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Darren Hicks
Environmental Analyst
Canada-Newfoundland and Labrador Offshore Petroleum Board
140 Water St., 4th Floor
St. John's, NL A1C 6H6

Dear Mr. Hicks

**Subject:** **Fisheries and Oceans Canada Review of Addendum - Environmental Impact Assessment for Marine 2-D Seismic Reflection Survey Labrador Sea and Davis Strait Offshore Labrador**

As requested, Fisheries and Oceans Canada (DFO) has completed a review of the document entitled *"Addendum - Environmental Impact Assessment for Marine 2-D Seismic Reflection Survey Labrador Sea and Davis Strait Offshore Labrador"* dated June 2011 and offers the following comments:

**Section 1.3.1 – Species at Risk, page 5, bullet 1**

It should be clarified that if a species is listed under Schedule 1 of SARA as extirpated, endangered, or threatened then a Recovery Strategy is required. For a species listed as Special Concern a Management Plan is required. Also it is important to note that critical habitat can also be identified in an Action Plan. The definition of critical habitat at the end of the bullet is missing the part "...and that is identified as the species critical habitat in the recovery strategy or action plan for the species", as per the SARA definition.

**Section 2.3.2 – 2D Seismic Survey Towed Array**

Table 2.1 and text contradict par 3 on page 13.

"The individual source unit volumes can range from 70 cu. in. to 290 cu. in. The larger source units are positioned at the front of the array with progressively smaller volumes to the back of the array."

This statement is opposite to what the diagram shows with the largest volumes at the back, and 45 to 250 $in^3$.

**Figure 5.9, page 53**

What is the source of the data presented?

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**Section 3.2 – Community Engagement and Information Gathering**

While most of the appropriate Labrador Aboriginal organizations were consulted in this process, the Torngat Joint Fisheries Board was not consulted. As they have an advisory role for the NG and DFO, they should also be included. Contact is Jamie Snook, at www.torngatsecretariat.com "The Torngat Joint Fisheries Board is the primary body making recommendations to the Minister on the conservation of species or stocks of Fish, species of Aquatic Plants and Fish Habitat in the Labrador Inuit Settlement Area."

Additionally, The Labrador Metis Nation should be referred to as their new name - the NunatuKavut Community Council Inc.

**Section 5.3.1 – Plankton**

There are a number of additional relevant papers (journal publications and research documents) not cited for example, NAFO website (http://www.nafo.int/publications/frames/science.html) and the annual status reports on the physical/chemical/biological oceanography of the Labrador Sea that can be found in the Bulletin of the Atlantic Zone Monitoring Program (http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/azmp-pmza/publications-eng.html#bul).

**Section 5.3.1.1 - Phytoplankton**

A description of ice-algae on the Labrador Shelf should be included in this section.

**page 55, par 5**
This section states "Phytoplankton are an autotrophic subset of plankton which derive their energy from sunlight."

Suggested changes are "Phytoplankton are autotrophs, which means they derive their energy from sunlight."

**page 55, par 5**
This section states "Phytoplankton production is limited by a number of physical, biological, and climatic factors, including water temperature, nutrient availability, irradiance (sunlight intensity), and the community of grazers..."

Suggested changes are " Phytoplankton production is limited by a number of physical, biological, and climatic factors, including nutrient availability, irradiance (sunlight intensity), and grazing."

**page 55, par 5**
This section states "The Newfoundland and Labrador Shelf region, which encompasses the proposed Study Area, regularly experiences a large spring bloom and a smaller fall bloom of phytoplankton (Templeman 2010)."

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The Study Area encompasses shelf and deep water regions and therefore, this has implications for the descriptive text that follows in the text.

**page 55, par 5**
This section states "In the North Atlantic Ocean. increases in phytoplankton abundances in the spring correspond to warming of surface waters (Colebrook 1979)."

Suggested text is "In the North Atlantic Ocean, increases in phytoplankton abundances in the spring co-occur with the warming of the surface waters (Colebrook 1979)."

**page 56, par 2**
This section states "Spring phytoplankton blooms begin when nutrients are mixed among layers and irradiance increases (Frajka-Williams and Rhines 2010). The timing of this bloom is especially important in the Labrador Sea because food chains in this region are short, such that higher predators depend almost exclusively on primary production (Frajka-Williams and Rhines2010). Unlike in other areas where the timing of the spring phytoplankton bloom follows alatitudinal gradient, the north Labrador Sea (north of 60° N and east of the Labrador Shelf) has its bloom before the central Labrador Sea. These differences are due to the limiting factors in each region: in the north phytoplankton production is nutrient limited while in the central it is light limited. The Study Area is within the central Labrador Sea, where the phytoplankton bloom is likely to occur in June (Frajka-Williams and Rhines 2010). Theschedule of the proposed work may therefore coincide with the phytoplankton bloom in the Study Area."

Suggested revision as follows, "Spring phytoplankton blooms rely on nutrients that have been mixed into the surface waters via winter storm activity and occur when the water column stabilises and irradiance levels increase (Frajka-Williams and Rhines 2010). The timing of this bloom is especially important in the Labrador Sea because food chains in this region are short, with higher predators depending almost exclusively on seasonal primary production (Frajka-Williams and Rhines 2010). In other areas of the open ocean the timing of the spring phytoplankton bloom follows a latitudinal gradient, but here the bloom in the northeast Labrador Sea (north of 60° N and east of the Labrador Shelf) occurs earlier than in more southerly regions. This difference is thought to be because the winter mixed layer depth is shallower in the northeast, because of the presence of water of relatively low density water in the 0-100 m depth range, which results from freshwater run-off from the Greenland Shelf. This allows for the earlier development of stratification (water column stability), which is needed to maintain the phytoplankton within the near-surface layer. Farther south, in the central basin, winter mixed layer depths are generally deeper and stratification is more dependent on the production of low density water in the surface layers by solar warming. The Study Area includes part of the central Labrador Sea, where spring phytoplankton blooms can start as early as April or as late as July and shelf regions, where phytoplankton blooms start as the ice-edge retreats, which occurs sometime between May and July (depending on latitude). The schedule of the proposed work may therefore coincide with the phytoplankton bloom in the Study Area."

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**Section 5.3.1.2 – Zooplankton**

Suggested changes and addition to the first paragraph, (1st sentence) in this section: "Zooplankton are heterotrophic organisms that are mostly invertebrates and that range in size between 10 □m and 1 m (or more) in diameter. Microzooplankton (size range 10-100 μm) includes organisms such as unicellular protists and copepod nauplii. The slightly larger mesozooplankton (size range 200-2000 μm) community is dominated by copepods in the Labrador Sea, and this group also dominates the zooplankton community biomass overall (Head et al. 2003). Larger organisms belong to the macrozooplankton (>2000 □m), a group that in the Labrador Sea includes large amphipods (up to 3 cm in length) and jellyfish (up to 30 cm in diameter)."

The following text is a suggested addition after the 2nd sentence in the 1st paragraph (Also included amongst zooplankton…). Additional text: Diversity of zooplankton within the region is quite low, with communities usually dominated by less than 30 species (Huntley *et al.* 1983). Zooplankton community composition varies geographically and from month to month, but for given regions and months community composition is quite consistent from year to year (Head *et al.* 2003).

The following is a suggested re-write of the 2nd paragraph in this section: "The eggs and larval stages of copepods are important food sources for larval fish, including cod, and partly for this reason there have been numerous studies of copepod reproduction. For many zooplankton species reproduction at high latitudes either coincides with or closely follows phytoplankton blooms (Huntley *et al.* 1983). This is the general pattern followed by the dominant species of the central Labrador Sea, the copepod *Calanus finmarchicus*. Individuals produced over one growth season (spring-summer) spend the winter at depth as pre-adults, returning to the surface layers in advance of the spring bloom to mature and mate. Reproduction (egg production) is fuelled by the females ingesting phytoplankton, but egg-laying can start before phytoplankton concentrations reach bloom proportions. In the Central Labrador Sea individual female egg production rates are generally high from May to July, but since the abundance of females declines over the same period, community egg production rates are higher earlier (Head, unpubl. data). Two arctic copepod species, *Calanus glacialis* and *Calanus hyperboreus*, which are important members of the mesozooplankton community in the arctic waters of the Labrador and Newfoundland shelves (Head et al. 2003), reproduce in advance of the pelagic phytoplankton bloom. Female *C. hyperboreus* spend the winter at depth, having accumulated large amounts of stored energy during the previous year's growth season, which enables them to reproduce in late winter (Jan-Feb) without feeding (Conover 1988). Female *C. glacialis* also accumulate energy stores and spend the winter at depth, but like *C. finmarchicus*, they need to feed to produce eggs. Unlike *C. finmarchicus*, however, they can feed on the algae that grow on the underside of the ice during early spring (Feb-Mar, Torangeau and Runge 1991). The reproductive strategies of the arctic species appear to be adaptations to a short growth season, allowing them to maximize the period

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over with their offspring will experience phytoplankton bloom conditions."

The following references should be added to the review:

Conover, R.J. (1988): Comparative life histories in the genera *Calanus* and *Neocalanus* in high latitudes of the northern hemisphere. Hydrobiologia, 1671168, 127-142.

Hirche, H.J., Brey, T., Niehoff, B. (2001) A high-frequency time series at Ocean Weather Ship Station M (Norwegian Sea): population dynamics of *Calanus finmarchicus* Mar. Ecol. Prog. Ser. 219: 205–219

Torangeau, S., Runge, J.A. (1991) Reproduction of *Calanus glacialis* under ice in spring Mar. Biol. 108: 227-233

**Section 5.3.3 – Coral and Sponges and Section 5.8 Coral Protection Zones**

The report should incorporate more recent results from Kenchington et al. 2010 and Wareham et al. 2010 into section 5.8 Coral Protection Zones (see Appendix 1) for known distributions of deep-sea corals.

The document needs to highlight Hatton Basin and Saglek Bank as two areas known for large concentrations of slow-growing long-lived gorgonian corals (e.g. *Primnoa resedaeformis* and *Paragorgia arborea*). Please see the references for MacIsaac et al., 2001; Gass and Wilison, 2005; Wareham and Edinger, 2007; Kenchington et al., 2010; Wareham et al., 2010.

**Section 5.3.4 – Marine Fish**

This section should have describe the species present in the area (which could have been done through analyses of DFO research vessel survey data) rather than listing the main species found in the entire Newfoundland and Labrador area.

A section on Atlantic Cod should have been included.

**Page 60, par 4**
Correction to the text "subdivision 2GH, subdivision 2J" as 2G, 2H and 2J are not subdivisions they are Northwest Atlantic Fisheries Organization (NAFO) divisions.

**Page 61, par 4**
The statement "…Redfish species *S. mentella* has been placed on the Prioritized Candidate List by COSEWIC in October 2006 (COSEWIC 2006f)…" requires updating. COSEWIC have assessed Atlantic Redfish as threatened in 2010.

**Page 61, par 5**

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American plaice have been found deeper than the 731 m stated in the report. They have been caught to depths of 1300 m (Morgan and Bowering 2006).

**page 62, par 4**
"American plaice has been placed on the Prioritized Candidate List by COSEWIC in October 2006 (COSEWIC 2006g)". This is not the latest information. In 2009, Newfoundland and Labrador American Plaice was assessed as "threatened" by COSEWIC

**page 62, par 6**
Morgan et al 2001 should be replaced by the primary publication Morgan et al 2003, especially since Morgan et al 2001 is not to be cited without prior reference to the authors and the author was not contacted.

**Page 69, par 5**
This section states that "Although this Arctic-boreal species has evolved to live at the edge of Arctic waters exploiting the feeding opportunities, capelin require higher temperatures for successful reproduction (Rose 2005)."

It would be useful to have the temperature for this area for comparative purposes.

**page 69, par 6**
This section states that (capelin) "They are members of the smelt family (Osmeridae), olive in colour with an elongated body and exhibit pronounced sexual dimorphism during spawning".

'Olive' should be replaced with 'silvery'. Scott and Scott (1988) or Templeman (1948) are the best references for general biology and include considerable information on spawning as well. Author is advised to refer to these references and correct this section. Also general capelin information given in 'Background biology section' of Capelin Stock Assessment Report (DFO 2008, 2011).

This section states that (capelin) "Capelin is found along the coasts of Newfoundland and Labrador and on the Grand Bank. Migration towards the coast precedes spawning on beaches or in deeper waters (DFO2006g). Capelin roll on sandy or fine gravel beaches in water temperatures ranging between 6°C to 10°C. Beach spawning is more prevalent at night. During spawning, the thermal range of capelin typically shifts upwards (Rose 2005)."

The text should read, "Capelin is found along the coasts of Newfoundland and Labrador and on the Grand Bank in water depths up to 400 m. Migration towards the coast precedes spawning on beaches or in deeper waters (DFO 2006g). Capelin spawn predominately on fine gravel beaches, but also off beach in water depths up to 20 m. Grain sizes on which spawning occurs range from 2-25 mm (Templeman 1948). Beach spawning is more prevalent at night. During the spawning period, the thermal range of capelin typically shifts upwards (Rose 2005)."

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It is also suggested that the report provide a description on annual changes in distribution throughout life history stages (i.e. spawning, feeding, migration).

**page 69, par 7**
The reference DFO 2006g has not been included in the reference list.

**page 70, par 1**
This section states that "Beach spawning occurs at 2°C to 10°C, but deepwater spawning is restricted to about 2°C to 7°C, most likely occurs from 2°C to 5°C (Rose 2005)."

"Beach spawning occurs at 2°C" should be 4°C. Check temperatures in Nakashima and Wheeler, 2002.

**page 70, par 1**
This section state that "Capelins are able to spawn at the age of two and males usually die following spawning. Spawning is typically in late June and early July, although it was somewhat later in the 1990s (Carscadden *et al.* 1997, 2001)."

This should be corrected to the following, "Spawning is typically in late June and early July, although it has been typically 2-6 weeks later since the early 1990s (Carscadden *et al.* 1997, 2001)."

**page 70, par 2**
This section states that "Eggs are red in colour, 1-mm diameter, and are attached to the substrate."

It should read, "Eggs are translucent when deposited , around 1-mm diameter, and are attached to the substrate."

**page 70, par 2**
This section states that "Incubation varies with ambient temperature and lasts approximately 15 days at 10°C."

What is the reference for this?

**page 70, par 2**
This section states that "Larval capelin is plankton and remains near the surface until the onset of winter."

It should read "Larval capelin is planktonic and remains near the surface until the onset of winter."

**page 70, par 3**
This section states that "Capelin feeding is seasonal with intense feeding late winter and early

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spring leading up to the spawning cycle when feed ceases."

Should be "Capelin feeding is seasonal with intense feeding in early to late fall and in early spring leading up to the spawning cycle when feed ceases."

**page 70, par 4**
This section states "Capelin predators comprise most major fish species including Atlantic cod, haddock, herring, flatfish species, dogfish and others."

Many flatfish eat primarily benthic organisms, and dog fish do not occur in most of the stock area. Check references. Turbot should be added to the list of predators.

**page 70, par 5**
This section states "Since 1991, the environment has been warming, returning to near-normal…"

"Near-normal" should be near normal.

**page 70, par 5**
This section states "The primary cause of capelin mortality is associated with predation and as such, variations in capelin abundances are directly linked to natural causes (DFO 2006g)."

Cohort strength has also been shown to be set upon emergence (Carscadden et al 2000).

**page 72, par 4**
This section states - "It takes 5-10 years for male snow crab to reach legal size (95-mm carapace width). The full natural life cycle for snow crabs is approximately 15 years (FRCC 2005)".

This would be more accurately described as, "It takes about 8-10 years for males to reach legal size (Sainte-Marie et al., 1995….CJFAS 52:903-924) and they can live 7 to 8 years thereafter (Fonseca et al., 2008…..Tran Am. Fish Soc. 137:1029-1043)."

**Section 5.3.6.1 – Cetaceans**

As a general comment DFO does have minimum population estimates for many cetacean and pinniped species in Atlantic Canada. These are based on systematic surveys such as detailed in Lawson and Gosselin (2009), and Stenson and Hammill (2006 and 2011). These figures should be quoted in place of statements such as "There are no complete population estimates for the western Northwest Atlantic Region", or the NOAA SAR estimates or Sikumiut reports, unless the latter include species for which the DFO surveys did not have enough sighting events to generate an acceptable estimate.

**page 82**
Humpback and sei whales have been sighted in waters all the way to Greenland; beluga satellite

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tag records show them entering and following canyon structures out to the slope edge on the northern Labrador Shelf (Hammill, pers. comm.); sperm whale males are sighted very commonly near fishing vessels now on the northern Labrador Shelf as they feed near, and move between, fishing boats.

**page 84**
A number of very large aggregations of humpback whales have been seen to the southwest of Greenland during recent aerial surveys there, so it is possible these whales may migrate through the proposed project area, or aggregate there to feed.

**Section 5.3.6.1 – Cetaceans, page 87 Beluga Whales**

Please note, the Ungava population of Beluga Whale was assessed as endangered by COSEWIC, but is not listed as such under SARA.

**Section 5.3.6.1 – Cetaceans, page 89 Killer Whale**

The Killer Whale population referred to is the Northwest Atlantic/Eastern Arctic population and it has been assessed by COSEWIC as special concern.

Killer whale abundance and distribution is reported in Lawson *et al.* 2007

**Section 5.3.6.2 – Pinnipeds**

Overall, the data presented on seals is largely out of date Table 5.6 reflects previous reports that have focus on more southern areas rather than the area of this study.

Harbour seals are not numerous but they commonly occur all along the Labrador coast. They are not thought to go far offshore so would not be a concern in this study area.

Bearded seals are also common throughout the area. They are not in high numbers compared to species such as harps but are sufficiently abundant to be an important species, particularly as they are an important part of the subsistence harvest. They are primarily observed along the coast because that is where people see them but they are regularly observed in the pack ice within this study area. They are also known to use offshore pack ice in other areas and so should be considered to be an important component of this study area.

Ringed seals are also very common along the coastal area. However, satellite tracking studies have shown that many ringed seals, including adults, feed on the shelf area that is included in this study. Therefore they also have to be considered significant species of this ecosystem.

Grey seals are not rare along the Labrador shelf. They are known to inhabit the area up to at least Nain and likely further. Again, the extent of their movements in offshore areas are not well

known, but is likely, given how they utilize the Scotian Shelf and other pelagic areas. Grey seals are present in most months of the year, particularly from April through November.

The information on harp seals and hooded seals inaccurate due to the significant new data available since 2005 that was not mentioned. Hoods are very common in the area and will be present in the study area during the summer and fall periods when operations will be occurring.

Large numbers of harp seals and hooded seals are present in the study area throughout the year. They are not restricted to the winter and spring periods as suggested. Satellite tracking studies have shown that both species utilized this entire study area throughout the year and in fact, the northern areas are critical feeding areas for both species. Harp seals tend to remain on the shelf while hooded seals utilize the shelf edge and deep water of the Labrador Sea. Harps utilize this area year round for feeding and pupping while hoods are found here in most months with the possible exception of July when they are in SE Greenland for the moult. As such, these species are likely to be present during the entire seismic period.

**Section 5.4.1 – Species Listed Under the Species at Risk Act and COSEWIC**

Revise section title. Species are "listed" under the *Species at Risk Act* and "assessed" by COSEWIC.

Where S. 32 of the *Species at Risk Act* is referenced, text should be revised to be more accurate. Under the *Species at Risk Act* it is prohibited to "kill, harm, harass, capture or take an individual...etc". Also note that S. 32 of the *Species at Risk Act* is not the prohibition against destruction of critical habitat, rather it's S 58.

**Table 5.7 *SARA* Schedule 1-listed Species within the Study Area, page 94**

Under Marine Mammals, Sowerby's Beaked Whale should be included as it was recently added to Schedule 1 of SARA as special concern. This should also be updated where mentioned throughout the document.

**Section 5.4.1.1 Marine Mammals and Reptiles. page 96 Leatherback Sea Turtle**

The 3rd paragraph says that the species is "considered nationally endangered" and then gives a reference to the COSEWIC assessment which was done prior to the species being listed on Schedule 1 of the *Species at Risk Act*. It's more accurate to say that Leatherback Sea Turtle is listed as endangered under the *Species at Risk Act*.

**Section 5.4.1.2 - Fish, page 96 Wolffish**

Wording should be revised - change "...have been designated by SARA" to "have been listed under SARA". Also, there are 3 species listed on Schedule 1 of SARA, Northern, Spotted and

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Atlantic Wolffish. Atlantic Wolffish is listed as special concern.

**Section 5.5 Sensitive Areas , page 105**

The northern edge of the study area has been identified as an ecologically and biologically significant area by DFO in 2011. This is primarily due to the high productivity of this area and its importance for sponges, corals, polar bears, seals, whales and various fish species such as Greenland halibut. When the report is published it will be made available at http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

**Section 5.7 – Marine Protected Areas (MPAs), page 111**

This section should make it clear that the MPA **protects** a genetically and geographically distinct population of Atlantic cod.

**Section 5.8 – Coral Protection Zones, page 112**

**par. 3**
The section states that "Nevertheless, the deep-sea coral program is new and there are data constraints associated with the mapping of deep-sea coral distributions and diversity".

The data constraints need to be more clearly defined. We know that information largely exists for locations where commercial fishing and DFO surveys occur, however, the question of accuracy of reporting of coral-sponge bycatch in test/trial fisheries, not directly managed by DFO, can be considered as a data constraint.

**par. 3**
This section states that "The impacts of fishing industries on deep-sea coral communities in Canadian waters are also poorly understood."

To qualify this statement it should be added that studies conducted in other areas have shown that benthic fishing activities can have a negative impact on deep-sea coral communities (see Probert, 1997; Watling & Norse, 1998; Fosså et al., 2001; Hall-Spenser et al., 2002; Grehan et al., 2005; Mortensen et al., 2005; Reed et al., 2005; Wheeler et al., 2005; Stone, 2006). Alternatively, it could be stated that based on known life histories of deep-sea corals, fishing industries will most likely have a negative impact…. (Andrews et al., 2002; Risk et al., 2002; Roark et al. 2005; Sherwood et al., 2006). The reference for the publications that are cited should be provided.

**par. 4**
This section states that *"Currently, there are no conservation measures in place to protect deep sea corals within the Newfoundland and Labrador region (Gilkinson et al. 2006). Operators should be aware however, that there is a possibility that conservation measures to protect deep sea corals could be adopted in the future for the Newfoundland and Labrador region."*

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This statement is not correct. There are two interim closures in the Newfoundland and Labrador region. The first, Voluntary Coral Protection Zone in NAFO division 2G-0B off Cape Chidley, Labrador (MPA News, 2007). The second, CAD-NAFO Coral Protection Zone, is a mandatory closure on the slope of the Grand Bank in NAFO division 3O between 800 - 2000 m (NAFO, 2007).

**Section 5.8.1 – Coral Conservation Priority Areas**

The EIA mentions a voluntary closure in NAFO 30 near Cape Chidley. This may actually be referring to the fishing industry coral protection zone voluntary closure in 0B and 2G (Page 70 (figure 10) and page 29 in Campbell and Simms 2009).

Even though the Voluntary Coral Protection Zone (VCPZ) was a good first step towards reducing fishing impacts on known coral and sponge concentrations in this area, it is imperative to point out here that this does not include all known concentrations. The boundaries of the VCPZ were arbitrarily decided on past fishing experiences with no scientific validation. In general, the area is mostly avoided by the commercial fishing fleet (see Wareham et al., 2010).

Based on Figure 2.1 (see 2.0 PROJECT DESCRIPTION), the northern boundary of study area under review does extend into the southern portion of Hatton Basin as well as includes all of Saglek Bank – two important areas for large gorgonian coral concentrations (see Kenchington et al., 2010; Wareham et al., 2010). (see map in Appendix 1)

*Paramuricia placomus, Paramuricia grandis* and *antipathorian species". Species misspelled: 'antipatharian' and 'Paramuricea' species*

Additional references to consider for a complete review are listed in Appendix 1.

**Section 5.9.1 – Hawke Channel and Hamilton Bank, page 113, par 3**

The statement " The area is within a Fisheries Conservation Closed Area related to salmon fishing and conservation, ..." is inaccurate. This closure is for all species other than snow crab.

**Section 5.10 – Ocean Resource Users**

The Northern Coalition should also be included in consultations.

**Section 5.11 – Commercial Fisheries, page 116 - 146**

The statement *"Harvest values are no longer provided by DFO Statistics Branch"* (page 116) is not accurate. Upon request DFO provides this information.

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This section of the report would be much more informative if the value of the catch in the study area were to be provided.

The weights in the tables and figures in this section appear to be in Kgs however are labelled as tones and tons. Please provide the weight in tonnes.

The weights appear to be the total volume landed in the survey area. It would be more informative to report on the weight or volume of fish *caught* in the survey area since it is the harvesting activity that can potentially be disrupted.

**Section 5.11.4.1 – Northern Shrimp, page 133**

There are errors in the information presented. The SFA 4 TAC is 11,320 t (not 4,700), the SFA 5 TAC is 23,300 t (not 11,320) and the quota referenced in the last line for SFA 6 is for 2011/12 (not 2010/11).

**Figure 5.43 page 145**

The title should be Greenland Halibut, not Snow Crab

**Section 5.13, page 147**

It is suggested the report mention snow crab surveys carried out in Div. 2H by the Torngat Joint Fisheries Secretariat during the past two years. As well, there is a trap survey for snow crab conducted collaboratively between DFO and FFAW that surveys Div. 2J in the Fall each year.

**Section 6.2 – Marine Finfish and Shellfish**

The proponent should be aware of other relevant literature on the effects of sound and potential risk on finfish and shellfish. Although keeping abreast of relevant literature has now become more difficult due to literature connected with other sources of sound, these sources are valuable for assessing risks related to seismic. Inclusion of this literature would likely have led to move precautionary conclusions about the potential effects of sound on fish and shellfish.

**Section 6.2.9 – Physical and Anatomical Effects**

It is concluded that harmful effects on fish would only occur within 10's of metres from the gun source. This may be true for obvious signs of mortality or gross pathology but not for sub-lethal effects which could be of potential importance. Studies on sub-lethal effects are few in number, especially in relation to chronic sound exposures. However reports on the effect of sound on fish eggs, lobster, shrimp and more recently on fish and squid, raise the possibility of sub-lethal effects occurring over widespread areas, potentially in the kilometre range.

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**Section 6.2.11 – Cumulative Effects**

Given that shrimp is a major fisheries in the area and seismic surveys might be carried out in adjacent areas for a number of years, some attention to addressing the question of whether chronic exposures of shrimp to low levels of sound, such as those experienced over a number of weeks in a seismic area, poses a risk to the species.

**Table 6.5 – Mitigation, page 173**

This section indicates that *"Adherence to the Statement of Canadian Practice on the Mitigations of Seismic Noise in the Marine Environment to the extent reasonably practical"* and *Avoidance of known spawning areas at time when fish are known to be spawning, where appropriate".*

Please be advised that the "*Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment"*(SOCP) specifies the mitigation requirements that must be met during the planning and conduct of marine seismic surveys, in order to minimize impacts on life in the oceans. These requirements are set out as minimum standards, which will apply in all non-ice covered marine waters in Canada. As such it is advised that the proponent adhere to all relevant minimum mitigations outlined in the SOCP including the Planning Seismic Surveys, Safety Zone and Start-up, Shut-down of Air Source Array(s), Line Changes and Maintenance Shut-downs, Operations in Low Visibility and Additional Mitigative Measures and Modifications sections of the SOCP.

DFO suggests removing the text *"where appropriate"* from the statement.

**Section 6.3.4.1 – Noise Emissions, page 178**

While the proponent has generally provided a good description of mitigative measures included in the *"Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment"* (SOCP), there are outstanding concerns specifically with respect to the phrase *"to the extent reasonable practical"* and the noticeably absent mitigative measures related to Operations in Low Visibilities., which include the use of cetacean detection technology such as a Passive Acoustic Monitoring System.

Please be advised that the SOCP specifies the mitigation requirements that must be met during the planning and conduct of marine seismic surveys, in order to minimize impacts on life in the oceans. These requirements are set out as minimum standards, which will apply in all non-ice covered marine waters in Canada. As such it is advised that the proponent adhere to all relevant minimum mitigations outlined in the SOCP including the Planning Seismic Surveys, Safety Zone and Start-up, Shut-down of Air Source Array(s), Line Changes and Maintenance Shut-downs, Operations in Low Visibility and Additional Mitigative Measures and Modifications sections of the SOCP.

DFO suggest that the proponent remove the phrase *"to the extent reasonable practical"* in the

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| |
|---|
| description of mitigation measures. |
| **Section 6.3.4.1 – Noise Emissions, page 182**<br><br>There exists evidence that at longer received ranges multiple seismic pulses become temporally "smeared" such that the "ambient noise" level intervals evident in the seismic pulses at short range become smaller; at distances of 100s of kilometres from the source a sound from a seismic operation can be received as an almost constant acoustic signal (albeit at very low intensity levels). Colleagues using the SOSUS hydrophone array in the Atlantic have noted this effect, and have been unable to identify and track blue whales as they normally could, for instance, on the Grand Banks during summer seismic operations (Dr. C. Clarke, pers. comm.). Whether blue whales, in this example, are able to modify their vocal patterns or attend to other acoustic features of their environment to overcome this new noise source remains unknown. |
| **Section 6.3.4.3 – Monitoring and Follow-up, page 183 par 5**<br><br>Note that "shut-in" should be shut-down. |
| **Section 6.4.4.3 – Accidental Event, page 187**<br><br>Accidental events could include ship strikes as leatherback turtles are very difficult to detect when they are at the surface relative to baleen whales and odontocetes (as suggested on p. 196 as well). When they are handling prey at the surface, or breathing after an extended dive, leatherbacks often have their heads out of the water, or at shallow depths, both locations which have relatively low sound propagation values. It is possible that these surfaced turtles may not receive a very loud seismic pulse or ship noise and might therefore be less likely to respond to the approaching source vessel, and more prone to shipstrike, than a more mobile marine mammal. |
| **Section 6.5 - Effects Assessment Species at Risk, page 190, par 3**<br><br>This section discusses 3 SARA-listed marine mammals potentially occurring in Study Area. This should be changed to 4 to include Sowerby's Beaked Whale (recently listed). |
| **Section 6.5.4.3 – Marine Mammals at Risk, page 195, par 5**<br><br>The "proposed" Recovery Strategy for Blue Whale is final (as of Nov 2009). The reference for the Recovery Strategy is given as COSEWIC 2002, but the correct reference is Beauchamp et al 2009.<br><br>It would be beneficial to reference the SOCP and relevant components in this section. |
| **Table 6.6 – Summary of Environmental Assessment for Species at Risk, page 198 (Mitigation, bullet #1)**<br><br>This bullet indicates that "Adherence to the *Statement of Canadian Practice on the Mitigation of* |

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*Seismic Noise in the Marine Environment* to the extent reasonable practical"

Please be advised that the SOCP specifies the mitigation requirements that must be met during the planning and conduct of marine seismic surveys, in order to minimize impacts on life in the oceans. These requirements are set out as minimum standards, which will apply in all non-ice covered marine waters in Canada. As such it is advised that the proponent adhere to all relevant minimum mitigations outlined in the SOCP including the Planning Seismic Surveys, Safety Zone and Start-up, Shut-down of Air Source Array(s), Line Changes and Maintenance Shut-downs, Operations in Low Visibility and Additional Mitigative Measures and Modifications sections of the SOCP.

**Section 6.6 - Effects Assessment - Sensitive Areas**

This section includes effects assessments of National Marine Conservation Areas, National Parks and Historic Sites, Ecological Reserves and Important Bird Areas; however, it does not include any effects assessments on Marine Protected Areas, Coral Protection Zones or Highly Productive Areas.

Marine Protected Areas, Coral Protection Zones and Highly Productive Areas are also sensitive areas; however, the EIA does not mention if the project will have any effects on these areas. It is unclear why some sensitive areas have effects assessments while others do not, but it seems that the EIA should have effects assessments on all sensitive areas.

**Section 6.7 - Traditional and Commercial Fisheries and Surveys**

The text notes on the Communal Commercial fisheries of the Nunatsiavut Government, but does not reference the Communal Commercial fisheries for either the Innu Nation or the NunatuKavut Community Council. This could cause some confusion and further, does not make it clear to the reader that there are a number of Aboriginal groups in Labrador conducting Communal Commercial fisheries in the area in question.

**Section 6.7.4.1 - Vessel Presence, page 204, par 4**

**Please note** that the annual summer NSRF-DFO northern shrimp survey is from July 12 - Aug 1 while the DFO fall survey is from October – December. It is recommended that mitigation measures to ensure that the seismic project does not have an impact upon population estimates due to startle responses be identified in this section.

**Table 8.2 – page 210-211**

AS per the *Statement of Canadian Practice on the Mitigation of Seismic Noise in the Marine Environment* a qualified Marine Mammal Observer must be present to monitor the safety zone.

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**Appendix III, page 10**

To estimate distances, it is strongly suggested that the observer use a pair of reticle binoculars. These are great visual aides and there is a simple formula to obtain distance estimates based on the eye height above water. These are a standard for marine mammal observers everywhere.

Thank you for providing DFO the opportunity to comment on this document. Should you have any questions or comments regarding the above, you can contact me by phone at 772-8889 or by e-mail (jason.kelly@dfo-mpo.gc.ca).

Regards

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Appendix 1

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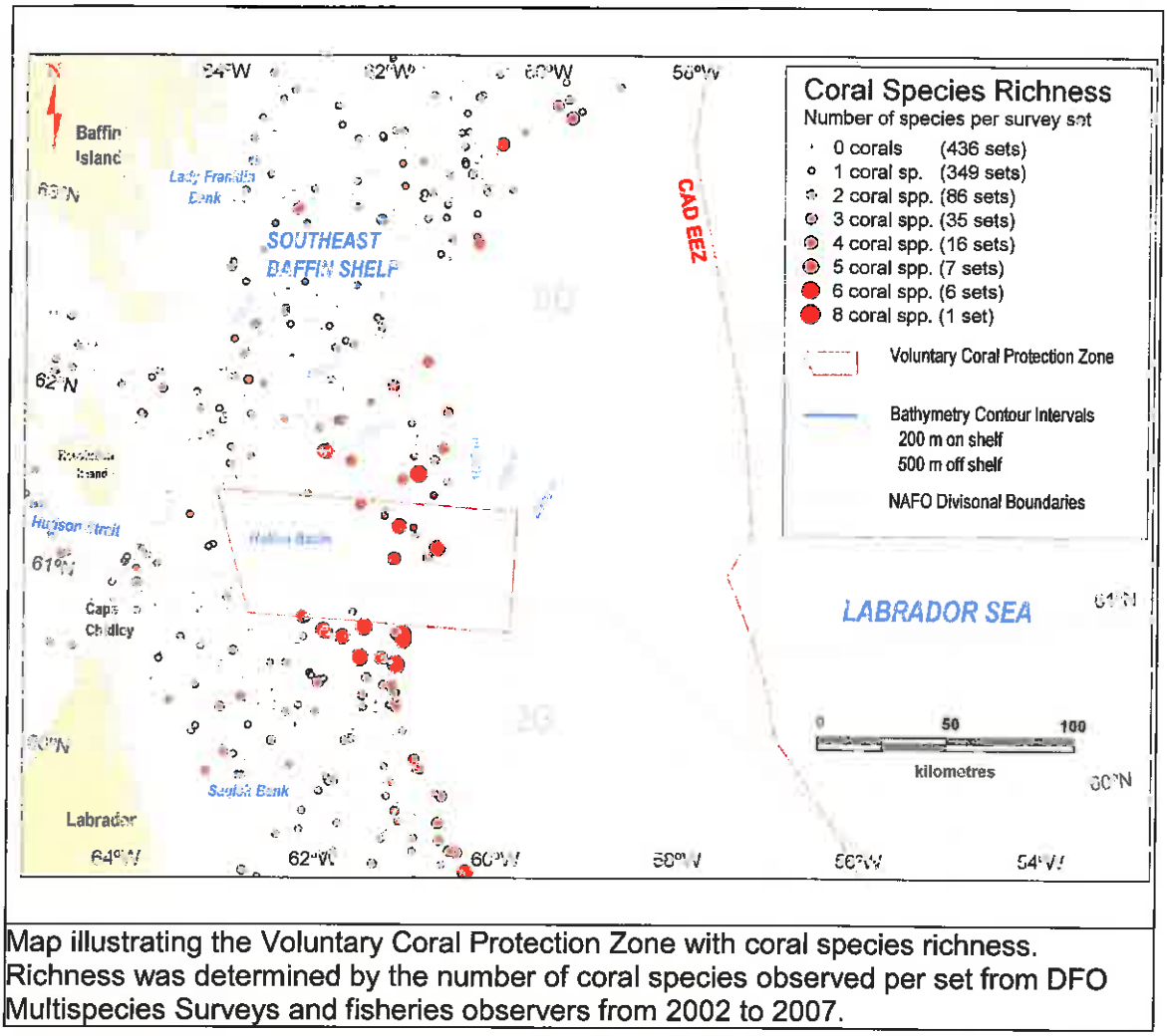


Map illustrating the Voluntary Coral Protection Zone with coral species richness. Richness was determined by the number of coral species observed per set from DFO Multispecies Surveys and fisheries observers from 2002 to 2007.

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