Seafloor and Seep Sampling Program – Labrador Offshore to Jeanne d'Arc Basin (2014 to 2019) – Environmental Assessment Addendum

Aivek Stantec Limited Partnership

Prepared on behalf of:
TGS Canada Ltd.
and
Multi Klient Invest AS
(A Wholly Owned Subsidiary of
Petroleum Geo-Services ASA)

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Consolidated Final Report

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1.0 GENERAL COMMENTS

Please note that the proponents of this survey are TGS Canada Ltd. (TGS), Multi Klient Invest AS (MKI) and Volcanic Basin Petroleum Research AS (VBPR). The 2014 Program will be conducted between August 15 and September 12, with mobilization and demobilization occurring on both ends of the program. The 2014 survey itself will take no more than 30 days.

1.1 Environment Canada – CWS

Please note that EC's previous comments on the scoping document and project description (submitted to you on 25 February 2014) are still applicable to the project as described in the EA report.

> Environmental protection and mitigation measures will reflect the need to comply with Section 36(3) of the *Fisheries Act*. Activities will be managed so as to ensure compliance with the *Migratory Birds Convention Act* and associated regulations. The project will not affect a wildlife species listed under the *Species at Risk Act* (or its critical habitat).
>
> The proposed program includes the collection of shallow substrate cores (maximum depth of 3 m), thermal heat probes and seep samples; there is no drilling associated with this program. A sub-bottom profiler (SBP) and multi-beam echosounder (MBE) will be used to delineate the bathymetry at the specific core locations; this is not a seismic survey. There are no Important Bird Areas (IBAs) or seabird colonies within the Study Area or 2014 Program Area (see Figure 1-1). The only potential for an oil spill (diesel) would be from the unlikely event of vessel distress due to an accidental event. A Live Seabird Salvage permit / permit to collect dead migratory birds will be obtained and in place prior to operations.
>
> Given the short duration of the survey (no more than 30 days), the general non-intrusive nature of the program (the collection of cores and bathymetry data at the specific core locations) and adherence to the proposed mitigation measures, it is anticipated that the proposed coring program will have a not significant effect on migratory birds.

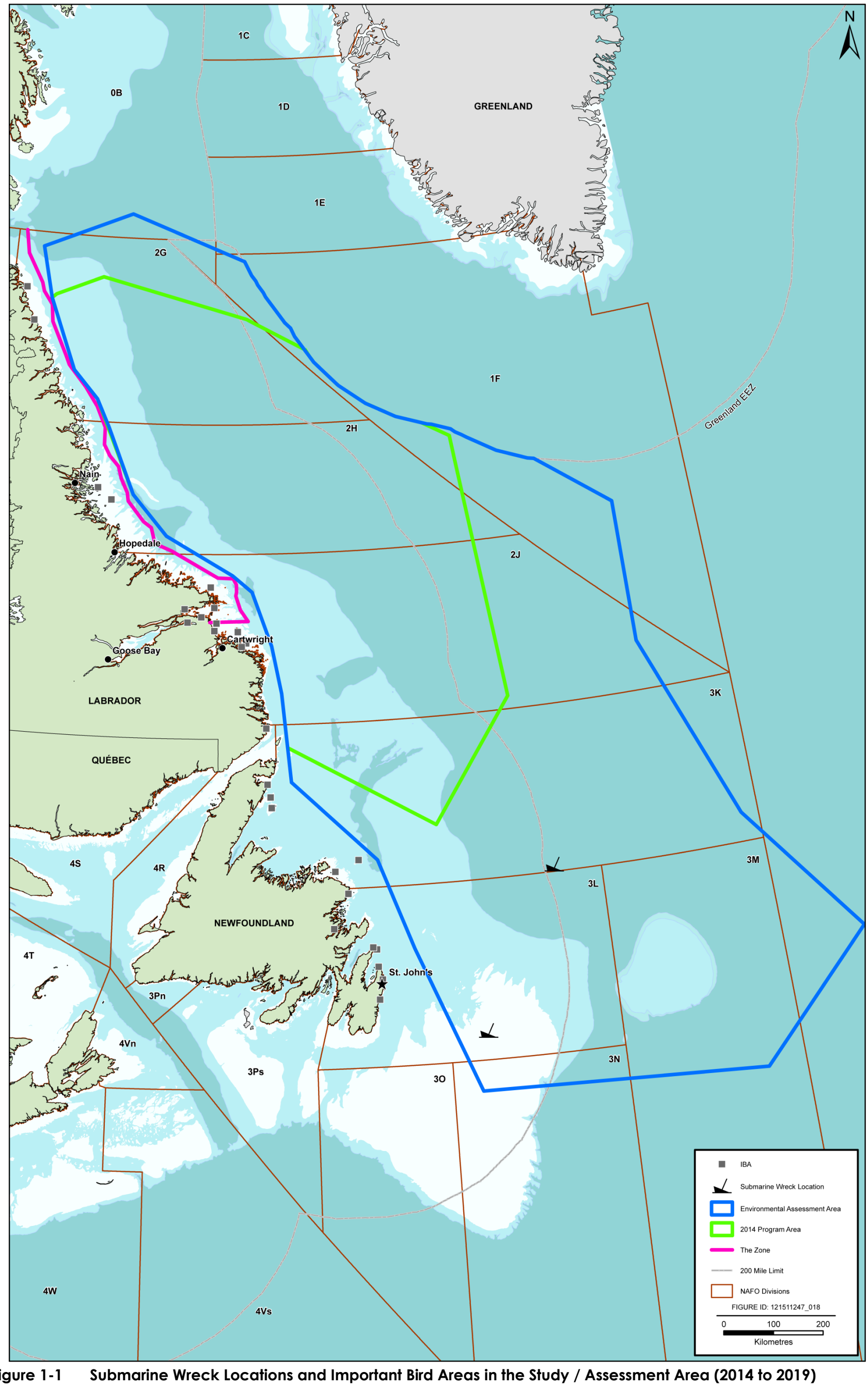


Figure 1-1 Submarine Wreck Locations and Important Bird Areas in the Study / Assessment Area (2014 to 2019)

1.2 Department of National Defence

The Department of National Defence (DND) acknowledges Section 2.7 of the report which states that "TGS will contact DND prior to start of the project to determine where naval exercises are being conducted; TGS will revise sampling area order if necessary to avoid interaction with naval vessels."

DND's initial response letter, dated 26 February 2014, stated that "there are two wrecks present within the immediate survey area; the U-520 Submarine (47.78N, 49.38W) and U-658 Submarine (50.00N, 46.53W). These vessels contained munitions at the time of sinking and may continue to pose an explosive hazard." It is advised that this information be placed on mapping in the document for project participant awareness.

The georeferenced information regarding the two wrecks has been included in the Study Area figure (see Figure 1-1).

2.0 SPECIFIC COMMENTS

2.1 Canada-Newfoundland and Labrador Offshore Petroleum Board

Figure 1-1 Multi-year Study/Project/Assessment Area (2014 to 2019), pg 2 –It should be made clear, both on Figures as well as in the text of the Environmental Assessment Report, that the "Project Area", where all project activities between 2014 and 2019 are proposed, is the larger "Study/Project/Assessment Area" outlined in blue and not the smaller "2014 Project Area" outlined in green. The "2014 Project Area" could be referred to as the "Operating" or "Program" Area.

Figures have been revised to refer to the 2014 Program Area.

Section 2.5 Schedule, pg 14 – The Temporal Scope should include the months that activities are proposed, not just "open/ice-free waters".

The temporal scope includes July to the end of mid-October, 2014 to 2019.

Section 4.0 Stakeholder Consultation, 4th para, last sentence, pg 37 – The Proponent should report on the meeting held with the Nunatsiavut Government in May 2014. This should be included in the "Addendum" to the EA Report not "Amendment", as stated.

TGS held a meeting with the Nunatsiavut Government on May 7. They provided a presentation on the program and provided clarifications on specific questions about the program. Key points included an observation from the Nunatsiavut Government on ice concentration off the coast of Labrador and interest in providing possible services or employment where possible. TGS indicated they would offer an observer liaison position to Nunatsiavut for the program (including providing the necessary training for this individual). TGS confirmed that they will adjust their schedule to avoid possible conflict with fishing vessels, should for example the crab season be delayed in zone 2J and indicated their willingness to return to Nain at the conclusion of the 2014 program to report on results and status. Input was also sought for style and content of presentation for the public information session held the same evening; no one attended this session.

Section 6.3 Cumulative Environmental Effects, pg 43 – Although overlap with other oil and gas exploratory programs or development project is not anticipated, it is expected that the Proponent commit to ongoing communications with other operators with active geophysical programs within the general vicinity of its program to minimize the potential for cumulative effects on the VECs.

TGS plans to conduct Simultaneous Operations (SIMOPS) with any ongoing geophysical surveys that may be conducted within the same area at the same time as the coring program.

2.2 Nunatsiavut Government

Inuit depend on the marine environment for a subsistence lifestyle and for their economic livelihood, particularly in regards to the Inuit Fishery. The scope of this program could potentially have negative impacts on Labrador Inuit health and wellbeing. The Nunatsiavut Government is adamant that all activities associated with this program do not disrupt the fishery, irrespective of the survey plan of TGS-NOPEC.

The sub-bottom profiler described in the EA report by the Proponent primarily operates in a high frequency bandwidth of 90 to 115 kHz with an intensity level of ~228 dB measured 1m from the energy source. This intensity level is in excess of the recommended guidelines for impulse sounds by the National Marine Fisheries Service (NOAA, 2010) of 180 dB for marine mammals and 190 dB for pinnipeds. This same document also notes that recent workshops on acoustic disturbance recommend that a precautionary approach be taken with marine mammals and disturbance. Furthermore, section 19.1(d) of the Canadian Environmental Assessment Act (2012) states "mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project" should be considered.

Therefore, the Department of Fisheries and Oceans Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment should apply, including the safety zone of 500m when the sub-bottom profiler is operating. As a result of this, having Marine Mammal Observers (MMO) onboard the vessel would be essential and necessary, and the Nunatsiavut Government recommends at least one of the MMOs be Inuit.

> TGS understands and respects that the Inuit depend on the marine environment for a subsistence lifestyle and for their economic livelihood, particularly in regards to the Inuit Fishery.
>
> As stated in Section 2.7: "At no time will a survey vessel enter or attempt to conduct any survey work in restricted or protected areas, including the Nunatsiavut Zone ('The Zone'),….", Section 3.4.2:" The sampling program proposed by TGS will not enter The Zone.", Section 4.0: "(note that the Project will not include any sampling within The Zone)…." and Section 6.1: "Samples will not be collected within The Zone, nor will the vessel enter The Zone to turn."
>
> TGS will make best efforts use at least two Fishery Liaison Officers (FLOs) throughout the Project (one FFAW representative and a representative of Inuit/Nunatsiavut) to facilitate communications with Nunatsiavut and non-Inuit fishers and assist with applying these mitigations.
>
> TGS will have a compensation program in place for any case of fishing gear damage, which covers any damage to fishing gear (or vessels) caused by the survey vessels or survey gear, and includes the value of any harvest lost as a direct result of an incident.

The 2014 Torngat Joint Fisheries Board-DFO Collaborative Post Season Trap Survey is scheduled for last week of August (see Figure 2-1); any sampling in the area will likely be completed before that date. Although none of the specific coring locations overlap with the survey locations, the FLOs on board the vessel will establish communications to prevent any potential disruption to the survey.

As per the DFO and C-NLOPB guidelines, a 500 m buffer is only required for seismic sources using compressed air (airguns), not an MBE or SBP. Therefore, there will be no MMO on this program.

Given the short duration of the survey (no more than 30 days), the general non-intrusive nature of the program (the collection of cores and bathymetry data at the specific core locations), adherence to the proposed mitigation measures and frequent and open communication, it is anticipated that the proposed coring program will not disrupt the Nunatsiavut fishery.

The Nunatsiavut Government recommends that adaptive management be required for Project-specific or cumulative effects, whether conducted by TGS-NOPEC, government bodies, or in combination. This would include the implementation of contingency plans and resources to enable responsive action, especially in areas where effect predictions are uncertain and where predictive errors may have serious consequences (e.g. disruption to traditional livelihoods or Inuit Fishery).

Noted. The program (collecting cores) is fairly non-intrusive and its duration is short (no more than 30 days). The hull-mounted SBP and MBE will only be used at the specific coring locations (i.e., will not sweep large swaths of the seabed).

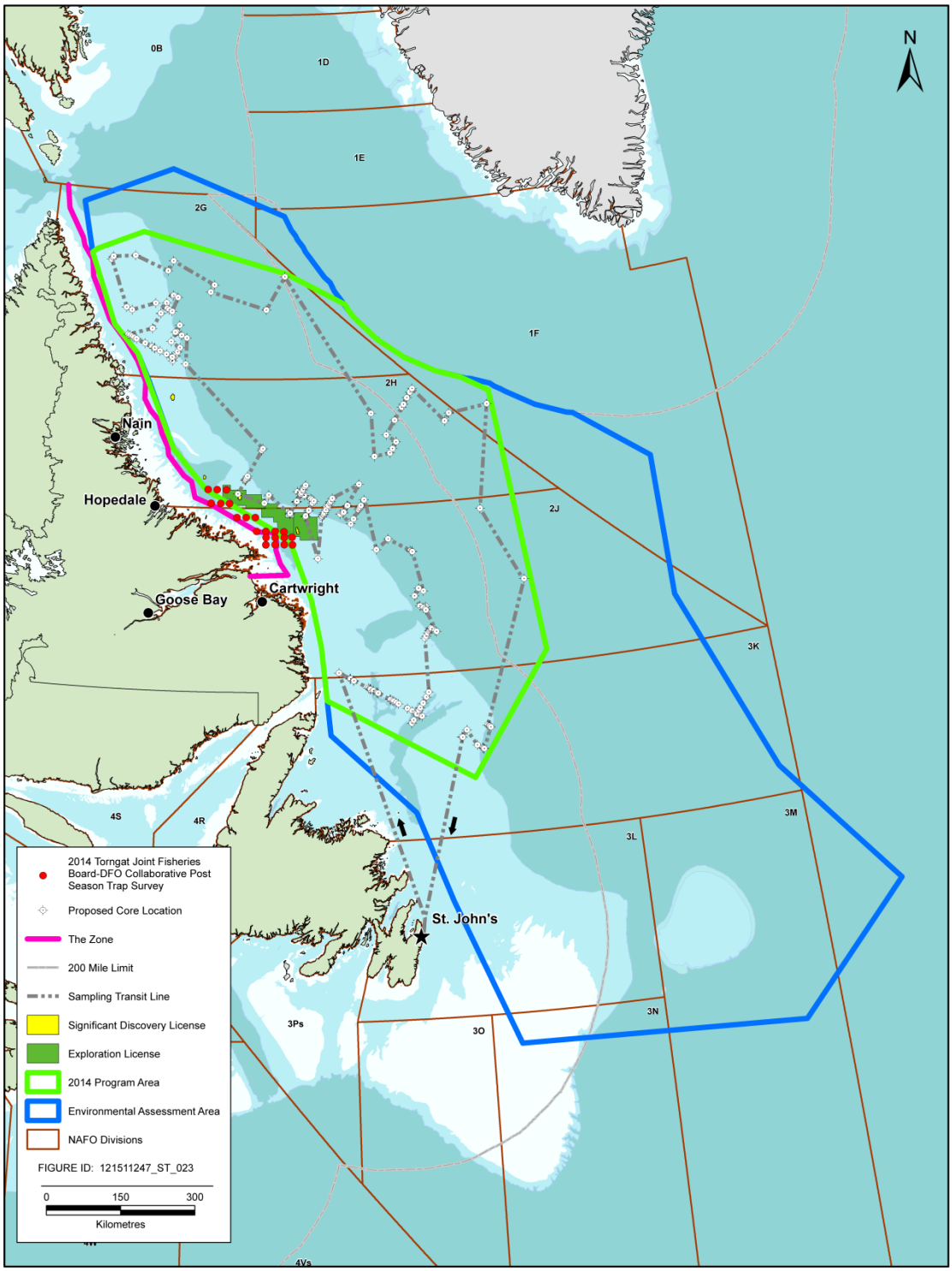


Figure 2-1 Proposed Core Locations and Transit Route

Hiring, training and ensuring meaningful employment for Labrador Inuit is essential. This could be established through an employment outreach program, with defined minimum targets for Labrador Inuit hiring. Such a program should include transportation assistance and measures to address social and cultural issues including any associated language barriers, if necessary. This would also include the establishment of paid trainee positions to be in place onboard the seismic vessel in order to build capacity. Furthermore, given that our Inuit fishers are not represented by the Fish, Food and Allied Workers Union, the Nunatsiavut Government is adamant that the Inuit Fisheries Liaison Officer be present on the seismic vessel at all times during the Project. We appreciate the proponent's initial interest in ensuring NG has an FLO on board and look forward to working with them to ensure that this is implemented for the 2014 season. We also request that the Proponent support, through an on-going basis, Nunatsiavut government businesses and service providers for the duration of their activity on the north coast of Labrador.

> TGS has committed to providing an observer liaison position to Nunatsiavut for the coring program

The Nunatsiavut Government recommends that an annual report be submitted to the CNLOPB and the Nunatsiavut Government no later than January 31, detailing the progress and potential environmental impacts of the Project, including progress on the implementation of mitigation measures and Inuit-specific opportunities.

> The proposed program is anticipated to take no more than 30 days. If requested, TGS will return to Nain at the conclusion of the 2014 program to report on results and status

2.3 Environment Canada – CWS

Section 2.7 Key Mitigation Measures, 3rd bullet, pg 16 - Quote: "As the data collection will occur over a 24-hour period, lighting is required at night for safety purposes; there is potential for marine and migratory birds to be attracted to the vessel at night."

In Atlantic Canada, nocturnal migrants and night-flying seabirds (e.g. storm-petrels) are the migratory birds most at risk of attraction to lights and flares. 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 minimize risk of incidental take of migratory birds due to human-induced light, Environment Canada recommends at minimum the following beneficial management practices:

- The minimum amount of pilot warning and obstruction avoidance lighting should be used on tall structures.

- The use of only strobe lights at night, at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada, is recommended.
- Using the minimum number of lights possible is recommended.

The 2014 program will be conducted from mid-August to mid-September. TGS will implement the suggested beneficial management practices that do not unduly impede the safe execution of the coring program.

Section 2.7 Key Mitigation Measures, 3rd bullet, pg 16 - Quote: "The vessel crew will conduct routine checks for stranded birds and release of stranded birds per the protocol of Williams and Chardine (1999). A Live Seabird Salvage permit may be required."

The permit should be obtained and in place prior to operations. Please contact Environment Canada's permits office at permi.atl@ec.gc.ca for further information concerning permits.

TGS will obtain the necessary permit prior to operations

Section 2.7 Key Mitigation Measures, 4th bullet, pg 16 - Quote: "The research vessel will avoid seabird colonies."

A minimum setback distance concerning seabird colonies should be stated here. Additionally, a map of important seabird colonies should be added to the document.

The research vessel will maintain a minimum distance of 2 km from active colonies. IBAs in the Study Area are illustrated in Figure 1-1.

Section 3.2 Species at Risk, pg 18 - Though Ivory Gull, Barrow's Goldeneye and Harlequin Duck are mentioned in this section, there has been no effects assessment, nor mitigations provided. Effects assessments and mitigations should be added to this section.

The Ivory Gull recovery strategy has been finalized and is currently available at the Species at Risk Registry (see http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=50).

Section 3.2 Species at Risk, pg 18 is revised to the following:

Harlequin Duck and Barrow's Goldeneye will be inland on rivers during the proposed timing of the coring program, and therefore there will be no interaction or effect.

Activities associated with the coring program are not expected to occur near any known nesting colonies, so they will not affect nesting colonies. Disturbance of small feeding concentrations of marine birds that may occur in the Study Area is possible. It is expected that bird behaviour would likely return to normal shortly after the completion of these activities (if disturbed at all).

> Offshore Labrador is a known wintering area for the Ivory Gull in the pack ice and marine waters between Greenland and Newfoundland and Labrador (Environment Canada 2014). The identified critical habitat necessary for Ivory Gull survival (39 breeding colonies in Nunavut) (Environment Canada 2014) is not within the Study Area. Additional critical habitat will be identified in an action plan, scheduled for release in 2018. The Ivory Gull is usually associated with pack ice and may be found in the Program Area during winter months. The proposed program will only be conducted during ice-free months (July to end-October. 2014 to 2019)

Section 3.5 Marine and Migratory Birds, pg 35 - This section should be augmented with additional information concerning pelagic migratory seabirds. These data can be obtained from EC-CWS, primary literature, strategic environmental assessments, and previous environmental assessments, among other sources.

As stated in Environment Canada's comments concerning the project description, the proponent should be aware of Environment Canada's Eastern Canadian Seabirds at Sea (ECSAS) program. This program has conducted over 4000 surveys covering 7800 km of ocean track in the Newfoundland and Labrador offshore area since 2006. The most up-to-date data for the study area must be included in the EA. This information is available by contacting Carina Gjerdrum (EC-CWS) at carina.gjerdrum@ec.gc.ca. It should be noted that the ECSAS program is ongoing, and a current focus on ECSAS monitoring is the Labrador Sea. Please see the attached report (Tranquilla et al. in press) for updated information in the region.

- Tranquilla, L. M., Duffy, S. J., Avery-Gomm, S., Roul, S., Gjerdrum, C., Bolduc, F., and G. J. Robertson (in press), Baseline Surveys for Seabirds on the Labrador Sea (2010-08S): Interim Report. Environmental Studies Research Funds.

The ECSAS program can be cited as follows:

- Gjerdrum, C., D.A. Fifield, and S.I. Wilhelm. 2011. Eastern Canada Seabirds at Sea (ECSAS) standardized protocol for pelagic seabird surveys from moving and stationary platforms. Canadian Wildlife Service Technical Report Series No. 515. Atlantic Region. vi + 36 pp.

> Section 3.5 Marine and Migratory Birds, pg 35 is revised to the following:
>
> Ship-based and aerial baseline surveys for seabirds on the Labrador Sea (Tranquilla et al. in press) were conducted in a Study Area very similar to (overlapping with) the proposed 2014 Program Area. Northern fulmar and dovekie were the most abundant species on the Labrador Shelf identified from ship-based surveys; northern fulmar had an extensive distribution, while dovekies had a more limited distribution (coastal and on the shelf). Large alcids identified during ship-based surveys had a widespread distribution, with higher densities closer to shore and on the shelf. Shearwaters were not widely distributed during ship-based observations, occurring primarily on the shelf and shelf edge. Leach's storm-petrel distribution from ship-based surveys was very sparse, with densities primarily over the Hamilton Bank (Tranquilla et al. in press).

> During aerial surveys the densest aggregations of aclids were found in the most northerly transects, while the densest aggregations of northern fulmar were along the most southerly transect lines. Black-winged gulls were not abundant during aerial surveys, while white-winged gulls were found throughout the aerial survey (Tranquilla et al. in press).

Section 3.5 Marine and Migratory Birds, pg 35 - This section should be augmented with additional information concerning colonial migratory seabirds. These data can be obtained from EC-CWS, primary literature, strategic environmental assessments, and previous environmental assessments, among other sources.

Population numbers for seabird colonies should be reported through the use of the most recent information available. Seabird colony numbers are routinely assessed and updated by EC-CWS and its partners, and data are compiled and stored in the CWS Atlantic Region Colonial Waterbird Database. These data can be obtained by contacting Sabina Wilhelm, EC-CWS colonial seabird biologist, at Sabina.wilhelm@ec.gc.ca .

Attached are two EC-CWS technical reports that can provide updated trend information on seabirds breeding in Groswater Bay and on one of the Wadham Islands. Additional more recent data for these and other colonies within the study area exist and are available upon request from EC-CWS.

- Robertson, G. J. and R. D. Elliot. 2002. Changes in seabird populations breeding on Small Island, Wadham Islands, Newfoundland. Canadian Wildlife Service Technical Report Series No. 381. Atlantic Region. iii + 26 pp.
- Robertson, G. J., R. D. Elliot, and K. G. Chaulk. 2002. Breeding seabird populations in Groswater Bay, Labrador, 1978 and 2002. Canadian Wildlife Service Technical Report Series No. 394. Atlantic Region. iv + 31 pp.

> Section 3.5 Marine and Migratory Birds, pg 35 is revised to the following:
>
> Of the approximately 590,000 pairs of breeding seabirds located at eight IBAs adjacent to the Study Area, approximately two-thirds reside on Funk Island (LGL 2014). Of those adjacent to the 2014 Program Area, the Gannett Islands off Hamilton Inlet has the largest breeding seabird nesting colony in Labrador (LGL 2014). As there are no IBAs within the Study Area (or 2014 Program Area) (see Figure 1-1), the only potential interaction with seabird colonies is the unlikely event of a diesel spill from vessel distress; it is unlikely these IBAs would be affected by the coring program.

Section 3.5 Marine and Migratory Birds, pg 35 - As mentioned in our comments regarding the project description, EC-CWS has developed a pelagic seabird monitoring protocol (attached) that is recommended for use by experienced observers on all offshore projects. A guide for pelagic seabirds of Atlantic Canada has also been attached, for assistance in identifying pelagic seabirds in the area.

Specific Comments
August 15, 2014

A report of the seabird monitoring program, together with any recommended changes, is to be submitted to EC-CWS on a yearly basis. In an effort to expedite the process of data exchange, EC-CWS recommends that the data (as it relate to migratory birds or Species at Risk) collected from the monitoring program be forwarded in digital format to the EC-CWS office following completion of the study. These data will be centralized for EC-CWS's internal use to help ensure that the best possible natural resource management decisions are made for these species in Newfoundland and Labrador. Metadata will be retained to identify source of data and will not be used for the purpose of publication. EC-CWS will not copy, distribute, loan, lease, sell, or use of this data as part of a value added product or otherwise make the data available to any other party without the prior express written consent.

> No bird monitoring has been proposed for this short (no more than 30 days) program because there is a high level of certainty regarding both the effects predictions and the effectiveness of proposed mitigation measures. There will be no trained bird observer on the vessel.

Section 3.7 Sensitive Areas, pg 36 - A discussion of and a map of Important Bird Areas in the region should be added to this section. In the event of an oil spill, these areas may be affected and should thus be added to the report. See http://www.ibacanada.com/ for further details.

> Note that the only potential for a diesel spill is from the unlikely event of vessel distress.
>
> Section 3.7 Sensitive Areas, pg 36 is revised to the following:
>
> Twenty-eight IBAs are located adjacent to the Study Area – 15 are adjacent to the 2014 Program Area; none are located within the 2014 Program Area or Study Area. IBAs in the Study Area are illustrated in Figure 1-1. As the only potential for an accidental event (a diesel spill) is from the unlikely event of vessel distress, and given the short duration of the program and that the IBAs are not located within the Program Area, it is unlikely these IBAs would be affected by the coring program.

Section 6.1 Project Activities, pg 42 - A permit will be needed to collect dead migratory birds. The permit should be obtained and in place prior to operations. Please contact Environment Canada's permits office at permi.atl@ec.gc.ca for further information concerning permits.

> TGS will obtain the necessary permit prior to operations

Section 6.2 Accidental Events, 2nd para, pg 43 - Quote: "Species at risk and other not at risk species would be able to avoid any film that might form."

EC recommend removing this sentence. Please consult O'Hara and Morandin (2010; attached) for information regarding the negative effects that even very small quantities of oil can have on thermoregulatory ability in migratory birds.

- O'Hara, P. D., and L. A. Morandin (2010) Effects of sheens associated with offshore oil and gas development on the feather microstructure of pelagic seabirds. Marine Pollution Bulletin 60: 672-678.

Section 6.2 Accidental Events, 2nd para, pg 43 is revised to the following:

Diesel has a low viscosity and is readily dispersed within the water column when winds reach approximately 9 to 13 km/h (5 to 7 knots) or with breaking waves. It is possible for diesel to be dispersed by wave action and may form droplets that are kept in suspension and move with currents. It is unlikely that the diesel would reach the seafloor. The research vessel will have limited amounts of marine fuel on board that could potentially be spilled to the ocean. The research vessel will have spill response equipment on board. The vessel's Safety, Health and Environment management system includes spill response (Appendix D). The Canadian Wildlife Service Response Plan Guidance (2012) will be followed in the event of an oil spill.

Section 6.2 Accidental Events, 2nd para, pg 43 - Quote: "The Canadian Wildlife Service Response Plan Guidance (2012) will be followed in the event of an oil spill."

The above guidance document is to help proponents formulate their own response plans, and is specific to migratory birds. The guidance document is not a response plan in and of itself, but information provided within it should inform the shipboard response plan.

Noted. The vessel will have an Emergency Response Plan, including an Oil Spill Response Plan, in the unlikely event of vessel distress.

Section 6.2 Accidental Events, pg 43 - Strategies to minimize or prevent accidental or chronic releases must be emphasized in a mitigation program. Proponents are required to demonstrate response preparedness and to identify provisions for ensuring measures are implemented to eliminate or minimize resulting sheens or slicks in the event of accidents and malfunctions involving the release of oil. The following considerations are requested to be factored into the development of a response plan that would help reduce impacts on seabirds:

- measures for containing and cleaning up spills (of various sizes) either at the drill site or during transport;
- equipment that would be available to contain spills;
- specific measures for the management of large and small spills (e.g., breaking up sheens);
- mitigation measures to deter migratory birds from coming into contact with the oil;
- mitigation measures to be undertaken if migratory birds and/or sensitive habitat becomes contaminated with the oil; and
- the type and extent of monitoring that would be conducted in relation to various spill events.

There is no drilling associated with this program. The program involves the collection of cores. The only potential for an accidental event (a diesel spill) is from the unlikely event of vessel distress.

2.4 Fisheries and Oceans Canada

DFO has determined that the project as described will not cause a "serious harm" to fish and/or fish habitat. The activities described would have very minimal impacts (if indeed any) and are of a very short duration.

Noted. Thank you.

2.5 Fisheries, Food and Allied Workers (FFAW)

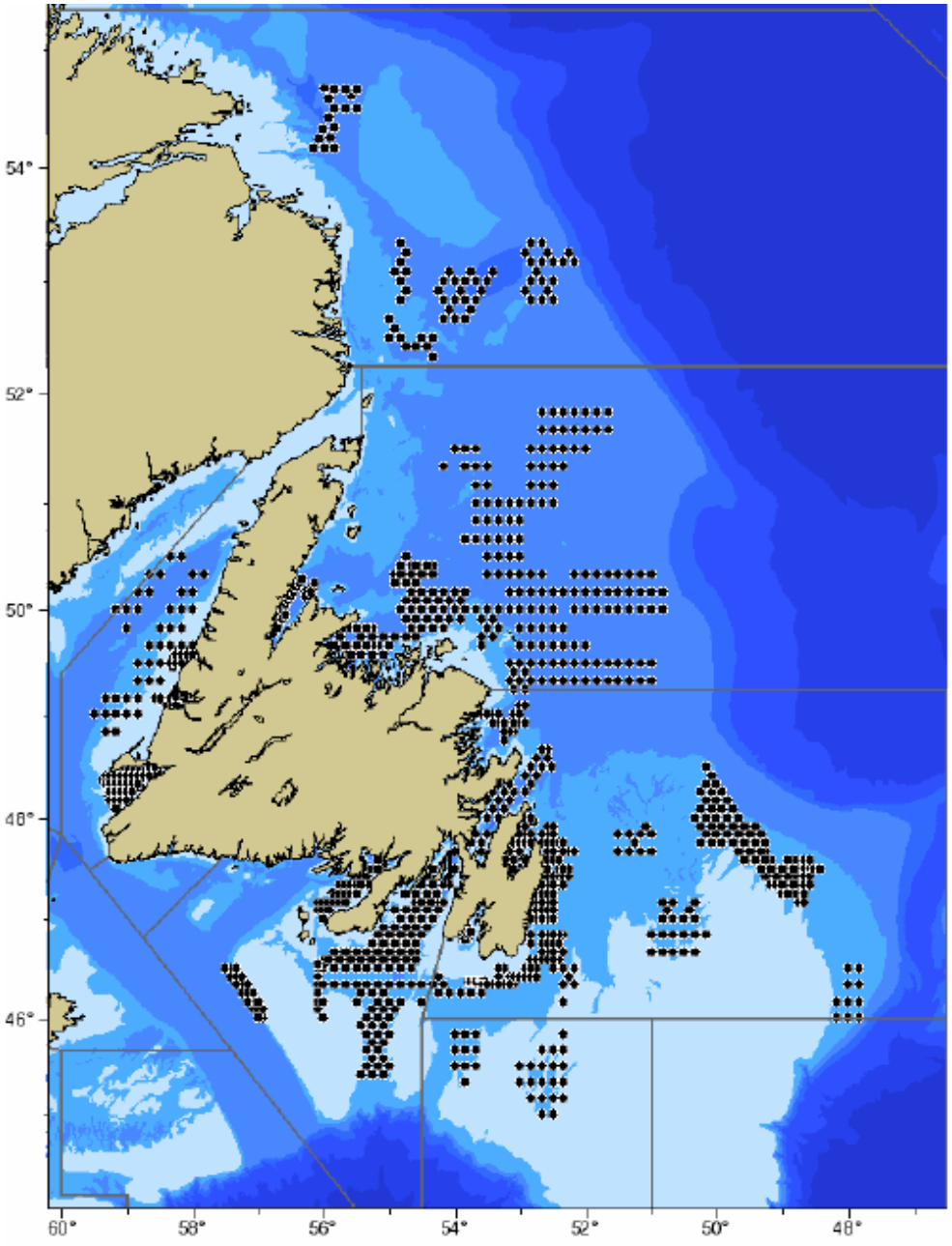
Table 5.1 Project-Valued Environmental Component Interaction, page 40 - it is presented that the collection of sediment cores and rock samples could interact with fish habitat and fisheries and other ocean users. Please provide reasoning why the operation of the research vessel would interact with fish habitat but not fisheries and other ocean users. Noted. The operation of the Research Vessel could interact with fisheries and other ocean users, although that interaction would be limited due to the nature (collection of cores) and duration (no more than 30 days) of the program. There will be an FLO on board for the duration of the coring program.

Section 5.5 Environmental Management, page 41 - please provide clarification on the statement "…and a fishing gear damage compensation program (as per C-NLOPB and CNSOPB 2002)…, in the event of an oil spill."

A compensation Program will be made available by TGS which is consistent with C-NLOPB guidelines and past practices. This program covers any damage to fishing gear (or vessels) caused by the survey vessel or survey gear, and includes the value of any harvest lost as a direct result of an incident. TGS will follow procedures for responding to a claim similar to those outlined in the One Ocean Protocol document (these have been successfully employed in the past by other operators). Any and all incidents will be reported to the C-NLOPB, which maintains a 24-hour answering service at 709-682-4426 for this purpose (709-778-1400 during working hours). Reports on contacts with fishing gear will include the exact time and location of initial contact, loss of contact and a description of any identifying markings on the gear.

Figure B-1 2013 DFO Research vessel Survey and DFO-Industry Post-season Crab Survey Locations in the Study/Project/Assessment Area - the crab survey information that is presented in is misleading. The Industry-DFO Post Season Trap Survey takes place from specified survey stations as depicted in Figure 3-10. The end point for gear that is set from these survey stations is not recorded. Therefore, displaying the information as transect data (in Figure B-1) is incorrect.

The data were provided by DFO. Figure B-1 can be disregarded, as the locations are provided in Figure 3-10 (as noted in the review comment).



Source: Stansbury et al. 2013

Figure 2-2 Stations for DFO-Industry Post-Season Crab Survey

3.0 COMMENTS ON ENVIRONMENTAL ASSESSMENT ADDENDUM

3.1 Environment Canada

EC-07 Section 3.5 Marine and Migratory Birds: Quote: "*No bird monitoring has been proposed for this short (no more than 30 days) program because there is a high level of certainty regarding both the effects predictions and the effectiveness of proposed mitigation measures. There will be no trained bird observer on the vessel.*"

The EC-CWS pelagic bird monitoring program contributes to a regional picture of migratory birds throughout Atlantic Canadian waters. It assists in providing information for emergency response actions in case of oil spills or other marine accidents. Migratory bird monitoring is recommended for all offshore projects in order to contribute to this overall picture, regardless of other proposed effects predictions or effectiveness of existing ship-board mitigation measures.

> A beneficiary of the Nunatsiavut Government will be on board the vessel as the Marine Mammal Observer (MMO) and bird observer. Bird observations will be made in transit (and during coring operations) and marine mammal observations will be made during operations. The bird and marine mammal observations will be made for data collection only.

3.2 Nunatsiavut Government

The Nunatsiavut Government believes that the original concern related to the impacts of the sub-bottom profiler and proposed mitigation measure was not adequately addressed.

The response from the proponent provided insufficient concern and consideration to the potential impacts and proposed mitigation measure. Furthermore, no explanation or reference to evidence was provided to diminish our concerns related to acoustic disturbance from the sub-bottom profiler on marine mammals.

Therefore, the Nunatsiavut Government requests that the C-NLOPB require the proponent to adhere to the original recommendation of applying a safety zone of 500m when the sub-bottom profiler is operating. Such a measure would necessitate the use of MMOs. If this request is denied, the Nunatsiavut Government requires an explanation as to how the impacts of the SBP do not warrant the same mitigation measure as those used by compressed air guns.

> MMOs are a useful mitigation measure to avoid harm to marine mammals within a 500 m safety radius of high area of ensonification during extensive seismic operations when arrays are active over long periods of time. Two things are of note about this program: use of the sub-bottom profiler is only a few minutes at each station with ample time between stations, making any impact on marine mammals unlikely; and levels drop below 228.8 within 1 m of the source as per C-NOLPB (2012) cited guidelines.

Together, noise level and length of activity will likely not cause any environmental effects.

As noted, there will be a MMO on board the vessel. However, no further mitigation (i.e., shut down of SBP if marine mammals are observed within 500 m of the vessel) will be implemented.

4.0 OCEANEYE® AERIAL SURVEILLANCE SYSTEM

Part of the scope of the Project is to locate and sample active petroleum slicks on the ocean surface. To assist in locating the slicks in real-time, in addition to interpreted results from satellite data, TGS proposes to implement the OceanEye® Aerial Surveillance System (Figure 4-1) to assist in locating active natural seafloor seeps on the ocean's surface. Prior to collecting seep samples using the AGI sampling kits, a weather-proof, helium-filled balloon carrying a triple-sensor unit will be deployed from a base unit off the stern of the survey vessel to an approximate height of 100 to 150 m above the ocean surface. Tethered by a heavy duty cable, the system will operate while the vessel is transiting to and within the identified potential seep areas, collecting and producing high-resolution day and night imagery and geo-location coordinates. The balloon's sensor unit locates the petroleum seep and transmits data wirelessly to the base unit on the vessel. With customized OverView software, the hand-held, touch-screen terminal displays daylight and infrared information for real-time identification and reconnaissance of active seafloor seeps.

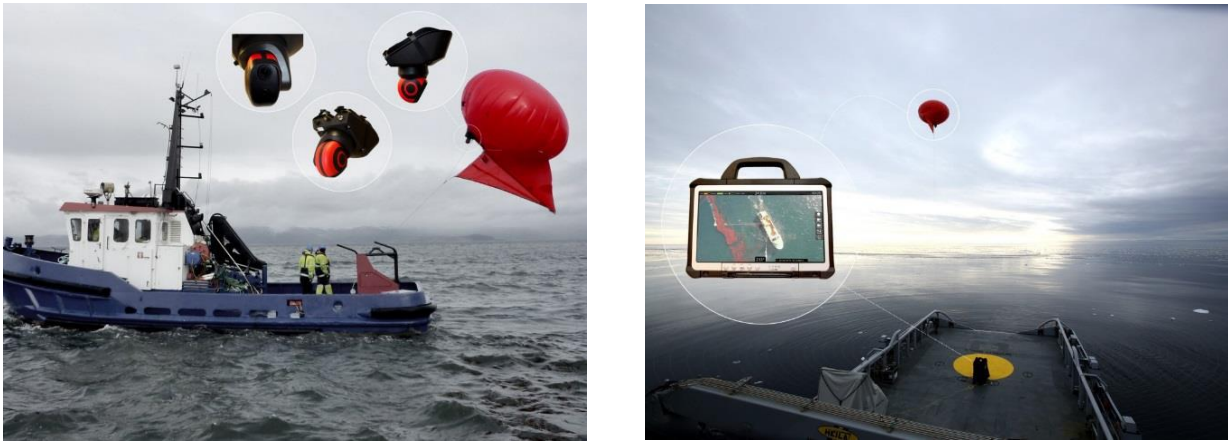


Figure 4-1 OceanEye® Aerial Surveillance System

During program operations, there will be a dedicated operator on board the vessel, who will be qualified and trained on the system prior to commencement of activities. The system will not be used continually during all operations, it will only be implemented and deployed to identify and detect active seeps in specific areas. Once seeps are visually identified for sampling using OceanEye®, the system will then be retrieved and stored in a dedicated area on the work deck of the vessel. Deployment and retrieval of the balloon can take from 15 to 30 minutes for each activity.

The system components include:

- Sensor Unit: Triple sensor unit (EO/IR/AIS) with real-time day & night video and imagery. The sensor unit is equipped with a video camera, sensor and wireless datalink. The compact camera is attached to the balloon, which makes the high quality footage from the OceanEye® Sensor unit stable. The product is built out of solid and robust material that can handle harsh weather
- Base Unit: The base unit serves as a docking station, winch control panel, helium-filling and storage unit. The compact system with base unit, balloon and sensor unit is compact for air freight and small vehicle transport. Completely self-contained and rapidly deployable with footprint of a standard ISO pallet.
- Viewer Terminal: Rugged Viewer terminal with touch-based OverView software, controls the OceanEye® Sensor unit and displays sensor data and position of video-view cross-hair.
- Balloon: Helium-filled balloon carries the airborne sensor unit for persistent aerial surveillance.

OceanEye® is manufactured and provided by Maritime Robotics, based out Trondheim, Norway. Maritime Robotics is a leading provider of innovative unmanned solutions for maritime operations in harsh environments (www.maritimerobotics.com/systems/ocean-eye). See attached brochure for more information.

5.0 References

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APPENDIX A

Percent Weight and Percent Value (2011 and 2012) for Northern Shrimp, Snow Crab and Greenland Halibut (revised 2014 Program Area)

APPENDIX B

2013 DFO Research Vessel Survey and

DFO-Industry Post-season Crab Survey Locations
(deleted; refer to Figure 3.10 for locations)

APPENDIX C

Sensitive Areas in the Study / Assessment Area
(revised 2014 Program Area)