Specific Comments

TC 1	**EA Reference:**:	Section 1.3 Regulatory Context Page 1-4, First Paragraph
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	It is stated that "Transport Canada may issue an approval under paragraph 5(1)(a) of the *Navigable Waters Protection Act* (NWPA)".	
Request:	To reflect the March 2009 amendments to the NWPA, please change to "Transport Canada may issue an approval under **Part 1, Section 5 of the *Navigable Waters Protection Act***".	

C-NLOPB 1	**EA Reference:**:	Section 1.5 Scope of the Project Page 1-7
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	In the list of project components and potential future activities, "etc." has been used.	
Request:	The list of components and future activities that are included in the assessment should be identified in this section. The use of the term "etc." is not appropriate.	

C-NLOPB 2	**EA Reference:**:	Section 2.1 Project Need and Justification Page 2-1
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	The Hebron Project's contribution to sustainable economic development within the Province is described in detail in the Socio-economic Impact Statement and the Canada-Newfoundland and Labrador Benefits Plan for the Project.	
Request:	The Socio-economic Impact Statement has not been made available during the review of the CSR.	

C-NLOPB 3	**EA Reference:**:	Section 2.6.4.1 Drilling Facilities Page 2-15
	Scoping Document Cross Reference:	Section 5.3.4.1 Construction and Operational Discharges
	Scoping Document	Scope not Satisfied

	Satisfied:	
Preamble:	The CSR states that only non-aqueous fluid (NAF) based mud and cuttings will be re-injected and not water based cuttings. Section 21 of the OWTG states that each application for a Drilling Program Authorization or Production Operations Authorization should contain a description of specific pollution prevention measures that the operator plans to implement to reduce waste generation and discharge. Reinjection of water-based cutting would fit with reducing the amount of waste discharged from the facility.	
Request:	It should be justified why it is not possible to re-inject water-based cuttings in terms of reducing waste discharged.	

C-NLOPB 4	**EA Reference:**:	Section 2.6.4.1 Drilling Facilities Page 2-15
	Scoping Document Cross Reference:	Section 5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Cuttings that are discharged inside the GBS	
Request:	The potential bacterial action and the potential need to treat should be addressed as well as the associated environmental effect of the treatment and deposit of cutting in the GBS.	

EC 01	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-15
	Scoping Document Cross Reference:	5.3.4.2 Air Quality - Description of Emissions from all Project Activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	In the March 2009 project description (Table 2.1-5, P. 2-23) the proponent mentioned investigating the use of pilotless flares. The CSR states that “fuel gas will be continuously used for flare pilots” and makes no mention of pilotless flares.	
Request:	What was the outcome of the investigation into the use of pilotless flares?	

C-NLOPB 5	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-16, Third Bullet
	Scoping Document Cross Reference:	Section 5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	It is stated that produced water will be discharged in accordance with the	

	OWTG 2002.
Request:	The proponent should evaluate technology beyond the standard hydro cyclone separation to see if it is possible to achieve oil in water concentrations lower than those of the OWTG and if it is economically or technically feasible to implement.

C-NLOPB 6	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-16, Third Bullet
	Scoping Document Cross Reference:	Section 5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	It is stated that the details regarding produced water re-injection feasibility will be addressed in the Development Plan. Produced water is the major waste discharged from oil and gas processing. Elimination of this waste stream removes, though re-injection, one of the greatest sources of effects the Hebron project will have on the environment.	
Request:	More detail should be provided as to the viability of re-injecting produced water. Also, initiating re-injection of produced water at the start of the project can reduce some of negative effects produced water may have on the reservoir.	

C-NLOPB 7	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-16, Third Bullet
	Scoping Document Cross Reference:	Section 5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	The CSR states that the details regarding produced water re-injection feasibility will be addressed in the Development Plan. The Scoping Document clearly states that the "Means for reduction, reuse and recovery of wastes beyond those specified in regulations and guidelines, including an evaluation of the applicability of "best available/practicable technology" (e.g., cuttings reinjection and produced water re-injection) to the project".	
Request:	The CSR should include an evaluation of produced water re-injection.	

C-NLOPB 8	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-16, Fourth Bullet
	Scoping Document Cross Reference:	5.3.4.2 Air Quality - Description of Emissions from all Project Activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The flare will dispose of associated gas from the low pressure separator when the low pressure compressor is down for maintenance. Flaring of low pressure gas tends to produce black smoke.	
Request:	The CSR should discuss flaring of low pressure gas in the air quality	

	section and the mitigations that could be implemented to reduce or eliminate black smoke from flaring operations.

EC 02	**EA Reference:**:	Section 2.6.4.2 Process Systems Page 2-17
	Scoping Document Cross Reference:	5.3.4.2 Air Quality - Description of Emissions from all Project Activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Part of the process description identifies the venting of gases from near atmospheric systems. There is no description of the magnitude, composition or significance of these gases, either in this or the air quality section.	
Request:	The proponent is asked to comment on the composition, magnitude and significance of the gases being released through these vents.	

DFO 1	**EA Reference:**	2.8 Hebron Project: Construction and Installation
	Scoping Document Cross Reference:	Section 3.1 Project Components Section 5.3.2.1 Marine Ecosystem Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The CSR does not provide sufficient information regarding the spoils disposal area within the nearshore project area. Fish habitat information within the proposed spoils disposal area is required in order for DFO to determine if it is likely to result in a HADD.	
Request:	Provide information on the proposed spoils disposal area including, but not limited to, location and fish habitat information.	

DFO 2	**EA Reference:**	Section 2.8 Hebron Project: Construction and Installation Page 2-20
	Scoping Document	Section 5.3.2.3 Marine Finfish and Shellfish

	Cross Reference:	
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Tables 2-6 and 2-7 indicate that dredging may be required for the tow-out from the deepwater site to the offshore location. The potential requirement for this dredging is not addressed in the environmental effects assessment.	
Request:	Given there is a possibility that dredging may be required, it should be included in the environmental effects assessment.	

HC 1	**EA Reference:**:	Section 2.8.1 Great Mosquito Cove: Drydock Construction Page 2-22, Table 2.5 – Potential Activities and Potential Discharges/Emissions/Wastes
	Scoping Document Cross Reference:	Scoping Document: Section 4(d) - Factors to be Considered: environmental effects of the project (as defined in Section 2 of the *Canadian Environmental Assessment Act*, which includes human health effects associated with the environmental effects of the project)
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Table 2.5 indicates that noise may be an issue during pre-construction and construction activities, however, noise with respect to nearby human receptors is not discussed further in the document. As such, Health Canada was unable to assess the potential noise impacts on nearby residents or other potentially sensitive human receptors during pre-construction and construction phases of the project on-land and in the nearshore.	
Request:	a) Please provide a discussion about the locations and proximity of all potential noise-sensitive human receptors relative to the project area, and the identification of areas in which receptors could be considered to have a reasonable expectation of "peace and quiet" (i.e. "quiet rural areas"). The identification of sensitive receptors may include residences, daycares, school, hospitals, places of worship, nursing homes, and First Nations and Inuit communities. b) Please provide a discussion of the expected duration of construction activities. Note that Health Canada uses the *Alberta Energy and Utilities Board Noise Control Directive 038* (2007) for guidance on whether	

	construction noise should be considered short-term with regard to the prediction of complaint levels. • If construction noise lasts for less than two months at receptors, it may be considered temporary, and community consultation is advised. • For construction noise at receptors with durations of less than one year (i.e. short-term), Health Canada advises that mitigation be proposed if the resulting levels are predicted to result in widespread complaints or a stronger community reaction, based on the U.S. EPA method (U.S. EPA 1974, Michaud et al. 2008). • For construction noise at receptors with durations of more than one year (i.e. long-term), for operational noise, and where noise levels are in the range of 45-75 dB at the nearest receptor, Health Canada advises that health impact endpoints be evaluated on the change in the percentage of the population (at a specific receptor location) who become highly annoyed (%HA). Health Canada suggests that mitigation be proposed if the predicted change in %HA at a specific receptor is greater than 6.5% between project and baseline noise environments, or when the baseline-plus-project-related noise is in excess of 75 dB. c) If health effects due to noise are predicted, Health Canada advises the identification of mitigation measures to limit noise, which typically include community consultation programs. In some situations where a specific type of mitigation is not technically or economically feasible, community consultation has achieved success in limiting the number of noise-related complaints. Noise References Alberta Energy and Utilities Board. 2007. Energy Resources Conservation Board - Directive 038: Noise Control. Revised edition. www.ercb.ca/docs/documents/directives/Directive038.pdf Michaud, D.S., Bly, S.H.P. and Keith, S.E. 2008. Using a change in percent highly annoyed with noise as a potential health effect measure for projects under the Canadian Environmental Assessment Act. Canadian Acoustics, 36(2):13-28. U.S. EPA. 1974. Office of Noise Abatement and Control. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. www.nonoise.org/library/levels74/levels74.htm

EC 03	**EA Reference:**	Section 2.8.2 Gravity Base Structure Construction at Drydock Page 2-22
	Scoping Document Cross Reference:	Section 3.1.1 Bull Arm – Great Mosquito Cove and Bull Arm (activities within or affecting the marine environment)
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Section 3.1.1 of the Scoping Document includes ocean disposal of berm material and potential disposals from dredging activities to facilitate GBS tow operations. The CSR document does not indicate that a disposal site has been selected to receive the material from the berm and the clearance dredging. Selection and assessment of a disposal site will be a requirement for a disposal at sea permit application. Delaying site selection until permit application could also have project scheduling implications.	
Request:	The proponents should indicate a potential disposal site location or locations in order to properly assess the associated environmental effects.	

DFO 3	**EA Reference:**	Section 2.8.3 Deepwater Site Construction Page 2-23
	Scoping Document Cross Reference:	Section 3.1 Project Components Section 5.3.2.3 Marine Finfish and Shellfish Section 5.3.2.1 Marine Ecosystem
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 2.8.3 states that "*It is anticipated that existing deepwater moorings will be used; however additional moorings may be required.*" There is no information provided on these moorings.	
Request:	a) Specify whether these moorings are located on land or in water. If located in water, provide a description of existing and new moorings, including but not limited to location, general design, construction method, mitigation measures to protect fish and fish habitat, etc. b) Given that the construction of new moorings is a possibility, it should be included in the environmental effects assessment.	

EC 04	**EA Reference:**:	Section 2.9.2 Operational Support Page 2-30, Table 2-9
	Scoping Document Cross Reference:	5.3.4.2 Air Quality - Description of Emissions from all Project Activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	In the March 2009 project description (Tables 2.1-4 and 2.1-5) the potential use of a waste incinerator is mentioned. The CSR has numerous mentions of waste treatment, but does not provide any specifics. Air emissions from an incinerator are not mentioned in the CSR.	
Request:	Could the proponent confirm that an incinerator is no longer part of the project? If an incinerator is to be included in the project, the emissions should be identified and included in the analysis.	

C-NLOPB 9	**EA Reference:**:	Section 2.9.6.3 Geotechnical Surveys Page 2-36
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	These surveys assist in the positioning of wells, pipelines and production facilities.	
Request:	Some general information should be provided as to how these surveys are conducted.	

EC 05	**EA Reference:**:	Sections 3.1.1.1 Wind Climatology & 3.1.2.1 Waves Pages 3-1 & 3-9
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	The data sources in these sections for the nearshore were incompletely described (and in Oceans 1.1.1 and 1.1.3).	
Request:	a) For each data source, please give the lat/long, exposure, elevation (land station) or water depth (wave buoy), and years of coverage. This information in needed for interpretation of differences in measurements.	

	b**)** Are the names Bull Arm Oceans and Mosquito Cove used interchangeably when referring to the Oceans Ltd. Weather station (Bull Arm Oceans in tables, but Mosquito Cove in text and figures)? c) Could an example of an extreme winter storm during the 1995-1997 interval, when there are local measurements available, be added to this section?

EC 06	**EA Reference:**:	Section 3.1.1.3 Tropical Systems Page 3-6
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	The distance chosen to find tropical systems that passed near Bull Arm, listed in Table 3-4, should be expanded, so that the list would include Hurricane Michael, 20 October 2000. Michael brings the peak wind speed for October at the MSC50 data point near Bull Arm (Table 3-2), and Michael is given as an example of an extreme tropical storm in the Oceans report (1.1.2).	
Request:	a) Include Hurricane Michael in table 3-4 b) There are contradictory sentences about the definition of the wind speeds in Table 3-4, in the text, 3.2.1.7, and in the Oceans report (1.1.6 and 1.29), that need to be corrected.	

EC 07	**EA Reference:**:	Section 3.1.1.3 Tropical Systems and 3.1.2.2 Waves Pages 3-6 & 3-9
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	In 3.1.1.3, the description of peak measurements in Hurricane Luis, which made landfall near Argentia on 11 Sept 1995, includes the peak wind speed at the MSC50 grid point location, but not the peak wind and wave measurements from the local weather stations and buoy.	
Request:	Include the peak wind and wave measurements from the local weather stations and buoy.	

EC 08	**EA Reference:**:	3.1.2.2 Waves and 3.1.3 Wind and Wave Extremes Pages 3-9 & 3-22
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	The analysis uses MSC50 wave hindcast data for a grid point location that is adjacent to land, for one of its primary sources of wave data.	
Request:	a) The text should indicate that caution is needed in using this data given limits of the model resolution and the proximity to land. This caution should also be noted in the Oceans and AMEC reports. b) Clarity would be improved if important information on extremes, results of a 1992 extremal wave analysis for Bull Arm, were moved from 3.1.2.2 to section 3.1.3, Wind and Wave Extremes, 3.1.3.2 Waves. The analysis method should be described briefly, to allow comparison with the extremal analysis method used in this CSR.	

EC 09	**EA Reference:**:	3.1.3 Wind and Wave Extremes, 3.1.3.1 Wind Page 3-22
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	This subsection gives extremal analysis results based on the MSC50 grid point data and adjusted to 10 minute and 1 minute sustained winds at 10 m.	
Request:	Given the height of the planned structure, and the increase of wind speed with height, it could also be useful for design to give equivalent estimates of the wind speed at a height relevant for the structure topsides.	

EC 10	**EA Reference:**:	Section 3.1.4 Sea Ice and Icebergs (nearshore) Section 3.2.3 Sea Ice and Icebergs (offshore) Section 13.3.6 Effects of the Environment on

		the Project: Sea Ice and Icebergs (nearshore) Section 13.4.6 Effects of the Environment on the Project: Sea Ice and Icebergs (offshore)
	Scoping Document Cross Reference:	Section 5.3.1 Physical Environment
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Errors and inconsistencies are noted throughout the text.	
Request:	Revise the text, figures and charts in accordance with the guidance provided in Appendix A – Environment Canada.	

EC 11	**EA Reference:**:	3.2.1.2 Wind Climatology Page 3-32
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	This section presents the monthly mean and maximum wind speed statistics for both the MSC50 grid point and several offshore platforms presented separately, and gives the platform anemometer heights, all useful information.	
Request:	a) To improve the utility of Table 3-23, maximum wind speeds, it would be appropriate to adjust the MSC50 values from a one-hour mean maximum to an expected 10-minute mean maximum, to make them more comparable to the maximum 10-minute sustained winds reported by the platforms (as is done in the section on Wind Extremes). This would also be appropriate for the MSC50 maximum wind speeds in Subsection 3.1.1.1, Table 3-2, for the nearshore, to compare with the maximum reported 10-minute means from the weather stations. b) The offshore platforms listed in Table 3-23 include Glomar Grand Banks and GSF Grand Banks. Positions and periods of coverage are given in the Oceans Report, Table 1-8. Please confirm whether these two periods were from the same platform, with different names at different times, and if those records could be combined.	

EC 12	**EA Reference:**:	3.2.1.2 Wind Climatology and 3.2.2.6 Wind and Wave Extremes Pages 3-32 & 3-56

	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	When using winds from different sources, it is advisable to adjust winds for height, in order to reduce (although not eliminate) uncertainty when interpreting the data.	
Request:	Given the large height differences involved between platform anemometers and 10 m, and the presence of both unstable (winter) and stable (spring and summer) conditions, it would be advisable to use a surface layer model that accounts for atmospheric stability, to adjust from one height to another (e.g. Cardone et al. 2004 and Bourassa et al. 1999, with software at: http://www.coaps.fsu.edu/~bourassa/BVW_html/bvw_docs.shtml). References: Bourassa, M. A., D. G. Vincent, W. L. Wood. 1999. A flux parameterization including the effects of capillary waves and sea state. *J. Atmos. Sci.*, **56**, 1123-1139. Cardone V.J., A.T. Cox, E.L. Harris, E.A. Orelup, M.J. Parsons and H.C. Graber. 2004. Impact of QuikSCAT Surface Marine Winds on Wave Hindcasting. *8th International Workshop on Wave Forecasting and Hindcasting*, *Oahu, Hawaii November 14-19, 2004.* [http://www.waveworkshop.org/]	

EC 13	**EA Reference:**:	3.2.1.7 Tropical Systems Page 3-41
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	In this section, Table 3-29 gives the strongest winds associated with tropical systems at the time they pass closest to the offshore project area.	
Request:	a) It would be useful to give an example of a severe event when platform wind and wave measurements are available. b) The table indicates the winds are in m/s, however it appears the values are in knots. Also, the table caption refers to a different (incorrect) location than the text. c) The text (and also the Oceans report, 1.2.9) attributes the increase in Atlantic hurricane activity since 1995 to naturally occurring cycles in the	

	tropical multi-decadal signal that typically last 20 to 30 years, referencing Bell and Chelliah (2006). This could give the impression that the increase would be expected to reverse. However, the paper by Bell and Chelliah did not describe the tropical multi-decadal mode or signal as a naturally occurring cycle, and it did describe notable differences between the earlier and the current period of higher activity. d) It should be noted that about one half of N Atlantic tropical cyclones transition to extratropical midlatitude storms, and about half of those reintensify (Hart and Evans 2001). This is important because the area of damaging winds and waves increases substantially. Reference: Hart and Evans, 2001: A Climatology of the extratropical transition of Atlantic tropical cyclones. J. of Climate, 14, 546-564.

EC 14	**EA Reference:**:	Section 3.2.2.1 Waves and 3.2.2.6 Wind and Wave Extremes Pages 3-46 & 3-56
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data.
Preamble:	This section benefits from the addition of analyses based on the past 10 years of measurements in this area, as well as from the MSC50 climatology.	
Request:	a) It would be valuable to include some comparison to statistics derived for the earlier relatively continuous observation period on the Northern Grand Banks, from 1979 to 1988 measurements. b) This section (or supporting documents) would be more complete with a brief description of the each of instruments, methods of measuring waves, and methods of calculating significant wave height and wave period, when these differ among the different data sources. As well, this should include any significant changes over time in these details which might affect the wave climatology, such as described in the Oceans report for the Hibernia wave data sampling interval. c) As with the nearshore section, this section contains a description of the metocean extreme wave conditions developed by the ExxonMobil Upstream Research Company that would be more appropriately located in 3.2.2.6, Wind and Wave Extremes. There is a statement (also in the AMEC report) that the significant wave height values were first calibrated to Hibernia measurements. Please explain this. d) The monthly statistics for both Terra Nova (1999 to 2007, Tables 3-34 and 3-35) and White Rose (2003 to 2007, Table 3-36), seem to be	

	based on incomplete data. The monthly means would be higher if the complete datasets were used. The reference for the Terra Nova dataset is DFO 2009b (in the AMEC report as DFO2009c), file WEL411, which does not cover the entire period indicated. There are additional DFO files for Terra Nova during this period (as well as more recent years, now up to 2009). Similarly, for White Rose, the data source is given as AMEC but the DFO file for White Rose for the same period, 2003-2007, seems to include more observations. The full available datasets should be used in the analysis, or there should be some explanation of why some data are excluded. e) What is the reason for using a different method of calculating the peak wave period for the Triaxys wave buoy than used by DFO, and why this is not the same as used for the Terra Nova buoy (Table 3-36 for White Rose notes that the peak wave period, Tp5, is calculated by the Read method)? f) While this does not affect the CSR, please note that the list of wave sources in the Oceans report, Table 1.9, includes invalid dates for buoy 44153. Valid dates for the project area are October 1997 to March 1998 only, not starting in 1994 as indicated. This will affect the values in the Wave Climatology Table 1.12. The error arises due to the DFO wave archive structure, and past use of the same identifier for short term buoys moored in different locations.

C-NLOPB 10	**EA Reference:**	Section 3.2.2.6 Page 3-56
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:		
Request:	The description of the February 11, 2003 storm should include the wave conditions, for completeness.	

C-NLOPB 11	**EA Reference:**	Section 3.2.2.6 Page 3-62
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	In the “Extreme Value Estimates…” section it is stated that the 100-year extreme Hs “corresponds with a Hs of 14.66 m recorded . . . on February 11, 2003”.	
Request:	It should be explained how two unequal Hs values correspond, or the statement should be amended.	

C-NLOPB 12	**EA Reference:**	Section 3.2.3.6 Page 3-76 ff.

	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:		
Request:	Given the variation in iceberg occurrence, the CSR should explicitly indicate what portion of the iceberg occurrence data will be used in generating design information for the platform, and give a rationale for this selection.	

C-NLOPB 13	**EA Reference:**:	Section 3.2.3.6 Icebergs Page 3-76
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	What is the design iceberg?	

C-NLOPB 14	**EA Reference:**	Section 3.2.5 Page 3-89, Paragraph 2
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph begins “An average of 400 icebergs per year (albeit highly variable) reach the latitude of the Grand Banks (Sonnichsen and King 2005).” The statement, even with qualifiers, is inconsistent with the discussion of iceberg occurrence numbers in Section 3.2.2.6.	
Request:	The inconsistency should be resolved.	

C-NLOPB 15	**EA Reference:**	Section 3.2.6 Page 3-91 – 3-93
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment fifth bullet
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The Climate Change section entirely omits any considerations of ice and iceberg coverage.	
Request:	The Climate Change section should include a discussion, to the degree feasible, of implications of climate change upon occurrence of sea ice and icebergs at/near the project area.	

EC 15	**EA Reference:**:	3.2.6 Climate Change, 3.2.6.2 Waves Pages 3-91 & 3-92
	Scoping Document Cross Reference:	5.3.1 Description of the Physical Environment

	Scoping Document Satisfied:	Scope largely met, comments relate to improving clarity or use of existing data
Preamble:	The reference for Swail et al. (2006), mentioned in Section 3.2.6 is incorrect.	
Request:	Please give the correct reference for Swail et al. (2006).	

EC 16	**EA Reference:**:	Section 3.2.6 – Climate Change Page 3-91
	Scoping Document Cross Reference:	Section 5.3.1 Physical Environment
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	While the proponent provides references and comments on storm activity and waves, there is little or no comment on extreme events related to increased storm activity such as heavy precipitation events. The proponent is using the length of the Construction and Operational Phase to discount the impact of 100-year extreme events. Even if the event has a return period of 100 years, that doesn't mean it couldn't happen next year.	
Request:	The proponent is asked to review current literature and incorporate extreme event values (particularly precipitation events) in their consideration of operations during both the onshore and offshore periods.	

EC 17	**EA Reference:**:	Section 3.2.6.1 Sea Level Rise (Climate Change) Page 3-91
	Scoping Document Cross Reference:	Section 5.3.1 – Physical Environment
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.1 of the Scoping Document states that the EA will consider the influence that noted environmental changes and hazards may have on the project. Sea Level rise information noted in the study has been superseded by newer work. More current research and recent indications note the rate of Greeenland & Antarctic land ice melt is occurring at a faster rate than previously predicted. Current research querying this increased melt rate indicate that by the year 2100, SLR could be as high as 1-2 metres, for example, *Rahmstorf et al. 2009.*	

Request:	The proponents should apply more recent research regarding sea level rise projections. Proponents can see latest research in article at this website: **http://www.nature.com/climate/2010/1004/pdf/climate.2010.29.pdf** Consideration of any adjustments to rig specifications and operations due to increases Sea Level Rise projections should be taken into account during the design stage of the project.

EC 18	**EA Reference:**:	Section 3.2.6.4 Summary (Climate Change) Page 3-93.
	Scoping Document Cross Reference:	Section 5.3.1 Physical Environment
	Scoping Document Satisfied:	Scope not satisfied.
Preamble:	The proponent deems all the information it referenced as "inconclusive" when describing the potential impact of climate change on the project. Such a statement reflects the proponents' lack of desire to incorporate information in non-traditional ways into their project planning. Recent approaches, taken by professional groups such as Engineers Canada, are focusing on risk management techniques to incorporate ranges of projections effectively into design decisions.	
Request:	The proponent is asked to consider incorporating current climate change projections for extreme events, high waves and storm surge (on top of sea level rise) into both phases of this project by utilizing risk management techniques	

C-NLOPB 16	**EA Reference:**:	Section 4.1 Types of Environmental Effects Page 4-1
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	The social and economic benefits of the Project are analyzed in the Socio-economic Impact Statement (SEIS)/Sustainable Development Report, submitted in support of the Hebron Project Development Application.	
Request:	The reference to the SEIS is inappropriate without its inclusion. This SEIS has not been made available and the Development application has not been submitted.	

C-NLOPB 17	**EA Reference:**	Section 4.3.2.1 Page 4-6

	Scoping Document Cross Reference:	5.2 Boundaries
	Scoping Document Satisfied:	Unclear if scope satisfied
Preamble:		
Request:	The Offshore Affected Area and/or Study Area boundaries must be reconsidered, and if necessary amended, in light of results from revisiting the oil spill trajectory modelling work for the Project.	

C-NLOPB 18	**EA Reference:**:	Section 4.3.7 Step 7 – Cumulative Environmental Effects Page 4-17
	Scoping Document Cross Reference:	Section 5.1 Cumulative Effects
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Cumulative effects assessment must include a consideration of environmental effects that are likely to result from the proposed project in combination with other projects or activities that have been or will be carried out.	
Request:	The nearshore Study Area is the same as that for Hibernia, however, the residual impact of the Hibernia project is not mentioned.	

C-NLOPB 19	**EA Reference:**:	Section 4.3.7 Step 7 – Cumulative Environmental Effects Page 4-18 and 4-19, Table 4-4
	Scoping Document Cross Reference:	Section 5.1 Cumulative Effects
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Information in this table is dated (e.g. Offshore Oil Exploration Activities – there are three seismic programs proposed for offshore Labrador, not one)	
Request:	Table 4-4 should be reviewed and revised to incorporate the most recent information...	

C-NLOPB 20	**EA Reference:**:	Section 6 Air Quality Page 6-1
	Scoping Document Cross Reference:	Section 5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Air quality is discussed in terms of the effects on local air quality. What is not discussed are the emissions from equipment and the federal government objectives to reduce emissions of Critical air contaminates, including green houses gases, from equipment.	
Request:	The CSR should address facility emissions in relation to the federal government's objectives and how they will be achieved. The CSR should address the use of ozone depleting substances (e.g. halocarbons) and why it would not be possible to use alternative	

	substances. Mitigation to prevent the release of these substances should also be identified.

HC 3	**EA Reference:**:	Section 6 Air Quality Page 6-1 Air Emissions and Dispersion Modelling Study for the Hebron Project
	Scoping Document Cross Reference:	Section 5.3.4.2 Air Quality (Bullet one – description and annual estimates of air emissions associated with all project activities)
	Scoping Document Satisfied:	Unclear if scope satisfied
Preamble:	In a review of National Pollutant Release Inventory (NPRI) for the Hibernia off-shore platform, several polycyclic aromatic hydrocarbons (including acenaphthene, acenapthylene, fluorene, naphthalene, and pyrene), n-hexane, benzene, toluene, ethylbenzene and xylenes were reported to have been released to air in 2008 (Environment Canada, 2009). These substances were not specifically modeled in the Air Emissions and Dispersion Modelling Study[2] and it is unclear whether they were implicitly included as part of the total volatile organic compound (VOC) releases or whether they were not assessed. Air Reference: Environment Canada. 2009. National Pollutant Release Inventory, 2008 data. Hibernia (NPRI ID: 6096). http://www.ec.gc.ca/pdb/websol/querysite/facility_substance_summary_e.cfm?opt_npri_id= 0000006096&opt_report_year=2008	
Request:	Please indicate whether or not these substances were included in the modeling assessment. If they were not, please provide a rationale as to why they were excluded, as several of these substances can act as respiratory irritants, and at least one (i.e. benzene) may be carcinogenic to humans via the inhalation route of exposure.	

HC 2	**EA Reference:**:	Section 6.1.1 Environmental Assessment Boundaries - Spatial Page 6-1
	Scoping Document Cross Reference:	Section 5.3.4.2 - Air Quality (Bullet six - assessment of fate and effects)
	Scoping Document Satisfied:	Scope not Satisfied

Preamble:	re: Air Quality – On-land and Nearshore *Please note that Health Canada does not verify air quality modelling results and assumes that correct and accepted and/or validated methods were used. Health Canada relies on the expertise of Environment Canada for the review of air quality modelling results and the provision of related advice. If errors and/or gaps in the modelling are noted by Environment Canada, it is suggested that revisions be made to address them as indicated by Environment Canada. If the revised results differ from the originally submitted results, it is advised that the report be resubmitted to Health Canada for review.* Section 6.1.1 (Environmental Assessment Boundaries – Spatial) – The report states that "*professional experience indicates that the environmental effects of emissions in construction would disperse to within the range of normal background levels at this distance* [at the nearest residences]". The locations of the nearest residences and/or other potentially sensitive human receptors are not identified in the report.
Request:	Please provide the locations and proximity of the nearest potentially sensitive human receptors in order for Health Canada to assess the potential for human health effects associated with air emissions as a result of construction activities on-land and in the nearshore.

EC 22	**EA Reference:**:	Section 6.1.3 Administrative Page 6-4, Table 6-2 Dispersion Modelling Study, Table 2-1
	Scoping Document Cross Reference:	5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	There is a blank box in the column listing pollutants in Table 6-2. This should be sulphur dioxide as correctly noted in the Modelling Study. The table gives the impression that the averaging times given for both PM2.5 and ozone are applicable to both the Canada-wide Standards and the NL Ambient Air Quality Standards. They are only applicable to the Canada-wide Standards. The NL standard averaging times are 24 hours for PM2.5, and 8 hours for ozone as presented in the table. There is also a 1 hour ozone standard of 160 ug/m3.	
Request:	This table should be corrected	

EC 25	**EA Reference:**:	Section 6.1.3 Administrative Page 6-4 Section 6.4.1 Change in Ambient Air Quality Page 6-16
	Scoping Document Cross Reference:	5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The proponent describes the “tolerable”, “acceptable”, and “desirable” categories of the National Ambient Air Quality Objectives but does not identify which of these categories will be used in the determination of exceedances.	
Request:	The proponent is asked to identify in the text that the modelling results (as identified in the tables further on) are the maximum “acceptable” objectives.	

EC 23	**EA Reference:**:	Section 6.2.1.1 Air Quality Page 6-6, Table 6-3
	Scoping Document Cross Reference:	5.3.4.2 Air Quality Assessment of fate and effects, including cumulative
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	It is not clear what the numbers in Table 6-3 represent. i.e. Are they the highest concentration for each time period over a year or longer, or some other metric (percentile, 4^{th} highest).	
Request:	The proponent is asked to confirm exactly what the values in the table represent and the time frame from which the data was selected.	

EC 19	**EA Reference:**:	Section 6.2.2 Offshore Page 6-7
	Scoping Document Cross Reference:	5.3.4.2 Implications for health and safety of workers
	Scoping Document Satisfied:	Scope not satisfied

Preamble:	Indication given in the introductory paragraph that each platform would be downwind of each other less than 15 percent of the time.
Request:	The proponent is asked to provide a reference or to substantiate this statement.

EC 26	**EA Reference:**:	Section 6.3.2 Offshore Page 6-11 Section 6.5.1.2 Greenhouse Gas Emissions Page 6-18, Table 6-9
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of emissions from all project activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	P. 6-11 states that natural gas use will release greater quantities of NOx than diesel and confirms this in Table 6-9 referencing the US EPA. AP-42, the US EPA's Compilation of Air Emission Factors, however, lists NOx emissions from the use of distillate fuel in turbines as being greater than that of natural gas.	
Request:	The proponent is asked to confirm these emissions estimates and the reference.	

EC 27	**EA Reference:**:	Section 6.3.2 Offshore Page 6-11 Section 6.5.1.2 Change in ambient Air Quality Page 6-19, Table 6-10
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of emissions from all project activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	P. 6-11 states that natural gas use will release lower quantities of CO2 than diesel use, however, Table 6-10 lists the CO2 emissions from natural gas as being far greater than from the use of diesel fuel.	
Request:	The discrepancy between the text and the table should be addressed.	

C-NLOPB 21	**EA Reference:**:	Section 6 Air Quality

		Pages 6-11 and 6-12
	Scoping Document Cross Reference:	Section 5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Fugitive emissions are described as originating from back up or standby generators, loading of fuel, etc. Not all of the mentioned sources fit the National Pollution Inventories definition of fugitive emissions. Fugitive emissions, as define by NPRI, are air pollution derived from human activities that do not emanate from a particular point, such as an exhaust pipe or stack. They are releases to air that are not released through confined process streams. Roadway dust and volatile organic compounds (VOCs) from refinery valves are examples of fugitive emissions. These releases include fugitive equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, etc., evaporative losses from surface impoundments and spills, releases from building ventilation systems, and any other fugitive or non-point air emissions from land treatment, mine tailings, storage piles, etc.	
Request:	The CSR should be reviewed in terms of what has been stated as being fugitive emissions in relation to the standard definition.	

C-NLOPB 22	**EA Reference:**:	Section 6.3.2.2 Operations/Maintenance Page 6-12
	Scoping Document Cross Reference:	Section 5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	It is concluded that minor amounts of TSP and VOC emissions will be emitted during various routine maintenance activities, including welding, machine oils and cleaning solvents. There will also be some fugitive emissions of VOCs and CACs from the loading and unloading of fuels and products, from storage tanks, and backup-generators. It has been stated that these emissions will be limited in quantity and therefore were not assessed further in the CSR. The CSR has not quantified fugitive emissions nor has it defined what is meant by limited in quanity.	
Request:	The conclusion reached in the CSR should be supported through references or calculations to show that such emissions are limited and, in relation to the federal clean air agenda, not significant. Management practices for fugitive emissions should be considered . CAPP's guidance for possible mitigative measures that could be aplied should be considered.	

C-NLOPB 23	**EA Reference:**:	Section 6.3.2.2 Operations/Maintenance Page 6-12
	Scoping Document Cross Reference:	Section 5.3.4.2 Air Quality
	Scoping Document	Scope not Satisfied

	Satisfied:	
Preamble:	It is stated that during operation of the Platform there will be times when excess gas will be flared, for example, during well testing.	
Request:	What is the need to flare gas during well testing? What is the technical impediment to processing gas from well testing with that of production?	

EC 24	**EA Reference:**:	Section 6.3.2.1 Offshore Construction/Installation Pages 6-11 and 6-13 Air Emissions and Dispersion Modelling Study, Page 15, Table 6-2.
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of emissions from all project activities. 5.3.4.2 Air Quality. Description of means for reduction, management and reporting of air emissions, taking into account best industry practices.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Pages 6-11 and 6-13 states that emissions other than those presented (i.e. loading and unloading) would be limited in quantity and are therefore not further assessed. However, Table 6-2 in the Dispersion Modelling Study uses values that for Hebron that are much smaller than those of the other three platforms. In the case of VOCs, this difference is in orders of magnitude.	
Request:	The proponent is asked to confirm whether these differences are real, and if so to describe the changes in technology that would allow the emissions from Hebron to be so much less than those from the other facilities. If these emissions differences are not real (i.e. there are sources included in the estimates for the other operations that are not included in those for Hebron) then these other sources should be identified and included in the analysis.	

C-NLOPB 24	**EA Reference:**:	Section 6.3.3 Summary Page 6-14, Table 6-8
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Table 6-8 does not appear to list all of the major activities. For example, power generation and gas compression are not listed.	
Request:	The table should be revisited and revised to include all the activities that	

	may occur.

EC 28	**EA Reference:**:	Section 6.5.1.1 Change in Ambient Air Quality Page 6-18 Dispersion Modelling Study, Page 7
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of emissions from all project activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The CSR notes that the sulphur concentration in the diesel fuel would be very low, and the Modelling Study lists this number as limited to 500 ppm by federal regulation. Technically, the Sulphur in Diesel Regulations apply to on and off road mobile engines that may not cover the generators (pending further design details) used in this project. As well, the limit is scheduled to be reduced to 15 ppm, possibly before the project is underway.	
Request:	The proponent is asked to confirm that the sulphur concentration limit identified in the federal regulation represents the maximum limit that will be actually used in the project. If this is not the case, the proponent should specify the maximum sulphur limit that will actually be used, and if significant, carry out the appropriate analysis.	

EC 31	**EA Reference:**:	Section 6.5.2.1 Change in Ambient Air Quality Page 6-27, Table 6-15 Page 6-43, Table 6-25
	Scoping Document Cross Reference:	5.3.4.2 Air Quality - Assessment of Fate and effects including cumulative effects
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The 1 hour maximum GLC for NOx is exactly the same in both the peak operation and cumulative scenarios. For most of the other pollutants, the cumulative GLCs are greater than those for peak operation. The dispersion modelling report does not give us access to the peak operation contours to better assess the likelihood (while recognizing that this is feasible) of these numbers being identical.	
Request:	The proponent is asked to confirm that these numbers are actually identical and not a transcription error.	

EC 29	**EA Reference:**:	Section 6.5.3 Offshore Decommissioning and Abandonment Page 6-32, Table 6-18
	Scoping Document Cross Reference:	5.3.4.2 Air Quality Description of potential means for reduction, management and reporting of air emissions
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The CSR states in table 6-18, and throughout the document that it will investigate the use of efficient/reduced emission technology and incorporate it where appropriate. The scoping requires a description of the potential means of reduction. Emission reductions can also be achieved through practices (i.e. leak detection and repair) as well as technologies and these should be identified as well.	
Request:	The proponent should commit to reporting on the results of their investigations in order to meet the requirements of the scoping document and allow the reviewers to evaluate the application of best industry practices.	

EC 20	**EA Reference:**:	Section 6.5.4.1 Change in Air Quality Page 6-35; Table 6-20
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of Emissions from all Project Activities
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Air dispersion Modelling Emission Rates are indicated in the table header without an indication of units.	
Request:	The proponent is asked to provide units for this table.	

EC 30	**EA Reference:**:	Section 6.5.4.1 Change in Air Quality Page 6-34; Table 6-22 Page 6-38
	Scoping Document Cross Reference:	5.3.4.2 Air Quality – Description of emissions and emission rates from upset conditions
	Scoping Document Satisfied:	Scope not satisfied

Preamble:	P. 6-34 alludes to the potential of an explosion or fire but states that the emissions would be marginally small, and does not provide any information on the frequency, magnitude, extent or duration of such an incident. The only analysis of an emergency event/upset conditions provided is for a relatively straightforward emergency flaring procedure.
Request:	The proponent is asked to revisit the possibility of a catastrophic event and carry out an appropriate analysis of the possible frequency, magnitude, extent and duration.

EC 21	**EA Reference:**:	Section 6.5.5.2 Offshore Page 6-45, Table 6.26
	Scoping Document Cross Reference:	5.3.4.2 Air Quality. Description of annual estimates.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Total of the four platform's CH4 CO2eq is greater than the provincial total after the inclusion of Hebron.	
Request:	The proponent is asked to reconcile this difference.	

EC 32	**EA Reference:**:	Section 6.7 Follow-up and Monitoring Page 6-47
	Scoping Document Cross Reference:	5.3.4.2 Air Quality Method for measuring or validating initial emission estimates. 5.3.4.2 Air Quality – Mitigation and Monitoring
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The proponent has only stated its intent to report its emissions, while the scoping document clearly states that the methods for validating and monitoring emissions methods should be included. While the difficulties of carrying out ambient monitoring in this location are understood, there should be some description of the methodologies that will be used to estimate or measure emissions once the project is underway. Given the variation in emissions between this project and the others in the area, it is important that this be undertaken.	
Request:	The proponent is asked to describe the methodology that will be used to validate the emissions	

DFO 4	**EA Reference:**	7.3 Existing Conditions Page 7-3
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	The information provided on existing fish habitat in the nearshore area is not sufficient with regards to the CSR scoping requirements. A more detailed description of fish habitat is required for the Bull Arm project area. Page 7-4 indicates that *"…an extensive fish and fish habitat survey of Great Mosquito Cove was conducted for the Hebron Project in August 2009."* However, none of this information appears in the CSR as the descriptions are based on earlier studies. Also, the information provided on fish species and their life history characteristics is not discussed in relation to the habitat present within the nearshore project area.	
Request:	a) Provide the August 2009 fish habitat survey of Great Mosquito Cove. b) Rather than providing general overviews of the life history characteristics of the species present, it should be linked to the habitat present within the nearshore project area itself.	

DFO 5	**EA Reference:**	7.3.1.5 Fish and Shellfish Page 7-7
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request the CSR describe the distribution/abundance of species in the study area. It is likely that American Plaice and Yellowtail Flounder would be found in the Nearshore Project Area.	
Request:	Confirm whether American Plaice or Yellowtail Flounder exist in the Nearshore Project Area.	

DFO 6	**EA Reference:**	7.3.1.5 Fish and Shellfish Page 7-14
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request the CSR describe the distribution/abundance of species in the study area.	
Request:	This section should be revised as there are a number of inaccuracies and discrepancies, including: • Snow Crab occur in all major bays surrounding the island and also off Labrador, not just "*...from Fortune Bay to White Bay*" as indicated in the text. • The 170-380 m estimate is likely one taken from a reference for the Gulf of St. Lawrence. In Newfoundland and the Eastern Scotia Shelf, Snow Crab are captured at greater depths along the slope edges, 20-2000 m is a common estimate. • Although a statement is made that, "*The distribution of small crabs is not well documented…*", the distribution of small crabs is described in any of the most recent Canadian Science Advisory Secretariat (CSAS) Research Documents produced by DFO NL Region. • Contrary to the text provided, females carry fertilized eggs for 1-2 years, which is likely influenced by temperature (Sainte-Marie 1993; Moriyasu and Lanteigne 1998; Comeau et al. 1999). Sainte-Marie, B. 1993. Reproductive cycle and fecundity of primiparous and multiparous female snow crab, *Chionoecetes opilio*, in the Northwest Gulf of St. Lawrence. Can. J. Fish. Aquat. Sci. 50(10): 2147-2156. Moriyasu, M. and Lanteigne, C. 1998. Embryo development and reproductive cycle in the snow crab, *Chionoecetes opilio* (Crustacea: Majidae), in the southern Gulf of St. Lawrence, Canada. Can. J. Zool. 76(11): 2040-2048. Comeau, M., Starr, M., Conan, G.Y., Robichaud, G. and Therriault, J-C. 1999. Fecundity and duration of egg incubation for multiparous female snow crabs (*Chionoecetes opilio*) in the fjord of Bonne Bay, Newfoundland. Can. J. Fish. Aquat. Sci. 56(6): 1088-1095.	

C-NLOPB 25	**EA Reference:**	Section 7.3.2.2 Page 7-17 and elsewhere
	Scoping Document	5.3.2.3 Marine Fish and Shellfish

	Cross Reference:	
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The description of substrate conditions in the Offshore Project Area relies heavily upon the references Chevron (2002) and Chevron (2003). They should be made available for examination/review as required.	
Request:	Submit Chevron (2002) and Chevron (2003).	

EC 34	**EA Reference:**:	Section 7.3.2.2 Habitat Page 7-17, Paragraph 3.
	Scoping Document Cross Reference:	Environment Canada Report EPS 1/RM/42, April 2002, Biological Test Method: Reference Method for Determining the Toxicity of Sediment Using Luminescent Bacteria in a Solid-Phase Test
	Scoping Document Satisfied:	Information and analysis provided are not complete and seem to be worded incorrectly
Preamble:	At Section 7.3.2.2, Page 7-17, paragraph 3, the text states "Eight of the twenty sediment samples taken throughout the Hebron Project Area were declared toxic using the Microtox™ test. None were declared toxic by the amphipod survival test. The Microtox™ test is known to be hyper-sensitive in substrates with less than 20 percent fines, which is the case in the Hebron Project Area (Chevron 2003)."	
Request:	(1) The text should state what is the criterion being used to judge a sediment sample being declared toxic. (2) Suggested text based on limitations of the test, the text should read something like "The Microtox™ test is known to be sensitive in substrates with more than 20 percent fines". This is based on information contained in Environment Canada Report EPS 1/RM/42 which could be referenced. (3) The proponent should reword and clarify the meaning of the last sentence.	

DFO 7	**EA Reference:**	7.3.2.5 Fish and Shellfish Page 7-26
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied

Preamble:	Section 5.3.2.3 request that the CSR describe the distribution/abundance of species in the study area.
Request:	Although American Plaice is noted as the fourth most abundantly caught species during the Hebron biological survey, there is no species description provided. It is noted, however, that a description of this species is included in Section 11.3.1.2, which should be cross-referenced here. This section states that, "*Historically, the most abundant species in the area, and over the entire Grand Banks, were Atlantic cod and American plaice. However, in more recent years, these species have become uncommon on the northern portion of the Grand Banks.*" This statement is not accurate for American Plaice. While there are fewer plaice in NAFO Div. 3L than were present in the 1980s, this species is still not uncommon. For example, in Figure 7.5, plaice is the fourth most common species encountered by catch and in Table 7-7 it is ranked third by weight landed. Please revise accordingly.

DFO 8	**EA Reference:**	7.3.2.5 Fish and Shellfish Page 7-28, Table 7-7
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request that the CSR describe the distribution/abundance of species in the study area.	
Request:	Information in Table 7-7 appears to be incorrect. Table 7-7 indicates that Yellowtail Flounder were not caught in the Study Area in 2007, however, distribution plots from 2007 (from the most recent assessments) depict Yellowtail Flounder throughout the Study Area at depths less than 93 m on the bank. Table 7-8 also contradicts Table 7-7 as values are reported for Yellowtail Flounder in 2007. Furthermore, values for American Plaice also seem low. The table indicates landed weight but should be revised to be weight caught as this information is from DFO research vessel surveys and not fishery related. Also the figures in the table need re-examination. For example, the table suggests there was 2,439,298 kg of Redfish caught in the in 2007 survey, which would be equivalent to 2, 439 metric tons (an incredibly high value for this fishery). Values for some of the other species are suspect as well. Perhaps there was some error in reading	

	the data from DFO species catch weight. Please review this information.

DFO 9	**EA Reference:**	7.3.2.5 Fish and Shellfish Page 7-30
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request that the CSR describe the distribution/abundance of species in the study area.	
Request:	This section states that, "*Halibut population estimates declined for many years, but a slight increasing trend has been observed more recently (Kulka et al. 2003).*" This information and reference is not considered "recent". More recent information exists which should be incorporated into the CSR.	

DFO 10	**EA Reference:**	7.3.2.5 Fish and Shellfish Page 7-31
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request that the CSR describe the distribution/abundance of species in the study area.	
Request:	This section should be revised as there are a number of inaccuracies and discrepancies, including: • Although it states that, "*Snow crab are relatively sedentary and are not known to undergo seasonal or spawning migrations,*" it has been known for quite some time that Snow Crab undergo seasonal breeding migrations throughout the Gulf of St. Lawrence and Newfoundland (Ennis et al. 1988). • Contrary to the statement, "*The spatial distribution of snow crab appears to be a function of their age, physical habitat and time of the year,*" the spatial distribution of Snow Crab may have nothing to do with age as we cannot age them. They also terminally molt at different sizes/ages, which introduces further uncertainty to the	

	statement. • Contrary to the statement, "*Recently-settled juveniles (<30 mm, carapace width) prefer a mud substrate…*" most appear to settle on shallow hard substrates (i.e., atop banks). Therefore, the following statement, "*Given the low percentage of fines in the substrate within the Offshore Project Area, it is not considered juvenile snow crab habitat*" is also incorrect. • The exploitable biomass of Snow Crab in NAFO Div. 3L has changed drastically since the DFO (2005b) report referenced here. Since assessments of this species are carried out annually, it would be more appropriate to reference the most recent, 2010 DFO Science Advisory Report, which indicates that the exploitable biomass of Snow Crab is now increasing. Ennis, G.P., Hooper, R.G. and Taylor, D.M. 1988. Changes in size composition of male crabs (*Chionoecetes opilio*) participating in the annual breeding migration in Bonne Bay, Newfoundland. CAFSAC Res. Doc. 88(2). 14p.	
DFO 11	**EA Reference:**	Section 7.3.2.5 Fish and Shellfish Page 7-31
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.3 request the CSR describe the distribution/abundance of species in the study area.	
Request:	This section states that, "*The most recent measure of the population of Greenland halibut on, and in the vicinity of the Grand Banks, indicates the exploitable biomass is currently at the lowest recorded level (Healey and Mahe 2005).*" The reference is an assessment of Greenland Halibut based on an age-based population model for the subarea 2 + Division 3KLMNO stock area, not just "*on, and in the vicinity of the Grand Banks*". It should also be noted that as the assessment of this resource occurs annually, a 2005 reference is quite dated. Information from more recent studies should be incorporated into the CSR.	

DFO 12	**EA Reference:**	7.4.1 Nearshore Page 7-42
	Scoping Document Cross Reference:	Section 3.1 Project Components

		Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 7.4.1 outlines nearshore project activities that could potentially interact directly or indirectly with marine fish and fish habitat. This list of activities does not include upgrades to the terminal at Back Cove, which will be used for vessel docking during crew transport. During a recent visit to the Bull Arm site, DFO was informed that upgrades to the terminal would be required, which could result in a narrowing of the mouth of a stream which empties at the site.	
Request:	a) Provide details on the upgrades required at the Back Cove terminal. b) Proposed upgrades to the terminal should be included in the environmental effects assessment.	

DFO 13	**EA Reference:**	7.5 Environmental Effects Analysis and Mitigation Page 7-46
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Although the potential environmental effects listed within the tables in this section are fairly comprehensive, some effects have not been adequately described within the text. Thus, it is important that there is sufficient discussion within the text to support the claims made within the tables.	
Request:	Provide a more detailed explanation of environmental effects.	

DFO 16	**EA Reference:**	7.5 Environmental Effects Analysis and Mitigation Page 7-46
	Scoping Document Cross Reference:	Section 3.1 Project Components
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	In Table 7-11 the use of "*bubble curtains, if required*" and "*Compliance with terms of Section 32 Fisheries Act Authorization (if required)*" are	

	listed as mitigations during removal of the bund wall and disposal (dredging/ocean disposal). These mitigations are typically associated with in-water blasting, however, the CSR does not specify that in-water blasting will be used for bund wall removal and disposal.
Request:	Provide clarification on whether in-water blasting will be required for removal of the bund wall.

DFO 17	**EA Reference:**	7.5 Environmental Effects Analysis and Mitigation Page 7-62
	Scoping Document Cross Reference:	Section 3.1 Project Components Section 5.3.2.1 Marine Ecosystem
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Table 7-11 lists installation of temporary moorings at the offshore project location as a project activity, however, there is no other information on these temporary moorings within the CSR.	
Request:	Provide details on the nature of these moorings.	

DFO 14	**EA Reference:**	7.5.1.1 Change in Habitat Quantity Page 7-49
	Scoping Document Cross Reference:	Section 5.3.6.3 HADD
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The last paragraph of this section states that, "*In accordance with the DFO policy of no net loss of fish habitat, a habitat compensation program will be developed in conjunction with DFO as a mitigation measure for the net loss of fish habitat resulting from nearshore and offshore Hebron Project activities.*" Although DFO acknowledges the proponent's commitment to the development and implementation of a fish habitat compensation program, a fish habitat compensation strategy is required as part of this CSR.	
Request:	Provide a Fish Habitat Compensation Strategy	

EC 36	**EA Reference:**:	Section 7.5.1.2 Change in Habitat Quality Page 7 - 52 last line to Page 7 - 53, line 3.
	Scoping Document Cross Reference:	5.3.2.3 Marine Fish and Shellfish
	Scoping Document Satisfied:	Information and analysis provided are not complete
Preamble:	(1) At Section 7.5.1.2, sub section on Nearshore, sub-sub section on Contamination, starting on Page 7 - 52 last line the text states "During the EEM program, iron and manganese were the only elements recorded above the Maximum Allowable Effects Levels, the concentration level in sediments above which the frequency of associated biological effects are unacceptable." (2) At Section 7.5.1.2, sub section on Offshore, sub-sub section on Contamination, on Page 7-56, the text states "Given that the metals concentrations reported are total concentrations, there is little risk that the metals will become highly bioavailable to filter feeding organisms should the sediments become suspended during offshore construction activities.".	
Request:	(1) For point # 1 above, please provide a reference for these Maximum Allowable Effects Levels, it is not clear what guidelines are being used for comparison with measured metal levels, or which organization has produced these guidelines. (2) For point # 2 above, it is recommended that the proponent compare metal levels against CCME interim marine sediment quality guidelines provided in CCME (1999) as a more rigorous way to predict whether adverse biological effects are likely or not. Reference: Canadian Council of Ministers of the Environment (CCME). 1999. *Canadian Environmental Quality Guidelines*. Canadian Council of Ministers of the Environment, Winnipeg.	

DFO 15	**EA Reference:**	7.5.1.4 Potential Mortality (Nearshore) Page 7-60
	Scoping Document Cross Reference:	Section 5.3.2.3 Marine Finfish and Shellfish
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Dewatering of the drydock will result in fish mortality, which is not included in the environmental effects assessment. During dewatering it is likely that fish will be stranded within the drydock area. Prior to	

	dewatering, fish should be removed from the isolated drydock area and be relocated to a predetermined location within the nearby marine environment.
Request:	a) Provide details of a fish recovery and relocation program. b) Fish mortality should be included as a potential environmental effect within the environmental effects assessment (text and tables). c) Make reference to the fish recovery and relocation program in the applicable mitigations column in Table 7-11.

EC 35	**EA Reference:**:	Section 7.5.1.4 Potential Mortality Page 7-62, Table 7-11 – Environmental Effects Assessment: Construction and Installation
	Scoping Document Cross Reference:	Section 4 (e) – Factors to be Considered
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The selection of a suitable disposal site is an important aspect of effects mitigation. Another area of concern is raised by the presence of construction debris found during the 2005 survey of the berm disposal site.	
Request:	Proper disposal site selection should be included in Table 7-11 in association with these activities: 1) Dredging of Bund Wall and Possibly Sections of Tow-out Route; and, 2) removal of Bund Wall and Disposal. Removal of construction debris should be added to the list of mitigations in Table 7-11 under the activity “Removal of Bund Wall and Disposal”. <u>Typos</u> Table 2-2: Page 2-1 Well Treatment Fluids – under Attributes “fluids” is misspelled. Pages 10-60 and 10-61: Reference is made to Sections 10.5.1.5 and 10.5.1.6. The last section numbered in this sequence of Chapter 10 is 10.5.1.4. <u>References</u> Page 18-2. The citation is incorrect for AMEC Earth and Environmental	

	Limited (2005a). The study was prepared for Environment Canada.

EC 37	**EA Reference:**:	Project Overview, and Section 7.5.2.2 Change in Habitat Quality Page 7-67
	Scoping Document Cross Reference:	Section 5.3.4.1, bullet 3 (Operational Discharges, in particular SBM drill cuttings)
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	In the Project Overview the text states "and synthetic-based mud will be re-injected into the formation." This is better than regulated practice (NEB Offshore Waste Treatment Guidelines), and ExxonMobil Canada Properties should receive recognition and encouragement for this pollution prevention measure. However, this is not mentioned in Section 7.5.2.2 (starting on page 7 - 67), nor in Table 7.12 (starting on page 7 - 72). but should be discussed at these locations. Re-injection of SBM drill cuttings is feasible and important, as stated in Section 7.5.5.2 at page 7 - 84, paragraph 3, quoted here in full "At Hibernia, partial re-injection of SBM drill cuttings commenced in March 2000; full re-injection capacity began in September 2002. In the 2002 EEM field study, a substantial reduction in hydrocarbon concentrations in sediment was already observed."	
Request:	Section 5.3.4.1, bullet 3 of the Scoping Document clearly states that the EA will consider discharges and emissions including “means for reduction re-use and recovery of wastes beyond those specified in regulations and guidelines”. Re-injection of synthetic-based mud cuttings needs to be discussed in section 7.5.2.2.	

C-NLOPB 26	**EA Reference:**	Section 7.5.2.2 Page 7-70. final paragraph
	Scoping Document Cross Reference:	5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph begins “All liquid discharges will adhere to the OWTG discharge limits and are subject to an Offshore Chemical Management System screening.” OCMS screening typically is applied to chemicals/substances that are planned for use by an operator, most commonly as either drilling fluid or process chemical ingredients. It has not generally been used to characterize whole discharges (e.g., black or grey water, cooling water).	
Request:	The statement should be reconsidered and modified as necessary.	

C-NLOPB 27	**EA Reference:**	Section 7.5.2.4 Page 7-72, paragraph 2
	Scoping Document Cross Reference:	5.3.4.1 Construction and Operational Discharges
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph states that "Due to a larger average size and discharge rate, SBM cuttings stay closer to the well site and do not disperse as widely as WBMs and cuttings."	
Request:	The statement should be referenced, and re-evaluated to determine whether it likely is consistent with the fate of SBM cuttings treated and discharged consistent with the 2002 Offshore Waste Treatment Guidelines (e.g., from a "cuttings dryer").	

C-NLOPB 28	**EA Reference:**	Section 7.5.4.2 Page 7-78, final paragraph
	Scoping Document Cross Reference:	5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph states that "Given the potential spill scenarios within the Nearshore and Offshore Study Areas. . . there is more potential for diesel to interact with the benthic community than crude oil."	
Request:	The statement should be justified and/or referenced.	

HC 4	**EA Reference:**:	Section 8 Commercial Fisheries Page 8-1
	Scoping Document Cross Reference:	Scoping Document Section 5.3.3.3 - Traditional, Existing and Potential Commercial, Recreational and Subsistence Fisheries, including Foreign Fisheries
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	Re: Recreational Fisheries The Scoping Document indicates that traditional, existing and potential commercial, recreational and subsistence fishing will be described. Scoping Document Table of Concordance indicates that this has been addressed in Section 8.3 of the Comprehensive Study. There was no discussion about traditional, recreational or subsistence fisheries in this section. Health Canada provides advice with respect to the ingestion of contaminated 'country foods', also known as traditional foods, which includes those foods trapped, fished, hunted, harvested or grown for subsistence or medicinal purposes, or obtained from recreational	

	activities such as sport fishing and/or game hunting. Country foods do not include foods produced in commercial operations (large farms, greenhouses, etc.).
Request:	Please provide a discussion about traditional, recreational and subsistence fisheries in the nearshore and off-shore areas and whether or not they may be adversely impacted as a result of project activities.

DFO 19	**EA Reference:**	Section 8 – Commercial Fisheries Page 8-1
	Scoping Document Cross Reference:	Section 5.3.3.3 Traditional, Existing and Potential Commercial, Recreational and Subsistence Fisheries, including Foreign Fisheries.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Scoping document requires CSR to provide a description of fisheries in Study Areas (including traditional, existing and potential commercial, recreational and subsistence). However, this section only identifies traditional and existing key species fisheries of significant value in the study areas.	
Request:	a) Study report to include potential commercial, recreational and subsistence fisheries. b) If not included, explain why.	

DFO 20	**EA Reference:**	Section 8 – Commercial Fisheries Page 8-1
	Scoping Document Cross Reference:	Section 5.3.3.3
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Scoping document requires CSR to detail traditional historical fishing activity – abundance data for certain species in this area, prior to the severe decline of many fish species (e.g., an overview of survey results and fishing patterns in the survey areas for the last 20 years). While there is some landings and value data presented as well as harvesting locations, theses are limited to the last 3-6 years.	
Request:	Please provide an overview of survey results and fishing patterns in the survey areas for the last 20 years	

DFO 21	**EA Reference:**	Section 8 – Commercial Fisheries

		Page 8-1
	Scoping Document Cross Reference:	Section 5.3.3.3 Traditional, Existing and Potential Commercial, Recreational and Subsistence Fisheries, including Foreign Fisheries.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Scoping document requires CSR to demonstrate consideration of underutilized species that may be found in the study area as determined by analyses of past DFO research surveys and Industry GEAC survey data, with emphasis on those species being considered for future potential fishers, and species under moratoria. This is not evident in the CSR.	
Request:	Demonstrate consideration of underutilized species that may be found in the study areas as determined by analyses of past DFO research surveys and Industry GEAC survey data, with emphasis on those species being considered for future potential fishers, and species under moratoria.	

DFO 22	**EA Reference:**	Section 8 – Commercial Fisheries Page 8-1
	Scoping Document Cross Reference:	Section 5.3.3.3 Traditional, Existing and Potential Commercial, Recreational and Subsistence Fisheries, including Foreign Fisheries.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Scoping document requires CSR to detail program(s) for compensation of affected parties, including fisheries interests, for accidental damage resulting from project activities. While a Fisheries Compensation Plan will be established, it only states that the plan will be developed based on existing practice and industry-based guidance.	
Request:	a) Identify what the plan will compensate and to whom. That is, who would be an "affected party" and if the plan will include compensation for accidental damage or other negative effect resulting from project activities. b) Although the plan is not yet developed, a summary of "existing practice" and industry-based guidance should be included.	

DFO 18	**EA Reference:**	Section 8.4.2 Potential Interactions (and Impact Pathways) Table 8-14 Potential Project-related Interactions with Commercial Fisheries

		Page 8-45
	Scoping Document Cross Reference:	Section 5.3.3.3 Traditional, Existing and Potential Commercial, Recreational and Subsistence Fisheries, including Foreign Fisheries.
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.3.3 requests that the environmental effects of the project fisheries be discussed. Section 8.4.1.1 indicates that fishers are concerned about effects of construction-related noise and light on fish behaviour in the nearshore however lighting is not indicated as having a potential effect in Table 8-14 or included in Section 8.5 Environmental Effects Analysis and Mitigation.	
Request:	Please revise Table 8.14 and Section 8.5 to include the potential for lighting to affect fisheries.	

DFO 23	**EA Reference**	Section 8.5.1.1 Nearshore (Mitigations) Page 8-51
	Scoping Document Cross Reference:	Section 5.3.3.2 Presence of Structures and/or Operations
	Scoping Document Satisfied	Scope not satisfied
Preamble:	Section 5.3.3.2 of the scoping document request that the means by which adverse effects upon marine use may be mitigated through design or operation procedures. List below are operational regulations and procedures regarding the movement of vessel traffic inshore and offshore.	
Request:	This section should be revised to include the following mitigations: • All vessel traffic to be made aware of the provisions of the Eastern Canada Traffic Zone Regulations (ECAREG) and inshore High Level Traffic Zone practices and procedures. • All parties provide Canadian Coast Guard with required information for issuance of Notices to Shipping and Notices to Mariners in a timely manner. • Private floating and fixed Aids to Navigation be established in Trinity Bay approaches to Bull Arm. See below The following Aids to Navigation are recommended by Superintendent,	

	Aids to Navigation, NL Region. 1. Floating aid identified as Bowers Ledge (TBU) North Cardinal Buoy with RACON. 2. Floating aid identified as Temples Knob (TB2) Starboard Hand Light Buoy 3. Floating Aid identified as Stanton Point (TB4) Starboard Hand Light Buoy 4. Floating Aid identified as The Hoof Port Hand Buoy 5. Fixed Aid – a sector light recommended at Ram Head. Item 4, The Hoof port hand buoy is already in place as a private AtoN. A tower is also in place to accommodate a sector light, item 5. Coast Guard would place, maintain and retrieve Aids on a cost-recovery basis from the project proponent.

DFO 24	**EA Reference::**	Section 8.5.1.2 Offshore, Mitigations Page 8-53
	Scoping Document Cross Reference:	Section 5.3.3.2 Presence of Structures and/or Operations
	Scoping Document Satisfied	Scope not satisfied.
Preamble:	Clarification of procedures is required regarding – Notice to shipping, Not mariners, Notice to Fish Harvesters.	
Request:	Please revise this section accordingly. Canadian Coast Guard will issue Notices to Shipping based on waterway conditions, exploration activities, or other short term operations. Notices to Mariners are written notices, usually based on a broadcast Notice to Shipping and also promulgated by the Canadian Coast Guard dealing with situations over three (3) weeks in duration. Notices to Shipping are broadcast by MF radio and Navtex and by VHF on the Continuous Marine Broadcast (CMB) while they are in force. Notices to Mariners are promulgated by written copy on a monthly basis. Notices to Fish Harvesters are promulgated by DFO Resource Management Branch. They are also broadcast by Coast Guard MCTS Centres on MF and on the CMB for a period of 24 hours. DFO also sends Notices to Fish Harvesters to CBC Radio for inclusion on the Fisheries	

	Broadcast.

C-NLOPB 29	**EA Reference:**	Section 8.5.3.1 Page 8-56, paragraph 2
	Scoping Document Cross Reference:	5.3.2.3 Marine Fish and Shellfish 5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph describes the difficulty in predicting, and possibly in quantifying, effects of an oil spill upon seafood market perceptions.	
Request:	The CSR should consider and describe whether any mitigation of, or response to, actual or potential market perception effects can be envisaged at the contingency planning stage.	

EC 38	**EA Reference:**:	Section 9.3.2.1 Data Sources and Survey Effort for Marine Birds in the Study Area Page 9-6
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed
Preamble:	The following comments pertain to the clarity of the text for the above mentioned section and page of the CSR. Changes to text should be made as appropriate:	
Request:	It is not clear where the data come from and which data were used for the summaries that follow. The text should indicate that PIROP data were collected from 1984-1992, and ECSAS data from 2006-2009. Page 9-6 states "*Systematic marine bird observations (Tasker surveys; Tasker et al. 1984) were conducted on the northern Grand Banks and the adjacent Orphan Basin from 2004 to 2008.*". – CWS surveys were also systematic and also used the Tasker method. As currently written, it sounds as though this method is unique to these surveys. The text should be changed to clarify this. Page 9-6 also states "*Tasker surveys provide marine bird data as densities (numbers per km2). The offshore research and seismic-related cruises on which Tasker surveys and other marine bird observations were conducted are listed in Table 9-3. The geographic distribution of Tasker surveys in and around the Offshore Study Area is illustrated in Figure 9-4*." – to call these the Tasker surveys is misleading, as the other sources of data also come from survey methodology based on Tasker. Please remove "Tasker" from this description.	

EC 39	**EA Reference:**:	Section 9.3.2.1 Data Sources and Survey Effort for Marine Birds in the Study Area Page 9-8, Table 9-3
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed
Preamble:	Not clear from previous text section 9.3.2.1 which data this table is summarizing.	
Request:	Recommend adding a sentence in the Table heading to indicate sources of the data.	

GF 7	**EA Reference:**:	Section 9.3.2.2 General patterns of Marine Bird Occurrence in the Offshore Study Area Page 9-9
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*but generally in lower densities than on the shelf and slope; the deeper waters away from the shelf and slope are typically less productive*."	
Request:	Provide a reference for the sentence.	

EC 40	**EA Reference:**:	Section 9.3.2.2 General Patterns of Marine Bird Occurrence in the Offshore Study Area Page 9-10 and Table 9-4
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed.
Preamble:	The species and general monthly abundance expected on the Continental Shelf and slope waters of the Offshore Study Area are listed in Table 9-4.	
Request:	Sources of data listed at end of table do not cite CWS 2009, although was discussed in section 9.3.2.1 as a data source. This source should	

	be added. Murres are not scarce to uncommon on the Grand Banks according to CWS 2009. The survey results reported in CWS 2009 conducted from 2006-2009 indicate relatively high densities of murres year-round in the study area. The data show murres as common on the shelf during the non-breeding season, less common (but not scarce) during the breeding season. Brown 1986 also indicates relatively high densities for murres (*Uria spp*) in the study area during the non-breeding season (1-10 birds/km). Lock et al. 1994 also indicates relatively high densities of vulnerable species (Auks) in the study area. The densities of murres reported in the table should be changed as indicated.

EC 41	**EA Reference:**:	Section 9.3.2.4 Species Profiles Page 9-16, Table 9-6
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed.
Preamble:	There is an error in the number presented for Average Density of All Species from 5-8 November (458.7 is too high).	
Request:	Please correct the number.	

GF 8	**EA Reference:**:	Section 9.3.2.4 Species Profiles Page 9-22
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*That number is low compared to the numbers of Leach's Storm Petrels seen from ships in the same area, and may have been a result of the tall height of observers off the water and the lack of persistent use of binoculars for scanning. Storm-Petrels are difficult to see because they are dark and fly very low over the water*."	
Request:	Should reference Ballie et al. 2005.	

EC 42	**EA Reference:**:	Section 9.3.2.4 Species Profiles Page 9-23 Pomarine Jaeger, Parasitic Jaeger and Long-tailed Jaeger
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed
Preamble:	This section states: "…Like skuas, they are kleptoparasites, preying chiefly on Black-legged Kittiwakes and Arctic Terns."	
Request:	The above sentence is misleading, however because they do not prey chiefly on kittiwakes and terns, but rather steal the prey of the kittiwakes and terns. Please rewrite this sentence.	

GF 9	**EA Reference:**:	Sections 9.4.1.1, 9.4.1.2, 9.4.1.3 Page 9-28
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Lighting at night throughout the Project may attract marine birds, particularly the Leach's Storm-Petrel, which may strike vessels or platform infrastructure leading to injury, strandings, and mortality*."	
Request:	Table 9-9, should identify mortality as source of effect from lighting as birds that hit structures can die (thus, infrastructure and lighting must both have mortality, not just infrastructure)**.**	

C-NLOPB 30	**EA Reference:**	Section 9.4.2.4 Page 9-29
	Scoping Document Cross Reference:	5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph states "An oil spill, although unlikely, could potentially occur. . ."	
Request:	The reference to a spill being "unlikely" should be referenced or qualified or both.	

EC 43	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality Page 9-34 Lighting
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed
Preamble:	There is very little information on the conditions favourable to bird strandings. More information of this type would be beneficial to our understanding of this phenomenon. CWS would like to see a commitment, not only to standardized searches and releases, but also to data collection regarding the meteorological and operational conditions experienced at the time of strandings.	
Request:	Data regarding meteorological and operational conditions (lighting flares, etc.) should be collected and submitted to CWS along with all reports of strandings.	

GF 10	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality, Offshore Lighting Page 9-36
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Habitat quality can also be degraded for birds attracted to lights may be exposed to increased risk of predation by gulls.	

C-NLOPB 31	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality, Offshore Lighting Page 9-36
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Young-of the-year birds appear to be more susceptible to light attraction*	

	than are adults, but the extent of Storm-Petrel susceptibility is unclear."
Request:	Please provide the reference for this statement. Has the attraction issues associated with lighting and possible spectral mitigations been considered. Some relevant studies are: Marquenie, J., Donners, M., Pool, H., Steckel, W., de Wit, B. 2008 *Adapting the Spectral; Composition of Artificial Light To Safeguard the Environment*, as cited from Petroleum and Chemical Industry Conference Europe – Electrical and Instrumentation Applications. 2008 Poot, H., B.J. Ens, H. de Vries, M. A.H. Donners, M.R. Wernand, and J.M. Marquenic. 2008. *Green Light for Nocturnally Migrating Birds* as published in Ecology and Society 13(2):47 available at http://www.ecologyandsociety.org/vol13/iss2/art47/.

GF 12	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality, Offshore Lighting Page 9-36
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Other marine bird species, as well as migrating land birds, are also known to be attracted to lights on offshore oil and gas platforms at night, especially during foggy or overcast conditions. Birds could potentially injure themselves by flying into structures on the platform (Avery et al. 1978).*"	
Request:	Given that Dovekies are one of the most abundant species in the area at certain times of year, this discussion should be expanded to consider evidence from ships in Alaska of closely related Alcids flooding onto boats from lighting levels far lower than that of a platform (Dick and Donaldson 1978, Condor 80:235-236;) and specifically consider dovekies. Further, because Dovekies are highly vulnerable to oil pollution, a two-tiered effect should be considered here: birds attracted to the platform are more likely to experience oil pollution from discharges.	

GF 13	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality, Offshore Lighting Page 9-36

	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Foggy nights seem to attract more birds, and Leach's Storm-Petrels are more common in the Offshore Study Area during late summer to early fall***."**	
Request:	Given that data exist for: 1) the number of foggy nights the project will experience; 2) density of lesp in study area; and 3) past salvage information, a model should be developed to provide estimates of the number of birds which may be salvaged during the lifetime of the project (separate models for both development and production). Further, it should be noted that the salvage protocol and the past findings of the numbers of birds represents an underestimate of the number of birds effected by lighting as the salvage protocol only works for birds that hit and fall on the platform; it does not address birds that fall into the water.	

GF 14	**EA Reference:**:	Section 9.5.1.2 Change in Habitat Quality, Offshore Lighting Page 9-37
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*EMCP will develop protocols for regular searches of birds that may become stranded on all vessels and facilities. Recovered birds will be released in accordance with standard protocols (Williams and Chardine 1999; Husky Energy 2008)."*	
Request:	Given that a new platform is being built, why not instead be at the forefront of new lighting technologies, which may reduce the need to recover birds? Such as shielding lights, changing light signature pattern, not having lights projected outwards (See Poot et al 2008, Ecology and Society 13:47; Baccetti, N., Sposimo, P. & Giannini, F. 2005. Avocetta 29: 89–91; Rodriguez and Rodriguez 2009 Ibis 151:299). Workers should be required to cover their windows at night to reduce light pollution and all non-safety lights should be shielded wherever possible.	

GF 15	**EA Reference:**:	Section 9.5.1.4 Potential Mortality Page 9-41

	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*The only routine Project construction/installation activity that is predicted to potentially result in mortality of marine birds is blasting in the nearshore*."	
Request:	Given that birds may hit infrastructure due to lighting or experience predation due to attraction to the platform during installation, can experience mortality, this sentence is incorrect. (Table 9-10 notes potential mortality, therefore appropriate mitigation measures to PREVENT attraction and mortality should be required).	

GF 16	**EA Reference:**:	Section 9.5.2.2 Change in Habitat Quality - Flaring Page 9-45
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*As in the case of lighting (described above), EMCP will develop protocols for regular searches of birds that may become stranded on all vessels and facilities. Recovered birds will be released in accordance with standard protocols (Williams and Chardine 1999; Husky Energy 2008). Stranded bird reports will be provided to the CWS*."	
Request:	In previous offshore oil and gas EAs in this region, other mitigation strategies have been noted on how to reduce the effects of flaring on marine birds. For example, Husky Oil Ltd (2001) noted they would attempt to "*schedule routine maintenance shutdowns to coincide with the time of maximum Storm-petrel local abundance…"* (pg 15). Assuming that shutdowns mean less chance of flaring, this mitigation should be required. Given that the Hibernia project exceeded their flaring quotas (e.g., C-NOPB 1999 Annual Report), the Hebron project needs to provide evidence that they will make every attempt to minimize flaring and provide details as to how this will be achieved. Further, there should be an analysis of past flaring for all production projects in the C-NLOPB's jurisdiction, the amount that they flared, when (seasonally) the flaring occurred and whether the flaring occurred at low lighting. A model should be developed to provide estimates of seabird mortality based on	

	these data in conjunction with known seabird (lesp and dove) estimates.

GF 17	**EA Reference:**:	Section 9.5.2.4 Potential Mortality Page 9-47
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*As described above, the Leach's Storm-Petrel is the most likely marine bird species to be affected*…"	
Request:	This sentence should include Dovekies as an additional species also affected by gas flaring at night.	

GF 18	**EA Reference:**:	Section 9.5.2.4 Potential Mortality Page 9-47
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	*There is currently no known mitigation for this potential effect, but flaring is expected to have minimal impact on marine birds over the duration of the Project*."	
Request:	See Comment 16 above regarding mitigation for flaring.	

GF 19	**EA Reference:**:	Section 9.5.2.4 Potential Mortality Page 9-48
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*The Environmental Studies Research Find (ESRF) has commissioned a study on the effects of sheens on marine birds that has not yet been published*."	

Request:	This should not be used as an excuse for not including data collected by operators on the frequency, size and persistence of oil sheens in the C-NLOPB's jurisdiction. At the very least EMCP should be required to present data from Hibernia. Without these data, a worst case scenario must be assumed. Without these data, it is not possible for the public to draw its own conclusions about the potential effects of oil sheens associated with the project and to assess whether the EA is correct in its assessment of the effect. With regards to sheens, a published paper, resulting from ESRF funding mentioned above was released in April 2010, prior to the release of the CSR, and should be discussed: O'Hara and Morandin 2010. Effects of sheens associated with offshore oil and gas development on the feather microstructure of pelagic seabirds. Marine Pollution Bulletin 60: 672-278. General: in the White Rose Project CSR, an assessment of the level of certainty of the residual effect of the prediction and the likelihood of the effect occurring were provided for each predicted effect (I see EMCP has this step for overall). Why was this not done for this project? These are important steps as they provide the public with a rating of whether the prediction is a best guess, or whether the prediction is relatively certain. General: Despite the definition of a significant residual environmental effect changing from the number individuals in the area (see Husky Oil Ltd 2001) potentially effected to populations, and improved information on marine bird abundance in the study area, there are still no species specific models provided in areas where the impact could be assessed. This continues to be an on-going weakness for oil and gas production EAs.

EC 45	**EA Reference:**:	Section 9.5.2.4 Potential Mortality Page 9-48
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Using the Study Area(s)
	Scoping Document Satisfied:	Not a deficiency, but clarification is needed
Preamble:	The ESRF study on the effects of sheens on marine birds has been published.	
Request:	The information from the results of this study should be included in the CSR	

GF 20	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-53
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*In June 1979, an oil spill occurred from the Ixtoc I off Texas*…"	
Request:	Ixtoc was not a spill, it was a blowout (and it was off Mexico, not Texas). This is an important distinction.	

GF 21	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-53
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Birds living in coldwater environments, such as the Study Area, are most likely to succumb to hypothermia (Hartung 1995).”*	
Request:	Wiese and Ryan 2003 should be cited here as well**.**	

GF 22	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-54
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Oiled birds that are cleaned and released might not have high survival rates*."	
Request:	This section needs to be updated. There has been much discussion in the seabird community on this issue, particularly in the past 3 months. Michael H. Ziccardi is the director of the Oiled Wildlife Care Network at the Wildlife Health Center at UC Davis, is quoted as saying “Even in the best of circumstances, many oil-affected animals will die in the rehabilitation center. However, due to the evolution of professional oiled rehabilitation organizations over the past 30 years, survival is much	

	higher than in the past. For spills that my organization, the Oiled Wildlife Care Network, manages for California, we successfully release, on average, 50 to 75 percent of the live animals collected." **http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2010/06/23/EDFM1E32SQ.DTL#ixzz0rgxFIdJA** Thus, Dr. Ziccardi is suggesting that the situation may not be as dire as we think when it comes to cleaning birds.

EC 47	**EA Reference:**:	Section 9.5.4.3 – Potential Mortality – Offshore Page 9-56
	Scoping Document Cross Reference:	Section 5.3.2.2 – Marine Birds – environmental effects of the project
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	The fourth paragraph on page 9-56 states "It appears that direct, long-term sublethal toxic effects on marine birds are unlikely." Research has shown that oil components are eliminated relatively quickly from the internal tissues of birds. However, recent research has clearly demonstrated delayed toxic effects on the immune and endocrine systems and on reproductive behaviour and success of birds after brief exposure to oil.	
Request:	(a) The proponents should better describe the duration of sublethal toxic effects of oil exposure on the immune and endocrine systems and on reproductive behaviour and success of birds.	

GF 23	**EA Reference:**:	Section 9.5.4.3 – Potential Mortality – Offshore Page 9-57
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Given that the EA discusses the lack of relationship between the quantity of oil spilled and the resulting mortality of seabirds in past oil spills, there should be a paragraph which discusses small spills known to originate from all production platforms in the C-NLOPB's jurisdiction, the frequency of these spills *and* follow-up on them especially regarding persistence & size. Information should be provided on whether attempts were made to contain/clean up small spills from platforms and how the	

	impacts of these small spills on seabirds were assessed and by whom (i.e., CWS or operator). If data on estimated mortality associated with small spills were not obtained, it should be discussed why this was not possible.
Request:	At the very least, EMCP should provide these data from the Hibernia Project. If these data are not presented, it should be stated why they are not presented. Further, there should be a citation on the impact of chronic oil pollution on seabird populations (Piatt et al. 1990. Effects of oil pollution on marine bird populations. In Effects of oil on wildlife, Research, Rehabilitation and general concerns. Proceedings from: The Oil Symposium, Herndon, Virginia, Oct 16-18 1990).

GF 24	**EA Reference:**:	Section 9.5.4.3 – Potential Mortality – Offshore Page 9-58
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*Mitigation for accidental hydrocarbon spills will consist of following the protocols detailed in the spill response plan. The oil spill response plan is under development. Depending on the nature and tiered response required, mitigations include the provision for spill response equipment and the rescue and rehabilitation of oiled marine birds*."	
Request:	Spill Response plans should be a public document, which is included in the EA process prior to permitting the Hebron project. Further, spill response plans should include detailed information as to HOW the impact of all oil spills > 1 bbl will determine the impacts of seabirds in the spill area. These plans should be based on prior experience in the area and describe successes and failures at attempts to clean and contain spills.	

C-NLOPB 32	**EA Reference:**	Section 9.5.4.3 Page 9-58, paragraph 3
	Scoping Document Cross Reference:	5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s) 5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Further clarification required
Preamble:		
Request:	While the detailed oil spill response plan required for the offshore portion of the Project likely will not be formally submitted for some time, greater detail than that presented in the cited paragraph should be available, and provided, in the CSR.	

GF 25	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-59, Table 9-13
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Subsea blowout predicted as reversible to marine bird populations.	
Request:	A prediction of a blowout, which could last 36 months as being reversible to all seabird populations present in the study area is not substantiated. EMCP must discuss the potential effects of a blowout separately and provide details on a worst case scenario and justify and provide species-specific population models which support this prediction**.**	

C-NLOPB 33	**EA Reference:**	Section 9.5.5.2 Page 9-61, final paragraph
	Scoping Document Cross Reference:	5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:	The paragraph states “However, condensate from a deepwater blowout may be considerably reduced when it reaches the surface, and the wind and wave conditions typical of the Grand Banks will further aid in the dispersal of condensate.”	
Request:	The relevance of condensate to the paragraph’s discussion of oil blowout effects is unclear. This should be clarified or the statement removed.	

C-NLOPB 34	**EA Reference:**	Section 9.5.7 Page 9-63
	Scoping Document Cross Reference:	5.3.6 Biological and Follow-up Monitoring
	Scoping Document Satisfied:	Further clarification required
Preamble:		
Request:	The follow-up / monitoring discussion is weak and over-generalized. At the very least, monitoring of marine birds following an oil spill should be described or referenced, as it is elsewhere in the CSR document. The potential for marine bird observation programs associated with the Project to lessen uncertainty respecting potential spill effects, and potential effects of light/flare attraction, should be discussed further.	

	It should be explained whether the marine bird observation program described in paragraph 3 for the MODU program also will be in place during the production platform's operation.

GF 26	**EA Reference:**:	Section 9.5.7 Follow-up and Monitoring Page 9-63
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"*A specific EEM program to verify the accuracy of assessment predictions and the efficacy of mitigation measures is not planned for Marine Birds*."	
Request:	This is unacceptable given that birds are a VEC and the most vulnerable to oil (and light) pollution. The EEM should at the very least include a verification of the accuracy of the assessment predictions for accidental spills. Further, EMCP should be required to contribute to the knowledge base on the effects of light and flares as they pertain to attraction. An automated radar system (such as "Merlin" Bird radar; see also Zaugg et al. 2008, Journal of the Royal Society Interface, 5:1041-1053; Hüppop et al. 2006 Ibis 148) should be required as part of the construction of the platform. General – the primary stakeholder, ExxonMobil is also the lead operator for the Hibernia Project. When members of the public, including NGOs who participated in EA reviews for Hibernia requested important information on oil spill pollutant data ExxonMobil choose not to disclose this information (Fraser, G.S. and J. Ellis 2008. Reply from Gail Fraser and Joanne Ellis to a letter from CNSLOPB. *Journal of Environmental Assessment Policy and Management.* 10 (4): 483). I request a statement from the EMCP that they have a commitment to disclosure, particularly around oil pollutant data.	

EC 44	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-58, Table 9-13
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Using the Study Area(s)
	Scoping Document	Not a deficiency, but clarification is needed

	Satisfied:	
Preamble:	The numbers in the table need to be updated.	
Request:	Please make the following changes: Wadham Islands Arctic and Common Terns 184[L] Funk Island: Northern Gannet 9987[L] Black-legged Kittiwake 100[N] * Cape Freels and Cabot Island Arctic and Common Terns Common Murre 10000[L] Baccalieu Island: Northern Gannet 2254[L] Black-legged Kittiwake 6456[L] Common Murre 1697[L] Thick-billed Murre216[L] Razorbill 352[L] Corbin Island: Herring Gull 50[L] The corresponding totals at the bottom of the table need to be changed as well. *** N reference to be added:** Nettleship, D.N. 1980. A guide to the major seabird colonies of eastern Canada, CWS, Dartmouth.	

EC 48	**EA Reference:**:	Section 9.5.4.3 Potential Mortality Page 9-58, Table 9-13 – Environmental Effects Assessment: Accidental Events

	Scoping Document Cross Reference:	Section 5.3.2.2 – Marine Birds – environmental effects of the project
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The table indicates that environmental effects from an OLS spill, subsea blowout or crude oil surface spill could be of high magnitude, high geographic extent but moderate duration. If a large oil spill occurred during the marine-bird breeding season and the oil slick moved towards the Witless Bay bird colonies, a large proportion of the breeding birds could be oiled. Direct mortality along with prolonged sublethal effects on reproduction and health of the marine birds could have a drastic impact on the breeding population for many years.	
Request:	(a) The proponents should more accurately assess the duration and reversibility of environmental effects of a major oil spill on local breeding colonies of marine birds.	

EC 46	**EA Reference:**	Section 9.5.7 Follow-up and Monitoring Page 9-63
	Scoping Document Cross Reference:	Section 5.3.2.2 Marine and/or Migratory Birds Using the Study Area(s) “means by which potentially significant effects upon birds may be mitigated through design and/or operational procedures.”
	Scoping Document Satisfied:	Needs further clarification
Preamble:	The predictions of the CSR (i.e., that light attraction will be not significant) cannot be verified without a follow-up program. CWS is aware that there are no marine bird components in existing EEMs for drilling operations, but it would be valuable for marine bird monitoring to be incorporated into the EEM.	
Request:	Include seabird monitoring in the EEM.	

DFO 25	**EA Reference:**	10.3.1.2 Fisheries and Oceans Canada Cetacean Sightings Database, Page 10-10
	Scoping Document Cross Reference:	Section 5.3.2.4 Marine Mammals and Sea Turtles

	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.2.4 request the CSR describe the distribution/abundance of species utilizing the study area.	
Request:	Lawson and Gosselin 2009 should also be referenced in this section as it includes effort measures and density estimates in a stratum that borders the western edge of the operational study area. Lawson, J. W. and Gosselin, J-F. 2009. Distribution and preliminary abundance estimates for cetaceans seen during Canada's Marine Megafauna Survey: A Component of the 2007 TNASS. Canadian Science Advisory Secretariat Research Document. 28p + vi.	

DFO 26	**EA Reference:**	Section 10.5 Environmental Effects Analysis and Mitigation Page 10-47
	Scoping Document Cross Reference:	Section 5.3.3.1 Noise/Acoustic Environment
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.3.1 of the scoping document requests that the proponent discuss the means by which potentially significant effect may be mitigated through design and/or operational procedures. Section 10.5.1.2 of the CSR describes the environmental effects of surveys, in particular seismic surveys, on habitat quality for marine mammals and sea turtles. While this section does make reference to the *Statement of Canadian Practice with Respect to the Mitigation of Sound in the Marine Environment* (SOCP) it accurate only provides a limited discussion of associated mitigations. For example, the SOCP states that monitoring should be carried out by a qualified Marine Mammal Observer, not a "*dedicated environmental observer*" as specified in the text on Page 10-47 of the CSR. 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 <u>minimum standards</u>, which will apply in all non-ice covered marine waters in Canada	
Request:	Provide all mitigation measures as stipulated in the SOCP that will be implemented to minimize any adverse effects on fish, marine mammals	

	and sea turtles.

C-NLOPB 35	**EA Reference:**	Section 10.5.4.3 Page 10-75 – 10-76
	Scoping Document Cross Reference:	5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope largely met; clarification
Preamble:		
Request:	The applicability to the Hebron Project of the references to "condensate" is unclear and should be clarified.	

DFO 27	**EA Reference:**	Section 11.1.3 – Administrative Page 11-3
	Scoping Document Cross Reference:	Section 5.3.2.5 – Species at Risk
	Scoping Document Satisfied:	Scope not Satisfied
Preamble:	There are several errors in the text about SARA that need to be addressed.	
Request:	a) The purpose of SARA as stated is not entirely correct. Replace text "management of other species to prevent from becoming at risk" with "manage species of special concern to prevent them from becoming endangered or threatened. b) There is reference made to Schedules 2 and 3 of SARA. Note that there are no species left to be reassessed on Schedule 2 and many of the Schedule 3 species have also been re-assessed. c) Section 32 of SARA as worded in this section is incorrect – it does not include critical habitat. Section 32 prohibits the killing, harming harassing, capturing, taking, etc. of an extirpated, endangered or threatened species. Section 33 deals specifically with damage and destruction of residences and Section 58 deals with the destruction of critical habitat. The text should be revised accordingly. d) The 3rd paragraph lists existing recovery strategies/mgmt plans. The Recovery Strategy for North Atlantic Right Whale should also be included.	

DFO 28	**EA Reference:**	Section 11.3 - Existing Conditions Page 11-5

	Scoping Document Cross Reference:	Section 5.3.2.5 – Species at Risk
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	There are several items that need to be addressed or revised in Table 11.2.	
Request:	a) For American Plaice it should be noted that it is the Newfoundland and Labrador population being referred to. b) It is not necessary to refer to the COSEWIC status of species which are listed on Schedule 1 of SARA. c) Earlier in the document (Table 7-2), it mentions that redfish may occur. Since Table 11.2 includes species assessed by COSEWIC, then it should be updated to include Deepwater and/or Acadian Redfish (as applicable) as both these species have been recently assessed by COSEWIC. For Deepwater Redfish, the Gulf of St. Lawrence/Laurentian Channel population was assessed as endangered and the Northern population was assessed as threatened. For Acadian Redfish, the Atlantic population was assessed as threatened and the Bonne Bay population was assessed as special concern. d) Earlier in the document (Section 10.3.3) it mentions that Loggerhead Sea Turtle may occur. This species was recently assessed by COSEWIC as endangered. Table 11.2 should be updated to include this.	

DFO 29	**EA Reference:**	Section 11.3.1.1 – Atlantic Cod Page 11-6
	Scoping Document Cross Reference:	Section 5.3.2.5 – Species at Risk
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Cod was recently re-assessed by COSEWIC and the information in this section needs up-dating.	
Request:	Revise text to indicate that the Laurentian North population is now assessed as endangered, not threatened.	

DFO 30	**EA Reference:**	Section 11.3.1.3 – American eel Section 11.3.1.6 – Grenadier Section 11.3.1.8 – Blue shark Section 11.3.1.11 – White shark Section 11.3.2.4 – Killer whale Section 11.3.2.5 – Harbour porpoise
	Scoping Document Cross Reference:	Section 5.3.2.5 – Species at Risk
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The same comment applies to all of the above sections. The wording used to describe COSEWIC assessments is inaccurate.	
Request:	COSEWIC does not "list" species. Where the document indicates that a species is "listed by COSEWIC" the wording should be changed to indicate that a species is "assessed by COSEWIC as…"	

DFO 31	**EA Reference**	Section 11.3.2. – Marine Mammals and Sea Turtle Species at Risk, Page 11-25
	Scoping Document Cross Reference:	Section 5.3.2.5 – Species at Risk
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The recovery strategies published for marine mammals and sea turtles are listed in this section.	
Request:	It should be noted that there is also a recovery strategy published for the North Atlantic Right Whale.	

DFO 32	**EA Reference:**	Section 12.4.1 Near shore (Project-Valued Ecosystem Component Interactions), Page 12-13
	Scoping Document Cross Reference:	Section 5.3.2.6 Sensitive Areas

	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The scoping document requires the CSR to discuss the environmental effects of the project on sensitive areas. The first paragraph in this section states that, "*These potential effects are fully considered and assessed in the respective VECs (i.e., Marine Fish and Fish Habitat, Marine Birds)*", which implies a complete assessment of all relevant species that may be affected by the development. However, this may not be the case. There are several large (>1000 m^2) productive eelgrass meadows within a 20 km radius of the Bull Arm site. The head of Bull Arm itself is particularly productive, through the presence of eelgrass nursery meadows, pebble-cobble areas, and extensive kelp and algae species, all of which provide cover for a variety of ground fish species, particularly juveniles of several prominent marine commercial species.	
Request:	Please revise this section to include the species to be affected by the impacts on these sensitive areas.	

DFO 33	**EA Reference:**	Section 12.4.1 Near shore (Project-Valued Ecosystem Component Interactions) p. 12-13
	Scoping Document Cross Reference:	Section 5.3.2.6 Sensitive Areas
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The last paragraph on this page states that, "*There is potential for eelgrass beds to be physically affected by an accidental oil spill in the near shore environment during construction, which could result in a change in habitat quality and mortality of individual plants.*" This statement understates a more serious concern, which would be the disruption or destruction of a significant portion of an entire eelgrass meadow. This should also be addressed in Table 12-2 and the environmental effects analysis.	
Request:	Please revise this section to include the impact an entire eelgrass meadow. IN additional please revise the Section 12.4.3 Summary to reflect these changes.	

C-NLOPB 36	**EA Reference:**:	Section 13.4.6 Sea Ice and Icebergs Page 13-7
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		

Request:	What is the duration of the data set that sea ice is based on.

C-NLOPB 37	**EA Reference:**:	Section 14 Accidental Hydrocarbon Spill Events Page 14-1
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Statistical background data and its treatment should be in one section and exposure calculations should be in a different section (i.e. Drilling, Production/Maintenance). There does not appear to be a discussion of small (<1 bbl) spills.	

C-NLOPB 38	**EA Reference:**:	Section 14 Accidental Hydrocarbon Spill Events Page 14-1
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The probability plots for a spill at the Hebron project are presented.	
Request:	The CSR should describe the spill scenario that the model was run on. Also in the last paragraph, “The Study” should be referenced.	

C-NLOPB 39	**EA Reference:**:	Section 14 Accidental Hydrocarbon Spill Events Page 14-1
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Blowouts are described as lasting hours, days, or weeks. Blowouts can last for months and in the Newfoundland and Labrador offshore, mobilization of a drilling unit can likely take weeks to arrive and begin drilling.	
Request:	The CSR should not only consider how long it may take to drill a relief well but also the time required to mobilize a rig.	

EC 49	**EA Reference:**:	Section 14 - Accidental Hydrocarbon Spill Events

	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.4.3 of the Scoping Document clearly states that the EA will consider quantification of risk of hydrocarbon/chemical spills of all volumes, from all facilities associated with the project. Section 14 highlights the potential for discharges from the OLS but none are discussed.	
Request:	There have been at least 6 incidents in 2008-2009 of spills involving the OLS from the 3 active oil fields off Newfoundland. The proponent should quantify the risk associated with potential incidents involving the OLS.	

EC 50	**EA Reference:**:	Section 14 - Accidental Hydrocarbon Spill Events
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.4.3 of the Scoping Document clearly states that the EA will consider quantification of risk of hydrocarbon/chemical spills of all volumes, from all facilities associated with the project. Hydrocarbons must not be limited to crude oil, but also include synthetic/oil based drilling fluids and refined hydrocarbons.	
Request:	Releases of drilling fluids has been an issue in the past in the Newfoundland offshore, the proponent should quantify the risk associated with these potential incidents as well as with refined products as stated in the scope.	

C-NLOPB 40	**EA Reference:**:	Section 14.1 Hydrocarbon Spill Probabilities Page 14-2
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Is the concept safety analysis (CSA) being prepared. The spill/blowout frequency estimates from the CSR should agree with the CSA. The data on wells drilled with ExxonMobil as operator from 1999-2009	

	should be presented to give a snapshot of spill/blowout performance.

C-NLOPB 41	**EA Reference:**:	Section 14.1.1 Blowouts Page 14-3, Table 14-2
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Please provide the reference for the definitions in Table 14-2. Also, SI units (i.e. m^3) should be used and intervals should be reported as ranges (i.e. large = >1000 bbl to <10,000 bbl).	

C-NLOPB 42	**EA Reference:**:	Section 14.1.1 Blowouts Page 14-3, Table 14-3
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Is this data set up to date? Table does not appear to be broken down by classes set out in Table 14-2.	

C-NLOPB 43	**EA Reference:**:	Section 14.1.1.1 Blowouts during Drilling Page 14-4, 1st paragraph
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Please review for agreement with Table 14-3	

C-NLOPB 44	**EA Reference:**:	Section 14.1.1.1 Blowouts during Drilling Page 14-4
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Data is poorly referenced. Please refer to Chevron work for that year. The data should be better documented or links to all base data should be provided for verification.	

GF 27	**EA Reference:**:	Section 14.1.1.1 Blowouts during drilling Page 14-7
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	"The reason for this, according to Scandpower (2000), is that North Sea operators are required by law to always have two barriers during exploration and development drilling, and this is not the case in the US. Regulations similar to the North Sea's apply in Canada (i.e., two barriers), so it is fair to derive blowout frequencies for Canada on the basis of North Sea statistics."	
Request:	The specific guidelines for a two-barrier requirement in Canada should be referenced in this statement.	

C-NLOPB 45	**EA Reference:**:	Section 14.1.1.1 Blowouts during Drilling Page 14-7, Table 14-7
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The blowout risk frequency for Hebron will be calculated as per Scandpower (2000) as the average of the four frequencies provided in Table 14-7 yielding an adjustment factor. The statistical basis for derivation of the adjustment factor is not explained or understood. The CSR should use a more rigorous statistical analysis to show a decreasing trend over time. The data set used for analysis ends at 2000. There is potentially 9 more years of data that could be included in the data set for analysis.	
Request:	The CSR should expand the data set used for blow and spill analysis to include data as close to 2010 as possible. Also, the statistical analysis showing that population is different statistically should be provided.	

C-NLOPB 46	**EA Reference:**:	Section 14.1.1.1 Blowouts during Drilling Page 14-8
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	Previously mentioned statistical testing is required to allow use of 0.51 factor and 64% as a useable ratio.	

C-NLOPB 47	**EA Reference:**:	Section 14.1.1.1 Blowouts during Drilling Page 14-9
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	The calculations here may be supported in the data but the presentation is not easily followed (i.e. A table corresponding to classes in Table 14-2 with frequency numbers). The probability of a gas blowout is 0.0234 over life of project. 1 in 1,300 per year is a bit disingenuous.	

C-NLOPB 48	**EA Reference:**:	Section 14.1.2 Page 14-11
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	What is a "major" platform spill. Define "major" or use one of the classifications from Table 14-2.	

GF 28	**EA Reference:**:	Section 14.1.3 Platform Spills Involving Small Discharges Page 14-13, Table 14-12
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Nowhere in this section does the proponent discuss the accidental spills of synthetic-based drill cuttings or drilling fluids. Yet, spills of these substances, including some in the 50-99 bbl category, have occurred in the C-NLOPB's jurisdiction. Given the exchange with the C-NLOPB over the reporting of these types of spills and how they were not accounted for in past EAs, it is disappointing to see this information is not present (Fraser, G.S. and J. Ellis 2008. Reply from Gail Fraser and Joanne Ellis to a letter from C-NLOPB. *Journal of Environmental Assessment Policy and Management.* 10 (4): 475-481).	
Request:	There must be a section that describes the discharge of these pollutants into the marine environment, even if they cannot be presented in terms of probability of occurrence, there should be a table that presents the spills associated with SBMs. In light of O'Hara and Morandin's (2010)	

	work this is outright negligence by the proponents not include this information and by C-NLOPB to allow the draft CSR to go forward without this information.

C-NLOPB 49	**EA Reference:**:	Section 14.3.5 Additional Modelling considerations Page 14-32
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	It is stated that blowouts were model for 45 days.	
Request:	Blowouts should be modeled based on the actual time the well would be flowing oil and should continue until the well is killed or until the criteria for ending the model run is met.	

C-NLOPB 50	**EA Reference:**:	Section 14.3.5 Additional Modelling Considerations Page 14-33, Table 14-16
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Column 2 of Table 14-16 is labeled "Flow M^3". Column 2 is the volume of the batch spill and not flow.	
Request:	The labeling of this heading should re-examine and should coincide with what is in the column and the discussion on batch spills.	

C-NLOPB 51	**EA Reference:**:	Section 14.4.5 External Assistance Relief Well Consideration Page 14-42
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The process and time required to mobilize a drilling facility to drill a relief well is outlined. Obtaining a drilling rig is one aspect however there are additional considerations such as consumables and well components that will also be required to drill a relief well.	
Request:	The CSR should outline how these items will be obtained.	

C-NLOPB 52	**EA Reference:**:	Section 14.6 Offshore Spill Response Operations Page 14-48
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events

	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The CSR does not discuss how it intents to deal with wildlife such as birds, marine mammals or fish that have been affected by a spill.	
Request:	The CSR should include a section on responding to and mitigating wildlife that is affected by an oil spill	

EC 51	**EA Reference:**:	Section 14.6.4.1 – Response Options Page 14-49
	Scoping Document Cross Reference:	Section 5.3.6.5 – Emergency Response Plan
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.6.5 of the Scoping Document clearly states that the EA should identify types and location of response equipment; and target times for equipment deployment. Section 14.6.4.1 states a contracted Response Organization will provide Tier 2/3 containment and recovery equipment but no time frame is provided.	
Request:	There appears to be a lack of containment and recovery equipment as well as available offshore supply vessels capable of handling a Tier 2/3 spill response in a timely manner. How will the proponent address this issue? Mutual aid agreements can provide vessels but not in timely manner, a lack of dedicated response vessels in the offshore not tied to specific programs such as stand by, can create unnecessary delays in response. The oil fields are over 300 km from St. John's, NL, transits from port to the Hebron oil field can be over 18 hours one way not including port time for equipment to be loaded, vessels modified to handle and deploy the equipment How will the proponent address these issues and propose solutions to make response efforts much more timely and effective. Target times for equipment deployment need to be provided.	

EC 52	**EA Reference:**:	Section 14.6.4.1 – Response Options Page 14-49
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.4.3 of the Scoping Document clearly states that the EA will provide Contingency Plans to be implemented in the event of a spill, including an analysis of the likely efficiency of spill response measures and any equipment upgrade or acquisition that may be required to	

	support the Project.
Request:	Information has not been provided in the report to address the efficiency of any of the spill response options listed, whether there are any equipment upgrades or acquisitions needed to provide an appropriate and timely response to spills and releases of pollutants from the Hebron project. Therefore, more information is needed for review in order to meet the requirements of the Scope.

EC 53	**EA Reference:**:	Section 14.6.4.3 – Response Methods Page 14-50
	Scoping Document Cross Reference:	Section 5.3.4.3 – Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.4.3 of the Scoping Document clearly states that the EA will consider an analysis of the likely efficiency of spill response measures. Section 14.6.4.3 Response Methods lists chemical dispersion as a response option but no information on testing or whether chemical dispersion is a viable option for Hebron crude.	
Request:	Information on chemical dispersant testing carried out on Hebron crude must be provided for review, as the limited information contained in Section 14.6.3 Characteristics of Spilled Crude Oil at Hebron suggests Hebron crude may not be suitable for chemical dispersion, more information is required on the physical and chemical properties of Hebron crude.	

EC 54	**EA Reference:**:	Section 14.6.4.4 – Availability of Containment and Recovery Equipment Page 14-50
	Scoping Document Cross Reference:	Section 5.3.6.5 – Emergency Response Plan
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	Section 5.3.6.5 of the Scoping Document clearly states that the EA should identify types and location of response equipment; and target times for equipment deployment. The CSR does not indicate the proponent's timetable for deploying Tier 2 or Tier 3 equipment only to state Tier 1 capability will meet or exceed the current standard for	

	production operators.
Request:	The proponent is requested to provide a copy of the standard it plans to meet for availability of equipment and spill response capacity for Tier 1, 2 and 3 spills for review.

C-NLOPB 53	**EA Reference:**:	Section 14.6.4.4 Availability of Containment and Recovery Equipment Page 14-50
	Scoping Document Cross Reference:	Section 5.3.6.5 – Emergency Response Plan
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The containment and recovery equipment available is discussed.	
Request:	More detail should be provided as to what Tier 1 equipment will be available at site. The CSR should also outline what equipment is available onshore for Tier 2 and 3 spill responses and if that equipment is the best available for the Newfoundland and Labrador offshore environment, if there is sufficient equipment quality available to contain and recover oil in a reasonable period of time, and if that equipment is suitable for use with Hebron crude.	

C-NLOPB 54	**EA Reference:**:	Section 14.6.4.5 Waste Hydrocarbon – Temporary Storage and Disposal Options Page 14-51
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	It is stated that “Most newly built vessels currently operating offshore Newfoundland are built to DNV oil-recovery standards.” This statement is meaningless as not all vessels are built as pollution class vessels and there are older vessels that are not pollution class vessels.	
Request:	It should be stated if the vessel used for the project would be pollution class and not allude to possibilities.	

C-NLOPB 55	**EA Reference:**:	Section 14.6.5 Investing in Industry Spill Response Capability Page 14-51
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	The CSR discusses what industry, specifically in relation to specific projects, is doing.	
Request:	Plans and/or intentions for investing and improving spill response should	

	be presented.

TC 2	**EA Reference:**:	Section 15.3 Other Required Programs Page 15-7, Paragraph 2
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:		
Request:	A bullet should be added detailing that compliance monitoring will be required for any approvals issued under the NWPA. The Bullet should state: "**Compliance monitoring to ensure that the *Navigable Waters Protection Act* Conditions of Approval are implemented as outlined by Navigable Waters Protection Program of Transport Canada**".	

C-NLOPB 56	**EA Reference:**:	Section 17.2.2 Summary of Proposed Mitigation Measures Page 17-3, Table 17-2 Offshore Construction and Installation
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	The bullets list some of the mitigation outlined in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines.	
Request:	For completeness, the following mitigation should be added: "Adherence to the Geophysical, Geological, Environmental and Geotechnical Program Guidelines".	

TC 3	**EA Reference:**:	Section 17.2.2 Summary of Proposed Mitigation Measures Page 17-3, Table 17-2, Third Column
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Chapter 5 of the CSR indicates that public concerns were raised related to increase vessel traffic and the potential for floating debris at the near	

	shore construction site. The NWPA protects the public's right to safe navigation. Given these public concerns, a mitigation bullet should be added to the Commercial Fisheries VEC regarding the NWPA.
Request:	Mitigation should state: "**Compliance with *Navigable Waters Protection Act* – Conditions of Approval**".

C-NLOPB 57	**EA Reference:**:	Section 17.2.2 Summary of Proposed Mitigation Measures Page 17-4, Table 17-2 Potential Future Construction Activities
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	The bullets list some of the mitigation outlined in the Geophysical, Geological, Environmental and Geotechnical Program Guidelines.	
Request:	For completeness, the following mitigation should be added: "Adherence to the Geophysical, Geological, Environmental and Geotechnical Program Guidelines".	

TC 4	**EA Reference:**:	Section 17.2.2 Summary of Proposed Mitigation Measures Page 17-5, Table 17-2, Fourth Column
	Scoping Document Cross Reference:	
	Scoping Document Satisfied:	
Preamble:	Mitigation states; "Adherence with all standard navigation procedures, Coast Guard requirements and navigation systems."	
Request:	Given Transport Canada has responsibility for the *Canada Shipping Act* and the *Navigable Waters Protection Act*, TC suggest re-wording to: "Adherence with all standard navigation procedures, **Transport Canada requirements**, Coast Guard requirement and navigation systems".	

GENERAL COMMENTS

	General Comments
EC	**Section 13.3.2** - There is a comment that *"site specific weather and oceanographic data are typically collected as part of the physical environment monitoring program, which will enhance the physical database for the area*"…This does not appear to be a firm commitment to actually perform the monitoring and to provide the data to appropriate bodies such as Environment Canada. Please review the wording and revise as appropriate.
EC	**Section 13.3.4** - In reference to storm surges, there is a mention of extreme water level being 1.52 metres above mean water level. Should this not be above highest astronomical tide, which would be significantly higher.
EC	**Section 13.4.2** – In the discussion about the wave climate, there is a paragraph which describes when sea states would be below Beaufort Force thresholds. Have the winds speeds been looked at in terms of Beaufort wind categories and then the typical sea states that are associated with those wind speeds applied. This would not take into account any swell and therefore could be rather misleading.

	General Comments
TC 5	1) In accordance with the *Navigable Waters Protection Act*, the proponent is required to submit an Application (s) for Project Review, complete with scaled drawings, for any new, repaired, altered, or rebuilt in-water works located at the near shore site. Complete applications are to be forwarded to: Navigable Waters Protection Program Transport Canada – Marine Safety P.O. Box 1300 St. John's, NL A1C 6H8 Tel: (709) 772-2284 2) The CSR indicates the proponent is aware of the various regulations under the *Canada Shipping Act* that apply to the project. The proponent, or any of the proponent's contractors, are encouraged to contact Transport Canada – Marine Safety at (709) 772-5166 should they have any questions regarding the *Canada Shipping Act*. 3) Throughout the CSR, the proponent indicates they will prepare a Vessel Traffic Management Plan to help mitigate interactions with project vessels and commercial fishing vessels. Transport Canada – Marine

	Safety would like an opportunity to review the proposed Vessel Traffic Management Plan. A copy of the plan can be forwarded to: Compliance and Enforcement Transport Canada – Marine Safety John Cabot Building, 10 Barter's Hill P.O. Box 1300 St. John's, NL A1C 6H8 Tel: (709) 772-5166

	General Comments

NLDEC 1	The following comments relate to the regulatory mandate of ENVC and the Pollution Prevention Division, Waste Management Section.
	
	• Operations in the near shore and marine environment will be regulated by the Canada-Newfoundland and Labrador Offshore Petroleum Board and the Federal Government.
	
	• As stated in the report, land-based activities in Bull Arm will comply with provincial legislation. The Department of Environment and Conservation (ENVC) requires an Environmental Protection Plan for the Bull Arm site. ENVC looks forward to assessing this plan as well as the following supporting documentation. The following documents were referenced in the Comprehensive Study Report.
	
	  • Waste Management Plan
	
	  • Oil Spill Response Plan
	
	  • Community Liaison Plan
	
	• While the EPP and other documents will require more detailed assessment, it is noted that the Bull Arm Fabrication Site was utilized for similar construction purposes in the past. Therefore, the environmental footprint of the Hebron Project is not expected to be significant from a near shore / land-based perspective.
	
	• It is encouraged that an oil spill response plan considers waste management issues and coastal zone impacts.
	
	• The near shore spill-modelling scenario refers to a diesel spill between 500 – 5000 gallons. It is agreed that the majority of modelling scenarios would result in spilled diesel remaining in the Bull Arm area. Diesel is a light end hydrocarbon and it is agreeable that impacts would be localized in nature.
	
	• The maximum impact that would result from an accidental event would be a spill of crude oil that reaches the coastline. Even in the offshore, a

	major spill of crude could eventually reach shorelines of NL. Once oil contaminates the shoreline, the magnitude of impacts and volumes of oily waste are significantly increased.
NLDEC 3	The following comments relate to the regulatory mandate of ENVC and the Water Resources Division. The approvals and permits that WRMD would issue for this project are mainly related to the site infrastructure and construction of the dry dock. At this stage there has been limited information provided in this document to outline the site infrastructure requirements for this project. In addition, this may be the responsibility of Nalcor as they are the owners of the site. The following is a general list of permits/approvals which may be required by WRMD for site infrastructure and construction of the dry dock: The proponent will require approval from this Division under Section 39 of the *Water Resources Act* for the proposed development within Protected Water Supply Areas. Contact: Manager, Surface Water Section (709) 729-2535 The proponent must obtain a permit under Sections 36 & 37 of the *Water Resources Act* prior to the start of construction. Contact: Manager, Surface Water Section (709) 729-2535 The proponent must apply for a non-domestic drilled well permit under Section 58 of the *Water Resources Act* for the proposed drilled well(s) Contact: Manager, Groundwater Section (709) 729-2939. The proponent must obtain a Water Use License from this Division for the non-domestic use of water. Contact: Manager, Water Rights Section (709) 729-4795 The proponent will require approval from this Division under Section 48 of the *Water Resources Act* before starting construction activities within 15 metres of any water body (including wetlands). Construction activities include all stream crossings, drainage works, fording and any other work such as landscaping, clearing or cutting of any natural vegetation within 15 metres of a body of water. Contact: Manager, Water Investigations Section (709) 729-5713 Any effluent or runoff leaving the site will be required to conform to the requirements of the *Environmental Control Water and Sewage Regulations*, 2003.

	Additional Deficiencies and Editorial Comments
DFO	**4.0 Effects Assessment Methods** 4.3.1 Step 1 – Scoping Issues and Selecting Valued Ecosystem Components Page 4-4 Under the Fish and Fish Habitat section, the first bullet should read "*Provisions of the Fisheries Act pertaining to the **harmful alteration, disruption or destruction** of fish habitat….*" 4.3.3 Step 3 – Definition of Significance Page 4-10 Fish and Fish Habitat The definition of a significant adverse environmental effect is somewhat confusing. This definition should be revised to the following "…would be one that results in a residual effect (i.e. harmful alteration, disruption or destruction of fish habitat) that is so large and/or the fish and fish habitat is of such importance that it cannot be adequately compensated for." This definition should also be revised in **Section 7.2 Definition of Significance p. 7-3, par. 2**
	7.0 Fish and Fish Habitat Some fish species descriptions are absent from this section, but appear in later sections of the document, most specifically the Species at Risk section. These species should at least be cross-referenced here, so the reader can locate the information easily. It should be noted throughout the assessment of fish and fish habitat that stocks are interrelated (i.e., have a connection with other areas), although knowing exactly what this connection is may be uncertain. It is also important to recognize that surveys are simply snapshots in time as fish tend to continually move in and out of areas. 7.3.1.5 Fish and Shellfish Page 7-10 (Greenland Halibut) This section states that, "*Although Greenland halibut can be found in small numbers at depths of less than 100 m, most of them are*

	caught near the sea bottom at depths of between 200 to 600 m. In the southern part of the range; however, they go as deep as 1,500 m". This statement is not entirely accurate as, "*Greenland Halibut can be found at depths ranging from less than 100 m to deeper than 1,500 m*" and although they are predominantly considered a deepwater fish, they are generally found at all depths. 7.3.2 Offshore Page 7-16 The second paragraph in this section states that, "*DFO RV data from 3Lt have also been reviewed along with relevant fish and fish habitat primary literature for the Hebron Offshore Study Area.*" In order to provide an accurate depiction of the species composition and abundance in the **Offshore Study Area**, surveys within other subdivisions of 3L and 3N, which fall within the Study Area should also be included. Depending on the findings, the assessment of impacts on fisheries may need to be revisited accordingly. Page 7-19 Table 7-2 should include American Plaice. 7.3.2.3 Plankton Page 7-18 The last paragraph in this section states that ichthyoplankton may include jellyfish and squid. This is incorrect as "*ichthyoplankton*" refers to fish eggs and larvae. While jellyfish and squid may have been found during ichthyoplankton surveys, they are not considered ichthyoplankton. 7.3.2.4 Benthos Although the CSR mentions the numbers of trawls reporting a particular coral species, it would be beneficial to present this number in the context of the total number of trawls taken. Page 7-20 This section refers to, "…*short-lived polychaetes, amphipods and cumaceans*". Please provide supporting reference(s). 7.3.2.5 Fish and Shellfish

	More recent references than Methven 1999 exist on the diet of ground fish in the area. Since there has been a regime shift on the Newfoundland shelf over time, the most up to date information should be incorporated into the CSR. Information on the biology of a species, including feeding habits, can be found in the most recent CSAS or NAFO documents for that species. Page 7-29 The second paragraph on this page states that, "*There are several other species that are so infrequent, there is little chance of an interaction with the Project.*" It is important to note that just because a species is infrequent, does not mean it is unimportant or does not need to be considered. In fact, the opposite may be true, particularly for some rare species and/or structural species such as corals and sponges. In addition, although plaice are no longer concentrated in Div. 3L (but are increasing slightly in the area), it does not mean they are infrequent. Notably, habitat in the area is very important to the recovery of American Plaice. Page 7-32 (Greenland Halibut) The caption for Figure 7-6 references Yellowtail Flounder when it should in fact be Greenland Halibut. Page 7-33 (Greenland Halibut) The first paragraph on this page states that, "*Spawning occurs during the winter in the Davis Strait….*" This information should be checked against more recent references, as it may prove the statement to be inaccurate. Page 7-33 (Yellowtail Flounder) Although it states that, "*Historically, their distribution has included the northern portion of the Grand Banks (Walsh et al. 2000) and, therefore may occur within the Offshore Project Area*", according to recent NAFO documents the distribution of Yellowtail Flounder, since their population increase in 2000, has been returning to its historical pattern and a greater proportion of the stock is found in Div. 3L. Page 7-40 (Redfish) It is likely that Figure 7-11 is inaccurate as Redfish are more common than indicated according to recent NAFO documents. <u>7.4 Project-Valued Ecosystem Component Interactions</u>

	Page 7-41 In the interactions summary categories a "*Change in Habitat Quantity*" is noted as, "*Project activities that may result in physical alteration of fish habitat, and may be declared a HADD of fish habitat by DFO and require a Section 35(2) Fisheries Act Authorization.*" This should be revised to read "*Project activities that may result in* ***the harmful alteration, disruption or destruction of fish habitat****, and may be declared a HADD of fish habitat by DFO and require a Section 35(2) Fisheries Act Authorization.*" Page 7-42 With regards to a "*Change in Habitat Quality*" it should be noted that this could be considered a harmful alteration or disruption of fish habitat and may be declared a HADD of fish habitat by DFO and require a Section 35(2) *Fisheries Act* Authorization. <u>Table 7-9</u> There are numerous instances where a change in habitat quality has been noted for a particular activity, however, DFO is of the opinion that no change in habitat quality will occur. Below is a list of these activities. This table, as well as other tables within this section should be updated to remove this environmental effect or a justification should be provided as to why the effect should remain. -Operation of vessels/vessel traffic -Lighting -Tow-out of GBS to Bull Arm deepwater site -GBS ballasting and de-ballasting (seawater only) -Complete GBS construction and mate topside at Bull Arm deepwater site -Hook-up and commissioning of topsides -Various surveys -Platform tow-out to deepwater site. -Hook-up and commissioning of Hebron platform -Hook-up, production testing and commissioning of excavated drill

	centres -Presence of structures Since Table 7-11 noted that OLS installation and testing could result in potential fish mortality, then Table 7.9 should be updated to reflect this information as well. Since Table 7-12 indicates that the potential future operational activity of geophysical/seismic surveys could result in potential fish mortality, then Table 7.9 should be updated to reflect this information as well. 7.5.1.1 Change in Habitat Quantity (Construction and Installation) Page 7-47 The fist paragraph on this page states that, "*The footprint of the bund wall, the area of the dry-dock, the area to be dredged and the footprint of any at-sea disposal will be quantified and detailed within the Habitat Compensation Strategy report for the Hebron Project*." While this level of detail is not required in a Fish Habitat Compensation Strategy, a separate document detailing the HADD quantification should be submitted to DFO. The second paragraph on this page states that, "*The bund wall footprint and the area to be drained for the dry-dock in Great Mosquito Cove may temporarily affect to a small degree, the quantity of available habitat for fish and shellfish for an estimated 24 months.*" While it is true that this change in habitat quantity will be temporary, it is important to note that construction of the bund wall and dry-dock dewatering may still constitute a HADD of fish habitat. 7.5.1.2 Change in Habitat Quality (Construction and Installation) Page 7-52 Two of the mitigation measures being considered to reduce sediment loading during construction are, "*Investigate the use of washed rock or in-water sediment control measures for fill material in the construction of the bund wall*" and "*Investigate technologies to reduce sedimentation during dredging operations*" There should be a commitment to implement, not investigate, these standard mitigations, which are commonly recommended by DFO for the protection of fish and fish habitat. Similar statements are made throughout the text and tables within this document. These statements should also be revised accordingly.

Table 7-11

Although the following comments were made regarding information contained within Table 7-11 on page 7-62, they also pertain to the text portion of Section 7 and Table 7-9 on page 7-44.

Near shore Project Activities:

- **Presence of Safety Zone**

The duration for presence of safety zone is noted as a "*2*" (1-12 months), it should in fact be a "*3*" (13-36 months) to correspond to the life of the project at the Bull Arm site.

- **Dewater Dry-dock/Prep of Dry-dock Area**

The text on page 7-47 states that, "*The bund wall footprint and the area to be drained for the dry-dock in Great Mosquito Cove may temporarily affect to a small degree, the quantity of available habitat for fish and shellfish for an estimated 24 months.*" However, Table 7-11 does not include habitat quantity as a potential environmental effect. It also rates the duration as "*2*" (1-12 months) when according to the text on page 7-47 it should clearly be rated as "*3*" (13-36 months). In addition, compliance to the Section 35(2) *Fisheries Act* Authorization and Fish Habitat Compensation should be included as mitigations.

The environmental effects of dewatering the dry-dock should also include fish mortality.

- **Concrete Production (Floating Batch Plant)**

"*Concrete wash water containment and testing to meet applicable regulations*" is included as an applicable mitigation in the text on page 7-53. This should be added to Table 7-11.

- **Dredging of Bund Wall and Possibly Sections of Tow-Out Route (May Require At-Sea Disposal)**

Compliance to the Section 35(2) *Fisheries Act* Authorization and Fish Habitat Compensation should be included as mitigations for at-sea disposal.

Section 7.4.1 (page 7-42) indicates that there may be possible blasting along sections of the GBS tow-out route to the deepwater site, however, there are no mitigations indicated in this table to offset the effects of in-water blasting. The mitigations section should be updated as applicable (i.e., bubble curtains,

compliance with Section 32 *Fisheries Act* Authorization, if applicable, etc.).

- **Removal of Bund Wall and Disposal (Dredging/Ocean Disposal)**

"*Implementation of in-water sediment control measures*" should be cited as a mitigation.

- **GBS Ballasting and De-Ballasting (Seawater Only)**

The environmental effects of GBS ballasting and de-ballasting (seawater only) should include habitat use.

Offshore Construction/Installation:

- **OLS Installation and Testing**

The OLS installation is considered a permanent structure and as such the duration rating should be "*5*" (> 72 months). Compliance to the Section 35(2) *Fisheries Act* Authorization should be included as a mitigation.

- **Concrete Mattress Pads/Rock Dumping Over the OLS Offloading Lines**

As noted in Table 7-9, the environmental effects of placement of concrete mattress pads/rock dumping over the OLS offloading lines could result in potential fish mortality and change in habitat quality. These effects should be added to this table.

The concrete mattress pads/rock dumping over the OLS offloading lines are considered permanent structures and as such the duration rating should be "*5*" (> 72 months). Compliance to the Section 35(2) *Fisheries Act* Authorization should be included as a mitigation.

- **Platform Tow-Out/Offshore Installation**

The environmental effects of offshore installation should also include potential fish mortality and change in habitat quality.

The offshore installation is considered a permanent structure and as such the duration rating should be "*5*" (> 72 months). Compliance to the Section 35(2) *Fisheries Act* Authorization should be included as a mitigation.

- **Placement of Rock Scour Protection on the Seafloor**

Around Final Hebron Platform Location

The environmental effects of placement of rock scour protection on the seafloor around the final Hebron platform location should also include potential fish mortality.

The placement of rock scour on the seafloor around the final Hebron platform location is considered a permanent structure and as such the duration rating should be "*5*" (> 72 months). Compliance to the Section 35(2) *Fisheries Act* Authorization and Fish Habitat Compensation should be included as mitigations.

Potential Future Construction Activities:

- **Installation of Pipeline(s)/Flow line(s) and Testing from Excavated Drill Centre(s) to Platform Plus Concrete Mattresses, Rock Cover, or Other Flow lines Insulation**

Installation of pipeline(s)/flow line(s) and testing from excavated drill centre(s) to platform plus concrete mattresses, rock cover, or other flow lines insulation are considered permanent and as such the duration rating should be "*5*" (> 72 months). Compliance to the Section 35(2) *Fisheries Act* Authorization should be included as a mitigation.

Page 7-61

The third paragraph states that, "*These studies indicate that dredging causes an initial reduction in the abundance, species diversity, and biomass of the benthic community and that substantial progress towards full restoration of the fauna and sediments can be expected within a period of approximately two to four years following cessation (Kenny et al. 1998; Sardá et al. 2000; Van Dalfsen et al. 2000).*" It should be noted that although this statement may be true for polychaetes etc., it is not the case for long-lived species such as corals.

Page 7-62

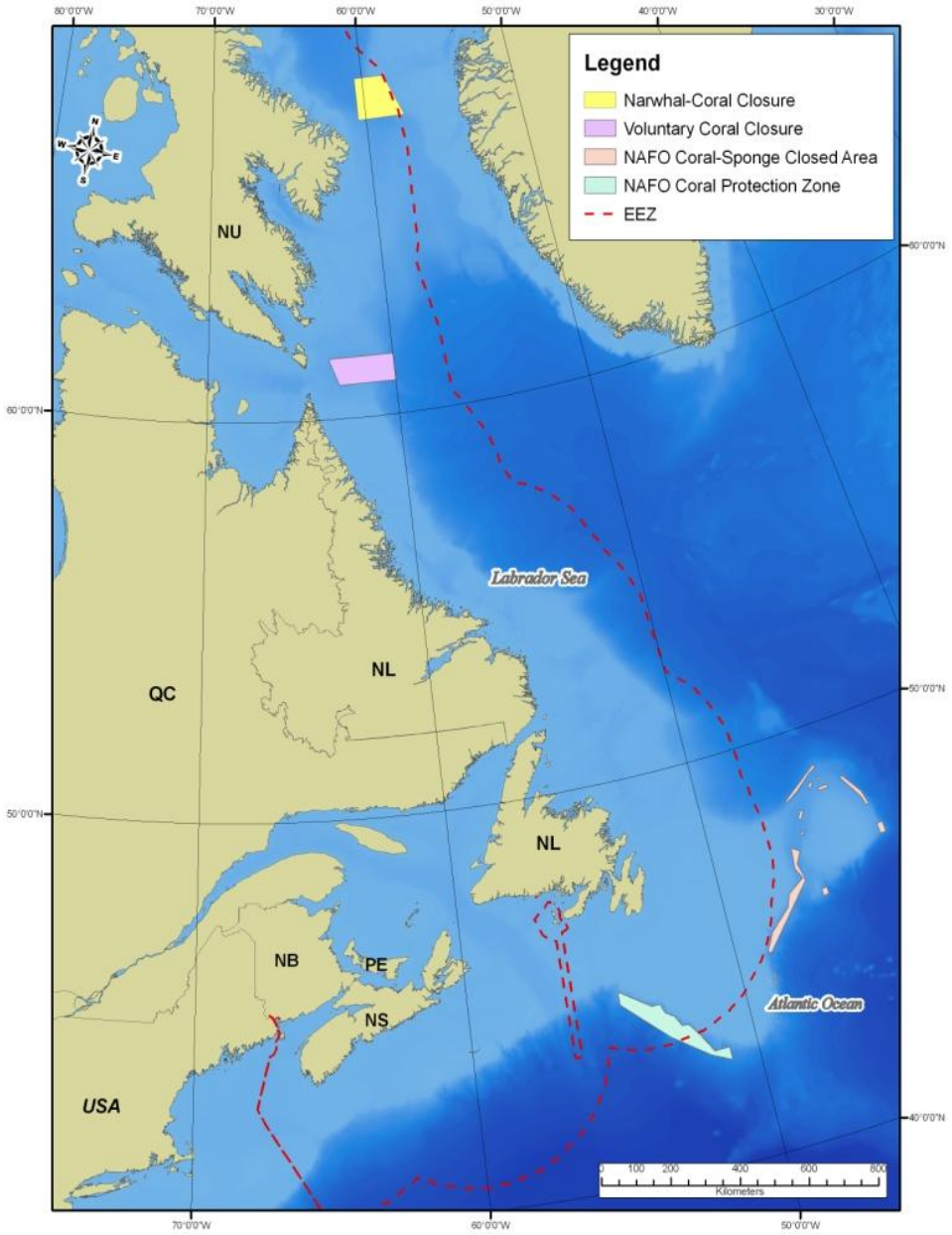
In the third paragraph it states that, "*The risk of mortality to sessile invertebrates from dredging will be reduced by having dredging contained to the smallest area possible and restricting dredge spoils disposal to a designated disposal area.*" The proponent should note that the disposal area should be determined though consultations with Federal Authorities, including DFO, to ensure the best location is chosen in order to minimize any adverse effects on fish and fish habitat.

	Table 7-12 Although the following comments were made regarding information contained within Table 7-12 on page 7-72, they also pertain to the text portion of Section 7 and Table 7-9 on page 7-44. • **Presence of Structures** The change in habitat quantity with regards to the presence of structures has already been considered in the environmental effects assessment for construction and installation (Table 7-11) and therefore does not need to be taken into consideration again under operations and maintenance. **Potential Future Operational Activities:** • **Presence of Structures** The change in habitat quantity with regards to the presence of structures is factored into the environmental effects assessment under construction and installation (Table 7-11) and therefore does not need to be taken into consideration again here. Table 7-13 • **Removal of the Hebron Platform and OLS Loading Points** As noted in Table 7-9, the environmental effects of removal of the platform and OLS loading points could also result in potential mortality. These effects should be added to this table. • **Surveys (Geophysical, Geological, Geotechnical Environmental, ROV, diving, etc.)** As noted in Tables 7-9 and 7-11, these activities would not result in potential fish mortality. This table should be updated to reflect the same information. 7.5.4.1 Change in Habitat Quantity (Accidents, Malfunctions and Unplanned Events) Page 7-77 The first paragraph in this section states that, *"In the offshore, a spill of crude oil would dissate through evaporation as well, but would have the potential to form tar balls and sink to the sea floor. In any case, the quantity of fish habitat affected by a spill would be*

	negligible." Please provide a reference which supports this prediction (i.e. formation and impact of tar balls).
	8. Commercial Fisheries 8.1.3 Administrative Page 8-1 This section gives the impression that NAFO divisions and unit areas are defined by DFO, which is not the case. Suggest revising this section. 8.3.2 Offshore Fisheries Page 8-14 Figure 8-5 NAFO unit area 3Na is mislabels as 3Lb 8.3.2.2 – Historical Overview of Regional Fisheries Page 8-16 Please revise Committee on the Status of Wildlife in Canada to Committee on the Status of Endangered Wildlife in Canada. This section states that "…COSEWIC listed the Atlantic Cod (Newfoundland and Labrador Population as an endangered species." Please be advised that COSEWIC assessed Atlantic Cod as endangered in 2003. Please revise accordingly. 8.5.1.2 Offshore (Access to Fishing Grounds) Page 8-52 The lack of harvest activity within the proposed offshore safety zone over the last two decades is a function of a significant decline in the abundance of ground fish. In the event of an increase in the abundance of ground fish, reduced access to these fishing grounds may have economic impacts for ground fish licence holders.
	10.0 Marine Mammals and Sea Turtles 10.3.1.1 Recent Marine Mammal Monitoring in the Jeanne d'Arc Basin Page 10-8 The last paragraph on this page states that, "There were no

	confirmed identifications of sperm whales…" However, DFO and others have made many sightings of sperm whales on the Grand Banks, including some in very shallow near shore waters, so the low number of these animals should be considered "unexpected". In addition, the most common cetacean sighted in association with offshore trawling operations in recent years are sperm whales. Thus, sperm whales are attracted to fishing operations on the Grand banks and may approach other vessels as a result. 10.3.2.2 Toothed Whales (Odontocetes) (Northern Bottlenose Whale) Page 10-20 It should be noted that there have been several northern bottlenose whale standings recently in coastal waters, including one in Terra Nova. It is likely these whales were chasing near shore squid.
	11.0 Species at Risk Since project activities will be occurring over a long time period (e.g. near shore construction up to 2016, offshore construction to 2017 and onwards) it is possible that during this timeframe more species could be added to Schedule 1 of SARA, new Recovery Strategies, Management Plans or Action Plans could be posted for listed species, critical habitat could be identified, COSEWIC will have assessed new species, etc. Many things could change that may affect a species status and the requirements for it under SARA. This will need to be taken into consideration by the proponent. 11.3.1.2 American Plaice Page 11-10 Although the second paragraph states that, "*Females in spawning condition may be found throughout the Grand Banks (Morgan 2001), indicating the lack of a specific spawning ground",* the last paragraph states that, "*The Southeast Shoal and Tail of the Banks EBSA, proposed by DFO, is known as a spawning and nursery area for plaice."* The former statement is more accurate, as recent data has shown that it is unlikely that the Southeast Shoal is the only spawning ground for American Plaice, although they do spawn there. It is also possible that it is not a nursery area as previously thought, however, despite this the area still contains important habitat for American Plaice.
	12.0 Sensitive of Special Areas

	Page 12-3 Figure 12-2 shows “Sponge/Coral Area” but does not note if this is an area where they are found, if these are VMEs (that is what is suggested in paragraph 3 on page 12-1 but not made clear), or closed areas. A map of NAFO Coral and Sponge closed areas and the NAFO Coral Protection zone exists. This data could be used to update table 12-2. This may be less ambiguous than using “sponge/coral area”. See attached map. Also the green area, southwest of the Flemish Cap, is the Beothuk Knoll as indicated by the map’s legend. However, the Orphan Knoll also appears as a green area north of the Flemish Cap, but is not included within the map’s legend.



12.1.2 Administrative

Page 12-5

The following changes should be made.

- Line 15 Some EBSAs **are** – change to – Some EBSAs **may be**

- Line 16…other EBSAs **are** – change to - ..other EBSAs **may be**

- Line 17….management implications **of the identification of**

	these…change to...management implications **for** these 12.3.2 Offshore Page 12-8 Please change where it says EBSAs **are** to EBSAs **may be** in lines 12 and 13 12.5 Environmental Effects Analysis and Mitigation This section notes that an oil spill in the Bull Arm area could adversely affect some capelin beaches or eelgrass habitat. However, relatively low levels of oil retained in inter-tidal or shallow sub-tidal sediments could potentially affect a variety of species. For instance, studies in the United States and Canada have noted that sub-lethal effects can be produced in flounder species chronically exposed to very low levels (≤ 3 ppm) of sedimentary PAH. This generalization would also hold true in the Offshore Project Area 12.5.1.1 Near shore (Accidents, Malfunctions and Unplanned Events) Page 12-16 (Eelgrass Beds) The references, Fingas (2001) and Wright (2002) do not appear to be first-hand accounts, but rather reviews or information taken from technical manuals. Since neither appears to be the source studies, the references have not been cited appropriately. Please check these references and revise as appropriate. It should be noted that the recovery time of eelgrass is likely to depend at least partly upon the extent and duration of the exposure. Research on eelgrass disturbance and recovery in Newfoundland coastal waters suggests that eelgrass may recover from disturbance (i.e., physical removal) in 2-3 years (Laurel et al 2003 MEPS; Warren et al. in press JEMBE). However, in both of the above referenced studies, underground rhizomes remained intact after the disturbance, therefore only the removal of the above-substrate biomass (shoots and blades) was investigated. The recovery of eelgrass meadows would take much longer if any spill resulted in appreciable mortality of the underground rhizomes in affected eelgrass beds, perhaps as much as a decade or more based on studies of eelgrass expansion in Newfoundland coastal waters (Warren et al. in press), but certainly longer than 2-3 years as referenced in the CSR. Laurel, B.J., Gregory, R.S. and Brown, J.A. 2003. Settlement and distribution of Age-0 juvenile cod, *Gadus morhua* and *G. ogac*,

	following a large-scale habitat manipulation. Mar. Ecol. Prog. Ser. 262: 241-252. The fourth paragraph states that, "*The average density of eelgrass shoots and flowering shoots were 24 percent and 62 percent lower at oiled sites than at reference sites in 1990; however, no differences between oiled and reference sites were observed with respect to eelgrass biomass, seed density, seed germination or the incidence of normal mitosis in seedlings, and there were no signs of elimination of eelgrass beds*". This sentence is contradictory and should be revised. Pages 12-18 to 12-20 (Capelin Beaches) Based on the spill trajectories, the CSR suggests that there is less than a 2% probability of a spill reaching the head of Bull Arm. This statement does not seem accurate given the coastal currents, wind conditions, proximity to the GBS fabrication site (~3 km in some cases), etc. Dispersal models tend to be highly dependent upon boundary conditions and assumptions, yet the supporting documentation on the model (prepared by AMEC), appears to contain no material to specifically address this. Due to the significance of any impact on near shore habitat, it is important to fully understand these aspects in order to effectively interpret the results of such models.
	14.0 Accidental Hydrocarbon Spill Events Given recent events in the Gulf of Mexico, it is strongly recommended that some discussion of these events be included in the CSR. Therefore, revisions to the text should reflect the possible ramifications of accidental hydrocarbon spill events in light of the new knowledge obtained from the Gulf of Mexico spill. 14.2.1 Model Set-up (Fate and Behaviour of Hebron Hydrocarbon Spills in the Near shore Study Area (Trajectory Modeling)) Page 14-15 The base model described in the CSR uses a release point 2 km south of the GBS fabrication site in Bull Arm. It is not clear as to why this distance from the development was selected. The modeled zone of impact in Bull Arm, given the above-mentioned displacement 2 km south of the Bull Arm fabrication site, does not cover two very prominent eelgrass meadows. Placing the modeled spill point at the GBS fabrication site may produce a very different prediction.

	15.0 Follow-Up and Monitoring 15.1.1 Proposed Offshore Environmental Effects Monitoring Program Page 15-3 The second last paragraph in this section states that, "*A fish habitat compensation monitoring survey is conducted following completion of the compensation works to verify the amount and productivity of habitat created*." While this is correct, it should also be noted that compensation monitoring to determine the continued functioning of the habitat will need to be carried out for a period of time and at intervals agreed upon by DFO and the proponent. Timelines for monitoring will be included in the Fish Habitat Compensation Plan, which will be included as a condition of the Section 35(2) *Fisheries Act* Authorization. Please revise accordingly. 15.2.1 Near shore Environmental Compliance Monitoring Page 15-5 Section 32 of the *Fisheries Act,* which prohibits the destruction of fish by any means other than fishing should also be included in the list of regulatory instruments as it may be applicable in relation to in-water blasting, if required. 15.2.2 Offshore Environmental Compliance Monitoring Page 15-6 As an Authorization for Works or Undertakings Affecting Fish Habitat will also be issued under the *Fisheries Act* for project components occurring at the offshore project area, a reference to this Authorization should be made in this section as well. 15.3 Other Required Programs Page 15-7 The third bullet can be removed as the information contained within the fifth bullet is more comprehensive. With regards to the fifth bullet, while this information is correct, it should also be noted that compensation monitoring to determine the continued functioning of the habitat will need to be carried out for a period of time and at intervals agreed upon by DFO and the proponent. Timelines for monitoring will be included in the Fish Habitat Compensation Plan, which will be included as a condition of the Section 35(2) *Fisheries*

	Act Authorization.
	17.0 Summary and Conclusions 17.2.2 Summary of Proposed Mitigation Measures Table 17-2 Mitigations relating to fish and fish habitat for 1) offshore construction and installation and 2) potential future construction activities should include adherence to the Section 35(2) *Fisheries Act* Authorization and completion of associated fish habitat compensation and related monitoring.

	General Comments
FFAW	Fundamentally, the overall project will impact fish harvesters both in Trinity Bay and the offshore. The nearshore component of the project will result in some loss of fishing grounds to harvesters in Trinity Bay. It needs to be noted that accessing alternate fishing grounds can be problematic when considering the traditional nature of the fishery in Newfoundland. Harvesters fish where their forefathers fished, particularly lobster grounds. Fishing alternate grounds generally means that they are infringing on another harvester's "territory". As well, commercial species are not distributed equally in bays and coves. Therefore, the impacts of project-related activities in the next few years will have an impact on many harvesters in Trinity Bay, that is, not just those in the communities adjacent to construction activities. All Trinity Bay harvesters will be subjected to increased risk of gear/vessel loss and damage, accidental spills, as well as reduced safety on the water, access to fishing grounds, and catch rates as a result of this project. As well, similar impacts will be faced by offshore harvesters with quotas to fish in NAFO Division 3L as offshore development begins.
FFAW	Section 18.1, page 18-1. The correct title for Saunders, R. is Petroleum Industry Liaison.
FFAW 1	Establishing a Fisheries Liaison Committee with adequate fish harvester representation will be key in the coming months to enable appropriate consultation with affected harvesters as the project proceeds (Section 8.5.1.1). Involving harvesters in the development of an Environmental Effects Monitoring program prior to the start of construction at the site will also provide opportunity for collaboration (Section 15.1.1).

FFAW 2	Construction of the proposed Gravity Based Structure in Trinity Bay will have an impact on the environment in the bay and more specifically fish habitat. Concerns from fish harvesters have been duly noted in the report (Section 5.3.1.2) with respect to dredging, blasting, debris, discharges, dumping, accidental spills, construction related noise and lighting. It needs to be reiterated however that construction activity will also impact catchability, and therefore profitability, for fish harvesters.
FFAW 3	It should be noted that lobster catches have been on the increase in Trinity Bay (Lobster Fishing Area 6) over the past number of years (Section 8.3.1.6). Harvesters attribute increased catches to the conservation measures, such as v-notching, that they have been involved with since the mid 1990s. DFO statistical information up to 2009 has been based on buyer slips (lobster sales to buyers). A mandatory logbook was introduced for the 2010 lobster season which will provide a more accurate representation of actual lobster catches in the ensuing years.
FFAW 4	The future fisheries (Section 8.4.1.2) section was nominal in the study report. Snow crab (Section 8.3.2.7) harvesters have been prospecting in recent years and have explored many new areas as the resource seemed to be moving further inshore. In 2010, harvesters are also reporting fishing in shallower depths for crab. Furthermore, the 2010 Science Advisory Report (in press) states a recent increase in the exploitable biomass of the 3LNO stock as well as increased recruitment that is expected to increase further over the next two to three years. As mentioned in the report, any DFO changes to quota area allocation boundaries would also impact fishing activity within the Jeanne d'Arc Basin of the Grand Banks. Lost harvesting grounds from the offshore component of this development could be more significant in the coming years (Section 5.3.2.2). The operator should consult with the fishing industry on a regular basis to keep up to date with snow crab fishing trends.
FFAW 5	Also with respect to future fisheries (Section 8.3.2.7), information presented at RAP meetings in 2009 and 2010 indicated that there are increasing signs of cod (Section 8.3.2.3) in the offshore with scope for more recovery. The 2010 Assessment of Northern (2J3KL) Cod (Science Advisory Report) noted that the annual DFO trawl surveys indicated an eight fold increase in the spawning stock biomass from 2004 to 2008. A commercial fishery for Atlantic cod on the Flemish Cap (an adjacent, NAFO-regulated stock) opened in 2010. The resumption of offshore groundfish fisheries would significantly alter fishing patterns and activities within the Jean d'Arc Basin of the Grand Banks and have an impact on fishing enterprises. Again, the fishing industry should be regularly consulted to keep apprised of fishing

	trends.
FFAW 6	The establishment of a Safety Zone (Section 8.5.1.1) at the Great Mosquito Cove site, and later at the deepwater site in the bay will result in a loss of fishing grounds to harvesters in Trinity Bay. This is significant for inshore harvesters in Trinity Bay as previously discussed.
FFAW 7	While the designation of a traffic lane for project related vessels in Trinity Bay and the associated proposed provisions such as communication protocols and speed reductions in designated areas are essential mitigation measures to reduce interference with harvesting activities (Section 8.5.1.1) it should be noted that crab (pots) and cod (gillnets) are fished in deeper water, likely where the proposed Designated Traffic Lane will be re-established in Trinity Bay. Project-related vessels that enter the bay should be aware that there may be fishing ongoing in the Traffic Lane. Similarly, there is also the possibility for gear conflicts.
FFAW 8	The FFAW and its members are very concerned about the potential of aquatic invasive species, such as green crab, infesting our bays and coastal waters. The additional vessel traffic associated with the construction of the Gravity Based Structure in Trinity Bay may potentially lead to the introduction of unwanted aquatic invasive species. The green crab species that has become resident in areas of Placentia Bay for example has destroyed eel grass beds and competes with native crab and lobster species for food. The potential for the introduction of aquatic invasive species in the area was not mentioned at all in the Hebron Study Comprehensive Study Report document. The FFAW strongly encourages the company to consider and detail the mitigation strategies that the contracting marine vessel companies will need to follow to prevent the introduction of aquatic invasive species in Trinity Bay. Furthermore, the FFAW calls upon the various regulatory bodies to be very stringent regarding any ballast water exchange plans proposed by the company and ensure vessels follow proper ballast water management practices. As well, aquatic invasive species should be incorporated into the nearshore Environmental Effects Monitoring program.

	General Comments
Alder 1	The draft *Comprehensive Study Report (CSR) for the Hebron Development Project* breaks the Project Environment down in to near shore (construction) and offshore (operations) environments. The Near shore Study Area is where the platform will be constructed and the Offshore Study Area is where the

	platform will be installed for the purpose of bringing oil to the surface and storing it within the fixed structure. We find the scope of the project deficient in not including in the Project Environment the area pertaining to the transportation of the product from the production platform to the Newfoundland Transshipment Facility or to market. For example, Table 2-9 includes the offloading of produced crude as an anticipated activity but it does not include the "transportation of produced crude". We request that this omission be corrected. We do not find the coverage of this issue provided by 2.9.5 adequate.
Alder 2	Shore base support is vague on what areas other than St. John's are to be used. We request that any use of other areas such as Bay Bulls must be noted specifically and assessed as part of the project. Bay Bulls is of particular interest due to its proximity to the Witless Bay Ecological Reserve. We request that all onshore sites anticipated to be used by the Hebron Project must be identified and included in the scope of the project's environmental assessment.
Alder 3	While the draft CSR states that, no new tankers will be added to the fleet of those presently servicing the offshore area near Hebron it must be assumed that the frequency of tanker traffic may increase. We request more detailed presentation of information on this traffic and a separate assessment of the cumulative risk of tanker accidents in Placentia Bay that may accrue from the addition of the Hebron Project.
Alder 4	We request that when using statistics to summarize data, which are not normally distributed that the use of means be replaced by the use of medians and whenever possible plots of raw data distributions are presented rather than only data summaries. For example, Figure 3-39 which depicts "average number of icebergs" is not useful in providing a true impression of the likely number of icebergs one might encounter.
Alder 5	With respect to marine birds, the draft CSR concludes that "*While there is no known mitigation, flaring is expected to have minimal effect on marine bird populations over the duration of the Project.* We are not convinced of the validity of this conclusion. We request that a detailed presentation of new research on this subject be required before the CSR is finalized including in the final CSR a detailed discussion of the evidence for the above conclusion.
Alder 6	We also request that the study of the feasibility of the reinjection of Produced Water be required to be included in the final CSR.
Alder 7	We request that the section of the final CSR addressing the "need for the project" include a discussion of the project in the context of green house gas emissions and Canada's energy policy and energy needs i.e. define the project as an "energy project" rather than simply an oil project. Alternatives to the project should include a review of the assumption that there is a need to increase the supply of fossil fuels at this time.

	General Comments
HC	Health Canada has recently produced a document entitled "*Useful Information for Environmental Assessments*" (attached separately) which outlines information that would be beneficial to include in environmental assessment documents when Health Canada's advice is requested.

Supporting Document Comments

Air Emissions and Dispersion Modelling Study

Stantec – June 2010

EC 33	**EA Reference:**:	Dispersion Modelling Study Page 15, Table 6.2
	Scoping Document Cross Reference:	5.3.4.2 Air Quality
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The modelling scenarios are not adequately labelled in the second row of table 6.2. We believe they match, from left to right, the 5 scenarios described on P. 11.	
Request:	Please confirm the modelling scenarios in Table 6.2.	

	General Comments
NLDEC 2	• The use of AERMOD versus CALPUFF. CALPUFF is more suited for modeling of long-range transport and has been proven to work very well in the near field and near shore environments. AERMOD is supposed to be good out to 50 kilometers, but given the size of the domain (100 km x 65 km), AERMOD is stretching the limits of acceptability. It has been found that CALPUFF is the more accurate of the two models. • The surface meteorological data is taken from both Hibernia and St. John's by incorporating a "linear interpolation". The use of such a method would result in inaccuracies in model outputs. It implies that not all the hourly data required for input into AERMET is available. Please clarify if all the parameters needed to run AERMET are available from Hibernia (ceiling height and cloud cover in particular)? If not, how are they accounted for in the model description? Given these uncertainties, a recommended approach is to use output from a meteorological model such as NAM or GEM as the input into the dispersion model. • There is a possible error in the document. The model describes receptors, which are located at the same location as the emission sources (e.g., Hibernia, Terra Nova and White Rose). Please clarify how this arrangement can provide accurate data or if this is an editing error. • The NO2 / NO / NOx reduction methods were discussed but it never said which option was used. Please provide the option chosen so that

	modeling results can be put into perspective. • It is mentioned that the BPIP program was used to calculate effects of building downwash for “particulate sources”. Does this mean that the downwash was not considered for gaseous emissions? In addition, BPIP is very sensitive to how inputs are entered. With the limited information provided, it cannot be determined whether BPIP will run accurately. • For particulate, only TSP was considered in the model. There is no mention of PM2.5, which is a primary particulate fraction of concern. There is minimal supporting information provided to validate the conclusions. The results indicate concentrations close to the provincial limits. It should be noted that if emissions exceed 50% of provincial limits, that the province could take action to request more detailed information or engage in monitoring of air emissions.

Spill Trajectory Modelling for the Hebron Project

AMEC Earth & Environmental – April 2010

EC 55	**EA Reference:**:	Spill Trajectory Modelling for the Hebron Project
	Scoping Document Cross Reference:	5.3.4.3 Accidental Events
	Scoping Document Satisfied:	Scope not satisfied
Preamble:	The study considered two spill sites: a near shore site in Bull Arm in Trinity Bay where the Hebron platform will be built and an offshore site where the Hebron oil production will take place. The study used three oil spill models to conduct this modelling work: ADIOS, the weathering model developed by NOAA and is publicly available, AMEC model developed (and apparently used previously) by AMEC, and finally the Oil map model developed by Applied Science Associates. ADIOS was used to address the oil weathering, AMEC model was used for stochastic modelling, and Oil map was used for trajectory modelling at the offshore spill site using deterministic approach, three blowout scenarios and three batch spill events. While the study showed a certain trend of the possible trajectory of spills and spatial distribution of the probability of oiling in Bull Arm in Trinity Bay and around the future offshore Hebron production site, the method used to conduct the modelling study is questionable as shown in the following comments. 1. The use of three different oil spill models to conduct this study is misleading and did not bring any benefit to the study, evaluation of the risk/impact associated with oil spills because: a) For the purpose of this study, trajectory modelling and tracking of the mass balance (weathering) should be integrated in the same model as in the Oil map model. The use of ADIOS model to address the weathering and AMEC model to predict the trajectory is not a correct approach as movement of the oil is strongly affected by its weathering states and vice-versa. b) The Oil map model is known to be oil spill software that can be used to conduct trajectory modelling in both deterministic and stochastic modes. Trajectory and weathering modelling are coupled in this model. c) ADIOS software model designed to estimate weathering and masse balance, but does not have any capability to model oil trajectory. d) From the description provided in the report, AMEC is not an oil spill	

	model suitable for this study as described below. 2. Modelling results obtained with the AMEC model and related to probability of oiling are questionable for the following reasons: a) As described in the report, the AMEC model includes oil advection to hydrodynamic current and wind, evaporation and vertical dispersion only. Important processes such as spreading, emulsification and interaction with shorelines are not included. b) The trajectory of the slick is modeled by tracking the centre of the slick only. For large spills, spatial distribution of the probability of oiling obtained with such approach is not correct as the edge of large slicks may reach the shoreline but not its centre. In addition, the same reasoning applies for the time for oiling. Trajectory of oil slicks is commonly tracked using Lagrangian approach using thousands of particles or spillets. This method is used in Oil map software. c) The method used to model vertical dispersion is not based on state-of-the-art knowledge. Much better methods have been developed during the last two decades and were validated with several data sets. The method used is elementary and does not include the effects of oil type and weathering (increase of oil viscosity and emulsification, for instance) in a systematic way (use of appropriate behaviour models). 3. Hydrodynamic currents used to conduct the study in the Bull Arm site are based on one-point conditions and cannot represent the hydrodynamic of the entire modelling grid. In such complex domain, it recommended to use proper gridded current data, such as those provided by the BIO finite element model for Northwest Atlantic area. Vector field of surface currents used in the simulations should be displayed on a couple of figures for illustration of both spill sites. 4. While it is recognized in the report (section 3.5 and 4.5) that there is a good chance that ice coverage at the two spill sites may be significant (50% or more) during the winter season, no modelling under ice condition was performed. The fate and weathering of an oil spill in ice-infested waters is known to be highly affected by ice. 5. A long series (hourly) of wind data (30 years) were used, which is very good to conduct the stochastic simulation, assuming that the data are of good quality. But, what is the rational of using 30 simulations per day? The fact that the number of simulations is greater than the number of data points (in a day), there will be duplicates of the extra simulations (in this case 6 per day). The result of this is that the simulations cannot be considered as independent and the resulting statistics (probability of oiling) become biased. 6. The maximum of the simulations was set between 7 and 45 days. We learned from many spills resulting from well blowout (including the recent Gulf of Mexico spill) that the spill might last for months. The rationale for the

	simulation timeframe must be explained and in particular, how the modelling results obtained with such short period of time may be used to assess the risk of oiling? 7. The predicted 17% (section 14.2.3) of the evaporation of IFO 180 is questionable. One notes that the ADIOS model is known to overestimate evaporation of many oils under wind conditions. Revision is necessary. 8. The word "any" in the last paragraph of section 14.2.3 should be removed, as the modeling results cover a small portion only of all possible spill events.
Request:	Redo the oil spill trajectory-modelling taking in to account the comments offered above.

C-NLOPB Comment #	Section	Subsection	Page	Comment
1	2	[N.A.]	1	**"Experience with the AMEC model indicates that having at least 60 predictions yields good confidence in the overall resultant statistics for a given month"** [Paragraph 3, line 10] A proper statistical justification for this statement should be provided.
2	2	2.1.2	3	The offshore model grid should extend westwards at least to the Avalon Peninsula, and preferably to the Burin, to properly delimit potential landfall areas.
3	2	2.3.1	6	Table 2-2: The source "Fisheries and Oceans Canada, 2009 is not in the Reference section.
4	2	2.3.2	13	<u>Vertical Dispersion</u>: It should be explained how the discussion in this section is relevant to Hebron crude oil. Has the dispersability of Hebron crude been tested using oil samples from the Hebron delineation-drilling program?
5	3	3.5	32	**"Recovery of the remaining fuel may only be possible by restraining the sea ice using ice booms and removing the fuel when the ice melts."** [Paragraph 1,

				line 2] The statement does not appear to consider the potential for in-situ burning to be employed.
6	3	3.6	32	The use of an artificial temporal cut-off for spill trajectories, in this case 30 days, is inappropriate. Rather, weathering calculations should form the basis for terminating trajectories that do not either reach shore or leave the model domain.
7	3	3.6.2	35	Paragraph 1, in its final sentence, mentions one trajectory, in April, that reached the head of Trinity Bay. However, other trajectories also appear to leave the model domain at its northern marine boundary: namely four in January and one in July. They also should be discussed.
8	4	4.2	45	The title of the subsection is “Fuel Spill Scenario”. The scenarios should deal with Hebron crude oil, as it represents the principal risk exposure for oil spillage during the drilling and production phases of the project.
9	4	4.2	45	Paragraph 2 describes the 30-year wind time series that was used for the spill trajectory simulation. Past trajectory analyses for the northeast Grand Banks have indicated that shoreline contact was relatively rare. Therefore, a longer time series would give additional confidence that those relatively rare conditions had properly been captured, and should have been employed. The reason for not using the entire 52-year wind data set should be explained in light of this.
10	4	4.3.1	46	Paragraph 2: It should be explained why the particular 30 years 1976 through 2005 were chosen from the 52-year wind data set.
11	4	4.4	50	Paragraph 2 describes the choice of a single “representative” year of current data, 2005, to use as input to the trajectory modelling, that 7% of the 2005 data were missing, and that interpolation on these

				occasions was “not practical”. The number of years that current data was available should be provided. The justification for the choice of 2005, the reasons why it was deemed representative, and why only one year of data was deemed sufficient, also should be provided. Additional justification for the lack of interpolation also should be provided.
12	4	4.6	51	Comments 2 and 6 also apply to this section.
13	4	4.6.2	66	Paragraph 2 concludes, with respect to Figures 4-5 through 4-16, that **“An inspection of these graphs suggests there should be no shoreline impacts for any trajectories in any months.”** This cannot reliably be concluded from the graphs since the western boundary of the model domain ends east of the Avalon Peninsula, and a number of trajectories impinge upon the western boundary in virtually every month.
14	4	4.7	69	As indicated in comment 13, the conclusion stated in Paragraph 2, line 1 is insupportable.
15	4	4.8	70	The basis for selecting the spill scenarios described in this section should be explained.
16	4	4.8	70	The justification for ending the simulations after 30 days should be provided. They should end only when the oil has weathered/dispersed to an appropriately small fraction, when shoreline is reached, or when the remaining oil leaves the model domain.

Appendix A

Environment Canada Comments

Hebron Project

Comprehensive Study Report

June 2010

Comments on Sea Ice and Iceberg sections

Canadian Ice Service, Environment Canada

Trudy Wohlleben, Luc Desjardins and Gilles Langis

(Senior Ice Forecasters)

3 PHYSICAL ENVIRONMENT SETTING

3.1 Near shore Environment (Bull Arm Area)

3.1.4 Sea Ice and Icebergs

Para 1, sentence 1: change "cyclical" to "variable".

Para 1, sentence 2: Poor wording. Also, the type of ice most likely to be encountered should be specified: up until the middle of March mostly new ice (0-10cm) and grey ice (10-15cm) can be anticipated, however from mid-March to mid-May if any ice is in the vicinity it will likely be first-year ice (which can range from 30 cm to greater than 1.2 m). **Suggest the sentence be changed to "**On average, pack ice is present in Trinity Bay every 1-in-3 years or 33% of the time, in the form of new or grey ice (<15cm) prior to mid-March and in the form of first-year ice from mid-March to mid-May (>30cm).**"**

Figure 3-13: **Inconsistencies/Errors in quoted Source** … in paragraph 1 of 3.1.4, you mention that ice charts from 1983-2008 were reviewed. For Figure 3-13, however, you quote the source as "Canadian Ice Service 2001", which would refer to the "Canadian Ice Service Sea Ice Climatic Atlas: East Coast of Canada 1971-2000". Further down, for Figure 3-14, you quote the source as "Canadian Ice Service weekly composite ice charts". … After reviewing the data in your graphs (Figures 3-13 and 3-14), it appears that you used the Ice Atlas data from 1971-2000 and not the 25-year 1983-2008 chart data that you mention in the text. **This needs to be corrected in the text and in the Sources listed under the Figures.**

Also, the reference to the East Coast Sea Ice Atlas is not listed in your references at the end of the CSR. The reference to the Atlas needs to be added. The only thing listed in the references is: "Canadian Ice Service, 2009. *Ice Archive. Latest, Past & Future Ice Conditions – East Coast*. Available at URL:

http://ice-glaces.ec.gc.ca/App/WsvPageDsp.cfm?Lang=eng&lnid=35&ScndLvl=no&ID=11889".

Note that CIS recently launched a new set of web pages, and referenced links may or may not work – all should be re-checked.

****Also, on both Figures 3-13 and 3-14, the data for the week of Feb 19 was erroneously skipped and replaced with that for the week of Feb 26. As a result, all weeks after Feb 19 contain the data for the following week and the whole time series is out by one week. These graphs need to be corrected / re-done.**

3.1.4.1 Ice Type

Para 1, sentence 2: Add the underlined for clarification … As a result, the analysis uses the upper limit for the standard thickness-ranges of the ice types present to derive sea ice thickness.

Para 2: **Several items are not clear here**. In the paragraph above, you say that you use the upper limit to derive the ice thickness in Figure 3-14. Then in Figure 3-14, you actually use the lower limit (70cm) for the first year ice range that you describe (70-120cm).

> Note that there are different categories of first year ice (FYI) thickness (thin FYI = 30-70cm; medium FYI = 70-120cm; thick FYI > 120cm). In the text you are talking about medium FYI but neglect to mention this. However, since the Atlas (from which the graph data was derived) does not distinguish between FYI categories, categories should not be mentioned here. **All of section 3.1.4.1 as well as the data in Figure 3-14 (as described here and for the source error and missing week as described above) needs to be checked, re-plotted and the paragraph re-worded and clarified.**

3.1.4.2 Iceberg Conditions in Trinity Bay

Para 1, sentence 3: **Typo** … According to Figure 3-15, the maximum number of icebergs (129) was sighted in **1997, not in 1979**. This typo needs to be corrected.

3.1.4.3 Iceberg Distribution by Year

In the references, the PAL Iceberg Sighting Database is listed as spanning the years 1989 to 2008. Why is the data in Figure 3-15 only plotted from 1992 to 2007? Is the data from the earlier years not used because it is considered unreliable? Or is it because these years contained no data for Trinity Bay? Either way, it needs to be stated why the full range of years available in the database was not considered.

3.1.4.4 Iceberg Distribution by Month

Again, if the PAL database spans 1989-2008, why were only the years 1992-2007 considered in figure 3-16?

3.1.4.5 Iceberg Size Distribution

Table 3-20: Source … the most recent version of MANICE is dated 2005. This should be corrected in the Source and in the references at the end.

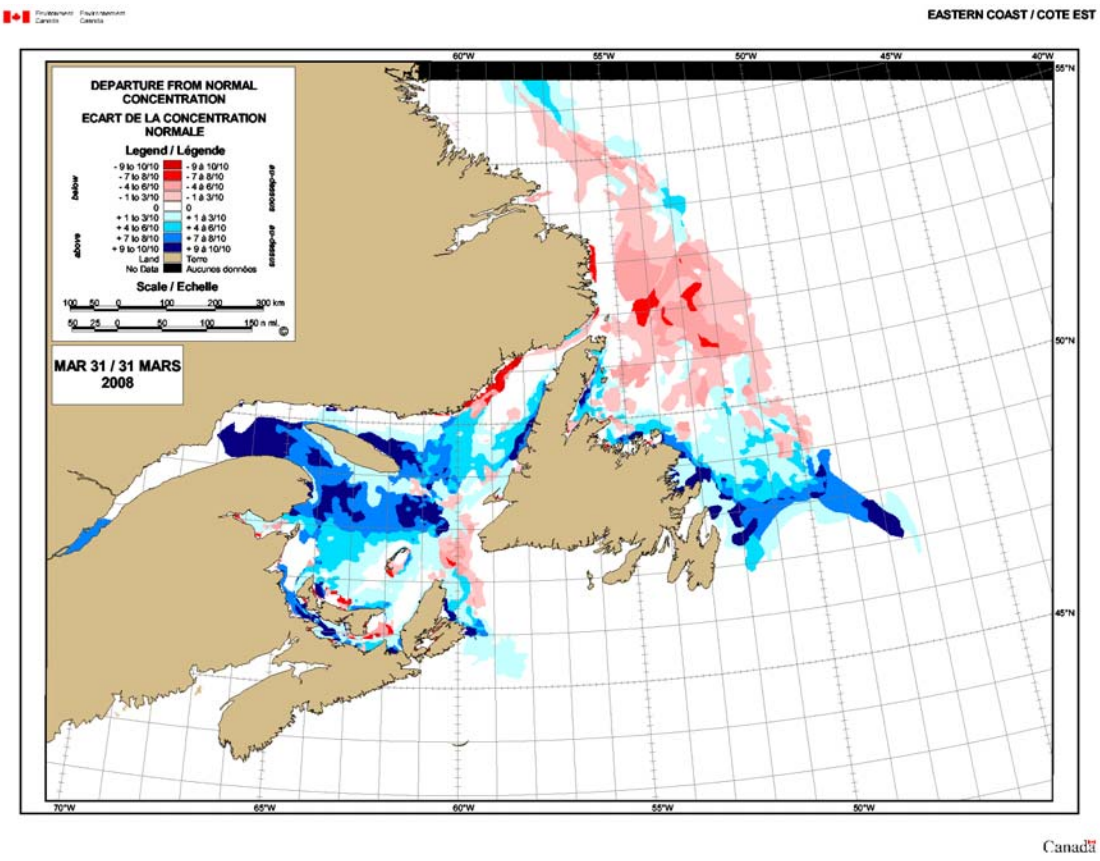
3.2 Offshore

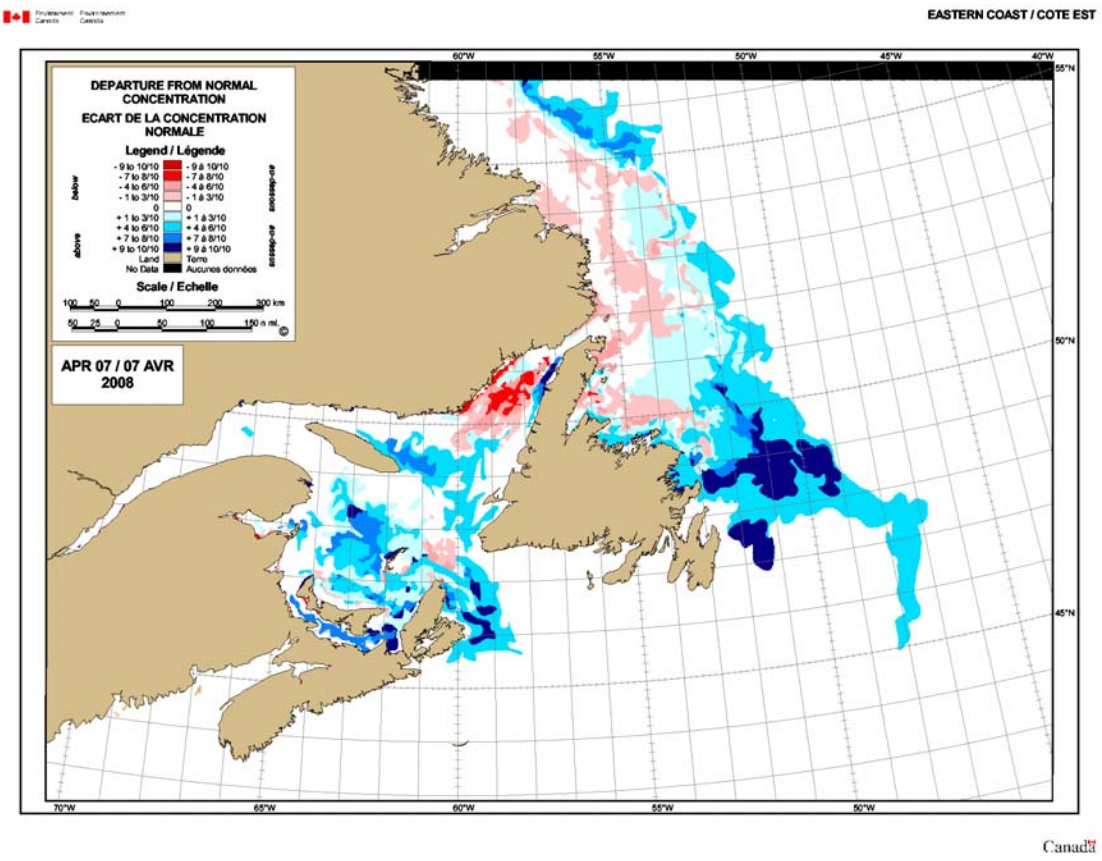
3.2.3 Sea Ice and Icebergs

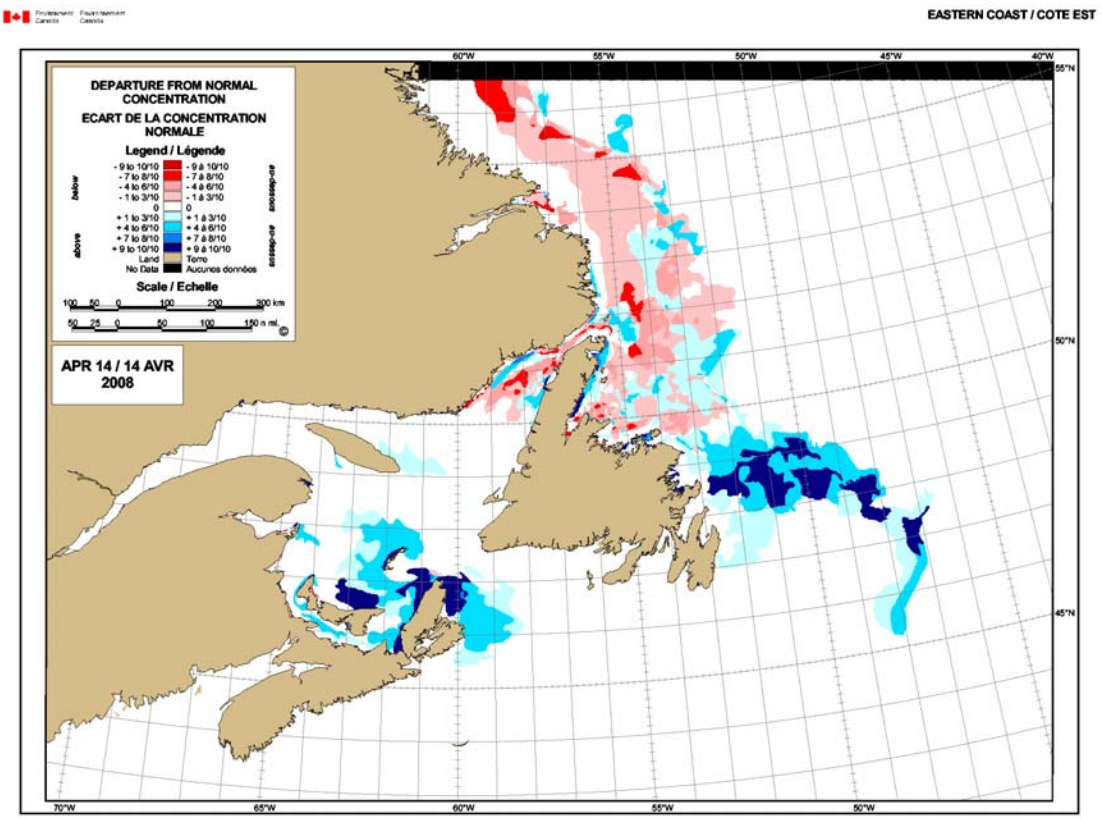
The three paragraphs in this section are well written. However, the information presented in the second paragraph fails to emphasize that sea ice can also be a significant threat to platform operations in some years, and not only because it can mask icebergs (which pose the more common hazard). This is in spite of the fact that in the Hebron area sea ice, when present, is generally “loosely packed”, “pressure-free”, “with small floes” and “in the advanced stages of deterioration”. For example, in April 2008, the White Rose oil platform was evacuated because of higher-than normal sea ice concentrations in the vicinity. The following article (see link below) about the incident contains many errors (e.g. it confuses sea ice floes and icebergs), but nevertheless records the fact that the platform was evacuated and production shut down because of encroaching sea ice in 2008:

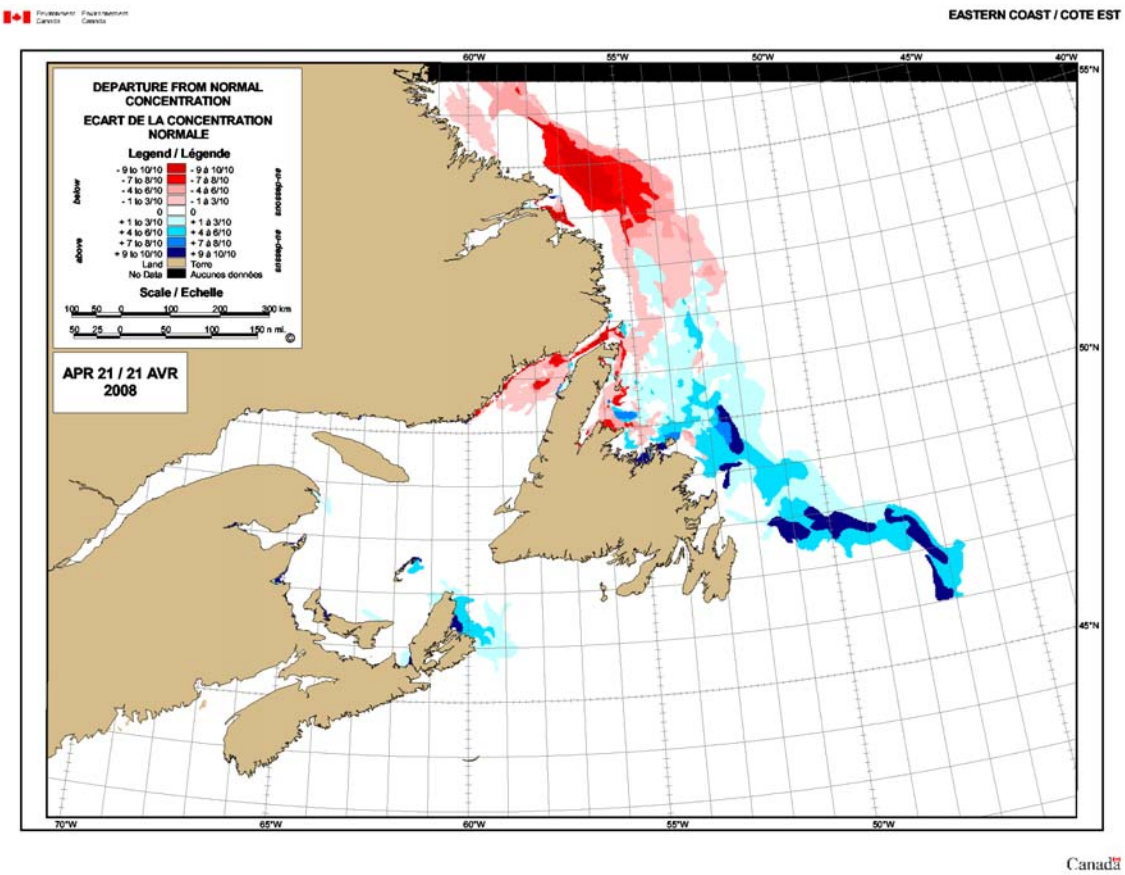
http://www.canada.com/calgaryherald/news/calgarybusiness/story.html?id=663b91ce-7090-4de1-9647-6948a5f10ef0.

Below is the series of departure-from-normal concentration sea ice charts showing the encroaching sea ice in the White Rose area over the period spanning end-of-March through April 2008:


EASTERN COAST / COTE EST
DEPARTURE FROM NORMAL CONCENTRATION
ECART DE LA CONCENTRATION NORMALE
Legend / Légende
- 9 to 10/10
- 7 to 8/10
- 4 to 6/10
- 1 to 3/10
0
+ 1 to 3/10
+ 4 to 6/10
+ 7 to 8/10
+ 9 to 10/10
Land
No Data
- 9 à 10/10
- 7 à 8/10
- 4 à 6/10
- 1 à 3/10
0
+ 1 à 3/10
+ 4 à 6/10
+ 7 à 8/10
+ 9 à 10/10
Terre
Aucunes données
below
above
Scale / Echelle
MAR 31 / 31 MARS 2008
60°W
55°W
50°W
45°W
40°W
55°N
50°N
45°N
70°W
65°W
60°W
55°W
50°W
Canada


EASTERN COAST / COTE EST
DEPARTURE FROM NORMAL CONCENTRATION
ECART DE LA CONCENTRATION NORMALE
Legend / Légende
- 9 to 10/10
- 7 to 8/10
- 4 to 6/10
- 1 to 3/10
0
+ 1 to 3/10
+ 4 to 6/10
+ 7 to 8/10
+ 9 to 10/10
Land
No Data
- 9 à 10/10
- 7 à 8/10
- 4 à 6/10
- 1 à 3/10
0
+ 1 à 3/10
+ 4 à 6/10
+ 7 à 8/10
+ 9 à 10/10
Terre
Aucunes données
below
above
Scale / Echelle
APR 07 / 07 AVR
2008
60°W
55°W
50°W
45°W
40°W
55°N
50°N
45°N
70°W
65°W
60°W
55°W
50°W
Canada


EASTERN COAST / COTE EST
DEPARTURE FROM NORMAL CONCENTRATION
ECART DE LA CONCENTRATION NORMALE
Legend / Légende
- 9 to 10/10
- 7 to 8/10
- 4 to 6/10
- 1 to 3/10
0
+ 1 to 3/10
+ 4 to 6/10
+ 7 to 8/10
+ 9 to 10/10
Land
No Data
- 9 à 10/10
- 7 à 8/10
- 4 à 6/10
- 1 à 3/10
0
+ 1 à 3/10
+ 4 à 6/10
+ 7 à 8/10
+ 9 à 10/10
Terre
Aucunes données
below
above
Scale / Echelle
APR 14 / 14 AVR
2008
60°W
55°W
50°W
45°W
40°W
55°N
50°N
45°N
70°W
65°W
60°W
55°W
50°W
Canada



It is our understanding that, while the sea ice itself does not pose a direct serious hazard to the platform, concentrations greater than six tenths (>6/10) prevent the safe launch of emergency escape life-raft pods from the platform chutes into the water below. If there is the possibility that life rafts cannot be launched, preventing escape from the platform in the case of an emergency, then operations need to be shut down and personnel evacuated. **This should be verified and confirmed with those who coordinated the White Rose evacuation in 2008**.

3.2.3.1 Sea Ice

Formation, Growth and Thickness

Para 1, sentence 2: In this sentence you mention “young” ice, but this is not defined in Table 3.50. Young ice comprises Grey and Grey-white ice and ranges from 10 to 30 cm in thickness.

Table 3.50: **Several corrections are required to this table, since MANICE is cited as the reference**. 1) In MANICE, new ice is defined as having a thickness **<10cm**, not 10cm; 2) The term “White Ice” is not an official MANICE term – the term “**First-Year**” ice should be used; 3) The thickness range of first year ice given in MANICE is any ice that is **>30cm**, and not 30-200cm. 4) The descriptions in the Age

column are not exactly correct. The phrases “Early season first year” and “Mid-season first year” ice are misleading as these ice types can develop throughout the season at the fringes of and between floes within the main ice pack. Removing the “Age” column and changing the header of column 1 from “Description” to “Stage of Development” is suggested, in keeping with the term used in MANICE; and 5) the latest version of MANICE is dated 2005.

Spatial Distribution

Para 2, sentences 2, 3, and 4: **The interpretation presented in this paragraph is not exactly correct and is written in a confusing way.** For example, on the charts, the exact 50% presence of sea ice line (equivalent to the median ice extent) lies between the blue and green areas on the charts, and is not represented by the blue area as indicated in sentence 3. Also, in sentence 2, the black area is discussed and then it goes on to say that this indicates, “in all months the region was ice-free in at least one year”. Because the Hebron area (indicated by a star on the charts) is not specifically referred to in sentence 2, it makes it sound like the black area is still the region being discussed. This could be very confusing to someone who is not used to looking at these charts. If mentioning the black area at all, it should be referred to as the area where ice is present 100% of the time but which is significantly north of the drilling site.

Suggest replacing Para 2, sentences 1-4 with: “The maximum mid-month ice extents for January through May, southeast of Newfoundland, are indicated by the yellow areas in Figures 3-29 to 3-33. These maximum extents are composites of the most advanced ice edges recorded over the 1971-2000 period. The Hebron platform location, indicated by a star on Figures 3-29 to 3-33, lies within the limit of the maximum recorded ice extent during the months of February, March and April. However, based on 1971-2000 data and as is indicated by the colours on the charts, the probability that this location will lie within the maximum limit is 1-15% in February and April, and 16-33% in March.”

Figure 3-29: This is not the "mid-month" chart for January. The charts for all the other months are for close to the 15th of that month, and in the text it says the included charts are for "mid-month", so why not use the January 15th chart (below) as opposed to the January 8th chart (used in the study)? **Replace Figure 3-29 with**:

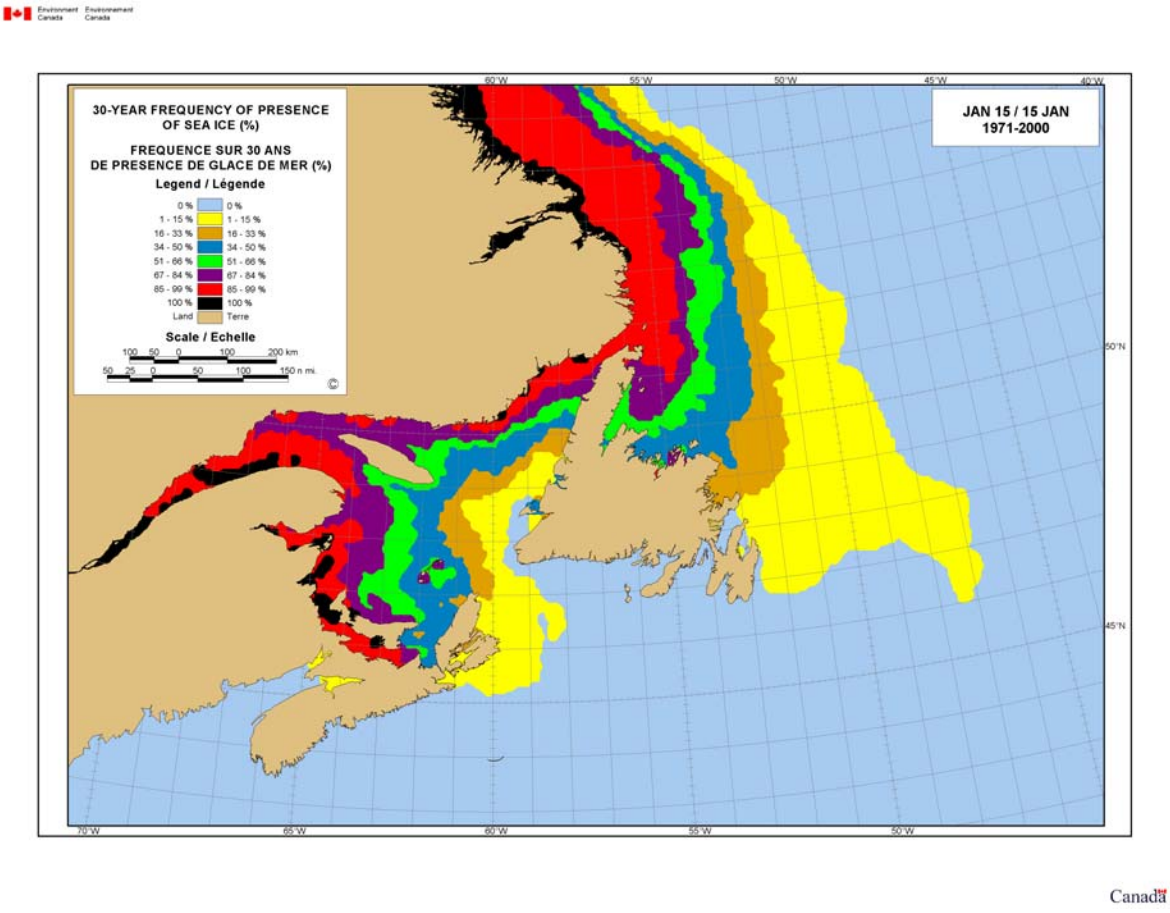
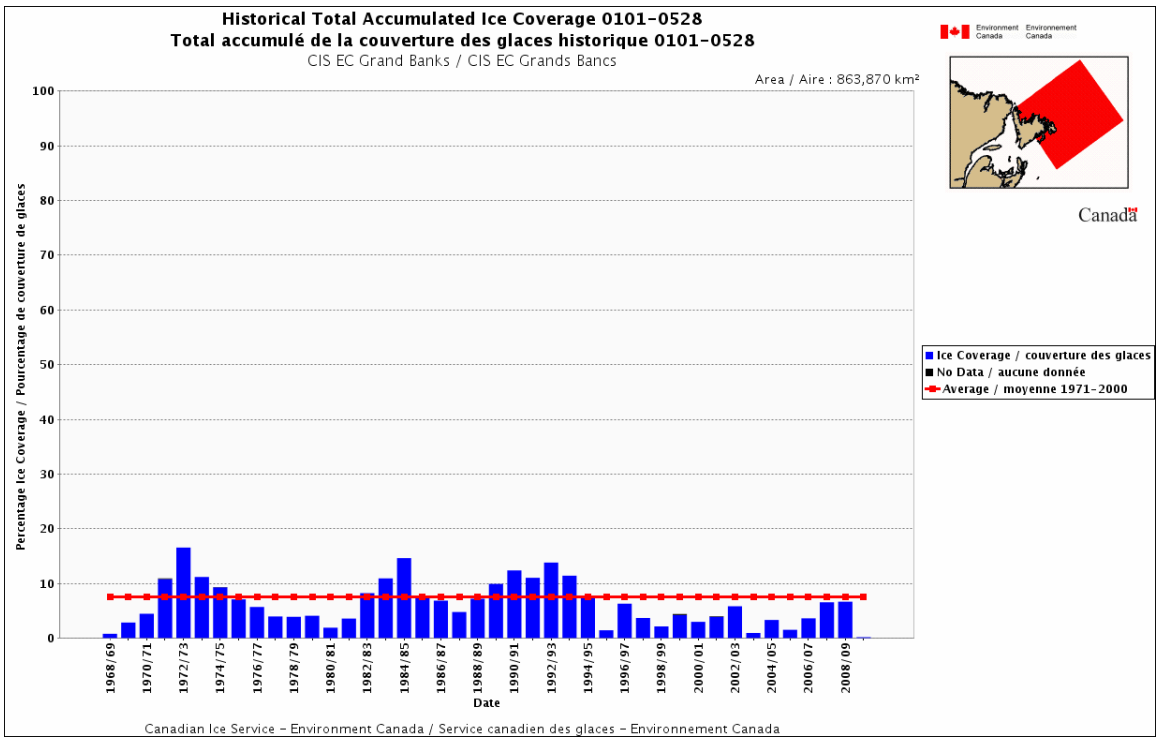
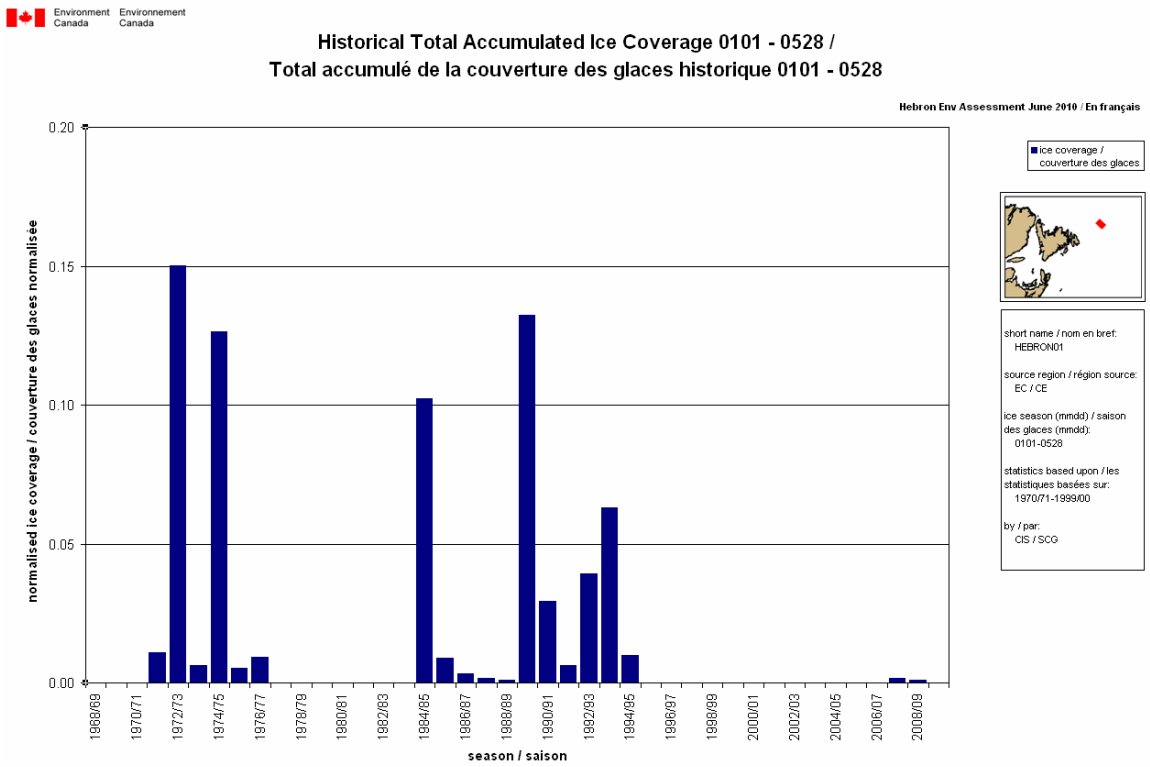


Figure 3-34: Why was this graph produced for the entire east coast and not specifically for the Grand Banks area (which is an option with CIS's online Ice Graph tool). Additionally, as indicated by the ice charts shown in Figures 3-29 to 3-33, the ice season for this area usually begins in January and ends in May, so why choose a period from mid-November to mid-July to average over? **It would be better if this time series were replaced with one specific to the Grand Banks and representing the average for the January to May period (see below)**:



CIS also has the capability of generating such ice graphs for areas not included in the web tool, if requested. It might also be good to include the following ice graph, tailored specifically to the Hebron Platform area. This graph also emphasizes that, based on 1969-2010 data, ice is only present in the area in approximately 19 years out of every 42 years (or in ~45% of the years). Based on 1971-2000 data, ice was present in that area in 57% of the years. The springs of 2008 and 2009 represented the first time ice was seen in that area within the last 15 years. (Note that the ice graph below shows an "Accumulated Ice Coverage" for the entire January to May period. Naturally, the "frequency of presence of sea ice" for the January to May period is higher than that for any individual month as shown in Figures 3-29 to 3-33).



The above ice graph also makes a nice progression between the larger Grand Banks area (Figure 3-34) and the area within a 15km radius of the platform (Figure 3-35).

Figure 3-35: In the text and in the caption, it says that this data is for within **15 km** of the platform location, but in the title of the top graph of Figure 3-35 it says within **28 km** of the platform. **Either the title or the Figure caption and text need to be corrected**.

Also, in the table for Figure 3-35 it is not clear what the values within the grey boxes represent. If they represent the average concentration of ice within 28 km of the

Hebron platform, then the column containing the Mean Concentration in the table contains errors. For example, for year 1991, values of 1, 9 and 4 are indicated. The mean value should then be 4.67, but the corresponding Mean concentration given in column 7 is "9". On the other hand, if the values in the grey boxes represent "occurrence of ice within the 28km radius" as indicated in the column header, how can a value of 9 be obtained for a 7-day period? **The values in the table in Figure 3-35 need to be clearly defined and re-checked for errors**.

Spatial Distribution section, para 4: This paragraph is organized in a confusing way. **Please make the following edits**: "The time frame of the annual ice incursions within 15 km of the Hebron Platform location, based on data from 1972 to 2008, is shown in Figure 3-35. These data show the onset (roughly between 1983 and 1994) of a period of greater incursions which was then followed by a period of no pack ice incursions (from 1997 to 2007). The data also show that ice incursions are centred broadly in mid-March."

Spatial Distribution section, last para: Again, the sentences in this paragraph are written in a very confusing way. For example, sentence 1 begins with rates in terms of years but then jumps to weekly periods with no logical transition from one phrase to the next. **Please edit this paragraph as follows**: "The Hebron Platform location experienced sea ice incursions in 11 of the 37 years examined in Figure 3-35. This is equivalent to a rate of one in every three to four years. Weekly probabilities, which peak at 14 percent, show two maxima: the first in the last week of February; and the second on the first week of April. The duration of the incursions vary from a minimum of one week to a maximum of seven weeks. Of the 11 years that ice was present, the average duration was three weeks."

3.2.3.2 Sea Ice Movement

Para 1, sentence 1: Make clearer … Suggest simplifying sentence 1 to: "Although the Hebron Platform location lies near the extreme southern limit of the regional ice pack, it is affected by the ice tongue that is formed by the loose pack ice being swept around the Grand Banks by the offshore branch of the Labrador Current".

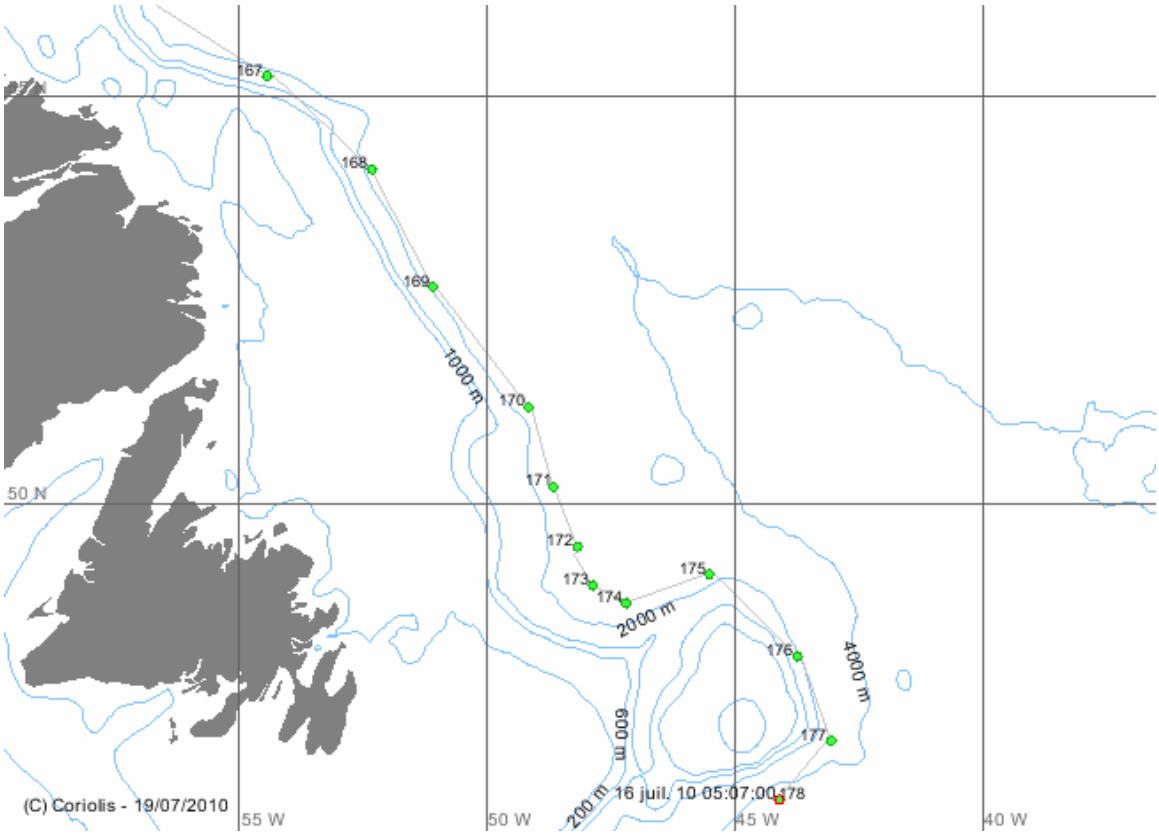
Para 2 and Figure 3-36: **Inconsistent reference**. In the text it says the study was conducted over the period 1984-87 by Seaconsult Ltd. (1988), but in the figure itself it says "Data: February through April 1985" and references "Fissel et al. (1985)".

Additional comment: the drift speed and direction study was conducted over a very limited period of 4 years (1984-87). Many factors can influence ice drift, including some that may not have been observed during this 4-year study. A new study should be conducted using new ARGO float data, freely available here:

http://www.argodatamgt.org/Access-to-data/Argo-data-selection .

For example, the drift track of ARGO float 6900190, released in 2005 south of Iceland, could be followed down the east coast and along the slope of the Grand

Banks in 2010 (green dots on figure below) over the period March 28 (float cycle 167) through July 16 (float cycle 178).



3.2.3.3 Concentrations

Para 1: The statements made in this paragraph do not agree with CIS median ice concentration charts. It appears that the statements were derived from the "Frequency of Presence of Sea ice" charts shown in Figures 3-29 to 3-33, and that "frequency of presence of sea ice" has been confused with "mean sea ice concentrations". **This needs to be corrected.** Also, it is not clear how the information in this paragraph, which purports to describe the seasonal variation in sea ice concentrations over the Grand Banks, relates to Figure 3-37 (whose data is not divided into monthly periods) as indicated in the last sentence. This needs to be amended.

Figure 3-37 and Para 2: √√ **Pie chart values were checked and are OK.** A spot-check was performed on several years during the 1979-2008 period during which ice was present in the Hebron area, using the CIS archived regional chart data. In 1985, ice affected the Hebron area between Feb03 and Apr07. Charts were produced every 3 days during this period, for a total of 17 charts. Ice concentrations

greater than or equal to 8/10 affected Hebron on 8 (or 47%) of these charts and ice concentrations less than 8/10 affected Hebron on 9 (or 53%) of the charts. These numbers agree with the values presented in the pie chart, where concentrations of greater than or equal to 8/10s were determined to affect the area 46% of the time (during years when ice was present) and concentrations less that 8/10s were determined to affect the area 54% of the time. For 1993, ice affected the Hebron area on 3-4 charts from Feb08 to Apr19, and none of the charts indicated 8/10 or greater ice concentrations. Therefore, in this year, the proportions of 8/10 or more versus less than 8/10 is 0% and 100%. For 1994, a time when charts were done every week, ice affected the Hebron area from Feb14 to Mar07 (4 charts). Ice concentrations of 8/10 or greater impacted the Hebron area on ~3 of the charts, changing the proportions to 75% and 25%. For the 3 spot-check years, the average % of time with ice concentrations of 8/10 or greater is 40%, close enough to the pie-chart percentages given the limited number of years checked. The mean overall concentration, based on the data in the pie chart is ~7/10 as indicated.

****Another way to show the information above would be to include the following Ice Graph**, which shows weekly ice coverages for the Hebron-specific area (although the coverages average less than the concentrations in the pie chart in Figure 3-37 because the area considered is >15km radius. The area on the Ice Graph covers a 1°×1° or 111km N-S × 76.5km E-W box).

3.2.3.4 Floe Size

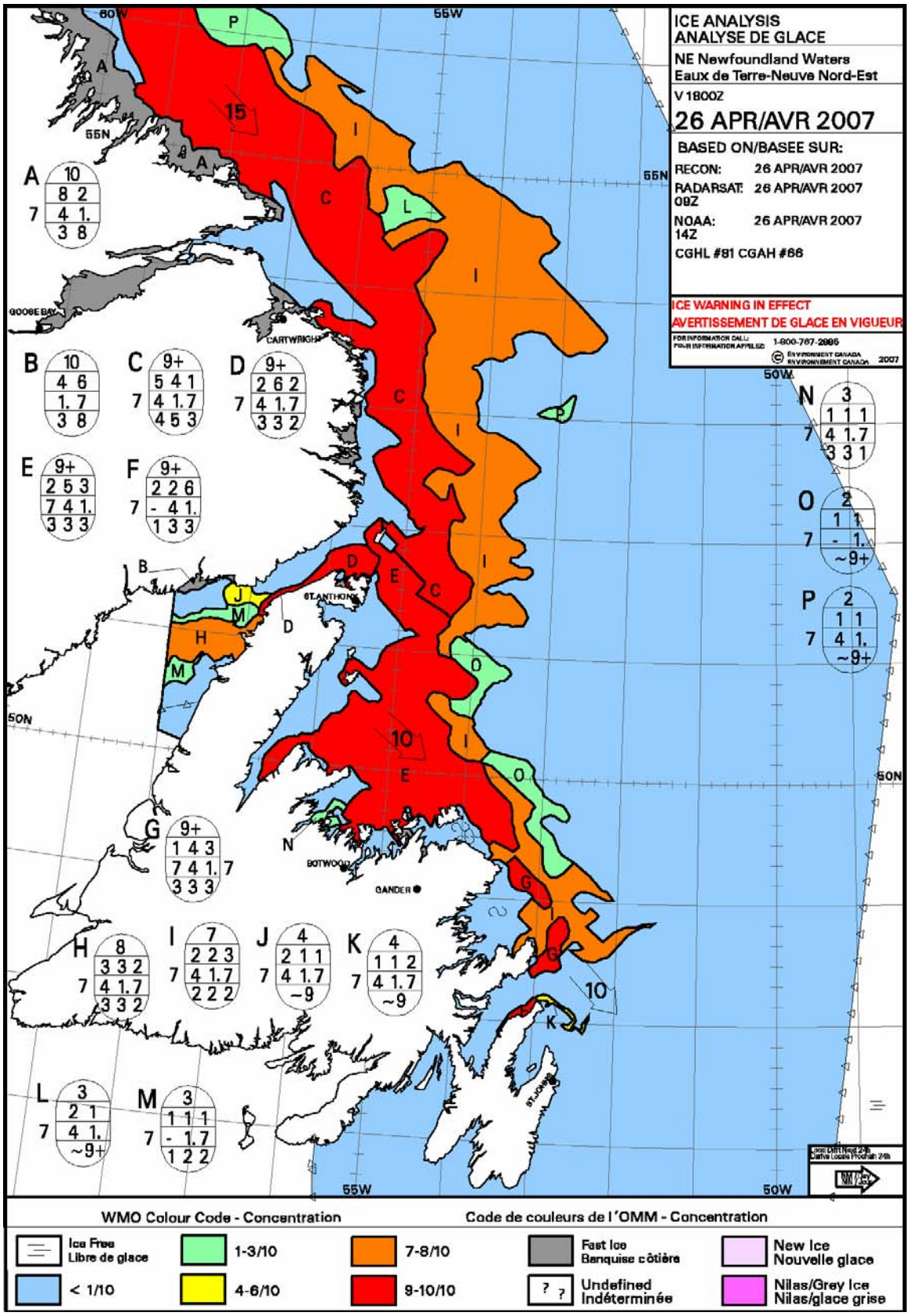
Sentences 2 and 3, immediately under the bullets: Poorly written and unclear. **Rephrase as**: "In Newfoundland waters, floe sizes tend to decrease from north to south and from west to east, towards the outer margins of the ice pack. Enhanced melt and disintegration of the ice floes occurs at the outer ice pack margins as a result of larger amplitude waves (not damped by the ice pack proper) and warmer sea surface temperatures."

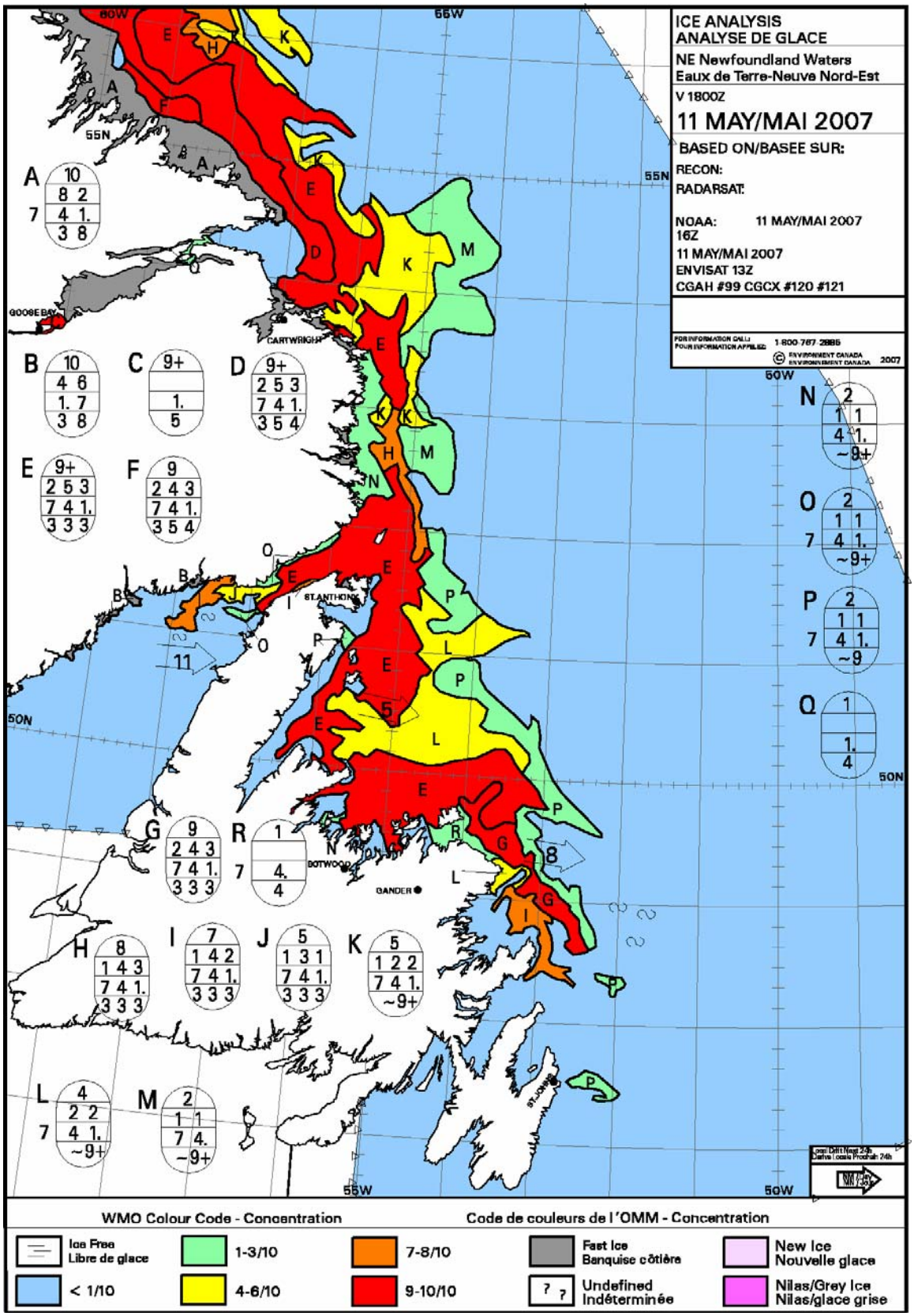
Para 4, sentence 1: It should be noted in the text that the Atmospheric Environment Service (AES) is now the Meteorological Service of Canada (MSC) and that the Canadian Ice Service (CIS) is a branch of the MSC.

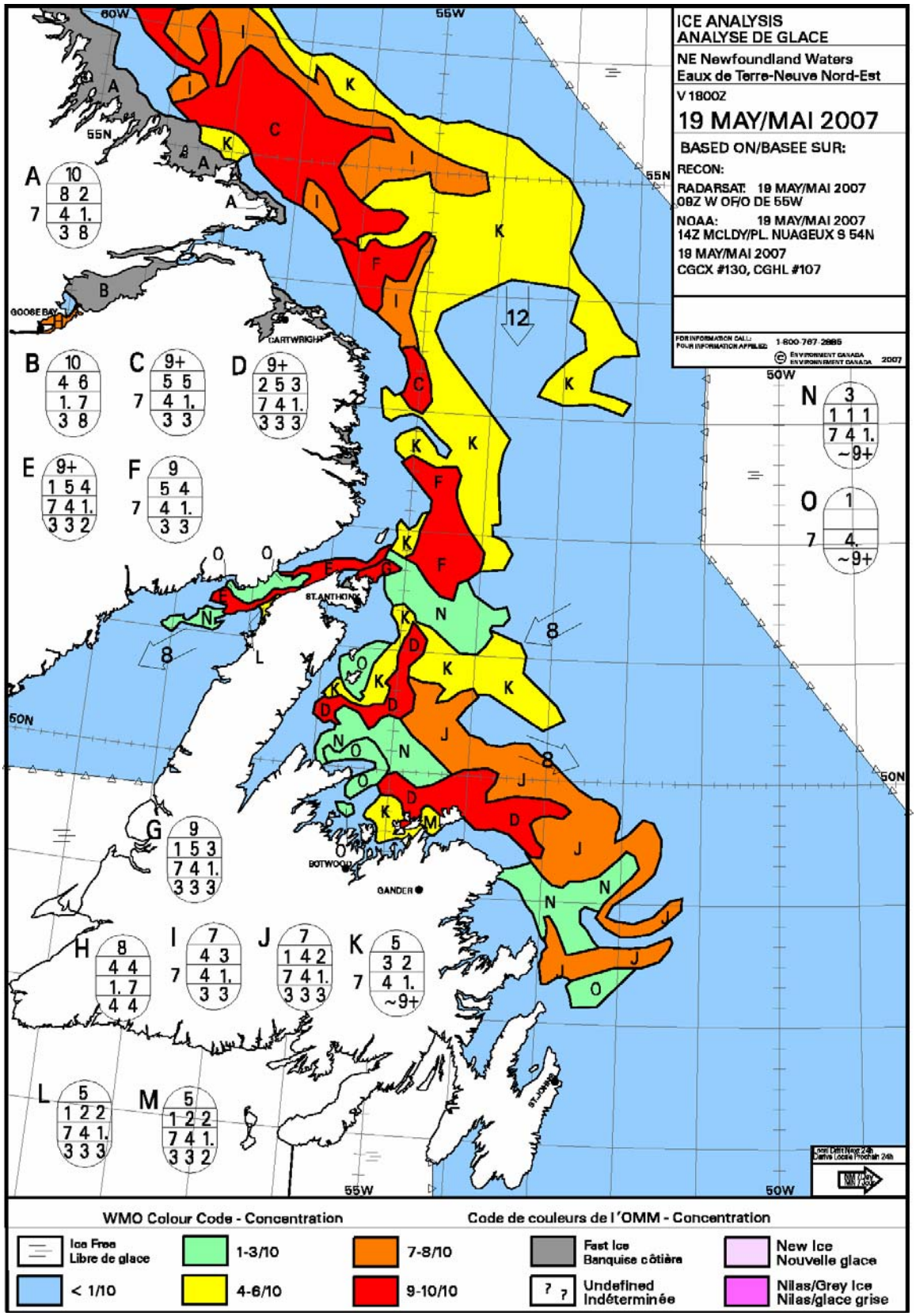
3.2.3.5 Thickness and Deformation

General comment: Most of this section is devoted to a review of high ice thicknesses in the Grand Banks area as a result of ridging and deformation. Only a brief mention is made of thick ice floes drifting into the area from northern waters. In recent years, such as 2007 and 2010, Nares Strait has not always been consolidating in the winter as per normal, and as a result greater than normal amounts of thick, multi-year ice have been observed drifting south from the Arctic Ocean into Baffin Bay, down along the Labrador Coast and into Newfoundland waters. In spring 2007, pockets of 4/10 concentration of thick, old ice were observed by Coast Guard ships in some areas around Newfoundland.

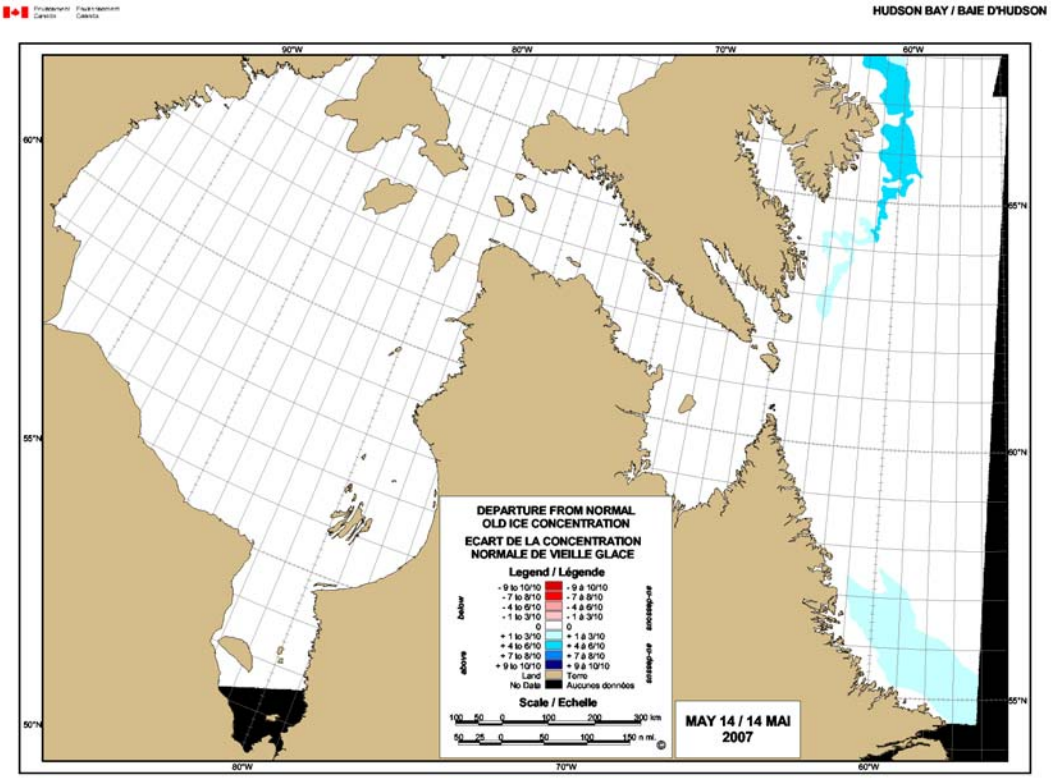
The sequence of daily ice charts below indicate a large area of 2/10 thick, old ice drifting south of 50N at the end of April, 2007.

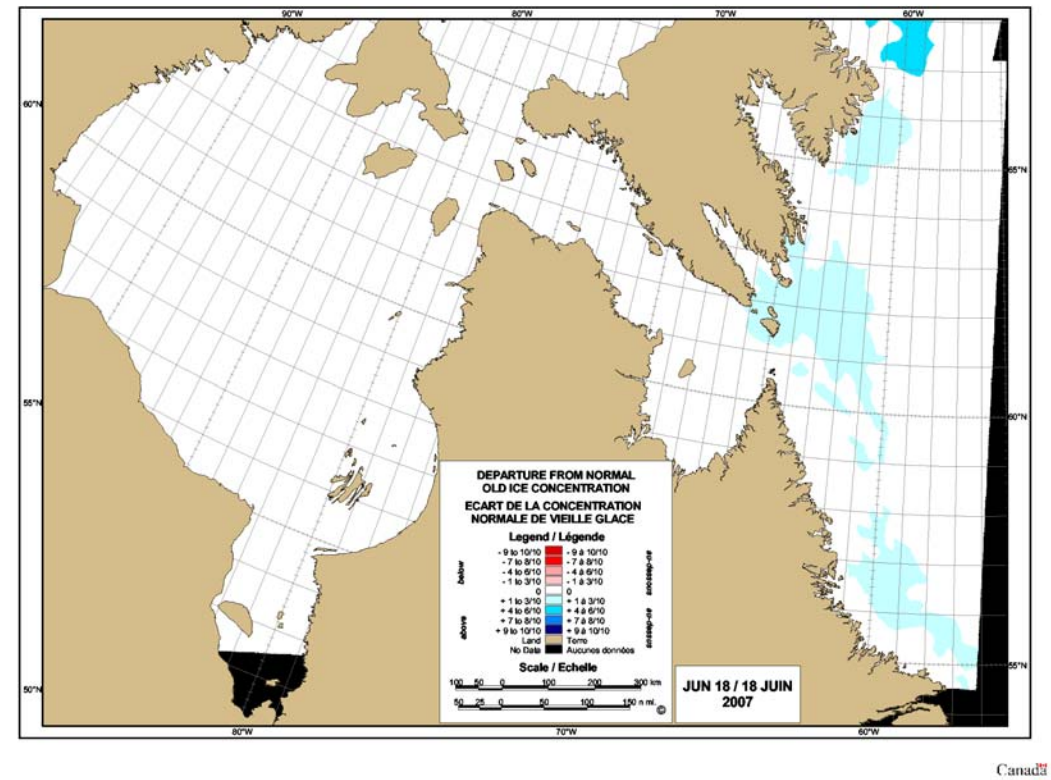

ICE ANALYSIS
ANALYSE DE GLACE
NE Newfoundland Waters
Eaux de Terre-Neuve Nord-Est
V 1800Z
26 APR/AVR 2007
BASED ON/BASEE SUR:
RECON: 26 APR/AVR 2007
RADARSAT: 26 APR/AVR 2007 09Z
NOAA: 26 APR/AVR 2007 14Z
CGHL #81 CGAH #66
ICE WARNING IN EFFECT
AVERTISSEMENT DE GLACE EN VIGUEUR
FOR INFORMATION CALL:
POUR INFORMATION APPELEZ: 1-800-767-2995
© ENVIRONMENT CANADA ENVIRONNEMENT CANADA 2007
60W
55W
50W
55N
50N
GOOSE BAY
CARTWRIGHT
ST.ANTHONY
BOTWOOD
GANDER
WMO Colour Code - Concentration
Code de couleurs de l'OMM - Concentration
Ice Free
Libre de glace
< 1/10
1-3/10
4-6/10
7-8/10
9-10/10
Fast Ice
Banquise côtière
Undefined
Indéterminée
New Ice
Nouvelle glace
Nilas/Grey Ice
Nilas/glace grise


ICE ANALYSIS
ANALYSE DE GLACE
NE Newfoundland Waters
Eaux de Terre-Neuve Nord-Est
V 1800Z
11 MAY/MAI 2007
BASED ON/BASEE SUR:
RECON:
RADARSAT:
NOAA: 11 MAY/MAI 2007 16Z
11 MAY/MAI 2007 ENVISAT 13Z
CGAH #99 CGCX #120 #121
FOR INFORMATION CALL: 1-800-767-2885
POUR INFORMATION APPELEZ:
© ENVIRONMENT CANADA ENVIRONNEMENT CANADA 2007
60W
55W
50W
55N
50N
CARTWRIGHT
GOOSE BAY
ST.ANTHONY
BOTWOOD
GANDER
ST.JOHN'S
WMO Colour Code - Concentration
Code de couleurs de l'OMM - Concentration
Ice Free
Libre de glace
< 1/10
1-3/10
4-6/10
7-8/10
9-10/10
Fast Ice
Banquise côtière
Undefined
Indéterminée
New Ice
Nouvelle glace
Nilas/Grey Ice
Nilas/glace grise


ICE ANALYSIS
ANALYSE DE GLACE
NE Newfoundland Waters
Eaux de Terre-Neuve Nord-Est
V 1800Z
19 MAY/MAI 2007
BASED ON/BASEE SUR:
RECON:
RADARSAT: 19 MAY/MAI 2007
08Z W OF/O DE 55W
NOAA: 19 MAY/MAI 2007
14Z MCLDY/PL NUAGEUX S 54N
19 MAY/MAI 2007
CGCX #130, CGHL #107
FOR INFORMATION CALL:
POUR INFORMATION APPELEZ: 1-800-767-2885
© ENVIRONMENT CANADA ENVIRONNEMENT CANADA 2007
60W
55W
50W
55N
50N
GOOSE BAY
CARTWRIGHT
ST. ANTHONY
BOTWOOD
GANDER
WMO Colour Code - Concentration
Code de couleurs de l'OMM - Concentration
Ice Free
Libre de glace
< 1/10
1-3/10
4-6/10
7-8/10
9-10/10
Fast Ice
Banquise côtière
Undefined
Indéterminée
New Ice
Nouvelle glace
Nilas/Grey Ice
Nilas/glace grise

See also the departure from normal concentration of old ice charts for 2007 below. Unfortunately, these are not produced for Newfoundland waters.


HUDSON BAY / BAIE D'HUDSON
90°W
80°W
70°W
60°W
60°N
55°N
50°N
DEPARTURE FROM NORMAL
OLD ICE CONCENTRATION
ECART DE LA CONCENTRATION
NORMALE DE VIEILLE GLACE
Legend / Légende
- 9 to 10/10
- 7 to 8/10
- 4 to 6/10
- 1 to 3/10
0
+ 1 to 3/10
+ 4 to 6/10
+ 7 to 8/10
+ 9 to 10/10
Land
No Data
- 9 à 10/10
- 7 à 8/10
- 4 à 6/10
- 1 à 3/10
0
+ 1 à 3/10
+ 4 à 6/10
+ 7 à 8/10
+ 9 à 10/10
Terre
Aucunes données
below
above
en dessous
au-dessus
Scale / Echelle
100 50 0 100 200 300 km
50 25 0 50 100 150 n mi
MAY 14 / 14 MAI
2007
Canada


HUDSON BAY / BAIE D'HUDSON
90°W
80°W
70°W
60°W
60°N
55°N
50°N
DEPARTURE FROM NORMAL
OLD ICE CONCENTRATION
ECART DE LA CONCENTRATION
NORMALE DE VIEILLE GLACE
Legend / Légende
- 9 to 10/10
- 7 to 8/10
- 4 to 6/10
- 1 to 3/10
0
+ 1 to 3/10
+ 4 to 6/10
+ 7 to 8/10
+ 9 to 10/10
Land
No Data
- 9 à 10/10
- 7 à 8/10
- 4 à 6/10
- 1 à 3/10
0
+ 1 à 3/10
+ 4 à 6/10
+ 7 à 8/10
+ 9 à 10/10
Terre
Aucunes données
below
above
en dessous
au-dessus
Scale / Echelle
100 50 0 100 200 300 km
50 25 0 50 100 150 n mi
JUN 18 / 18 JUIN
2007
Canada

It may be worth adding a line or two to this section indicating that in some years thick multi-year ice floes originating from the Arctic Ocean can drift southwards into Newfoundland waters. Because of their thickness and low-salinity (which makes the ice nearly as hard as glacier-derived ice), these ice floes can pose a significant danger to ships in the area – similar to the risks posed by icebergs. These ice floes are slow to melt because of their thickness and may or may not reach the Hebron area. Once individual multi-year floes are left behind by the main (melting and retreating first-year) pack as they drift south, they would be indistinguishable from bergy bits or growlers. Multi-year ice floes could also occasionally impact the ice conditions at the entrance to Trinity Bay (previous section of this study).

3.2.3.6 Icebergs

Para 2, general comment: The text mentions that data up to 2008 was considered, but the PERD Iceberg Sighting Database is updated annually … data up to 2009 and perhaps even 2010 are available on the NRC website:

http://www.nrc-cnrc.gc.ca/eng/ibp/chc/reports/ice-engineering.html

PERD Iceberg Sighting Database: 2010

Iceberg_Sighting_10.pdf
PERD_Iceberg_Sighting_Database_10.mdb
PERD_Iceberg_Sighting_DatabaseXP_10.mdb
BMT Fleet Technology, Kanata, ON, Canada, 2010

Comprehensive Iceberg Management Database 2010
Iceberg_Management_10.pdf
PERD_Iceberg_Management_Database_10.zip
PAL Environmental Services, St. John's, NL, Canada, 2010

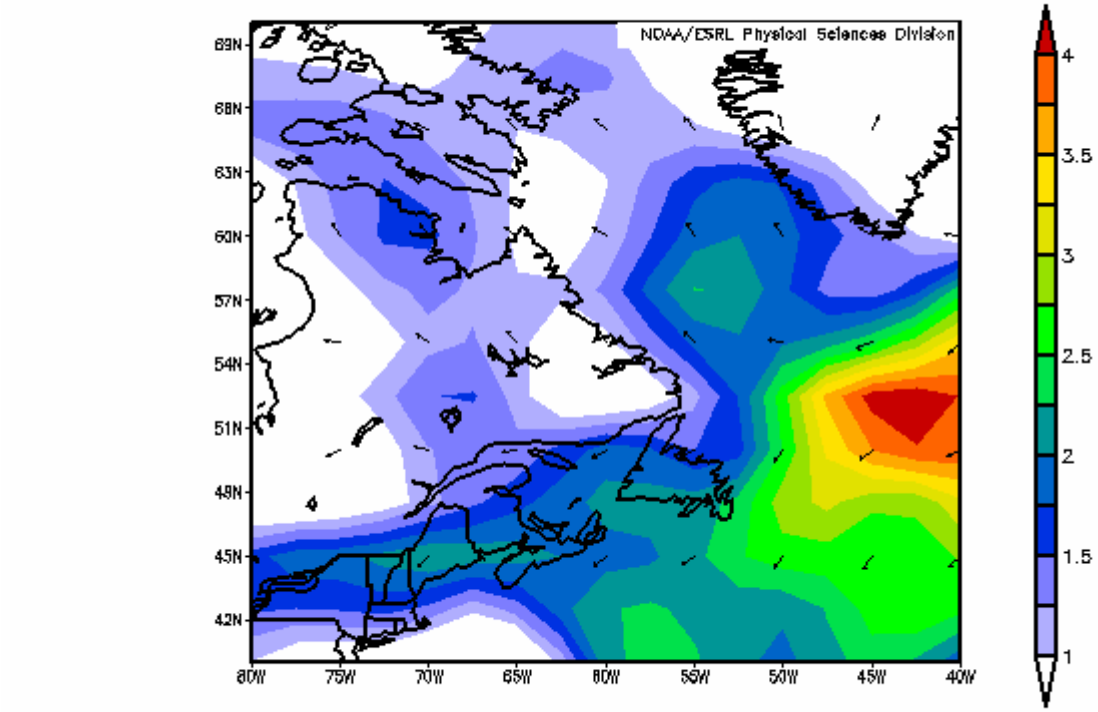
Grand Banks Iceberg Management
GB_Iceberg_Manage_Overview_07.pdf
AMEC and others
PERD/CHC Report 20-84, St. John's, NL, Canada, 2007.

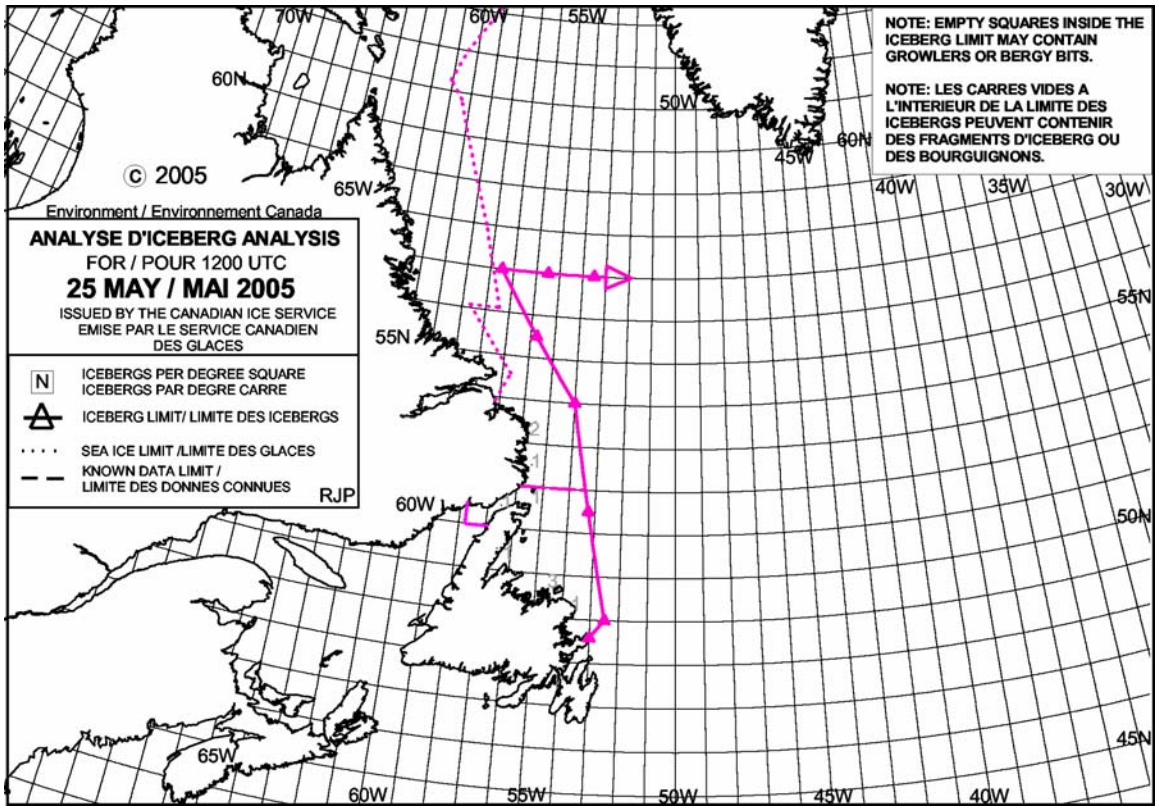
Variations in Local and Regional Iceberg Numbers

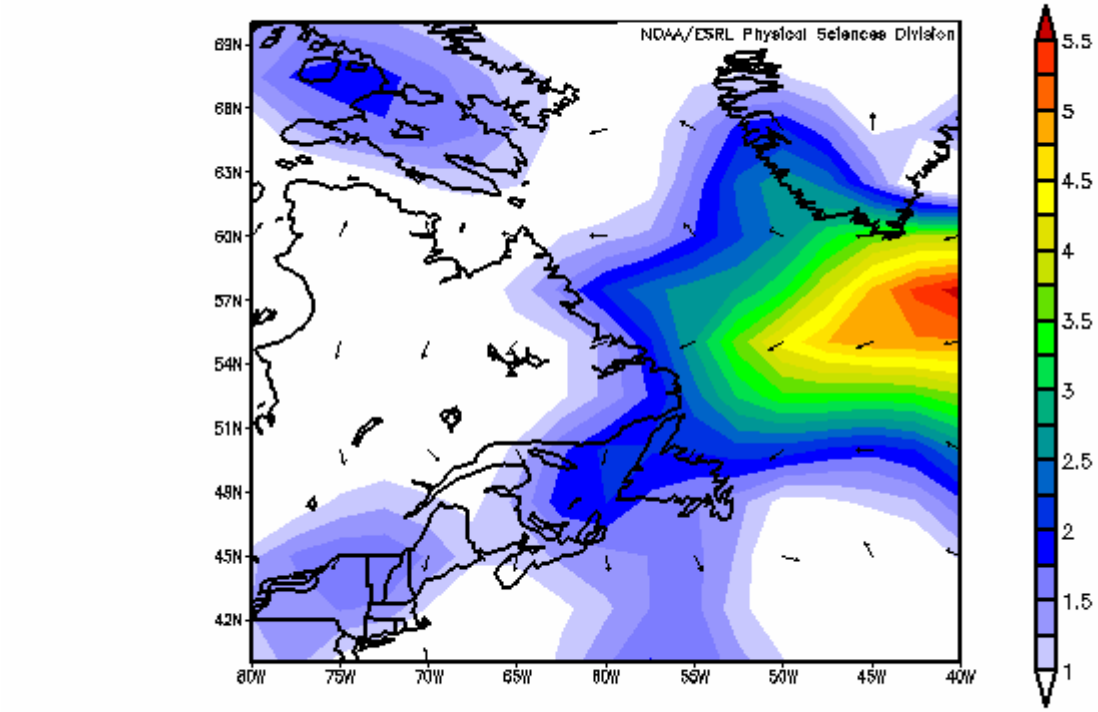
Para 1, sentence 4: "These low numbers were attributed to a combination of very light sea ice coverage and higher than normal water temperatures on the Grand Banks" … Note that the low numbers in years such as 2005 were primarily the result of prolonged periods of onshore easterly winds during the spring months, which drove the bergs onto the Labrador Coast where they grounded. As a result, they were not free to drift south into Newfoundland waters. See the vector wind anomaly plots below for Mar-May (wind speeds in m/s), created from NCEP reanalysis data on the ESRL website:

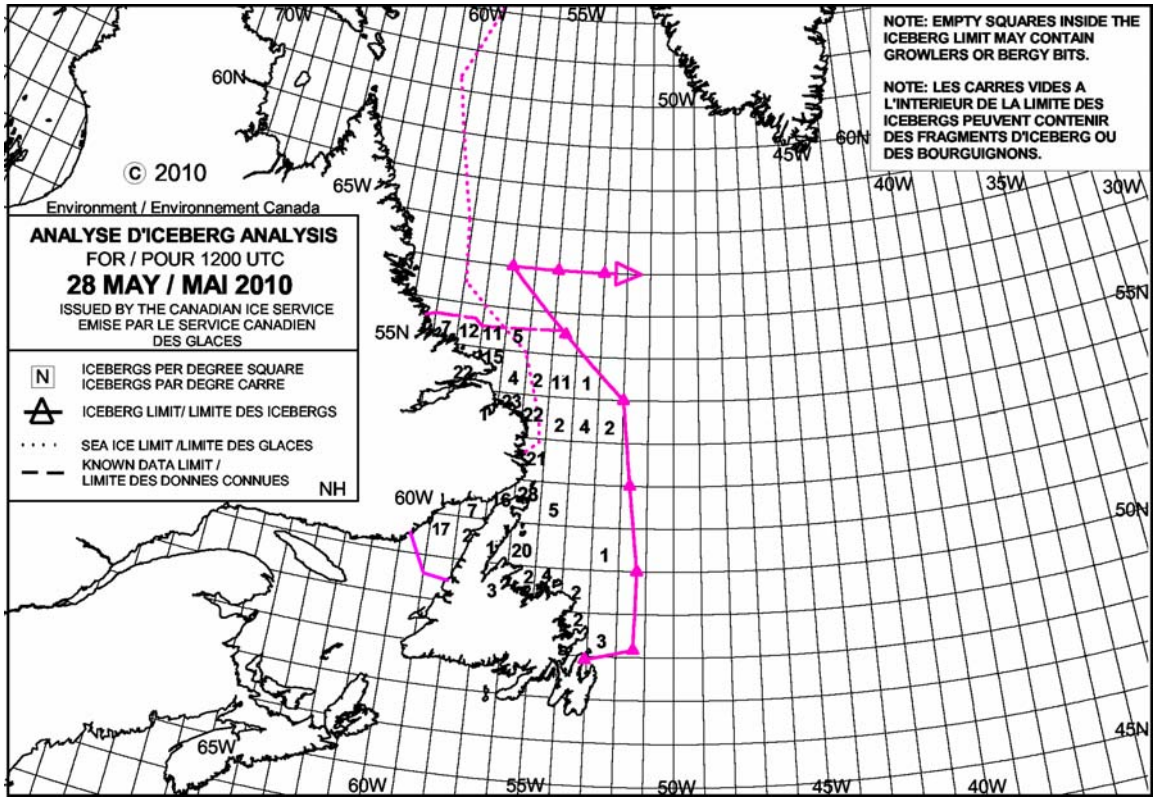
http://www.esrl.noaa.gov/psd/data/composites/day/

along with the CIS the daily iceberg charts from May of the years 2005 and 2010.


NOAA/ESRL Physical Sciences Division
69N
66N
63N
60N
57N
54N
51N
48N
45N
42N
80W
75W
70W
65W
60W
55W
50W
45W
40W
4
3.5
3
2.5
2
1.5
1


NOTE: EMPTY SQUARES INSIDE THE ICEBERG LIMIT MAY CONTAIN GROWLERS OR BERGY BITS.
NOTE: LES CARRES VIDES A L'INTERIEUR DE LA LIMITE DES ICEBERGS PEUVENT CONTENIR DES FRAGMENTS D'ICEBERG OU DES BOURGUIGNONS.
© 2005
Environment / Environnement Canada
ANALYSE D'ICEBERG ANALYSIS
FOR / POUR 1200 UTC
25 MAY / MAI 2005
ISSUED BY THE CANADIAN ICE SERVICE
EMISE PAR LE SERVICE CANADIEN DES GLACES
N ICEBERGS PER DEGREE SQUARE
ICEBERGS PAR DEGRE CARRE
ICEBERG LIMIT/ LIMITE DES ICEBERGS
SEA ICE LIMIT /LIMITE DES GLACES
KNOWN DATA LIMIT /
LIMITE DES DONNES CONNUES
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60W
55W
60N
50W
45W
60N
40W
35W
30W
65W
55N
55N
60W
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NOAA/ESRL Physical Sciences Division
69N
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42N
80W
75W
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60W
55W
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2
1.5
1


NOTE: EMPTY SQUARES INSIDE THE ICEBERG LIMIT MAY CONTAIN GROWLERS OR BERGY BITS.
NOTE: LES CARRES VIDES A L'INTERIEUR DE LA LIMITE DES ICEBERGS PEUVENT CONTENIR DES FRAGMENTS D'ICEBERG OU DES BOURGUIGNONS.
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ANALYSE D'ICEBERG ANALYSIS
FOR / POUR 1200 UTC
28 MAY / MAI 2010
ISSUED BY THE CANADIAN ICE SERVICE
EMISE PAR LE SERVICE CANADIEN DES GLACES
N ICEBERGS PER DEGREE SQUARE
ICEBERGS PAR DEGRE CARRE
ICEBERG LIMIT/ LIMITE DES ICEBERGS
SEA ICE LIMIT /LIMITE DES GLACES
KNOWN DATA LIMIT /
LIMITE DES DONNES CONNUES
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40W

Para 5, sentence 1: **Typo** … The sentence should read: "Variations in the timing of iceberg influxes reflect annual differences in southward ice ***drift rates,*** iceberg drift rates and wind fields".

Para 6, sentence 1: "It should be noted that very low (less than 12) to iceberg-free conditions appear over 6 percent of the 118-year record and 15 percent when looking at only the past 20-years" … **specify over what area**: just in the vicinity of the Hebron platform or over the entire area south of 48N?

Drift

Para 2, general comment: Although the study (Figure 3-40) indicates that less than 20% of icebergs have a speed >45 km/day, **it should be stressed in the text that even though they are few these fast-moving bergs can be problematic to a fixed platform**. Size and speed both figure in the damage that can result from a berg impact and it could be difficult for ships to manage such fast moving bergs.

Figure 3-40: **Errors** …

1) The figure caption indicates that this figure shows data about both speed and direction. The text in paragraph 2 also refers the reader to Figure 3-40 for information on both of these factors. Yet the x-axes of both graphs shown in Figure 3-40 are identically labeled "Drift in km/day" and the ticks have speed values. Based on the similar Figure for ice drift (Figure 3-36) I suspect this is an error which needs to be corrected. **The second bar graph is supposed to show direction as opposed to speed, and its x-axis labels need to be corrected.**

2) The symbols > and < respectively denote "greater than" and "less than". They should not be used to show a range of values. On the x-axis of the speed graph, "18>35", "36>44", and "45>67" should be replaced with "18-35", "36-44", and "45-67".

Size Distributions

Para 1, sentence 1: **Table 3-37, defining iceberg size categories, is referred to but is missing from the document**. This table needs to be added to the document.

Figure 3-41: Source … Instead of citing the source reference here, the range of years considered is given. **The proper source reference needs to be added**.

13 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

13.3 Nearshore Potential Marine Effects

13.3.6 Sea Ice and Icebergs

Para 1, sentence 1: **replace the word "cyclical" (which incorrectly implies extremely regular cycles), with "variable".**

Para 1, last sentence: **Error … First year ice is ice that is >30cm thick, NOT ice that ranges from 70 to 120cm thick.** First-year ice that ranges between 70 and 120 cm is termed "medium first-year ice". First-year ice that is 30-70cm thick is "thin first-year ice". First year ice that is >120cm thick is "thick first-year ice". But these-subtypes are not defined or referred to in the text. So the definition ">30cm" should be used here.

Para 2, sentences 1 and 2: **These sentences are speculation and the conclusions based on these speculations should be presented as tentative, not definite. Rephrase these sentences as**: "The Trinity Bay region does not lie on a primary aerial ice reconnaissance route; the low numbers of icebergs sighted each year, therefore, may be related to the low number of flights over that area. If this is true, the number of icebergs in the Trinity Bay area may be under-detected and under-reported."

Para 3: State where this "Ice Management Plan" plan can be found, if it already exists: either gives a page reference (if it is contained in this study) or a document reference. If it does not yet exist, state that it is under development.

13.4 Offshore Potential Marine Effects

13.4.6 Sea Ice and Icebergs

Para 1, sentence 1: This sentence is written in a confusing way and is somewhat misleading. Stating that ice incursions occur in 1 out of every 4 years in the Hebron area is misleading. As seen in the Ice Graph for the Hebron area included on page 9 of this comment file, the incursions tend to occur in clusters or groups of years. **For clarity, rephrase this sentence as**: "The Hebron location experienced sea ice incursions in approximately 25% of the years spanning 1972 to 2008. These incursions are bi-modal and have peak probabilities centered on two periods: the first peak in the last week of February and the second in the first week of April."