GXT LabradorSPAN 2-D Seismic, Gravity and Magnetic Survey: Environmental Assessment Update for 2018

Prepared for:
GX Technology Canada Ltd
800, 350 7th Ave SW
Calgary, Alberta
Canada T2P 3N9

Prepared by:
Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL A1B 0L2
Tel: (709) 576-1458
Fax: (709) 576-2126

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Table of Contents

LIST OF APPENDICIES

LIST OF TABLES

LIST OF FIGURES

Abbreviations

CCG	Canadian Coast Guard
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
EA	Environmental Assessment
EBSA	Ecologically and Biological Significant Area
ECCC	Environment and Climate Change Canada
EEZ	Exclusive Economic Zone
FFAW-Unifor	Fish, Food, and Allied Workers – Unifor Union
FLO	Fisheries Liaison Officer
GXT	GX Technology Canada Ltd. (a subsidiary of ION Geophysical Corporation)
MARPOL	International Convention for the Prevention of Pollution from Ships
MMSO	Marine Mammal and Seabird Observer
NAFO	Northwest Atlantic Fisheries Organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
The Project	ION-GXT Newfoundland and Labrador 2018 2-D Seismic, Gravity and Magnetic Survey:
SARA	*Species at Risk Act*
SFA	Shrimp Fishing Area
SPOC	Single Point of Contact
TAC	Total allowable catch
VEC	Valued Environmental Component
VMS	Vessel Monitoring System
The Zone	The Tidal Waters of the Labrador Inuit Settlement Area, as defined in the Labrador Inuit Land Claims Agreement

1.0 INTRODUCTION

This document is submitted by to the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) as an annual update of the Environmental Assessment (EA) filings related to GX Technology Canada Ltd.'s (GXT's) LabradorSPAN 2D Seismic, Gravity and Magnetic Survey program in preparation for a seismic survey planned within the relevant area during 2018. The previous EA filings for the survey program are available at www.cnlopb.ca/assessments/gxtc.php.

1.1 Purpose

An EA update report is required by the C-NLOPB in any year that acquisition is planned in order to consider the relationship of the proposed program to the scope of the original assessment and screening, and to consider any new information that has become available. Specifically, the C-NLOPB requires the Operator to "outline the proposed activities, confirm that the proposed program activities fall within the scope of the previously assessed program, and indicate if, with this information, the EA predictions remain valid. In addition, GXT shall provide information regarding the adaptive management of requirements of the federal *Species at Risk Act* (SARA) into program activities (e.g., introduction of new species or critical habitat to Schedule 1; additional mitigations; implementation of recovery strategies and/or monitoring plans)"
(C-NLOPB 2013a).

1.2 Scope of the 2018 EA Update

In 2013 the C-NLOPB determined that the LabradorSPAN seismic survey proposed by GXT was not likely to result in significant adverse environmental effects. This determination was based on the EA that was submitted by GXT (LGL and GXT 2013) and on the subsequent filings by GXT in response to comments, questions and advice received during the review process. The EA was guided by the Scoping Document released by the C-NLOPB on 26 March 2013, which outlined the factors to be considered in the EA, and by stakeholders who provided input. These documents have further guided this update, which also considers new studies and data related to effects of seismic and to the biological setting of the Study Area.

As described below, the 2018 LabradorSPAN portion of the survey will occur within the same Project Area and within the same temporal period (June to November) using the same methodology and other project parameters; thus, the relevant work for 2018 has been assessed within the previously reviewed EA documents. This update therefore focuses on describing the specifics of the 2018 work and reviewing relevant changes related to the Valued Environmental Components (VECs) that have occurred since the filing of the previous EA documents, the most recent being GXT's Environmental Assessment Amendment (GXT 2016). Specifically, the present document considers, in relation to the 2018 planned activities:

- Any new Species of Special Concern that have been designated under SARA, by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or under the *Migratory Birds Convention Act* that may occur within the Project Area
- Introduction of any new species or critical habitat to Schedule 1 of SARA; implementation of recovery strategies and/or monitoring plans
- Any recently designated Special Areas
- Any new or experimental fisheries and fisheries research surveys, or changes in existing fisheries
- Any new literature on the effects of sound and/or seismic surveys on marine biota
- Any potential changes to the effects assessment as a result of the above
- Any changes in mitigations required.

This update also reports GXT's various recent communications and consultations to inform interested parties about the 2018 plans, and to seek any new information or advice relevant to the update.

2.0 PROPONENT AND CONTACTS

GXT contact information is provided below:

GX Technology Canada Ltd.
(a subsidiary of ION Geophysical Corporation)
800, 350 7th Ave SW
Calgary, Alberta
Canada T2P 3N9

GXT contacts for the original screening and the 2018 seismic program:

Project Manager - Dean Kennedy
GX Technology Canada Ltd.
Phone: (709) 747-6232
Cell: (709) 682-2336
Dean.Kennedy@iongeo.com

Environmental Manager - Robert Pitt
GX Technology Canada Ltd.
Phone: (709) 753-9499
Cell: (709) 682-3342
Rob.Pitt@iongeo.com

3.0 EXISTING ASSESSMENT

In 2013, GXT submitted an EA for its proposed LabradorSPAN 2D Seismic, Gravity and Magnetic Survey, 2013-2015 (LGL and GXT 2013) to the C-NLOPB. Subsequently, two amendments were filed extending the maximum length of the seismic streamer to 12 km and the potential maximum annual acquisition (number of kilometres surveyed per year) to 16,000 km (GXT 2013), and extending the temporal scope of the project beyond 2015 (GXT 2016). Although GXT had requested that the temporal scope be extended to 2020, the C-NLOPB approved the change to the end of 2018 based on new C-NLOPB policy related to the maximum effective length of EAs (C-NLOPB 2018).

The conclusion of GXT's assessment filed in 2013 was that potential effects from the Project, as proposed, were predicted to be not significant with the identified mitigations in place (see LGL and GXT 2013, Sections 5, 6 and 7). Similarly, C-NLOPB stated in its August 2013 Letter of Determination (C-NLOPB 2013a) after reviewing the EA and associated Addenda: "We have considered this information and the advice of the C-NLOPB's advisory agencies and have determined that the proposed project, following the application of mitigation measures, is not likely to cause significant adverse environmental effects", as it did in its Screening Report Decision concerning the Project: "The C-NLOPB is of the opinion that, taking into account the implementation of the proposed mitigation measures set out in the conditions above and those committed to by GXT the Project is not likely to cause significant adverse environmental effects" (C-NLOPB 2013b). After GXT's 2016 proposed amendment was reviewed, the C-NLOPB's conclusion was again that "the project is not likely to cause significant adverse environmental effects" with stated mitigations in place (C-NLOPB 2018).

Although GXT's 2013 EA and subsequent filings considered the possibility of acquisition occurring in any or all years from 2013, no GXT programs have taken place in the region since 2013. In that year a survey was conducted between 20 August 2013 and 1 November 2013. During the 70-day program, a total of 6,574.65 km of seismic data was acquired. All mitigation measures described in the EA filings were implemented and there were no reports of fishing gear conflicts and no environmental or safety incidents. Details of program operations and mitigation implementation that year are provided in an EA update report filed in 2014 (LGL and GXT 2014). It was also a conclusion of that report that "based on the full implementation of the mitigations, communications with resource users and scientists during the survey, and the systematic reports and observations of the Fisheries Liaison Officers (FLOs) and Marine Mammal and Seabird Observers (MMSOs), there is nothing to indicate that the conclusions of GXT's EA and the C-NLOPB's Screening Report should not stand: that the project, as conducted, was not likely to have caused significant adverse environmental effects".

4.0 PROJECT DESCRIPTION

The following sections summarize the key elements of GXT's 2-D Seismic, Gravity and Magnetic Survey for the Labrador Shelf Area as described in the 2013 EA document and subsequent filings, and as considered in the C-NLOPB's Screening Report and Letters of Determination, particularly as they relate to the scope of the Project. This section also describes the work proposed for 2018 and demonstrates that the program remains within the scope previously assessed.

4.1 Project Overview and Methods

As described in the 2013 EA and subsequent filings, GXT's 2-D Seismic, Gravity and Magnetic Survey for the Labrador Shelf Area is a 2-D (single streamer) marine geophysical survey to collect seismic, gravity, and magnetic data, potentially starting as early as 1 June and concluding as late as 30 November in any of those years. The survey is restricted to a defined Project Area (Figure 4-1), focused mainly on the Labrador Shelf and Slope, using a conventional type seismic ship which tows a sound source (compressed air array) up to 6,300 in^3 in volume, and a single streamer (buoyant cable) up to 12 km long, containing receiving (listening) hydrophones. The sound energy received by the hydrophones is recorded by computers on board the seismic ship. The seismic vessel also passively collects and records gravity and magnetic data at the same time and has an echosounder for depth soundings. A support vessel is also used when needed to scout for fishing gear or hazards, and potentially for re-supply or crew changes. No helicopter use is planned in 2018.

Each of the components and methods of the proposed 2018 LabradorSPAN work fall within the scope of these parameters as set out in the 2013 EA Project Description and subsequent amendments, as do the communication, mitigation, safety, and emergency response plans for 2018.

4.2 Spatial Boundaries

The Project Area as described in the EA is the Labrador Shelf and Slope between approximately 61°N and 50.5°N, as depicted in Figure 4-1. Depths in the area range from approximately 100 to >3,000 m. No acquisition or gear deployment may occur outside this Project Area. As shown on the maps in the 2013 EA and in this document, the Project Area is within Canada's Exclusive Economic Zone (EEZ) but does not enter the waters of the Nunatsiavut Zone (the Tidal Waters of the Labrador Inuit Settlement Area, as defined in the Labrador Inuit Land Claims Agreement). Similarly, no acquisition will take place within any part of Canada's Territorial Sea. Acquisition lines will end short of the Zone – and all other Project Area boundaries – to ensure that line turns can be made without seismic equipment (array or streamer) entering.

Most of the EA Project Area is also within the Study Area used for the C-NLOPB's Strategic Environmental Assessment Labrador Shelf Offshore Area (Sikumiut 2008). The western limit of the Project Area is about 22 km (at its closest) from the Labrador mainland. The communities closest to the Project Area are approximately 40 to 50 km away. No portion of the survey will be acquired within Gilbert Bay, Nain Bight or Hamilton Inlet; survey activities will also remain outside of the Hawke Channel box (i.e., the mobile fishing gear closure area), now designated the Hawke Channel Marine Refuge.

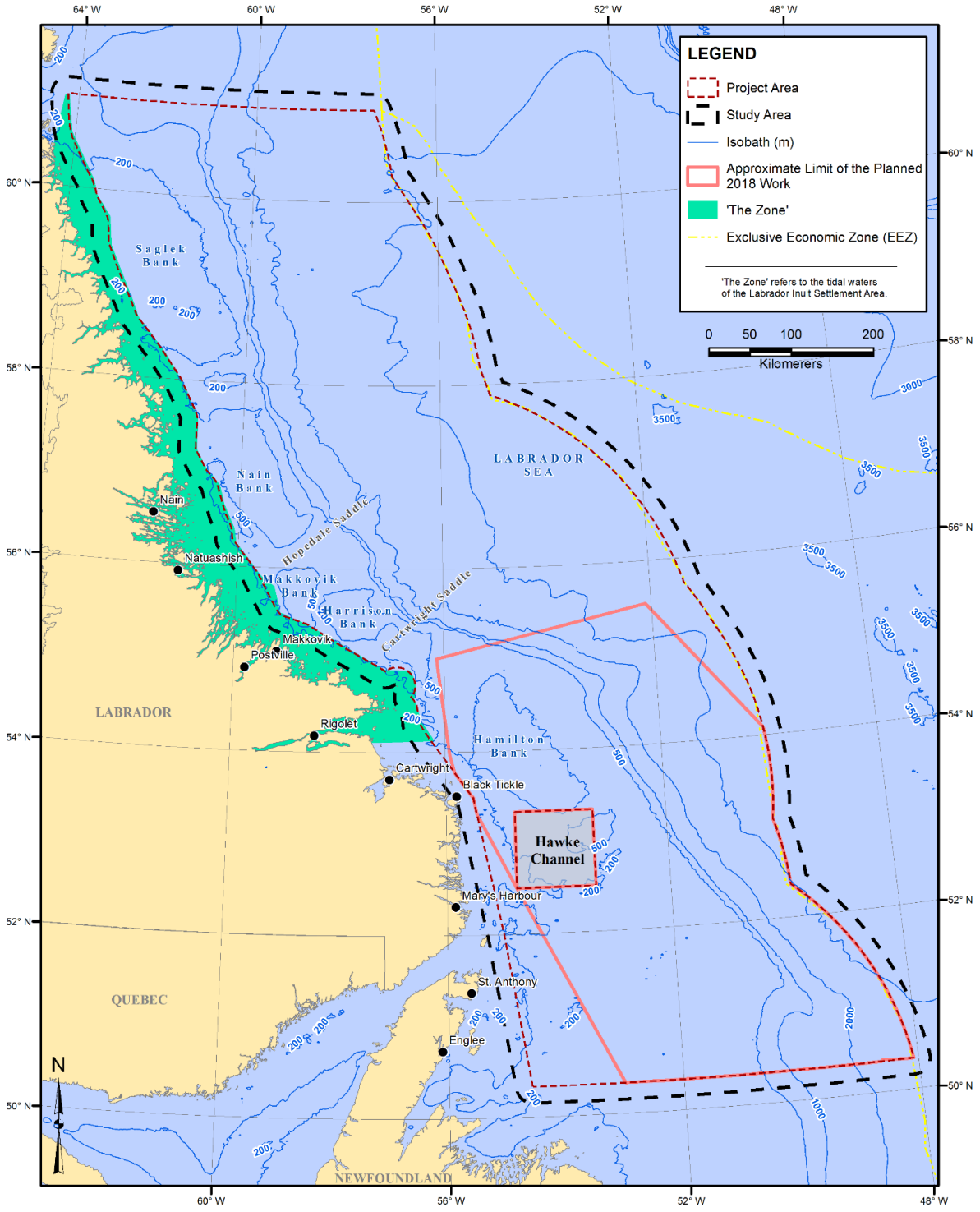

Figure 4-1 Locations of the Project Area and Study Area for GXT's LabradorSPAN seismic program(s), 2013 to 2018Spatial Boundaries, and 2018 Work Area

For 2018, the planned work is located in the southern half of the Project Area, south of approximately 55°30' N latitude. GXT is expected to request approximately 2,100 km of seismic acquisition (full fold) within the LabradorSPAN Project Area, although this might increase (or decrease) slightly as planning moves forward (final plans will be communicated to relevant beneficiaries, stakeholders and agencies before acquisition begins). The amount will be well under the 16,000 km of annual acquisition scoped in the EA filings. As with the 2013 work, the lines will be widely spaced (typically 50 to 200 km apart, except where they intersect) and many are long (up to 580 km) within the LabradorSPAN area. All LabradorSPAN project work for 2018 will conform with, and will adhere to, each of the assessed spatial boundaries. The focus of the 2018 work within the LabradorSPAN EA geographical scope is shown in Figure 4-1.

4.3 Temporal Boundaries

The survey window described and assessed in the existing assessment documents is 1 June to 30 November in any Project year.

4.3.1 2018 Temporal Boundaries

Work in the LabradorSPAN EA area in 2018 could begin in mid-June and continue into the late fall, remaining within the assessed temporal scope. As described in the filings, the timing of the acquisition of specific lines within the LabradorSPAN Project Area can depend on several factors, including commercial fish harvesting, the local weather, sea state, ice conditions in specific locations, and on the timing of other parts of GXT's program.

4.4 Survey Ships

In Section 2.2.6 of the 2013 LabradorSPAN EA, details were provided for ships that might be used for the Project; these are the seismic source / streamer vessel, which will also house the gravity and magnetic instruments, and a support ship, which will accompany the seismic ship as and where needed. The seismic vessel will also collect (passively) gravity and magnetic data at the same time and will have an echosounder for depth soundings. The seismic ship will likely deploy a workboat to repair the streamer when necessary, which could also be used as a Fast Rescue Craft and for personnel transfers. Communications with other vessels and scouting for hazards may be done by the support vessel. Although specific ships were presented for the purposes of the assessment filings, the EA noted that "If another vessel needs to be used instead as the seismic source ship, it will be equivalent in all respects related to environment and safety. This would not alter acquisition methods, mitigations or impact predictions" (Note, page 9). Subsequently, the seismic ship *M/V Discoverer* and the support ship *M/V Polar Prince* were submitted to the C-NLOPB on 28 June 2013 and deemed by the regulator and the vessel's Classification Society to be appropriate for the work.

4.4.1 2018 Survey Ships

For 2018, the candidate vessel is the *M/V Discoverer 2*. It, like any other ship that GXT would use on the Project, is suitable for the work and will be approved for survey use by the C-NLOPB (within the

Geophysical Program Authorization) before the survey begins in 2018. Use of this ship or a similar ship will not alter acquisition methods, mitigations or impact predictions contained in GXT's previous filings, and remains within the EA scope. The support vessel likely to be used in 2018 is GXT's *M/V Polar Prince*, which supported the 2013 survey. Again, if a different vessel is used for the survey or survey support in 2018, it will also be suitable for the work proposed and will also be approved for survey use by the C-NLOPB and their Port State Control status will be reviewed by Transport Canada before acquisition.

The seismic ship will tow a conventional sound source (airgun array) and a single streamer containing receiving hydrophones, described below, as well as collecting gravity, magnetic and depth data. The support ship will accompany the seismic ship when and as needed. All vessels employed by GXT during the Project will be approved for operation in Canadian waters by the relevant classification society and the C-NLOPB, as noted above. Both ships will be fully MARPOL compliant and have oil spill/pollution prevention and emergency response plans. As described in the 2013 EA, the ships will use low-sulphur marine diesel fuel, and will require normal ships' supplies/provisions. Transfers of personnel may be done offshore using the support ship and/or suitable area ports. No helicopter use is planned. Only existing Newfoundland and Labrador port infrastructure are planned to be used for this Project. As stated in the 2013 EA, it is also possible that the project might hire another smaller boat to assist with scouting operations (i.e., locating gear) in areas that might have active fisheries.

Information about the vessels expected to be used for the 2018 work is provided below. As noted, if a change of either vessel occurs, the capabilities and suitability of the ships for the work, particularly in terms of the potential for effects on the environment and relevant VECs, will be equivalent.

Expected Survey Ship: M/V *Discoverer 2* (call sign C6UN7)

- Owned by Sinopec Offshore Oilfield Services Company
- Built in 1993 by North American Shipbuilding, Inc., Louisiana (former *Geco Marlin*)
- 70.1 m length over all, 18 m beam, 5 m draught, 2,722 t gross
- Classification Society DNV-GL, DNV✠1A1

Expected Support Ship: *M/V Polar Prince* (call sign CFK9552)

- Owned by GXT Canada (since 2009)
- Built 1959 by Davie Yards Inc, Quebec - major refit 2009 (former Canadian Coast Guard (CCG) / Fisheries and Oceans Canada (DFO) *Sir Humphrey Gilbert*)
- 72.5 m length over all, 14.7 m beam, 5 m draft, 2,153 t gross
- Classification Society DNV-GL, 1A1 Ice (1A) Medium icebreaker

4.5 Seismic Energy Source and Streamer

The 2013 EA, and the subsequent C-NLOPB Screening, was conducted on the basis of the seismic ship using a compressed air array as the seismic data sound source. The array considered for the purposes of the assessment had a maximum cubic volume of 6,300 in^3, with a nominal firing pressure of 2,000 pounds per square inch (psi), and a shot (airgun activation) interval of approximately 19 to 22 seconds (= every 50m). The array tow depth was specified at 8 to 11 m, and the survey speed at approximately 4.5 knots (8.3 km/h).

A single towed seismic hydrophone cable (streamer) is also described in detail in Section 2.2.7 of the EA (LGL and GXT 2013). The maximum streamer length assessed (as amended) is 12,000 m, deployed behind the seismic ship at a depth of approximately 9 to 15 m. This is a passive listening device, which receives the sound waves reflected from structures underneath the ocean floor and transfer the data digitally to an on-board recording and processing system.

4.5.1 2018 Seismic Energy Source and Streamer

The seismic array and streamer planned for use in 2018 will conform to each of these maximum assessed parameters (or less/lower). The array on board the *M/V Discoverer 2* is 6,060 in^3 at 2,000 psi, and would be towed at a depth of approximately 10 m, with a shot (airgun activation) interval of approximately 19 to 22 seconds, and therefore within the assessed scope for those parameters. The survey speed will again be approximately 4.5 knots, with a solid core seismic streamer, no more than 12,000 m in length, towed at a planned depth of ~15 m.

4.6 Other Equipment

As described in the EA filings, gravity and magnetic data will also be collected (passively) using a marine gravity meter system, and the seismic vessel will also employ an echosounder for depth soundings. Sound velocity profiles may also be acquired in the water column at various locations within the survey area, as described in the 2013 EA (LGL and GXT 2013).

4.7 2018 Work in Relation to the EA, the C-NLOPB Screening and Mitigation Commitments

As described above, all aspects of the proposed 2018 LabradorSPAN area work plan fall within the scope of the 2013 EA submission and subsequent filings. As in 2013, GXT will apply each of the identified communication, mitigation, safety, and emergency response plans, all of which contributed to the C-NLOPB's determination that "the proposed project, following the application of mitigation measures, is not likely to cause significant adverse environmental effects", and that the project might proceed.

No requirement for additional mitigation measures beyond those established in 2013 has been identified during this review of the proposed 2018 work, including during the 2018 consultations for this update, although some enhancements will be made related to communication and information exchange measures (see below, Section 5.0).

4.8 Other 2018 GXT Work Outside the LabradorSPAN EA area

GXT is also applying for 2D acquisition in other parts of the Newfoundland and Labrador offshore sector, to the south and outside of the LabradorSPAN EA area, as part of its 2018 Project, using the same ships, methods and parameters described above. The work will be within GXT's GrandSPAN environmental assessment areas, as amended. (Past and current filings are available on the C-NLOPB website at http://www.cnlopb.ca/assessments/gxtgpm2ds.php.) The total expected acquisition – including the lines in the LabradorSPAN area – is approximately 12,000 km, which is less than the maximum number of annual kilometres assessed for either the LabradorSPAN (16,000 km) or GrandSPAN (14,000 km of 2D for a single 2D ship survey) area separately.

4.9 Commitments and Mitigation

The scope of activities related to this Project have not changed since the original 2013 EA (as amended), and the mitigation measures remain the same. The largest potential for interaction with both the biophysical and socio-economic environment is through the use of equipment such as survey vessels, the array and streamers to collect the seismic data.

As described in GXT's previous filings, and implemented during the 2013 survey, communications and planning are key to avoiding or reducing the potential for interaction with and effects on commercial fishing, including fisheries research activities. The importance of these communications was also reiterated during the 2018 consultations for this update (Section 5.0, below). As described in GXT's mitigation commitments. This includes elements such as continuing updates and information exchanges with stakeholders, Notices to Shipping, Newsletters, the expertise of the on-board FLOs, and a Single Point of Contact (SPOC), with the aim of avoiding conflicts with fishing activities, particularly fixed gear harvesting. A compensation program will be available, which is consistent with C-NLOPB guidelines and past practices. This program covers damage to fishing gear (or vessels) caused by the survey vessel or survey gear and includes the value of harvest lost as a direct result of an incident. GXT will follow procedures for responding to a claim similar to those outlined in the One Ocean Protocol document, which have been successfully employed in the past by other operators. Incidents will be reported to the C-NLOPB, which maintains a 24-hour answering service at 709-682-4426 for this purpose (709-778-1400 during working hours). Reports on contacts with fishing gear will include the exact time and location of initial contact, loss of contact and a description of identifying markings on the gear. Information for contacting the SPOC will also be included in GXT communications and in the Notices to Shipping.

No new mitigations were deemed necessary based on GXT's 2013 work, the consultations, and communications for the 2018 program and the assessment of this update. However, two additional mechanisms will be implemented this year to enhance the application of these mitigations. As part of its ongoing communications with fishing interests, GXT will participate in a weekly conference call between Project personnel and Fish, Food, and Allied Workers (FFAW)-Unifor (as deemed necessary by FFAW-Unifor). For enhancing operational safety and avoidance of no-go areas, the survey ship will use an on-board computerized marine management system (ION's MARLIN system). MARLIN combines temporal project planning with 3D spatial situational awareness. MARLIN integrates AIS, GPS, GIS, MetOcean and visual data between offshore structures and other vessels to create a common operational picture. For

the 2018 program, this will include, but not limited to, The Zone boundaries, the Hawke Channel, the PA limits, and known fishing gear locations, among others.

Appendix A summarizes GXT's mitigation commitments, organized by the potential effects they aim to prevent or mitigate (Table A-1), and the status of these commitments (as of 1 May 2018) in relation to 2018 Program preparation (Table A-2).

5.0 CONSULTATION AND INFORMATION EXCHANGE

5.1 GXT Approach: Consultation and Continuing Engagement

GXT's consultations and information exchanges for marine seismic projects aim to communicate with relevant rights-holders (e.g., beneficiaries), stakeholders, agencies, and other potentially interested agencies before the survey begins to provide information about the Project, and to gather information about resources, resource use, issues and concerns, and to provide best approaches for continuing information exchange and mitigation during the survey. As described in the 2013 EA (Section 5.3) and subsequent filings, GXT conducted extensive consultations and communications with the parties (e.g., fisheries representatives, government agencies, scientists, community representatives) in advance of the C-NLOPB's environmental screening and those communications were a key part of the Project planning process.

After the survey start in 2013, follow-through communications and information exchanges continued throughout the survey, and involved meetings, multiple emails from GXT (several a week on occasion) informing fisheries interests, DFO, Environment Canada, the Department of National Defence (DND) (MARLANT), Nunatsiavut Government representatives, the C-NLOPB and many others, about planned and current activities, and providing maps of survey plans. In addition, a survey website was established and updated throughout the program, and newsletters were circulated. On board the seismic ship, the two FLOs maintained at-sea radio communications with fishing vessels in the area, the crew and on-land project personnel and agencies.

Communications about the survey and survey contacts were also provided to CCG radio (Notices to Shipping), to CBC radio's The Broadcast and to the OKâlaKatiget Society (OK coastal radio network). All GXT communications contained contact details for GXT managers and for the 24-hour live toll-free telephone number to contact the fisheries SPOC, as well as the survey website. After the survey, the wildlife observation data collected during the 2013 survey were provided to DFO, Canadian Wildlife Service (CWS), and the Torngat Wildlife, Plants and Fisheries Secretariat, as was the final MMSO report. A further formal report about the program and the application of mitigation commitments was supplied to the Regulator, as required under the C-NLOPB's authorization.

Indications during and after the 2013 survey were that these communications / information exchanges had worked well, before and during the survey. Each of these measures will be implemented again for the 2018 work.

5.2 2018 Advance Consultation and Communications

Consultation and information exchange activities in advance of the 2018 program have taken the form of meetings, telephone calls, emails and/or information packages. The purpose of these communications was to provide information about all of GXT's proposed plans for 2018 in Newfoundland and Labrador offshore areas, to answer questions, and to seek comments, advice and any additional information / knowledge the respondents could provide relevant to the survey activities and survey area VECs.

5.2.1 Information Provided

For this Update, the agencies, organizations and other entities contacted for the original EA (and amendments) were contacted again (unless they had stopped operating in the area), as were some additional groups relevant to the overall scope of work proposed for 2018. These are listed in Section 5.2.3, with an indication of the types of communications involved this year. In all cases, the communications involved at a minimum:

1. A description of the GXT geophysical work proposed this year, including information about the timing, location (including maps), the proposed ships, types of equipment, and methods. This included all the work areas involved in GXT's 2018 Program, including activities on and near the Grand Banks to the south and east.
2. Information about GXT's existing EA filings for all parts of the 2018 Program, about the current EA update process, and the relation of the currently proposed program relates to the scope of the existing EAs, and about GXT's 2013 LabradorSPAN program.
3. Details of mitigations and communications measures to be applied again in 2018.
4. Request for questions, comments, information and/or advice.
5. GXT contact information for further information exchange and continuing communications.

In email communications, recipients were invited to contact GXT managers concerning any questions, advice, concerns or other comments about the planned 2018 GXT work, or if they wanted to communicate or meet with GXT for any other reason. GXT also noted that it would continue to provide updated information throughout the program as the work moves forward, including advance details of the locations of individual survey lines.

During the in-person meetings, PowerPoint presentations were used, which included maps of specific lines to be acquired. The presentations were also tailored in terms of the more specific interests of the particular group involved; for example, more focused information about fisheries in relation to the work area for fishing organizations, and more on other wildlife (seabirds, marine mammals) for groups such as the Torngat Wildlife, Plants and Fisheries Secretariat. Where requested, a copy of the presentation was provided for use within that organization / agency.

5.2.2 Issue Identification and Information Received

During the 2018 information exchanges and communications, no new issues were identified that had not been raised in some way during the 2013 consultations for the EA and the C-NLOPB screening (see EA Section 5.2.3 and subsequent GXT filings), each of which was intended to be addressed in the various communication and other mitigation measures identified in those documents, and which will be applied again in 2018.

Questions asked and responded to during the 2018 discussions included inquiries about the particulars of the Project – for example, about the ION-GXT Basin SPAN concept and approach, the types of information collected during the survey and the way it is used, the difference between 2D and 3D seismic, and about various details related to the equipment employed (e.g., the size of the array being used, or the length of the streamer). Other questions related to effects of the survey on VECs - on seals, fish, and

fisheries in particular (also addressed in the original EA filings and in Sections 6 and 7 of this Update). GXT also responded to questions about survey proximity to the Nunatsiavut Zone, the Hawke Channel and shore-associated features. Some other matters raised related to employment opportunities. During a few meetings, participants asked for a copy of a particular science study mentioned, which was supplied (via pdf or internet link) afterwards.

Information received by GXT concerning particular VECs was noted and has been incorporated within the relevant sections of this update (e.g., the status and timing of science surveys in 2018, in Section 6.1.1.2), while other information (including expected start times of certain fisheries, locations where fixed gear might be particularly intense (e.g., in Northwest Atlantic Fisheries Organization (NAFO) 3K, and confidential enterprise fishing plans) will be incorporated into various aspects of operational planning for the survey. Other specific information provided included, for example, information about the new Nunatsiavut – Canada Imappivut ("Our Ocean") initiative and Memorandum of Understanding (from Nunatsiavut Government representatives), information about participation in harvesting newly-awarded deep-sea clam quota (NunatuKavut / Nunacor / NDC Fisheries) in waters south of the Project Area, and issues with fisheries-survey communications during some 2017 programs which pointed to means of enhancing communications during Project operations (e.g., weekly fisheries-Project conference calls (FFAW-Unifor)). Other agencies supplied information about current preferred seabird observation protocols and data keeping, and bird salvage permits for the survey ships (Environment and Climate Change Canada (ECCC) / CWS) and contact information for military operations deconfliction (MARLANT).

5.2.3 Agencies, Departments, Enterprises and Other Organizations

The following entities and individuals were contacted. The types of consultations / communications involved are indicated after the entity name. As noted above, all were invited to contact GXT if they wanted further information or discussions.

- Association of Seafood Producers (ASP) – meeting, email
  - Derek Butler, Executive Director, St. John's, NL
- Canadian Association of Prawn Producers (CAPP) – email
  - Bruce Chapman, Executive Director, Ottawa, ON
- Clearwater Seafoods Limited Partnership – telephone / email
  - Catherine Boyd, Director Sustainability and Public Affairs, Bedford, NS
- Department of Fisheries and Aquaculture Newfoundland and Labrador – Email
  - Todd Budgell, Manager of Aquaculture Licencing and Inspections, St. John's, NL
- DFO – telephone and/or email
  - Blair Thorne, Oceans Biologist, Integrated Management, St. John's, NL

  - Darrin Sooley, Senior Biologist, Coastal Marine Oil & Gas Regulatory Review Unit Fisheries Protection Program Senior Biologist, St. John's NL
  - Don Stansbury, Section Head, Shellfish Section, St. John's, NL
  - Earl Dawe, Research Scientist, Shellfish Section, St. John's, NL
  - Eugene Lee, Senior Biologist, Marine Habitat Section, St. John's, NL
  - George Sheppard, Technician, Program Services and Planning/ science surveys, St. John's, NL
  - Jason Kelly, Senior Biologist, Marine Habitat Section, St. John's, NL
  - Judy Hosein, Chief, Statistical Services, Economic Analysis and Statistics, Ottawa ON
  - Krista Baker, Biologist (Snow Crab Survey), St. John's NL
  - Luiz Mello, Biologist Marine Fish Species at Risk (R/V Surveys), St. John's, NL
  - Paul Higdon, Research, Fisheries Sampling / Surveys, St. John's, NL

- DND Canada – Email
  - Carol Lee Giffin, Safety and Environmental Officer, Maritime Forces Atlantic / MARLANT
- ECCC / CWS – telephone and/or email
  - Jerry Pulchan, Environmental Assessment, St. John's, NL / Dartmouth, NS
  - Glenn Troke, EA Coordinator, St. John's, NL
  - Joshua Mailhiot, EA Coordinator (CWS), St. John's, NL
  - Carina Gjerdrum, Seabird Issues Biologist (CWS), Dartmouth, NS
  - Sabina Wilhelm, Seabird Biologist, St. John's, NL
  - Isabelle Robichaud, Wildlife Permits Officer, Saint John, NB
- FFAW-Unifor – meetings and/or email
  - Robyn Lee, Petroleum Industry Liaison, St. John's, NL
- Groundfish Enterprise Allocation Council (GEAC) – telephone, email
  - Kris Vascotto, Executive Director, Clementsvale, NS
- Harbour Grace Shrimp Company – email
  - Bev Sheppard, Harbour Grace, NL
- Icewater Seafoods – email
  - Dennis Slade, Fisheries Consultant, Arnold's Cove, NL
- Innu Nation – telephone, email
  - F. Milley, Sheshatshi, NL
  - Paula Reid, Environmental Analyst, Sheshatshi, NL
- Labrador Fishermen's Union Shrimp Company – Telephone, email

  - Gilbert Linstead, General Manager, L'Anse au Loup, NL
  - Ken Fowler, Assistant General Manager, L'Anse au Loup, NL

- Mersey Seafoods Ltd. – email
  - William Muirhead, Director Domestic Sales & Marketing, Liverpool, NS
- MV Osprey Ltd. – email
  - Scott Nichols, Fleet Manager, North Sydney, NS
- Nataaqnaq Fisheries Inc. – email
  - Keith Coady, Fleet Manager, St. John's, NL
- Nature Newfoundland and Labrador – telephone /email
  - Len Zedel, Memorial University, St. John's, NL
- Netukulimk Fisheries Limited, Miawpukek First Nation – email
  - Joeleen Drake, Conne River, NL
- Newfound Resources Ltd. (NRL) – email
  - Brian McNamara, President, St. John's, NL Jeff Simms, Operations Manager, St. John's, NL
- NAFO – telephone / email
  - Jana Aker, Fisheries Information Administrator, Halifax, NS
- Nunacor – Telephone, email
  - Andy Turnbull, Chief Executive Officer, Happy Valley-Goose Bay, NL
  - Gail King, Chief Financial Officer, Happy Valley-Goose Bay, NL
  - Richard Lewis, Operations Manager, Happy Valley-Goose Bay, NL
- Nunatsiavut Government – Meeting, emails, telephone,
  - Rodd Laing, Director of Environment, Department of Lands and Natural Resources, Nain, NL
  - Claud Shepard, Director of Non-Renewable Resources, Nain, NL
  - Colin Webb, Fisheries Specialist, Department of Lands and Natural Resources, Nain, NL
- NunatuKavut Community Council – Meeting, email
  - Donna Carroll, Natural Resources and Environment, Happy Valley-Goose Bay, NL
- Ocean Choice International (OCI) – meetings, email
  - Rick Ellis, Director, Manager of Fleet Operations, St. John's, NL

- One Ocean – telephone, meeting, email
  - Maureen Murphy, Director, St. John's, NL
- Seafreez Foods Inc. (Barry Group Inc.) – email
  - Karl Sullivan, St. John's, NL
- Torngat Fish Producers Co-operative Society, Limited - meeting
  - Karl Sullivan, St. John's, NL
  - Keith Watts, General Manager, Happy Valley-Goose Bay, NL
  - Ronald Johnson, Assistant General Manager, Happy Valley-Goose Bay, NL
  - John Ikkusek- Board Member Nain - Vice President (meeting Chair)
  - John W. Andersen - Board Member Nain
  - Ross Flowers - Board Member Hopedale
  - Elizabeth Flowers - Board Member Hopedale
  - Keith Decker - Board Member Postville
  - Stephen Rose - Board Member Postville
  - Wilson (Junior) Andersen - Board Member Makkovik
  - Randy Rice - Board Member Makkovik
  - Richard Rich - Board Member Rigolet (Secretary)
- Torngat Wildlife, Plants and Fisheries Secretariat (Nunatsiavut) – Meeting, emails
  - Craig Taylor, Fisheries Research Program Manager
  - Keith Watts, Nunatsiavut Appointee, Joint Fisheries Board

5.3 Continuing Communications and Information Exchange

As in previous discussions, most of those who commented during 2018 reinforced the need and value of maintaining strong on-going communications in 2018 to mitigate potential impacts on commercial fisheries and fisheries science. This includes frequent updates about activities and the mutual exchange of plans, including the use of at-sea FLOs representing both Labrador / Nunatsiavut and FFAW-Unifor interests. Several remarked during the 2014 Update consultations and again in 2018 that GXT had done a good job with the continuing communication process during the 2013 work (see above, Section 5.1.), and stressed the need for GXT to maintain similar procedures and mechanisms before and during the 2018 work – which GXT will do.

In addition to continuing targeted information exchanges about the current locations of science surveys, or fishing activities in relation to the survey, GXT will conduct follow-up discussions with all interested groups during and after the survey. This will include reporting on the progress of the survey, monitoring the effectiveness of mitigations, determining if any survey-related issues have/had come up and (post-survey) and/or to present monitoring results. Appendix A provides additional information about the communication protocols that make up a key part of the EA mitigation commitments.

Another vital part of the communications plans going forward is to ensure that on-board survey personnel are aware of the environmental commitments and requirements so that they can be properly

implemented. In that regard, several communication measures are implemented, including the start-up meetings (see 2013 EA, Section 5.6). At these sessions the GXT Environmental and Project Managers meet with all key at-sea personnel (representing all departments) before the start of the survey and at each crew change to present training (with translators as required) on the local environment and VECs (e.g., expected fisheries and timing of harvests), the environmental commitments and requirements (e.g., marine mammal shutdowns, fisheries avoidance, pollution prevention), the roles of the MMSOs and FLOs during the survey, incident reporting requirements, and other such matters. The FLO and MMSOs typically attend as well.

6.0 ENVIRONMENTAL UPDATES

6.1 Commercial Fisheries and Other Ocean Users

6.1.1 Commercial Fisheries

6.1.1.1 Commercial Fishing Activity

Commercial fishing activity in offshore Newfoundland and Labrador has taken place for centuries, with the most common species in the fishery overall being northern shrimp and snow crab since the collapse of groundfish stocks in the early 1990s. Greenland halibut (turbot) has also been a groundfish species that has been harvested frequently in Newfoundland and Labrador offshore waters, including the Project Area. The 2014 EA update provided geospatial fishing information, provided by DFO, for 2011 and 2012 fishing years, identifying locations for fishing activities using both fixed gear and mobile gear. This 2018 update follows a similar pattern, and Figure 3-1 illustrates commercial fishing activity for all species of fish, while Figures 3-2 and 3-3 illustrate commercial fishing activity in the Project Area using either fixed gear or mobile gear.

These geospatial data are presented for 2012 to 2016 for all fisheries within the Project Area. Based on analysis of harvesting over many years the locations of key species harvesting are known not to alter substantially from year to year, mainly because most harvested species focus on areas of specific habitat.

As shown in Figure 6-1, the heaviest concentration of multi-year commercial fishing in the Project Area occurs within NAFO Divisions 3K and 2J, with activity generally decreasing towards the north. Fixed gear fisheries (Figure 6-2), primarily for snow crab, occupy a smaller portion of the Project Area, occurring primarily in the southwest section of 3K, and along the edge of the 1,000 m isobath along 3K and 2J. Fishing activity occurs in 2J as well, it is less dense than the mobile gear fishery. There has been some fixed gear fishing activity in 2G and 2H, but it has been sporadic, and the level of activity has been low. Mobile gear fishing (Figure 6-3) (e.g., shrimp and groundfish trawls, and longlines) make up the majority of commercial fishing activity within the Project Area. This is common, and northern shrimp and turbot are both important fisheries for the area and are distributed throughout the coast of Labrador.

Requested domestic fisheries landings data for 2016 for these NAFO Divisions from DFO were not available at the time of writing. However, data (quantities of harvest) are available for 2012-2016 from the NAFO Statlant 21 datasets and are thus presented in Table 6.1 for 2012 to 2016. Since these data are only accessible at the NAFO Division level, all domestic Canadian data for NAFO Divisions 2G, 2H, 2J and 3K (collectively 2+3K) are presented as the principal Divisions that overlap with the LabradorSPAN Project and Study Areas (see Figure 6-1). It should be noted, however, that the data for 3K overrepresents the LabradorSPAN EA fisheries, since it captures a larger area of activity to the south and inshore fisheries that are not in the Project Area. The data presented below also exclude capelin and herring that appear in the Statlant 21 data for 3K since these are known to be focused outside the Project Area parts of 3K. As the Table shows, the period has seen recent marked decreases in landings of snow crab and northern shrimp in particular, which is discussed in the following sections.

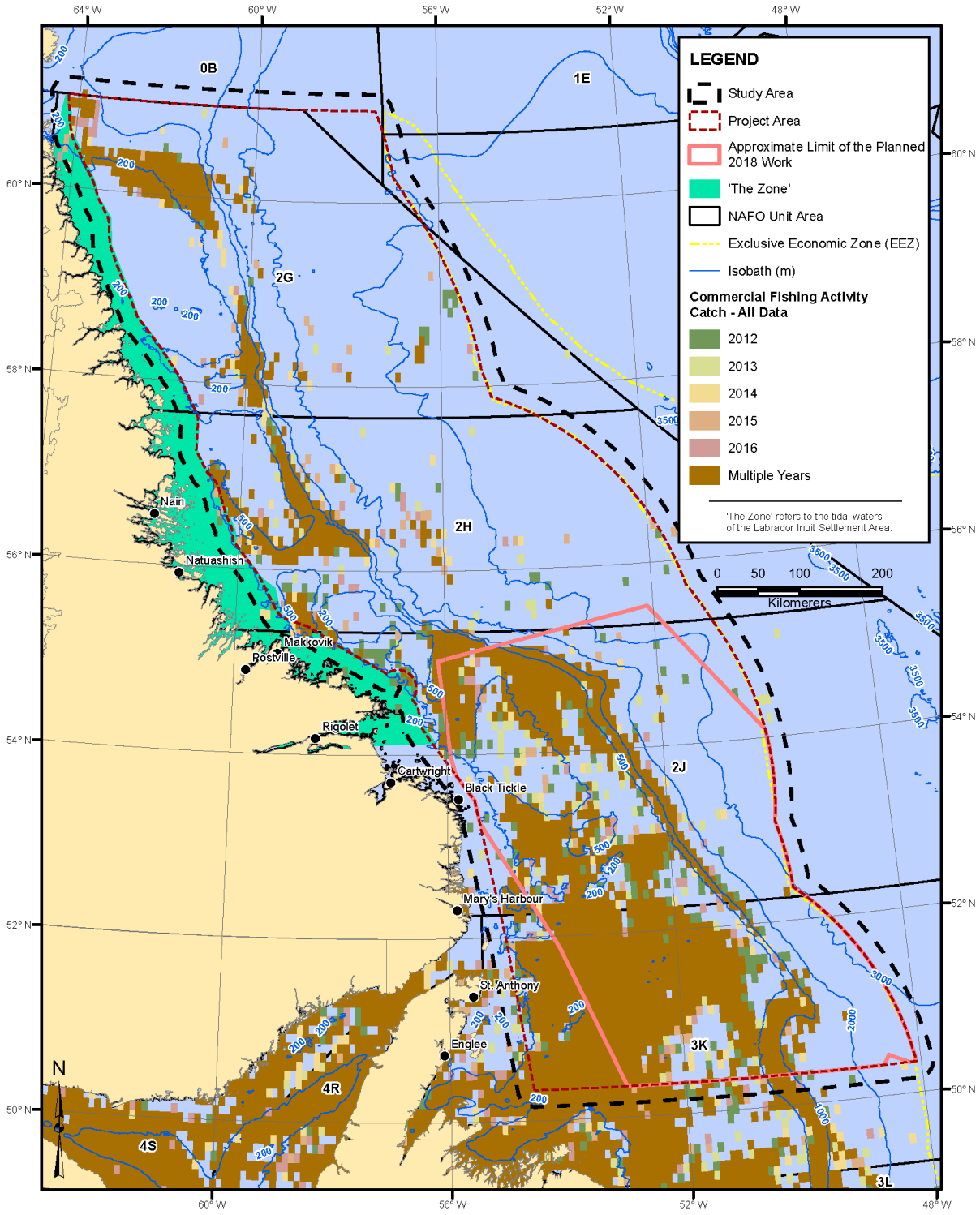

Figure 6-1 Commercial Harvesting Activity, All Species, 2012 to 2016

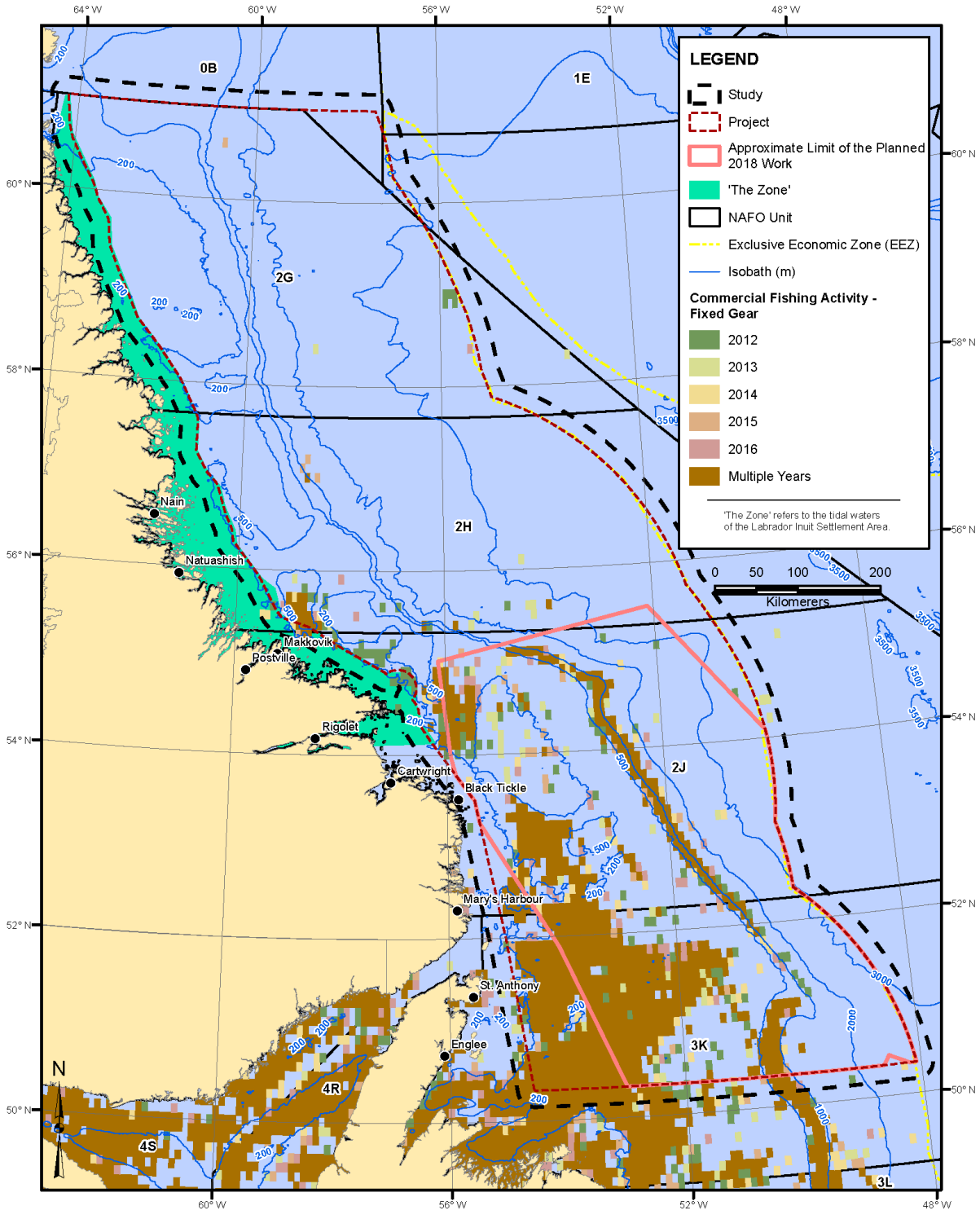

Figure 6-2 Commercial Fish Harvesting Activity, Fixed Gear, 2012 to 2016

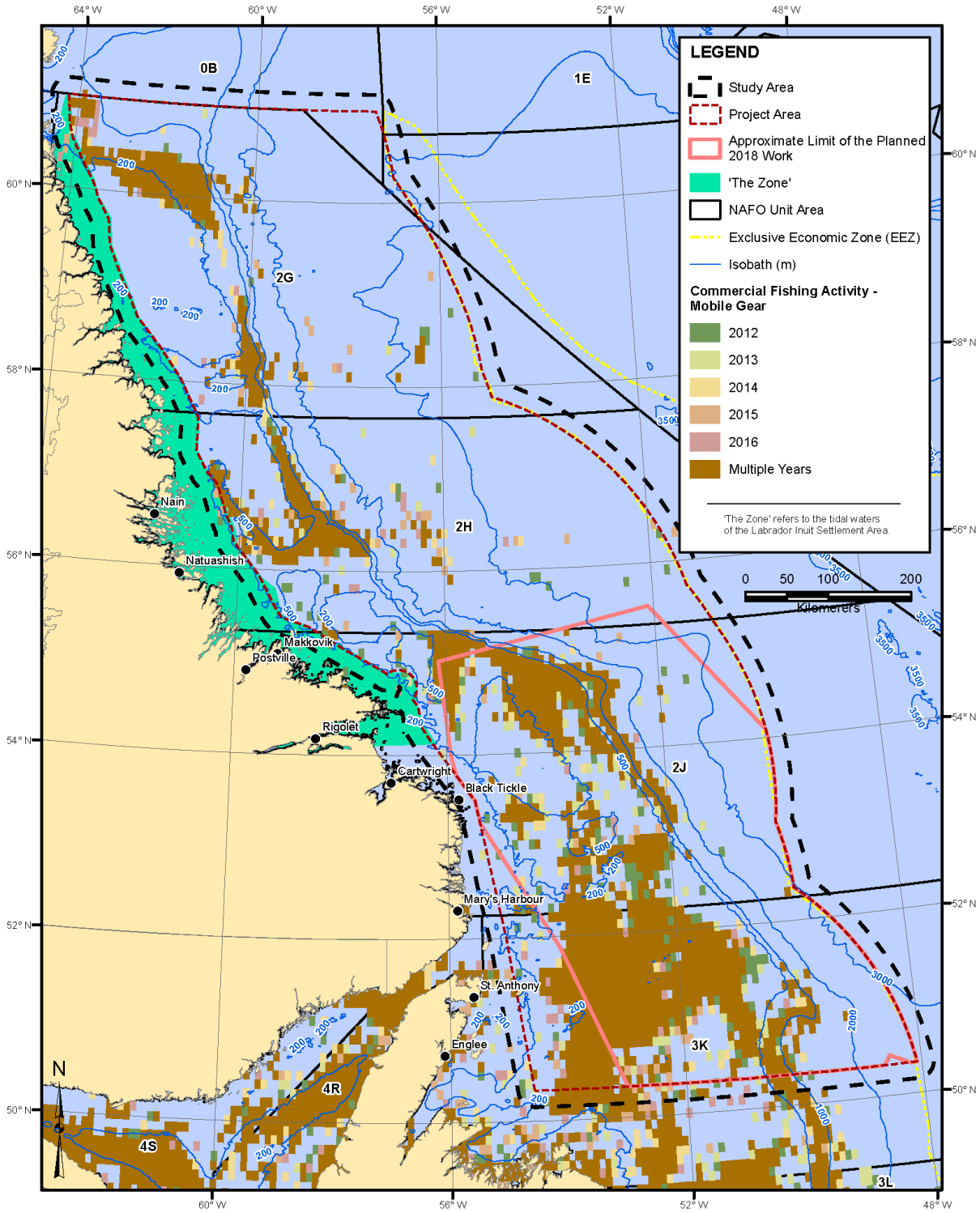

Figure 6-3 Commercial Fish Harvesting Activity, Mobile Gear, 2012 to 2016

Table 6.1 NAFO 2+3K Domestic Quantity of Harvest by Species, 2012-2016 Average and 2016

Species	Average Quantity (T) 2012-2016	% of Average Total	Quantity (T) 2016	% of 2016 Total
Northern Shrimp (Pandalus Borealis)	62,527	77.3%	21,257	57.7%
Snow/Queen Crab	9,129	11.3%	7,215	19.6%
Greenland Halibut/Turbot	4,518	5.6%	3,908	10.6%
Atlantic Cod	2,412	3.0%	3,610	9.8%
Pink Shrimp (Pandalus Montagui)	1,568	1.9%	518	1.4%
All Other	710	0.9%	317	0.9%
Totals	80,864	100.0%	36,825	100.0%
Source: NAFO 2017a				

6.1.1.2 Update of Project Area Commercial Species Fisheries

Commercial fishing activities have seen some changes since the 2014 EA update was written, mainly relating to the availability of commercial fish species and the declining health of commercial fish stocks over the years. Northern shrimp stocks have been in decline since 2010, with the most recent assessment by DFO in 2016 for northern shrimp in shrimp fishing areas (SFA) 4, 5, and 6 showing varying trends. In SFA 6, where much commercial fishing occurs for northern shrimp, the total allowable catch (TAC) was reduced by 42 percent from the 2015 / 2016 fishing season, from approximately 48,196 t to 27,825 t. The fishable biomass in SFA 6 declined from 785,000 t in 2006 to 104,000 t in 2016. There was a 25 percent decrease in the fishable biomass between 2015 and 2016, decreasing from 138,000 t to 104,000 t (DFO 2017a). The female spawning stock biomass also declined from approximately 466,000 t in 2006 to 65,000 t in 2016, with a 27 percent decline between 2015 and 2016 (DFO 2017a). This puts the female stock spawning biomass within DFO's "critical zone".

Within SFAs 4 and 5, the female spawning biomass has been listed in the healthy zone, and the TAC in SFA 5 increased by 10 percent between the 2015 / 2016 and 2016 / 2017 fishing season by approximately 10 percent. Recently, the TAC for SFA 5 was reduced by approximately 14 percent to 22,000 t for the 2017 / 2018 season, to achieve a 20 percent exploitation rate of the stock. (DFO 2017b). TAC levels in SFA 4 have remained the same since the 2013 / 2014 fishing season (DFO 2017a). In DFO's most recent fisheries management decision (2018), the TAC was increased by 754 t from 14,971 t to 15,725 t (DFO 2017b).

The discussion around the declining health of northern shrimp in key productive fishing areas has led to declines in TAC, with the most pronounced change occurring in 2015 with the removal of harvesting operations from SFA 7 (south of the LabradorSPAN Study and Project Areas). As mentioned above, because of the decline in shrimp stocks, the federal government announced a 42 percent reduction for the TAC for northern shrimp for the 2016-2017 season in SFA 6 (FFAW-Unifor 2016). The TAC for SFA 6 was cut again, down approximately 63 percent to 10,400 t for the 2017 / 2018 fishery and has since been further reduced to 8,730 t for the 2018/2019 fishing season (DFO 2017b).

Snow crab stocks have also been in decline recently, with TAC being affected as a result. In the results from the most recent assessment of snow crab by DFO in 2016, total landings of snow crab in offshore Newfoundland and Labrador (2HJ3KLNOP4R) peaked in 2009 at 53,500 t, and then declined to 42,000 t in 2016. The total exploitable biomass of snow crab has been in decline since 2013, and is now at its lowest observed levels (DFO 2017c). Landings in NAFO Divisions 2HJ have remained low, at less than 2,000 t since 2011 (DFO 2017c), which can partially be explained by the natural range and distribution of snow crab; however, snow crab landings in NAFO Division 3K declined by 63 percent since 2009 to their lowest observed level in two decades to (5,600 t) (DFO 2017c). Because of these changes in biomass in certain areas, TAC and quotas have changed as well. In 2016, the TAC for the Newfoundland and Labrador snow crab fishery in areas 2HJ, 3KLNO, 3Ps, and 4R3Pn was approximately 45,667 t. That number was reduced by approximately 22 percent in 2017 to 35,419 t, and again in 2018 to 28,975 (DFO 2017b).

Overall, TACs for snow crab have been decreasing since 2014, with the largest being between the 2016 and 2017 fishing season. However, allocations within the NAFO Divisions that overlap with the Project Area (2GHJ and 3K) have been relatively stable. The majority of changes to crab TACs and quotas have occurred in NAFO Division 3L, where most snow crab is harvested. This area does not overlap with the Project or Study Areas. The opening and tentative closing dates for the snow crab fishery in Project Area Divisions in 2018 are shown in Table 6.2 (DFO 2018).

Table 6.2 Fishing Windows for Snow Crab, 2018 Season

NAFO Division	Crab Fishing Area	2018 Season Dates
2GHJ	2GH, 2J North	TBD
2J South	All fleets	TBD
3K	3A	April 14 - July 15
	3BC, 4	April 14 - June 30
	3D	April 16 - June 30
	3B	April 22 - June 30
	3C	April 30 - June 30

Greenland halibut (turbot) is another commercial species that is harvested along the Labrador Shelf and within the Project Area and is managed by NAFO for stocks in Subarea 2 and within Divisions 3KLMNO. In 2010, NAFO adopted a Management Strategy Evaluation for the fishery, which looked at a survey-based harvest control rule to set TACs and quotas for the species. This rule is based on multiple variables and science to determine the appropriate TAC, which is assessed on an annual basis. During NAFOs 39th annual meeting, NAFO members agreed on a TAC for Greenland halibut in 2+3KLMNO of approximately 16,500 t for 2018, representing an 11 percent increase (NAFO 2017b). Of that amount, approximately 12,227 t (74 percent) was allocated to fisheries in 3LMNO.

6.1.2 Other Ocean Use / Research

Annual research surveys are conducted by DFO throughout NAFO divisions within Canada's 200 nm EEZ and are split primarily into the annual spring and fall surveys. Based on the 2018 schedule developed by DFO, the research vessel (R/V) *CCG Teleost* will be conducting surveys within NAFO Division 3K between late April and late May. It will then be absent for the summer season and return to the Study Area in early October to undertake the fall survey throughout the Study Area, until late December. The *CCG Needler* will be present in the Study Area in late August and early September, conducting shellfish surveys, and will then return to the Study Area in early November to complete a portion of the fall survey in NAFO Division 3K. Table 6.3 provides the portions of the preliminary schedule for each research vessel that include locations that fall within the Study Area and within the timing of GXTs planned survey activities (i.e., 1 June to 30 November of 2018). GXT will maintain contact with DFO about R/V survey updates and any scheduling changes.

Table 6.3 DFO Research Vessel Survey Schedules (Preliminary), Study Area, June-November 2018

Vessel	Activity	Start Date	End Date	Total Days	Area
CCG Teleost	NL Fall Survey	05-Oct-2018	24-Oct-2018	20	2H
		24-Oct-2018	06-Nov-2018	14	2H + 2J
		07-Nov-2018	20-Nov-2018	14	2J
		20-Nov-2018	04-Dec-2018	14	3K
CCG Needler	Shellfish Survey	30-Aug-2018	11-Sep-2018	13	2J+4R
	NL Fall Survey	07-Nov-2018	20-Nov-2018	14	3K+3L
Source: L. Mello, pers. comm. 2018					

Along with standard DFO annual research surveys, DFO and industry (operated through both FFAW-Unifor and the Torngat Wildlife, Plants and Fisheries Secretariat) collaborate to conduct annual post-season snow crab trap surveys throughout eastern Newfoundland and Labrador. Figure 6-4 shows the locations for these surveys for the most recent year available, 2017. The locations of survey traps are not standard from year to year and are potentially subject to change based on various factors. The most recent survey locations for 2018 were not available at the time of writing this EA update, and the coordinates are anticipated to come out in May 2018. GXT have communicated and will continue to communicate with DFO, FFAW-Unifor, and the Torngat Joint Fisheries Board to receive the coordinates of the survey locations when available. The coordinates will be provided to the survey vessel as well, prior to the start of survey activities.

The Canadian Association of Prawn Producers (CAPP) in association with the Northern Shrimp Research Fund (NSRF) participates in shrimp resource surveys in northern Shrimp Fishing Areas. However, there are no current plans for surveys south of SFA 4 (northern Labrador Shelf in NAFO 2G), and therefore none in the area of GXT's 2018 work (B. Chapman, pers. comm. 2017).

The DND undertakes military exercises off of Canada's east coast and has had operations off the coast of Labrador in the past. GXT has identified and communicated to DND (MARLANT Safety and Environmental Officer) a Point of Contact for the survey (for deconfliction) and will maintain this liaison regarding survey activities and any potential for interaction or interference with any planned DND training exercises or other operations. Although no UXOs have been identified in the PA, if any should be located the location will be noted and Coast Guard will be informed immediately.

Other marine oil and gas exploration projects might also be in the area during the summer and fall of 2018. These are identified and discussed in Section 7.3.

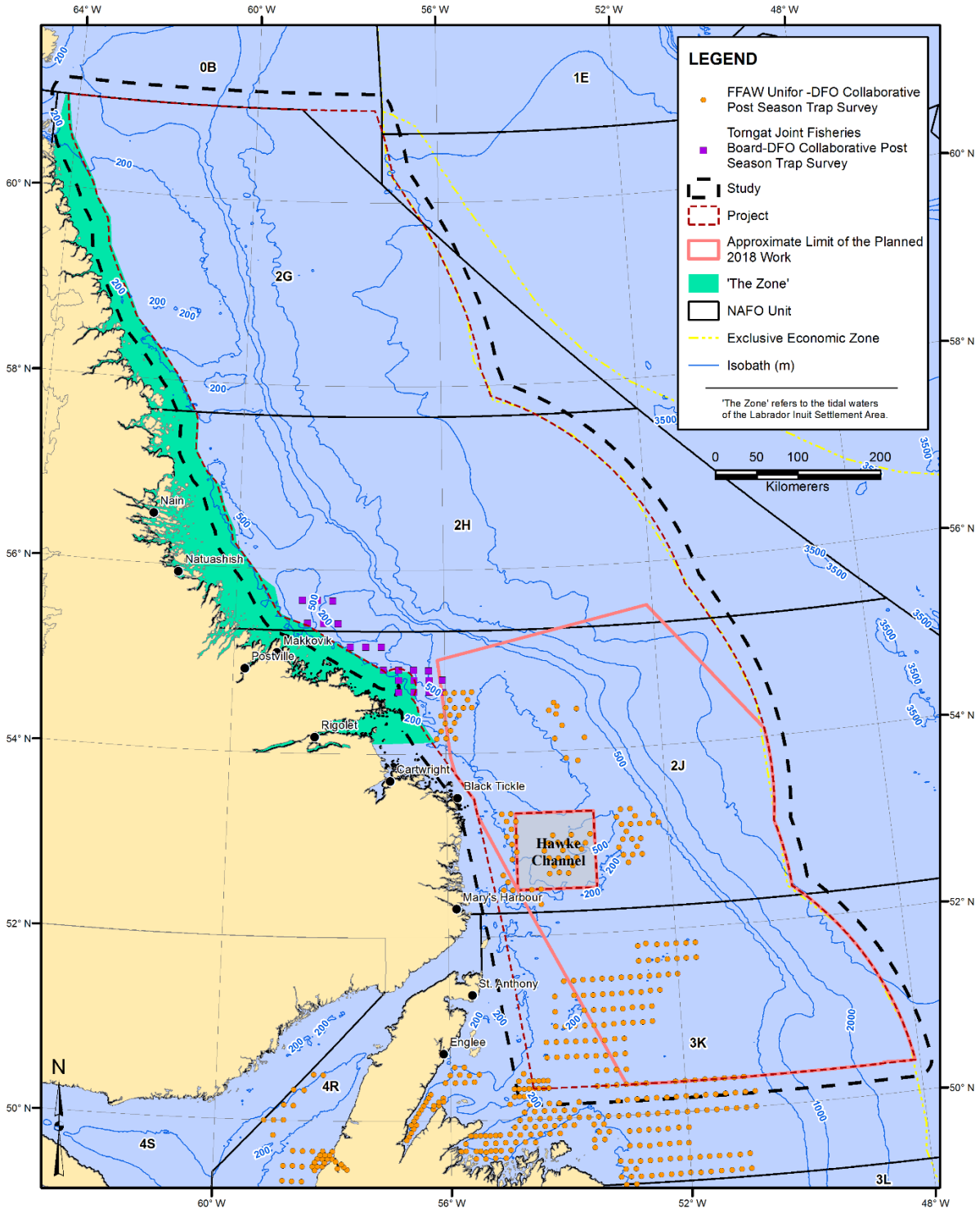

Figure 6-4 Post-Season Snow Crab Trap Survey, Survey Location, 2017

6.2 Special Areas

The following sections describe special areas that have either undergone changes in their designation, or have been created, since the EA update in 2014. The updated map showing all existing special areas within the Project Area is provided in Figure 6-5.

6.2.1 Marine Refuges

Since the last EA update in 2014 (LGL and GXT 2014), the federal government has placed an emphasis on ocean protection and increased the numbers of protected waters along Canada's coastline. As a result, in 2017 DFO announced the creation of seven new marine refuges off the coasts of Nunavut and Newfoundland and Labrador (DFO 2017d). Five of these marine refuge areas (i.e., Hawke Channel, Hatton Basin, Hopedale Saddle, Funk Island Deep, and Northeast Newfoundland Slope) fall either entirely, or partially within the Study Area, and some overlap with portions of the existing Ecologically and Biologically Significant Areas (EBSA) within the Newfoundland and Labrador Shelves Bioregion. These marine refuges are listed in the following sections and depicted in Figure 6-5. Although specific types of fishing activities are prohibited in these areas, DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

6.2.1.1 Hawke Channel

The Hawke Channel is located at the southern extent of the Study Area, off the southeast coast of Labrador and above the Northern Peninsula of Newfoundland. The refuge covers an area of approximately 8,837 km^2 and overlaps with existing portions of the Labrador Marginal Trough EBSA, which is an important area for a variety of fish species (e.g., capelin, Greenland halibut, witch flounder, Atlantic cod, and American plaice) and benthic invertebrates such as snow crab and northern shrimp. This marine refuge area has been designated to protect the bottom habitat within the area, and closed to fishing activity from bottom trawls, gillnetting, and longlines. DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

6.2.1.2 Hatton Basin

The Hatton Basin marine refuge is located at the northern edge of the Study Area and falls between the boundaries of Labrador and Nunavut. The area is approximately 42,459 km^2 and is designed to protect bottom habitat, particularly aggregations of cold-water corals and sponges. This includes large aggregations of small and large gorgonian corals, sponge species, black corals, stony corals, and hydrocorals. It is also the only known overwintering area for northern Hudson Bay narwhal. This area overlaps with approximately 21 percent of the Outer Shelf Saglek Bank EBSA (DFO 2017e). The Outer Shelf Saglek Bank EBSA is an aggregation point for a variety of marine mammals, ivory gull, roundnose grenadier, and is known to contain species of corals and sponges. This area is closed to bottom fishing activities DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

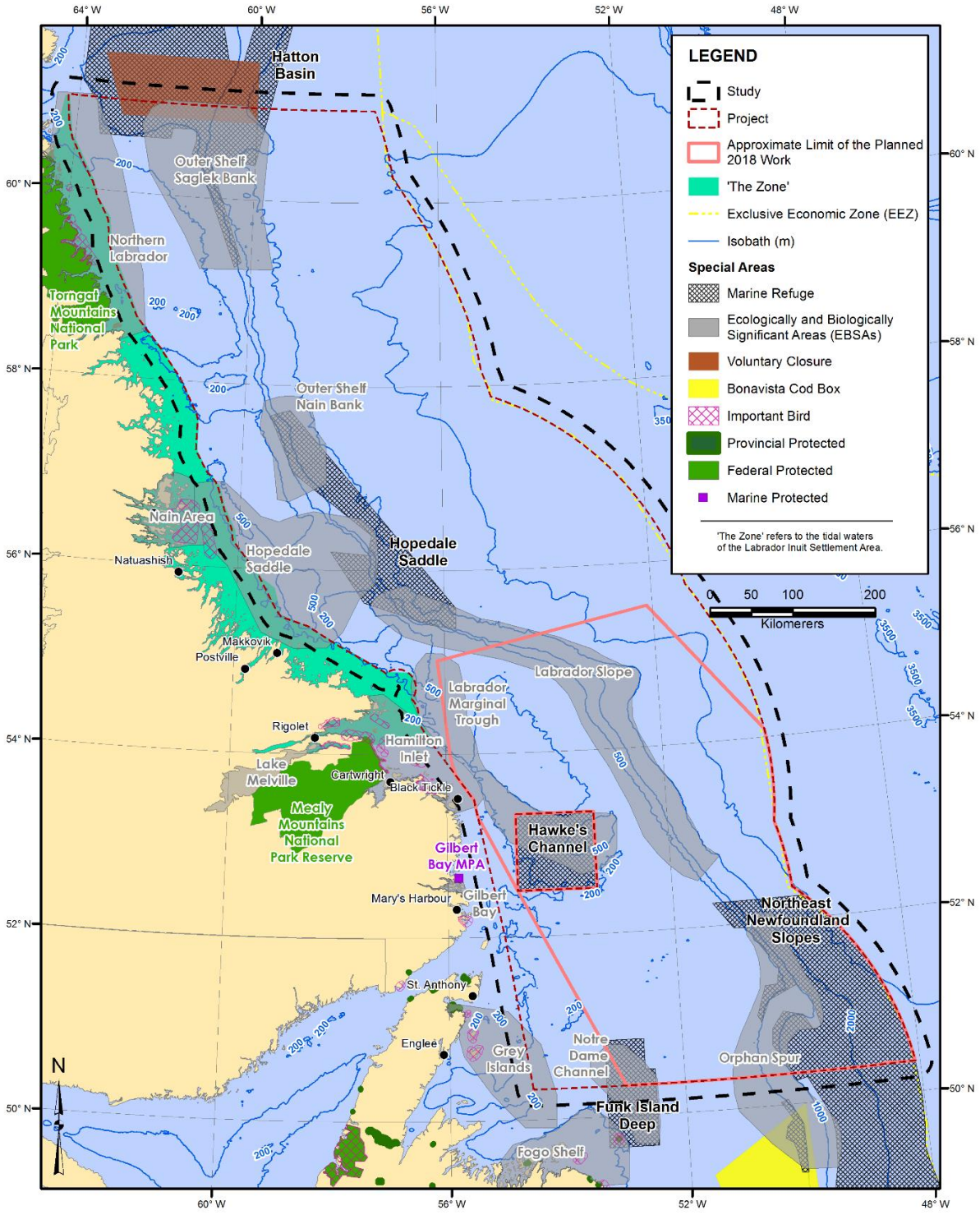

Figure 6-5 Special Areas Within the Project and Study Areas

6.2.1.3 Hopedale Saddle

The Hopedale Saddle marine refuge is an area of approximately 15,412 km^2 off the Labrador coast. This area overlaps with portions of three existing EBSAs: Outer Shelf Nain Bank; Labrador Slope; and Hopedale Saddle. All three EBSAs are important areas for aggregations of corals, sponges and sea pens, fish species, seabirds, and hooded seals. The Hopedale Saddle EBSA is also an overwintering area for eastern Hudson Bay beluga whales. The Hopedale Saddle marine refuge has been designated to provide further protection to overwintering beluga, along with benthic environments such as corals and sponges. The area is closed to bottom-fishing activity. DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

6.2.1.4 Funk Island Deep

The Funk Island Deep marine refuge is located off the northeast coast of Newfoundland, spans an area of approximately 7,274 km², partially overlaps with the southern extent of the Project Area, and overlaps a large portion of the Notre Dame Channel EBSA (DFO 2017e). The Notre Dame Channel EBSA is an aggregation point for a variety of benthic fish species, including snow crab, skate species, American plaice, Greenland halibut, capelin, redfish, witch flounder, and northern shrimp. The Funk Island Deep marine refuge has been created to further protect the bottom habitat that supports these species and the ecological diversity and productivity of the area. This area is closed to fishing activity from bottom trawls, gillnets, and longlines (DFO 2017f). DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

6.2.1.5 Northeast Newfoundland Slopes

The Northeast Newfoundland Slopes Closure Marine Refuge Area is approximately 46,833 km² and is designated primarily to protect cold water corals and sponges that are present along the continental shelf. These corals and sponges also have ecological importance, as they provide habitat to marine species and help provide a productive marine environment for these species. The Northeast Newfoundland Slope Closure also overlaps with the Orphan Spur, and existing EBSA, which also has a high concentration or corals, and is known to provide habitat to shark, grenadier, wolffish, Greenland halibut American plaice, and redfish, along with providing and aggregation point for marine mammals (DFO 2007). Within this refuge area, all bottom contact fishing activities are prohibited. DFO notes that no other human activities that take place in this area are incompatible with the conservation of the ecological components of interest (DFO 2017e).

6.2.2 Mealy Mountains National Park Reserve

In the original EA, Mealy Mountains National Park was included as a proposed national park but had not yet been granted status (LGL and GXT 2013). In 2015, an agreement was reached between the provincial and federal government, and 10,700 km of land was transferred from the Province of Newfoundland and Labrador to Canada, to officially form Mealy Mountains National Park Reserve. This area now is managed primarily by Parks Canada under the *Canada National Parks Act* and is designed to be co-managed between Parks Canada and the three Indigenous groups of Labrador and the Innu of

Quebec. Parks Canada has signed Park Impact Benefit Agreements with both the Nunatsiavut Government and Innu Nation, a Shared Understanding Agreement with NunuatuKavut Community Council, and is working to negotiate an interim protocol agreement with the Quebec Innu. A co-management board and advisory boards will be established to manage the current and future land use within the boundaries of the park, for both traditional and non-traditional uses (Parks Canada 2017). The marine margin of the Reserve is approximately 60 km from the survey Project Area at its closest point.

6.3 Species at Risk

6.3.1 New / Additional Species

Section 4.6 of the original EA in 2013 provided information on Species at Risk that may occur within the Project and Study Areas (LGL and GXT 2013), and Table 5.1 the 2014 EA update included information on new species that may have been listed under SARA or assessed by COSEWIC, or changes in designations of species that may have already been on the list. Since the writing of the EA update in 2014 the following are the changes to the list of species at risk for the Project:

- Basking shark (*Cetorhinus maximus*) has been added to the list of species at risk that may occur within the Study Area, based on a 2009 assessment by COSEWIC that showed basking shark distribution within the Study Area (COSEWIC 2009a). Basking shark is assessed as a species of special concern under COSEWIC but is not listed under SARA.
- Bowhead whale (*Balaena mysticetus*) has been added to the list of species at risk that may occur within the Study Area, based on the spring distribution range of whales that show overlap with northern portions of the Labrador coast and the Study Area (COSEWIC 2009b). The bowhead whale is assessed as a species of concern from COSEWIC, but not listed under SARA.
- Smooth skate (*Malacoraja senta*) has been added as a species at risk, based on the 2012 assessment by COSEWIC, which assessed the Funk Island Deep population as endangered (COSEWIC 2012). The distribution range for this species overlaps with the Study Area. Smooth skate is currently not listed under SARA.

6.3.2 Changes to Management and Recovery Plans

Since the 2014 EA update, the following changes have occurred with regards to species management plans and recovery strategies for SARA listed species:

- In 2017, the final version of the Management Plan for the Fin Whale *(Balaenoptera physalus)*, Atlantic Population in Canada, was released to the public (DFO 2017f). This follows the proposed management plan that was released in 2016.
- In 2016, the final version of the Management Plan for the Sowerby's Beaked Whale (*Mesoplodon bidens*) in Canada was released (DFO 2017g). This replaces the proposed plan that was published in 2016. No critical habitat was identified in this management plan.

With GXT's mitigation measures in place for the Project, there is nothing in the new management plans that is incompatible with GXT's Project activities.

7.0 ENVIRONMENTAL EFFECTS ASSESSMENT

7.1 Summary of Effects Assessment

A review of the environmental effects assessment predictions and mitigation assessed as part of the original EA (LGL and GXT 2013) (Chapters 5 and 7) was conducted as a result of updated commercial fisheries data, and additional special areas within the Project and Study Areas. The proposed activities for 2018 involve the same components and activities associated with the scope of work described in the original EA, and the proposed activities fall within the existing Project Area.

The mitigation measures regarding the planned activities to be carried out under the scoped of work assessed in the original EA are still appropriate (summarized in Section 4.9 and Appendix A of this EA update). GXT reiterates their commitment to the mitigation measures cited in both this EA update, as the original EA and subsequent filings, to reduce the potential for environmental interactions and resulting residual environmental effects.

As noted in the original EA, each of the potential environmental interactions associated with the VECs identified, and potential effects that could be associated with the Project, can be avoided or otherwise mitigated through the use of proactive planning, and Project-specific and industry standard mitigation that have been identified and implemented by GXT as part of the Project and its EA. Overall, the proposed Project will result in very short-term and transient disturbance in the marine environment at any one location and time during survey activities. The proposed work for 2018 does not deviate from the original scope of work for the Project, nor result in changes in the original environmental effects predictions, required mitigation, or effects significance evaluations for any component of the environment. The conclusion is that the routine Project activities as proposed for 2018 are therefore not likely to result in significant adverse environmental effects.

7.2 Cumulative Environmental Effects

Chapter 6.0 of the original EA of the LabradorSPAN Survey addressed the potential cumulative effects from past, present and reasonably foreseeable projects. In terms of “within Project” cumulative effects, as described above, GXT’s seismic lines (approximately 2,100 km in total in the LabradorSPAN Project Area) are very widely spaced, sometimes 100 to 200 km apart, amounting to a one-time exposure for any VEC in the particular area. As noted, this will be the first time GXT has had a survey in the PA since 2013, although the original assessment considered annual work.

For the most part, patterns of “other users” in the Labrador Sea have not changed since early 2013. The primary difference is a small number of new projects listed on the C-NLOPB’s Public Registry (as indicated by * in the bulleted list below).

Offshore oil and gas industry projects listed on the C-NLOPB public registry (www.cnlopb.nl.ca as viewed 29 March 2018) for offshore Labrador include:

- Multi Klient Invest AS Labrador Offshore Seismic Program, 2018-2023*
- Fugro GeoSurveys Offshore Seafloor and Seep Sampling Program, 2017-2027* [project includes multibeam sonar]
- MG3 (Survey) UK Limited Offshore Labrador Geochemical and Seabed Sampling Program, Newfoundland and Labrador Offshore Area, 2015-2024 [project includes multibeam sonar]*
- TGS NOPEC Geophysical Company ASA and Multi Klient Invest AS Offshore Labrador Seafloor and Seabed Sampling Program, 2014-2019* [project includes multibeam bathymetric surveys]
- Multi Klient Invest AS Labrador Sea seismic program, 2014-2018
- ARKeX Ltd., TGS-NOPEC Labrador Sea Gravity Gradient Survey, 2014-2018

Although these programs have the potential to be active in some part of GXT's Project Area in 2018, those that will be active when GXT is present is not yet know. If GXT's operations do overlap spatially with another seismic project on the Labrador Shelf in 2018, seismic operators will communicate with each other to provide a spatial and/or temporal separation of operations, which is a standard practice in the industry. Concurrent seismic programs in the same general area have occurred several times in Atlantic Canada in recent years, as well as in other jurisdictions. A key mitigation for all of these programs is a simultaneous operations plan (SimOps), which would aim to establish a minimum separation distance that both/all seismic operators would maintain while acquiring seismic data. This will be aided by the use of ION/GXT's MARLIN on the seismic ship system this year. Not only is a SimOps plan important for mitigating cumulative effects, but separation is also necessary to prevent the sound from nearby arrays from interfering with the each other's data recording. GXT will also be guided by the International Association of Geophysical Contractors (IAGC) Time Sharing Guidelines, that establish best procedures for the industry (IAGC 2014), filed with GXT's GPA application

Considering that the scope of the activities listed above still falls within the range of those assessed in the EA (LGL and GXT 2013), and with a simultaneous operations plan and the other mitigation measures in place, no significant residual cumulative effects are predicted.

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APPENDIX A

Mitigation and Monitoring

Table A.1 Primary Mitigation Commitments by Potential Effects

Potential Effects	Primary Mitigations
Interference with fishing vessels / mobile and fixed gear fisheries	• Advance communications, liaison and planning to avoid active fishing areas • Continuing communications throughout the program • On-board Fisheries Liaison Officers (FLOs) - 1 representing FFAW and 1 representing Inuit/Nunatsiavut interests • Single Point of Contact (SPOC) • Other advisories and communications - continuing e-mails, dedicated toll-free 24/7 telephone contact, dedicated web site (gxtspan.com), newsletters, notices to Coast Guard, CBC and OK coastal radio • Accessing Vessel Monitoring System (VMS) data • Avoidance • Start-up meetings on ships
Fishing gear damage	• Upfront communications, liaison and planning to avoid fishing gear • Use of scout vessel • SPOC; 24/7 toll-free telephone contact • Other advisories and communications • FLOs • Compensation program • Reporting and documentation • Start-up meetings on ships
Interference with shipping	• Advisories and at-sea communications • FLOs (for fishing vessels) • Use of scout vessel • SPOC (fishing vessels) • Accessing Vessel Monitoring System (VMS) data (for fishing vessels)
Interference with DFO/FFAW research program	• Plotting locations • Communications and scheduling around survey timing • Avoidance
Temporary or permanent hearing damage/disturbance to marine animals	• Pre-watch of safety zone • Delay start-up if marine mammals or sea turtles are within 500m • Ramp-up of airguns • Shutdown of airgun arrays for *endangered* or *threatened* marine mammals and sea turtles within 500m • Use of qualified MMO(s) to monitor for marine mammals and sea turtles during daylight seismic operations
Temporary or permanent hearing damage/ disturbance to Species at Risk or other key habitats	• Pre-watch of safety zone • Delay start-up if marine mammals or sea turtles are within 500 m • ramp-up of airguns • Shutdown of airgun arrays for *endangered* or *threatened* marine mammals and sea turtles within 500 m • Use of qualified MMO(s) to monitor for marine mammals and sea turtles during daylight seismic operations.
Injury (mortality) to stranded seabirds	• Daily monitoring of vessel • Handling and release protocols for stranded seabirds • Minimize lighting if safe
Seabird oiling	• Adherence to MARPOL • Spill contingency and response plans • Use of solid streamer
Source: (LGL Limited and GX Technology Canada Ltd. 2013, Table 5.2)	

Table A.2 Mitigation and Monitoring Commitments and Implementation Status

Mitigation and Monitoring Commitments	Implementation Status (as of 1 May 2018)
Pre-survey information exchanges, plan sharing, agreed on-going communications protocols for 1. identifying key fishing areas and times (particularly fixed gear) 2. planning mitigation of potential conflicts with fisheries, science studies and other ocean users (e.g. DND)	• Completed / in place (but will continue as needed through to start-up and throughout the survey). Contacts identified.
Continuing communications / information exchanges throughout the program to avoid key fishing areas and times (particularly fixed gear), and conflicts/interactions with science surveys and other ocean users. (Advisories and communications during the survey will be via continuing e-mails, phone contacts, dedicated web site, newsletters, notices to Coast Guard, CBC and OK coastal radio and/or other means.)	• Notices to Shipping - will be issued at survey start (specifying work area, fishing gear and vessel compensation claims contact). • Agreed on-going communications protocols - to be implemented when the survey begins; • FLOs on-board the seismic ship (throughout the survey for at-sea communications) – in process of hiring; • Photos of the planned survey vessels for the FFAW-Unifor – photos provided in copy of presentation and will be updated. Will also be included in general mail-out. • 24/7 telephone contact – to be in place before survey start. • Reporting procedures for FLOs and MMSOs - established. • MARLIN system on-board seismic ship • DND/MARLANT contact identified
On-board Fisheries Liaison Officers (FLOs): one representing FFAW/Unifor and one representing Labrador/Nunatsiavut interests (when offshore Labrador)	• FLOs - GXT has contacted the FFAW-Unifor about GXT's 2018 requirements; Nunatsiavut Government has been informed and RFPs issued through recommended channels.
Fishing Gear and Vessel Compensation Program plan (including communications about contacts)	• Plan in place; Project contact information included in all pre-survey communications, and will be included in future communications, and in all Notices to Shipping; FLO reporting protocols in case of fishing gear incidents
Single Point of Contact with 24/7 toll-free telephone access during survey; dealing with fishing gear and vessel claims	• SPOC identified – GXT Environmental Manager
Accessing Vessel Monitoring System (VMS) data (for fishing vessel locations)	• A request has been made for access to the VMS locational data for 2018.
Use of support/scout vessel to look for fishing gear and hazards, as needed	• Support ship has been identified and obtained.

Mitigation and Monitoring Commitments	Implementation Status (as of 1 May 2018)
Avoidance of EA identified special or unauthorized areas (including The Zone, the Hawke Channel, areas outside an assessed Project Area, bird colonies, Marine Protected Areas); No seismic equipment in the water outside eth Project Area (including on route to and from ports).	• Location of any such areas near the Project Area and the Project Area charted on board the ships and entered into the MARLIN system – MARLIN onboard; coordinates of these areas have been provided (GIS shapefiles); rules regarding these areas have been communicated and will be emphasized during start-up meetings
Marine Mammal Mitigations - Qualified MMSO for 1. Pre-watch of safety zone 2. Ramp-up of airguns 3. Watch, and shutdown of airgun arrays for endangered or threatened marine mammals and sea turtles within 500 m	• RFPs have been issued for qualified MMSOs; Statement of Canadian Practice will be followed as in GXT commitments.
Observation and Data Collection - Qualified MMSOs to monitor for 1. Marine mammals and sea turtles observation and data collection during seismic operations and other times at sea 2. Seabird observation and data collection when at sea 3. Regular and post-survey observation/incident reports (and data) to go to relevant agencies	• RFPs have been issued for qualified MMSOs, with MM and seabird experience. • ECCC/CWS has provided computerized data forms and protocols for data collection and entry in 2018.
Minimize lighting as and if safe to do so, to minimize attracting seabirds	• This will be applied during the survey and transits.
Handling and release protocols / permit for seabirds	• Renewal of GXT's 2013 permit - in process.
Start-up meetings on ships: Communicate mitigation commitments, environmental, safety, area fisheries	• Planned for all departments, both ships, at survey start and crew changes; FLOs and MMSOs will be involved.
SymOps Plan to avoid conflicts / temporal/spatial overlap with other petroleum industry exploration programs	• MARLIN system - onboard survey ship. • Continuing communications with other operators before the survey and during
Pollution Prevention / Emergency Response (including spill contingency and response plans)	• Adherence to MARPOL - certified for the ships. • Low sulphur fuel – onboard • SOPEP / Pollution Prevention and Emergency Response, Waste Management Plans - on ships. • International Air Pollution Prevention Certificates - in place • Solid core streamer - on board the seismic ship