

GX Technology Canada Ltd's GrandSPAN 2D Seismic, Gravity and Magnetic Survey, 2014 – 2018: Environmental Assessment Amendment (for 2016 – 2018)

Responses to Reviewer Comments

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1 INTRODUCTION

1.1 Purpose and Context

The following provides GX Technology Canada Ltd.'s (GXT's) responses to reviewer comments provided by the Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) regarding the *GrandSPAN 2D Seismic, Gravity and Magnetic Survey, 2014 – 2018: Environmental Assessment Amendment (for 2016 – 2018)*, which was submitted to the Board by GXT in December 2015 (<http://www.cnlopb.ca/pdfs/gxtgpm2ds/eaamen.pdf> + Appendices).

The EA Amendment describes and assesses the environmental implications of a proposed modification to the Project which would provide additional options (and thereby flexibility) for conducting seismic work during GXT's planned multi-year seismic, gravity and magnetic survey (described in <http://www.cnlopb.ca/assessments/gxtgpm2ds.php>), The original Project plans were assessed and approved by the C-NLOPB in 2014. The amendment options are important as a result of recent adjustments of priorities within the industry at large, and an evolving focus by offshore petroleum interests within the Newfoundland and Labrador sector in particular, and is in keeping with ION / GXT's overall aim of best meeting these emerging data needs.

1.2 Organization of Responses

The following sections reproduce each of the review comments (organized and numbered under the commenting organization's name) and then provides (immediately thereafter) GXT's responses / replies to these comments.

Following this *Introduction (Chapter 1)*, the remainder of this response document is organized as follows:

Chapter 2: General Comment

Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)

Chapter 3: Specific Comments

Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)

Fisheries and Oceans Canada (DFO)

Department of National Defence (DND)

Fish, Food and Allied Workers – Unifor (FFAW-Unifor)

2 GENERAL COMMENT

2.1 Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)

C-NLOPB Comment 1: Section I of Appendix 2 of the Geophysical, Geological, Environmental and Geotechnical Programs Guidelines (C-NLOPB 2012) contains verbatim the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment.

Appendix 2 contains all recommended environmental planning, mitigation and reporting measures for marine seismic surveys in the NL offshore area, including recommended practices for interaction with other ocean users, particularly fisheries interests, during the conduct of surveys and recommended reporting formats.

GXT Response: Understood and acknowledged. GXT references the Guidelines document and its recommended environmental planning, mitigation and reporting measures (including the Statement of Canadian Practice) throughout the original 2014 GrandSPAN EA Report (see, for instance, Sections 1.3, 2.8, 5.2, 5.2.1, 5.2.2, 5.2.4, 5.2.5) and commits to incorporating the relevant measures. As noted in the EA Amendment submission (throughout Section 5 and in Section 6) “All of the mitigation measures outlined in the EA and associated filings ... would be implemented” for any amended Project options.

3 SPECIFIC COMMENTS

3.1 Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)

C-NLOPB Comment 2: Section 1 Introduction, pg 2 – The Amendment includes the assessment of two new options: two (2) 2D vessels working simultaneously in the original Project Area; and 3D seismic surveys. Both of which will not be implemented at the same time.

[A.] Although it is stated in various locations throughout the Amendment Report that the option of one (1) 2D and one (1) 3D may be undertaken simultaneously in the Project Area, this 3rd option has not been included in the assessment of new activities. [B.] Also, if the option of one (1) 2D and one (1) 3D undertaken simultaneously in the new “3D Acquisition Area” is considered then this activity should also be included in the assessment of activities within this area.

GXT Response: A. Because the use of one 2D ship to carry out the GrandSPAN program was addressed within the scope of the original EA review process (and approved thereunder) it was not treated as a separate amendment if undertaken at the same time as the 3D survey option. Instead, the possibility of a 3D survey occurring at the same time as the original single 2D program was considered within the assessment of the 3D option. Not identifying this as a separate, distinct option was therefore an organizational decision, not an omission since this possibility is identified and considered throughout the document.

As stated initially in the Amendment Summary of the EA Amendment document, for example:

The amendment includes the following options (both options would not be used at the same time, although GXT might want to implement the original plan - one 2D ship - at the same time as a 3D survey, in different parts of the Project Area as described in the follow section) ... (Section 1.0).

This is similarly stated in the Project Description section of the EA Amendment:

If GXT were to undertake a single ship 2D program (as described in the original EA), at the same time as a 3D program (in the potential 3D area), a minimum 50 km separation would also be maintained to ensure no activity overlap and address any potential cumulative effects issues, as in the two 2D ship option (Option 1). (Section 2.2.2).

The implementation of the original single ship 2D survey activity in combination with one of the Project amendment options (i.e., the addition of one more 2D vessel or the addition of a 3D survey in the defined area) was therefore the basis for the environmental analysis provided in the EA Amendment. Much of the environmental effects analysis (both Project-specific and cumulative) is therefore focussed on evaluating whether and how the environmental emissions and interactions associated with the “original” 2D survey vessel would or would not interact with those of the potential second 2D survey vessel or with the 3D survey (depending on the option implemented), including the various planning measures to be undertaken by GXT to ensure geographic separation between vessels and potential environmental effects. Some further examples of the discussion are given below.

As noted at various locations in the EA Amendment, if two separate survey operations were being conducted at the same time by GXT (whether two 2D surveys or one 2D and a 3D survey) the ships would remain at least 50 km apart when in acquisition mode. Since the maximum array used for any 3D work would be smaller (in terms of cubic volume) than the 2D array considered in the original EA and the EA Amendment, the potential for any sound overlap with a one 2D / one 3D scenario would be expected to be less than for a two 2D ship scenario (Option 1) where both might employ the maximum array size considered in the original 2014 assessment.

Although the possible combination of one 2D survey and a 3D survey was not specifically labelled “Option 3” in the Amendment document, the scenario was identified and its potential effects were fully considered. In the EA Amendment Environmental Effects Analysis (Section 5), the potential environmental effects of a one 2D / one 3D scenario were assessed for all relevant VECs. For example, in the Section 5.1 (Marine Fish and fish Habitat) analysis, the Amendment document states that the “geographic separation of the seismic vessels would again reduce the potential for individual animals to be affected by multiple sound sources. This would likewise be the case if the 2D program were to be implemented concurrently with any GXT 3D program (Option 2), which would also maintain at least a 50 km separation between acquisition operations... . The proposed 3D amendment option therefore does not change the results of the original (2014) environmental effects assessment for this VEC, and if this option is used the Project is still not likely to result in significant adverse environmental effects on Marine Fish and Fish Habitat.” Similar assessment conclusions are stated for other VECs, including in Sections 5.2, 5.3 and 5.4.

An assessment of the environmental effects of a one 2D / one 3D scenario is also included in the Cumulative Effects assessment section of the EA Amendment document (Section 5.7), where it was concluded that “If GXT were to undertake a single ship 2D program (as described in the original EA), at the same time as a 3D program (in the potential 3D area), a minimum 50 km separation would also be maintained to ensure no activity overlap and address any potential cumulative effects issues, as in the two 2D ship option (Option 1)” (also stated in Section 2.2.2). Essentially, the potential effects are no different from any other two operations by any operators occurring simultaneously in different parts of the Grand Banks. Arguably, they might be less in GXT’s case since GXT has made it an undertaking to keep any two such active GXT sources separated by at least 50 km at all times, and typically much more than this considering the size of the 2D Project Area.

It is also the conclusion of the EA Amendment that the simultaneous use of a single 2D operation at the same time as a 3D survey within the 3D acquisition area (as described in the document), with the 50-km minimum separation and the other mitigations in place, would not change the results of the original (2014) environmental effects assessment for any of the VECs considered, and if this combination is used the Project is still not likely to result in any significant adverse environmental effects.

B. If a 2D ship is active (in acquisition mode) at the same time that a GXT 3D survey is ongoing, the 2D ship will not approach closer than 50 km (at a minimum) to any other active GXT operations, wherever they are, as stated and considered in the EA Amendment document. For example, if the GXT 3D vessels were working in the northeast portion of the 3D Acquisition Area, the single GXT 2D ship might work through a part of the 3D Acquisition Area 50 km or more to the west. It should be noted that, given the typical layout of the 2D SPAN survey with very long lines typically 50 km apart, the amount of time in any locality is of short duration and the next closest 2D line might not be revisited for several days or weeks.

As shown in Section 3 (Existing Environment) of the EA Amendment document, the planned 3D Acquisition Area is not considered to be more environmentally sensitive than other parts of the GrandSPAN Project Area, so it does not need special avoidance measures on that basis. Thus, the environmental implications of a 3D deployment being active when a 2D ship passes by 50+ kms away inside the 3D Acquisition Area would be no different from the case of the 2D ship passing 50+ km away from 3D operations when the 2D ship was outside the 3D Acquisition Area.

There is good geoscientific value in having 3D and deep basin 2D data for the same area because each provides a different but mutually illuminating perspective. Studied and interpreted together, the datasets allow unique insights into the region being investigated.

C-NLOPB Comment 3: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 7 – Please provide the coordinates and the area in square kilometers for the “3D Acquisition Area”.

GXT Response: The NW, NE, SE and SW (approximate “corner”) coordinates of the 3D Acquisition Area are as follows:

NW	50°12'20"N, 46°38'40"W
NE	49°09'40"N, 44°12'25"W
SE	46°07'50"N, 47°10'00"W
SW	47°07'20"N, 49°29'45"W

This Area is approximately 92,000 km² in size, and includes an approximately 20 km buffer beyond all pre-plot acquisition lines to allow for line turns. As noted in the EA Amendment document (Sections 1 and 5), this is less than 10 percent of the total size of the overall GXT GrandSPAN Project Area.

C-NLOPB Comment 4: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 7 – As with the 2D Project Area, does the “3D Acquisition Area” include vessel turning for line changes?

GXT Response: As Section 2.2.2 states “Any and all 3D acquisition activity would occur within the area outlined in green on this map (hereinafter referred to as the 3D acquisition area)”. This includes vessel turning for line changes and any other activities with gear deployed (except in the case of an emergency). As noted in GXT’s response above (C-NLOPB Comment 3), in general a buffer of approximately 20 km has been assumed beyond pre-plot survey lines. This provides a fully adequate turning area.

C-NLOPB Comment 5: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 7 – What is the maximum acquisition per year for 3D seismic?

GXT Response: The maximum acquisition achievable per year will depend on several factors, such as the start date, weather conditions, maintenance and crew change downtime, end date, etc., and on the streamer configuration. An average daily acquisition of 100 km along a sail line(s) would be considered very good. The actual amount of acquisition would then be determined by the width / coverage of the streamer spread. For instance, a 12-streamer spread with 200 m separation between the streamers would result in acquisition of approximately 220 km² per day. If the program lasted 100 days, this would result in a total acquisition of 22,000 km². However, if an 8-streamer configuration with a 100-m inter-streamer separation is employed, acquisition would be just 7,000 km² over the same period. Note that in both case, the distance sailed and the number of array shotpoints would be the same.

C-NLOPB Comment 6: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 7 – The original EA for 2D activity included the assessment of gravity and magnetic data collection. Are these activities proposed as part of the 3D seismic surveys? If so, they should be included in the assessment.

GXT Response: Gravity and magnetic data will likely be collected using a marine gravity meter during any 3D acquisition as well as during the 2D survey. Given that gravity and magnetic data will be obtained passively as part of the proposed survey program through the installation of the recording equipment on the seismic vessel(s), and because the planned use of this apparatus does not have any environmental emissions, sounds or other interactions associated with it (and these were described

and considered as part of the original EA), these data collection devices were not given separate consideration in the environmental effects assessments for each VEC in the EA Amendment.

For the purposes of completeness, however, the following sentence can be assumed for the relevant parts of Section 5 of the EA Amendment (namely, Sections 5.1.3, 5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3):

Gravity and magnetic data will also be gathered passively as part of the proposed 3D survey option. The use of this equipment will not result in environmental emissions or other disturbances, and therefore, these activities are not likely to interact with or otherwise adversely affect the VEC. No additional mitigation specific to this proposed Project activity is therefore required or proposed.

Again, as these components were part of the original Project description and assessment they were not considered a change to the existing plans. Because the data collection equipment is passive and does not in any way affect the project footprint or method of acquisition, it will have no adverse effects on any VEC.

It is therefore the conclusion of the EA Amendment that gravity and magnetic data collection by any of the ships contemplated in the 2D or 3D amendment options would not change the results of the original (2014) environmental effects assessment for any of the VECs considered, and if this combination is used the Project is still not likely to result in any significant adverse environmental effects.

C-NLOPB Comment 7: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 8 – “One or two support boats will also be used, as needed, for line scouting, guard duties and resupply”. Please explain how one support vessel can accomplish all of these duties with up to five seismic survey vessels and two support vessels operating at the same time for the 3D seismic survey.

GXT Response: The decision on the number of support vessels will be made during final survey planning in any acquisition year based on needs and safety. Key factors will be the number of 3D survey ships engaged (one to five, depending on the chosen configuration), the endurance of the ships used, the amount or likelihood of fishing gear near the area, crew change options employed, and the size and capabilities of the support vessels available. If the five-ship configuration is used the ship designated for standby infill will be able to provide some support services for the other ships. The fact that all the ships will be relatively close to each other (typically within a 15 km radius of the recording ship) means that they can also provide mutual support in an urgent situation, and all could be reached quickly by a support ship anywhere in the field of operations. It is therefore likely (and planned) that if the 3D survey work is implemented these functions would and could be accomplished by one or two support vessels.

C-NLOPB Comment 8: Section 5 Environmental Effects Analysis and Mitigation, pg 73 – Please include a description of the “3D Acquisition Area”.

GXT Response: “3D Acquisition Area: This is the area within which all potential GrandSPAN 3D acquisition activities would take place. It is fully within the overall GrandSPAN Project Area, and represents approximately nine percent of that larger area. It is focused primarily on the marine area beyond the “nose” of the Grand Banks in the region of the Sackville Spur; approximately 80 percent of the area is outside (eastward of) Canada’s EEZ boundary. The 3D Acquisition Area as shown includes an approximately 20 km buffer beyond all pre-plot acquisition lines to allow for line turns and other associated 3D operations.”

The area is shown in Figure 2.2 in Section 2.2.2 of the EA Amendment document when it is first identified and described. Figure 3.1 shows the area in relation to NAFO Unit Areas, Figures 3.2 – 3.5 show it in relation to marine faunal density, biomass and species richness, and Figures 3.5 – 3.14, 3.23 show the 3D area in relation to various fisheries activities and sensitive areas. Additional maps showing the 3D area are provided in Appendix A (fisheries) and B (seabirds).

C-NLOPB Comment 9: Section 5.1.3 Implications of Amendment Option 2: 3D Data Acquisition, page 83, second paragraph – One recording ship, up to four source vessels and 2 or more support vessels is not within the nature and scope of 2D surveys, particularly with respect to ensonification and ecological footprint. Please discuss.

GXT Response: The referenced statement in the EA Report (page 83, 2nd paragraph) states: “As a result of the above characteristics and factors, any localized ‘intensiveness’ of 3D survey activity and associated environmental disturbances would be minimized, and likely well within the nature and scope of many 2D surveys that are routinely approved and conducted in the NL Offshore Area.”

The statement was primarily intended to compare and contextualize the sound / ensonification aspects of the potential 3D operations, since this has the greatest potential for effects on the VEC under consideration at that point in the text (Fish and Fish Habitat). It was not intended to suggest that the nature and intensity of the 3D survey as a whole was no different in any respect from that of a typical 2D survey, and indeed, the paragraph following does state specifically, observing, for example, that “The proposed 3D survey activity would result in an increase in the overall level of marine vessel activity in the area, with one recording ship, and up to four source ships and one (or two) support vessel, as compared to the single 2D vessel scenario that was originally described and assessed”.

The statement in question was made in light of the discussion and information provided in the description of potential multi-ship 3D operations in the preceding paragraphs, in particular that: 1. the 3D operations would not activate the arrays more frequently than typical 2D operations (8 - 12 seconds apart), 2. that multiple arrays (if used) would activate sequentially and not simultaneously (except under the circumstances noted), and 3. that the maximum array used would be smaller (in cubic volume) than many 2D surveys, including GXT’s 2D options. Further, as that section notes, “because the various arrays would be spaced out much farther than typical 3D surveys, with each

moving at approximately 9 km/hr and only activating once in a cycle, the resulting sound energy would be much less localized” (p. 82) than typical 2D or 3D surveys.

The referenced statement in the EA Amendment was therefore made to point out that as a result of these factors and characteristics, the localized “intensiveness” of sound energy and other environmental disturbances in the marine environment would be considerably reduced and therefore more akin to that of a 2D survey, such that it is “very unlikely that any fish would be displaced from key habitats or disrupted during particularly important and sensitive activities over extended areas or periods, or be otherwise affected in a manner that causes negative and detectable effects to fish populations in the region. “

C-NLOPB Comment 10: Section 5.3.1, d) Environmental Monitoring and Follow-up, pg 91 – The Geophysical, Geological, Environmental and Geotechnical Programs Guidelines (C-NLOPB 2012) provide the reporting requirements for seabird monitoring.

GXT Response: Recognized and acknowledged. EA Amendment Section 5.3.1.d summarizes the monitoring commitments and procedures now in place through the original GrandSPAN EA screening. For reference, that document states:

Wildlife Data Collection: Marine mammal / sea turtle observations will be made during ramp-ups and during data acquisition periods, and at other times on an opportunistic basis. This will include observations about marine mammal responses and behaviour to the ships and/or the array. Seabird surveys (standardized counts) will be conducted throughout the seismic program from the seismic vessel by qualified environmental observer(s) experienced in the identification of seabirds at sea. Protocols modified and approved for use from ships at sea by Environment Canada as outlined in the Eastern Canada Seabirds at Sea (ECSAS) Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms (Gjerdrum et al 2012) will be utilized. A schedule for conducting seabird surveys (likely three times per day) at appropriately spaced intervals will be followed.

This will meet or exceed the CWS’s seabird monitoring standards described in the 2004 ESRF Report #156 *Recommended Seabird and Marine Mammal Observation Protocols for Atlantic Canada* (<http://www.esrfunds.org/pdf/156.pdf>) identified in the C-NLOPB Guidelines document.

C-NLOPB Comment 11: Section 5.3.3 Implications of Amendment Option 2: 3D Data Acquisition, page 92, second paragraph – Please justify the statement “There are no new or increased potential environmental emissions associated with the use of multiple survey vessels”. We recommend explaining how you arrived at this conclusion.

GXT Response: This statement, from Section 5.3.3 (effects assessment for “Marine / Migratory Birds”, 3D option) relates to aspects of the Project which might interact with this particular VEC. Specifically, Section 5.3.3 states (first paragraph) that “The main potential environmental interactions between the proposed 3D survey activity and the Marine Birds VEC are again essentially the same as those

described for the original Project concept and assessed in the 2014 EA. These relate primarily to the following Project components and activities: 1) presence and movement of Project vessels; 2) seismic sound; and 3) other possible environmental discharges (routine or accidental).”

The statement quoted by the reviewer was intended to emphasise that the type of vessel, equipment, lights and other emissions will not be different environmentally from those associated with a 2D survey on a *per vessel* basis. (It was noted previously - e.g. Section 5.1.3 - that the sound emissions would likely be lower than a 2D survey in terms of overall array volume and distribution around a larger area.) A few sentences later, in the Section cited, the text further clarifies this by stating that, “the proposed 3D survey activity will again result in an increase in the overall level of marine vessel activity and associated lighting in the area if the multiple-ship configuration is applied (with up to five recording or source ships plus one or two support vessels being used as compared to the single 2D vessel scenario that was originally described and assessed). The presence of multiple survey and support vessels in fairly close proximity during 3D operations would create a greater lighting source and potential attractant or disturbance for marine birds than an individual vessel, including a possible ‘reef effect’.” Similar acknowledgements of an increased level of marine activity associated with a multi-ship 3D occur elsewhere in the Amendment document, e.g. Sections 5.1, 5.2, 5.4.

In each case however the conclusion of the assessment is that with active mitigations in place and considering the other mitigating factors, any residual environmental effects would not be significant.

C-NLOPB Comment 12: Section 5.7.1 “Within Project” Effects, page 107, Option 2 – The cumulative effect will be greater than the original EA of one seismic ship and support vessel as it will include at least five additional vessels.

GXT Response: The section cited by the reviewer (5.7.1) addresses the potential for “within project” cumulative effects, and particularly the potential for spatial / temporal overlap between the environmental effects associated with the various components of the project. As a key area of focus and analysis in the “project-specific” environmental effects assessment for both of the proposed Project amendment options it is recognized, throughout the document, that the addition of 3D survey activity will result in an increase in the amount of marine activity, associated environmental emissions and potential interactions if a multiple-ship configuration is used as compared to that for the original single 2D Project concept (see discussion in the above response). The consequences of this are considered in the assessment of each VEC in Section 5, where it is concluded that – with mitigations in place – the effects would not result in a significant impact on the VECs.

Section 5.7.1 reaches the same conclusion with respect to the potential for cumulative effects resulting within the project and reiterates key reasons for this conclusion:

For the multi-ship 3D option, the arrays (much smaller than the 2D configuration) would also maintain a typical distance of approximately 8 to 10 km during acquisition. Most importantly in terms of overall cumulative effects, one of GXT’s main design objectives is to reduce or eliminate much of the usual need for extensive infilling (repeating) missed line sections. This, and the wider streamer spread, will result in the overall amount of sound and ship activities in

the water being much reduced compared to other 3D surveys acquiring data in the same sized area. Other factors and mitigations (such as multiple FLOs and monitors on multiple platforms) for reducing potential “within Project” effects on the previously considered VECs (and thus cumulative effects for each of them) are described in the relevant sections above.

Thus the conclusion for the assessment of within-project cumulative effects is that the increase in multiple vessel related activities will not be significant based on the significance criteria employed in the original EA and the Amendment document.

C-NLOPB Comment 13: Section 6 Summary and Conclusion, pg 110 – “The proposed Project requires a number of authorizations from the C-NLOPB, including a previous requirement to complete an EA, which was submitted by GXT in March 2014 and for which EA (as amended) approval was received on October 15, 2014”. What is meant by “a number of authorizations” and it is not clear what “(as amended) means.

GXT Response: This is, as noted, summary text for the EA Amendment, with the various authorizations required from the C-NLOPB (each year of operation) for the Project being described in the original EA Report (Section 1.3 - Regulatory Context and Environmental Assessment Requirements). As described therein, these include 1. An Operating Licence, and 2. Geophysical Program Authorization.

“As amended” is intended to reference the fact after the original EA was submitted in March 2014, GXT filed an Addendum document in response to reviewer comments which effectively added to the original EA submission and undertakings. See <http://www.cnlopb.ca/pdfs/gxtgpm2ds/eaadd.pdf>.

3.2 Department of Fisheries and Oceans Canada (DFO)

DFO Comment 1: Section 2.2.2 Option 2: 3D Seismic Survey in a Portion of the GrandSPAN Area, page 7 - given the inability to complete the planned 2D seismic program in 2014 and 2015 due to unavailability of a seismic vessel it is possible that there will be similar uncertainty for 2015 and 2016 given that the services of up to 5 vessels may be needed to carry out the potential 3D survey. Given this uncertainty it is assumed that confirmation and/or notification of the exact nature of the seismic survey – either 2 vessel 2D or multi-vessel 3D survey - will be received prior to initiation of the survey.

GXT Response: Recognized and acknowledged. GXT will provide details of the planned seismic survey work (methodology, ship details and contacts, locations) to all identified stakeholders prior to initiation of a survey every year. These details will also be included in GXT’s applications for relevant (post EA) authorizations from the C-NLOPB, as referenced above.

DFO Comment 2: Table 3.15 EBSA Characteristics, page 66 - the description provided for the Northeast Shelf and Slope EBSA should also note (as per the cited reference) the area is an important feeding area for marine mammals.

GXT Response: Acknowledged. The referenced Table 3.15 in the EA Amendment document is revised as follows (text included in original EA Report, Table 4.26):

Table 3.1 EBSA Characteristics

EBSA Name	Description
Northeast Shelf and Slope ¹	<p><i>Finfish:</i> This EBSA has the highest concentrations of Greenland halibut and spotted wolffish in the region. These species aggregate in the area in the spring.</p> <p><i>Marine Mammals:</i> Moderate fitness consequences as a potentially important marine mammal feeding area; harp seals, hooded seals and pilot whales in particular aggregate in this area.</p>
Sources: Templeman (2007); DFO (2013)	

DFO Comment 3: Section 5.1.3 Implications of Amendment Option 2: 3D Data Acquisition, pages 81-83 and Section 5.6.3 Implications of Amendment Option 2: 3D Data Acquisition, pages 103-106 - given the overlap with the potential 3D survey area and a portion of the Northeast Shelf and Slope area there is a likelihood of wolfish (e.g. spotted wolffish) being present in the Northeast Shelf and Slope portion of the survey area during the spring season. Although the EA and EA Amendment predict no significant adverse effects on marine fish and marine fish species at risk it should be indicated whether efforts will be made to survey this area during the summer/fall to further reduce possible interaction with (and risk to) marine fish – wolfish species in particular. This type of mitigation is consistent with provisions of the Statement of Canadian Practice to which the proponent has committed to implement and follow.

GXT Response: GXT will use its best efforts to avoid surveying areas of particular importance to spotted wolffish at times of particular importance. GXT is mindful of the Statement’s requirements related to fish aggregations¹ and will contact DFO before any 3D surveying to identify any areas of such overlap, given the acquisition plans that year.

DFO Comment 4: Section 5.4.1 (d) Environmental monitoring and Follow up, page 96 (and possibly other similar parts of Chapter 5 that reference Environmental Monitoring and Follow up) – Could/should the noted monitoring plan and related reporting on same also include monitoring to confirm compliance/implementation of the various measures outlined within the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment and other mitigations committed to within the EA and EA Amendment.

¹ The Statement of Canadian Practice states, “Each seismic survey must be planned to avoid: ... c) dispersing aggregations of spawning fish from a known spawning area; ... e) diverting aggregations of fish ... from known migration routes or corridors if it is known there are no alternate migration routes or corridors, or that if by using those alternate migration routes or corridors, the ... aggregations of fish would incur significant adverse effects.” (Appendix 2.I, C-NLOPB Geophysical, Geological, Environmental and Geotechnical Program Guidelines, 2012)

GXT Response: GXT uses a variety of tools to ensure that the environmental commitments and mitigations (including those resulting from EA reviews) are communicated and followed during its operations.

It is, for example, a specific responsibility of each on-board Manager of the MMOs implementing the marine mammal and seabird mitigation and monitoring program (on each vessel with an array) to insure that all related mitigation and monitoring measures are in place and to monitor their proper application during the survey. This includes the implementation of pre-ramp-up watches, ramp-ups, monitoring the safety zone during array activities, and efficient shutdowns if necessary. The Manager also has at-sea responsibility to ensure that marine animal and seabird data are collected and recorded appropriately and accurately, and that reports and other communications are completed in a timely manner. This has been the case for all of GXT past Canadian marine seismic surveys (Beaufort Sea, Nova Scotia and Labrador offshore areas).

GXT also places a strong emphasis on pre-Survey Start-Up Sessions with all the project personnel and crew so that each of the mitigation commitments, responsibilities and compliance requirements are understood by all, and that all are aware of ongoing monitoring and reporting requirements. See for instance Section 5.2.2 of the 2014 GrandSPAN EA Report.

GXT on-shore managers also maintain regular contact with personnel at sea (Including the and check on how the various mitigations and monitoring measures are being applied. In addition, as noted in Section 5.4.1 (d) of the EA Amendment document, monitoring reports will be forwarded weekly to authorities which will provide evidence of implementation and compliance throughout the seismic activities.

3.3 Department of National Defence (DND)

DND Comment 1: Please identify a specific individual or office to serve as a Point of Contact (POC) for MARLANT queries and concerns.

GXT Response: The principal POC for DND will be
Project Manager Dean Kennedy
Tel (709) 747-6232, Cell (709) 682-2336, Fax (709) 747-6248
Email dean.kennedy@gxt.com

Backup POC is
Environmental Manager Robert Pitt
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DND Comment 2: 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 lighting.

GXT Response: As noted in the original 2014 EA Report and in the EA Addendum (e.g., Section 5.2.1) GXT will ensure that Notice to Mariners and/or Notices to Shipping (as appropriate) are filed.

DND Comment 3: 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.

GXT Response: No such activities are being proposed or planned as part of this Project

DND Comment 4: Please ensure engagement of CTF 84, through Director General Naval Strategic Readiness (DGNSR), to ensure de-confliction with possible Allied submarine activities

GXT Response: GXT will inform Director General Naval Strategic Readiness (DGNSR) via the Point of Contact, LCdr Hopkins, DNSO SSO Readiness, telephone 613-945-0652, before GXT activities within the Project Area.

3.4 Fish, Food and Allied Workers - Unifor (FFAW-Unifor)

FFAW-Unifor Comment 1: Section 2.2.2 Option 2: 3D Survey in a portion of the GrandSPAN Area, pages. 7/8 – Two 2D vessels operating in different parts of the survey area at the same time, rather than one, or one 2D and one 3D, increases concern that fish species and harvesting could be impacted on an even greater basis than proposed in the original EA. More area will be affected (20,000 km as opposed to the original 14,000 km).

GXT Response: It is recognized in the EA Amendment that the possible presence of two simultaneously operating seismic surveys has the potential to affect a larger area overall, and that “the proposed 3D survey option would result in an increase in the overall level of marine vessel presence, movements and overall activity in that more limited area resulting in more restricted but spatially more intensive survey activity in the Sackville Spur / Flemish Pass area during the period that 3D work might be carried out” (Section 5.2.3). However, as also discussed in that section, various characteristics of the survey and planned mitigation approaches by GXT will help to avoid or reduce the potential for adverse effects upon fisheries.

The planned geographic separation of any active surveys (by at least 50 km), for example, means that any effects on fish or individual fish harvesters in the vicinity of active survey activities at any given time will be essentially the same as if a single survey was operating. In addition, given that distance and the wide separation of all the lines for 2D operations, there would be no increased likelihood for multiple or cumulative impacts on local resources or particular fishing operations. As discussed in the EA Amendment document, any 3D surveys would employ a reduced-size array (compared to the 2D work) and thus would be expected to have a lesser potential for effects resulting from ensonification.

Given these factors, and the other mitigations (including the use of FLOs) and communications plans, the EA Amendment has concluded that proposed activities do not change the results of the original (2014) environmental effects assessment and that Project is still not likely to result in significant adverse environmental effects on marine fisheries or other marine activities.

FFAW-Unifor Comment 2: Table 3.6 Fish Harvest by Month by Weight and Value (2013, 3D Acquisition Area, NAFO Unit Areas), page 44 – Column Total (2013)/row Value \$ (Feb), comma should be placed between 4 and 7, not a decimal.

GXT Response: The February row value total - [extract_itex]43,014.78 - is correct as shown in the Table. This is the total of the values under Unit Areas 3Le and 3Li as reported by DFO (2,986+ 40,028). As the February quantity row (above) also shows there was only a small catch for this month reported in the DFO 2013 data set. (This value and the one immediately below it in the table look different because they were inadvertently not rounded to the nearest whole number, unlike the other values in the table.)

FFAW-Unifor Comment 3: Section 5.1.1 Summary of Original EA Information and Findings, b) Existing Knowledge, page 77 - FFAW-Unifor reiterates the point that effects of seismic on key commercial species in the areas (i.e. groundfish, snow crab, northern shrimp) are unknown and that research has not provided a consistent evidentiary base on which to say effects will be “localized and/or temporary.” Similarly, to say fish might move toward harvesting activity when avoiding seismic noise and that this is the “logical” conclusion is very assumptive and some evidence to this regard should be referenced.

GXT Response: The original GrandSPAN assessment (2004), as well as the present EA Amendment disagree with the view that there is inadequate evidence on which to base an EA finding that any effects will be localized and temporary, as described in the literature cited in those documents.

While logic would suggest that if fish move away from an ensonified area they are as likely to move toward fishing gear if it is in a nearby area as away from it (other environmental factors being equal), there is evidence of this in the literature as well. For a fairly recent analysis that shows an increase in catches for some fixed gears in the vicinity of a seismic survey see:

Løkkeborg S., Ona E., Vold A., Salthaug A. *Sounds from seismic air guns: gear-and species-specific effects on catch rates and fish distribution. Canadian Journal of Fisheries and Aquatic Sciences* 2012; 69:1278-1291. <http://www.nrcresearchpress.com/doi/abs/10.1139/f2012-059#.VsEnyNDZfjZ>

FFAW-Unifor Comment 4: Section 5.1.1 Summary of Original EA Information and Findings, c) Environmental Effects Assessment (with identified mitigations in place), page 79 - While the statement that little evidence exists that negative effects on fish occur at distances greater than several meters, the opposite is also correct, as there is a lack of sound evidence on the effects of seismic noise on the most common marine fish species in the area. As we do not have a sound basis on which to make the statement, it is also unknown whether or not

the effects are temporary or localized. The last paragraph on the page, therefore, makes a broad, general statement that cannot be proven or disproven as evidence of either argument has not been accepted as finite. To say this is “very unlikely” is, at the opinion of the reviewer, incorrect and misleading.

GXT Response: As stated above, the original GrandSPAN EA (2004), the EA Amendment and other assessments of proposed seismic survey activities in this region and elsewhere, do not support the view that there is an insufficient basis on which to say effects will be localized and temporary, or to conclude that it is “very unlikely that any fish will be displaced from key habitats or disrupted during key activities (such as reproduction) over extended areas or periods, or be otherwise affected in a manner that causes negative and detectable effects to fish populations in the region” (EA Amendment p.79)

FFAW-Unifor Comment 5: Section 5.1.3 implications of Amendment Option 2: 3D Data Acquisition, page 83 - The increased temporal separation that comes with the proposed 3D Amendment is a concern to FFAW-Unifor, as is the increase in marine vessel traffic in the proposed area.

GXT Response: The increased temporal separation described in Section 5.1.3 (page 83) of the EA Amendment (which states that “each line would likely take more than between one day to complete, and so the next return to the start area of the first line would be 2 to 3 days later and would be located some 10 km away since the survey would not involve working on immediately adjacent sail lines. Under less than ideal conditions the temporal separation would be even greater”) would – as the text states – tend to minimize any localized effects of the 3D survey activity, including any associated environmental disturbances to locally occurring species (particularly sedentary species).

Potential issues associated with an increase in vessel traffic during a 3D survey on marine fish and fish habitat are also acknowledged and discussed in this Section of the EA Amendment, which notes that:

Although the presence and operation of these marine vessels might result in some degree of attraction, avoidance or other behavioural responses amongst individuals (depending upon the species involved), marine fish would again not likely be adversely disturbed by Project-related vessel activity, due to its transitory nature (and thus, its short-term presence at any one location), and because the Project’s vessel movements would create noise similar to daily and frequent marine traffic in the area. During seismic survey operations, any vessel noise would likely be over-ridden by the acoustic outputs of the seismic airguns, as discussed below, and would therefore not be a detectable contributor to any Project-related noise effects on marine biota (Section 5.1.3).

With regard to the potential effects of 3D activities on fish harvesting, Section 5.2.3 of the EA Amendment provides a detailed discussion of the implications of using multiple survey vessels. Considering that there would still be only one ship towing streamers (main potential for gear conflicts), that the array sound output would be no greater than for a 2D survey, and that the described communication and liaison protocols would be in place (including the expertise of the FLOs) it is not likely that there would be any increased risk of adverse effects on to fisheries because of the additional ships associated with this option.

FFAW-Unifor Comment 6: Section 5.2.1 Summary of Original EA Information and Findings, c) Environmental Effects Assessment (with identified mitigations in place), page 85 - As stated in previous responses to GXT, the 7 day temporal separation is NOT an acceptable mitigation for fisheries or fisheries science in the view of the FFAW-Unifor. In relation to the Industry-DFO Collaborative Post-Season Trap Survey for Snow Crab, the 7 day temporal separation is not an acceptable protocol. Furthermore, this perspective is shared by our scientific partners at Fisheries and Oceans Canada. There should be no seismic activity in the vicinity of these survey stations.

GXT Response: FFAW-Unifor's views on this issue are again noted. The 7-day temporal/ 30-km spatial separation mitigation is described in the original EA document in 2014 (e.g. Sections 5.2.3 and 5.4.3.1), and GXT's response to FFAW-Unifor's views is as stated in the June 2014 EA Addendum document (Sections 2.3). GXT's response in that document was (in part):

While we respect the reviewer's opinions and perspectives on this matter, we would reiterate that as presented and discussed in the EA Report, information from the available scientific literature indicates any potential behavioral effects on fish as a result of marine seismic surveys (and any subsequent implications for fish catch rates), are of a temporary and localized nature. GXT therefore remains strongly of the view that the proposed 7-day pre-survey separation period is an adequate and appropriate mitigative approach. As noted in GXT's original response, the 7-day separation period (and 30 km distance separation) has been reviewed by DFO in several other EAs, and has been accepted as appropriate for those projects through the regulatory screening process undertaken by the C-NLOPB. GXT respects and adheres to all conditions placed on its Project by the regulatory authority.

FFAW-Unifor Comment 7: Section 5.2.3 Implications of Amendment Option 2: 3D Data Acquisition, page 88 - While it is stated that only a small amount of overlap will occur with 3D seismic and the FFAW-DFO Post-Season Industry Snow Crab Survey, it is implied that the proposed 3D option will increase vessel traffic and activity in the area. It is imperative to note that NO seismic activity should begin in survey station areas until the stations have been completed. There is a strong opinion that overlap is NOT an acceptable mitigation when it comes to the Industry-DFO Collaborative Post-Season Trap Survey for Snow Crab. That the perspective is shared by our scientific partners at Fisheries and Oceans Canada, but not reflected in the Environmental Assessment Amendment. Other Environmental Assessments and/or addendums/amendments have provided material towards this stance and accepted that the only acceptable mitigative approach is one where no seismic activity occur on or around a Snow Crab Survey Station until it has been completed in a given year.

GXT Response: FFAW-Unifor's views on this matter are again noted. As discussed above, the 7-day temporal/ 30-km spatial separation mitigation is described in the original EA document in 2014 (e.g. Sections 5.2.3 and 5.4.3.1), and GXT's response to FFAW-Unifor's views is as stated in the June 2014 EA Addendum document (Section 2.3). This applies to 3D survey activity as well. Whether conducting 2D or 3D work, all active snow crab fishing gear will be avoided by the seismic ships and associated vessel traffic.