidence.

5.3.2 Implications of the Addition of EL 1134

Although detailed species and site specific survey data are not available for this part of the Project Area itself, the available DFO sightings database (see Section 4.2.3) does show some observations in this immediate area (Figures 4.10 to 4.12), and it is likely that this general region is used by some marine mammals and/or sea turtles during parts of the year

Again, however, this particular area is not known or considered likely to be used by species (including those at risk) or contain particularly important or sensitive habitats that were not considered and addressed in the original EIS, nor to increase the potential for or degree of any such environmental interactions and effects. It will therefore not result in any new or different interactions with, or increase the proximity of planned Project activities to, identified important areas and times for these species off the coast of Newfoundland and Labrador.

With the exception of the above described inclusion of planned Project activities within EL 1134 (which is in the south-central portion of the current Project Area), no other aspect of the Project is planned to change as compared to that which was described and assessed in the original EIS. All of the mitigation measures and commitments outlined in the EIS remain applicable and will continue to be implemented and adhered to by ExxonMobil in planning and implementing this Project.

This proposed amendment (inclusion of EL 1134) therefore does not change the results of the environmental effects assessment for this VC, and the Project is still not likely to result in significant adverse environmental effects on marine mammals and sea turtles (Table 5.5).

Table 5.5 Environmental Effects Assessment Summary: Marine Mammals and Sea Turtles – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY	
Summary of Existing Conditions and Ecological and Social Context: EL 1134 • See EIS Table 10.5 for an overview of the Project Area and LSA as a whole. • These species are highly mobile, and so information on their presence and distribution (spatially and temporally) is inherently regional in nature. • In this EL and surrounding area, offshore species of marine mammals and sea turtles are expected to occur transiently.	**Summary of Key Mitigation** • Use of existing and common travel routes for vessels and helicopters will be used where possible and practicable • Low-level aircraft operations will be avoided where they are not required per Transport Canada protocols • Establishment of a safety zone around drilling installations in accordance with the Newfoundland Offshore Petroleum Drilling and Production Regulations SOR/2009-316 • Operational discharges will be treated prior to release in accordance with the OWTG (2016) and other applicable regulations and standards • The selection and screening of chemicals to be discharged, including drilling fluids, will be in accordance with the Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands • Project associated vessel traffic will be approximately eight to ten trips per month to service one drilling installation. Use of existing and common travel routes will be used where possible and practical. Vessels will maintain a steady course and safe vessel speed whenever possible • Use of explosives will not be employed for removal of wellheads • As required in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines, mitigation measures applied during the Project's geophysical surveys will be consistent with those outlined in the Statement of Canadian Practice with respect to the Mitigation of Geophysical Sound in the Marine Environment (SOCP) (DFO 2007). The following is a partial list of those mitigation measures: – Trained MMOs will be used to monitor and report on marine mammal and sea turtle sightings during VSP and geophysical surveys where geophysical source arrays are used – A ramp-up of the source array (i.e., gradually increasing geophysical source elements over a period of at least 20 minutes until the operating level is achieved) starting from a single source element – MMOs will implement a pre-ramp up watch of 30 minutes prior to the start of the air source. Ramp-up will be delayed if marine mammal or sea turtle is sighted within the safety zone – Shut down of the geophysical source array if a marine mammal or sea turtle listed as endangered or threatened on SARA Schedule 1

Project Component or Activity	Potential Environmental Effects	Residual Environmental Effects Summary Descriptors						
		Nature / Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Certainty
Presence and Operation of Drilling Installation	• Change in mortality or injury (underwater noise)	A	L-M	PA-LSA	S-M	R	R	M

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality							
Drilling and Associated Marine Discharges	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality • Change in health (contaminants)	A	L	L-PA	S	R	R	H
Formation Flow Testing with Flaring	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality • Change in health (contaminants)	A	N-L	L-PA	S	S	R	H
Wellhead Decommissioning	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality	A	N-L	L-PA	S	S	R	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys	• Change in mortality or injury (underwater noise) • Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes)	A	N-L	L-LSA	S-M	S	R	H

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
	• Change in food availability or quality							
Geological, Geotechnical and Environmental Surveys	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality	A	N	L-PA	S	S	R	H
Supply and Servicing	• Change in habitat quality or use (behavioural effects) • Change in mortality or injury (vessel strikes) • Change in food availability or quality	A	L	L-LSA	S	R	R	H

Evaluation of Significance

- Based on the nature and characteristics of the Project and the existing environment for this VC within the LSA and RSA, and with the planned implementation of mitigation, the Project is not likely to result in significant adverse effects on Marine Mammals and Sea Turtles.
- Although Project-related components, activities, and emissions may result in some localized, short-term interactions with individuals the number of individuals and areas that may be affected, and the temporary and reversible nature of these interactions, means that the Project will not have any overall ecological or population-level effects, and will not result in any detectable decline in overall abundance or changes in the spatial and temporal distributions of populations within the RSA.
- For SAR, the potential for interactions between individuals of these species and the Project is limited, and no identified critical habitat is present in the LSA or RSA. The Project will therefore not have implications for the overall abundance, distribution, or health of any such species nor its eventual recovery within the RSA. The Project is not predicted to result in significant adverse effects on marine mammal or sea turtle SAR.

NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY

KEY

Nature / Direction:

P	Positive
A	Adverse
N	Neutral (or No Effect)

Magnitude:

N	Negligible
L	Low
M	Medium
H	High

Geographic Extent:

L	Localized, In Immediate Vicinity of Activity
PA	Within Project Area
LSA	Within LSA
RSA	Within RSA or Beyond

Frequency:

O	Occurs once
S	Occurs sporadically
R	Occurs on a regular basis
C	Occurs continuously

Duration:

S	Short term (For duration of the activity)
M	Medium term (Beyond duration of the activity – weeks or months)
L	Long term (Beyond duration of the activity – years)
P	Permanent (Recovery unlikely)

Reversibility:

R	Reversible (Will recover to baseline)
I	Irreversible (Permanent)

Certainty in Predictions:

L	Low level of confidence
M	Moderate level of confidence
H	High level of confidence
N/A	Not Applicable

5.4 Special Areas

Changes to the environment resulting from offshore oil and gas activities and their potential effects on identified Special Areas may be both direct and indirect in nature and cause. The conduct of oil and gas exploration activities directly within or near such areas may have adverse implications for these locations and their important and defining ecological and socio-cultural characteristics. These interactions may occur through the possible presence of oil and gas exploration equipment, personnel, and activities within the Special Area in question, as well as the associated emissions and discharges from Project activities. Biophysical effects resulting from oil and gas or other human activities within the RSA may also "spread" to adjacent Special Areas by affecting the marine fish, birds, mammals, or other environmental components that move to and through these areas. Any resulting decrease in the real or perceived integrity of these areas in the short or long term may also affect their ecological and/or societal importance, use and value.

As a result of these identified environmental interactions, issues identified in the EIS Guidelines and concerns raised through consultation and engagement, the assessment of Project-related environmental effects on Special Areas is focused on the following potential environmental effects:

- Change in Environmental Features and/or Processes
- Change in Human use and/or Societal Value

5.4.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 11.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

Project exploration activities will occur in an offshore marine area that is more than 300 km from the shoreline of Eastern Newfoundland. These planned Project components and activities will therefore not occur within, or otherwise interact directly with, any of the existing provincially-defined Special Areas, such as provincial ecological reserves, parks and protected areas and historic sites. Likewise, the Project will not have a direct interaction with most federally designated areas (i.e., marine protected areas, fisheries closures within Canada's EEZ, migratory bird sanctuaries, national parks and historic sites). International designations such as Important Bird Areas will also not be directly affected by the Project. These areas, most regularly used by humans for recreation, subsistence or tourism activities, are located in coastal and onshore areas.

The Project Area – Northern Section overlaps with portions of one EBSA, three VMEs and eight NAFO FCAs, none of which has associated prohibitions of offshore exploration activities. In particular, the Sackville Spur (6) FCA, Northern Flemish Cap (9) FCA, Northwest Flemish Cap (12) FCA, Sackville Spur VME, and Northern Flemish Cap VME overlap EL 1141 and 1142. In addition, a number of Special Areas (EBSAs, VMEs, NAFO FCAs and PRMAs) are located in the general vicinity, some within approximately 17 km of the Project Area / LSA boundary. These areas are not regularly used by humans but are valued for their biological and ecological characteristics and their importance for human activities such as the fishing industry.

The Project Area – Southern Section overlaps with the same EBSA, two VMEs and one NAFO FCA, which have no prohibitions of oil and gas exploration activities. Similar to the Northern Section, there

are also various other VMEs and FCAs, and to a lesser extent EBSAs, located in the general vicinity of the Project Area – Southern Section and one is within 10 km.

Potential vessel and aircraft traffic routes to the Project Area – Northern Section cross an EBSA, two VMEs and an FCA, while those to the Project Area – Southern Section cross two EBSAs one of which is also crossed by routes to the Northern Section.

The overall and defining environmental features and characteristics of the Northeast Shelf and Slope EBSA and the five VMEs – Sackville Spur, Northern Flemish Cap, Northeast Shelf and Slope (within Canadian EEZ), Beothuk Knoll and Southern Flemish Pass to Eastern Canyons – that overlap with the Project Area (including ELs 1135, 1141, and 1142) will not be adversely affected by the Project. The small environmental footprints and short-term nature of the planned exploration activities will mean that activity will occur at any one location for a short period of time. Moreover, the implementation of the various mitigation measures outlined throughout this EIS will serve to help address any direct or indirect potential environmental effects that may have implications for overlapping or adjacent Special Areas.

The Project Area also overlaps with portions of eight FCAs, including the Sackville Spur (6), Northern Flemish Cap (7, 8, 9), Northwest Flemish Cap (10, 11, 12) and Flemish Pass / Eastern Canyon (2), which intersect with ELs 1141, and 1142. These areas have been designated as such to protect important and sensitive benthic components and habitats from further disturbance due to certain types of bottom-dragging fishing activity, but their designations as such do not prohibit petroleum exploration activities in these areas. As discussed in Chapter 2 of the EIS, the planned drilling and associated activities will be characterized by a relatively small and temporary footprint, with mitigation measures planned to reduce potential effects the marine benthic environment. In particular, a pre-drill coral survey will be undertaken to determine if corals/sponges are present within the potential zone of influence as predicted by the drill cuttings model. Many of the other offshore survey activities that are planned to be undertaken as part of this Project will not result in any direct contact with the seabed, and will therefore not physically disturb benthic animals or their habitats. Any seabed geological, geochemical or geotechnical sampling activities will likewise have a short duration, and those which involve contact with the seabed will have a small footprint.

Notwithstanding the overall size and extent of the Project Area itself, all exploration drilling activity carried out as part of this Project will occur within the boundaries of an EL, as currently defined in Section 2.0.

The offshore vessel and aircraft activity within the Project Area and to and from Eastern Newfoundland will be generally in keeping with, and may make a relatively minor contribution to, the overall marine vessel activity occurring in the region for many years. Supporting vessels that are involved in Project activities will travel in an essentially straight line between a drilling installation operating within an EL in the Project Area and the established supply facility in Eastern Newfoundland, recognizing that specific routes may vary at times based on the location of the active drilling installation(s) and to avoid sea-ice. The planning and conduct of Project-related vessel traffic will be undertaken in consideration of these factors, relevant regulatory requirements, and through established cooperative processes that involve discussions and communications between the oil and gas sector, fishing industry and other ocean users.

The changes associated with Project components and activities are predicted to be neutral to adverse, negligible to low in magnitude, localized and within the Project Area, short to medium term duration, occurring sporadically to regularly in frequency, and reversible, with a high level of confidence. As

described for the biophysical VCs (Sections 5.1 to 5.3 above), the Project is not expected to result in significant adverse effects upon marine fish, birds, mammals, sea turtles, species at risk or their habitats. It will therefore not adversely affect the ecological features, processes and integrity of any marine or coastal locations that are designated as Special Areas, nor their human use and societal value.

5.4.2 Implications of the Addition of EL 1134

Table 5.6 below provides a summary of the minimum distance between the boundaries of EL 1134 and the various special areas identified and mapped in Section 4.2.4 above.

Planned Project activities – including any within EL 1134 – will occur in an offshore area that is located hundreds of kilometres from shore. They will therefore not occur within, or otherwise interact directly with, any of the existing provincial or federal Parks, Ecological Reserves, Wildlife Reserves, Marine Protected Areas, Migratory Birds Sanctuaries, Important Birds Area or other locations that have been designated as protected on or around the Island of Newfoundland on in Labrador.

EL 1134 does, however, overlap with several identified protected or sensitive areas in the offshore environment, as illustrated in the Figures provided earlier in Section 4.2.4. These include the Southern Flemish Pass to Eastern Canyons VME, the Flemish Pass / Eastern Canyons NAFO FCA and the Slopes of the Flemish Cap and Grand Bank UN Convention on Biological Diversity EBSA.

There are no known prohibitions of marine activities such as those being proposed as part of this Project within these special areas, with the Project having little or no potential to result in adverse environmental effects upon these areas (see effects assessment in Chapter 11 of the original EIS). As described for the various preceding biophysical VCs, the Project is not expected to result in any significant adverse effects upon marine fish, birds, mammals, sea turtles or their habitats. It will therefore not adversely affect the ecological features, processes and integrity of any marine or coastal areas, including the protected and sensitive areas that are part of this VC. The implementation of the various environmental protection measures and procedures outlined throughout the original EIS, including those which are designed to avoid or reduce Project-related discharges and/or disturbances and their associated environmental effects, will also serve to help address any direct or indirect potential effects on overlapping or adjacent protected and sensitive areas. All of the mitigation measures and commitments outlined in the EIS would remain applicable and will continue to be implemented and adhered to by ExxonMobil in planning and implementing this Project, including the planned activities within EL 1134

This proposed amendment (inclusion of EL 1134 Project Area extension) therefore does not change the results of the environmental effects assessment for this VC (Table 5.7), and the Project is still not likely to result in significant adverse environmental effects on special areas.

Table 5.6 Special Areas: Summary of Minimum Distances from EL 1134

Special Area	Minimum Distance (km)
Marine Protected Areas (MPAs) and Areas of Interest (AOI)	
Eastport – Duck Islands MPA	512
Eastport – Round Island MPA	517
Laurentian Channel AOI	733
Gilbert Bay	861

Special Area	Minimum Distance (km)
Marine Refuges	
Northeast Newfoundland Slope Closure	98
Funk Island Deep Closure	473
Hawke Channel Closure	723
Canadian Fisheries Closure Areas (FCAs) within the EEZ	
Eastport Peninsula Lobster Management Area	498
Funk Island Deep Box	473
Hawke Channel	723
Lobster Area Closures	
Mouse Island	666
Glover's Harbour	655
Gander Bay	587
Gooseberry Island	501
Penguin Islands	748
Snow Crab Stewardship Exclusion Zones	
Crab Fishing Area 5A (2 zones)	435
Crab Fishing Area 6A (2 zones)	404
Crab Fishing Area 6B	385
Crab Fishing Area 6C	370
Crab Fishing Area 8A	393
Crab Fishing Area – 8BX	106
Crab Fishing Area 9A (2 zones)	492
Near Shore (2 zones)	367
Canadian Ecologically and Biologically Significant Areas (EBSAs)	
Newfoundland and Labrador Shelves Bioregion EBSAs	
Orphan Spur	280
Notre Dame Channel	475
Fogo Shelf	489
Grey Islands	593
Southern Pack Ice	Not Applicable
Refined PB/GB LOMA EBSAs	
Northeast Slope	72
Virgin Rocks	225
Lilly Canyon-Carson Canyon	165
Southeast Shoal	306
Eastern Avalon	367
Southwest Slope	485
Smith Sound	469
Placentia Bay	503
Laurentian Channel	706
Haddock Channel Sponges	523

Special Area	Minimum Distance (km)
St. Mary's Bay	477
Bonavista Bay	484
Baccalieu Island	374
Preliminary Representative Marine Areas (RMAs)	
Virgin Rocks	229
South Grand Bank Area	251
Northwestern Conception Bay	423
Southern Coast of Burin Peninsula and Southeastern Placentia Bay	618
Migratory Bird Sanctuaries (MBSs)	
Terra Nova	526
Île aux Canes	722
Shepherd Island	728
Coastal National Parks and Historic Sites	
Cape Spear National Historic Site	414
Signal Hill National Historic Site	418
Ryan Premises National Historic Site	468
Castle Hill National Historic Site	516
Terra Nova National Park	506
Coastal Provincial Ecological Reserves	
Witless Bay Seabird Ecological Reserve	427
Baccalieu Island Seabird Ecological Reserve	433
Mistaken Point Fossil Ecological Reserve	463
Funk Island Seabird Ecological Reserve	520
Cape St. Mary's Seabird Ecological Reserve	537
Lawn Bay Seabird Ecological Reserve (Middle Lawn, Swale, and Colombier Islands)	643
Fortune Head Fossil Ecological Reserve	660
Coastal Provincial Parks and Protected Areas	
Marine Drive Provincial Park Reserve	428
Chance Cove Provincial Park	449
Dungeon Provincial Park	467
Bellevue Beach Provincial Park Reserve	499
Gooseberry Cove Provincial Park	527
Windmill Bight Provincial Park Reserve	521
Deadman's Bay Provincial Park	533
Frenchman's Cove Provincial Park	625
Dildo Run Provincial Park	611
Coastal Provincial Historic Sites	
Cape Bonavista Lighthouse Historic Site	468
Heart's Content Cable Station Historic Site	472
UN Convention on Biological Diversity EBSAs	
Labrador Sea Deep Convection Area	~1,000

Special Area	Minimum Distance (km)
Seabird Foraging Zone in the Southern Labrador Sea	250
Orphan Knoll	293
Slopes of the Flemish Cap and Grand Bank	Intersects
UN FAO Vulnerable Marine Ecosystems (VMEs)	
Northeast Shelf and Slope (within Canadian EEZ)	64
Sackville Spur	107
Northern Flemish Cap	130
Southern Flemish Pass to Eastern Canyons	Intersects
Beothuk Knoll	36
Deep Water Coral Area	138
Flemish Cap East	239
South East Shoal and Adjacent Shelf Edge / Canyons	295
Division 3O Coral Closure	524
NAFO Fisheries Closure Areas (FCAs)	
High Sponge and Coral Concentration Area Closures	
Tail of the Bank (1)	293
Flemish Pass / Eastern Canyon (2)	Intersects
Beothuk Knoll (3)	95
Eastern Flemish Cap (4)	203
Northeast Flemish Cap (5)	215
Sackville Spur (6)	109
Northern Flemish Cap (7)	154
Northern Flemish Cap (8)	174
Northern Flemish Cap (9)	151
Northwest Flemish Cap (10)	59
Northwest Flemish Cap (11)	21
Northwest Flemish Cap (12)	113
Beothuk Knoll (13)	73
Eastern Flemish Cap (14)	205
Seamount Closures	
Orphan Knoll Seamount	298
Newfoundland Seamounts	305
Fogo Seamounts (1)	634
30 Coral Area Closure	524
Important Bird Areas (IBAs)	
Quidi Vidi Lake	417
Witless Bay Islands	423
Cape St. Francis	422
Baccalieu Island	430
Grates Point	436
Mistaken Point	453

Special Area	Minimum Distance (km)
The Cape Pine and St. Shotts Barren	486
Placentia Bay	506
Terra Nova National Park	506
Funk Island	514
Cape Freels Coastline and Cabot Island	507
Cape St. Mary's	527
Wadham Islands and adjacent Marine Area	546
UNESCO World Heritage Sites (WHSs)	
Mistaken Point Ecological Reserve	461
Red Bay National Historic Site	830
L'Anse aux Meadows National Historic Site	767

Table 5.7 Environmental Effects Assessment Summary: Special Areas – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY

Summary of Existing Conditions and Ecological and Social Context – EL 1134

- A number of marine and coastal areas in Newfoundland and Labrador have been designated as protected under provincial, federal and/or other legislation or agreements due to their biological/ecological or socio-cultural characteristics and importance, and other areas have been formally identified as being special or sensitive through relevant processes and initiatives.
- Special areas designation or identification is often directly related to the existing physical and biological environment, including marine fish and fish habitat, marine and migratory birds and marine mammals and sea turtles (including species at risk) or socio-cultural values such as economy, culture, history or recreation, which are also covered in other sections.
- EL 1134 itself intersects with three identified special areas. These include the Southern Flemish Pass to Eastern Canyons VME, the Flemish Pass / Eastern Canyons NAFO FCA and the Slopes of the Flemish Cap and Grand Bank UN Convention on Biological Diversity EBSA.

Summary of Key Mitigation

- Mitigation measures that are designed to avoid or reduce the effects of planned Project components and activities on marine biota, habitats and other marine users will also reduce effects on to special areas
- Pre-drilling coral survey and risk assessment based on the NOROG guideline. Industry best practice approach in areas with potentially high concentrations of cold water corals

Project Component or Activity	Potential Environmental Effects	Residual Environmental Effects Summary Descriptors						
		Nature / Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Certainty
Presence and Operation of Drilling Installation	• Possible direct interactions with special areas • Possible effects through associated changes to the biophysical environment • Possible interactions (interference or disturbances) with other human activities	A	N-L	L-PA	S-M	R	R	H
Drilling and Associated Marine Discharges		A	N-L	L-PA	S-M	R	R	H
Formation Flow Testing with Flaring		N	-	-	-	-	-	H
Wellhead Decommissioning		A	N-L	L	S	S	R	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys		A	N-L	L-PA	S	S	R	H
Geological, Geotechnical and Environmental Surveys		N	-	-	-	-	-	H
Supply and Servicing		N	-	-	-	-	-	H

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY		
Evaluation of Significance • Oil and gas exploration activities are not prohibited within special areas that overlap with the Project Area. • For the various special areas that overlap with the Project Area (offshore and associated vessel traffic routes), the overall and defining physical, biological, and socioeconomic environments within these areas will not be adversely affected by the Project. NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.		
KEY Nature / Direction: P Positive A Adverse N Neutral (or No Effect) Magnitude: N Negligible L Low M Medium H High Geographic Extent: L Localized, In Immediate Vicinity of Activity PA Within Project Area LSA Within LSA RSA Within RSA or Beyond	Frequency: O Occurs once S Occurs sporadically R Occurs on a regular basis C Occurs continuously Duration: S Short term (For duration of the activity) M Medium term (Beyond duration of the activity – weeks or months) L Long term (Beyond duration of the activity – years) P Permanent (Recovery unlikely) Reversibility: R Reversible (Will recover to baseline) I Irreversible (Permanent)	Certainty in Predictions: L Low level of confidence M Moderate level of confidence H High level of confidence N/A Not Applicable

5.5 Indigenous Communities and Activities

A key focus of the EIS has been assessing and evaluating the potential for the Project, and the various changes to the environment that may be associated with it, to interact with and affect Indigenous communities and their activities, including each of the socio-cultural aspects identified in Section 5(1)c of CEAA 2012. This VC also relates to and overlaps with other components of the biophysical and socioeconomic environments, including several of the other VCs being considered in this assessment. Potential effects to Indigenous communities and their activities may, for example, result from Project-related changes in air quality and noise levels (Section 2.9 of the EIS), in the availability and quality of marine resources and other components of the biophysical environment (Chapters 8-11 of the EIS), and other human components and activities (Chapter 13 of the EIS).

The presence of drilling installations and the conduct of these exploration activities is not anticipated to interact directly with or adversely affect Indigenous Communities and Activities, as the Project Area is located hundreds of kilometers from the nearest community. Indirect effects may occur if the Project adversely affects fish and wildlife, as these biophysical effects may in turn reduce the availability or quality of such resources and their use for traditional purposes.

As a result of these identified environmental interactions, issues identified in the EIS Guidelines and concerns raised through engagement, the assessment of Project-related environmental effects on Indigenous communities and their activities is focused on the following potential environmental effects:

- Change in Health and Socioeconomic Conditions
- Change in the Current Use of Lands and Resources for Traditional Purposes
- Change in Physical and Cultural Heritage and Change in any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological or Architectural Significance

5.5.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 12.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

In general, Project components or activities that would result in possible restricted access to lands and resources, possible emissions to the environment, or other disturbances have the potential to (directly or indirectly) affect Indigenous communities and their activities where these occur within or near the Project Area and its expected environmental zone of influence (LSA).

Most Project-related activities will take place in an offshore marine environment, hundreds of kilometres from land and any Indigenous community. Project-related emissions and discharges and environmental interactions will be localized and short-term in nature (Chapters 8-11 and 13 of the EIS), and are unlikely to extend to or affect the physical or social health and well-being or other socioeconomic conditions of Indigenous communities.

The components and activities that comprise this Project (and the LSA) will be located a considerable distance (hundreds of kilometers) from Indigenous communities, and from the traditional territories associated with each of these groups. The Operator is not aware that these or other Indigenous groups assert Aboriginal or Treaty rights or otherwise undertake traditional activities within or near the Project

Area and LSA, pursuant to Section 35 of the *Constitution Act, 1982*. Although fishing enterprises associated with several of these organizations undertake commercial fishing activity for various species within NAFO Divisions that overlap parts of the Project Area, it is understood that most of these organizations (including those in Newfoundland and Labrador) undertake fishing activities off Eastern Newfoundland through commercial licences issued by the federal government under the *Fisheries Act* and its associated *Aboriginal Communal Fisheries Licencing Regulation*, as well as other government policies and strategies that are designed to involve Indigenous groups in commercial fisheries in Canada. As "traditional use" is (as outlined above) generally understood to mean activities that have been exercised (and are being exercised) by an identifiable Indigenous community since before European contact or control of a specific area, these contemporary, commercial land and resource use activities within the LSA may not be considered traditional in that they are not a continuation of ancestral activities that took place historically within this area offshore Eastern Newfoundland and Labrador. The Project, including its planned components and activities and potential vessel and aircraft traffic routes, and the environmental emissions / disturbances and associated environmental changes resulting from these (as defined through the LSA), will therefore not directly interfere with or otherwise interact with the current use of lands and resources for traditional purposes by Indigenous communities. The Project will not have adverse effects on such activities as they do not occur within or near the LSA at any time of the year.

The environmental effects analysis also indicates there is limited potential for marine associated species that are known to be used by the identified Indigenous groups to occur within the Project Area / LSA prior to moving to any area of traditional use (e.g., Atlantic salmon (various populations)). The implementation of the mitigation measures outlined throughout this EIS will reduce direct or indirect potential effects on these resources. The Project will not have an adverse effect on the availability or quality of resources that are currently used for traditional purposes by Indigenous groups to a nature and to a degree that would alter the nature, location, timing, intensity or value of these activities or the health or heritage of any Indigenous community.

The Project Area and LSA are not known to contain resources of historical, archaeological, paleontological, or architectural significance, and given its location far offshore Eastern Newfoundland, are not likely to contain such resources or materials that are relevant to and valued by Indigenous groups. Based on the nature, location, extent and duration of planned Project activities and the associated emission and discharges, the Project will not interact with nor adversely affect physical and cultural sites, including structures, sites, or things of historical, archaeological, paleontological, or architectural significance.

5.5.2 Implications of the Addition of EL 1134

EL 1134 is again located entirely within the Project Area (and thus the surrounding LSA and RSA) considered in the original EIS, and any planned Project related activities in this area will likewise not occur in or near any Indigenous communities or areas of traditional activity. The closest Indigenous community (the Miawpukek First Nation Reserve located at Conne River, Newfoundland) is, for example, nearly 650 km from the boundaries of EL 1134. The planned inclusion of EL 1134 therefore does not increase or otherwise change the potential for, or nature or intensity of, the Project's potential interaction with Indigenous communities or activities.

The environmental effects analysis in presented in the EIS (Chapter 12) has also indicated that few of the marine associated resources (species) that are known to be used by these Indigenous groups migrate through the Project Area / LSA and are thus likely to be affected by Project activities and

disturbances, and the implementation of the various mitigation measures and procedures outlined throughout the EIS will serve to further address direct or indirect potential effects on these resources. There is almost no potential for the availability or quality of resources that are currently used for traditional purposes by Indigenous groups to be reduced or negatively affected in other ways as a result of the Project, especially to a nature and to a degree that would alter the nature, location, timing, intensity or value of these activities or the health or heritage of Indigenous peoples. This conclusion does not change with the planned inclusion of Project activities within EL 1134.

This proposed amendment (inclusion of EL 1134) therefore does not change the results of the environmental effects assessment for this VC (Table 5.8), and the Project is still not likely to result in significant adverse environmental effects on Indigenous communities and activities.

Table 5.8 Environmental Effects Assessment Summary: Indigenous Communities and Activities – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY	
Summary of Existing Conditions and Ecological and Social Context: EL 1134 • There are no communities or other aspects of the physical / cultural heritage and other socioeconomic components and activities of any Indigenous groups located within or near the Project Area / LSA, including EL 1134 • Other past and on-going projects and activities in Eastern Canada have, to varying degrees, interacted with and affected Indigenous communities and activities, depending on their location, nature, and scale in relation to the communities, activities and other components and interests of individual groups. • The description of the socioeconomic characteristics of these Indigenous communities provided in the EIS inherently reflects any such past and on-going activities and effects	**Summary of Key Mitigation** • Mitigation measures that are outlined elsewhere in this EIS will serve to avoid or reduce Project-related environmental emissions, disturbances and resulting environmental changes by reducing the nature, degree, extent and duration of these changes, and therefore reducing the potential for these to interact with and adversely affect the various components and activities that comprise this VC • A copy of the EA update will be sent to Indigenous groups and stakeholders identified in Chapter 3. The Operator will follow up with Indigenous groups and stakeholders on questions arising from the EA update • The Operator will continue to communicate with relevant Indigenous communities and representative organizations, through established and/or informal engagement processes, as required and requested. The specific nature, frequency, subject matter and format of such future engagement will be determined in discussion with the Indigenous organization and outlined in an Indigenous Communities Fisheries Communication Plan

Project Component or Activity	Potential Environmental Effects	Residual Environmental Effects Summary Descriptors						
		Nature / Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Certainty
Presence and Operation of Drilling Installation	• Possible direct interactions (interference or disturbances) with Indigenous communities and their activities Possible effects through associated changes to the biophysical environment (health, resource availability or quality)	N	-	-	-	-	-	H
Drilling and Associated Marine Discharges	• As above	N	-	-	-	-	-	H
Formation Flow Testing with Flaring	• As above	N	-	-	-	-	-	H

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
Wellhead Decommissioning	• As above	N	-	-	-	-	-	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys	• As above	N	-	-	-	-	-	H
Geological, Geotechnical and Environmental Surveys	• As above	N	-	-	-	-	-	H
Supply and Servicing	• As above	N	-	-	-	-	-	H

Evaluation of Significance

- As there are no Indigenous communities or other aspects of the physical / cultural heritage and other socioeconomic components and activities of these groups located within or near the Project Area / LSA, and because the environmental changes and effects of the Project will not otherwise extend to and affect lands and resources that are currently used by these groups for traditional purposes, the Project will not have adverse effects on this VC.
- The planned components and activities associated with the Project will therefore not likely have significant adverse effects upon Indigenous communities and their activities.

NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.

KEY

Nature / Direction:

P Positive
A Adverse
N Neutral (or No Effect)

Certainty in Predictions:

L Low level of confidence
M Moderate level of confidence
H High level of confidence

5.6 Commercial Fisheries and Other Ocean Users

Potential interactions between offshore oil and gas exploration activities and Commercial Fisheries and Other Ocean Users can occur both directly and indirectly. Key potential interactions have been identified based on previous EAs conducted for similar projects and activities in the Canada-NL Offshore Area, including the Eastern Newfoundland SEA, and include:

- Possible damage to fishing gear, vessels, equipment, or other components as a result of direct interactions between Project equipment or emissions and these other ocean users
- Loss of access to important and established fishing grounds, or other areas of potential marine use, as a result of Project activities, and associated decreases in value (economic or otherwise) of these activities
- Possible indirect effects on Commercial Fisheries and Other Ocean Users due to biophysical effects on the presence, abundance, distribution, or quality of marine fish species or other resources
- Possible interference with scheduled government / industry research activities, including direct disturbance and/or effects on research results and associated management decisions

As a result of these identified environmental interactions, issues identified in the EIS Guidelines and concerns raised through consultation and engagement, the assessment of Project-related environmental effects on Special Areas is focused on the following potential environmental:

- Direct interference, resulting in a change in the distribution, intensity and/or functions (effectiveness / efficiency) of Commercial Fishing and Other Ocean Users
- Damage to fishing gear, vessels, and other equipment and components
- Change in the abundance distribution and quality of marine resources, resulting in a change in distribution, intensity and/or function (effectiveness / efficiency) of Commercial Fishing and Other Ocean Uses

5.6.1 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for this VC is provided in Section 13.3 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis.

5.6.1.1 Presence and Operation of Drilling Installation (Including Drilling and Associated Discharges)

The predicted environmental effects associated with the presence and operation of a drilling installation are primarily associated with environmental effects on fish, as discussed in Section 6.1 and Chapter 8 of the EIS. Project-related biophysical effects to fish or other marine resources have the potential to result in a subsequent change in the nature, quality, and/or value of one or more of the marine activities that depend upon them. However, disturbance to fish or other marine biota will therefore be localized and of short-term duration at any one location. It is therefore unlikely that marine resources will be affected or disrupted due to presence of the drilling installation and associated drilling activities in a manner and to a degree that would then translate into effects on the overall availability or quality of a marine resource, and thus, on the overall nature, intensity or value of related commercial activity.

The presence and operation of the drilling installation and the safety zone may require commercial fishers and other oceans users (e.g., research surveys) to reroute, relocate or reschedule their activities. Given the short-term and localized nature of these planned Project activities, and in consideration of the implementation of communication protocols, such as Notices to Shipping, and the relatively small footprint of the safety zone, it is predicted there will be no measurable adverse effects on other ocean users resulting from the presence and operation of the drilling installation and associated drilling activities.

With implementation of mitigation measures, the overall magnitude of the effect of drilling and marine-associated discharges on Commercial Fisheries and Other Ocean Users is anticipated to be low. The slight decrease in access to fishing or other ocean use will be localized, short-term, occurring continuously when drilling activities are scheduled, and reversible, with a high level of confidence. The localized and short-term nature of these disturbances at any one location and time during the Project considerably reduces the potential for detectable, adverse effects upon the commercial fishery and other ocean users.

5.6.1.2 Formation Flow Testing with Flaring

Formation flow testing, including associated flaring activity, is not expected to have adverse interactions with or effects on Commercial Fisheries and Other Ocean Users. When well fluids are sent through the wellbore and to the drilling installation for testing they are in a closed casing and does not interact with the surrounding marine environment. Likewise, flaring is not anticipated to have an interaction with commercial fishing activity and other ocean users, as it will take place above the drilling installation and will therefore not come into contact with commercial fishing activities or resources, nor have an interaction that would result in an effect on other ocean users.

5.6.1.3 Wellhead Decommissioning

The potential for gear damage from wellhead decommissioning is limited as the cut will be as close to the seafloor as possible (maximum height is 0.85 m) and the Operator will provide the locations for each decommissioned well to fishers and the Canadian Hydrographic Service, enabling mobile-gear and fixed-gear fishers to avoid these locations. Given the implementation of mitigation measures, the resulting residual environmental effects on Commercial Fisheries and Other Ocean Users is expected to be adverse, low in magnitude, localized, long-term in duration, continuous in occurrence, and reversible, made with a high level of confidence

5.6.1.4 Project-Related Surveys

The effects of underwater noise associated with Project-related surveys on marine fish species have been assessed in the Marine Fish and Fish Habitat VC and it was concluded that there would not be a significant residual environmental effect on marine fish species (including commercial fish species). Therefore, underwater noise is likely to have only limited indirect effects on catch rates and associated economic value for commercial fishers.

Some Project-related surveys that use geophysics, such as VSP and wellsite surveys, can result in direct interference with commercial fishing activity because the sound waves have the potential to interact with fishing gear (e.g., crab pots) that may already be set in an area where surveying is taking

place. However, due to the transient and localized nature of Project-related surveys, and their short-term duration, gear damage is not likely. Similarly, although there is a potential for interaction with research gear, and other vessels, the likelihood is low due to the nature of the Project activity.

In consideration of the limited temporal scope of Project-related surveys, and the implementation of mitigation, the residual environmental effects of Project-related surveys are predicted to be adverse, low in magnitude, localized, short-term in duration, occurring sporadically, and reversible, with a high level of confidence.

5.6.1.5 Supply and Servicing

The contribution of the Project to existing offshore supply vessel and helicopter traffic serving the offshore industry will be negligible, and will continue at approximately the same level as current traffic supporting the operators' ongoing exploration activities in the region. Residual environmental effects on Commercial Fisheries and Other Ocean Users associated with supply and servicing operations are predicted to be low in magnitude, localized, short-term in duration, occurring at regular intervals, and reversible, with a high level of confidence.

5.6.2 Implications of the Addition of EL 1134

EL 1134 is located in the south-central portion of the Project Area, overlapping with NAFO Unit Areas 3Li and 3Lt (Section 4.3.1), beyond the 200 nautical mile limit, and outside the more recent and intensive commercial fishing areas on the Banks and along the shelf The planned inclusion of Project activities in EL 1134 does not increase or otherwise change the nature or intensity of the Project's potential interaction with key fishing activities, locations and times (see previous Figures), its proximity to the "NAFO Fisheries Footprint" area (Figure 4.21), or to Industry-DFO fish survey stations (Figure 4.56). Given its location far offshore, this likewise does not result in new or increased potential interactions with other marine activities in or near the region, including sealing areas, aquaculture operations, recreational fishing locations, unexploded ordnances and legacy sites, and others.

As noted throughout the EIS, on-going coordination and effective and timely communication between offshore oil and gas operators and the fishing industry and other marine interests, through the various processes and measures described and committed to in the EIS, remain the best means for ensuring that such activities are carried out in a safe and environmentally responsible manner, avoiding or reducing potential adverse interactions between offshore exploration programs and other users of the marine environment. With the exception of the above described inclusion of EL 1134, no other aspect of the proposed Project is planned to change as compared to that which was described and assessed in the original EIS. All of the mitigation measures and commitments outlined in the EIS related to this VC remain applicable and would continue to be implemented and adhered to by ExxonMobil.

This proposed amendment (addition of EL 1134) therefore does not change the results of the environmental effects assessment for this VC (Table 5.9), and the Project is still not likely to result in significant adverse environmental effects on commercial fisheries and other ocean users.

Table 5.9 Environmental Effects Assessment Summary: Commercial Fisheries and Other Ocean Users – EL 1134

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY	
Summary of Existing Conditions and Ecological and Social Context: Project Area / LSA • A variety of commercial fishing activity for multiple fish species takes place within the Project Area / LSA and RSA, with the summer months usually being the times when offshore Newfoundland and Labrador experiences the most ocean use / activity. • Important commercial fisheries include those for snow crab and northern shrimp. Other commercial fisheries that occur in the area include those for clams, cockles, capelin, Greenland and Atlantic halibut, yellowtail flounder, and pelagic species such as swordfish and various species of tuna. • Recent decades have seen important and widespread changes in the fishing industry due to natural (climate change) and human (other anthropogenic activities), which have influenced the nature, intensity, distribution, and timing of fisheries into his region. • There are also possible future changes in the fisheries off Eastern Newfoundland, such as a possible resurgence of groundfish activities, which are relevant to the characteristics of the VC over the lifespan of this Project • EL 1134 overlaps with a portion of NAFO Division 3L, and specifically, with NAFO Unit Areas 3Li and 3Lt. • Fishing activity during the 2011 to 2015 period occurred generally within the April to December timeframe, with the highest landings by weight and value occurring in the April – July period.	**Summary of Key Mitigation** • Use of existing and common travel routes for vessels and helicopters will be used where possible and practicable • Low-level aircraft operations will be avoided where it is not required per Transport Canada protocols • Operational discharges will be treated prior to release in accordance with the OWTG and other applicable regulations and standards. • The selection and screening of chemicals to be discharged, including drilling fluids, will be in accordance with the Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands • During formation flow testing with flaring, produced hydrocarbons and produced water will be flared. If there is a large amount of produced water encountered, it will be treated in accordance with the relevant regulatory requirements prior to ocean discharge, or shipped to shore for appropriate disposal • Appropriate handling, storage, transportation, and on-shore disposal of solid and hazardous waste • Establishment of a safety zone around drilling installations in accordance with the Newfoundland Offshore Petroleum Drilling and Production Regulations SOR/2009-316 • Issuance of Notices to Shipping, Notice to Mariners (where appropriate) regarding planned Project activities • Ongoing communication with commercial fishers through One Ocean, FFAW-Unifor and seafood producers regarding planned project activities, including timely communication of drilling locations, safety zone, and decommissioned wellheads. This information will also be communicated to Indigenous fishers in accordance with the Indigenous Communities Fisheries Communication Plan • Ongoing communications with the NAFO Secretariat, through DFO as the Canadian representative, regarding planned Project activities, including timely communication of drilling locations, safety zone, and decommissioned wellsites • In accordance with the One Ocean “Risk Management Matrix Guidelines,” the need for a Fisheries Liaison Officer (FLO) and/or fisheries guide vessels during drilling installation movement from port to its offshore location will be determined in consideration of the guidelines. Use of a FLO during geophysical programs will also be determined in consideration of these guidelines • A single point of contact (SPOC) will be established during Project activities to facilitate communications between fishers and the Operator regarding gear loss/damage and other compensation matters • Develop and implement a compensation program for damages resulting from Project activities. This compensation program will be developed in consideration of C-NLOPB guidelines, including the Compensation Guidelines Respecting Damages Relating to Offshore Petroleum

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
		Activities (March 2002) and as revised. This program will outline compensation procedures for actual loss or damages to commercial fishers, including Commercial-communal fishers, attributable to the operator resulting from a spill or debris, or expenses incurred in taking remedial action. Actual loss or damage includes loss of income or future income; loss of hunting, fishing, or gathering opportunities; and costs and expenses incurred for action taken to remedy a situation involving a spill, including measure to control or clean a spill • The communication of suspended and/or abandoned wellsite locations to the appropriate authorities for inclusion on nautical charts for use by commercial fishers and other mariners • Contact DFO regarding timing and locations of planned DFO research surveys • Contact DND regarding timing of planned offshore military exercises						
Project Component or Activity	**Potential Environmental Effects**	**Residual Environmental Effects Summary Descriptors**						
		Nature / Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Certainty**
Presence and Operation of Drilling Installation	• Direct interference • Change in resource abundance, location, quality	A	L	L	S	C	R	H
Drilling and Associated Marine Discharges	• Damage to equipment • Change in resource abundance, location, quality	A	L	L	S	R	R	H
Formation Flow Testing with Flaring	• None expected	N	-	-	-	-		H
Wellhead Decommissioning	• Direct interference • Damage to equipment	A	L	L	L	C	R	H
Geophysical, Geohazard, Wellsite Seabed and VSP Surveys	• Direct interference • Damage to equipment • Change in resource abundance, location, quality	A	L	L	S	S	R	H
Geological, Geotechnical and Environmental Surveys	• Direct interference • Damage to equipment • Change in resource abundance, location, quality	A	L	L	S	S	R	H
Supply and Servicing	• Direct interference	A	L	L	S	R	R	H

ENVIRONMENTAL EFFECTS ASSESSMENT SUMMARY								
	• Damage to equipment • Change in resource abundance, location, quality							

Evaluation of Significance

- The Project is not likely to result in significant adverse environmental effects on Commercial Fisheries and Other Ocean Users. The establishment of a safety zone around the Drilling Installation may temporarily displace commercial fishers and other activities from accessing certain localized areas, but is unlikely to have an overall and detectable economic effect on any industry within the RSA.
- The implementation of standard mitigation measures for Commercial Fisheries and Other Ocean Users, such as gear damage compensation, establishment of a safety zone around the drilling installation, presence and active advice of a FLO as required, Notice to Shippers and Notice to Mariners, and other communications are expected to further reduce the potential for interactions and effects.

NOTE: The environmental effects assessment for accidental events is presented separately, in Chapter 15 of the EIS.

KEY

Nature / Direction:
- P Positive
- A Adverse
- N Neutral (or No Effect)

Magnitude:
- N Negligible
- L Low
- M Medium
- H High

Geographic Extent:
- L Localized, In Immediate Vicinity of Activity
- PA Within Project Area
- LSA Within LSA
- RSA Within RSA or Beyond

Frequency:
- O Occurs once
- S Occurs sporadically
- R Occurs on a regular basis
- C Occurs continuously

Duration:
- S Short term (For duration of the activity)
- M Medium term (Beyond duration of the activity – weeks or months)
- L Long term (Beyond duration of the activity – years)
- P Permanent (Recovery unlikely)

Reversibility:
- R Reversible (Will recover to baseline)
- I Irreversible (Permanent)

Certainty in Predictions:
- L Low level of confidence
- M Moderate level of confidence
- H High level of confidence

- N/A Not Applicable

6 CUMULATIVE ENVIRONMENTAL EFFECTS

As required under Section 19(1) of CEAA 2012 and specified in the EIS Guidelines, the EIS assesses and evaluates any cumulative environmental effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out, as well as the significance of these potential effects. The cumulative effects assessment for all VCs is presented in Chapter 14 of the EIS.

6.1 Summary of Cumulative Effects Assessment (EIS)

The cumulative effects assessment considers the overall (total) effect on the VCs as a result of any predicted effects resulting from the Project and those of other relevant projects and activities in the RSA. The cumulative effects assessment focusses upon the same set of VCs as those considered in the Project-specific analysis, as these represent the key components of the environment that may be affected by the Project, and thus, which it may contribute to cumulative effects upon. The spatial and temporal boundaries for the cumulative effects assessment are also consistent with those established for the Project-specific assessment (see LSA and RSA definitions, EIS Chapter 4), as these were defined to incorporate the likely geographic and temporal zones of influence of the Project and its effects, the overall distributions of the various biota and human activities that comprise the VCs, and the other physical activities that may affect the same individuals or populations.

Past and on-going projects and activities and their environmental effects are reflected in the existing (baseline) environmental conditions for each VC. The current condition of the VC as a result of natural and anthropogenic factors, and thus its overall sensitivity or resiliency to further change, has been considered throughout the effects assessments. The assessment considers how this existing environmental condition may be changed by the Project, and then, whether and how the effects of other on-going and future projects and activities would affect the same VCs through direct overlap in space and time and/or by affecting the same individuals or populations. The following other projects and activities are considered in the cumulative effects assessment for each VC as relevant: 1) Existing oil production projects (Hibernia, Terra Nova, White Rose and Extension, Hebron), 2) Offshore petroleum exploration programs (seismic, drilling and others), 3) Fishing activity, 4) Other marine vessel traffic, and 5) Hunting.

The assessment also included the consideration of mitigation measures to avoid or reduce potential environmental (including cumulative) effects, and evaluates the significance of predicted cumulative effects on each VC using the same criteria used for the Project-specific effects assessment.

6.1.1 Marine Fish and Fish Habitat (including Species at Risk)

Marine fish and their habitats in the Project Area, RSA and in the larger Northwest Atlantic are being affected by a variety of natural and anthropogenic factors and processes. These include past and on-going fishing activity, offshore petroleum exploration and production, general vessel traffic and other human activities (both planned and routine, as well as illegal activities and accidental events), as well as the effects of climate change and other natural and anthropogenic processes. These have collectively, and to varying degrees, influenced the presence, distribution and abundance of fish and invertebrate species in particular areas and times, as well as the overall size and health of fish populations and the availability and quality of their habitats.

Offshore exploration drilling and associated activities such as those that will comprise this Project may affect marine fish and fish habitat in various ways, including possible injury, mortality or behavioral effects due to noise or other disturbances in the marine environment, effects to benthic communities through the alteration of marine habitats and change in habitat quality from discharges or accidental events. Although the Project will interact with fish and their habitats within parts of the Project Area, it will entail a relatively minor, localized and short-term environmental disturbance at any one location, with various mitigation measures being implemented to avoid or reduce the magnitude, geographic extent and duration of any such effects.

While other oil and gas exploration and production activities have and will have similar effects on fish and fish habitat within their respective zones of influence, their EAs and/or associated EEM programs indicate that these have somewhat localized environmental effects. The planned and required distances between Project activities other oil and gas programs and fishing activities (due to EL boundaries and safety zones) will further decrease the potential for interactions between effects. This will reduce the potential for individuals and populations to be affected through multiple interactions with this Project and other activities in the marine environment, and for species to be affected simultaneously and repeatedly by multiple activities, and thus, for cumulative environmental effects to occur.

6.1.2 Marine and Migratory Birds (including Species at Risk)

The distribution, abundance and health of marine and migratory birds and their populations are often influenced by both natural phenomena such as weather, food availability and oceanographic variation, as well as human activities and their associated disturbances including hunting, fishing activity, vessel traffic, offshore structures and pollution. In addition to these local disturbances, migratory bird species may also be affected by a variety of activities and associated effects within their often very extensive ranges. Although the populations of most marine-associated bird species occurring off Eastern Newfoundland are considered stable overall, some species such as the Leach's Storm-petrel have seen declines in recent years.

Potential interactions with marine and migratory birds as a result of the Project relate primarily to possible attraction and/or disorientation of the birds around the drilling installation and vessels due to artificial light sources. Because any such interactions are anticipated to be minor and spatially and temporally limited, and given the typically wide variation in marine bird presence and distribution in space and time throughout this very large offshore area, the number of individuals affected by the Project is not expected to have population-level effects, nor to interact cumulatively with similar effects from other projects and activities in the region. The environmental zone of influence of each project and activity in the region is typically localized (especially with regards to the effects of lights and other such disturbances), often short-term, and very small compared with the total amount of habitat available in the region. This reduces the potential for individuals and populations to be affected repeatedly through multiple interactions with this Project, as well as the potential for, and degree and duration of, overlap between the effects of this Project and other activities in this marine environment.

6.1.3 Marine Mammals and Sea Turtles (including Species at Risk)

The potential effects of human activities on marine mammals and sea turtles include possible hearing impairment or permanent injury or mortality from exposure to loud underwater noise, as well as behavioural effects (avoidance) due to these or other disturbances, which may alter the presence, abundance and distribution of these species and their health, movements, communications, feeding and other activities. The migratory nature of most species and their overall sensitivity to certain types

of disturbance somewhat increases the potential for individuals to be affected by multiple environmental disturbances, and thus, for cumulative effects to occur. This is reflected in the fact that many species have been designated as being at risk or are otherwise of conservation concern.

Potential interactions with marine mammals and sea turtles as a result of this Project relate primarily to possible injury or disturbance (behavioural effects) from the noise, lights and possible waste materials associated with the drilling installation and other related vessel and aircraft traffic. Potential for Project-VC interactions is likely to be highly transient and temporary for individuals, especially in consideration of the large-scale daily and seasonal fluctuations in presence within the assessment areas and the alternative habitats available. Mitigation measures will be applied across a number of Project components and activities and will help prevent or reduce potential interactions with this VC.

Other on-going and future activities which may affect marine mammals and sea turtles in the RSA include the fisheries, general vessel traffic and other offshore oil and gas exploration and development activities. Based on previous studies, most potential effects as a result of these activities occur within relatively close proximity (several kilometers) of the source, although this propagation of underwater noise in the marine environment results in some potential for overlap and interactions between individual disturbances. Behavioural effects as a result of most such activities would however be temporary in nature, and this along with the known and likely spatial distribution of these activities will reduce the potential for, and degree and duration of, interaction or accumulation between the effects of the Project and other activities in the marine environment. Marine Mammals and Sea Turtles will therefore not likely be displaced from key habitats or during important activities, or be otherwise affected in a manner that causes adverse and detectable effects to populations.

6.1.4 Special Areas

Special Areas of various types are located off Eastern Newfoundland, including coastal and marine areas that have been designated as protected through legislated processes or formally identified through other initiatives. The current environmental conditions within these special areas reflect the occurrence and environmental consequences of past and ongoing anthropogenic activities and natural processes within and beyond their boundaries. In some cases, special areas are designated to help conserve the presently pristine nature of these areas, while in others their designation helps prevent further damage to already affected and thus sensitive environments.

Although the Project Area overlaps with a number of special areas off Eastern Newfoundland, there are no prohibitions of the types of activities being planned as part of this Project. Moreover, given the overall nature, scale and duration of the planned Project activities, the overall and defining biophysical and socioeconomic environments within these areas will not be adversely affected by it. While there is some potential for other types of human activities (such as oil and gas exploration or fishing activity) to have varying degrees of effect on the same special areas that may interact with this Project, most such activities result in a short-term disturbance within a relatively limited zone of influence, with applicable mitigation measures implemented avoid or reduce their environmental consequences. This reduces the potential for particular areas and their environmental characteristics to be affected simultaneously and repeatedly by multiple projects and activities, to a degree and duration that will affect their defining characteristics and overall integrity.

6.1.5 Indigenous Communities and Activities

Other past and on-going projects and activities in Eastern Canada have, to varying degrees, interacted with and affected Indigenous communities and activities, depending on their location, nature and scale in relation to the communities, activities and other components and interests of individual groups. The description of the socioeconomic characteristics of these Indigenous communities provided in the EIS inherently reflects such past and on-going activities and effects.

Given the nature, location and timing of the various activities and associated environment changes likely to occur as a result of this Project, it is not expected to have direct, adverse effects on Indigenous communities and activities. The effects analysis also indicates that few of the marine associated resources (species) that are known to be used by these Indigenous groups migrate through the Project Area / LSA and are thus likely to be affected by Project activities and disturbances. The Project will therefore not result in residual environmental effects on Indigenous communities and activities, and will therefore not result in or contribute to cumulative effects on this VC.

6.1.6 Commercial Fisheries and Other Ocean Users

Fisheries and other marine activities may be affected both individually and collectively by offshore oil and gas exploration and production, general marine traffic and other activities, each of which may result in direct disturbance, damage to equipment, effects on marine resources or other interactions, which may accumulate or interact on a regional scale. The extensive and dynamic nature of fishing and other marine activity throughout the region (in terms of locations, seasons, gear types and key species), and possible future changes in the fisheries off Eastern Newfoundland, makes it difficult to predict specific areas and times from year to year for both domestic and foreign activities, and thus, the potential for interactions between the effects of separate projects on these.

Although Project components and activities, including the associated safety zones, will temporarily reduce access for fishing and other activities in certain areas, such disturbances will be localized, short term, and reversible once Project activity ceases at a particular location. The potential for interference by offshore oil and gas installations and vessels as well as general marine traffic can be further mitigated through good communication and cooperation between industries, with fishing gear damage compensation initiatives being implemented as required. These mitigation measures will apply to the Project and other oil and gas activities in the region. This, along with the relatively localized and in most cases short-term duration of these disruptions, and the amount of alternative fishing areas available, mean that detectable, cumulative effects are unlikely.

6.1.7 Cumulative Effects Assessment Summary

The EIS (Chapter 14) concludes that Project is not likely to result in significant adverse cumulative environmental effects to either VC in combination with other projects and activities that have been or will be carried out. Moreover, the relative contribution of this Project to overall effects within the RSA will be low, and will not likely be perceptible. Mitigation and monitoring or follow-up programs identified as part of the Project-specific effects assessment (Chapters 8 to 13 in the EIS) would be applicable to cumulative effects, in that they are relevant to addressing the Project's potential contribution to cumulative effects in the region. No additional or revised mitigation, monitoring or follow-up is required or proposed related specifically to cumulative environmental effects. The follow up and monitoring plan as identified in Section 8.6 in the EIS and Chapter 9 of the Addendum will be followed.

6.2 Implications of the Addition of EL 1134

As noted in the EIS (Chapter 14), a key consideration in assessing the potential for – and the nature and characteristics of – any cumulative effects resulting from the Project in combination with these other projects and activities relates to the spatial and temporal distributions of these and their associated environmental disturbances, and in particular, the potential for the environmental zone of influence of the Project to overlap or otherwise interact with those of one or more of these other projects and activities.

Where information was available on the overall spatial and temporal characteristics of these other projects and activities, this was presented and considered in the cumulative effects assessment (see for example EIS Table 14.2). Any further, available information on the known and likely effects of these projects and activities (and especially, their spatial and temporal characteristics) was also presented in the VC-specific sections and tables in Chapter 14 (see for example Table 14.4, which summarizes the result of environmental effects monitoring [EEM] programs completed for the various production projects, as relevant to the cumulative effects assessment for fish and fish habitat). Figures 14-1 and 14-2 of the EIS provide a general overview of these other projects and activities where possible. These Figures focussed on those which could be mapped in order to show their spatial relation to the Project Area and the various ELs that comprise the Project, for general context. This included the four existing petroleum projects (see list above) as well as the available (and most recent as of EIS writing) commercial fisheries mapping available from Fisheries and Oceans Canada (DFO).

For further illustration, Table 6.1 below provides a summary of the distances between those other projects and activities that have defined (or at least somewhat definable) locations and distributions and each of the ELs that comprise the Project, including EL 1134. As shown, EL 1134 (and thus any planned Project related activity within it) is not located any closer to these other projects and activities in the RSA than the various ELs that formed part of the original scope of the Project as assessed in the EIS.

Table 6.1 Other Projects and Activities Considered in the Cumulative Effects Assessment and Their Distances from the Project

Project / Activity	Minimum Distance to Project ELs (km)						
	EL 1134	**EL 1135**	**EL 1139**	**EL 1140**	**EL 1141**	**EL 1142**	**EL 1137**
Hibernia Oilfield	125	110	284	339	312	261	8
Terra Nova Oilfield	106	118	298	351	322	264	38
White Rose Oilfield and Extension Project	67	71	251	304	273	214	37
Hebron Oilfield	105	112	292	346	316	259	30
Offshore Petroleum Exploration – Drilling	Unknown (see below)						
Offshore Petroleum Exploration – Geophysical and Other Exploration Activities	Unknown (see below)						

Project / Activity	Minimum Distance to Project ELs (km)						
	EL 1134	EL 1135	EL 1139	EL 1140	EL 1141	EL 1142	EL 1137
Fishing Activity	67	12	123	180	156	118	100
Other Marine Vessel Traffic*	22	Intersecting	6	31	47	3	Intersecting
Hunting Activity (Coastal Areas)	413	372	463	510	514	483	270

*There are no defined / designated shipping lanes offshore Newfoundland and Labrador

As noted in the table above, however, a key activity that occurs in the RSA for which there is little or no specific information available on the locations and times of planned activities is other offshore seismic and drilling programs. For these projects, the only known information available is from the EA related documents submitted for these projects by their respective proponents under CEAA 2012 and/or the Canada-Newfoundland and Labrador Offshore Petroleum Board's (C-NLOPB's) EA review processes (see EIS Table 14.2, with associated links to these projects' EA documentation at http://www.cnlopb.ca/assessments). This EA information was accessed and reviewed in some detail as part of the preparation of the cumulative effects assessment for the EIS. These EAs are, however, typically conducted for multi-year programs (typically up to 10 years in duration) with relatively large overall project and EA study areas. In particular, at the time of EA preparation there is typically little if any specific information available and reported on the planned location and timing of these exploration activities on which to base a detailed analysis of same as part of a cumulative effects assessment. Any available EA Updates for these projects were also accessed and reviewed, but current documents are not available for all such projects, and in any event, these provide information up to 2018 at the latest and do not typically include detailed and specific information on the location of planned survey or drilling activities in any year.

The EIS therefore recognizes that other oil and gas exploration and production activities have had and will have similar effects on the VCs within their respective zones of influence, and the cumulative effects assessment conservatively assumes in all cases that there is at least some potential for interaction between the effects of multiple, independent projects and activities in the region (see for example, EIS Table 14.5). The cumulative effects assessment also notes, however, that the EAs and/or associated EEM programs for such oil and gas related projects indicate that these have somewhat localized environmental effects, which in the case of exploration activities are short-term and transient in nature at any particular location. This, along with the planned and required distances between Project activities and other oil and gas programs (due to EL boundaries and safety zones, as discussed in some detail in the EIS), will help to decrease the potential for interactions between the effects of multiple activities, and thus, for cumulative environmental effects to occur.

In terms of the potential processes of accumulation and interaction that may lead to cumulative effects, the cumulative effects assessment also recognizes that while there is limited potential for the direct "footprint" or environmental zones of influence of many Project-related disturbances or effects to accumulate with those of other projects and activities, the widespread and often migratory nature of some marine-associated species and/or human activities increases the potential for individuals /

populations and activities to be affected by multiple perturbations, and therefore, for cumulative environmental effects to occur. At the same time, many (especially benthic invertebrate) species are relatively immobile or sessile, which limits the potential for interactions with multiple projects and disturbances, while mobile fish, birds, marine mammals and sea turtle species that have higher potential to interact with multiple projects also have higher capability for avoidance of potential effects. Therefore, the typical movement patterns and ranges of many marine species, coupled with the availability of alternative habitats during short periods and localized extents of Project-related disturbance, limits the potential for cumulative effects to occur. Of particular concern, however, is the potential for displacement from key habitats or disruption during key activities over extended areas or periods, such that these species are (cumulatively) affected in a manner that causes negative and detectable at a population or regional level.

With the exception of the above described inclusion of EL 1134, no other aspect of the proposed Project is planned to change as compared to that which was described and assessed in the original EIS. All of the mitigation measures and commitments outlined in the EIS related to this VC remain applicable and would continue to be implemented and adhered to by ExxonMobil.

This proposed amendment (addition of EL 1134) therefore does not change the results of the cumulative effects assessment for any VC, and the Project is still not likely to result in significant adverse cumulative environmental effects in combination with other projects and activities that have been or will be carried out.

7 ACCIDENTAL EVENTS

During an offshore exploration drilling project, an accidental event or malfunction is an unlikely, although potential, occurrence. Environmental incidents that may be associated with offshore drilling activities include potential subsurface blowouts, as well as spills of hydrocarbons or other substances from a drilling installation or associated supply and support vessel activities. As documented in Chapter 15 of the EIS, the probability of a large oil spill occurring is extremely low and analyses of international data related to blowouts that have occurred, indicate that it is likely that the incident would be resolved in two days or less with only a small chance of it lasting more than two weeks. The modelling conducted for this study shows that the probability of shoreline oil exposure was very low as fewer than 1 percent of the annual scenarios reached the shoreline. The predicted contact occurred on the Avalon Peninsula and south coast near Burgeo but only a very small portion of the cumulative trajectory was predicted to move in this direction. Only, 0.01 percent of the modelled release volume was predicted to make contact with the shoreline and only after 116 days, without response measures, and would be highly weathered.

This Accidental Events Section of the EIS Addendum is presented as a focused description of the planned changes to the Project (through the addition of EL 1134) as they would relate to accidental events scenarios that are specific to EL 1134 and a discussion and analysis of any implications of this for the content and findings of the EIS. In the interests of efficiency and brevity, it does not repeat all of the detailed information and analysis provided in the EIS and EIS Addendum (IR Responses). Relevant information in the EIS that are not repeated here but give further context to the EL 1134 specific changes to the project include:

- C-NLOPB specific plans and guidelines and regulatory oversight in general (Section 15.0 of EIS)
- Spill prevention and response mechanisms (Section 15.1 of EIS)
- Details of potential accidental event scenarios other than those presented in the EL 1134 specific modeling (Section 15.2 of EIS)
- Spill risk and probabilities (Section 15.3 of EIS)
- Literature review of the effects of oil and dispersants on relevant VCs (Section 15.5 of EIS)

7.1 Summary of EL 1134 Specific Modeling

In order to assess the fate and behavior of potential spill scenarios, RPS (2018, see Appendix B) conducted trajectory and fate modelling related to potential (hypothetical, example) exploration example wells at EL 1134. Modelling and analyses were performed to help support and give context to the accidental events effects assessment reported in this chapter. To be conservative, the oil spill modelling did not include consideration of mitigations such as response procedures.

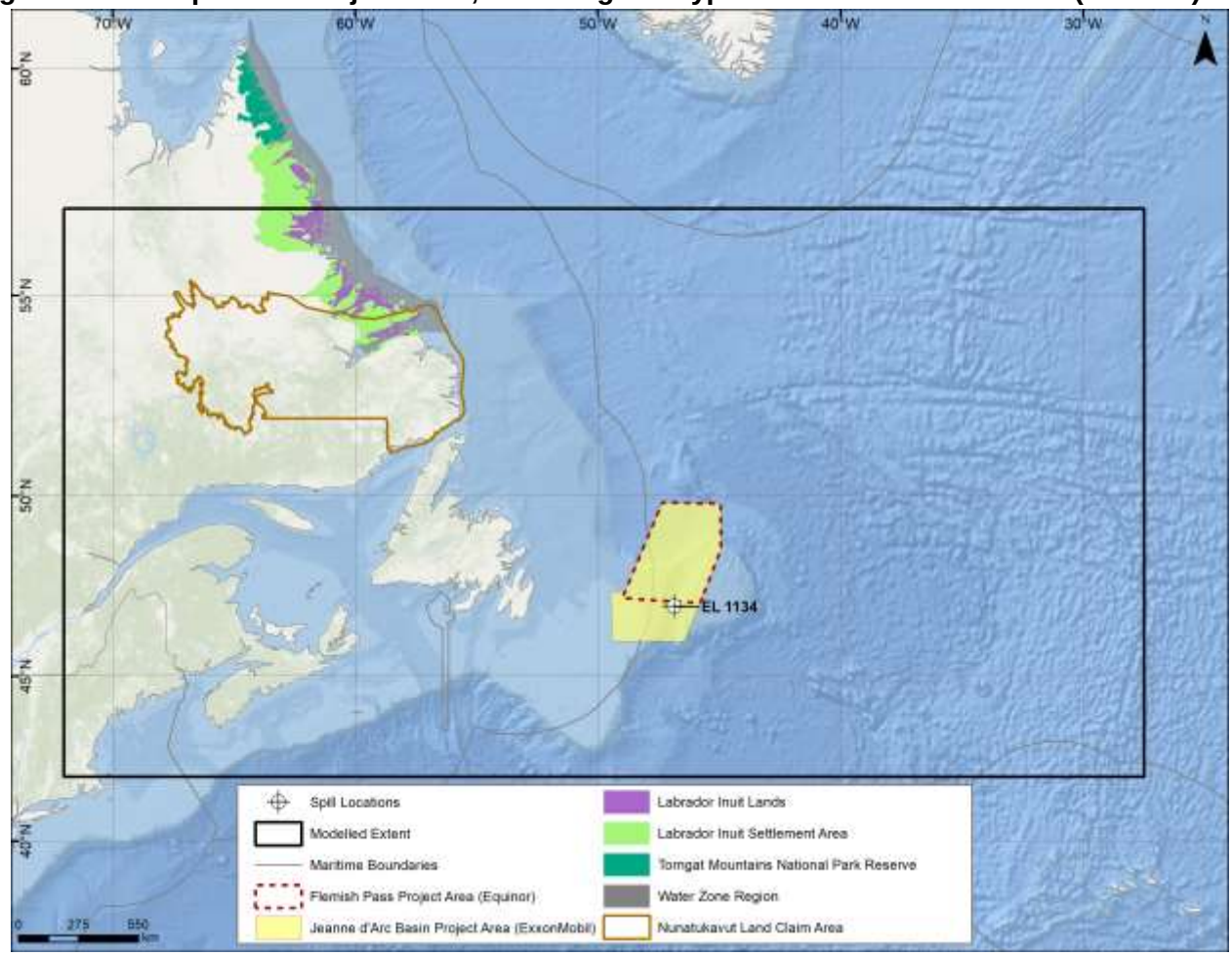
7.1.1 Modelling Approach

Several scenarios were modelled as listed in Tables 7.1. Modelling was performed at a representative site that was located approximately 400 km east of the Newfoundland Coast, with exploratory drilling anticipated in waters that range in depth from <80 m to >4,000 m. Hypothetical continuous unmitigated subsurface blowout scenarios of Ben Nevis crude oil were developed at a single location in the EL 1134 site (Figure 7.1). The water depth is approximately 1,175 m for the hypothetical release location modelled within EL 1134.

Table 7.1 Modelled Spill Scenarios for EL 1134

Depth of Release	Release Duration	Release Rate (bbl/d)	Model Duration	Number of Model Runs	Released Product	Release Type	Release Volume (bbl)
1,175	30 days	37,800	45 days	179	Ben Nevis	Subsurface	1,134,000
1,175	113 days	37,800	160 days	171	Ben Nevis	Subsurface	4,271,400
Surface	Instantaneous		30 days	1	Marine Diesel	Batch Spill	100 L
				1		Batch Spill	1,000 L
*179 model simulations consisted of 88 winter and 91summer for each site *171 model simulations consisted of 80 winter and 91 summer for each site							

Figure 7.1 Map of the Project Area, including the hypothetical release location (EL 1134)



Both a stochastic and deterministic modelling approach was taken as detailed in the original EIS. In summary, stochastic modelling provides a probabilistic view of the likelihood that a given region might be exposed to released hydrocarbons over specified thresholds given the range of possible environmental conditions that may occur within and across multiple years. A deterministic analysis then provides a view of the time history of the specific movement and behavior of released product from a given (e.g., representative) individual release. Together, these methods provide a comprehensive analysis of both the likelihood and degree of potential exposure. Both modelling results are discussed below and give complementary information that helps to frame the potential exposure regime for the environmental effects assessment of the hydrocarbon spill scenarios.

7.1.2 Model Results

The results from both the subsurface topside releases (batch spills) and blowouts presented below illustrate the spatial extent of the water surface and shoreline oil contamination. Stochastic results include:

- The probability footprints for surface oil in excess of 0.04 µm;
- The corresponding minimum time for surface oil to exceed a threshold of 0.04 µm;
- The probability footprints of shoreline oil in excess of 1 g/m²; and
- The corresponding minimum time for surface oil to exceed a threshold of 1 g/m².

Representative deterministic scenarios (i.e., single trajectory) were identified from each set of stochastic subsurface blowout results. Individual scenarios were selected based upon the length of shoreline contacted with oil based upon a highly conservative socio-economic threshold of shore oil average concentration >1.0 g/m^2.

Figures and Tables that are directly referred to in the following section or representative of the worst case results are presented below. For stochastic results, the maps with the largest areas in terms of probabilities are the winter probabilities of surface oil thickness and shoreline contact (113 days). For deterministic results, the 95th-98th percentile for surface oil thickness. However, details and maps of all runs and scenarios are available in Appendix B.

7.1.2.1 Subsurface Blowout Results

Stochastic Results for Blowout Scenarios

The probabilities of oiling were based on a statistical analysis of the ensemble of individual trajectories modelled for each release scenario. Stochastic figures again do not imply that the entire contoured area would be covered with oil in the event of a release, nor do they provide any specific information on the quantity of oil in a given area. Rather, these figures denote the probability of oil exceeding socioeconomic effects thresholds over all stochastic runs (179 to 171 individual releases for the annual scenario), at all modelled time steps (over 45 or 160 days), and for each point within the modelled domain. Note that only probabilities of greater than or equal to one percent were included in the map output (Appendix B).

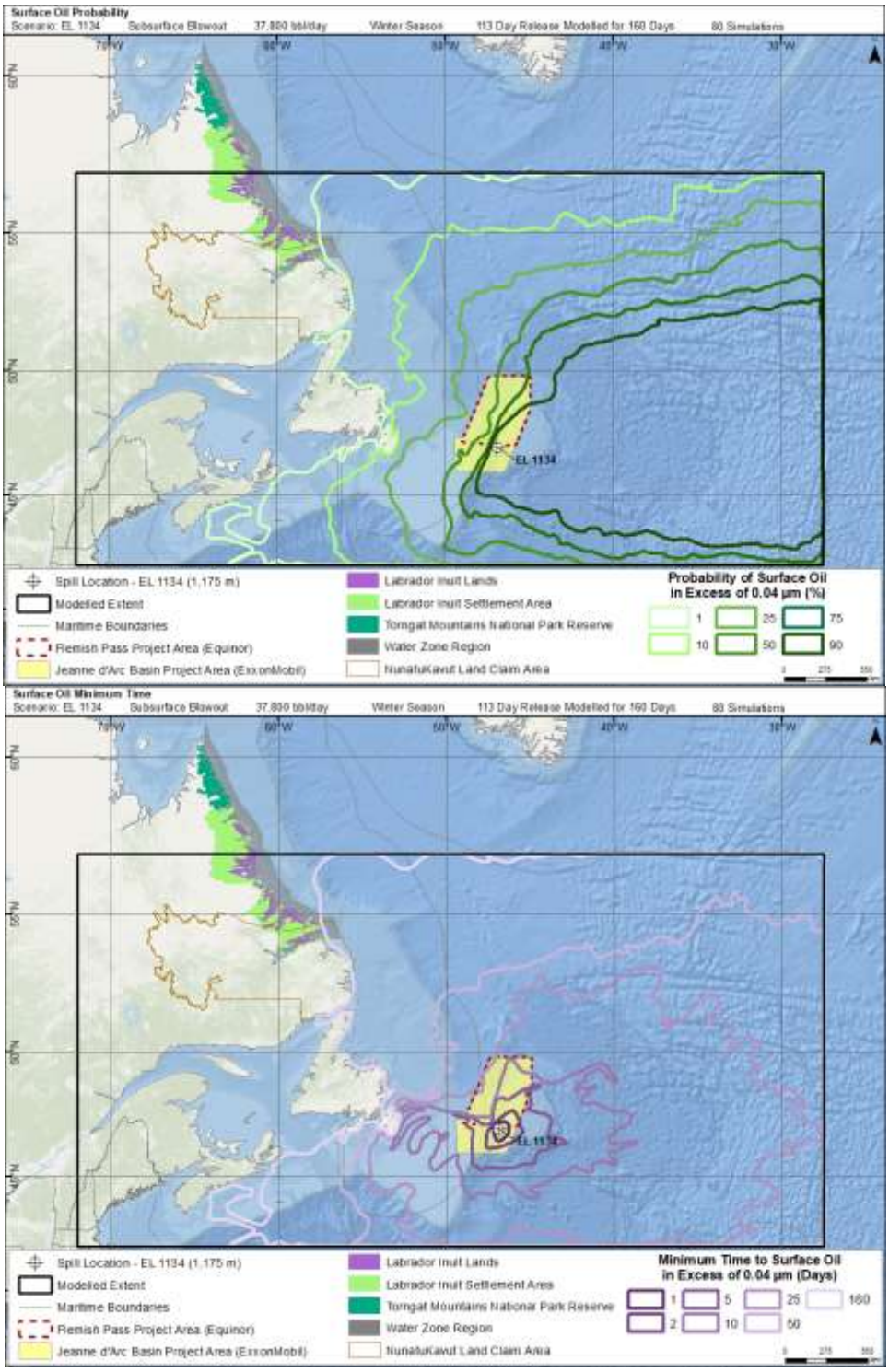
Stochastic footprints for potential surface oil exceeding a thickness of 0.04 µm were between 2,265,000 – 2,495,000 km^2 for the 30-day releases and 3,402,000 - 3,528,000 km^2 for the 113-day releases (Table 7.2). Within the footprints, the highest predicted likelihood of contamination above 0.04 µm occurred to

the east and south of the release site, while there was a much lower probability (<25%) for oil being transported to the north or west towards Canadian waters (Figure 7.2). Footprints depicting higher probability contours (90%) yield only a fraction of the total footprint, ranging from 81,440 – 1,394,000 km^2 depending on the scenario. Seasonal variations were evaluated yielding different predicted surface oil results for summer versus winter scenarios. For both the 30- and 113-day releases, larger surface oil footprints associated with >90% probability contours were predicted for summer scenarios at both sites indicating more coherency in the predicted footprints of the releases. However, the areas associated with lower probabilities (i.e., 1% and 10%) are larger in the winter, indicating more extensive and variable transport with a high likelihood of entrainment (Figure 7.2).

Table 7.2 Summary of predicted areas of threshold exceedance (km^2) for surface and water column, and lengths (km) of shoreline oil predicted to have the potential to be affected

Stochastic Scenario Parameters				Areas Exceeding Threshold (km^2)		
Component and Threshold	**Scenario**	**Site**	**Probability Contour or Bin**	**Annual Results**	**Winter (ice cover)**	**Summer (ice-free)**
Surface Oil >0.04 µm, on average	30-day release	EL 1134 (37,800 bbl/d)	1%	2,399,000	2,495,000	2,265,000
			10%	1,618,000	1,806,000	1,377,000
			90%	88,600	81,440	100,300
	113-day release	EL 1134 (37,800 bbl/d)	1%	3,422,000	3,528,000	3,402,000
			10%	2,723,000	2,885,000	2,488,000
			90%	1,314,000	1,286,000	1,394,000
Water Column Dissolved Hydrocarbons >1 µg/L at some depth within the water column	30-day release	El 1134 (37,800 bbl/d)	1%	1,401,000	1,579,000	1,400,000
			10%	646,000	681,800	604,300
			90%	9,961	9,953	19,410
	113-day release	EL 1134 (37,800 bbl/d)	1%	2,524,000	2,678,000	2,475,000
			10%	1,941,000	2,047,000	1,835,000
			90%	727,400	714,200	752,400
				Lengths Exceeding Threshold (km)		
Shoreline Oil >1 g/m^2, on average	30-day release	EL 1134 (37,800 bbl/d)	1 - 5%	384	1,245	18
			5 - 15%	-	-	-
			15 - 25%	-	-	-
	113-day release	EL 1134 (37,800 bbl/d)	1 - 5%	1,877	1,859	847
			5 - 15%	1,068	1,678	761
			15 - 25%	37	107	-

Figure 7.2 Winter probability of surface oil thickness >0.04 µm (top) and minimum time to threshold exceedance (bottom) resulting from a 113-day subsurface blowout at the EL 1134 site

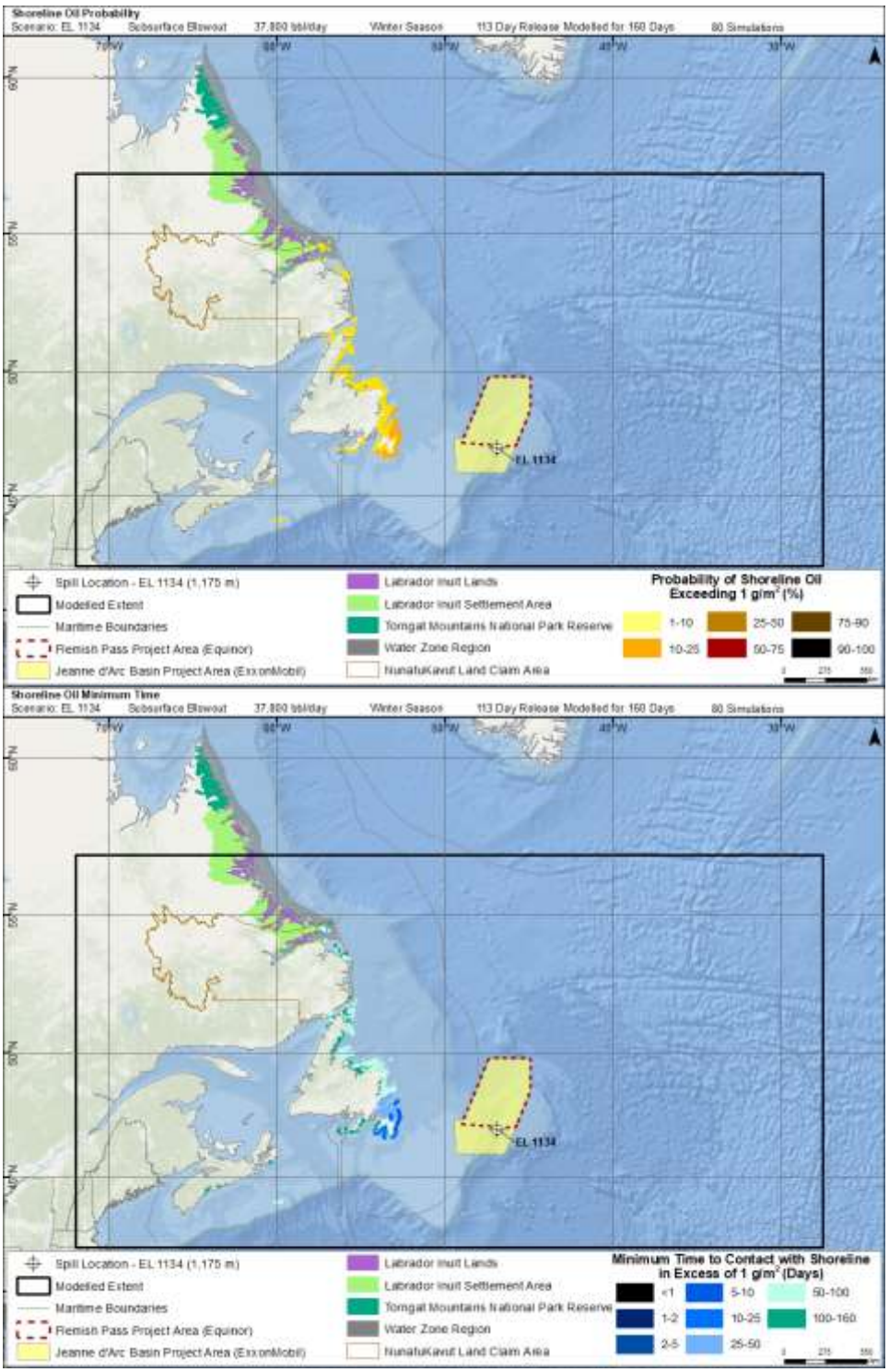


The highest predicted potential (25%) for oil to make contact with shorelines exceeding 1 g/m^2 occurred within the 113-day releases that were modelled under wintertime conditions (Figure 7.3), with summer conditions typically resulting in a lower probability of contact with shorelines (Table 7.3). The probability of oil making contact with shorelines above 1 g/m^2 within the 30-day releases was <5% for the 30-day release. The probability of oil making contact with the shoreline above 1 g/m^2 from the 113-day release was up to 25% on the Avalon Peninsula and primarily <10% on the northern and southern coasts of Newfoundland. Minimum time estimates for first shoreline oil exposure ranged from approximately 8-27 days for both the 30- and 113-day releases (Table 7.3). Modelled oil from these subsurface releases had a higher potential to be transport to the west and southwest prior to surfacing, where surface currents and winds typically carried releases further offshore.

Table 7.3 Shoreline contamination predicted probabilities and minimum time for oil exposure exceeding 1 g/m^2

Scenario	Release Site	Scenario Timeframe	Average Probability of Shoreline Oil Contamination (%)	Maximum Probability of Shoreline Oil Contamination (%)	Minimum Time to Shore (days)	Maximum Time to Shore (days)
30-day release	EL 1134 (37,800 bbl/d)	Annual	2	3	8	36
		Winter	2	5	8	44
		Summer	1	2	27	42
113-day release		Annual	5	16	8	151
		Winter	6	25	8	160
		Summer	4	14	27	160

Figure 7.3 Winter probability of shoreline contact >1 g/m^2 (top) and minimum time to threshold exceedance (bottom) resulting from a 113-day subsurface blowout at the EL 1134 site



Deterministic Results for Blowout Scenarios

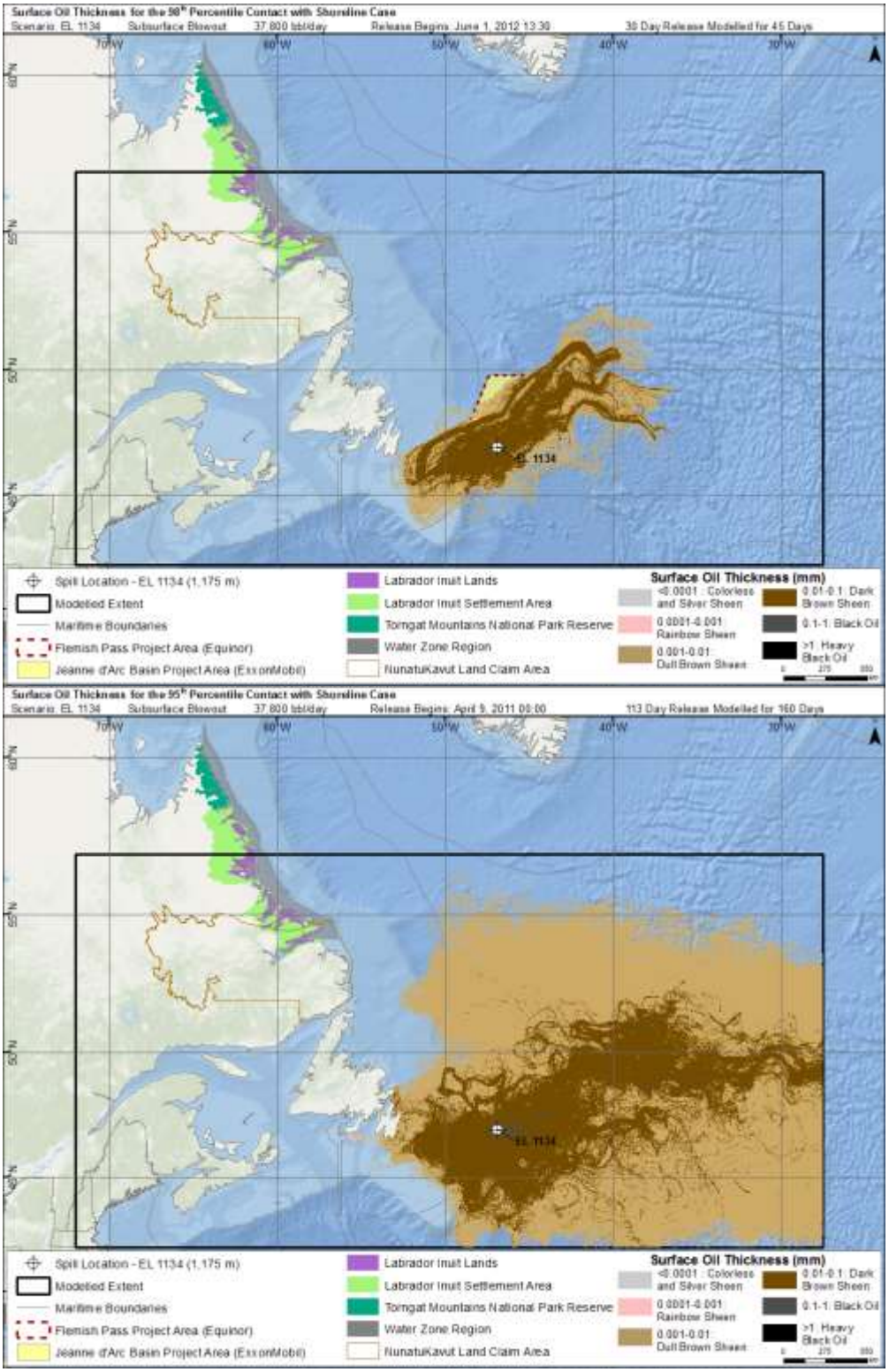
The deterministic trajectory and fate simulations provided an estimate of the oil's transport through the environment over time as well as its physical and chemical behavior for the specific set of environmental conditions modelled. The two deterministic representative worst case scenarios for shoreline length contact were identified from the two stochastic ensembles of results. Two individual trajectories of interest were selected for the deterministic analysis that represent the 98th and 95th percentile for the 30 day and 113 day release scenario, respectively (Table 7.4). The 95th percentile is typically chosen for the deterministic approach but as the 95th percentile for the 30-day release did not reach the shoreline, the 98th percentile was chosen instead.

The longer duration and larger volume release of Ben Nevis at EL 1134 was predicted to result in larger areas of dull brown oil (0.001 – 0.01 mm) and thick dark brown oil (0.01 – 0.1 mm) compared to the shorter, smaller volume release which was predicted to result in a smaller region of both the thinner dull brown sheens and dark brown oil (Figure 7.4). The area of surface oil exposure (>0.04 µm) for the 113-day representative worst case (~2,300,000 km^2) is about five times larger than that of the 30-day representative worst case (~450,000 km^2) (Table 7.4).

Table 7.4 Representative deterministic scenarios and associated areas exceeding specified thresholds (km^2) for the representative worst case shoreline contamination trajectories

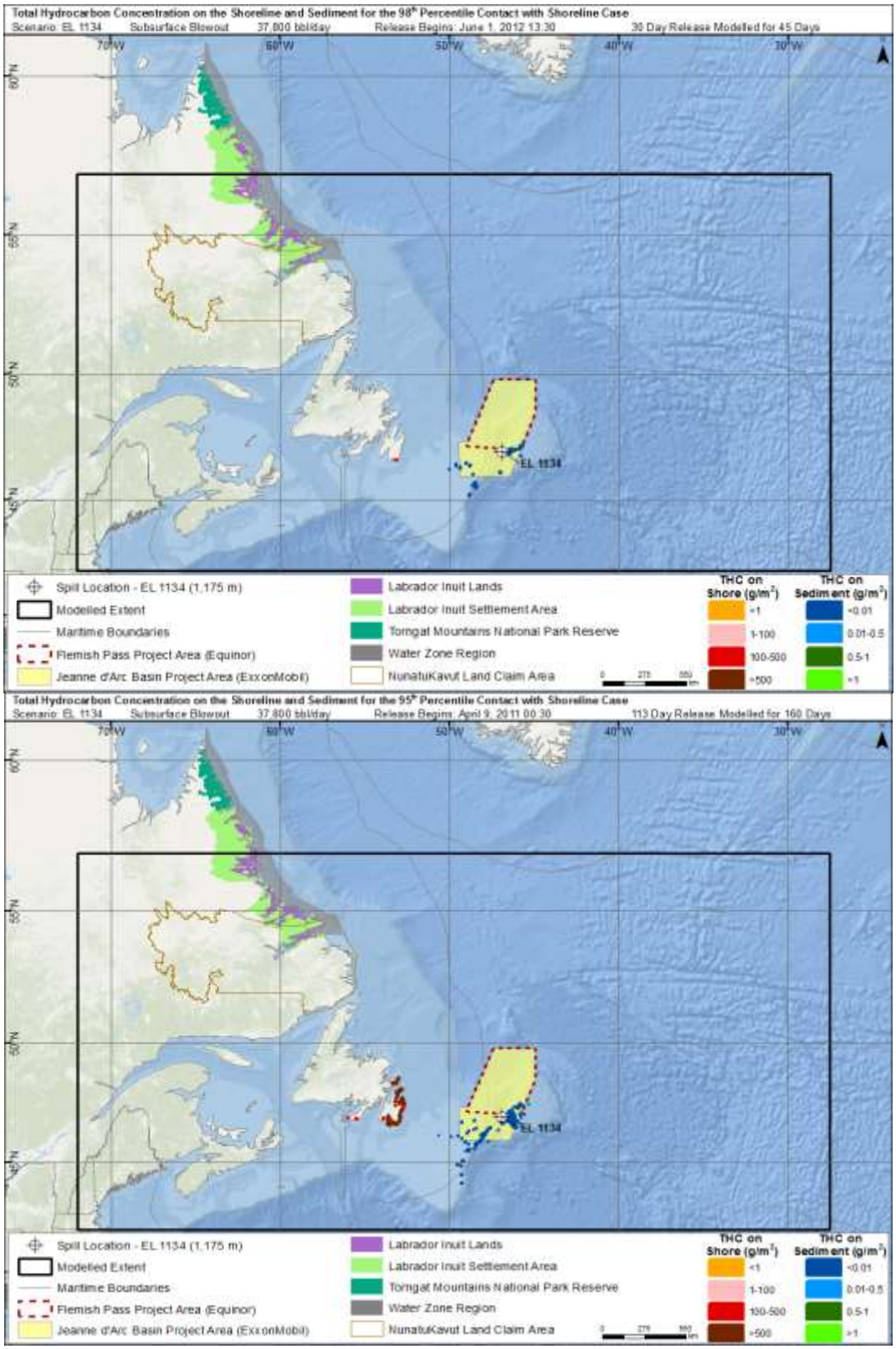
Scenario Name (Start Date)	Released Volume	Approximate Surface Area exceeding thickness thresholds (km^2)		Approximate Shore Length exceeding mass per unit area thresholds (km)		Approximate Subsurface Volume exceeding THC threshold (km^3)
		Socioeconomic (0.04 µm)	Ecologic (10 µm)	Socioeconomic (1 g/m^2)	Ecologic (100 g/m^2)	Socioeconomic (1 µg/L)
98th percentile shoreline contact case – 30 d (June 1, 2012)	1,134,000 bbl	457,300	226,300	15	15	18,930
95th percentile shoreline contact case – 113 d (April 9, 2011)	4,271,400 bbl	2,316,000	750,400	807	767	72,200

Figure 7.4 Surface oil thickness for the representative worst case for shoreline contact resulting from 30-day (top) and 113-day (bottom) subsurface blowouts at EL 1134



Shoreline contact was also limited for these simulations, where even the representative worst care shoreline contact cases were predicted to have less than 0.2% of the total volume of released oil reaching shore (Figure 7.5). In both simulations, some portions of the oil mass were predicted to travel outside of the model domain. In the 113-day release, up to 18% of the oil left the domain to the south and east, further out to sea.

Figure 7.5 Total hydrocarbon concentration (THC) on the shore and sediment for the representative worst case for shoreline contact resulting from 30-day (top) and 113-day (bottom) subsurface blowouts at EL 1134. Only limited shoreline contact was predicted for the 30-day scenario on the Avalon Peninsula.



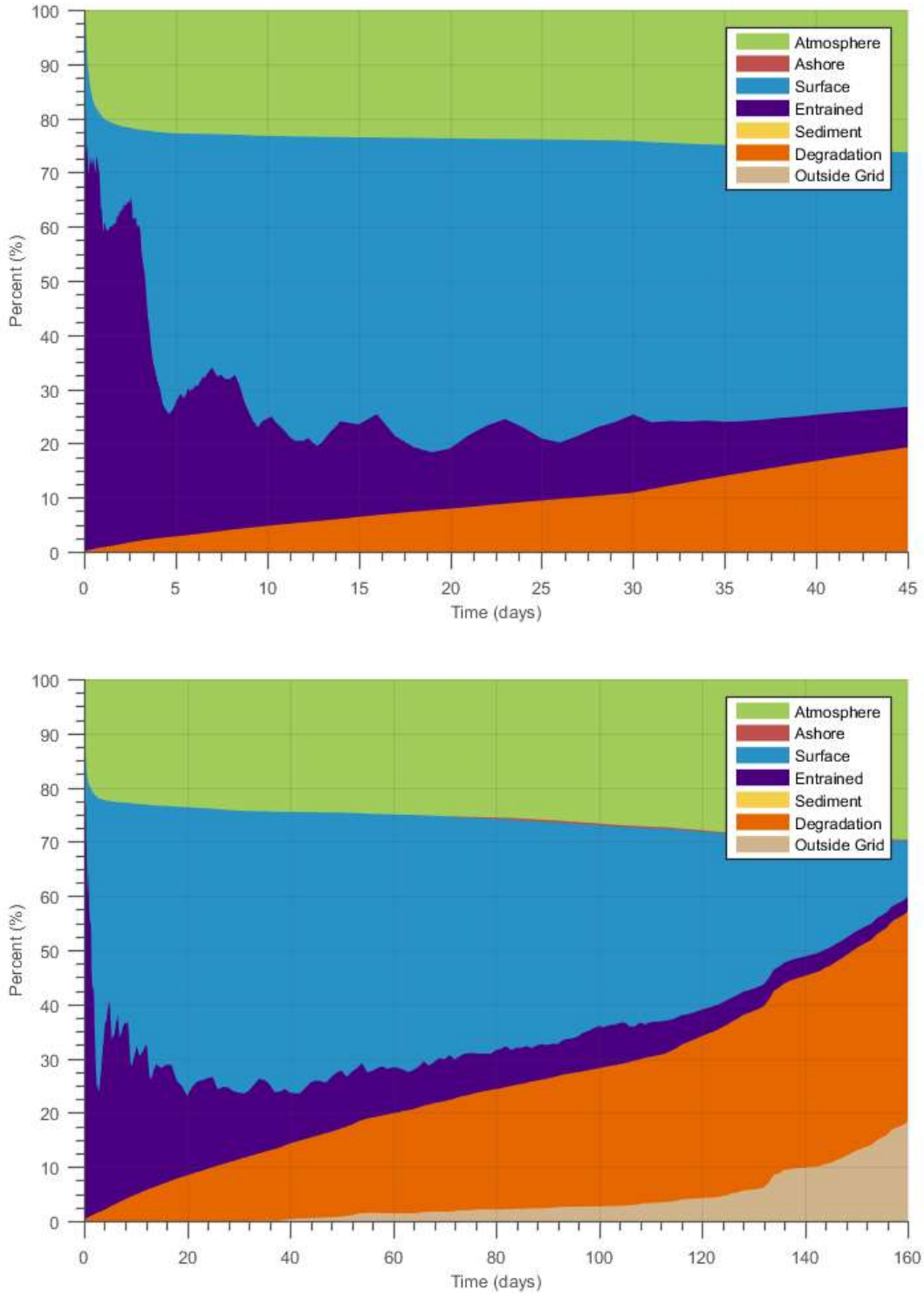
Mass Balance Results for Blowout Scenarios

For all representative deterministic scenarios, the amount of oil remaining in surface waters at the end of the simulation was less than 47% for the 30-day release and less than 10% for the 113-day release at EL 1134 (Table 7.5, Figure 7.6). Entrainment into the water column ranged between 3-8%. The amount of evaporation and degradation was relatively consistent between the two different duration model runs. Approximately 26-30% of the Ben Nevis crude oil releases was predicted to evaporate and another 19-39% to degrade by the end of the 45- or 160-day simulation (Table 7.5, Figure 7.6). Most of the variability in the mass balances was associated with the amount of oil found either on the surface or entrained within the water column. The amount of oil remaining on that water surface at the end of the representative 45- and 160-day deterministic simulation was 47% and 10%, respectively (Table 7.5). This degree of variability is expected, as the entrainment and resurfacing of oil occurs on timescale of minutes, depending on the wind and wave conditions at the specific time. Entrainment into the water column ranged between 3% and 7%. Shoreline contact was a small percentage of the total released oil, where even the worst case shoreline contact cases were predicted to have less than 0.2% of the total volume of released oil reaching shore. The amount of oil predicted to be on sediments at the end of the simulations was less than 0.01% of the total release volume.

Table 7.5 Summary of the mass balance information for blowout scenarios. All values represent a percentage of the total amount of released oil.

Scenario	Surface (%)	Evaporated (%)	Water Column (%)	Sediment (%)	Ashore (%)	Degraded (%)	Outside Grid (%)
30-day 98th percentile shoreline contact case	46.94	26.30	7.48	<0.01	0.01	19.25	0.03
113-day 95th percentile shoreline contact case	10.43	29.61	2.66	<0.01	0.19	38.78	18.33

Figure 7.6 Mass balance plots of the representative worst case for shoreline contact resulting from 30-day (top) and 113-day (bottom) subsurface blowouts at EL 1134



7.1.2.2 Batch Spills

Accidental discharges of marine diesel from small volume batch spills were modelled as near instantaneous releases. These small volume releases were predicted to result in far less contamination (spatially and concentration) when compared to the large volume blowout releases. By the end of the 30-day release simulations, 60-73% of the released diesel was predicted to evaporate and 17-28% degrade (Figure 7.7). A small portion of highly weathered diesel may continue to be transported at the surface or in the water column for some distance. However, this oil would be patchy and discontinuous. None of the oil from the batch spills was predicted to reach the shoreline (Figure 7.8).

Figure 7.7 Mass balance plots of the EL 1134 release site marine diesel batch spills of 100 L (top) and 1,000 L (bottom)

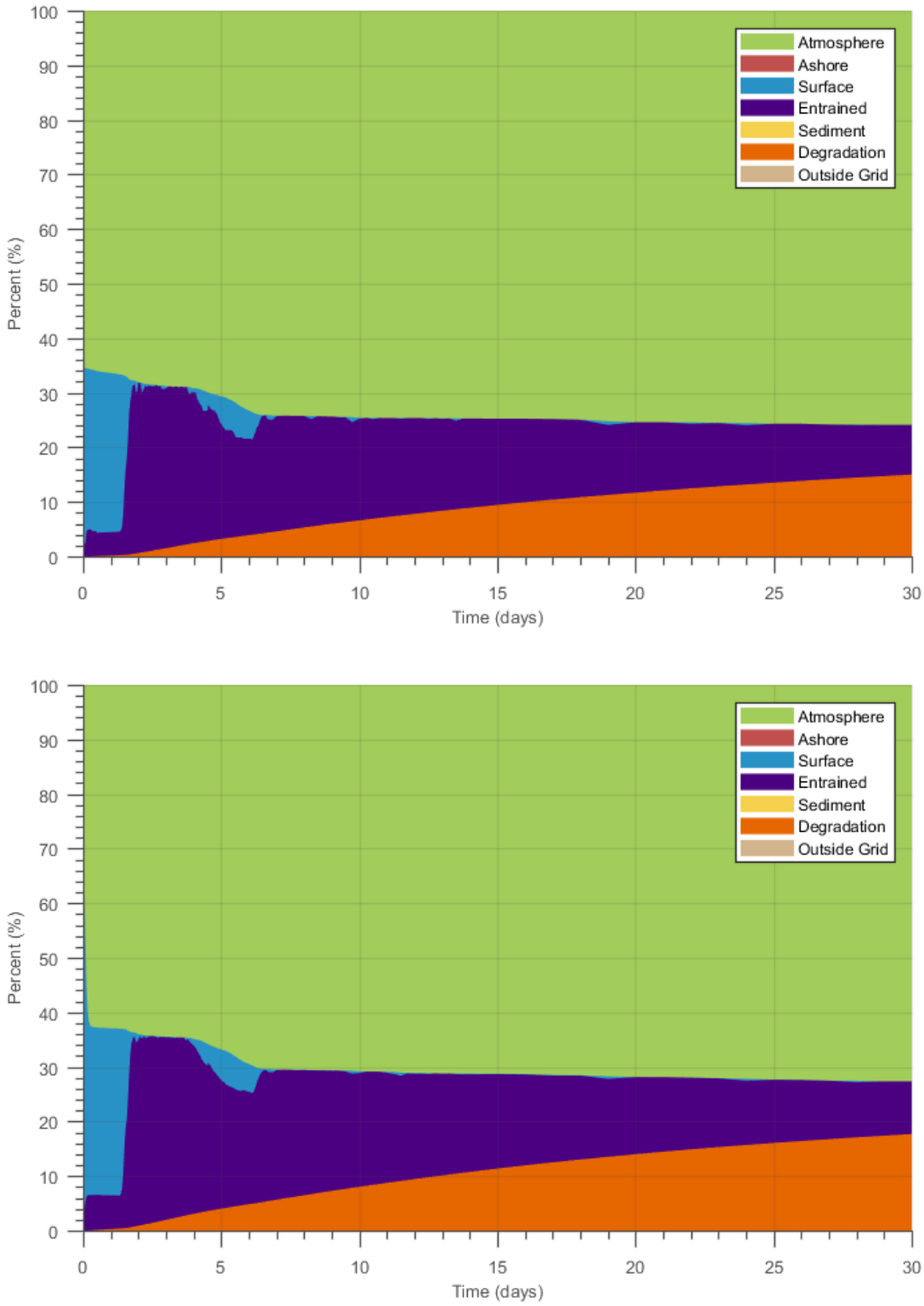
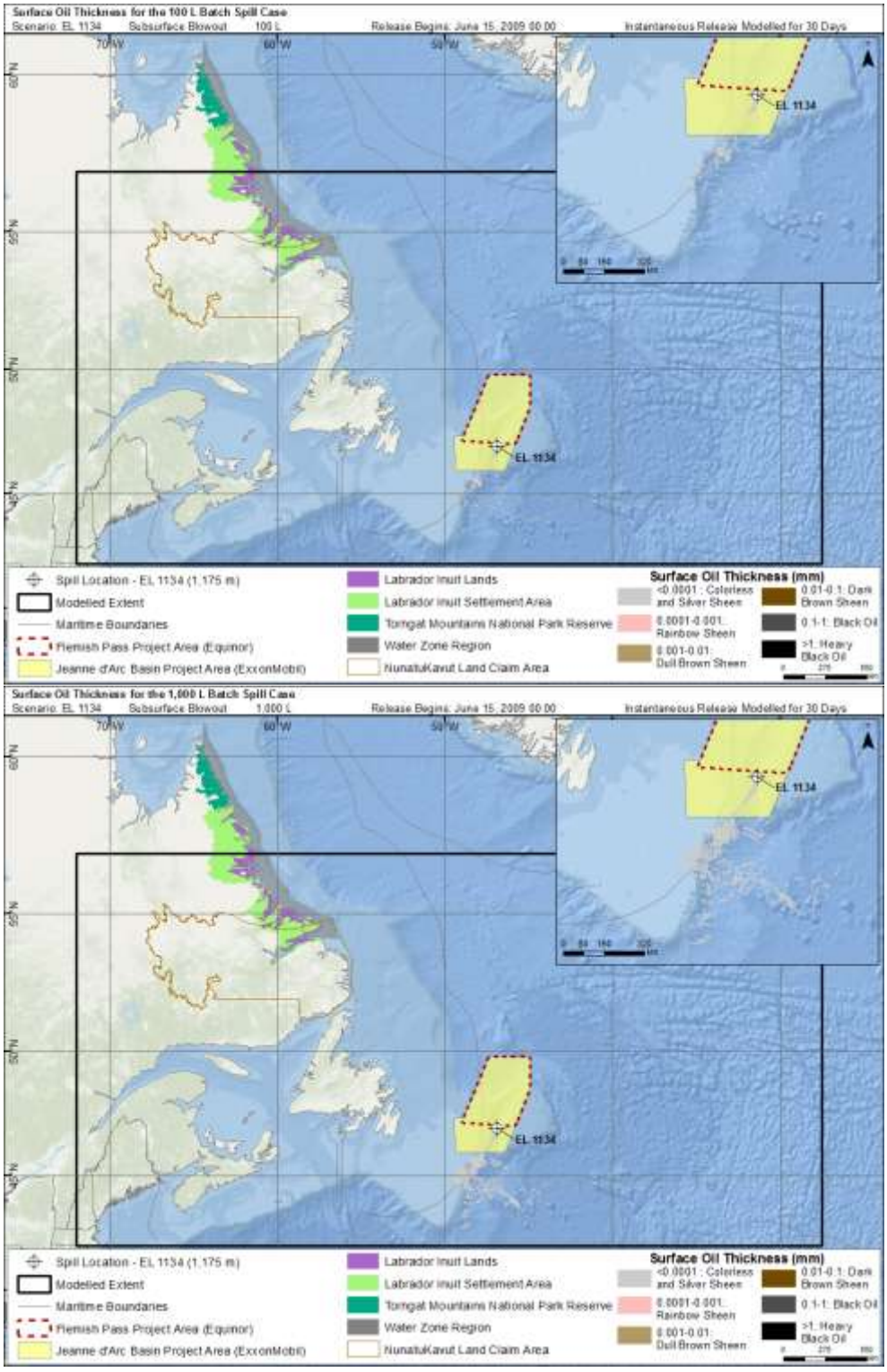


Figure 7.8 Surface oil thickness resulting from the EL 1134 marine diesel batch spills of 100 L (top) and 1,000 L (bottom)



7.2 Summary of Environmental Effects Analysis (EIS)

The detailed environmental effects assessment for accidental events is provided in Chapter 15 of the EIS, a brief summary of which is provided below as general background and context for the EIS Addendum analysis including assessing 1134-specific spill models (Appendix B).

7.2.1 Marine Fish and Fish Habitat (including Species at Risk)

Potential accidental events may interact with and potentially affect fish and fish habitat in terms of habitat availability and quality, fish mortality, injury and health, and fish presence and abundance. Potential accidental effects that are considered involve varying degrees of hydrocarbon interaction and exposure with fish and fish habitat and include SBM spills, batch diesel spills, and subsurface blowouts.

Modelling of batch diesel spills (100 L or 1,000 L) predicts that no area will exceed the ecological threshold of 100 µg/L THC; therefore, the potential for exposure and the likelihood of adverse effects on Marine Fish and Fish Habitat from a batch release are low. Only fish in the immediate vicinity near the surface at the time of the spill may be exposed, and at the concentrations predicted. A change in habitat availability and quality will likewise be of low magnitude. While batch diesel spills would affect water quality around the spill site, this would be short-term until the slick naturally disperses through surface wave action in the offshore environment.

A subsurface blowout has a larger potential to have long-term environmental effects. The results of a hypothetical, unmitigated subsurface blowout modelled at in the Project Area may result in reaching or exceeding the ecological threshold for in-water concentration (1 µg/L PAH or 100 µg/L THC) for areas of the Flemish Cap, Flemish Pass, Grand Bank and mid-Atlantic. In the deterministic modelled scenarios, small amounts of oil are predicted to reach shoreline areas of localized to regions of the Avalon Peninsula and portions of the island of Newfoundland to the south and north of the Avalon Peninsula (Figure 7.7). However the small volumes would be expected to be weathered, patchy and discontinuous. For coastal Newfoundland, oil is predicted to make first contact with shoreline in a minimum time of 8 days for both the 30-day and 113-day release. Model results indicate the oil would not accumulate in marine sediments (<0.01%), although flocculating and sinking of hydrocarbon material through plankton and microbial pathways may result in interactions with benthic environments. Adult demersal and pelagic fish could potentially avoid the spill areas, but the juvenile and the early life stages of fish and benthic invertebrates in the immediate areas of the spill would likely result in sub-lethal and lethal effects. Fish presence and abundance would also be affected by this unmitigated scenario as mobile fish species would temporarily avoid the spill footprint within the model results. Local reductions in plankton due to injury or mortality from hydrocarbon exposure may also reduce foraging opportunities for fish.

In the unlikely event of an offshore oil release, some degree of residual adverse effects to individual marine fish and to fish habitat in the area at the time of the incident are expected. The degree of exposure and type of effects would depend on the type and size of spill, time of year, and location and species of fish within the affected area. However, effects are not expected to alter the long-term viability of local or regional fish populations in the RSA. Spill prevention techniques and response strategies (e.g., cap stacks, spill clean-up processes, shoreline protection measures as detailed in Section 15.1 of the EIS) will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of low to medium magnitude, occurring within the RSA, of short to long term duration, not likely to occur or occurring sporadically, and reversible with a moderate level of confidence in the effects prediction.

7.2.2 Marine and Migratory Birds (including Species at Risk)

Accidental events such as oil spills can have important, adverse consequences for marine-associated birds, leading to potential changes in the presence, abundance, distribution and/or health of marine birds (individuals and populations). Exposure to accidental oil spills from a drilling installation or vessels may affect individuals (e.g. through physical exposure including ingestion), important habitats and food sources. Marine birds are amongst the biota most at risk from oil spills, as they spend much of their time upon the surface of the ocean. In the event of a spill, and depending upon project and area specific factors, coastal birds may also be at risk on beaches and in intertidal zones.

Batch spills, if any, resulting from the Project would cause a temporary (likely less than 24 hours) decrease in water quality (and thus habitat quality) around the spill site. This would be short-term in nature, lasting until the slick disperses in the offshore environment. Based on modelling results, the potential for exposure and the likelihood of adverse effects on marine birds from a batch release are low. Only those birds occupying the immediate footprint of the spill for this time period would be affected.

A subsurface blowout represents the accidental event with the greatest potential to affect marine birds, given the potentially large volume of discharged oil, and the possibility for such a spill to have a large geographic extent. Based on vulnerability indices the mortality rate would range from 35-95 percent for birds that come in contact with the slick in the 0.01-0.1 mm thickness range. Murres and dovekies, which spend most of their time sitting on the water's surface, are most vulnerable (estimated 95 percent mortality), while species that dive or feed at the water's surface for their prey but otherwise spend little time on the water, including Leach's storm-petrels, great shearwaters, and great skuas, are predicted to have a lower mortality rate of 35 percent. Black-legged kittiwakes and northern gannets, which do often sit on the water but spend more time in the air than alcids (murres and dovekies), would be expected to have an intermediate mortality rate. Shoreline contact was considered possible for both scenarios (30-day and 113-day) the EL 1134, with maximum probabilities of shoreline contact with the Avalon Peninsula was 25 percent from the EL 1134 site in the case of a 113-day release (5% for 30-day release). Oil that is predicted to make contact with the shoreline is expected to be highly weathered, patchy and discontinuous given the time to make contact with the shoreline. For coastal Newfoundland, oil is predicted to make first contact with shoreline in as few as eight days. Shoreline contact with other areas of Newfoundland and Labrador, Sable Island, and Eastern Nova Scotia was considered low probability (<10 %).

In the unlikely event of an offshore oil release, some degree of residual adverse effects to individual marine and migratory birds in the area at the time of the accident or malfunction are expected. The degree of exposure and type of effects would depend on the type and size of spill, time of year, and location and species of Marine and Migratory Birds within the affected area. Spill prevention techniques and response strategies (e.g., cap stacks, spill clean-up processes detailed in Section 15.1 of the EIS) will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of low to high magnitude, occurring within the RSA, of short to long term duration, not likely to occur or occurring sporadically, and reversible with a moderate level of confidence in the effects prediction.

7.2.3 Marine Mammals and Sea Turtles (including Species at Risk)

Various species of marine mammals and sea turtles, including several SAR/SOCC, are known to occur in the RSA seasonally or year-round, and could therefore be present at the time of an accidental event.

The potential for interaction of different species of marine mammals or sea turtles with an accidental event such as a hydrocarbon release will vary based on the timing, location, duration, and extent of the spill. Marine mammals and sea turtles may experience a change in mortality or injury (acute or immediate effects) if directly exposed to accidentally-released hydrocarbons or associated volatiles and aerosols. They may experience a change in health (sub-lethal effects) from direct contact with hydrocarbons (including volatiles and aerosols) or consumption of contaminated prey. There may be a change in habitat (marine water or shoreline/haulout) quality due to oiling and associated response measures.

Results of the modelling of batch diesel spills (100 or 1,000 L) suggest that both the potential for exposure and the likelihood of adverse effects on marine mammals and sea turtles from a batch release (e.g., fouling, inhalation of vapours) are low. Only animals in the immediate vicinity at the time of the spill may be exposed, and at the concentrations predicted, change in mortality or injury is considered unlikely and changes in health are predicted to be of low magnitude (e.g., temporary inflammation of mucous membranes). Changes in habitat quality or use will likewise be of low magnitude. Batch diesel spills are not expected to affect haulout areas on distant shorelines. While there will be a decrease in water quality around the spill site, this would be short-term until the slick disperses (aided by surface wave action in the offshore environment).

Based on modelling of a sub-surface release at the EL 1134 site, oil is predicted to be transported by subsurface currents, and to contact shorelines after approximately 8-27 days (depending on the season). Highly weathered, discontinuous patches of oil may the coast of southern Newfoundland, or the Avalon Peninsula; terrestrial areas affected may or may not be used by marine mammals for haulouts.

In the unlikely event of shoreline oiling, fur-bearing marine mammals that haul out in the affected area may experience a change in mortality or injury and a change in health upon exposure to hydrocarbons, although it is probable that only a small proportion of local populations would be affected. Predatory marine mammals that prey on seals (e.g., killer whales) may also experience changes in mortality, injury, or health following consumption of oiled prey species. Change in habitat quality or use of terrestrial habitats is predicted to be low in magnitude and short-term in duration.

Potential for change in habitat quality or use of oceanic habitats (i.e., water quality and air quality at the air-sea interface) will be greater near the location of the sub-surface release. The degree of change in mortality or injury and change in health will depend in large part on the occurrence and distribution of marine mammals and sea turtles at the time of the blowout, as well as the duration and extent of oil release (i.e., potential severity of effects will be dependent on the potential for exposure). Depending on the exact nature, extent, and duration of a spill, marine mammals and sea turtles in the spill area are likely to experience a combination of exposures from contaminated air, water, and sediment and via a combination of pathways (inhalation, ingestion, aspiration, and adsorption). Oceanic animals that are closer to the site of the blowout are more likely to be exposed to a more constant flow and higher concentrations of fresher oil, as compared to nearshore species.

In the unlikely event of an offshore oil release, some degree of residual adverse effects to individual marine mammals or sea turtles in the area at the time of the accident or malfunction are expected. The degree of exposure and type of effects would depend on the type and size of spill, time of year, and location and species of animals within the affected area. However, effects are not expected to alter the long-term viability of local or regional marine mammal and sea turtle populations in the RSA and it is considered unlikely that the size, health, ecological function, and/or sustainability of a population of

marine mammals or sea turtles would be measurably affected. Spill prevention techniques and response strategies will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of low to medium magnitude, within the RSA, short to long term in duration, not likely to occur or occurring sporadically, and reversible with a moderate to high degree of confidence in the effects prediction.

7.2.4 Special Areas

Based on modelling of batch spills (100 or 1,000 L at EL 1134 site, EL 1135 site and EL 1137 site), the total hydrocarbon concentrations will be highest in the immediate vicinity of the spill and would be limited in terms of its overall magnitude, extent and duration, and thus, its potential adverse environmental consequences. Given that such a spill could conceivably occur at any location within the Project Area or along the associated vessel and aircraft traffic routes, it is possible that a spill could overlap with and to a degree interact with the identified Special Areas that are located within these boundaries. EL 1134 overlaps directly with a NAFO FCA, a VME and a UNCBD EBSA. The cumulative area of average surface oil thickness does not exceed the 0.04 µm socioeconomic threshold at any location.

A subsurface blowout represents the accidental event with the greatest potential to affect adjacent Special Areas, given the potentially large amount of discharged oil that could conceivably be associated with a blowout event, and the possibility for such a spill to extend to adjacent areas and resources. Based on the 30-day model results the worst-case modelling results (i.e., 98th percentile) indicates that the likely areas to be affected by such a spill include:

- NAFO FCAs: Tail of the Bank (1), Flemish Pass/Eastern Canyon (2), Beothuk Knoll (3), Eastern Flemish Cap (4), Northeast Flemish Cap (5), Northwest Flemish Cap (11), Eastern Flemish Cap (14), Beothuk Knoll (13), and Newfoundland Seamounts.
- VMEs: South East Shoal and Adjacent Shelf Edge / Canyons, Beothuk Knoll, Southern Flemish Pass to Eastern Canyons, Flemish Cap East, Northern Flemish Cap, and Deep Water Coral Area.
- UN CBD EBSA: Slopes of the Flemish Cap and Grand Bank.

Based on the 113-day model results the worst-case modelling results (i.e., 95th percentile) indicates that the likely areas to be affected by such a spill include:

- NAFO FCAs: Tail of the Bank (1), Flemish Pass/Eastern Canyon (2), Beothuk Knoll (3), Eastern Flemish Cap (4), Northeast Flemish Cap (5), Sackville Spur (6), Northern Flemish Cap (7), Northern Flemish Cap (8), Northern Flemish Cap (9), Northwest Flemish Cap (10), Northwest Flemish Cap (11), Northwest Flemish Cap (12), Beothuk Knoll (13), 3O Coral Area Closure, Fogo Seamounts (1), Newfoundland Seamounts, and Orphan Knoll.
- Eastern Flemish Cap 14
- PRMA: South Grand Bank Area, and Virgin Rocks.
- Snow Crab Stewardship Exclusion Zone: 8A and 8B.VMEs: Division 3O Coral Closure, South East Shoal and Adjacent Shelf Edge / Canyons, Beothuk Knoll, Southern Flemish Pass to Eastern Canyons, Flemish Cap East, Northern Flemish Cap, Sackville Spur, Northeast Shelf and Slope (within Canadian EEZ), and Deep Water Coral Area.
- UNCBD EBSAs: Seabird Foraging Zone in the Southern Labrador Sea, Orphan Knoll, and Slopes of the Flemish Cap and Grand Bank. .

Shoreline Contact

In the extremely unlikely event of an offshore oil release, some degree of residual adverse effects to Special Areas are expected. Given the potential interaction with identified Special Areas in the offshore environment of Eastern Newfoundland is predicted to be limited, and with the various spill response procedures outlined previously, it is considered extremely unlikely that any of these Special Areas would be subject to oiling to the degree and duration that would result in a change in their overall, important and defining ecological and socio-cultural characteristics, resulting in a decrease in their overall integrity, value or use. Given that the points of contact are patchy and discontinuous, a worst-case approach was taken to identify Special Areas that may be affected; that is, Special Areas in the vicinity of the points of contact have been identified. The 30-day model results (i.e., 98th percentile) indicates that the shoreline areas to be affected by such a spill may include:

- IBA: Mistaken Point
- Coastal Parks/Ecological Reserves: Mistaken Point Fossil Ecological Reserve
- World Heritage Site: Mistaken Point

The 113-day model results (i.e., 95th percentile) indicates that the shoreline areas to be affected by such a spill may include:

- IBAs: Grates Point, Baccalieu Island, Cape St. Francis, Witless Bay Islands, Mistaken Point, The Cape Pine and St. Shotts Barren, Cape St. Mary's, Placentia Bay, and Green Island
- Coastal Parks/Protected Areas/Coastal Ecological Reserves: Windmill Bight Provincial Park, Dungeon Provincial Park, Marine Drive Provincial Park Reserve, Chance Cove Provincial Park, Gooseberry Cove Provincial Park, Cape Bonavista Lighthouse, Baccalieu Island Seabird Ecological Reserve, Witless Bay Seabird Ecological Reserve, Mistaken Point Fossil Ecological Reserve, Cape St. Mary's Seabird Ecological Reserve, Lawn Bay Seabird Ecological Reserve, and Fortune Head Fossil Ecological Reserve
- World Heritage Site: Mistaken Point

Due to the time predicted for the oil to reach shore (8-27 days), the oil is expected to be highly weathered, patchy and discontinuous. In the event of a spill, there will be adequate time to plan and implement shoreline response measures before any weathered oil contacts the shoreline.

Spill prevention techniques and response strategies will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of low to medium in magnitude, within the RSA, of short to long-term duration, not likely to occur or to occur sporadically, and reversible with a moderate level of confidence in the effects prediction. In the extremely unlikely event of a subsurface blowout occurring within a Special Area, significant effects may result, depending on the nature of the Special Area, and the extent and duration of the spill event.

7.2.5 Indigenous Communities and Activities

Although the environmental effects assessment for the Project's planned components and activities has predicted no potential interactions with or adverse effects upon Indigenous communities and their activities, there is potential for an accidental event, such as a large oil spill to eventually reach and affect Indigenous communities and their activities elsewhere in Eastern Canada.

A potential batch spill from a Project-related drilling installation or supply vessel will be limited in terms of its overall magnitude, extent and duration, and thus, its potential environmental consequences. The geographic extent of such Project-related discharges and their effects, if they did occur, will be localized to the Project Area, far away from Indigenous communities and therefore unlikely to extend to or affect the physical or social health and well-being of Indigenous persons or communities. Moreover, given the distances involved, they will not interact with nor adversely affect the physical and cultural heritage of any Indigenous community. The Project Area is also not known to contain resources of historical, archaeological, paleontological, or architectural significance, and given its location far offshore Eastern Newfoundland, is not likely to contain such resources or materials that are relevant to and valued by any Indigenous group. The potential effects of the Project on commercial fishing activities by Indigenous groups are addressed as part of the Commercial Fisheries and Other Ocean Users VC (Section 5.5).

Although extremely unlikely to occur, a large subsurface blowout is the scenario with greatest potential to interact with Indigenous Communities and Activities in Newfoundland and Labrador, and elsewhere in eastern Canada. The two modeled scenarios include subsurface blowouts at a single location (within EL1134). This type of event could potentially discharge a large volume of oil which could extend beyond the LSA. Notwithstanding the much larger size and magnitude of such a blowout as compared to a smaller batch spill during routine operations, most of the potential issues, key considerations and general principles associated with the potential effects of a batch spill on this VC, as described above, are also generally relevant to a blowout. While it is obviously not possible to determine with absolute certainty whether any individual of a species (e.g., Atlantic salmon) (in any life history stage) used for traditional purposes by any group may be present in the affected area before moving to an area that is the subject of traditional harvesting activity, as noted in Section 6.5.3 of EIS, there is limited potential for any degree of connection. As also described for the various preceding biophysical VCs (Section 4.3) accidental events are not likely to occur and therefore significant adverse environmental effects upon marine fish and marine mammals are not likely.

In the extremely unlikely event that a blowout occurs, the (conservative, without mitigation) oil spill modelling predicts a low potential of oil making contact with the shoreline areas of Newfoundland and Labrador, and Sable Island and the eastern shores of Nova Scotia (depending on the time of the spill) and thus, potentially coming into direct contact with Indigenous communities or activities. Given the time to shore, any oil that did make contact with the shoreline is expected to be highly weathered, patchy and discontinuous. There will be little or no potential for such biophysical effects on marine-associated resources to translate into any decrease in the overall nature, intensity, distribution, quality or cultural value of these traditional activities by Indigenous communities. Spill prevention techniques and response strategies will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of neutral to low magnitude, within the RSA, of medium to long-term duration, not likely to occur, and reversible with a moderate to high level of confidence in the effects prediction.

7.2.6 Commercial Fisheries and Other Ocean Users

Accidental events that have the potential to interact with Commercial Fisheries and Other Ocean Users are primarily related to the release of hydrocarbons from a surface batch spill or subsurface blowout. These releases could interact with Commercial Fisheries and Other Ocean Users by potentially impeding the ability of fishers to harvest fish, affecting the biological health of commercial fish species, reducing the marketability of commercial fish products, and interfering with marine research activities or offshore military exercises.

In the event of a batch spill, there is potential for temporary closure of commercial fishing activity in the immediate area. Likewise, a subsurface blowout from the EL 1134 site has the potential to result in the closure of fishing areas and fouling of gear and vessels. The potential effects on commercial fishing and other ocean users will depend on the volume of oil released, the time of year, and the timely implementation of mitigation and response measures. The geographic and temporal extent of a spill would be reduced through the implementation of mitigation and response measures.

Although a temporary closure of one or more areas to fishing activities and other ocean users, such as researchers and military training, may result, the geographic and temporal extent will be reduced through the implementation of mitigation and response measures. The issuance of a Notice to Shippers will provide timely notice of closure areas, giving fishers opportunity to make alternate plans, thereby reducing effects to commercial harvesting activity and notifying fishers to avoid the area, and reducing potential gear/vessel fouling. In the event of gear fouling, the compensation program for damages will be activated, mitigating the cost of damaged or lost fishing gear. Likewise, other commercial damages or losses associated with the spill will be addressed through the existing compensation program and best practices procedures currently under development by One Ocean (joint fishing and petroleum industry initiative). Spill prevention techniques and response strategies will be incorporated into the design and operations for Project activities as part of contingency planning, resulting in predicted adverse residual effects of low magnitude, within the RSA, short to long term, not likely to occur or occurring sporadically, and reversible with a moderate level of confidence in the effects prediction.

7.3 Implications of the Addition of EL 1134

Again, with the exception of the above described inclusion of planned Project activities within EL 1134, no other aspect of the Project is planned to change as compared to that which was described and assessed in the original EIS. All of the mitigation measures and commitments outlined in the EIS remain applicable and will continue to be implemented and adhered to by ExxonMobil in planning and implementing this Project. This proposed amendment (addition of EL 1134) therefore does not change the results of the environmental effects assessment for any of these VCs. Table 7.6 provides a summary of predicted residual environmental effects of accidental event scenarios on Special Areas, given the conservative approach that was used for the spill modelling, and the implementation of mitigation measures to prevent and reduce effects from a spill. Accordingly, the determination of significance is summarised as the following for each VC:

- In consideration of the present knowledge of marine fish and fish habitat occurrence in the RSA, the result of spill modelling exercises, and planned mitigation, the predicted residual environmental effects from an accidental event scenario on Marine Fish and Fish Habitat is considered not significant.
- In consideration of the present knowledge of marine and migratory bird occurrence in the RSA, the known effects of oil spills on marine-associated avifauna, the result of spill modelling exercises, and planned mitigation, a precautionary conclusion is drawn that residual environmental effects from an accidental subsurface blowout on Marine and Migratory Birds are predicted to be significant depending on the specific occurrence and nature and degree of the event, but extremely unlikely to occur.
- In consideration of the present knowledge of marine mammal and sea turtle occurrence in the RSA, the result of spill modelling exercises, and planned mitigation, the residual environmental effects from an accidental event scenario on Marine Mammals and Sea Turtles are predicted to be not significant.

- In consideration of the present knowledge of Special Areas within the RSA, the result of spill modelling exercises, and planned mitigation, the predicted residual environmental effects from an accidental event scenario on Special Areas is considered not significant.
- In consideration of the location and extent of Indigenous communities and their activities within the RSA, the result of spill modelling exercises, and planned mitigation, any predicted residual environmental effects from an accidental event scenario on Indigenous communities and activities are considered not significant.
- In consideration of commercial fishing and other ocean activities within the RSA, the result of spill modelling exercises, and planned mitigation and financial compensation, the predicted residual environmental effects from an accidental event scenario on Commercial Fisheries and Other Ocean Users is considered not significant.

All of the residual environmental effects from an accidental event scenario on all of the VCs with the exception of Marine and Migratory Birds are predicted to be not significant. In the extremely unlikely event of a large scale offshore oil release, some degree of residual adverse effects to marine and migratory birds present in the area at the time of the accident or malfunction are expected. The degree of exposure and thus the type and level of any such effects would depend on the type and size of spill, time of year, and the number, location, and species of animals within the affected area. For the blowout scenarios, these environmental effects however could be significant if it led to a detectable decline in overall bird abundance or change in the spatial and temporal distribution of bird populations in the overall RSA for multiple generations. Again, this is considered extremely unlikely given the very low probability of a large spill to occur and the response mitigations that will be implemented. Spill prevention techniques and response strategies will be incorporated into the design and operations for all Project activities as part of contingency planning, which will further help to ensure that such an incident and its effects do not occur, and in the unlikely event they did, that these would not likely have significant adverse effects to marine and migratory birds.

Table 7.6 Summary of Residual Accidental Event-Related Environmental Effects on all VCs

Accidental Event Scenario	Accidental Events Effects Characterization						
	Nature	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Certainty**
Marine Fish and Fish Habitat (including Species at Risk) **Potential Effects:** Change in Habitat Availability and Quality, Change in Fish Mortality, Injury, Health, and Change in Fish Presence and Abundance (Behavioral Effects)							
100 litre Diesel Spill	A	L	PA	S	S	R	M
1,000 litre Diesel Spill	A	L-M	PA	M	N	R	M
Subsurface Blowout (30 Day)	A	M	RSA	M-L	N	R	M
Subsurface Blowout (113 Day)	A	M	RSA	M-L	N	R	M
Marine and Migratory Birds (including Species at Risk) **Potential Effects:** Changes in Mortality / Injury Levels and Bird Health (individuals or populations), Changes in Avifauna Presence and Abundance, Change in Habitat Availability and Quality, and Change in Food Availability or Quality							
100 litre Diesel Spill	A	L	PA	S	S	R	M
1,000 litre Diesel Spill	A	M	PA	M	N	R	M
Subsurface Blowout (30 Day)	A	M-H	RSA	M-L	N	R	M
Subsurface Blowout (113 Day)	A	M-H	RSA	M-L	N	R	M
Marine Mammals and Sea Turtles (including Species at Risk) **Potential Effects:** Change in Mortality or Injury, Change in Health, and Change in Habitat Quality and Use							
100 litre Diesel Spill	A	L	PA	S	S	R	H
1,000 litre Diesel Spill	A	L	PA	S	N	R	H
Subsurface Blowout (30 Day)	A	L-M	RSA	M-L	N	R	M
Subsurface Blowout (113 Day)	A	L-M	RSA	M-L	N	R	M
Special Areas **Potential effects:** Change in Environmental Features and/or Processes, Change in Human Use and/or Societal Value							
100 litre Diesel Spill	A	L	PA	S	S	R	M
1,000 litre Diesel Spill	A	L-M	PA	M	N	R	M
Subsurface Blowout	A	M	RSA	M-L	N	R	M

Table 7.6 Summary of Residual Accidental Event-Related Environmental Effects on all VCs

Accidental Event Scenario	Accidental Events Effects Characterization						
	Nature	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Certainty**
(30 Day)							
Subsurface Blowout (113 Day)	A	M	RSA	M-L	N	R	M
Indigenous Communities and Activities **Potential Effects:** Changes in Health and Socioeconomic Conditions; Changes in the Current Use of Lands and Resources for Traditional Purposes; Change in Physical and Cultural Heritage; and Changes in any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological or Architectural Significance.							
100 litre Diesel Spill	N	-	-	-	-	-	H
1,000 litre Diesel Spill	N	-	-	-	-	-	H
Subsurface Blowout (30 Day)	A	N-L	RSA	M-L	N	R	M
Subsurface Blowout (113 Day)	A	N-L	RSA	M-L	N	R	M
Commercial Fisheries and Other Ocean Users **Potential Effects**: Direct Interference, Resulting in a Change in the Distribution, Intensity, or Function of Commercial Fishing and Other Ocean Uses, Damage to Fishing Gear, Vessels, and Other Equipment and Components, Change in the Abundance, Distribution and Quality of Marine Resources							
100 litre Diesel Spill	A	L	PA	S	S	R	H
1,000 litre Diesel Spill	A	L	PA	M	N	R	H
Subsurface Blowout (30 Day)	A	L	RSA	M-L	N	R	M
Subsurface Blowout (113 Day)	A	L	RSA	M-L	N	R	M

KEY

Nature / Direction:
- P Positive
- A Adverse
- N Neutral (or No Effect)

Magnitude:
- L Low
- M Medium
- H High

Geographic Extent:
- L Localized
- PA Within Project Area
- LSA Within LSA
- RSA Within RSA and / or Beyond

Duration:
- S Short term
- M Medium term
- L Long term
- P Permanent

Frequency:
- N Not likely to occur
- O Occurs once
- S Occurs sporadically
- R Occurs on a regular basis
- C Occurs continuously

Reversibility:
- R Reversible
- I Irreversible

Certainty in Predictions:
- L Low level of confidence
- M Moderate level of confidence
- H High level of confidence

N/A Not Applicable

8 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The effects of the environment on the Project are the same as was identified in Chapter 16 of the EIS. A significant adverse residual effect of the environment on the Project is defined as one that results in one or more of the following if:

- Project infrastructure is damaged, causing harm to Project workers or the public.
- A substantial impact to the Project schedule delaying ongoing Project activities by one season or resulting in a shutdown of drilling operations for three months or more.
- Project infrastructure is damaged, resulting in repairs that are not technically or economically feasible.

The key environmental factors that may affect the Project include severe and/or extreme weather conditions, sea ice, icebergs and superstructure icing, oceanographic conditions, and geological stability and seismicity (unlikely due to low probability of occurrence). Engineering design, operational procedures, and mitigation measures discussed in Section 16.2 will reduce the potential adverse effects to the Project.

The short-term duration of offshore activities between 2018 and 2029 (i.e., 35 to 65 days drilling per well (up to 35 wells), the absence of fixed offshore infrastructure, the harsh-weather design criteria for the drilling installation, the requirements of the C-NLOPB's Operations Authorization for drilling an exploration well, the requirements of the Newfoundland Offshore Certificate of Fitness Regulations and the Offshore Physical Environmental Guidelines also reduce the potential for, and possible magnitude of, effects of the environment on the Project. Meteorological and oceanographic conditions are constantly monitored, and stop-work procedures have been developed should unsafe conditions arise. Based on the significance criteria defined above, and with the application of the engineering and environmental design standards, operational procedures, regulations (e.g., Newfoundland Offshore Certificate of Fitness Regulations, Newfoundland Offshore Petroleum Installations Regulations), and adherence to the Offshore Physical Environmental Guidelines, it is predicted that there will be no significant adverse residual effects of the environment on the Project.

There is potential for effects of the environment on the Project to result in the Project having an accidental event or experiencing a malfunction. Potential environmental effects of Project-related accidents and malfunctions are assessed in Chapter 7.

9 FOLLOW UP AND MONITORING

The Operator will obtain the required permits, approvals, and authorizations for the Project, and the Operator and its contractors will comply with these and relevant regulations and guidelines in planning and implementing the Project. This includes the mitigation measures summarized in the preceding sections, the implementation of which will be directed, managed and tracked in accordance with the Operator's existing policies and procedures.

The following sections summarize the monitoring and follow-up programs to which the Operator has committed in the EIS.

9.1 Follow-up Program

Under CEAA 2012, a follow-up program is defined as a program for "verifying the accuracy of the environmental assessment of a designated project" and "determining the effectiveness of any mitigation measures." Based on the information presented in the EIS, and the conclusion of the effects assessment, a follow-up program will be undertaken in consideration of sensitive benthic habitat. Follow-up monitoring will occur if drilling is undertaken in the following circumstances:

- within an identified VME or FCA
- adjacent/near to an identified VME or FCA, such that drill cuttings dispersion model predicts that drill cuttings deposition may occur within the VME or FCA at levels above the biological effects threshold, or
- in an area where the results of the pre-drill coral survey and risk assessment (DFO / C-NLOPB reviewed and accepted) indicate that monitoring is required

The purpose of the follow-up monitoring program would be to determine the effectiveness of mitigation measures in protecting the sensitive benthic habitat. The monitoring program may include parameters such as:

- sediment traps and/or seabed core samples to measure drill cuttings deposition
- current and turbidity measurements
- visual assessments using high-definition images / video

Detailed design of a follow-up monitoring program would be based on the pre-drill coral survey, potential zone of influence as estimated in the drill cuttings dispersions modelling, location of the well in proximity to the sensitive benthic habitat, other site-specific information collected during planning, and industry experience in conducting similar monitoring programs (e.g., Norwegian Continental Shelf experience). If exploration wells are planned to be drilled near sensitive benthic habitat as outlined above, a follow-up monitoring program plan will be developed and submitted for C-NLOPB / DFO review and acceptance.

The effects of exploration drilling activities are well understood, and mitigation measures are effective, allowing for a high level of confidence in the environmental effects predictions. Therefore, follow-up monitoring is not proposed for other VCs, including SAR.

9.2 Environmental Monitoring and Observation Programs

The Operator is proposing to implement monitoring and observation programs related to Marine Fish and Fish Habitat, Marine and Migratory Birds, and Marine Mammals and Sea Turtles as well as environmental compliance monitoring as required by the Drilling and Production Regulations. A summary of these monitoring programs is provided in Table 9.1, with additional detail available in the EIS. The implementation schedule and program details will be developed in consultation with the appropriate regulatory agencies, including C-NLOPB, DFO, and CWS, as applicable.

As outlined in the EIS (Chapter 17), ExxonMobil has identified and committed to a number of measures and processes to avoid or reduce the potential for adverse effects from the Project activities. The Operator will obtain the required permits, approvals, and required authorizations for the Project, and the Operator and its contractors will comply with these and relevant regulations and guidelines in planning and implementing the Project. Follow-up monitoring programs will also be undertaken to determine the

effectiveness of the proposed mitigation measures. A summary of the follow-up and compliance monitoring and observational program that were provided in the EIS (Chapter 17 – Table 17.5) will also be applied to activities at EL 1134.

10 SUMMARY AND CONCLUSION

This EIS Addendum has been provided as a supplement to the original (December 2017) EIS for the Project. It provides an overview and analysis of a proposed modification to the scope of the Project as compared to that which was described and assessed in ExxonMobil's original EIS, which involves the proposed inclusion of EL 1134 in the south-central portion of the Project Area.

As described in the preceding sections, the planned Project activities that would occur within EL 1134 are in keeping with the nature and scope of the activities as described and assessed in the EIS. Each of the environmental interactions, potential effects and associated mitigation measures therefore remain applicable to the nature and scope of the planned activities in EL 1134 as described and assessed herein. These mitigations will be implemented in accordance with ExxonMobil's commitments and obligations pursuant to applicable legislative and regulatory requirements.

The proposed inclusion of EL 1134 does not result in any changes in the original environmental effects predictions, required mitigation or associated determinations related to environmental effects significance for any component of the environment.

The proposed Project – including the planned exploration activities associated with EL 1134 - is therefore not likely to result in significant adverse environmental effects.

11 REFERENCES

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APPENDIX A

EL 1134 Drill Cuttings Modelling Report

APPENDIX B

EL 1134 Oil Spill Modelling Report