

**Environmental Assessment of Multiklient Invest
Newfoundland and Labrador Offshore Seismic Program,
2017–2026 Addendum**

Prepared by



for

Multiklient Invest AS

&

TGS-NOPEC Geophysical Company ASA

**November 2017
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Environmental Assessment of Multiklient Invest Newfoundland and Labrador Offshore Seismic Program, 2017–2026 Addendum

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INTRODUCTION

This document is an Addendum to the Environmental Assessment (EA) of Multiklient Invest Newfoundland and Labrador Offshore Seismic Program, 2017–2026. It provides responses to the comments generated during review of the EA.

GENERAL COMMENTS

Environment and Climate Change Canada (ECCC)

General Comment

Due to the recent change in name of Environment Canada to Environment and Climate Change Canada, references to the departmental name and associated acronyms (i.e. EC-CWS to ECCC-CWS) should be updated accordingly.

The following species at risk may be incidentally found near the project site in migration: Harlequin Duck, Barrow's Goldeneye, Red Knot (*rufa* subspecies), Piping Plover, Olive-sided Flycatcher, Red Crossbill (*perna* subspecies) and Common Nighthawk. Though unlikely to be found within the project footprint, these species may occur within the study area and we request that sightings be reported to ECCC-CWS.

Attraction to lights at night or in poor visibility conditions during the day may result in collision with lit structures or their support structures, or with other migratory birds. Disoriented migratory birds are prone to circling light sources and may deplete their energy reserves and either die of exhaustion or be forced to land where they are at risk of depredation.

To reduce risk of incidental take of migratory birds related to human-induced light, ECCC-CWS recommends implementation of the following beneficial management practices:

- The minimum amount of pilot warning and obstruction avoidance lighting should be used on tall structures. Warning lights should flash, and should completely turn off between flashes;
- The fewest number of site-illuminating lights possible should be used in the project area. Only strobe lights should be used at night, at the lowest intensity and smallest number of flashes per minute allowable by Transport Canada;
- Lighting for the safety of the employees should be shielded to shine down and only to where it is needed; and
- LED lights should be used instead of other types of lights where possible. LED light fixtures are less prone to light trespass (i.e. are better at directing light where it needs to be, and do not bleed light into the surrounding area), and this property reduces the incidence of migratory bird attraction.

The assessment of environmental effects which could result from accidents and malfunctions should include a consideration of potential spill events. The assessment should be guided by the need to ensure compliance with the general prohibitions against the deposit of a deleterious substance into waters frequented by fish (Section 36, *Fisheries Act*) and against the deposit of oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds (Section 5.1, *Migratory Birds Convention Act*). In addition, it should be focused on potential worst-case scenarios (e.g., concentrations of marine birds, presence of wildlife at risk). Based on this analysis, the environmental assessment should describe the precautions that will be taken and the contingency measures that will be implemented to avoid or reduce the identified impacts.

In developing a contingency plan that would support the assessment of accidents and malfunctions, and a determination that impacts could be avoided or reduced, it is recommended that the Canadian Standards Association publication, *Emergency Planning for Industry CAN/CSA-Z731-95 (Reaffirmed 2002)*, be consulted as a useful reference. All spills or leaks, including those from machinery, fuel tanks or streamers, should be promptly contained, cleaned-up and reported to the 24-hour environmental emergencies reporting system (Phone: 1-800-563-9089).

Spills could result in significant effects on migratory birds in the event that large numbers of birds, or individual species at risk (SAR), are affected. Migratory birds, including bird species at risk, could be significantly affected if spills affect important habitats or critical habitat for SAR. Disturbance resulting from accidental events during the breeding season in the vicinity of SAR or colonial bird nesting areas could also result in significant effects if it results in nesting failure or site abandonment by the birds.

Response: MKI notes that that the departmental name Environment Canada and its acronym EC should be changed to Environment and Climate Change Canada and ECCC, respectively.

MKI also notes that any unlikely sightings of Harlequin Duck (*Histrionicus histrionicus*), Barrow's Goldeneye (*Bucephala islandica*), Red Knot (*Calidris canutus, rufa* subspecies), Piping Plover (*Charadrius melodus*), Olive-sided Flycatcher (*Contopus cooperi*), Red Crossbill (*Loxia curvirostra, percna* subspecies), and Common Nighthawk (*Chordeiles minor*) made during the program will be reported to ECCC-Canadian Wildlife Service (CWS).

MKI notes the ECCC-CWS recommended beneficial management practices intended to reduce the risk of incidental take of migratory birds related to human-induced light.

The assessment of the environmental effects of accidents and malfunctions on migratory birds has been included in the current EA in Tables 5.9 and 5.10, and Subsection 5.7.6.3 (Accidental Releases). Mitigations related to the assessment of the environmental effects of accidents and malfunctions on migratory birds are addressed in detail in the 2014 EA of the MKI Labrador Sea Seismic Program, 2014–2018 (Subsection 5.6, Mitigation Measure Number 6, Pollution Prevention / Emergency Response; LGL 2014a). MKI's

Oil Spill Response Plan, which will be filed with the C-NLOPB, will also address this issue.

The development of a contingency plan that would support the assessment of accidents and malfunctions and a determination that impacts on migratory birds could be avoided or reduced will be addressed in MKI's Shipboard Oil Pollution Emergency Plan (SOPEP), which will be filed with the C-NLOPB. The SOPEP's primary purpose is to set in motion the necessary actions to stop or minimize the discharge of oil and to mitigate its effects. The SOPEP includes a summary flowchart to guide the Master through reporting and acting procedures required during an oil pollution incident response.

Department of National Defence (DND)

General Comment

MARLANT Safety and Environment (MARL SE) has the following comments:

- Please identify a specific individual or office to serve as a Point of Contact (POC) for MARLANT queries and concerns;
- Please ensure the appropriate Notice to Mariners will be issued for all underwater activities and any significant surface ventures, such as use of flares, buoys, and unconventional night lighting;
- Please ensure the appropriate Notice to Airmen will be issued for all activities that could affect air safety, such as use of balloons, Unmanned Aerial Vehicles (UAVs) or tethered airborne devices; and
- Please ensure engagement of CTF 84, through Director General Naval Strategic Readiness (DGNSR), to ensure de-confliction with possible Allied submarine activities.

The UXO Program has conducted a search of our database and there are two identified UXO sites of concern in that area (see attached) and numerous shipwrecks.

Due to the fact that there may be uncharted shipwrecks or other UXO sites or munition dumps, and in the event activities are conducted that have contact with the seabed (such as drilling or mooring), it is strongly advised that operational aids, such as remotely operated vehicles, be used to conduct seabed survey to prevent unintentional contact with harmful UXO items, shipwrecks, or dumpsites that are not noted on the maps.

Should any suspected UXO be encountered during the course of the operations, do not disturb/manipulate it. Please mark the location and immediately inform the Coast Guard. Additional information is available in the 2010 Annual Edition - Notices to Mariners, Section 37. Further UXO general information is available at our website at www.uxocanada.forces.gc.ca.

Response: The Point of Contact (POC) for MARLANT queries and concerns is Jason Norman, Project Supervisor based in St. John's, NL. His contact information is as follows:

Jason Norman
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Multiklient Invest AS
1 Church Hill
St. John's NL A1C 3Z7
Tel. +1 281 509 8263
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MKI notes the other DND comments related to Notice to Mariners, Notice to Airmen, and engagement of CTF 84 through Director General Naval Strategic Readiness.

If MKI encounters any suspected UXO during its operations, the UXO will not be disturbed. Its location will be marked and the Coast Guard will be informed immediately.

Canada-Nova Scotia Offshore Petroleum Board (CNSOPB)

General Comment

A portion of the project area includes Fisheries Management Area 4Vs. Some fisheries originating from Nova Scotia work in the 4Vs area. It is not clear in sections 5.1.1 and A-11 of the EA Report if the proponent has consulted with or informed fisheries from Nova Scotia of the program plans.

If fisheries originating from Nova Scotia are not yet aware of the program, it is recommended that the proponent make the commitment to inform these fisheries and/or fishing organizations, as the proposed program may impact them.

Response: On 16 May 2017, MKI reached out to relevant fishing groups (originating from Nova Scotia) in the 4Vs area (as recommended by the CNSOPB) as part of its Southern Grand Banks seismic program. Contacted groups were sent a one page summary document of the seismic program which provided details on survey timing, location, vessels, and equipment as well as directions on how to access EA documents. MKI also offered to send each group weekly updates on acquisition plans. The fishing organizations contacted included:

- Area 23 Snow Crab Fishermen's Association/LFA 30
- Area 19 Snow Crab Fisherman's Association
- Clearwater Seafoods Limited Partnership
- Eastern Shore Fishermen's Protective Association

- Eastern Fishermen’s Federation
- N-ENS Snow Crab Association

In future years, MKI will contact fisheries groups originating from Nova Scotia as appropriate. This will be detailed in annual EA Updates.

Nunatsiavut Government (NG)

General Comment

The Nunatsiavut Government (NG) finds this environmental assessment to be lacking in substance. The proponent has stated that they are unable to assess impacts for the period they have chosen for their project. Therefore, the timeline should be minimized until they are able to assess cumulative effects.

Paragraph 19(1)(a) of *CEAA* 2012 specifies that a project EA must take into account environmental effects, including cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out. This environmental assessment does not clearly state the proponent’s scenario with which they are assessing their own cumulative effects of a 10-year program. The proponent states that the maximum possible combinations within each year are 2D and 2D or 2D and 3D and 4D; therefore the maximum combination should be used each year for 10 years to assess cumulative effects. The proponent is applying for a 10-year project; the environmental assessment should be able to properly assess cumulative effects over that time span by assessing the certain and probable projects over that time period – otherwise each project should reduce the scope to an assessable timeframe; likely resulting in each seismic project being treated as an annual or bi-annual project with separate environmental assessments.

Section 5.5 states that the mitigation measures will “be adhered to during each survey year, with necessary adjustment based on monitoring and follow up”. There is no detailed monitoring program specified in the environmental assessment. Please detail the monitoring plans that will be used to assess the effects of and adjust the mitigation measures. An environmental effects monitoring plan is an essential part of any environmental assessment (see Table 3 in Duiker et al. 2012), and should be required in the EA process, especially for longer term EAs.

The Nunatsiavut Government takes issue with the referencing of previous EA studies to validate or defend a position. Rather than providing evidence to support conclusions, the proponent has instead asked the reviewer to refer to past EAs that are not included in the document. This is poor EA practice and should be discouraged by the regulator.

The environmental assessment states that it incorporates best practice into its mitigations, however it does not explain why the new NMFS sound exposure criteria requirements have not been assessed in this case as a best practice. Instead, MKI is relying on the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*, which is based on a 2004 Canadian Science Advisory Secretariat (CSAS) report that outlines the large data gaps and potential consequences

of seismic exploration as well as encouraging the use of new mitigation measures, particularly in cases where cumulative effects should be assessed. The more recent CSAS Report, the Review of Mitigation and Monitoring Measures for Seismic Survey Activities in and Near the Habitat of Cetacean Species at Risk, highlights next steps and best practices for seismic surveys using three case studies of Atlantic SARA species. This document should be applied to the consideration of mitigation measures for this project and can be found here: <http://waves-vagues.dfo-mpo.gc.ca/Library/364484.pdf>

In light of the most minimal sound mitigation being used in this environmental assessment while other jurisdictions are working to apply to new evidence and research to their mitigation practices, what opportunities exist for the adoption of best practices and improved mitigation? What specific reporting requirements exist in order to ensure adaptive mitigation over the 10-year period of the project?

Response: MKI notes that the assessment of cumulative effects remains a challenge in the environmental assessment process. A recent review article (Willstead et al. 2017) examines the current state of Cumulative Effects Assessment (CEA) as it relates to marine energy developments. Willstead et al. (2017) conclude that CEA should advance “*to become the much-needed tool decision-makers require to sustainably manage the marine environment. For CEA to evolve to fulfil this role requires existing knowledge, tools and future advances from multiple streams of research to be brought together within a modular or iterative system that results in improvement characterizations of ecosystems and the receptors therein, and the responses to variable and interacting stressors. There is, therefore, a clear need to support coordinated and multidisciplinary development of CEA to advance our knowledge of how cumulative effects from multiple activities incrementally change the environment, and how effects can be managed and mitigated to enable sustainable use of the seas*”. MKI acknowledges that the uncertainty currently surrounding CEA needs to be reduced.

As indicated in Subsection 2.7 of the EA, there will be qualified and dedicated personnel onboard all seismic vessels to monitor marine mammals, sea turtles and seabirds observed in the vicinity of the seismic vessels. Systematic data on marine mammal and sea turtle behaviour and distribution will be collected. Systematic seabird counts and searches for stranded birds will also be conducted regularly each day. In addition, a Fisheries Liaison Officer (FLO) onboard each seismic vessel will collect information related to the commercial fishery (i.e., gear and/or fishing vessels encountered during seismic surveying). These primary elements constitute the proposed monitoring program.

The cross-referencing of other relevant EAs was encouraged by the C-NLOPB in its Final Scoping Document. To facilitate the process, the EA contains links to the principal documents being cross-referenced.

The new NMFS sound exposure criteria, although based on science, result in very small mitigation radii (<100 m) for marine mammals for large airgun arrays. This is based on LGL’s work with U.S. clients over the last few months for which the mitigation radii

have been modeled acoustically – the EAs for these projects will be available online shortly at <http://www.nmfs.noaa.gov/pr/permits/incidental/research.htm>. In fact, instead of using the new criteria, NMFS is now recommending a mitigation zone of 500 m for some large-array surveys. The CSAS report (DFO 2015a) also recommends that the most conservative of either 500 m or a radius determined through modeling should be used during seismic surveys. Although no acoustic modeling was done for the proposed arrays that may range from 3000–6000 in³, modeling for large arrays of up to 36 airguns with total discharge volumes of 6600–7800 in³ resulted in mitigation radii <100 m.

Opportunities for the adoption of best practices and improved mitigation during the 10-year period of the proposed program do exist. An annual EA Update will be prepared each year prior to the onset of exploration activities and these Updates will provide the opportunity to consider adaptive mitigation measures.

Fish, Food and Allied Workers (FFAW)

General Comment

The overall study area for this EA is large. While fisheries data has been examined in the document there is no discussion regarding the regime shift (from a shellfish dominated to groundfish dominated fishery) that is currently underway in our dynamic marine environment. An increase in Atlantic cod abundance was mentioned (page 58), but increased fishing activity is anticipated for all groundfish species (e.g. Atlantic cod, turbot, Atlantic halibut, grey sole, redfish, yellowtail flounder, etc.) throughout the scope of this ten year EA. *It is critical that effective and regular communication ensue with the fishing industry throughout the EA lifespan so that the seismic company is kept apprised of ongoing developments with fisheries in the vast project area.*

There is some misinterpretation of gear type data in the report (page 78). For example, it is important to clarify that snow crab would be the only commercial species targeted in “pots” in the study area. There may be incidental bycatch of the other species listed in this section of the report as being fished with pots but it would not be the target species. As well, long lines are used for Atlantic halibut and on a smaller scale with Atlantic cod but the other species listed would be incidental bycatch. Atlantic cod are not directed commercially with a rod and reel. Furthermore, gill nets were not even discussed as a gear type although it is listed in the associated Table 4.9 (pages 80–81). *It is recommended that this section be rewritten to more accurately reflect the gear types used and the species targeted using two categories - fixed or mobile gear. (The pot fishery for yellowtail and Greenland halibut was also mentioned on Page 188).*

The collaborative DFO-industry post season crab survey is undergoing changes in terms of the location and number of survey stations. However, changes have not been confirmed for 2017. We question the source of the number of stations for 2017 (1316 indicated in the report – page 116). As well, reported stations within the project area and the associated map of stations (page 116) should have a caveat statement noting that stations may be subject to change from year to year. This is a new development. *It*

is therefore crucial that the seismic company maintain effective communication with FFAW/Unifor and DFO to receive accurate information on the post-season crab survey going forward.

Furthermore, this communication will be important as we reiterate that the 7 day/30 km temporal/spatial buffer (page 171 and 224) is NOT an acceptable mitigation for fisheries or fisheries science in the view of FFAW/Unifor. It continues to be our stance that seismic work should NOT be conducted in the vicinity of survey stations until they have been sampled for the year. *We have worked cooperatively with MKI over the past few years on this issue and anticipate the same level of understanding going forward.*

The C-NLOPB's current Compensation Guidelines (March 2002) are a bit ambiguous regarding oil spills. The report indicates that these Guidelines would be used in the event of a substantial hydrocarbon release (page 189). *We request further information as to how these Guidelines would be followed.*

Response: Replace the second paragraph in § 4.3.3.1 with the following:

“Northern shrimp stocks have recently declined (see § 4.3.3.1 of LGL 2015), resulting in a shrimp fishing moratorium in Shrimp Fishing Area (SFA) 7 since 2015 (NAFO 2015b,d in LGL 2016; NAFO 2017a). As indicated in § 4.2.2.1, the overall exploitable biomass and recruitment of snow crab in the region have declined in recent years to historically low levels. Although some Divisions may experience a modest increase in recruitment within approximately five to seven years due to a small pulse of young crabs which emerged during 2013–2014, the warming oceanographic climate and relatively low abundance during the past decade indicate overall poor long-term recruitment (DFO 2016a). Given these recent declines in predominant shellfish species, a regime shift is currently underway from a shellfish to groundfish-dominated fishery. Cod and redfish stocks on the Flemish Cap in Division 3M appear healthy, with relatively high recruitment levels since 2005. The Total Allowable Catch (TAC) remained unchanged for cod and redfish in 3M during 2016 and 2017, and redfish TAC in 3LN was increased for 2017 (NAFO 2017b,c). In a continued effort to improve stocks, fishing moratoria remain in place for 2017 for several fish species, including Atlantic cod in 3LNO, American plaice in 3LMNO, witch flounder in 3L, and capelin in 3NO (NAFO 2017b,c).”

In terms of long-term fishing activity projections, discussion is limited based on the currently available information from sources such as DFO's management decisions, stock assessments, annual seafood industry reviews and commercial fisheries database, and NAFO's STATLANT 21A database, stock advice reports and annual compliance reviews. However, the Proponent acknowledges the anticipated increased reliance on groundfish catches in the near future.

MKI commits to regular communication with the fishing industry throughout the EA lifespan.

Replace the first paragraph in § 4.3.3.2, *Fishing Gear Used in the Study Area*, with the following:

“A variety of fishing gear types were used in the Study Area during May–November 2010–2015. Snow crab were fished using pots, and several other species, including Greenland halibut, redfish, American plaice, Atlantic cod and Atlantic halibut were caught incidentally in the pots (Tables 4.8 and 4.9). Longlines were used to harvest Atlantic halibut and, to a lesser extent, Atlantic cod, with several additional species as incidental bycatch such as Greenland halibut, redfish, American plaice and yellowtail flounder. Many of the fish species in Table 4.9 were caught using gillnets and trawls, either as targeted or incidental catch. Several species were caught using trap or seine nets, including capelin, hagfish, Atlantic herring and mackerel. Atlantic cod were also harvested using hand-line (baited) and rod and reel, although there is no direct commercial fishery for this species using rod and reel. Bivalve species were harvested using dredges. Shrimp trawls (mobile gear) accounted for about 59% of the total catch weight of all species in the Study Area during 2010. Pots (fixed gear) accounted for ~24% of the total catch weight during this period. Overall, mobile and fixed gears accounted for 68% and 32%, respectively (Table 4.8).”

Edit the second sentence in the first paragraph in § 5.7.5.2 from:

“Fishing with fixed gear (e.g., pot fishery for snow crab, and to a lesser extent the yellowtail flounder and Greenland halibut gillnet fisheries) poses the highest potential for conflict.”

To:

“Fishing with fixed gear (e.g., pot fishery for snow crab) poses the highest potential for conflict.”

A GIS shapefile for the post-season snow crab survey station locations was received from the PGS Senior GIS Representative in Houston, TX, on 13 February 2017.

As stated in the second-last paragraph on page 117 (§ 4.3.9), “...post-season snow crab survey data will be altered through randomization of survey stations to be sampled in 2017...”. In addition to this statement, add the following to the end of the last paragraph in § 4.3.8:

“All of the stations will not necessarily be sampled from 2017; rather, the new plan by DFO is to randomize the survey locations within each NAFO Division (N. Paddy, PGS, Contract Manager, pers. comm., 11 February 2017).”

MKI commits to maintaining effective communication with FFAW|Unifor and DFO throughout seismic operations for the lifespan of the EA.

DFO does not indicate an official spatial and/or temporal buffer mitigation method for seismic operations in the vicinity of survey stations. MKI will continue to work cooperatively with FFAW|Unifor and DFO in an effort to avoid survey stations prior to their sampling to the best extent possible.

Oil spill prevention and response protocols were described in § 3.2.5.5 of the Eastern Newfoundland SEA (C-NLOPB 2014), with descriptions of compensation measures beginning on page 63. As such, add the following to the end of the first paragraph in § 5.7.5.4 of the EA:

“Compensation protocols based on C-NLOPB Guidelines (C-NLOPB 2017) are described in § 3.2.5.5 of the Eastern Newfoundland SEA.”

Groundfish Enterprise Allocation Council (GEAC)-Canadian Association of Prawn Producers (CAPP)

General Comment

We note that the study area encompasses virtually all of the regions fished by our membership in the offshore waters of NL. We feel that such a large spatial footprint for the project makes it all but impossible for us to assess the impacts of the project on our activities, as we do not know with any precision how the activities will be conducted relative to our harvesting activities. Given that the timing of the project activities is May 1st to November 30th, there will certainly be some overlap between our harvesting activities and potential seismic activity.

The relationship between seismic activity and the behavior of shrimp and groundfish is poorly understood. We have experienced substantial changes in catch rates and resource distribution associated with nearby seismic activity and feel that this EA does not adequately consider those risks. This is especially true given the broad nature of the study area and the reality that responses may differ in areas recently surveyed (e.g., southern areas) and those areas where this is the ‘first’ such activity (e.g., northern areas). A one-size-fits-all assessment may not be reasonable in this context.

The impact on fisheries VEC is very poorly described. From our perspective, any mitigation should include a spatial and temporal avoidance of harvesting activities that is based on a discussion between those operators on the water and the surveyor. We suggest that such mitigation is not discussed in this document, and should be considered.

As we have noted in other EAs, the document suggest that no fisher will be required to relocate based on the exploration activities. We question this conclusion, especially given that we have observed substantial reduction in catch rates of both shrimp and groundfish as a result of seismic testing within the general vicinity. This means that although a seismic survey vessel may not force us to immediately relocate to avoid the survey vessel, the resultant impacts of fish distribution from the seismic pulses will cause us to significantly alter our fishing plans – even leading us to abandon some areas for several months. We request that the EA include some parameters on the avoidance of activity, to be determined through direct discussion with us. This avoidance should include both a spatial and temporal element to allow our harvesting activities to continue without reductions in catch rates.

We suggest that there is not sufficient information in this document to adequately assess the impacts of seismic exploration on shrimp and groundfish behavior and distribution (and thus the catch rates experienced by our operators).

We submit these comments based on our past experience with seismic exploration near our harvesting grounds. This experience has generally not been positive and we seek to improve our relationships with the oil and gas exploration industry such that the benefits of our oceans can benefit all sectors.

Response: As summarized in § 5.7.5.2 of the EA, MKI commits to maintaining regular communication with fishers and researchers, and to spatial and temporal avoidance of areas where concentrated fishing is occurring, to the best of its ability. MKI also commits to the production of annual EA Updates specifying planned survey areas and their associated temporal window within the Project Area for a given year, which will assist in the understanding of potential impact and prevention of conflict between stakeholder and seismic activities. The entire Project Area would not be surveyed within any given year.

Data gaps currently exist regarding the extent and/or duration of potential reduction in catch rates of shrimp and groundfish associated with nearby seismic activity. Overall, currently available studies are inconclusive regarding this issue. As such, add the following to the end of the third-last paragraph (i.e., the paragraph appearing after the last bullet point) in § 4.3.9:

“There is also uncertainty regarding the spatial and/or temporal extent of potential reduction in catch rates of shrimp and groundfish species associated with nearby seismic activity, a concern reported by stakeholders during consultations for this EA (e.g., see questions from consultation in Mary’s Harbour, Appendix A).”

SPECIFIC COMMENTS

Canada – Newfoundland and Labrador Offshore Petroleum Board

Section 1.1 Relevant Legislation and Regulatory Approach, page 1 – Environment Canada (EC) is now Environment and Climate Change Canada (ECCC).

Response: MKI notes that Environment Canada (EC) is now referred to as Environment and Climate Change Canada (ECCC).

Section 1.1 Relevant Legislation and Regulatory Approach, page 3 – The *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* were revised in April 2017.

Response: MKI notes that the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* were revised in April 2017 (and again in September 2017). References to this document in the EA should be cited as ‘C-NLOPB 2017’.

Section 2.2 Project Overview, page 7 – The potential interaction and assessment of effects tables in Section 5.7 Effects of the Project Activities on the Environment list Echo Sounder and Side Scan Sonar as project activities. A description of these activities should be provided.

Response: Underwater sound will also be generated by navigational, operational and safety equipment on board the vessels, such as echo sounders and multibeam sonars (e.g., side scan sonar). The seismic survey will use an industry-standard echosounder/fathometer instrument (i.e., Kongsberg Simrad EA600 echosounder or equivalent) for navigational purposes by obtaining information on water depths and potential navigation hazards for vessel crews during routine navigation operations. Navigation echosounders direct a single acoustic signal focused in a narrow beam directly downward to the sea floor. The reflected sound energy is detected by the echosounder which calculates and displays water depth to the user. Typical source levels of the navigational echosounder instruments are generally 180 to 200 dB re 1 μ Pa @ 1m_{rms}. The echosounder emits a single-beam at frequencies of 33 kHz and 200 kHz. While the seismic vessel will not have a side scan sonar, support vessels associated with the program may employ some type of multibeam sonar. Depending on water depth and the level of precision required, multibeam echosounders operate at 100-700 kHz with maximum source levels of 200-215 dB re 1 μ Pa @ 1m_{rms}.

Section 2.2 Project Overview, 1st paragraph, page 7 –Although “*Specific data acquisition plans for 2D, 3D and/or 4D surveys during 2018-2026 are not determined*”, the environmental assessment should be based on the maximum amount to be acquired each year and therefore this number should be stated.

Response: The maximum annual amount of 2D and 3D/4D combined that will be acquired during 2018–2026 are 26,000 km and 22,000 km², respectively.

Section 2.2 Project Overview, 3rd paragraph, page 7 – Section III of the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (April 2017) states that “*Operators are expected to implement a seabird and marine mammal observation program throughout all C-NLOPB authorized program activities. Such a program should involve a designated observer trained in marine mammal and seabird observations.*”

Response: MKI notes what is stated in Section III of the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2017) and will commit to such practices throughout all authorized program activities.

Section 2.2.7 Seismic Streamers, page 10 – if it is possible that future 3D surveys may tow more than 16 streamers, then it should be included in this assessment. The purpose of an EA Update is 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. It is not appropriate to assess additional activities in an EA Update.

Response: A maximum of 24 streamers will be towed during 3D surveying over the 2018–2026 period.

Section 2.2.7 Seismic Streamers, page 10 – what will be the total width of the streamers?

Response: The maximum width of the streamer footprint during 3D surveying over the 2018–2026 period will be 2 km.

Section 2.5 Consultations, page 15 – It is stated that *Results of the remaining Labrador consultations will be included in the Addendum to the EA that is prepared to address EA reviewer comments.* Please provide details and results.

Response: The report on face-to-face consultation meetings and public meetings in Nain, Labrador is included in Appendix 1 of this Addendum.

Section 2.7 Environmental Monitoring, page 16 – “As per LGL protocol, seabird observations will be conducted...” During the initial scoping phase, ECCC commented on and made multiple submissions on protocols for bird observations, handling birds of multiple scenarios. It is the position of the C-NLOPB that ECCC protocols are adhered to.

Response: MKI confirms that the most up to date ECCC protocols available for bird observation and bird handling are followed.

Section 2.2.8.1 Vessels, page 10 – “*When necessary, escort vessels will be used to scout ahead of the seismic vessels for fishing vessels and gear, and hazards such as ice and floating debris.*” Section 5.5 Mitigation Measures, Table 5.1, pg 171 states that mitigation identified to avoid potential effects on fishing gear is the “*use of escort vessel*”. Please explain what is meant by “when necessary”? Section II (2) c) of the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (April 2017) states that “*Communication throughout survey operations with fishing interests in the area should be maintained. The use of a “Fisheries Liaison Officer” (FLO) onboard the seismic vessel is considered best practice in this respect. The use of a standby/picket/guard/chase vessel is also considered best practice in this respect.*”

Response: When fishing vessels and gear or other hazards such as ice and floating debris are thought to be in the immediate path of the seismic vessel, the escort vessel will be used to scout ahead of the seismic vessel. When the seismic survey is being conducted in an area known to be without fishing vessels and gear, the escort vessel could be sent to scout out another area where the seismic vessel would be working next.

Section 4.6.1 Species at Risk within the Study Area, Table 4.20, page 152 – the scientific name for Harlequin Duck (Eastern population) is *Histrionicus histrionicus*.

Response: MKI notes that the scientific name for Harlequin Duck in Table 4.20 should read *Histrionicus histrionicus*.

Section 5.5 Mitigation Measures, page 170 and Section 5.9 Mitigation Measures and Follow-up, page 224- Section 5.1.4.1 Environmental Assessment of the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB April 2017) states that the environmental assessment report should include *a table that lists all of the environmental commitments and mitigation measures made by the Applicant during the environmental assessment that is suitable for tracking the subsequent status of those commitments and measures. Thirty days prior to commencement of the project, the Applicant shall submit the tracking table identifying the status of each of the environmental commitments and mitigation measures.* Tables 5.1 and 5.19 should also include any commitments made throughout the assessment.

Response: MKI notes that a tracking table identifying the status of each of the commitments and mitigation measures made by the proponent during the environmental assessment process shall be submitted to the C-NLOPB at least 30 days prior to commencement of the Project.

Section 5.7.2 General Activities-Marine Use, 1st paragraph, page 174- Just to confirm, the escort vessel will be onsite with the seismic vessel at all times the seismic vessel is acquiring data. When the picket/chase/escort vessel is to be unavoidably absent from the operational area and/or is unable to perform its duties, the operator is expected to perform a risk assessment of their ongoing operations and to plan and implement risk mitigation measures to minimize the potential for negative interaction with commercial fishers. The risk assessment and the type of mitigations expected were communicated to MKI on August 25, 2016.

Response: MKI agrees with the protocol stated above regarding escort vessel onsite presence with the seismic vessel.

Section 5.7.4 Fish and Fish Habitat VEC, Table 5.3, page 181 – this table is missing the Vessel/Equipment Rows, see Table 5.6 for reference.

Response: As indicated in Table 5.2, there really is no interaction between the Fish and Fish Habitat VEC and ‘Vessel/Equipment Presence’. Therefore, this is not carried forward to Table 5.3.

Section 5.7.7 Marine Mammal and Sea Turtle VEC, Table 5.12, page 205 – why is the geographic extent for the Marine Mammal VEC less than a km², with respect to vessel/equipment presence, but it is up to 100 km² for the Bird VEC?

Response: MKI agrees that the ‘geographic extent’ associated with the potential effect of ‘seismic vessel/equipment presence’ on the Marine Mammal VEC in Table 5.12 should be changed to ‘1–3’ (<1km² to 11–100 km²). This increase in ‘geographic extent’ accounts for the range of possible footprint area of seismic vessel plus streamers/airgun arrays. The ‘geographic extent’ for the supply and escort vessels remains as ‘1’ (<1km²).

Section 5.7.7 Marine Mammal and Sea Turtle VEC, Table 5.14, page 210 – why is the geographic extent for the Sea Turtle VEC less than a km², with respect to vessel/equipment presence, but it is up to 100 km² for the Bird VEC?

Response: MKI agrees that the ‘geographic extent’ associated with the potential effect of ‘seismic vessel/equipment presence’ on the Sea Turtle VEC in Table 5.14 should be changed to ‘1–3’ (<1 km² to 11–100 km²). This increase in ‘geographic extent’ accounts for the range of possible footprint area of seismic vessel plus streamers/airgun arrays. The ‘geographic extent’ for the supply and escort vessels remains as ‘1’ (<1km²).

Section 5.7.8 Species at Risk VEC, Table 5.17, page 217 – why is the geographic extent for the Species at Risk VEC, of which there are two bird species, less than a km², with respect to vessel/equipment presence, but it is up to 100 km² for the Bird VEC?

Response: MKI agrees that the ‘geographic extent’ associated with the potential effect of ‘seismic vessel/equipment presence’ on the Species at Risk VEC in Table 5.17 should be changed to ‘1–3’ (<1 km² to 11–100 km²). This increase in ‘geographic extent’ accounts for the range of possible footprint area of seismic vessel plus streamers/airgun arrays. The ‘geographic extent’ for the supply and escort vessels remains as ‘1’ (<1km²).

Environment and Climate Change Canada (ECCC)

Section 2.7 Environmental Monitoring, page 16 - ECCC-CWS has a mobile version of the Eastern Canada Seabirds at Sea (ECSAS) database that can be provided to the proponent, which will facilitate data entry. The MMO or delegated personnel can enter data into the database while undertaking observations, with little to no need for post-processing. [C-NLOPB comment: This database was provided to MKI (Neil Paddy) in July of 2015]

Response: MKI will contact ECCC-CWS to acquire the most recent mobile version of ECSAS database. The decision as to whether to use the mobile version will be made in conjunction with MMO/SBO provider. Regardless, the ECSAS protocol will be followed and the required data fields will be collected.

Section 4.4 Marine-associated Bird VEC, page 118 - Quote: “The most current census data related to important seabird nesting colonies in Newfoundland and Labrador have been acquired from the CWS and are incorporated into this EA.” Please provide citation.

Response: The citation for the most current CWS data related to important seabird nesting colonies in NL is “Sabina Wilhelm, ECCC-CWS, unpublished data, December 2016”.

Section 5.7.6.3 Effects Assessment of other Routine Project Activities - Accidental Releases, page 195 - Quote: "Upon investigation of a visually identified hydrocarbon sheen, such birds would find that its odour does not resemble that of any food item. As a result, these birds would be unlikely to come in contact with a sheen during foraging." Please provide citation or remove.

Response: The visual appearance of a hydrocarbon sheen would resemble a sheen of biological origin and may initially attract such species (Nevitt 1999). However, these species also search for food by olfaction, relying on the smell of chemicals found in their foods, such as dimethyl sulfide (e.g., Leach’s Storm-Petrel; Nevitt and Haberman 2003). Upon investigation of a visually identified hydrocarbon sheen, such birds would find that its odour does not resemble that of any food item (Hutchison and Wenzel 1980). As a result, these birds would be unlikely to come in contact with a sheen during foraging.

Fisheries and Oceans Canada (DFO)

Section 2.2.7 Seismic Streamers, page 10 – the maximum spacing between streamers should be noted.

Response: The maximum distance between adjacent streamers during 3D surveying will be 200 m.

Section 2.2.9 Waste Management, page 11 – does “garbage” include liquid waste discharges? If so, the second sentence should note as such.

Response: According to the definition of ‘garbage’ in Marpol Annex V, liquid waste is not considered to be garbage. Marpol defines garbage as the following:

“Garbage includes all kinds of food, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically except those substances which are defined or listed in other annexes to MARPOL 73/78 (such as oil, sewage or noxious liquid substances)”.

Section 3.2 Climatology, page 20 – it is assumed that the noted data reports provided in the first paragraph of page 20 (e.g. C-NLOPB 2008, C-NLOPB 2014, Oceans 2014) are the most recent / up to date datasets for the hind cast data; this should be confirmed and noted accordingly in this paragraph.

Response: The information provided is the most up to date information available regarding datasets for the hind cast data.

Section 3.2.4 Weather Variables, page 23, first sentence – a reference for ICOADS should be provided within Section 6 Literature Cited.

Response: The ICOADS citation has been added to Section 6, Literature Cited.

Section 4.3.1 Information Sources, page 64 – it is felt that this section could benefit from addition of a table showing/describing the source (i.e., DFO and NAFO), time period and geographic location represented by the DFO and NAFO data.

Response: So noted. Add the following table after the first paragraph in § 4.3.1 (and add reference to the table at the end of the first sentence within this paragraph; the table number for all proceeding tables in Section 4 must be shifted accordingly):

Table 4.2 Summary of Information Sources for Commercial Fisheries Data.

Data Source	Domestic/Foreign Fisheries	Temporal Period	Geographic Area	Spatial Resolution
DFO	Domestic	May–November, 2010–2015	Within Study Area; mostly within Canadian EEZ but generally within 2000 m depth	Geo-referenced (2010); Gridded 6’x6’ cells (2011+)
NAFO	Domestic/Foreign	2010–2015 (1989–2015 for historical overview, § 4.3.3.1)	Within/beyond Study Area; beyond Canadian EEZ	NAFO Divisions

Section 4.3.3.2 Study Area Catch Analysis 2010–2015, Fishing Gear Used in the Study Area, 2nd sentence, page 78 - “...pots (snow crab, Greenland halibut, redfish, American plaice, Atlantic cod and Atlantic halibut)” suggests that pot gear is used to capture Greenland halibut, plaice, redfish, cod and halibut. Pot gear is used exclusively to capture snow crab rather than the other noted species unless the catch of the other species is by catch. Either way this sentence needs to be clarified and corrected accordingly.

Response: See above response to similar comment by FFAW.

Section 4.3.5 Recreational Fisheries, 2nd paragraph, 1st sentence, page 99- this could be amended to reflect that the noted recreational groundfish fishery has occurred and has been concluded for 2016.

Response: Noted. Edit the aforementioned sentence from:

“In 2016, the Newfoundland and Labrador recreational groundfish fishery was set to be open for a total of 46 days, an increase of 14 days from previous years, beginning with the first weekend in July and ending in the beginning of October (DFO 2016f).”

To:

“The 2016 Newfoundland and Labrador recreational groundfish fishery has concluded. This fishery was open for a total of 46 days, an increase of 14 days from previous years, beginning with the first weekend in July and ending at the beginning of October (DFO 2016f).”

Section 4.5.1 Marine Mammals, Table 4.17, pages 133–135 - appropriate population names should be included for those species noted as being listed under SARA or by COSEWIC. This section should also note that based on work completed in 2016 by researchers at Dalhousie University in the southern Grand Banks/Flemish Pass/Flemish Cap areas and which has been reported in various media sources (e.g., CBC News online) it would appear that northern bottlenose whales from both the North Atlantic and Scotian Shelf populations frequented the noted areas studies in 2016. This is also supported by information presented in Table 4.18 on marine mammal sightings. As such it is felt that the representation in Table 4.17 and various sections of the EA that describe northern bottlenose whales as “rare” is not accurate and should be reconsidered and amended to reflect the reasonable likelihood of occurrence within the study area to be something other than rare.

Response: Population names were included in Table 4.20. Table 4.20 lists both populations (i.e., Scotian Shelf, Endangered and Davis Strait-Baffin Bay-Labrador Sea, Special Concern) as potentially occurring in the Study Area. Based upon recent communication with DFO St. John’s (J. Lawson, Research Scientist, DFO, pers. comm., 6 June 2017) it is unclear at this stage which population of northern bottlenose whales were sighted (and sampled for genetic analyses) by Dalhousie researchers. MKI agrees that ‘rare’ may not be an accurate description for the northern bottlenose whale and should be changed to ‘uncommon’ in Table 17.

Section 4.5.1.3 Toothed Whales (Odontocetes), 1st sentence, page 139 - this should be amended to also include reference to Table 4.18.

Response: MKI agrees that reference to Table 4.18 should also be included in the noted sentence.

Section 4.5.3 Marine Mammal and Sea Turtle Data Gaps, last sentence, page 149 - "...opportunistic efforts are being made during seismic surveys to collect more distribution and abundance data for marine mammal and sea turtles". It should be described or noted how this data is being compiled and reported.

Response: During periods of daylight, MMOs are required to be on watch during the 30-minute pre-ramp up watch and during all periods airguns are active. During seismic monitoring programs, MMOs will also conduct systematic watches during periods when the airguns are inactive. All marine mammal and sea turtle data are summarized in a data report and included in an Excel spreadsheet; this information is then submitted to the C-NLOPB. It is our understanding that the C-NLOPB then forwards the data and report to DFO each year. However, if funding were available, it would be possible to analyze the data in more detail to determine relative abundance for each species.

Section 4.6.2.3 Marine Mammals and Sea Turtles, Northern Bottlenose Whales, page 156 – see above comment on Section 4.5.1 the description of northern bottlenose whales provided on page 156 should also factor this comment into the description accordingly.

Response: Agreed, northern bottlenose whales should be considered uncommon versus rare within the Study Area.

Section 4.6.3 Data Gaps associated with the Species at Risk VEC, 2nd paragraph, page 157 - it is mentioned the "sensitive areas VEC" it is assumed that this is an error and the noted sentences should refer to the "Species at Risk VEC" rather than the sensitive areas VEC. This should be clarified and corrected accordingly.

Response: Edit both appearances of "Sensitive Areas VEC" to "Species at Risk VEC" in the aforementioned paragraph.

Section 4.7.1 Sensitive Areas within the Study Area, pages 158 and 159 – please combine bullets 3 and 4 as they all fall under the Newfoundland and Labrador Shelves Bioregion the Oceans Program no longer references the Placentia Bay Grand Banks Large Ocean Management Area vis a vis EBSAs. As such there are 18 EBSAs in total. Bullet 6 please add the acronym (AOI) following "Area of Interest". Bullet 8 the area described is known as the Hatton Basin and Bullet 8 should be amended accordingly. Bullet 10 and 11 can be combined as both are identified as Fishery Exclusion Areas. Bullet 15 should make the distinction that the Gilbert Bay is designated as an MPA under Canada's *Oceans Act* and the Milne Seamount Complex is designated internationally as a component of the OSPAR Network of Marine Protected Areas.

Response: Replace the bulleted list in § 4.7.1 with the following:

- Fourteen NAFO coral/sponge fishery closure areas, and the 30 Coral Protection Zone;
- Four seamount fishery closure areas: (1) Orphan Knoll Seamount; (2) Newfoundland Seamount; (3) Fogo Seamount 1; and (4) Fogo Seamount 2;
- Eighteen NL Shelves Bioregion Ecologically and Biologically Significant Areas (EBSAs): (1) Grey Islands; (2) Hamilton Inlet; (3) Hopedale Saddle; (4) Labrador Marginal Trough; (5) Labrador Slope; (6) Nain Area; (7) Northern Labrador; (8) Notre Dame Channel; (9) Orphan Spur; (10) Outer Shelf Nain Bank; and (11) Outer Shelf Saglek Bank; (12) Laurentian Channel and Slope; (13) Lilly Canyon-Carson Canyon; (14) Northeast Shelf and Slope; (15) Southeast Shoal and Tail of the Banks; (16) Southwest Shelf Edge and Slope; (17) St. Pierre Bank; and (18) Virgin Rocks;
- Five Scotian Shelf Bioregion EBSAs: (1) Eastern Shoal; (2) Laurentian Channel Cold Seep Communities; (3) Laurentian Channel Slope; (4) Scotian Slope; and (5) Stone Fence and Laurentian Environs;
- DFO Laurentian Channel Area of Interest (AOI);
- Bonavista Cod Box;
- Hatton Basin – coral protection zone off northern Labrador that was established voluntarily by the fishing industry;
- Two candidate National Marine Conservation Areas: (1) Nain Bight; and (2) Hamilton Inlet;
- Two Fishery Exclusion Areas: (1) Hawke Channel; and (2) Funk Island Deep;
- Gannet Islands Ecological Reserve;
- ‘The Zone’;
- Three Important Bird Areas (IBAs): (1) Seven Islands Bay; (2) Quaker Hat Island; and (3) Gannet Islands;
- Two Marine Protected Areas (MPAs): (1) Gilbert Bay – designated as an MPA under Canada’s *Oceans Act*; (2) Milne Seamount Complex – designated internationally as a component of the OSPAR Network of MPAs (IUCN and UNEP-WCMC 2016); and
- *Lophelia* Coral Conservation Area (DFO 2015b).

Section 4.7.1 Sensitive Areas within the Study Area, Figure 4.40, page 160 – this figure depicts the Bonavista Cod Box as a DFO area, it should be noted that is an area that fishers recognize as an important cod spawning area however it is currently not under any protective measures by DFO.

Response: Noted. Replace Figure 4.40 with the figure below (note that the PB-GB EBSAs are now included with the NL Shelves EBSAs in the figure below, reflecting the new information provided in the previous comment):

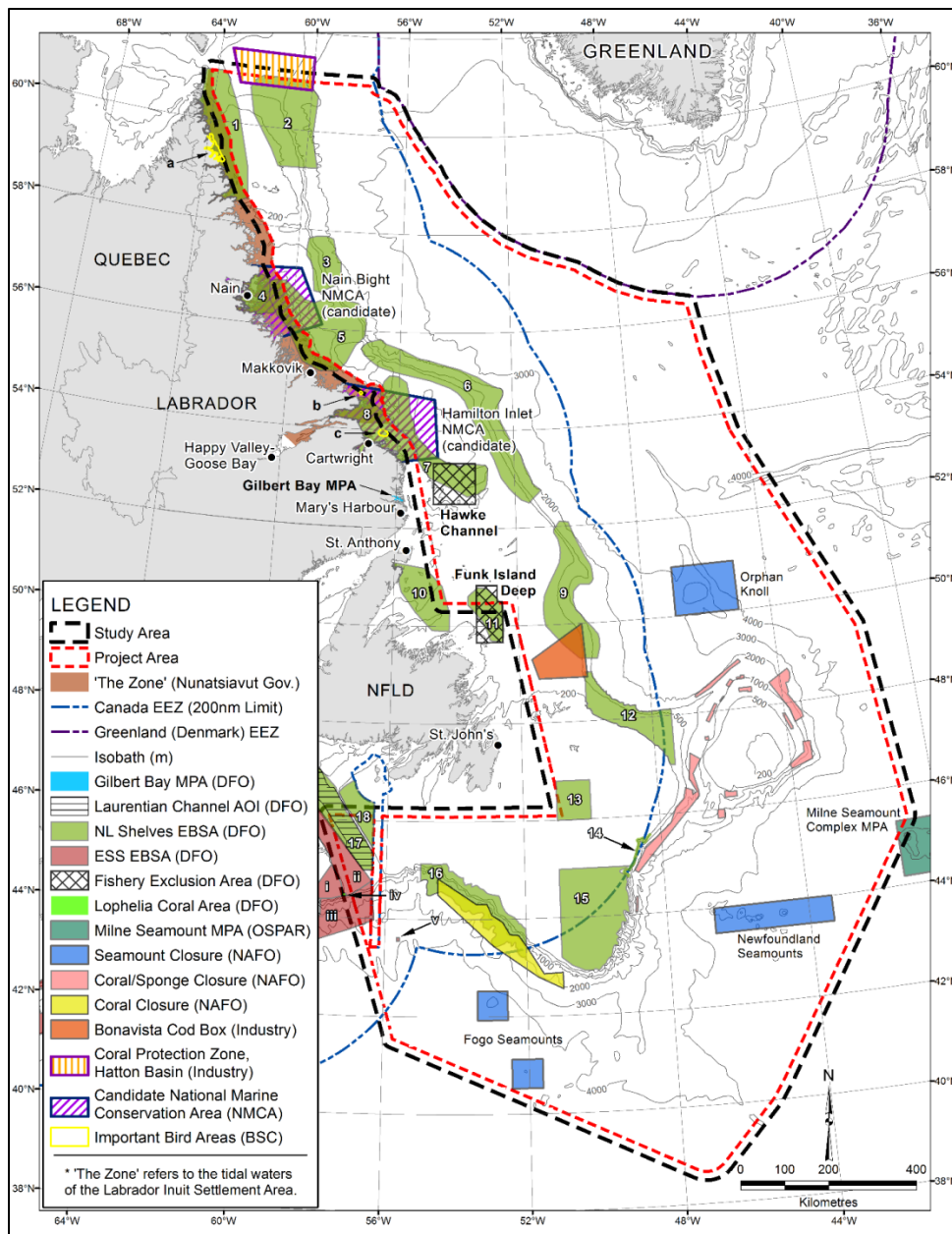


Figure 4.40 Location of Sensitive Areas that Overlap the MKI Study Area.

Section 4.7.1 Sensitive Areas within the Study Area, 2nd paragraph, page 161 - the information presented in the first sentence is incorrect and should be omitted; the Southeast Shoal of the Grand Bank has not been recommended and proposed for MPA designation. Currently, the Laurentian Channel AOI is being proposed as an MPA. This paragraph should be amended accordingly. It is felt that if the purpose of this paragraph is to follow up on areas that are legislated then a short description of all such areas could be / should be provided including (from an Oceans Management perspective) Gilbert Bay MPA, the Fishery Exclusion Areas (Hawke Channel and Funk Island Deep), NAFO coral/sponge and seamount fishery closures, and the 30 Coral Protection Zone.

Response: Noted. Delete the entire second-last paragraph in § 4.7.1 referencing the Southeast Shoal of the Grand Bank, and replace with the following:

“The Laurentian Channel AOI is currently being proposed as an MPA (DFO 2017). See Table 3.22 in the Southern Newfoundland SEA (C-NLOPB 2010), Table 4.14 in LGL 2014b) for descriptions of this AOI, listed as ‘Laurentian Channel and Slope EBSA’.”

The remaining sensitive areas within the bulleted list and Figure 4.40 not otherwise described within the text in § 4.7.1 were previously described in the SEA and EA documents listed in § 4.7.

Section 4.7.2 Data gaps associated with Sensitive Area VEC, page 162 – Bullet 1 it should be noted that there was new and updated distribution data presented in 2016 in the CSAS report ‘Delineation of Coral and Sponge Significant Benthic Areas in Eastern Canada Using Kernel Density Analyses and Species Distribution Models’ (CSAS, Research Document 2016/093) which if not already should be included within the appropriate sections of the EA report. Also with respect to Bullet 3 it should be noted that Ecological Risk Assessment (ERA) to evaluate the risk posed by bottom contact fisheries on significant coral and sponge communities has been carried out on three areas identified in the 2016 CSAS (mentioned above) including areas in the Hatton Basin, Hopedale Saddle, and Tobin’s Point. These areas are being proposed as fisheries closures and extensive consultations on each area are currently underway.

Response: Replace the second-last paragraph in § 4.7.2 with the following:

“All of the data gaps indicated above still exist, although there have been recent data updates for deep-sea coral and sponge distribution (see § 4.2.1.2; Kenchington et al. 2016), and an Ecological Risk Assessment (ERA) to evaluate the risk posed by bottom contact fisheries on deep-sea coral and sponge communities in eastern Canadian waters has been carried out on three areas mentioned in Kenchington et al. (2016), including areas in the Hatton Basin, Hopedale Saddle and Tobin’s Point. These areas are being proposed as fisheries closures and extensive consultations on each area are currently underway. The Government of Canada has also recently committed to “establishing a more systematic approach to MPA planning and establishment,” “enhance collaboration for management and monitoring of MPAs,” “increase awareness, understanding and participation of Canadians in the MPA network,” and “link Canada’s network of MPAs to continental and global networks” (DFO 2016b). Any new information that has been made available since the three SEAs were completed and for areas that were beyond the scope of the SEAs is noted throughout § 4.2.”

Section 5.4 Effects Assessment Procedures, page 169 – it is felt that there should be a very short summary of the effects assessment procedures presented in this section of the EA, rather than referring readers to previous EA Reports.

Response: The following is a summary of the effects assessment procedures used in the EA.

1. The preparation of interaction matrices to identify the potential interactions between the various Project activities and the VECs;
2. The assessment of the residual effects (post-mitigation) of the various Project activities on the VECs, based on identified interactions;
 - a) Identification of the potential effect as positive or negative
 - b) Identification of mitigations to be applied to each potential effect
 - c) Provision of ‘ratings’ to the various criteria used in the assessment to describe the residual effect

The criteria and their associated ratings used in the assessment include the following:

- Magnitude (proportion of individuals in the affected area affected) (4 ratings: negligible, low, medium and high;
- Geographic Extent (6 ratings: <1 km², 1–10 km², 11–100 km², 101–1,000 km², 1,001–10,000 km², and >10,000 km²)
- Frequency (6 ratings: <11 events/year, 11–50 events/year, 51–100 events/year, 101–200 events/year, >200 events/year, and continuous)
- Duration (5 ratings: <1 month, 1–12 months, 13–36 months, 37–72 months, and >72 months)
- Reversibility (2 ratings: reversible and irreversible); and
- Ecological/Socio-cultural and Economic Context (2 ratings: relatively pristine area and evidence of existing negative effects).

3. Determination of significance of residual effects
 - a) A significant effect is defined as follows:

High magnitude; or

Medium magnitude for a duration >1 year over a geographic area >100 km²

- b) A level of confidence (low, medium or high) is provided for each determination of significance
- c) If a residual effect is deemed ‘significant’, then ratings of ‘probability of occurrence’ and ‘scientific certainty’ are provided.

Note that professional judgement is applied during the assessment in addition to the consideration of scientific information.

Section 5.5 Mitigation Measures, page 170 - the listed bullets should also include reference to the *Species at Risk Act* and the Marine Mammal Regulations which are undergoing amendment. It should be noted that Schedule 11 of the proposed amended MMR provide approach distances for marine mammals based on species, vehicle (vessel, aircraft, etc.), area and timing. Given that the proposed seismic survey(s) are scheduled to run from 2017–2026 it is recommended that the proponent be aware of any potential implications that may arise if any proposed amendments to MMR are accepted during the timeframe covered by the proposed survey program.

Response: MKI agrees that reference should also be made to the *Species at Risk Act* (SARA) and the Marine Mammal Regulations (MMR) in Subsection 5.5, Mitigation Measures. MKI notes that the MMR are currently undergoing amendment and that Schedule 11 of the proposed amended MMR provide approach distances for marine mammals based on species, vehicle, area and timing. MKI also notes that if proposed amendments to the MMR are accepted during the spatial scope of the proposed Project (2017–2026), there may be implications relevant to their operations.

Section 5.5 Mitigation Measures, Table 5.1, page 171 – as noted in later comments based on this table it is not clear what mitigations will be employed to monitor marine mammal presence within the 500 m exclusion radius during periods of darkness and/or low visibility. This will require clarification in accordance with similar comments to follow.

Response: See response below to comment made on Section 5.9.

Section 5.5 Mitigation Measures, page 172 – similar to comment on Section 5.4 above it is felt that there should be a very short summary of the 7 mitigation categories noted on page 172 presented in this section of the EA rather than referring readers to previous EA Reports.

Response: The following are summaries of the various mitigation categories referred to on page 170 Subsection 5.5 of the EA. The VECs to which these mitigation categories apply are presented in parentheses.

1. Planning Survey Layout and Location (Fish, Fisheries, Seabirds, Marine Mammals/Sea Turtles, Species at Risk, Sensitive Areas)

Early planning of the layout of survey transect lines helps to reduce the probability of effect on VECs. A certain level of spatial and temporal flexibility associated with this planning serves as a mitigation measure for numerous VECs.

2. Communications and Liaison (Fisheries, Other Marine Users)

A number of strategies associated with communications and liaison are available to serve as mitigation measures. They are as follows:

- a. Information exchange
 - b. Weekly status updates
 - c. Fisheries Liaison officers (FLOs)
 - d. Single Point of Contact (SPOC)
 - e. FFAW/One Ocean petroleum industry liaison contacts
 - f. Vessel Monitoring System (VMS) Data
 - g. Notices to shipping
 - h. Survey start-up sessions
 - i. Consultation
 - j. Communications follow-up
3. Fisheries Avoidance

There are a number of examples associated with this category. They are as follows:

- a. Temporal avoidance of active fishing areas, to the best of a proponent's ability (related to communications with FFAW and fishers)
 - b. No seismic gear deployment until arrival within the Project Area
 - c. Spatial and temporal avoidance of active fisheries science surveys
 - d. Use of a picket vessel
4. Fishing Gear Damage Program

Each proponent will prepare its own Fisheries Compensation Plan in case the seismic survey activities result in gear/vessel damage and/or loss. This process involves contact with the Single Point of Contact. A protocol developed by One Ocean describes responses to a gear conflict to be followed by those on a Project vessel.

5. Marine Mammal/Wildlife Protection

Some of the following measures related to marine mammals and sea turtles are based on the *Statement of Canadian Practice* (see C-NLOPB 2017).

- a. The establishment of a **safety zone** with at least a 500 m radius measured from airgun source array.
- b. Implementation of a **pre-start-up watch** of the safety zone by a qualified MMO for at least 30 minutes prior to array start-up. If a marine mammal or sea turtle is detected within the safety zone during the 30 minute pre-start up watch, ramp up cannot commence until at least 30 minutes have passed since the last sighting within the safety zone.
- c. If array activation is permitted, based on the pre-start-up watch, a gradual **ramp-up/soft start** of the airgun source array may take place over a minimum period of 20 minutes.

- d. The airgun source array(s) will be **shut down** immediately if a marine mammal or sea turtle with either *endangered* or *threatened* status on Schedule 1 of the *SARA* is observed within the safety zone. For the Study Area, this currently includes North Atlantic right whales, blue whales, leatherback sea turtles, and loggerhead sea turtles. Note that MKI also commits to implementing shut downs for all sea turtle species and all beaked whales, including northern bottlenose whales and Sowerby's beaked whale.
- e. When seismic surveying ceases during **line changes, maintenance or other operational reasons**, the airgun source array(s) will either be shut down completely or reduced to a single source element.
- f. Any **seabirds that become stranded** on vessels used during the seismic surveying will be released using the mitigation methods consistent with *Procedures for handling and documenting stranded birds encountered on infrastructure offshore Atlantic Canada* (ECCC-CWS 2017).
- g. **Marine mammal, sea turtle and seabird observations** will be made by qualified environmental observers during operations, including those related to marine mammal behavioural responses to the vessels and airgun source array(s).
- h. The results of the marine mammal and seabird monitoring program will be included in the **EA mitigation and monitoring report**; this report will be submitted to the C-NLOPB within six months after completion of the fieldwork, as per C-NLOPB (2017).

6. Pollution Prevention/Emergency Response

a. Waste Management

Wastes produced during activities, including hazardous and non-hazardous material, will be managed in accordance with MARPOL and the vessel-specific management plan. All solid wastes will be sorted by type, compacted where practical, and stored onboard until disposal at an appropriate certified reception facility.

b. Discharge Prevention and Management

Vessel discharges will not exceed those of standard vessel operations, and will adhere to all applicable regulations. The primary discharges include grey water (e.g., wastewater from washing, bathing, laundry and food preparation), black water (e.g., human wastes), bilge water, deck drainage and discharge from machinery spaces.

c. Air Emission Control

The vessels will have an International Air Pollution Prevention Certificate issued under the provisions of the Protocol of 1997 as amended by resolution MEPC 176

(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978. Air emissions will be those associated with standard operations for marine vessels in general.

d. Response to Accidental Events

MKI will implement the measures outlined in the Shipboard Oil Pollution Emergency Plans (SOPEPs) which will be filed with the C-NLOPB. In addition, MKI has an emergency response plan in place which bridges the emergency plans of all project entities and vessels to the local facilities and the Halifax Search and Rescue Region. The vessels also carry Spill Kits.

e. Use of Streamers with a Solid Core

MKI will use a solid core streamer, thereby removing any risk of flotation fluid leakage.

Section 5.6 Effects of the Environment on the Project, last paragraph, 1st sentence, page 172 – as a small point it is also likely that poor visibility will affect the ability of marine mammal observers to observe marine mammals within the 500 m radius around the air gun array perhaps the first sentence in the last paragraph should also include this effect of the environment on the project.

Response: MKI agrees that poor visibility (e.g., fog) will affect the ability of the MMOs to observe marine mammals occurring within the 500 m safety zone. Thus, this should be included in Subsection 5.6 as a potential effect of the environment on the Project.

Section 5.7.4.1 Sound - Physical and Physiological Effects, last paragraph, last sentence, page 177 – this sentence notes that “Effects of exposure to <500 Hz sound and marine vessel sound appear to be primarily behavioural and somewhat temporary” please define or clarify what is meant by “somewhat temporary” and provide an appropriate reference.

Response: As indicated in Subsection 5.7.4.1, acute behavioural effects on fishes after exposure to low frequency sound (e.g., airgun sound, marine vessel sound) are temporary. The duration of such a temporary effect varies depending on numerous factors including species being exposed, the behaviour being exhibited by fishes when exposed to low frequency sound, the characteristics of the sound (e.g., source level, continuous vs. impulsive sound, captive vs. non-captive fishes, etc.). For example, captive fishes exposed to sound from a single airgun by McCauley et al. (2000) exhibited acute startle and alarm responses that ceased 15–30 minutes after cessation of exposure. Pearson et al. (1992) exposed non-captive fishes to sound from a single airgun and these fishes also exhibited startle and alarm responses which subsided 20–60 minutes after exposure. On the other end of the ‘temporary’ spectrum, various studies (Løkkeborg 1993, 2012; Engås et al. 1993, 1996) have investigated behavioural effects on wild fish from a fisheries perspective. The temporary effect observed in these studies appeared to persist for a number of days before ‘normal’ distribution was re-established.

Section 5.7.4.1, Sound Table 5.4, page 182 – the text provided on page 181(see last sentence assessment of effects of sound) gives a level of confidence as medium, however the information presented in Table 5.4 provides level of confidence as 2–3 (medium to high). One of either the wordings on page 180 or the rankings in table 5.4 need to be amended.

Response: The level of confidence related to the determination of significance of the residual effect of exposure to sound on the Fish and Fish Habitat VEC should be changed in the text to *medium to high*.

Section 5.7.8.3 Marine Mammal and Sea Turtles Species at Risk, 1st sentence, page 216 - it is indicated that among others “northern bottlenose whales are not expected to occur regularly in the project area” based on information presented in earlier comments (see Section 4.5.1 above) it is felt that this is not an accurate reflection on the potential occurrence of northern bottlenose whales in the study area in particular the southern most part as well as areas of the Flemish Pass and Flemish Cap. This sentence should be amended accordingly.

Response: Noted. The statement refers to the Study Area as a whole (which includes the relatively shallow waters of the Grand Banks), but MKI agrees that northern bottlenose whales are likely to occur more regularly in the slope and deep basin waters of the Study Area which include the slope waters off southern Newfoundland and the Flemish Pass area. It should also be noted that northern bottlenose whales have been observed during seismic monitoring programs in the Orphan Basin (e.g., Moulton et al. 2005, 2006).

Section 5.9 Mitigation Measures and Follow up, 1st paragraph, page 225 – it is noted that “...observers will watch for marine mammals and sea turtles during daylight periods”. Building on earlier comments it is not clear what measures will be employed to monitor for SARA listed endangered and/or threatened mammals (e.g. Scotian Shelf population northern bottlenose whales) and sea turtles during periods of darkness and/or low visibility. Based on information presented in Tables 3.11, 3.12 and 3.13 during the May to October timeframe (i.e. planned survey timeframe) survey the frequency of poor visibility (<500 m) ranges from 4%, 5.4% and 7.3% (October) and from 26%, 40.3%, 33 % (July) respectively for the Flemish Cap, Grand Banks and Laurentian Basin respectively. Given this likelihood and the precautionary possibility of encountering northern bottlenose whales it is not clear why there is no acknowledgement that other more precautionary mitigation measures may be needed / used during periods of low visibility / darkness especially within the southern most parts of the study/project area. This should be clarified.

Response: MKI acknowledges that periods of poor visibility during daylight are frequent in the Study Area--particularly in June and July and that this inhibits the ability of a MMO to visually detect marine mammals and sea turtles within the 500-m safety zone. The *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* requires that during operations in low visibility (i.e., the full extent of the safety zone is not visible) that cetacean detection technology, such as Passive Acoustic Monitoring (PAM), must be used during the 30-minute pre-start

up watch if the seismic survey is in an area identified as critical habitat. Currently, no critical habitat has been identified within the MKI Project and Study areas. Also, the EA did not identify significant adverse effects on marine mammals and sea turtles.

MKI will use the ramp up procedure (i.e., gradual activation of the airguns in an array) during daylight periods of limited visibility and during periods of darkness (as well as all other periods). This procedure is intended to warn marine mammals, sea turtles and other marine fauna before they are exposed to the higher sound levels from the full airgun array. MKI will also operate a single airgun (lowest volume) during line changes. Once again, this measure is intended to decrease the likelihood that marine mammals and sea turtles would occur close to the airgun array during periods with and without limited visibility. MKI will also require that a ramp up occurs during the transition from a single airgun to the full array—this exceeds the requirement in the *Statement of Practice*.

To reiterate, it is unclear at this stage which population (Scotian Shelf vs. Davis Strait-Baffin Bay-Labrador Sea) of northern bottlenose whales occurs offshore Newfoundland, including sightings made off the south coast and in the Flemish Pass area. Given this uncertainty and in accordance with Moors-Murphy and Theriault (2017), MKI has committed to implementing shut downs for all beaked whales (including northern bottlenose whales and Sowerby's beaked whales) that are detected within the 500-m safety zone. This exceeds requirements in the *Statement of Practice*.

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