

Environmental Assessment Update of the MKI Southern Grand Banks Seismic Program, 2014–2018

Prepared by



for

Multi Klient Invest AS

&

TGS-NOPEC Geophysical Company ASA

**April 2015
Project No. FA0038**

Environmental Assessment Update of the MKI Southern Grand Banks Seismic Program, 2014–2018

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1.0 Introduction

This document is an Update of the Environmental Assessment (EA; LGL 2014a) of Multi Klient Invest AS (MKI) and TGS-NOPEC Geophysical Company ASA (TGS)'s proposed 2014–2018 2-Dimensional (2D) and/or 3-Dimensional (3D) marine seismic program in the Southern Grand Banks area, Newfoundland and Labrador, and its associated Addendum (LGL 2014b) and Amendment (LGL 2015). In 2015, MKI is proposing to conduct a 2D seismic survey in the Southern Grand Banks Project Area (see Figures 2.1 and 2.2 later) and this document addresses the validity of the EA and its Amendment (Table 1.1) as it pertains to MKI's 2015 proposed seismic survey. The EA Update is intended to assist the C-NLOPB in its regulatory review process by demonstrating that both the scope of the assessment and the mitigation measures to which MKI previously committed and implemented in 2014 remain technically valid for proposed seismic survey operations in 2015.

Table 1.1 Environmental Assessment Documents for the MKI Southern Grand Banks Geophysical Program.

Screening Determination Reference	Temporal Scope	EA Document Title
C-NLOPB File No. 45006-020-004	1 May to 30 November, 2014-2018	Environmental Assessment of MKI Southern Grand Banks Seismic Program, 2014-2018 (LGL 2014a) ^a
	1 May to 30 November, 2015-2018	Amendment to Environmental Assessment of MKI Southern Grand Banks Seismic Program, 2014-2018 (LGL 2015) ^b

^a On 24 July 2014, the C-NLOPB made a determination (positive) on this document and its Amendment.

^b This document, which includes an assessment of 3D seismic survey activities, is currently undergoing the C-NLOPB review process.

The following sections provide the information necessary to confirm the validity of the EA and its associated documents (see Table 1.1). This Update also includes new relevant information not included in the EA and its associated documents.

2.0 Project Description

2.1 VECs and Project Activities Assessed in the EA and its Amendment

The EA (LGL 2014a) and its Amendment (LGL 2015) assessed the potential effects of 2D and 3D seismic survey activities within the defined Project Area (Figure 2.1) on the following Valued Environmental Components (VECs):

- Fish and fish habitat;
- Fisheries;
- Seabirds;
- Marine mammals and sea turtles;
- Species at risk; and
- Sensitive areas.

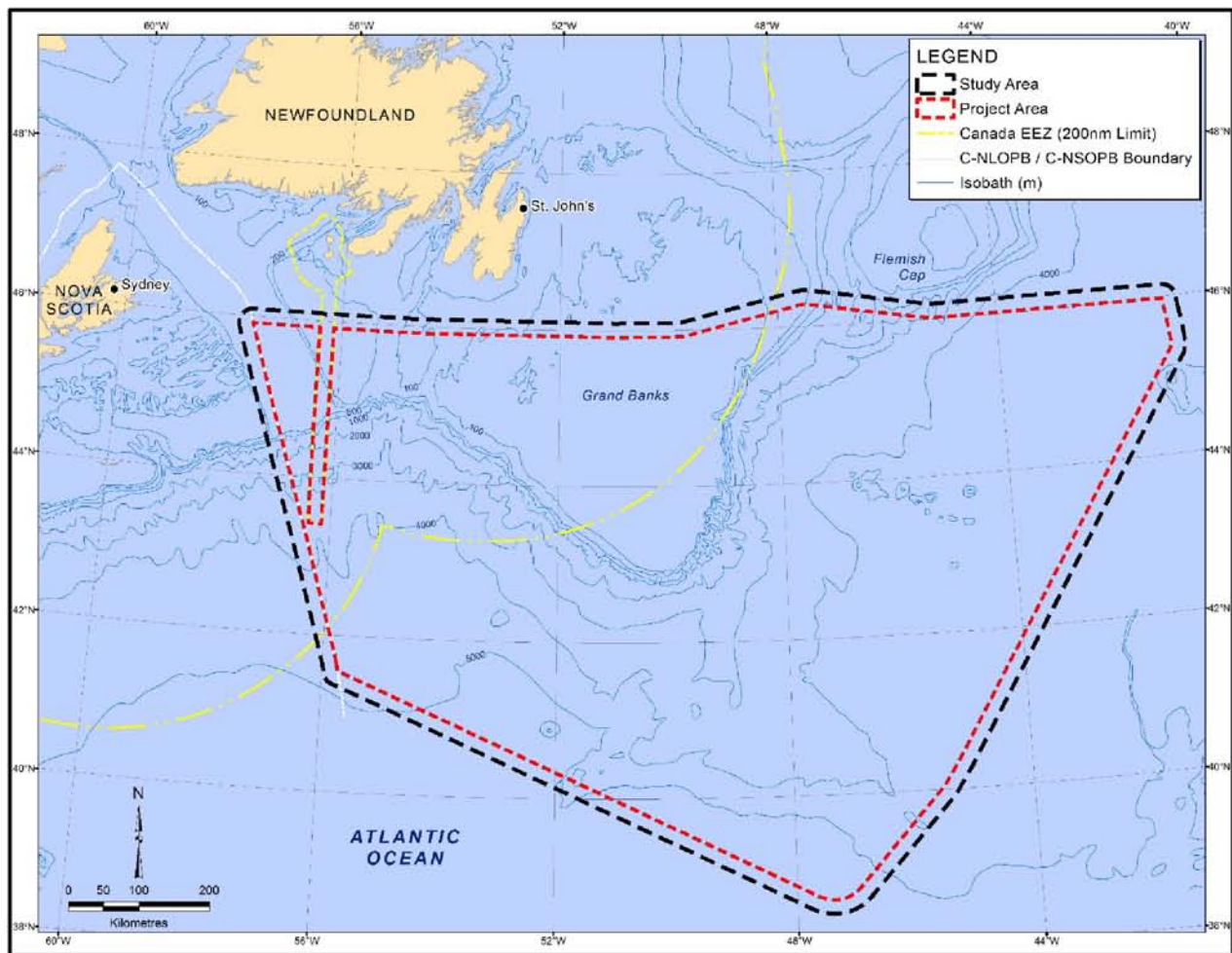


Figure 2.1 Locations of the Project Area and Study Area for Southern Grand Banks Seismic Program, 2014 to 2018.

2.2 Vessels and Equipment

In addition to the seismic vessel, 2D and/or 3D seismic surveys require two support vessels: (1) a picket vessel tasked with communicating with other vessels (primarily fishing vessels) that may be operating in the area, and scouting ahead for any other hazards such as floating debris; and (2) a supply vessel tasked with resupply, refuelling and personnel transfer.

The 2D and 3D survey sound sources will consist of one or more airgun arrays with a total discharge volume of 3,000 to 6,000 in³, operating at a tow depth of 6 to 15 m. The airgun arrays are comprised of individual airguns ranging in size from 22 to 250 in³ each. The airguns will be operated with compressed air at pressures of 2,000–2,500 psi and produce approximate peak-to-peak pressures of 100 to 200 bar-m. A typical airgun array used by MKI for 2D surveys consists of four sub-arrays with a total volume of 4,808 in³, operated at a pressure of 2,000 psi. This array is generally towed at a depth of 9 m and produces peak-to-peak pressures of 179 bar-m. The airguns in the array are strategically

arranged to direct most of the energy vertically downward rather than sideways. The shotpoint interval will be one array pulse every 19 to 25 s, and the survey speed will be around 4.5 knots (8.3 km/h).

For 2D surveys, the seismic ship will also tow a single seismic hydrophone cable (streamer) up to 10 km long, deployed near the ocean surface, at a depth of ~ 15–25 m. This is a passive listening device, which will receive the sound waves reflected from structures underneath the ocean floor and transfer the data to an on-board recording and processing system. The cable is a solid streamer, PGS GeoStreamer[®]. For 3D seismic surveys, the seismic ship will tow multiple streamers. Streamers will be solid with an expected length of 8,000 to 10,000 m, depending on survey design, and deployed at depths ranging from ~ 15–25 m. As many as 16 streamers may be towed during a 3D seismic survey.

The seismic vessel is also equipped with a Furuno FE-700 echosounder. The downward-facing echosounder operates at a frequency of 50 kHz or 200 kHz and will be used to collect water depth information. For this Project, sound velocity profiles will also be acquired in the water column at various locations within the survey area. This is a routine practice during seismic programs. Sound velocity profiles allow for more accurate interpretation of the acoustic data (i.e., seismic pulses) recorded by the seismic streamer. These data are acquired with a small, passive device that will be deployed by the support vessel. The device measures pressure, temperature, and salinity, from which the speed of sound can be calculated.

2.3 Spatial Scope

The Project and Study areas considered in the EA remain unchanged and are presented in Figure 2.1. The Project Area, within which all survey activities will occur, is encompassed by the Study Area. The boundary of the Study Area is 25 km outside of that for the Project Area. The 25 km wide area is intended to account for the propagation of sound being generated within the Project Area that could potentially affect marine biota.

2.4 Temporal Scope

The temporal scope indicated in the EA (LGL 2014a) was defined by a 1 May to 30 November period during each year of the 2014 to 2018 period.

2.5 Seismic Survey Activities Planned for 2015

In 2015, MKI plans to conduct 2D seismic surveying within the Project Area. Figure 2.2 shows the locations of the 2D seismic survey lines proposed for 2015. An Amendment of the EA (LGL 2015), which provides assessment of 3D seismic survey activities within the Project Area until 2018, has been submitted to the C-NLOPB. Currently, MKI intends to focus the 2D seismic surveying on the western portion of Project Area in 2015 (Figure 2.2). However, once the C-NLOPB have confirmed the location of Sector NL01-SEN (Call for Bids on parcels in the Eastern Newfoundland Region), which will be on the eastern side of the Project Area, it is anticipated that MKI will conduct focused 2D seismic surveying over this area. The MV *Atlantic Explorer* will most likely be the seismic vessel conducting

the 2D seismic surveying in 2015. Details of this vessel are provided in the EA (LGL 2014a). All other project details presented in Section 2.0 of the EA apply to MKI's seismic survey activities in 2015.

MKI is currently in the process of obtaining authorization from the French Government to operate within the Exclusive Economic Zone of Saint-Pierre et Miquelon. MKI is also in communication with the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) regarding the proximity of seismic operations to its jurisdiction. MKI has confirmed that its seismic survey will not cross the NL-NS jurisdictional border. All seismic activities, including turning of the vessel and gear, will be conducted within the Project Area.

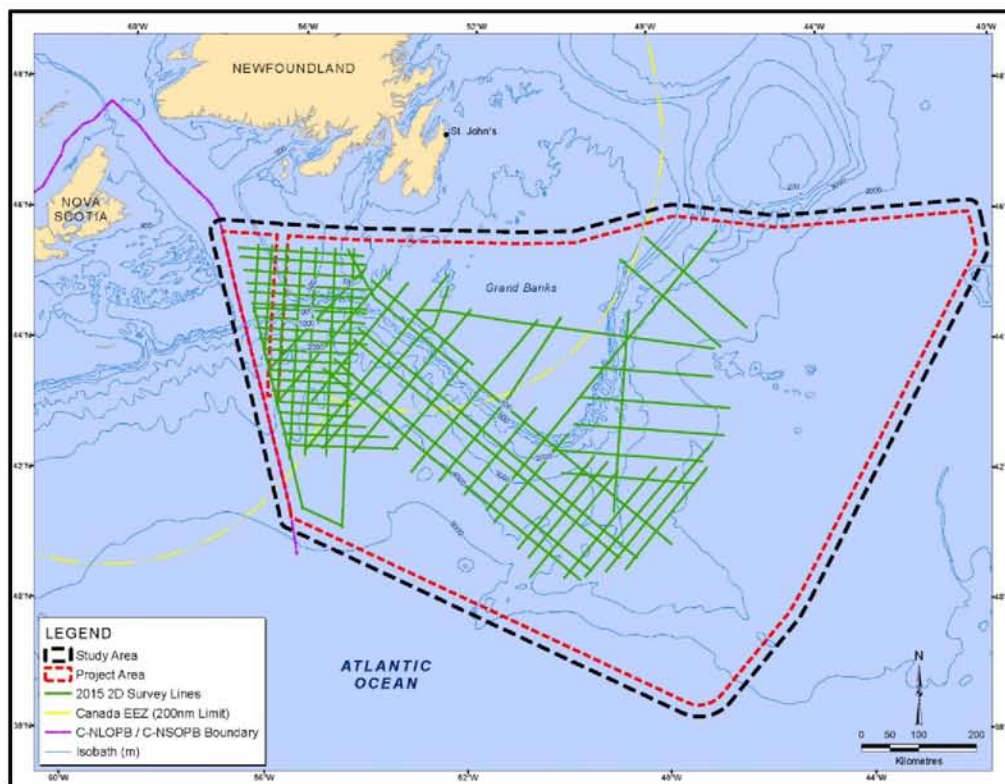


Figure 2.2 Locations of 2D Seismic Survey Lines Proposed for 2015.

2.6 Mitigation Measures

Mitigation measures implemented during seismic surveys carried out under this Project will follow those described in prior documents (LGL 2014a, 2015) and defined in Appendix 2 of *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (CNLOPB 2012). These include ramp-up (i.e., soft start) of the airgun arrays, the use of qualified, dedicated Marine Mammal Observer(s) (MMOs) to monitor marine mammals and sea turtles and implement shut downs/ramp up delays of the airgun array when appropriate, and the use of a Fisheries Liaison Officer (FLO) and communication procedures to avoid conflicts with fisheries. Seabird observations and monitoring/mitigation for stranded birds will also be carried out by qualified personnel according to established Canadian Wildlife Service (CWS) protocols.

3.0 Physical Environment

A comprehensive report describing the physical environment of the Study Area (i.e., bathymetry, geology, climatology, physical oceanography, and sea ice and icebergs) was prepared for MKI in 2014 (Oceans 2014). A summary of that report was provided in Section 3.0 of the EA. There is no new and relevant information available on the physical environment in the Study Area.

4.0 Biological Environment

Newly available background information not included in the previous documents associated with this Project is included in this section.

4.1 Fish and Fish Habitat

This section includes updates to the description of the Fish and Fish Habitat VEC in Section 4.2 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). Information is included for key points concerning the relationship between planktonic communities and oceanic conditions of the Southern Grand Banks area, as well as for snow crab (*Chionoecetes opilio*), white hake (*Urophycis tenuis*), and northern shrimp (*Pandalus borealis*). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

4.1.1 Plankton

The Atlantic Zone Monitoring Program (AZMP) was implemented by DFO in 1998 in an attempt to better understand, describe and forecast the state of the marine ecosystem. A critical element of the AZMP is an observation program designed to assess the variability in nutrients, phytoplankton and zooplankton (DFO 2014a). The AZMP findings in relation to oceanographic conditions in the Study Area for 2013 are summarized below.

- Sea-surface temperatures on the Grand Banks were at record highs in September 2013, and generally above normal during ice-free months across the area. Bottom temperatures were also generally above normal across the area.
- Nitrate inventories in both surface and subsurface waters in 2013 were below normal on the Newfoundland and Labrador Shelf and Grand Banks.
- Overall abundance of phytoplankton was near the long-term (1999-2010) average throughout much of the Atlantic Zone in 2013. Chlorophyll anomalies, which have generally been below normal across much of the Newfoundland and Labrador Shelf since 2011, increased slightly on the Grand Banks in 2013.
- High abundance levels of non-copepod zooplankton (e.g., larval stages of benthic invertebrates and carnivores that feed on other zooplankton) were observed on the Newfoundland Shelf and Grand Banks in 2013.

- The abundance levels of zooplankton species (e.g., *Pseudocalanus* spp., *Calanus finmarchicus*) have been above normal levels since 2009.
- Overall, the Southern Grand Banks were characterized by above normal nutrient inventories and near normal phytoplankton abundance while conditions across much of the Newfoundland and Labrador Shelf were below average in 2013.

4.1.2 Snow Crab

Offshore snow crab landings in NAFO Div. 3LNO between 2009 and 2013 have increased by 20% while offshore landings in NAFO Div. 3Ps declined by 16% between 2011 and 2013 (DFO 2014b).

4.1.3 White Hake

In 2013, Spanish survey biomass indices for white hake in NAFO Div. 3NO indicate that despite the increase in white hake biomass in recent years, it still remains at very low levels (González-Troncoso and Paz 2014).

4.1.4 Northern Shrimp

The northern shrimp fishery in NAFO Div. 3LNO has been characterized by a reduction in catch and declining Total Allowable Catch (TAC) levels in recent years. TACs increased from 6,000 t in 2000 to 30,000 t in 2009 and 2010 but subsequently declined to 4,300 t by 2014, based on continued declines in survey and commercial fishery indices. Small and large Canadian fishing fleets have altered their fishing patterns in response to low catch rates by fishing along the border between 3L and 3K. The number of countries fishing for shrimp in 3L has decreased from as many as 16 in 2006 to only one country in 2013 (Orr and Sullivan 2014).

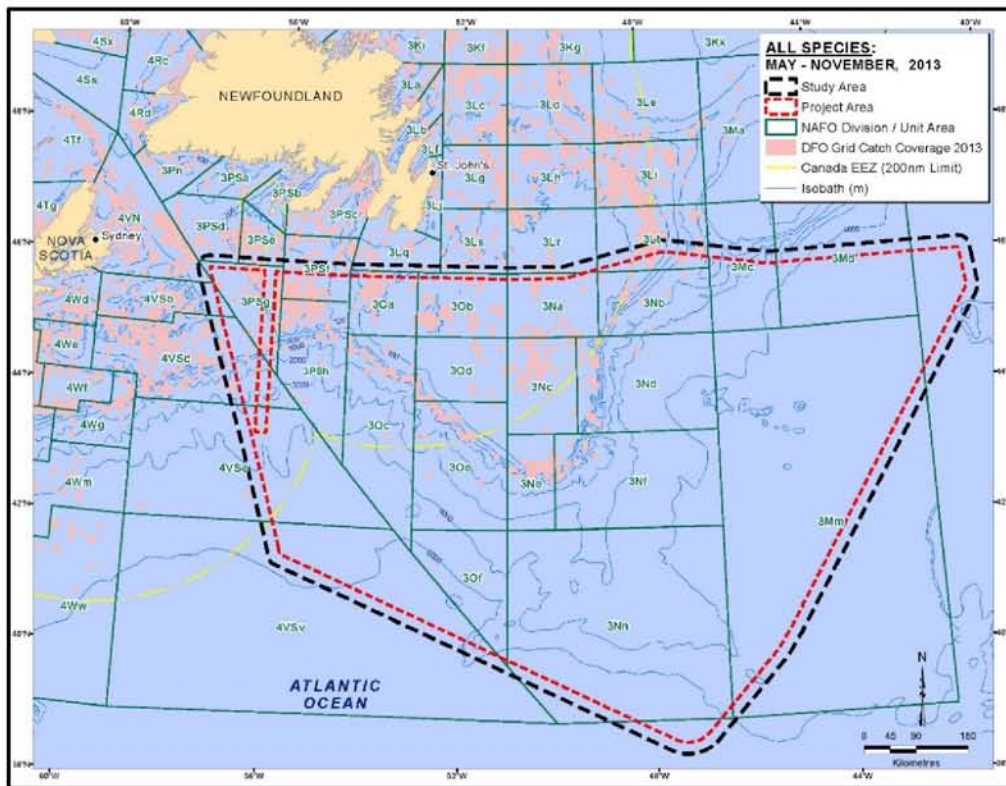
4.2 Fisheries

This section includes updates to the description of the Fisheries VEC provided in Section 4.3 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

4.2.1 Commercial Fisheries

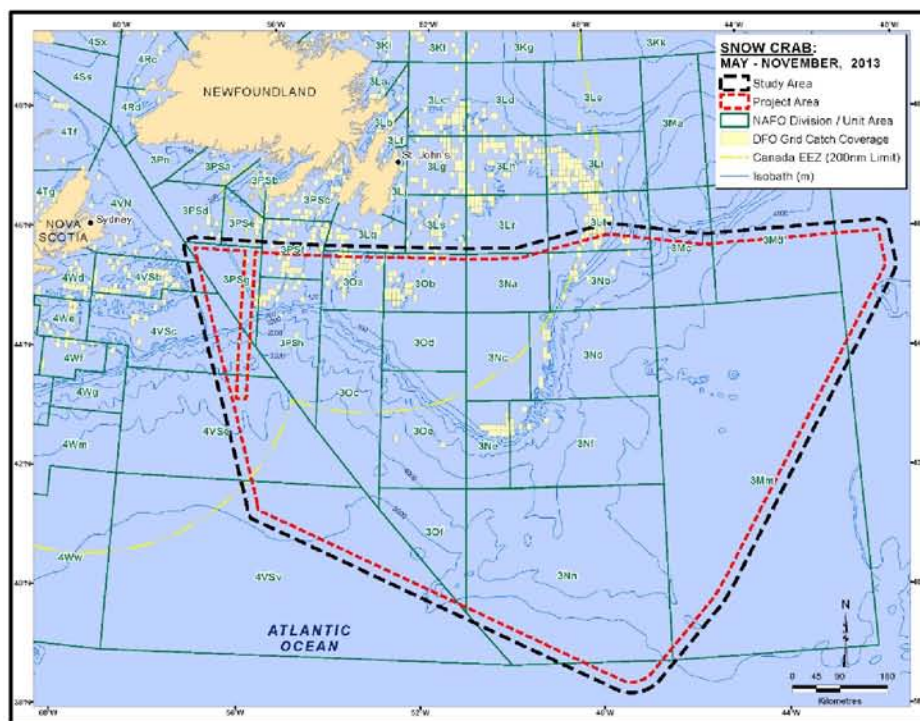
Analysis of the 2013 commercial fisheries landings data did not indicate any major differences in distribution of harvest locations for May–November 2013 (Figures 4.1 to 4.4) compared to the distributions for May–November 2005–2012 (see Figures 4.3 to 4.5 and 4.8 in LGL 2014a). Figures 4.1 to 4.4 show the distribution of 2013 harvest locations for all species, snow crab, groundfishes and invertebrates, respectively. The majority of harvesting occurred on the Grand Banks slope and shelf, with relatively few catches occurring in deeper water areas. In 2013, as in previous years, snow crab was the most important commercial species in the Study Area (see Table 4.2 in

LGL 2014a), followed by Atlantic cod (*Gadus morhua*), Atlantic halibut (*Hippoglossus hippoglossus*), whelks (*Buccinum* sp.), American plaice (*Hippoglossoides platessoides*), haddock (*Melanogrammus aeglefinus*), redfish (*Sebastes* sp.) and Greenland halibut (*Reinhardtius hippoglossoides*) (these eight species accounted for 98% of the total catch weight quartile code counts; Table 4.1). Compared to previous years, yellowtail flounder (*Pleuronectes ferruginea*) and redfish (*Sebastes* sp.) accounted for smaller proportions of the 2013 catches. In 2013, no cockle (*Serripes groenlandicus*) catches were reported in the Study Area.



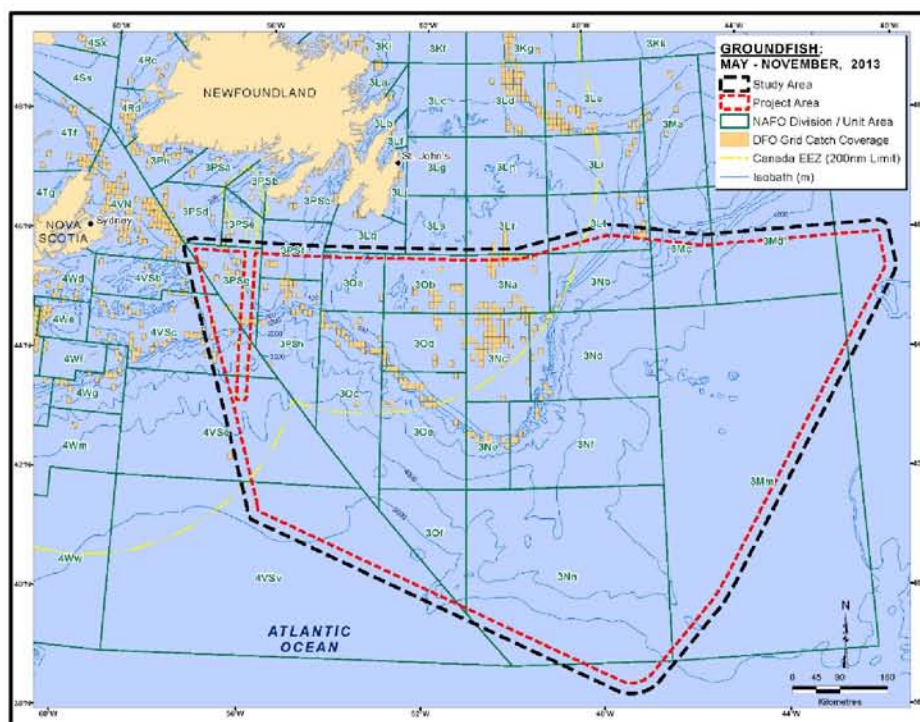
Source: DFO commercial landings database, 2013.

Figure 4.1 Distribution of Commercial Fishery Harvest Locations, All Species, May-November, 2013.



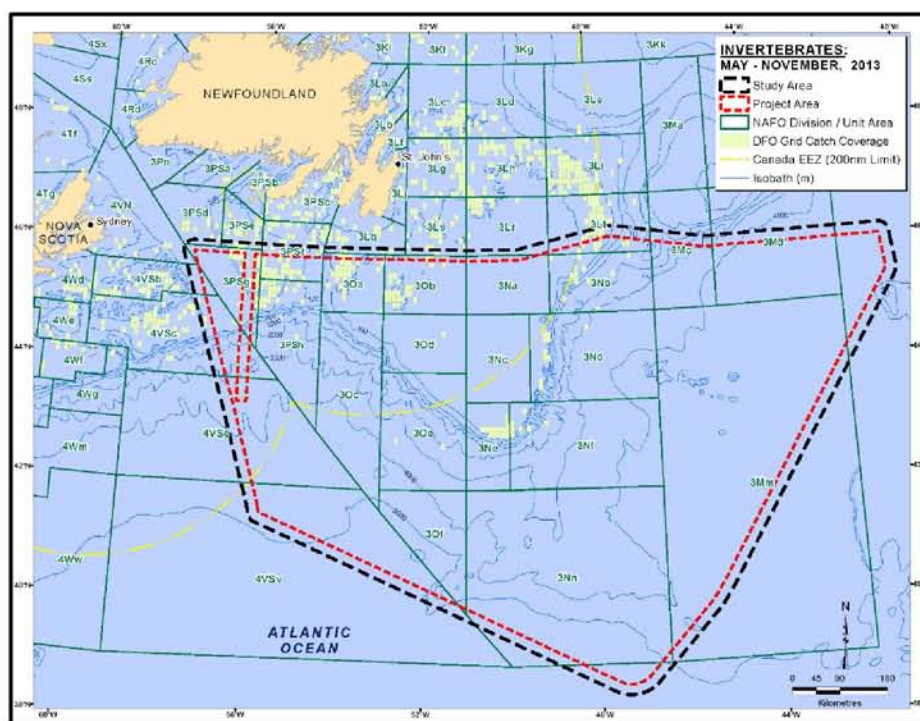
Source: DFO commercial landings database, 2013.

Figure 4.2 Distribution of Commercial Fishery Harvest Locations, Snow Crab, May-November, 2013.



Source: DFO commercial landings database, 2013.

Figure 4.3 Distribution of Commercial Fishery Harvest Locations, All Groundfishes, May November, 2013.



Source: DFO commercial landings database, 2013.

Figure 4.4 Distribution of Commercial Fishery Harvest Locations, All Invertebrates, May-November, 2013.

During May-November 2013, the distribution of harvest locations for snow crab in the Study Area was consistent with that observed during May-November, 2005-2012 (see Figure 4.2 above and Figures 4.10 to 4.12 in LGL 2014a). Since 2010, the TAC for snow crab in NAFO Divisions 3LNO and 3Ps has remained somewhat consistent, although there seems to be a slight increasing trend in Divisions 3LNO (DFO 2014c).

During 2005–2010, there was a relatively small harvest of northern shrimp in the Study Area (see Table 4.2 in LGL 2014a). The northern shrimp harvest will likely decrease further in the next several years, given the decline of the TAC in Shrimp Fishing Area (SFA) 7 (inclusive of the Study Area) since 2010 (DFO 2014c). In 2015, commercial fishing for northern shrimp will not be permitted in NAFO Division 3L (NAFO 2015).

In 2013, as in previous years, the majority of harvest within the Study Area occurred during the May to July period (see Figure 4.5 below and Figure 4.8 in LGL 2014). Gear types used in the 2013 harvest were typical of those used in the region's commercial fisheries in recent years (see Section 4.3.3.2 [*Fishing Gear in the Study Area*] in LGL 2014).

Table 4.1 Commercial Catch Weights and Values in the Study Area, May–November, 2013
(Values indicate the frequency of catch weight quartile codes (i.e., 1–4) attributed to each species. Gear types and months of effort are also indicated).

Species	Catch Weight Quartile Code Counts ^a				Catch Value Quartile Code Counts ^b				Total Counts ^c	Month Caught	Gear Type	
	1	2	3	4	1	2	3	4			Fixed	Mobile
Snow Crab	38	82	36	9	30	70	43	22	165	May–Aug	Pot	-
Atlantic Cod	44	51	20	9	52	48	21	3	124	May–Nov	Gillnet; Longline	Trawl
Atlantic Halibut	42	16	2	0	37	20	3	0	60	May–Oct	Gillnet; Longline	Trawl
Whelks	9	17	14	0	19	18	3	0	40	May–Jul	Pot	-
American Plaice	6	12	2	1	13	6	2	0	21	May–Jul; Sep–Nov	Gillnet	Trawl
Haddock	6	1	1	0	6	2	0	0	8	Jul–Aug	Gillnet	Trawl
Redfish	5	1	1	0	6	0	1	0	7	Aug; Oct–Nov	-	Trawl
Greenland Halibut	6	1	0	0	3	4	0	0	7	May; Jul	Gillnet	Trawl
Bluefin Tuna	2	0	0	0	1	1	0	0	2	Jul; Sep	Longline	Rod and Reel (Trolling)
Stimpson's Surf Clams	0	0	2	0	0	1	1	0	2	Oct–Nov	-	Dredge
Propeller Clams	0	0	2	0	0	2	0	0	2	Jun	-	Dredge
Swordfish	1	0	0	0	1	0	0	0	1	Aug	Longline	-
Hagfish	0	0	1	0	0	1	0	0	1	Jun	Trap Net	-
Yellowtail Flounder	0	1	0	0	1	0	0	0	1	Nov	-	Trawl
Total	159	182	81	19	169	173	74	25	441	-	-	-

Source: DFO commercial landings database, 2013.

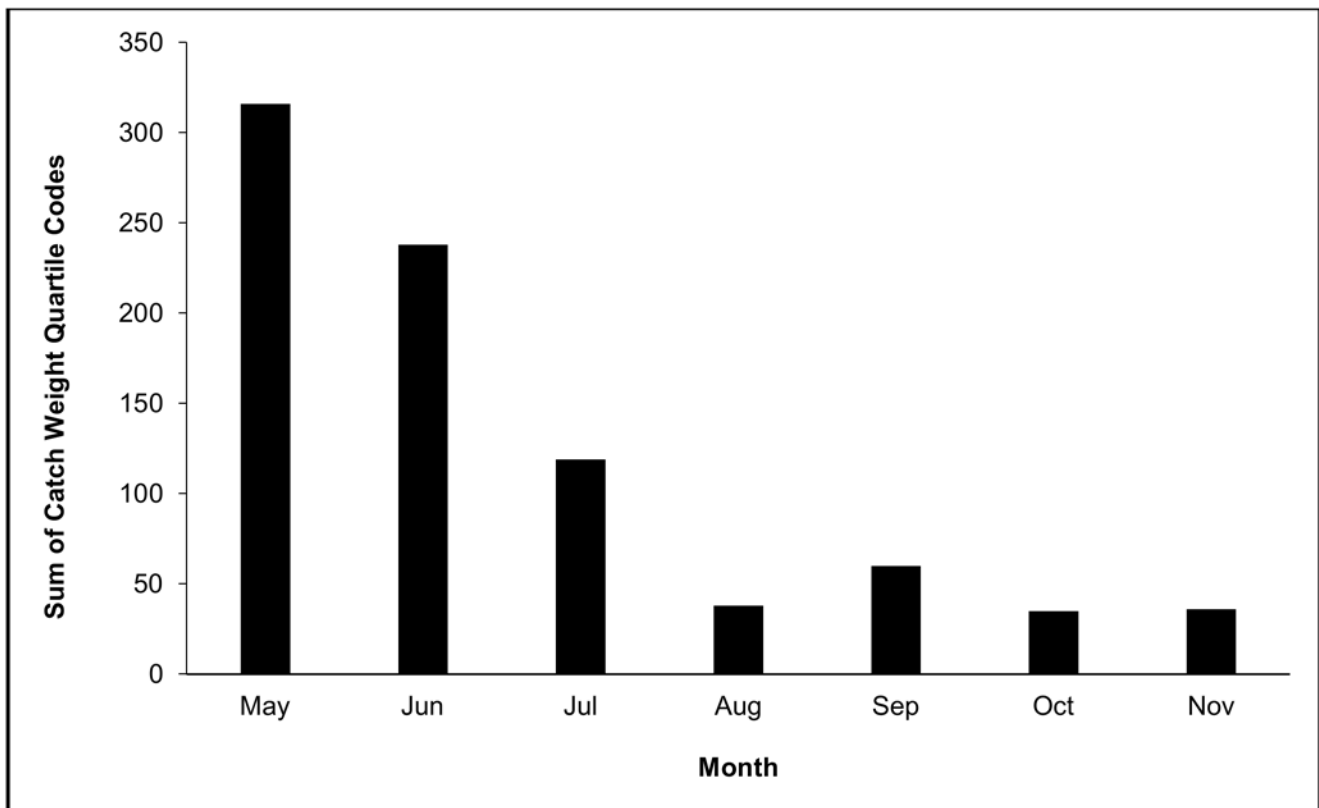
^a Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). 2013 quartile ranges: 1 = 0 – 2,565 kg, 2 = 2,566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg.

^b Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch values in a given year, all species combined). 2013 quartile ranges: 1 = \$0 – \$8,934, 2 = \$8,395 – \$35,699, 3 = \$35,700 – \$125,728, 4 = ≥ \$125,729.

^c Total counts of the number of catch records per species; the total quartile range counts for catch weight and catch value are equal.

4.2.2 Traditional and Aboriginal Fisheries

There is no new information regarding traditional and aboriginal fisheries in the Study Area since the preparation of the EA in 2014 and publication of the Eastern Newfoundland Strategic Environmental Assessment (SEA) (see Section 4.3.4 in LGL 2014a and Section 4.3.4 in C-NLOPB 2014). While the Nunatsiavut Government does hold a Communal Snow Crab licence and allocation within NAFO Divisions 2GHJ, its area of allocation is located north of the Study Area (DFO 2010a).



Source: DFO commercial landings database, 2013.

Note: Sum of quartile catch ranges is the summation of catch weight quartile ranges (i.e., 1–4) for all catch records for all species; the greater the sum of quartile range counts, the greater the catch weight for a given month.

Figure 4.5 Monthly Sum of Catch Weight Quartile Codes in the Study Area, All Species, May-November, 2013.

4.2.3 Recreational Fisheries

Recreational fisheries in Newfoundland and Labrador are described in Section 4.3.5 of the EA (LGL 2014a), Section 3.3.3 in the Southern Newfoundland SEA (C-NLOPB 2010), and Section 4.3.4.4 of the Eastern Newfoundland SEA (C-NLOPB 2014). In 2015, the recreational groundfish fishery will occur in all NAFO areas around Newfoundland and Labrador, including NAFO Divisions 2GH, 2J3KL, 3Ps, 3Pn and 4R (DFO 2014d). This fishery is largely conducted in coastal and inshore waters (C-NLOPB 2014), and will be open for three weeks in the summer beginning on 18 July 2015, and for nine days in the fall beginning on 19 September 2015 (dates are subject to change; DFO 2014d).

As in previous years, the retention of Atlantic halibut, spotted wolffish (*Anarhichas minor*), northern wolffish (*A. denticulatus*), and any species of shark is prohibited in the Newfoundland and Labrador 2015 recreational fisheries (DFO 2014d). While sculpins (Cottoidea) and cunners (*Tautoglabrus adspersus*) may be released, all other groundfish caught must be retained (DFO 2014d).

4.2.4 Aquaculture

As per the EA (see Section 4.3.6 in LGL 2014a), there are currently no approved aquaculture sites within the Study Area. Aquaculture sites in southern Newfoundland are coastal-based and occur north of the Study Area (see Section 4.3.4.3 and Figure 4.150 in C-NLOPB 2014; DFA 2014).

4.2.5 DFO and Industry Science Surveys

DFO Research Vessel (RV) data collected during annual multi-species trawl surveys between 2007 and 2011 were presented in the EA (see Section 4.3.7 in LGL 2014a). Analysis of the 2012 dataset for spring (April–June) and fall (September–November) RV surveys in the Study Area did not indicate any major differences in either the predominant species caught or the harvest locations compared to previous survey years (see Table 4.4 and Figure 4.34 in LGL 2014a).

Fisheries research surveys conducted by DFO and the fishing industry were described in Section 4.3.8 of the EA (LGL 2014a). The tentative schedule of the 2015 DFO multispecies science surveys (RV surveys) is presented below (Table 4.2; G. Sheppard, DFO, pers. comm.). Spring RV surveys are currently set to begin at the end of March and continue into mid-June, with surveys potentially occurring within the Study Area between late-May and mid-June. DFO fall RV surveys will begin in mid-September and end in early-December, and may occasionally occur in the Study Area throughout this time period.

As indicated in the EA (see Section 4.3.8 in LGL 2014a), several DFO-Industry collaborative post-season snow crab trap survey stations are located in the northwest and north-central portions of the Study Area (see Figure 4.42 in LGL 2014a). Sampling at these stations will occur annually during the September to November period throughout the remainder of the Project (i.e., 2015-2018).

Table 4.2 Tentative Schedule of DFO RV Surveys in 2015.

NAFO Division	Start Date	End Date	Vessel
3P	31 Mar	14 Apr	<i>Needler</i>
3P	14 Apr	28 Apr	<i>Needler</i>
3P + 3O	29 Apr	12 May	<i>Needler</i>
3O + 3N	12 May	26 May	<i>Needler</i>
3L + 3N	27 May	13 Jun	<i>Needler</i>
3O	16 Sep	29 Sep	<i>Needler</i>
3O + 3N	29 Sep	13 Oct	<i>Needler</i>
2H	04 Oct	13 Oct	<i>Teleost</i>
2H + 2J	14 Oct	27 Oct	<i>Teleost</i>
3N + 3L	14 Oct	27 Oct	<i>Needler</i>
2J + 3K	27 Oct	10 Nov	<i>Teleost</i>
3L	28 Oct	10 Nov	<i>Needler</i>
3K	11 Nov	24 Nov	<i>Teleost</i>
3K + 3L	11 Nov	24 Nov	<i>Needler</i>
3K + 3L Deep	24 Nov	08 Dec	<i>Teleost</i>

Start/end dates subject to change as trip plans are finalized.

4.3 Seabirds

This section includes updates to the description of the Seabird VEC described in Section 4.4 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

The following update applies to Section 4.4.3.7 of the EA (LGL 2014a).

Data collected through the application of geolocators to 19 Thick-billed Murres (*Uria lomvia*) and 20 Common Murres (*Uria aalge*) from five nesting colonies in the Northwest Atlantic indicated that murres exhibited a combination of site fidelity and flexibility to wintering areas (McFarlane et al. 2014). During the non-breeding season (September to April), Thick-billed Murres occurred in the offshore from Davis Strait south to the Flemish Cap and Southeast Grand Banks, and Common Murres occurred in areas off eastern Newfoundland, including the Flemish Cap and the Southeast Grand Banks (McFarlane et al. 2014).

The last sentence of the third paragraph in Section 4.4.3.7 (LGL 2014a), "Murres were not recorded in the deeper waters", should be deleted.

4.4 Marine Mammals and Sea Turtles

This section includes updates to the description of the Marine Mammal and Sea Turtle VEC described in Section 4.5 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

4.4.1 Updated COSEWIC Designations

The following are updated COSEWIC designations for particular marine mammals included in Table 4.10 of the MKI EA (LGL 2014a).

- Beluga whale (*Delphinapterus leucas*) (St. Lawrence Estuary population) – changed from *threatened* to *endangered*;
- Sei whale (*Balaenoptera borealis*) (Atlantic population) – changed from *data deficient* to *high-priority candidate* species;
- Sperm whale (*Physeter microcephalus*) (Atlantic) – changed from *low-priority candidate* species to *mid-priority candidate* species;
- Harp seal (*Pagophilus groenlandicus*) (Atlantic) – changed from *mid-priority candidate* species to *high-priority candidate* species; and
- Hooded seal (*Cystophora cristata*) (Atlantic) – changed from *mid-priority candidate* species to *high-priority candidate* species.

4.4.2 Updated Population/Abundance Estimates

Some of the marine mammal and sea turtle population/abundance estimates included in the original EA (LGL 2014a) are updated below.

- Sperm whale - there is currently no reliable estimate of sperm whale abundance for the entire western North Atlantic. The best recent abundance estimate of 2,288 (CV = 0.28), based on aerial and shipboard surveys and uncorrected for dive-time, is likely an underestimate (Waring et al. 2014).
- Long-finned pilot whale (*Globicephala melas*) - although the total number of long-finned pilot whales off the east coast of the U.S. and Canada remains uncertain, an estimated 26,535 individuals occur in the Northwest Atlantic (Waring et al. 2014). Lawson and Gosselin (2009) provided an abundance estimate of 6,134 pilot whales, based on aerial surveys conducted from northern Labrador to the Scotian Shelf.
- Bottlenose dolphin (*Tursiops truncatus*) - Waring et al. (2014) estimated an abundance of 77,532 (CV = 0.40) bottlenose dolphins in the area from central Florida to the lower Bay of Fundy.
- Common dolphin (*Delphinus delphis*) - an estimated 173,486 (CV = 0.55) common dolphins reside in the Northwest Atlantic, based on aerial surveys conducted from northern Labrador to the Scotian Shelf (Lawson and Gosselin 2009 in Waring et al. 2014). Lawson and Gosselin (2009) provided an abundance estimate of 576 common dolphins for Newfoundland, based on aerial surveys conducted off the southern and eastern coast. The corrected abundance estimate is 1,806 dolphins (Lawson and Gosselin, unpublished data).
- Striped dolphin (*Stenella coeruleoalba*) - the best abundance estimate for striped dolphins in the western North Atlantic is the sum of the 2011 estimates—54,807 (CV = 0.30; Waring et al. 2014).
- Risso's dolphin (*Grampus griseus*) - the best abundance estimate for Risso dolphins in the western North Atlantic is the sum of the 2011 estimates—18,250 (CV = 0.46; Waring et al. 2014).
- Harbour seal (*Phoca vitulina*) - the abundance estimate for the western North Atlantic stock of harbour seals for 2001 and 2012 were 99,340 and 70,142 individuals, respectively. The current best abundance estimate is 70,142 from 2012 (Waring et al. 2014).
- Harp seal - the total population size for the Northwest Atlantic harp seal population was estimated to be 7,411,000 in 2014 (SE = 656,000; Hammill et al. 2014a). Despite highly variable pup production among years, this population has shown little change in abundance since 2004 and is considered to be relatively stable (Hammill et al. 2014a).
- Grey seal (*Halichoerus grypus*) – the 2014 population sizes for grey seals at Sable Island, coastal Nova Scotia and the Gulf of St. Lawrence were estimated to be 394,000 (95% CI = 238,000-546,000), 13,800 (95% CI = 9,300–27,300), and 98,000 (95% CI = 54,000-179,000), respectively (Hammill et al. 2014b).

4.4.3 Additional References

Davoren (2013) compared data on previously described annually persistent aggregations of capelin (*Mallotus villosus*) on the northeast Newfoundland coast with data on predator distribution and abundance collected during at-sea surveys repeated over 8 years (2000–2003, 2007, and 2009–2011). They found that for all years combined, there was a higher frequency of baleen whales (predominantly humpback whales *Megaptera novaeangliae*; also minke whales *Balaenoptera acutorostrata* and fin whales *Balaenoptera physalus*) associated with three persistent prey hotspots relative to other areas. Baleen whales were associated with both spawning and staging hotspots for capelin. At capelin spawning hotspots, the baleen whales were most frequently present during spawning than before or after spawning. These hotspots are located a considerable distance north of the Study Area.

In 2008 and 2009, Prieto et al. (2014) deployed satellite tags on sei whales in Portugal, and subsequent analysis of tracking data revealed a well-defined migratory corridor between the Azores and the Labrador Sea. Tracking data also showed that sei whales in the Labrador Sea spend considerable time foraging, indicating that the Labrador Sea constitutes an important feeding ground for them. Recent satellite telemetry data also suggested a discrete feeding area for sei whales may be present off the Gulf of Maine and Nova Scotia (Prieto et al. 2014). These data support the hypothesis that separate stocks of sei whales exist off the coasts of the U.S. and Canada. Some of the sei whales tracked to the Labrador Sea by Prieto et al. (2014) arrived in the area in mid-May with some remaining there until mid-September, coinciding with the time when sei whales are known to occur in the Gulf of Maine (CETAP 1982; Baumgartner et al. 2011).

Kennedy et al. (2014) reported two humpbacks outfitted with satellite transmitters near the Dominican Republic travelled near or within the Study Area. One whale was recorded on the eastern edge of Cabot Strait in May 2011, and the second whale was recorded on the Grand Banks in June 2012.

McCordic et al. (2014), using images from the North Atlantic Humpback Whale Catalogue (NAHWC), examined humpback whale flukes for the presence of rake marks from killer whales. They found that within the western North Atlantic, Canada (including the Newfoundland and Labrador region and the Quebec shore of the Gulf of St. Lawrence) has a scarring rate that is almost twice that of either the Gulf of Maine or West Greenland. This suggests that the Canadian population of killer whales may prey preferentially on marine mammals.

Matthews and Ferguson (2014) analyzed stable isotopes in the tooth collagen of killer whales (*Orcinus orca*) from the Eastern Canadian Arctic (ECA) and the north-west Atlantic (NWA; samples from Newfoundland). Significant differences in stable nitrogen isotope values between killer whales from the two areas support the hypothesis that ECA and NWA killer whales are from largely non-overlapping populations. Despite these inter-area differences, ECA and NWA killer whales were found to forage at similar trophic levels.

4.5 Species at Risk

This section includes updates to the description of the Species at Risk VEC described in Section 4.6 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

Table 4.3 summarizes species at risk that could potentially occur in the Study Area, based on information as of March 2015 from the websites for *SARA* and COSEWIC. Changes in species designations since the EA was prepared in 2014 are detailed below and noted in red font and light grey shading in Table 4.3. These changes in designation do not affect the effects assessment or requirement for mitigation measures. Note that the scientific names of the animals are provided in Table 4.3.

- Sei whale (Atlantic population) added; it is considered a high priority candidate species by COSEWIC;
- Cuvier's beaked whale added; it is considered a mid-priority candidate species by COSEWIC;
- Kemp's Ridley sea turtle added; it is considered a low priority candidate species by COSEWIC;
- Atlantic bluefin tuna added; it is assessed as endangered by COSEWIC;
- Shortfin mako shark (Atlantic population) added; it is assessed as threatened by COSEWIC;
- White hake (Atlantic population) added; it is assessed as threatened by COSEWIC;
- Winter skate (Eastern Scotian Shelf population) added; it is assessed as threatened by COSEWIC;
- Smooth skate (Laurentian-Scotian population) added; it is assessed as special concern by COSEWIC;
- Thorny skate added; it is assessed as special concern by COSEWIC;
- Basking shark (Atlantic population) added; it is assessed as special concern by COSEWIC;
- Atlantic mackerel added; it is considered a mid-priority candidate species by COSEWIC;
- Alewife added; it is considered a mid-priority candidate species by COSEWIC;
- King Eider added; it is considered a low priority candidate species by COSEWIC;
- Beluga whale (St. Lawrence Estuary population) – COSEWIC assessment changed from threatened to endangered (as of November 2014);
- Hooded seal – COSEWIC assessment changed from a mid-priority to a high priority candidate species;
- Harp seal – COSEWIC assessment changed from a mid-priority to a high priority candidate species; and
- Sperm whale – COSEWIC assessment changed from a low priority to a mid-priority candidate species.

Table 4.3 SARA Schedule 1- and COSEWIC-Listed Marine Species that Potentially Occur in the Study Area.

SPECIES		SARA Schedule 1 ^a			COSEWIC ^b			
Common Name	Scientific Name	Endangered	Threatened	Special Concern	Endangered	Threatened	Special Concern	Candidate Species
Marine Mammals								
Blue whale (Atlantic population)	<i>Balaenoptera musculus</i>	X			X			
North Atlantic right whale	<i>Eubalaena glacialis</i>	X			X			
Northern bottlenose whale (Scotian Shelf population)	<i>Hyperoodon ampullatus</i>	X			X			
Beluga whale (St. Lawrence Estuary population)	<i>Delphinapterus leucas</i>		X		X			
Fin whale (Atlantic population)	<i>Balaenoptera physalus</i>			X			X	
Sowerby's beaked whale	<i>Mesoplodon bidens</i>			X			X	
Harbour porpoise (Northwest Atlantic population)	<i>Phocoena phocoena</i>						X	
Killer whale (Northwest Atlantic/Eastern Arctic population)	<i>Orcinus orca</i>						X	
Sei whale (Atlantic population)	<i>Balaenoptera borealis</i>							High priority
Ringed seal	<i>Phoca hispida</i>							High priority
Hooded seal	<i>Cystophora cristata</i>							High priority
Harp seal	<i>Phoca groenlandica</i>							High priority
Bearded seal	<i>Erignathus barbatus</i>							Mid priority
Sperm whale	<i>Physeter microcephalus</i>							Mid priority
Cuvier's beaked whale	<i>Ziphius cavirostris</i>							Mid priority
Sea Turtles								
Leatherback sea turtle	<i>Dermochelys coriacea</i>	X			X			
Loggerhead sea turtle	<i>Caretta caretta</i>				X			
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>							Low priority
Marine Fish								
White shark (Atlantic population)	<i>Carcharodon carcharias</i>	X			X			
Northern wolffish	<i>Anarhichas denticulatus</i>		X			X		
Spotted wolffish	<i>Anarhichas minor</i>		X			X		
Atlantic wolffish	<i>Anarhichas lupus</i>			X			X	
Atlantic cod (Newfoundland and Labrador population)	<i>Gadus morhua</i>				X			

SPECIES		SARA Schedule 1 ^a			COSEWIC ^b			
Common Name	Scientific Name	Endangered	Threatened	Special Concern	Endangered	Threatened	Special Concern	Candidate Species
Porbeagle shark	<i>Lamna nasus</i>				X			
Roundnose grenadier	<i>Coryphaenoides rupestris</i>				X			
Cusk	<i>Brosme brosme</i>				X			
Atlantic bluefin tuna	<i>Thunnus thynnus</i>				X			
Atlantic salmon (various populations)	<i>Salmo salar</i>				X	X	X	
American eel	<i>Anguilla rostrata</i>					X		
American plaice (Newfoundland and Labrador population)	<i>Hippoglossoides platessoides</i>					X		
Acadian redfish (Atlantic population)	<i>Sebastes fasciatus</i>					X		
Deepwater redfish (Northern population)	<i>Sebastes mentella</i>					X		
Shortfin mako shark	<i>Isurus oxyrinchus</i>					X		
White hake (Atlantic population)	<i>Urophycis tenuis</i>					X		
Winter skate (Eastern Scotian Shelf population)	<i>Leucoraja ocellata</i>					X		
Blue shark (Atlantic population)	<i>Prionace glauca</i>						X	
Spiny dogfish (Atlantic population)	<i>Squalus acanthias</i>						X	
Roughhead grenadier	<i>Macrourus berglax</i>						X	
Smooth skate (Laurentian-Scotian population)	<i>Malacoraja senta</i>						X	
Thorny skate	<i>Amblyraja radiata</i>						X	
Basking shark (Atlantic population)	<i>Cetorhinus maximus</i>						X	
Northwest Atlantic Lumpfish	<i>Cyclopterus lumpus</i>							High priority
Spinytail skate	<i>Bathyraja spinicauda</i>							Mid priority
Pollock	<i>Pollachius virens</i>							Mid priority
Greenland shark	<i>Somniosus microcephalus</i>							Mid priority
Atlantic mackerel	<i>Scomber scombrus</i>							Mid priority
Alewife	<i>Alosa pseudoharengus</i>							Mid priority
Birds								
King Eider	<i>Somateria spectabilis</i>							Low priority

Sources: ^aSARA website (http://www.sararegistry.gc.ca/species/default_e.cfm), accessed March 2015; ^bCOSEWIC website (<http://www.cosewic.gc.ca/index.htm>); accessed March 2015; COSEWIC candidate species not included.

As of March 2015, no additional species of special status that could potentially occur within the Study Area have been added to Schedule 1 of *SARA*. Final recovery strategies have been prepared for seven species currently designated as either *endangered* or *threatened* under Schedule 1 and potentially occurring in the Study Area: (1) the blue whale (Beauchamp et al. 2009); (2) the North Atlantic right whale (Brown et al. 2009); (3) the Scotian Shelf population of northern bottlenose whale (DFO 2010b); (4) the St. Lawrence Estuary population of beluga whale (DFO 2012a); (5) the leatherback sea turtle (ALTRT 2006); (6) the spotted wolffish (Kulka et al. 2007); and (7) the northern wolffish (Kulka et al. 2007). The recovery strategy for the North Atlantic right whale (Brown et al. 2009) was amended in 2014 to incorporate changes made pertaining to the critical habitat of the population (DFO 2014e). A management plan has been prepared for the Atlantic wolffish (Kulka et al. 2007), currently designated as *special concern* on Schedule 1 of *SARA*.

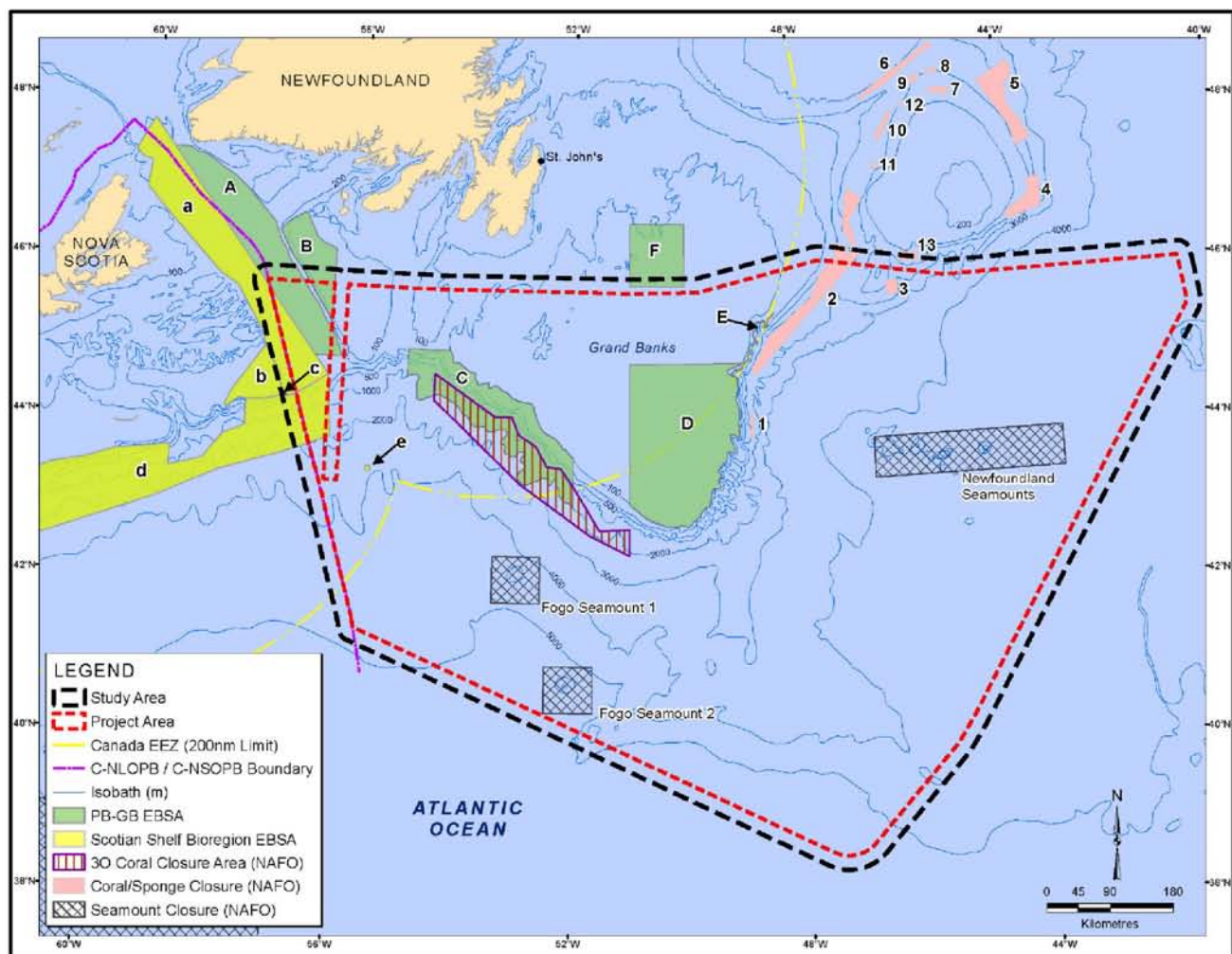
MKI will monitor *SARA* issues through the law gazettes, the Internet, and communication with DFO and Environment Canada, and will adaptively manage any issues that may arise in the future. MKI will comply with relevant regulations pertaining to *SARA* Recovery Strategies and Action Plans, and continue to exercise due caution to minimize impacts on species at risk during all of its operations. MKI also understands that other marine species may be designated as *endangered* or *threatened* on Schedule 1 of the *SARA* during the course of the Project and will continue to monitor any status changes.

4.6 Sensitive Areas

This section includes updates to the description of the Sensitive Areas VEC described in Section 4.7 of MKI's EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in either the EA (LGL 2014a) or its Amendment (LGL 2015).

There are 11 Ecologically and Biologically Significant Areas (EBSAs) associated with the Placentia Bay - Grand Banks Large Ocean Management Area (PB-GB LOMA; DFO 2012b) and the Scotian Shelf Bioregion (DFO 2014f) that either overlap or are proximate to (within 20 km) the Study Area (Figure 4.6).

Since the submission of the EA, the EBSAs within the Scotian Shelf Bioregion have been re-evaluated and updated (Doherty and Horsman 2007; DFO 2014f). In addition, a NAFO Coral/Sponge Closure Area has been added near Beothuk Knoll (see Figure 4.6, Area 13), and the closure periods for the NAFO 3O Coral Closure Area, NAFO Seamount Closure Areas, and NAFO Coral/Sponge Closure Areas have been extended from 31 December 2014 until 31 December 2020 (NAFO 2015).



Notes: PB-GB LOMA EBSAs: (A) Laurentian Channel, (B) St. Pierre Bank, (C) The Southwest Shelf Edge and Slope, (D) Southeast Shoal and Tail of the Banks, (E) Lilly Canyon-Carson Canyon, and (F) Virgin Rocks. Scotian Shelf Bioregion EBSAs: (a) Laurentian Channel, (b) Eastern Shoal, (c) Stone Fence, (d) Scotian Slope, and (e) Laurentian Fan Cold Seep Communities.

Figure 4.6 Sensitive Areas Overlapping or Proximate to the Study Area.

4.6.1 Placentia Bay - Grand Banks Large Ocean Management Area

The six PB-GB LOMA EBSAs that either overlap or are proximate to the Study Area include:

- Southeast Shoal and Tail of the Banks;
- Southwest Shelf Edge and Slope;
- St. Pierre Bank;
- Laurentian Channel and Slope;
- Virgin Rocks; and
- Lilly Canyon - Carson Canyon.

The key attributes of the six PB-GB LOMA EBSAs are presented in Table 4.14 of the EA (LGL 2014a).

4.6.2 Scotian Shelf Bioregion

Since the submission of the EA (LGL 2014a), the EBSAs within the Scotian Shelf Bioregion have been refined based on the previously described Scientific Expert Opinion (SEO) ESBAs (Doherty and Horsman 2007), current broad-scale ecological and biological data, and DFO EBSA criteria (DFO 2014f). Six Scotian Shelf SEO EBSAs (Doherty and Horsman 2007) were described in the EA. Two of these SEO EBSAs, the Laurentian Channel and Slope and the Laurentian Channel Slope (Doherty and Horsman 2007) have been combined into one EBSA, the Laurentian Channel (DFO 2014f). Based on the recent science advisory report, five Scotian Shelf Bioregion EBSAs either overlap or are proximate to the Study Area:

- Eastern Shoal;
- Stone Fence;
- Laurentian Channel;
- Laurentian Fan Cold Seep Communities; and
- Scotian Slope.

The key attributes of the five Scotian Shelf Bioregion EBSAs are presented in Table 4.4 (Doherty and Horsman 2007; DFO 2014f).

4.6.3 NAFO 3O Coral Closure Area

A NAFO Coral Protection Zone currently exists as a mandatory closure on the slope of the Grand Bank in NAFO Div. 3O between 800 m and 2,000 m (see Figure 4.6). The protection zone, which encompasses an area of 14,040 km², was initiated by the Canadian-NAFO Working Group and implemented by NAFO (NAFO 2015). The purpose of the closure is to protect corals found in the area and ‘freeze the footprint’ of fishing activities in deeper waters. This area is closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015).

4.6.4 NAFO Seamount Closure Areas

The term ‘Vulnerable Marine Ecosystem (VME) Element’ refers to topographical, hydrophysical, or geological features which potentially support VMEs including slopes, summits and flanks of seamounts and knolls, and canyons. Three NAFO seamount closure areas occur entirely within the Study Area: (1) Fogo Seamount 1; (2) Fogo Seamount 2; and (3) Newfoundland Seamounts (see Figure 4.6). These areas are closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015).

Table 4.4 Key Attributes of Scotian Shelf Bioregion EBSAs either Overlapping or Proximate to the Study Area.

EBSA	Key Attributes
Eastern Shoal	<ul style="list-style-type: none"> • Large, shallow sand body is unique; • Important for groundfish (Atlantic cod, American plaice, winter skate, thorny skate) and sandlance; • Important for commercial invertebrates (surf clams, scallops, quahogs); • High fish and invertebrate species diversity; • Significant area for plankton; and • Important seabird habitat (several functional guilds).
Stone Fence (previously Stone Fence and Laurentian Environs)	<ul style="list-style-type: none"> • Unique and sensitive benthic community; • Only confirmed location of the coral <i>Lophelia pertusa</i> on the Scotian Shelf; • Potentially important area for juvenile fishes; and • High diversity of cetaceans.
Laurentian Channel (previously Laurentian Channel and Slope and Laurentian Channel Slope)	<ul style="list-style-type: none"> • High primary productivity and high zooplankton biomass; • High invertebrate species diversity; • Sensitive benthic communities (sea pen fields); • Important for groundfish (overwintering area for Atlantic cod and other species, redfish, white hake); • Important migration route in and out of the Gulf of St. Lawrence (groundfish, cetaceans, leatherback sea turtle); and • High fish species richness (demersal, pelagic, and mesopelagic fish).
Laurentian Fan Cold Seep Communities (previously Laurentian Channel Cold Seep)	<ul style="list-style-type: none"> • Unique, diverse, and highly productive chemosynthetic cold seep communities (vesicomyid and thysanid clams, gastropods, and galatheid crabs); and • Occurrence of unique polychaete species.
Scotian Slope (previously Scotian Slope/Shelf Break)	<ul style="list-style-type: none"> • High primary productivity; • High finfish species diversity; • Important for groundfish (cusk, redfish, white hake, thorny skate, Atlantic halibut); • Migratory route (large pelagic fishes, cetaceans); • High small fish and small invertebrate species richness; • High diversity of squids; • Unique habitats and sensitive benthic communities (corals); and • Important for seabirds (most functional guilds).

Sources: Doherty and Horsman 2007; DFO 2014f.

4.6.5 NAFO Coral/Sponge Closure Areas

In 2008 and 2009, the NAFO Scientific Council identified areas of significant coral and sponge concentrations within the NAFO Regulatory Area. Based on these identifications, areas for closure to fishing with bottom contact gear were delineated. Four of these areas occur either entirely or partially within the Study Area (see Figure 4.6). These areas are closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015).

5.0 Consultations

The document One Ocean Protocol for Consultation Meetings: Recommendations for the Fishing and Petroleum Industries in Newfoundland and Labrador (One Ocean 2013a) outlines recommendations for preparing, convening and following up on consultation meetings.

In early March 2015, MKI distributed a newsletter to various stakeholders and agencies (consultees), describing the seismic activities planned for 2015. The newsletter and list of recipients are provided in Appendices 1 and 2, respectively.

In late March 2015, MKI met with three of the consultees: (1) DFO; (2) the Food, Fish and Allied Workers (FFAW) Union; and (3) Ocean Choice International (OCI). Points of discussion at each of these meetings are outlined below.

5.1 DFO

DFO stated that from its point of view, seismic surveying does not pose ‘serious harm to fish’. Therefore, subsequent face-to-face meetings with DFO are not necessary. Feedback from DFO will be provided, if necessary, during its review of the Update document.

5.2 FFAW

After the presentation of planned seismic activities in the Southern Grand Banks Project Area, the FFAW representative requested a copy of the presentation with which to facilitate discussion with fishers from communities located nearest to the Project Area. MKI committed to maintaining close communication with the fishing industry during 2015 operations.

5.3 OCI

After the presentation of planned seismic activities in the Southern Grand Banks Project Area, the OCI representative indicated that there has been minimal interaction between OCI vessels and seismic vessels during past seasons. The representative did indicate that there is some possibility of spatial overlap between OCI and seismic vessels to the west of Saint-Pierre et Miquelon on the shelf edge. MKI committed to maintaining close communication with OCI during 2015 operations.

6.0 Environmental Assessment

6.1 Mitigation Measures

The mitigation measures described in the EA (Sections 5.6 and 5.10 *in* LGL 2014a) and the associated Addendum (LGL 2014b) and Amendment (LGL 2015) remain applicable to the seismic survey activities planned for 2015.

In 2011, One Ocean reviewed fishing and petroleum industry processes and practices for offshore seismic survey operations in Newfoundland and Labrador with the intention of identifying opportunities to better understand and improve operational processes that would mutually benefit both industries. Results of the review are outlined in the document One Ocean Protocol for Seismic Survey Programs in Newfoundland and Labrador (One Ocean 2013b).

6.2 Validity of Significance Determinations

Based on careful consideration of newly available information presented in Section 4.0 and consultations with stakeholders, the determinations of significance of the residual effects of seismic survey activities on VECs presented in the EA (see Table 5.21 in LGL 2014a) and its Amendment (LGL 2015) remain valid for the 2015 seismic survey activities planned by MKI.

7.0 Concluding Statement

The seismic survey activities that MKI plans to conduct in 2015 have been reviewed and assessed to be within the scope of the EA (LGL 2014a), its Addendum (LGL 2014b), and its Amendment (LGL 2015) (see Table 1.1).

The environmental effects predicted in the EA and its associated documents remain valid. MKI reaffirms its commitment to implement the mitigation measures proposed in these assessment documents and in the Screening Decisions made by the C-NLOPB.

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List of Appendices

Appendix 1 – MKI Newsletter Distributed to Consultees

Appendix 2 – List of Consultees Contacted by MKI

Appendix 1

MKI Newsletter Distributed to Consultees

Resumption of the Program in 2015

This news update is to inform stakeholders and other interested parties of the continuation of MKI's 2D seismic program, started in 2014, in the offshore waters of the Southern Grand Banks. The Project Area is within the regulatory jurisdiction of the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and it is expected that the Atlantic Explorer will again be acquiring the survey data between June and October 2015. Further survey lines, currently not identified on the map below, will be added into the program on the eastern side of the Grand Banks in July 2015 upon the identification by the C-NLOPB of the Sector NL01-SEN which will be the subject of a Call for Bids in November 2019.



Figure 1: Atlantic Explorer

How to Access Environmental Information about the Project

The Environmental Assessment (EA) for the Southern Grand Banks Seismic Program 2014-2018 along with additional documentation including the Annual EA Update can be accessed on the C-NLOPB website (www.cnlopb.ca).

From the C-NLOPB homepage, click on the link "Environmental Assessments" on the right hand side. Then click on the "Completed/On Hold Environmental Assessments" link. Once this page has opened, scroll down to the project titled "MKI Southern Grand Banks Seismic 2014- 2018" and click on the link. Here you can find all environmental documents related to this project.

The EA provides a comprehensive and detailed overview of the project. The overview includes: information on the Physical and Biological Environment, including Fisheries, Fish and Fish Habitat, Marine Mammals and Species at Risk, and a Cumulative Effects Assessment.

Upon the completion of every acquisition season an Environmental Report is supplied to the C-NLOPB and other government agencies. This report summarizes the marine mammal observations, bird observations and interactions with fishing.

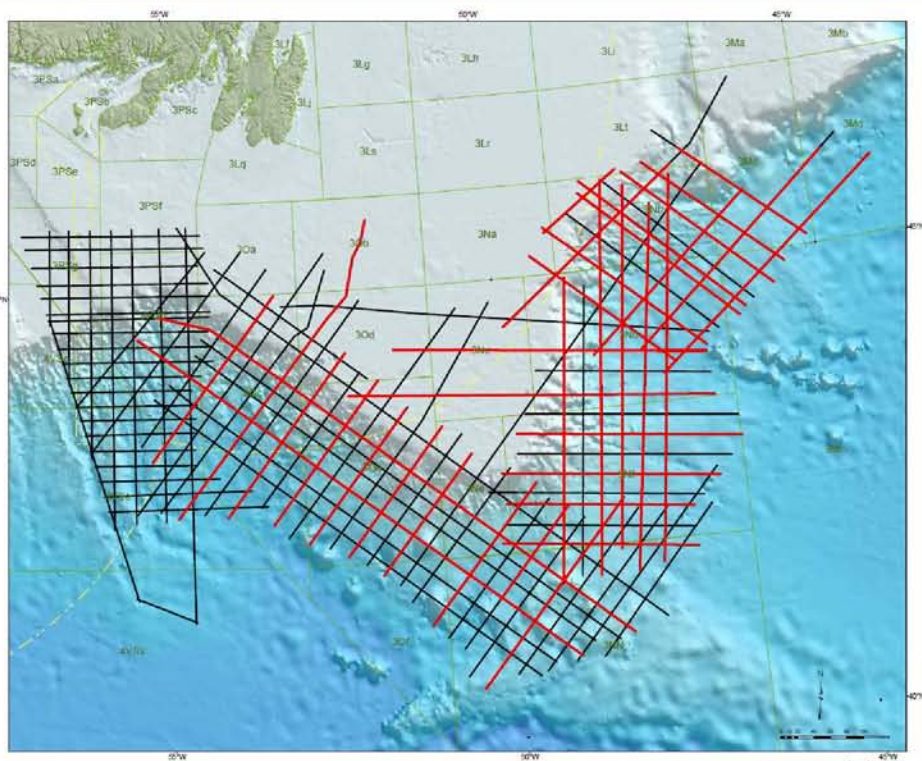


Figure 2: Provisionally planned 2015 survey lines (black) and lines surveyed in 2014 (red)

Ongoing Communication

As a component of the ongoing communications between MKI and local fisheries organizations, MKI will be providing weekly briefing materials including information such as updated schedules, maps, and/or revised timelines.

Employment Opportunities

Employment opportunities associated with this year's operating season have been considered and it has been determined that there will be possible positions for hire as part of the maritime crew. The recruitment process through a local agency will commence in the coming weeks and interested parties should look out for notices posted in community employment offices and other advertisements.

Contact Information

If you have any inquiries regarding the Southern Grand Banks Seismic Program (2014-2018) please feel free to contact:

Petroleum Geo-Services
15150 Memorial Drive
Houston, Texas, 77079
(P) 1-281-509-8000
(F) 1-281-509-8500
canada@pgs.com



Appendix 2

List of Consultees Contacted by MKI

Organization or Group Name	Email Address	Contact Name	Engagement Type
Aquaforte			
Aquaforte Town Council			Table Meeting
Argentia			
Argentia Management Authority Inc.			Table Meeting
Arnold's Cove			
Town of Arnold's Cove	acadmin@bellaliant.com		PPT, Handouts
Avalon Ocean Products Inc.	Avalon.ocean@nf.aibn.com	Aloysius Wadman	Information Pack
Hopkins & Quinton Fisheries Ltd.			Information Pack
Icewater Seafoods Inc.	awareham@icewaterseafoods.com	Alberto Wareham	Information Pack
Bay Bulls			
Town of Bay Bulls	townofbaybulls@nf.aibn.com		Table Meeting
Burin			
Town of Burin	lhartson@townofburin.com	Leo Hartson, Town Manager	PPT, Handouts
Burin Harbour Authority			Table Meeting
Burin Peninsula Environmental Reform Committee	info@greenburin.ca		Information Pack
College of North Atlantic			
Wave Energy Research Centre		Administrator	Information Pack
Come by Chance			
Town of Come by Chance	townofcbc@eastlink.ca	Clerk	Information Pack
Conne River			
Miaqpukek First Nation	thowse@mfngov.ca	Tracey Howse, Director, Training and Economic Development	Information Pack
Corner Brook			
Qalipu Mi'kmaq First Nation Band	reldridge@qalipu.ca	Ralph Eldridge, Manager of Community Economic Development	Information Pack

Organization or Group Name	Email Address	Contact Name	Engagement Type
Ferryland			
Town of Ferryland	Town.ferryland@nf.aibn.com		Table Meeting
M. & A. Fisheries Limited			Information Pack
Ferryland Fisheries Limited			Information Pack
Ferryland Fisheries Committee Limited->Now Ferryland Harbour Authority			Table Meeting
Fortune			
Town of Fortune	norma@townoffortune.ca	Norma Stacey, Clerk	Table Meeting
Fortune Harbour Authority	*fortuneharbour@hotmail.com		Table Meeting
Atlantic Ocean Farms Limited		President	Information Pack
Grand Bank			
Town of Grand Bank		Office Administrator	Table Meeting
Grand Bank Harbour Authority			Table Meeting
Marystown			
Town of Marystown		Clerk	Table Meeting
Burin Peninsula Community Business Development Corporation		Admin Assistant	Information Pack
Burin Peninsula Chamber of Commerce	administration@bpchamber.ca		Information Pack
Marystown Shipyard and Offshore Facilities		President	Table Meeting
Placentia			
Town of Placentia		Executive Assistant	Table Meeting
Placentia Area Chamber of Commerce	Eugene.collins@placentiachamber.ca	Eugene Collins, Executive Director	Information Pack
Harbour Authority of Placentia Area			Table Meeting

Organization or Group Name	Email Address	Contact Name	Engagement Type
Avalon Gateway Regional Economic Development Inc.		Executive Director	Information Pack
Avalon West Community Business Development Corporation		Administrative Assistant	Information Pack
Placentia Area Development Association		Executive Director	Information Pack
Southern Harbour			
Town of Southern Harbour			Information Pack
St. Brides			
Town of St. Brides		Clerk	Table Meeting
St. Bride's Harbour Authority			
St. Johns			
Fisheries and Oceans Canada- Coast Guard	Jason.kelly@dfo-mpo.gc.ca	Jason Kelly, Senior Fisheries Protection Biologist	Table Meeting
Environment Canada	Glenn.troke@ec.gc.ca	Glenn Troke, EA Coordinator	Table Meeting
Transport Canada	Clement.murphy@tc.gc.ca	Clement Murphy, Manager, Examinations, and Enforcement	Table Meeting
Parks Canada	Randy.thompson@pc.gc.ca	Randy Thompson, Resource Management Officer	Information Pack
National Defence	information@forces.gc.ca		Table Meeting
St. Johns Port Authority	jmcgrath@sjpa.com	Jeff McGrath, Director of Marine Safety and Security	Table Meeting
Newfoundland and Labrador Fisheries and Aquaculture	Davidlewis@gov.nl.ca	David Lewis, Deputy Minister	Table Meeting

Organization or Group Name	Email Address	Contact Name	Engagement Type
City of St. Johns	rellsworth@stjohns.ca	Ron Ellsworth, Deputy Mayor	Table Meeting
Food, Fish, and Allied Workers	jjoensen@ffaw.net	Johan Joensen, Petroleum Industry Liaison	Table Meeting
One Ocean	Maureen.murphy@mi.mun.ca	Director	Table Meeting
Groundfish Enterprise Allocation Council	bchapman@sympatico.ca	Bruce Chapman, Executive Director	Table Meeting
Association of Seafood Producers	dbutler@seafoodproducers.org	Derek Butler, Executive Director	Table Meeting
Seafood Processors of Newfoundland and Labrador	[REDACTED]	[REDACTED] Executive Director	Table Meeting
Beothic Fish Processors Ltd.	[REDACTED]	[REDACTED] Executive Vice President	Information Pack
Breakwater Fisheries Limited	[REDACTED]	[REDACTED]	Information Pack
Deep Atlantic International Inc.	[REDACTED]	[REDACTED] Director	Information Pack
GC Rieber Carino Ltd.	John.c.kearley@carino.ca	John Kearley, CEO	Table Meeting
HSF Ocean Products Limited	[REDACTED]	[REDACTED] Director	Information Pack
Nataaqnaq Fisheries	[REDACTED]	[REDACTED] Fleet Manager	Table Meeting
Newfound Resources Limited	[REDACTED]	[REDACTED] Operations Manager	Information Pack
Notre Dame Seafoods Inc.	jeveleigh@notredameseafoods.com	Jason Eveleigh, President	Information Pack
San-Can Fisheries Limited	sgoff@san-can.com	Sandra Goff, Director	Information Pack
Ocean Choice International	rellis@oceanchoice.com	Rick Ellis, Director of Fleet Operations	Table Meeting
Quinlan Brothers Ltd.	dearle@quinlanbros.ca	David Earle, Chief Financial Officer	Table Meeting
Nature Newfoundland and Labrador	[REDACTED]	[REDACTED]	Table Meeting

Organization or Group Name	Email Address	Contact Name	Engagement Type
St. Lawrence			
Town of St. Lawrence	townofstlawrence@nf.aibn.com	[REDACTED]	Table Meeting
St. Mary's			
Town of St. Mary's	[REDACTED]	[REDACTED]	Table Meeting
Csi Sea Products			Information Pack
Deep Atlantic Sea Products (plant manager in St. Johns)	[REDACTED]	[REDACTED] Plan Manager	Information Pack
Sunnyside			
Town of Sunnyside	townofsunnyside@eastlink.ca	Philip Smith, Town Manager	Information Pack
Trepassey			
Town of Trepassey	[REDACTED]	[REDACTED] Clerk	Information Pack
Trepassey Management Corporation	[REDACTED]	[REDACTED] Chairperson	Information Pack
Southern Avalon Development Association	[REDACTED]	[REDACTED] VP and Board Member	Information Pack
Witless Bay			
Town of Witless Bay	townofwitlessbay@nl.rogers.com	[REDACTED] Clerk	Information Pack
Shawmut Fisheries Ltd.			Information Pack