



**Stantec**

**Stantec Consulting Ltd.**  
607 Torbay Road  
St. John's, NL A1A 4Y6  
Tel: (709) 576-1458  
Fax: (709) 576-2126

## **2010 Environmental Assessment Update Hibernia Drill Centres Construction and Operations Program**

Prepared for:

Hibernia Management and  
Development Company (HMDC)  
Suite 1000, 100 New Gower Street,  
St. John's, NL

File No. 121510470

Date: May 19, 2010

## Table of Contents

---

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>2.0 GEOHAZARD SURVEY PROJECT DESCRIPTION .....</b>	<b>1</b>
2.1 Survey Objective .....	1
2.2 Hibernia South Extension Project Geohazard Survey Work Scope.....	2
2.2.1 HSE Drill Center Location – .....	2
2.2.2 Primary Flowline Route .....	3
2.2.3 Alternate Flowline Route .....	4
2.2.4 West of Hibernia Platform Site Survey .....	4
2.2.5 Hibernia GBS Drill Cuttings Pile MBES Survey .....	4
2.3 Project Schedule .....	5
2.4 Mitigation Measures.....	5

---

<b>3.0 BIOLOGICAL ENVIRONMENT UPDATES .....</b>	<b>5</b>
3.1 Commercial Fisheries .....	5
3.2 Species at Risk Updates.....	6

---

<b>4.0 ENVIRONMENTAL EFFECTS ASSESSMENT .....</b>	<b>6</b>
<b>5.0 REFERENCES .....</b>	<b>7</b>

### LIST OF APPENDICES

APPENDIX A	Commercial Fisheries
APPENDIX B	SARA Species

### LIST OF FIGURES

Figure 2.1 Hibernia South Extension and Hebron Development Locations .....	2
Figure 2.2 Hibernia South Extension 2010 Site Surveys .....	3

## 1.0 INTRODUCTION

---

An updated project description for the geohazard (including seabed properties) survey is contained within this report. In addition to updating the project description and verifying that the scope and assessment predictions of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (EA) (CEAR No. 08-01-42279) are still accurate and valid, the commercial fisheries and *Species at Risk Act* (SARA) species information that was provided has also been updated to reflect the most current information (as of April 23, 2010).

ExxonMobil Properties is undertaking a geohazard site survey at the HSE Project Area. The project is scheduled to commence in June 2010 and will take approximately 2-3 weeks to complete.

## 2.0 GEOHAZARD SURVEY PROJECT DESCRIPTION

---

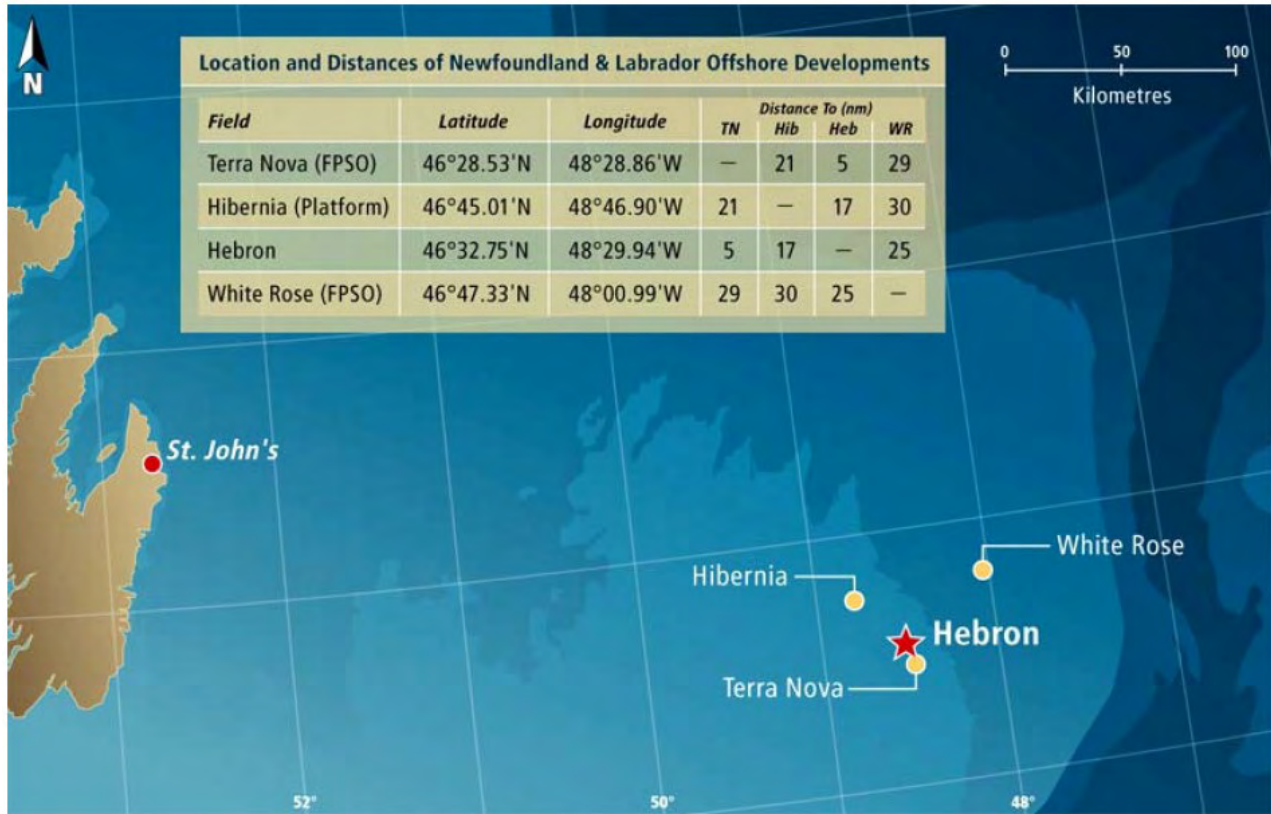
The following sections provide a more detailed and up to date project description for the geohazard (including seabed properties) surveys than was originally provided in Sections 2.1.3 and 2.5 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009). A geohazard site investigation and pipeline route surveys at the Hibernia South Extension (HSE) area, on the Grand Banks offshore Newfoundland (Figure 2.1) will be conducted by ExxonMobil Canada Properties, a partnership (EMCP) and is described in subsequent sections.

### 2.1 Survey Objective

The objectives of the survey are to provide engineering geohazard data to the project, including: a site survey for the HSE excavated drill center, flowline lay-down area north of the Hibernia Gravity Based Structure (GBS) and as a minimum an 8 km flowline route survey from the Hibernia GBS to the HSE excavated drill center. Optional 7.4 km flowline route survey has been included. The technical objectives for this program include the acquisition of high quality analog geophysical sub-bottom profiler and multi-beam bathymetry. These data are intended to provide the seabed and shallow sub-seabed information necessary to support both the development projects (Pipeline, GBS foundation, HSE Drill Center) in these established offshore fields and ExxonMobil's OIMS Shallow Drilling Hazards Evaluation requirements. (Figure 2.2)

Fugro Jacques GeoSurveys Inc. (FJGI) of St. John's, Newfoundland and Dartmouth, Nova Scotia has been selected as the acquisition contractor, and will use the Cape Harrison Marine, Newfoundland based vessel, the MV Anticosti.

**Figure 2.1 Hibernia South Extension and Hebron Development Locations**



**2.2 Hibernia South Extension Project Geohazard Survey Work Scope**

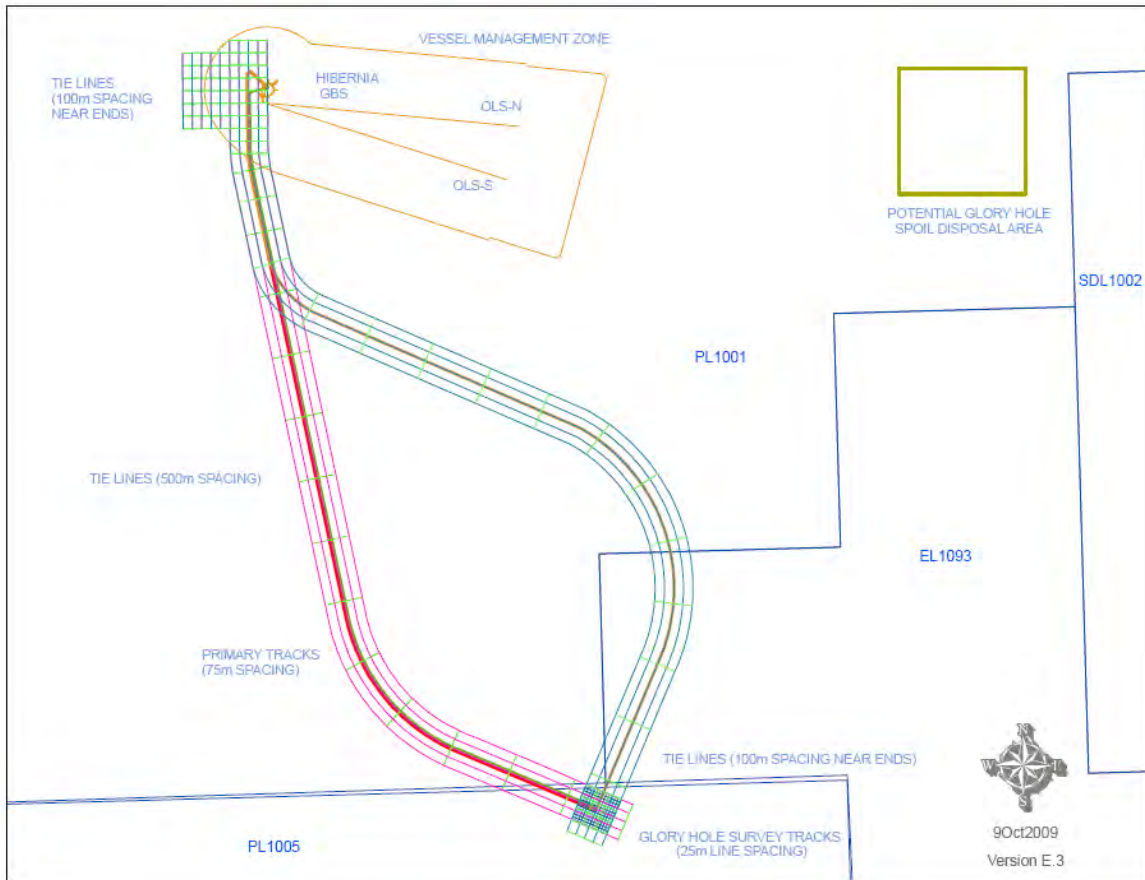
The geohazard program requires the acquisition of Single-beam Echosounder (SBES), Multibeam Echosounder (MBES), Dual Frequency ~100/500kHz Side Scan Sonar (SSS), Chirp/Pinger/Parametric Array Sub-bottom Profiler (SBP1), Hunttec Boomer/Sparker Sub-bottom Profiler (SBP2) and Magnetometer (MAG). The survey program will be determined as far in advance of the proposed start up as is possible, but it may be subject to change, up to and possibly during the acquisition program.

Seabed sampling for basic geological and geotechnical applications will be undertaken and require a large volume grab sampler and a drop camera/video equipment to complete drift transects. The survey will be in an area of active production, and simultaneous operations (SIMOPS) issues are to be expected. This will require additional planning and coordination with the involved parties, and could involve delays in acquisition.

**2.2.1 HSE Drill Center Location**

The geohazard survey program will undertake the acquisition of MBES, SSS, SBP1, SBP2 and MAG data over a 500m x 500m area at the proposed HSE drill centre location. The line spacing planned will be 25 meters x 100 meters. The preliminary survey program estimate consists of 27 x 500 meter lines acquiring MBES, SSS, SBP1, SBP2 and MAG survey lines. No seabed sampling program is planned at this location.

**Figure 2.2 Hibernia South Extension 2010 Site Surveys**



Note: *Precise Line Locations are subject to change*

**2.2.2 Primary Flowline Route**

The geohazard survey program will undertake the acquisition of SSS, MBES, SBP, and MAG data along the approximately 8 km route between the Hibernia Platform and the proposed HSE Drill Center, center point. The line Spacing planned will be 75 meters x 500 meters with a corridor width of 600 meters.

Large volume seafloor grab samples, for physical properties and grain size, will also be acquired at intervals of approximately 200 meters. Simple seabed drop camera/video stations might be required, with the number of stations to be determined.

The preliminary survey program estimate consists of:

- 9 x 8000 meter and 17 x 600 meter lines acquiring of SSS, MBES, SBP, and MAG data along the approximately 8 km flowline route; and
- a seabed sampling program will consist of approximately 41 large volume sea floor grab samples and up to 41 drop camera/video stations.

### **2.2.3 Alternate Flowline Route**

The alternate flowline route will be surveyed only if issues are identified during acquisition along the primary route. The geohazard survey program will undertake the acquisition of MBES, SSS, SBP1, SBP2 and MAG data along the approximately 7 km route between the Hibernia Platform and the proposed Drill Center, center point. The line Spacing will be 75 meters x 500 meters with a corridor width of 600 meters.

Large volume seafloor grab samples, for physical properties and grain size, will also be acquired at intervals of approximately 200 meters. Simple seabed drop camera/video stations might be required, with the number of stations to be determined.

The preliminary survey program estimate consists of:

- 9 x 7400 meter and 16 x 600 meter lines acquiring of SSS, MBES, SBP, and MAG data along the approximately 8 km flowline route; and
- a seabed sampling program will consist of approximately 41 large volume sea floor grab samples and up to 41 drop camera/video stations.

### **2.2.4 West of Hibernia Platform Site Survey**

An area 500 meters immediately west of existing Hibernia Platform structure will be survey with the acquisition of SSS, MBES, SBP, MAG data collected over a 500m x 500m area. The line spacing is expected to be 25 meters x 100 meters. The actual survey design is pending completion and final approval. The SIMOPS criteria need to be determined and finalized.

The preliminary survey program estimate consists of:

- 27 x 500 meter lines acquiring MBES, SSS, SBP1, SBP2 and MAG survey lines; and
- no seabed sampling program planned.

### **2.2.5 Hibernia GBS Drill Cuttings Pile MBES Survey**

An MBES survey is required in close proximity to the Hibernia GBS to determine size and slopes of cuttings piles next to platform. The survey design is still pending completion and final approval. The SIMOPS criteria need to be determined.

### 2.3 Project Schedule

The proposed schedule for the geohazard Hibernia South Extension Development program is as noted below.

Program Components	Proposed Timing
Site Mobilization	Early June 2010
Data Acquisition	14 - 21 days depending on final scope
Data Report Delivery	August 31, 2010

### 2.4 Mitigation Measures

The program will be executed in accordance with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) *Geophysical, Geological, Environmental and Geotechnical Program Guidelines*, dated May 2008.

Two quality control consultants will be employed by ExxonMobil Canada Properties, a partnership (EMCP) to monitor technical and Safety, Health, and Environmental (SHE) issues and performance as well as assist to ensure compliance with EMCP and C-NLOPB requirements during the survey. Marine Mammal Observers (MMOs) will be employed to help ensure that the surveys have no negative impact on marine life and ensure compliance with all environmental regulations and restrictions. A Fisheries Liaison Officer (FLO) will also be engaged.

## 3.0 BIOLOGICAL ENVIRONMENT UPDATES

---

As noted in Section 1.0, in addition to updates to the Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009), the commercial fisheries and SARA species information has been updated to reflect the most current information (as of April 23, 2010). These updates are contained within Appendices A and B, respectively.

### 3.1 Commercial Fisheries

Fisheries activities within the study area are similar to those identified in the HSE EA report. The key fishery for the Northwest Atlantic Fisheries Organization (NAFO) Unit area 3Lt remains the snow crab (*Chiocetes opilio*). However, it should be noted that for 2008 and 2009, there were no snow crab catches (or any other species) from within the identified study area.

Updates to section 4.2 (Commercial Fisheries) of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are provided in Appendix A.



### 3.2 Species at Risk Updates

Since the submission of EA for the Hibernia Drill Centres Construction and Operations Program (Jacques Whitford 2009), the killer whale (*Orcinus orca*), basking shark (*Cetorhius maximus*), American plaice (*Hippogloisoides platessoides*), American eel (*Anguilla rostrata*), roughhead grenadier (*Macrourus berglax*) and roundnose grenadier (*Coryphaenoides rupestris*) have been recently assessed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as either special concern, threatened or endangered.

Sowerby's beaked whale (*Mesoplondon bidens*) had not been included in the EA and there were no sightings of Sowerby's beaked whales reported in the Fisheries and Oceans Canada (DFO) cetacean sightings database for the Hibernia South Extension Study Area. However, there were two unidentified beaked whale sightings during seismic monitoring in the Jeanne d'Arc Basin during 2005 to 2008 and it has been suggested that one of these sightings was likely a Sowerby's beaked whale (Stantec 2010). Therefore, Sowerby's beaked whale has been added to the list for completeness. Updates to section 4.5 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are provided in Appendix B.

None of the SARA/COSEWIC species updates have final recovery strategies, actions plans or associated critical habitat identified. None of the recovery or action plans that are available for the SARA species affect the mitigation measures committed to by HMDC in Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

## 4.0 ENVIRONMENTAL EFFECTS ASSESSMENT

---

A review of the environmental effects assessment (Section 6.0) predictions and mitigations that were assessed as part of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) was conducted as a result of updated commercial fisheries data and new SARA/COSEWIC species information. The environmental effects predictions and significance determinations cited in the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are still valid with respect to commercial fisheries and SAR species. The mitigations for the activities planned to be carried out under the scope assessed in the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are still appropriate for the commercial fisheries and SAR species and HMDC reaffirms its commitment to the mitigation measures cited in this assessment and the Screening Report (C-NLOPB 2009).



## 5.0 REFERENCES

---

- C-NLOPB (Canada-Newfoundland and Labrador Offshore Petroleum Board). 2009. *Hibernia Drill Centres Construction and Operations Program*. Hibernia Management and Development Company (HMDC), *Canadian Environmental Assessment Act, Screening Report*. 39 pp
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2010. *Canadian Wildlife Species at Risk*. Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON. Available at URL: [http://www.cosewic.gc.ca/eng/sct5/index\\_e.cfm](http://www.cosewic.gc.ca/eng/sct5/index_e.cfm)
- COSEWIC. 2008. COSEWIC assessment and status report on the Roundnose Grenadier *Coryphaenoides rupestris* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 42 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm)) .
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2006a. COSEWIC assessment and status report on the American eel *Anguilla rostrata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 71 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm)).
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2006b. COSEWIC assessment and status report on the roughhead grenadier *Macrourus berglax* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 71 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm)).
- COSEWIC 2006c. COSEWIC assessment and update status report on the Sowerby's beaked whale *Mesoplodon bidens* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 20 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm)).
- DFO (Fisheries and Oceans Canada). 2007. *Cetacean Sighting Database*. Marine Mammal Section, DFO, St. John's, NL.
- FAO (Food and Agriculture Organization of the United Nations). 2007. *Species Fact Sheets: Macrourus berglax (Lacepede, 1801)* ([www.fao.org/fi/website/FIRetrieveAction.do?dom=species&fid=3034](http://www.fao.org/fi/website/FIRetrieveAction.do?dom=species&fid=3034)) .
- Ford, J.K.B., G.M. Ellis and K.C. Balcomb. 2000. *Killer Whales*. Second Edition. UBC Press, Vancouver, BC. 104 pp.
- Goff, G.P. and J. Lien. 1988. Atlantic leatherback turtles, *Dermochelys coriacea*, in cold water off Newfoundland and Labrador. *Canadian Field-Naturalist*, 102(1): 1-5.
- González-Costas and H. Murua. 2007. An analytical assessment of NAFO roughhead grenadier Subareas 2 and 3 stock. *NAFO Science Research Document*, 07/34.
- Hooker, S.K. and R.W. Baird. 1999. Observations of Sowerby's beaked whales, *Mesoplodon bidens*, in the Gully, Nova Scotia. *Canadian Field-Naturalist*, 113(2): 273-277.
- Jacques Whitford Limited. 2009. *Hibernia Drill Centres Construction and Operations Program Screening Report*. Prepared for Hibernia Management and Development Company, St. John's, NL.
- Jefferson, T.A., M.A. Webber and R. Pitman. 2008. *Marine Mammals of the World: A Comprehensive Guide to their Identification*. Academic Press, London. 573 pp.

- Kenney, R.D. and H.E. Winn. 1987. Cetacean biomass densities near submarine canyons compared to adjacent shelf/slope areas. *Continental Shelf Research*, 7: 107-114.
- Kulka, D.W., N.C. Antle and J.M. Simms. 2003. Spatial Analysis of 18 Demersal Species in Relation to Petroleum License Areas on the Grand Banks (1980-2000). *Canadian Technical Report on Fisheries and Aquatic Sciences*, 2473: xix + 182 pp.
- Lawson, J.W., T. Stevens and D. Snow. 2007. Killer whales of Atlantic Canada, with particular reference to the Newfoundland and Labrador region. *Canadian Science Advisory Secretariat Research Document*, 2007/062: 16 pp.
- Lien, J. and F. Barry. 1990. Status of Sowerby's beaked whale, *Mesoplodon bidens*, in Canada. *Canadian Field-Naturalist*, 104(1): 125-130.
- MacLeod, C.D., W.F. Perrin, R. Pitman, J. Barlow, L.T. Ballance, A. D'Amico, T. Gerrodette, G. Joyce, K.D. Mullin, D. Palka and G.T. Waring. 2006. Known and inferred distributions of beaked whale species (Cetacea: Ziphiidae). *Journal of Cetacean Research and Management*, 7(3): 271-286.
- MacLeod, D. 2000. Review of the distribution of *Mesoplodon* species (order Cetacea, family Ziphiidae) in the North Atlantic. *Mammal Revue*, 30(1): 1-8.
- SARA (*Species at Risk Act*). 2010. *Species at Risk Public Registry*. Available at URL: ([www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm))
- Scott, W.B. and M.G. Scott. 1988. *Atlantic Fishes of Canada*. *Canadian Bulletin of Fishery and Aquatic Sciences*, 219: 731 pp.
- Stantec Consulting Ltd. 2010. Hebron 2010 *Geohazard Survey Environmental Assessment*. Prepared for ExxonMobil Properties Canada, St. John's, NL. 159 pp. + Appendixd.
- Waring, G.T., E. Josephson, C.P. Fairfield-Walsh and K. Maze-Foley. 2009. US Atlantic and Gulf of Mexico marine mammal stock assessments -- 2008. *NOAA Technical Memorandum*, NMFS-NE 210: 440 pp.
- Whitehead, H. and C. Glass. 1985. The significance of the Southeast Shoal of the Grand Bank to humpback whales and other cetacean species. *Canadian Journal of Zoology*, 63: 2617-2625.
- Wiese, F.K. and W.A. Montevecchi. 1999. *Marine Bird and Mammal Surveys on the Newfoundland Grand Bank from Offshore Supply Vessels*. Contract report prepared for Husky Oil Operations Limited, St. John's, NL. 23 pp.

# **APPENDIX A**

## Commercial Fisheries

**A Commercial Fisheries**

The following information is provided as an update to section 4.2 (Commercial Fisheries) of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009). The following updates are for Tables 4.1 and 4.3 as well as Figures 4.6, 4.7, 4.8, 4.9 and 4.10, (sections 4.2.3 and 4.2.4).

**Table A.1 Study Area Harvest, 2005, 2006, 2007, 2008 and 2009**

Species	Weight In Tonnes					Total Weight	% of Total Weight
	2005	2006	2007	2008	2009		
Snow/Queen Crab	4311.70	4218.60	3514.95	12535.03	11060.54	35640.82	28.08
Clams (sp)	2711.82	4813.70	159.17	136.51	39.57	7860.77	6.19
Cockles	4394.89	9864.11	726.93	0.00	1006.45	15992.38	12.60
American Plaice	1008.28	5.51	189.10	610.71	704.64	2518.24	1.98
Yellowtail	10666.16	176.09	2053.03	7961.92	3149.79	24006.99	18.91
Turbot	540.26	290.44	477.02	485.84	968.47	2762.03	2.18
Grenadier	39.57	18.87	5.42	0.16	4.60	68.62	0.05
Northern Shrimp	1723.66	4667.12	4013.77	10821.10	14546.48	35763.13	28.18
Other Ground Fish	220.52	3.60	68.38	726.92	764.15	1783.57	1.41
Tuna (sp)	7.05	0.00	0.00	0.00	3.33	10.38	0.01
Swordfish	9.08	0.00	0.00	0.00	0.00	9.08	0.01
Shark/Skate (sp)	2.44	2.60	0.88	12.68	25.58	44.18	0.03
Iceland Scallop	123.22	346.08	0.00	0.00	0.00	469.3	0.37
<b>Total Harvest in Study Area</b>							<b>100.00</b>

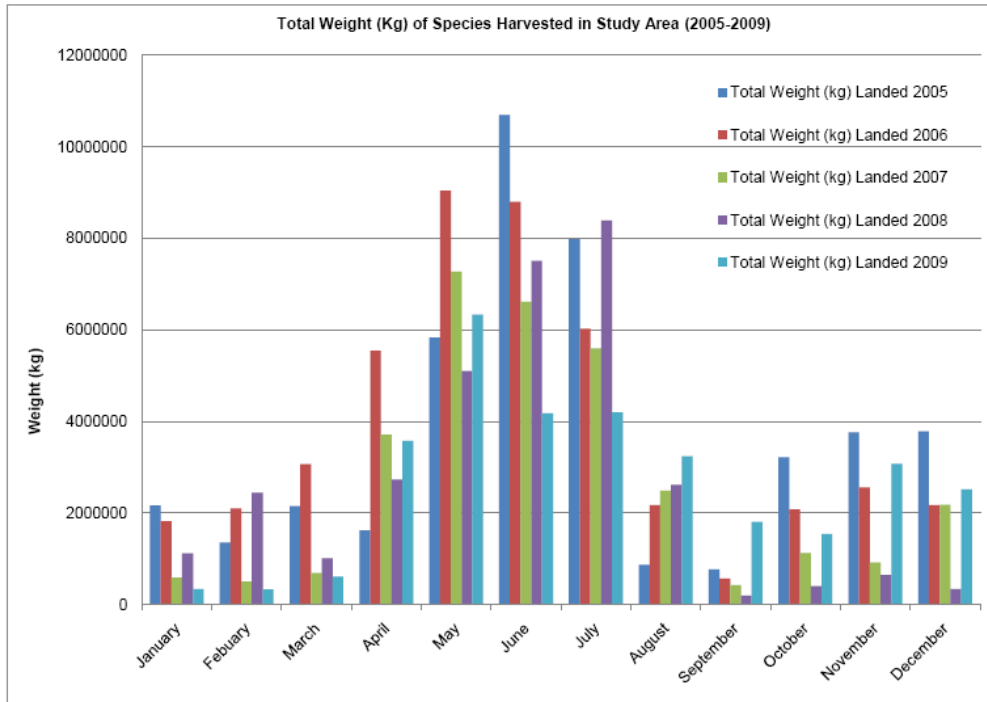
Update for Table 4.1 (Jacques Whitford 2009)

**Table A.2 3Lt and Project Area Harvest Summary**

Area	Species	Weight In Tonnes					Total	Percent of Total
		2005	2006	2007	2008	2009		
<b>3Lt Excluding Project Area</b>	Snow/Queen Crab	2503.19	2868.84	2826.33	1771.7	1783.9	11,753.96	99.1
	Stimpson's Surf Clams	0.00	84.73	0.00	0.00	0.00	84.73	0.7
	Cockles	0.00	18.21	0.00	0.00	0.00	18.21	0.1
	<b>Total Harvest in 3Lt Excluding Project Area</b>						<b>11,856.90</b>	
<b>Project Area</b>	Snow/Queen Crab	9.16	6.02	0.00	0.00	0.00	15.18	0.1
	<b>Total Harvest in Project Area</b>						<b>15.18</b>	
<b>3Lt + Project Area</b>	<b>Total Harvest in Project Area and 3Lt</b>						<b>11,872.08</b>	100.00

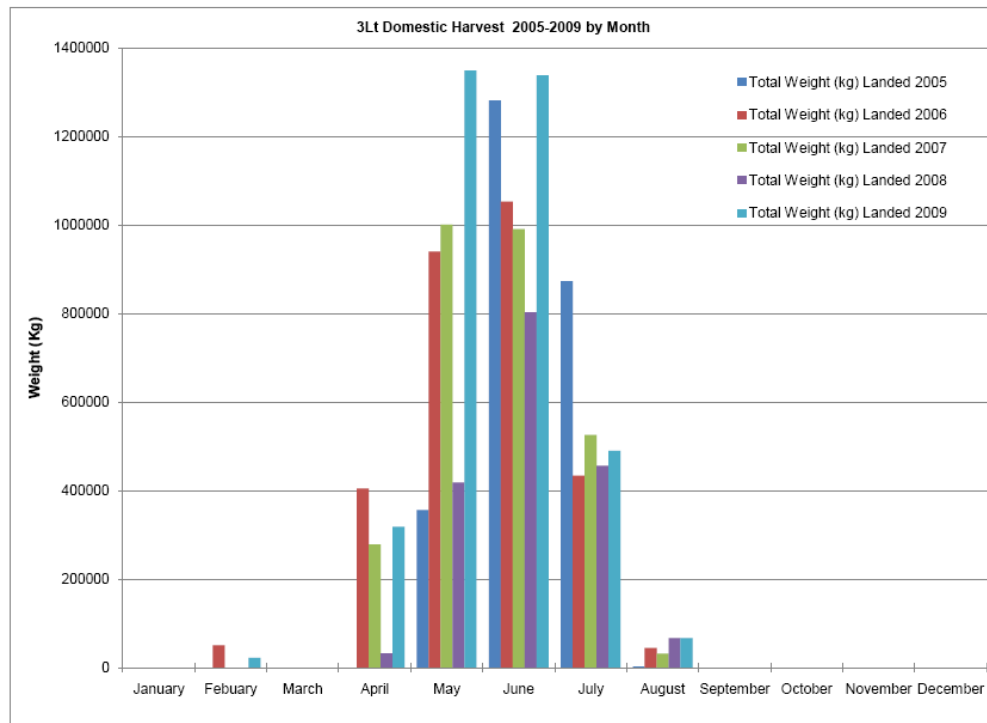
Update for Table 4.3 (Jacques Whitford 2009)

**Figure A.1 Temporal Distribution of All Species Harvesting within the Study Area**



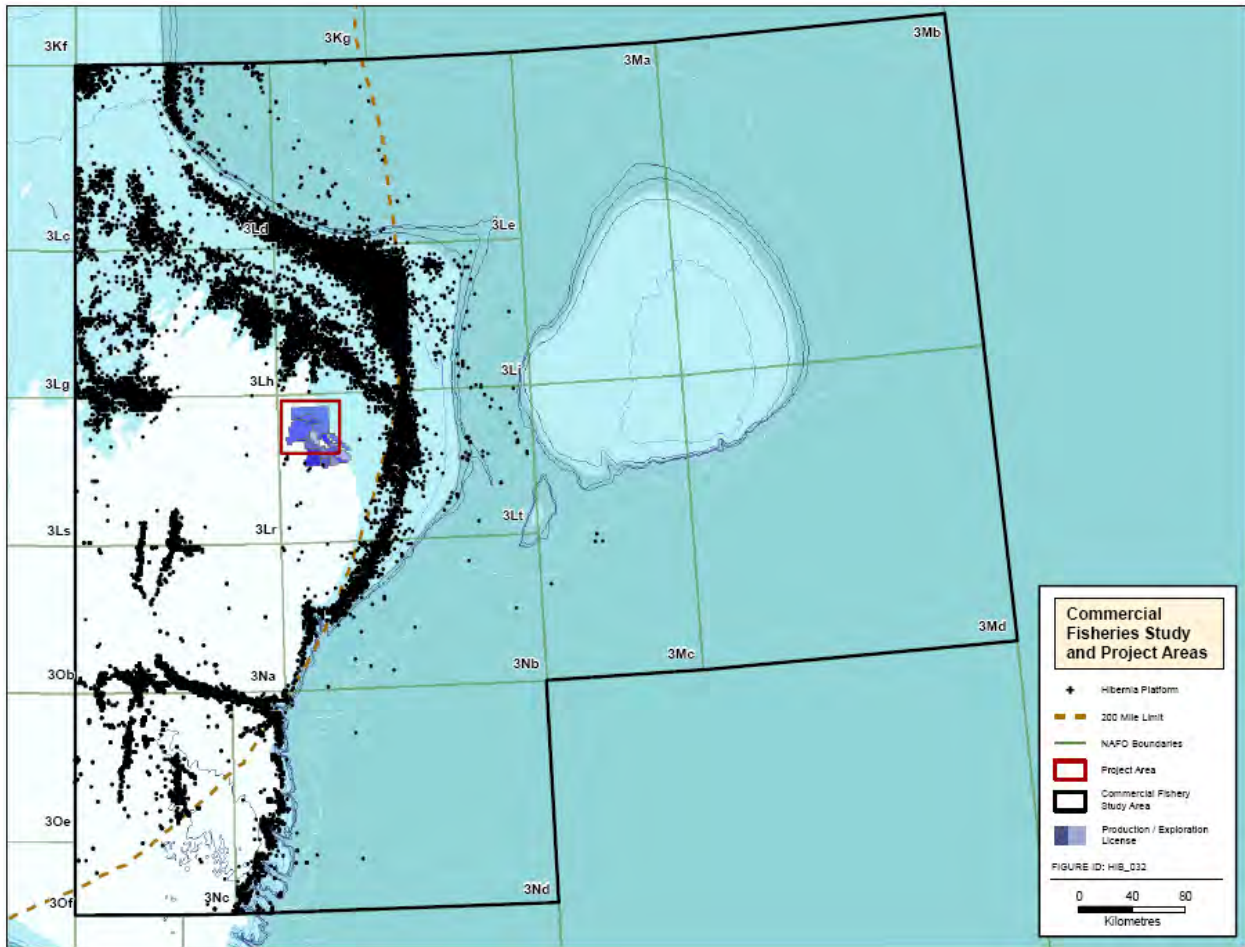
Update for Figure 4.6 (Jacques Whitford 2009)

**Figure A.2 Temporal Distribution of All Species Harvesting within 3Lt**



Update for Figure 4.7 (Jacques Whitford 2009)

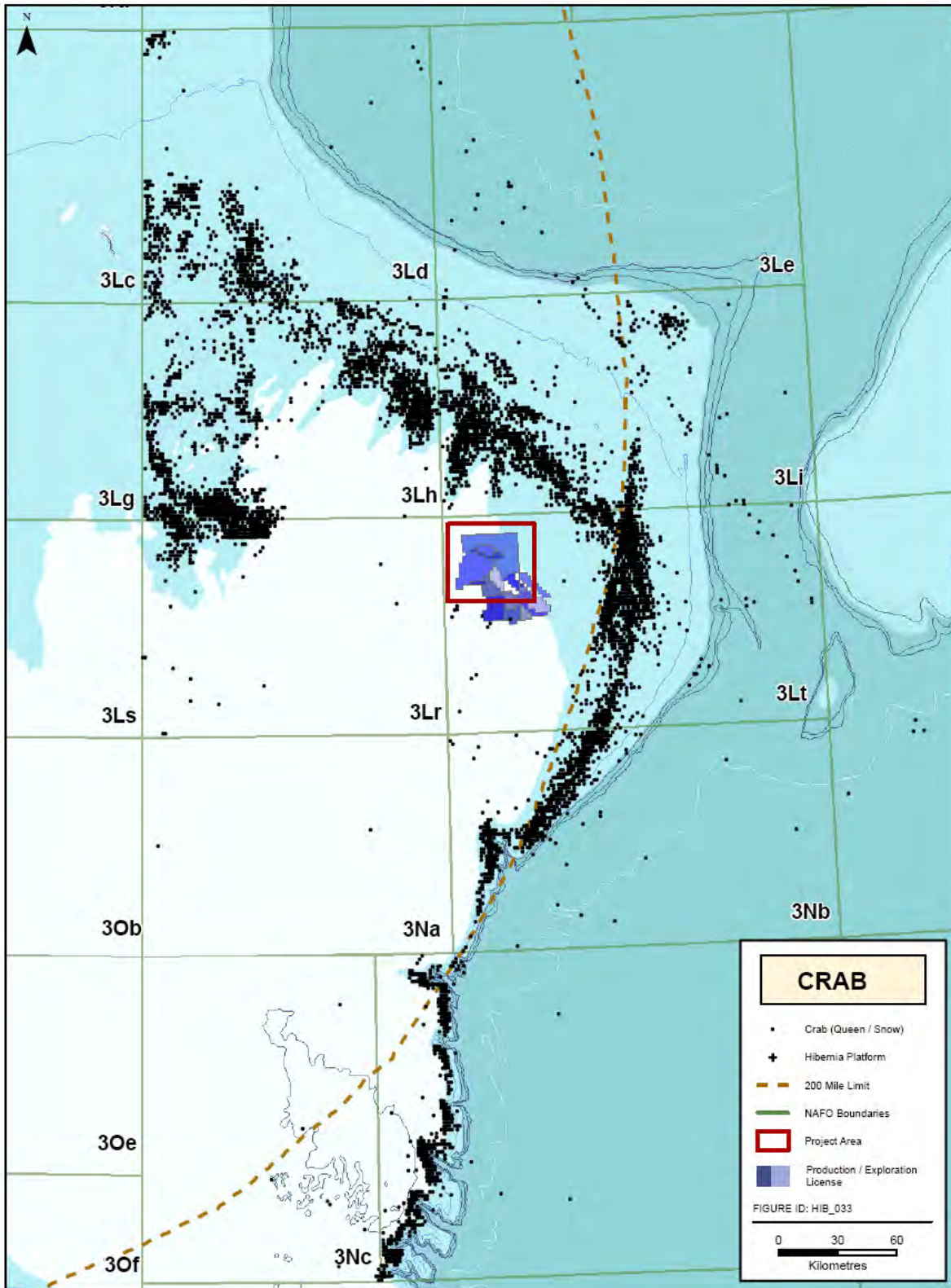
**Figure A.3 Study Area Commercial Fisheries all Species (2005 -2009)**



Update for Figure 4.8 (Jacques Whitford 2009)



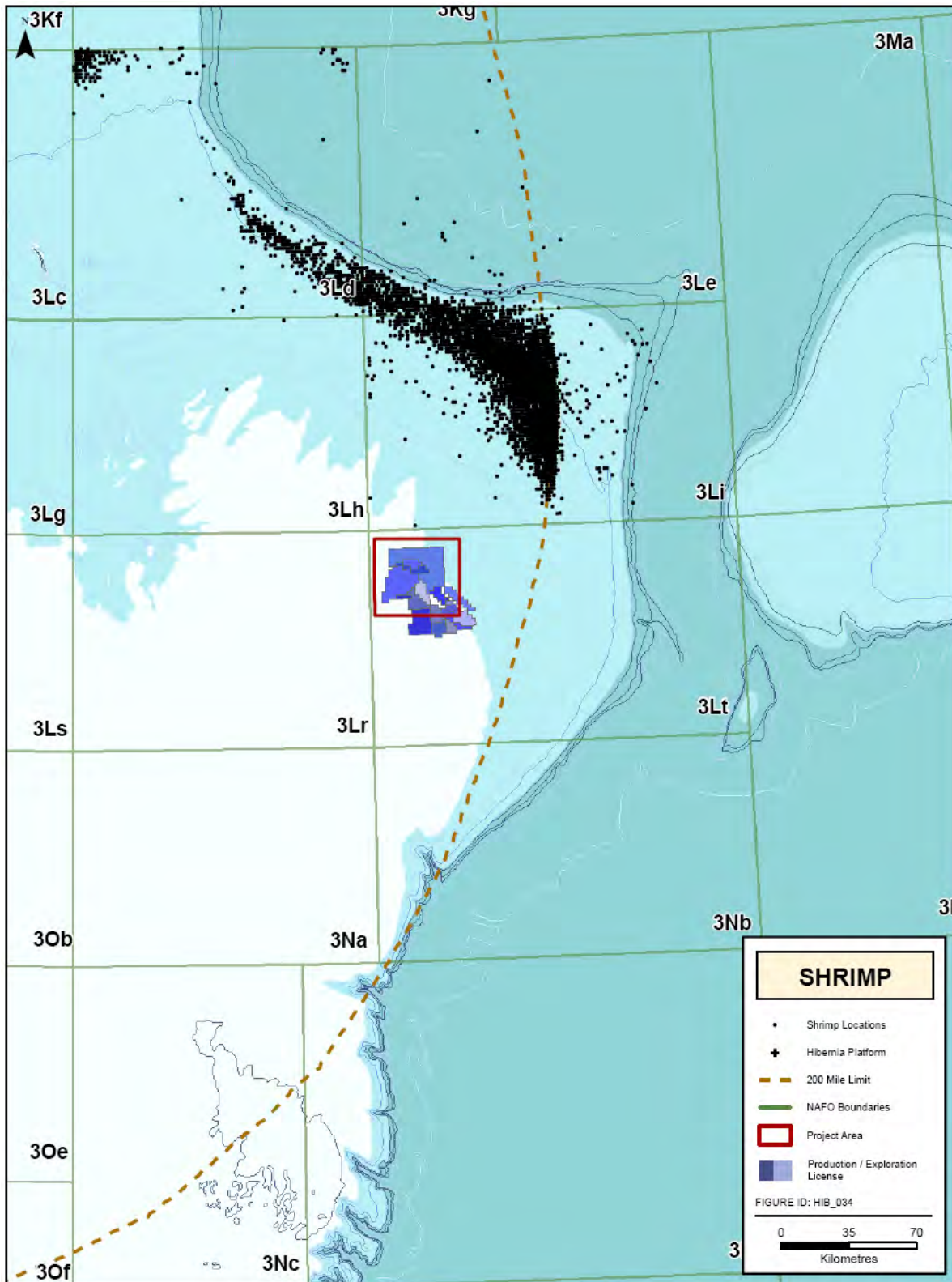
**Figure A.4 Snow Crab Harvesting Locations (2005 -2009)**



Update for Figure 4.9 (Jacques Whitford 2009)



**Figure A.5 Northern Shrimp Harvesting Locations (2005 – 2009)**



Update for Figure 4.10 (Jacques Whitford 2009)

# **APPENDIX B**

## SARA Species

**B Species at Risk**

The following information is provided as an update to section 4.5 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009). The information contained within this section is current as of April 23, 2010. Table B.1 is an updated table 4.10 (Jacques Whitford 2009) and has an additional seven species that have either had a change to their SARA or COSEWIC Status. A brief description of each of the added species is provided in subsequent sections.

**Table B.1 Occurrence of Species at Risk within the Study Area**

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
<b>Birds</b>				
Ivory Gull	<i>Pagophila eburnea</i>	Schedule 1 – Special Concern	Endangered	May occur but area is not known to be critical habitat for the species
<b>Marine Mammals</b>				
Blue Whale	<i>Balenoptera musculus</i>	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species
Fin Whale	<i>Balenoptera physalus</i>	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species
Sowerby's Beaked Whale	<i>Mesoplodon bidens</i>	Schedule 3 – Special Concern	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Killer Whale	<i>Orcinus orca</i>	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Harbour Porpoise	<i>Phocoena phocoena</i>	Schedule 2 – Threatened	Special Concern	Occurs but area is not known to be critical habitat for the species
<b>Fish</b>				
Atlantic Cod (NL Pop)	<i>Gadus morhua</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Atlantic Wolffish	<i>Anarhichas lupus</i>	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species
American Plaice	<i>Hippoglossoides platessoides</i>	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species
American Eel	<i>Anguilla rostrata</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Blue Shark	<i>Prionace glauca</i>	No Schedule – No Status	Special Concern	Not likely to occur
Roughhead Grenadier	<i>Macrourus berglax</i>	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species
Roundnose Grenadier	<i>Coryphaenoides rupestris</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Basking Shark	<i>Cetorhinus maximus</i>	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Northern Wolffish	<i>Anarhichas denticulatus</i>	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species
Porbeagle	<i>Lamna nasus</i>	No Schedule –	Endangered	Occurs but area is not known to

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
Shark		No Status		be critical habitat for the species
Shortfin Mako	<i>Isurus oxyrinchus</i>	No Schedule – No Status	Threatened	Not likely to occur
Spotted Wolffish	<i>Anarhichas minor</i>	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species
Cusk	<i>Brosme brosme</i>	No Schedule – No Status	Threatened	Not likely to occur
White Shark	<i>Carcharodon carcharias</i>	No Schedule – No Status	Endangered	Not likely to occur
<b>Reptiles</b>				
Leatherback Turtle	<i>Dermochelys coriacea</i>	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species

Update for Table 4.10 (Jacques Whitford 2009)

**B.1 Fish**

The following fish have been added to section 4.5.1 of Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

**B.1.1 American Plaice**

Detailed information for American plaice was originally provided in Section 4.1.5.2 (Jacques Whitford 2009) and is still relevant. American plaice was designated as Threatened by COSEWIC in April 2009, but is not listed under SARA. Therefore, no SARA recovery strategies or management plans are currently in place.

**B.1.2 American Eel**

American eel are found from northern South America to Greenland and Iceland. They breed at sea and return to fresh water to feed and grow; all spawners are part of a single breeding unit. Spawning and hatching takes place in the Sargasso Sea and spawning occurs only once per adult. The larval stages are completely physiologically dissimilar to the adult eel. Female silver eels exit Newfoundland freshwater systems between August to October (Gray and Andrews 1971, in COSEWIC 2006a).

The historic Canadian range includes accessible fresh water, estuaries and coastal marine waters connected to the Atlantic Ocean, up to the mid-Labrador coast. Continental shelves are used by juvenile eels arriving from the spawning grounds, and by silver eels returning to the spawning grounds. They are primarily benthic inhabitants, using substrate and bottom debris as protection and cover. Eels are not likely to occur in the Project Area. Freshwater habitat is protected by the *Fisheries Act* and other legislation; however, marine habitat is not exempt from exploitation (even those areas with special protection such as Marine Protected Areas (MPAs) (COSEWIC 2006a). While there has been no evidence of ongoing decline in elver abundance, there has been a recorded decline in adult American eel. Possible reasons include alteration of habitat, fishery, changing oceanic conditions and contaminants (COSEWIC 2010).

### **B.1.3 Roughhead Grenadier**

Roughhead grenadier are listed as Special Concern by COSEWIC, but currently have no status under SARA. Roughhead are primarily a deepwater species located on the slope of the northeast Newfoundland Shelf, the Flemish Pass and along the edge of the Grand Banks (Kulka *et al.* 2003). It is commonly found between depths of 800 to 1,500 m but can be found at depths of 2,700 m, preferring temperatures of -0.5°C to 5.4°C (González-Costas and Murua 2007). Roughhead grenadier have been reported near the Hibernia South Expansion Study Area during DFO spring and fall surveys for several years (Kulka *et al.* 2003).

Biology and population dynamics are not well understood for roughhead grenadier (González-Costas and Murua 2007). Concentrations of roughhead have been higher in the Project Area during fall surveys. Spawning is thought to take place between late winter and early summer, and there is evidence of a prolonged reproductive period that could extend over an entire year (FAO 2007; COSEWIC 2006b). Age determination studies have shown the life span to be at least 25 years (FAO 2007); however, growth trajectories of male and females differ, with males growing slower than females from 9 to 10 years old (González-Costas and Murua 2007).

They are non-specialist predators with food type being directly dependent on the size of the fish (COSEWIC 2006b). Diet for small fish is predominately comprised of amphipods; however, polychaetes, crustaceans, bivalves, echinoderms and ctenophores are also important (FAO 2007; COSEWIC 2006b). Large roughhead grenadier feed on active benthopelagic organisms such as larger bivalves, shrimp, squid and small fish (COSEWIC 2006b). Feeding is apparently seasonal and peaks during fall and winter, diminishing during the summer (Scott and Scott 1988). Due to their slow movements, they are potentially easy prey for larger predatory fish and have been found in the stomachs of cod (*Gadus* spp.) (COSEWIC 2006b). Predators of the roundnose grenadier include Greenland halibut (*Reinhardtius hippoglossoides*), whales and redfish (*Sebastes* spp.) (Scott and Scott 1988). Little is known about the spawning time.

Limiting factors for roughhead grenadier are susceptibility to resource exploitation as result life history characteristics such as long life, late maturity, slow growth rates, low fecundity and long population turnover (COSEWIC 2006b).

### **B.1.4 Roundnose Grenadier**

Roundnose grenadier are found in deep waters (400 to 1,000 m) of the North Atlantic continental shelves and slopes, with the greatest concentration off Newfoundland and Labrador occurring at depths greater than 503 m and 3.5°C to 4.5°C. The COSEWIC designation was changed to Endangered in November 2008 based on a new status report which indicated that the species has experienced a sharp decline, first between 1978 to 1994, then another decline between 1995 and 2003 (COSEWIC 2008). The spawning location is unknown and estimates of spawning time range from spring and autumn to late autumn to spawning intermittently throughout the year. Roundnose grenadier have a varied diet that includes squid, small crustaceans, euphausiids and small fishes (Scott and Scott 1988). The decline in abundance of greater than 95 percent in the past 10 years is due primarily to the fact that the fishery outside Canadian waters remain largely unregulated.



### **B.1.5 Basking Shark**

The Atlantic population of basking shark has recently been designated as a species of Special Concern by COSEWIC; it has no status under SARA (SARA 2010). The basking shark is found in the western North Atlantic from northern Newfoundland south to Florida and occurs in Canadian Waters from May to September (Scott and Scott 1988). It is the second largest fish, with a maximum length of 15 m (COSEWIC 2010), but average from 5 to 7 m in the Atlantic region (Scott and Scott 1988). Females do not reach maturity until 16 to 20 years old and gestate to 2.6 to 3.5 years, resulting in extremely low productivity. The Canadian population ranges from approximately 5,000 to 10,000 individuals (COSEWIC 2010).

The primary threat to the basking shark is incidental by catch from trawl, longline and gillnet fisheries and collision with ships (COSEWIC 2010).

### **B.2 Marine Mammals**

The following marine mammals have been added to section 4.5.2 of Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

#### **B.2.1 Sowerby's Beaked Whale**

The Sowerby's beaked whale, is found only in the cold temperate waters of the North Atlantic, where just one record in the Northwest Atlantic occurs outside the area between Labrador and New England (MacLeod 2000; MacLeod *et al.* 2006). The number of Sowerby's beaked whales in eastern Newfoundland is unknown, and the best population estimate for the Northwest Atlantic (of 3,513 individuals) combines sightings of all *Mesoplodon* spp. and Cuvier's beaked whale (*Ziphius cavirostris*) (but these other species have more southerly distributions) (Waring *et al.* 2009). Sowerby's beaked whales are considered of Special Concern by COSEWIC and on Schedule 3 of SARA (COSEWIC 2006c).

Little is known, in general, about beaked whales, but most information on Sowerby's beaked whales in Newfoundland is based on stranding records or a few opportunistic sightings (Lien and Barry 1990). Sowerby's beaked whales are also relatively difficult to detect at sea due to their short surface durations, apparently offshore distribution, and barely detectable blows (Hooker and Baird 1999). They have most often been observed in deep waters and continental shelf edges or slopes (Kenney and Winn 1987; COSEWIC 2006c) and presumably make deep dives to forage on medium to large-bodied squid (COSEWIC 2006c).

There were two unidentified beaked whale sightings during seismic monitoring in the Jeanne d'Arc Basin during 2005 to 2008. One of these sightings was deemed a species other than a northern bottlenose whale (*Hyperodon ampullatis*), and the observer suggested that it was likely a Sowerby's beaked whale (Stantec 2010). There was only one confirmed sighting of a Sowerby's beaked whale during four years of monitoring in the adjacent and deeper Orphan Basin; the sighting of four individuals occurred in 2,500 m of water during September (Stantec 2010). There were no sightings of Sowerby's beaked whales reported in the DFO cetacean sightings database in the Hibernia South Extension Study Area (DFO 2007).

**B.2.2 Killer Whale**

Killer whales have a cosmopolitan distribution, occurring in oceans from polar pack-ice to the equator, but seem to be most common in coastal waters at higher latitudes (Jefferson *et al.* 2008). It is unknown how many killer whales occur in the Northwest Atlantic (Waring *et al.* 2009). In Newfoundland and Labrador, at least 63 animals have been individually identified to date (Lawson *et al.* 2007). Killer whales in Atlantic Canada were recently listed as of Special Concern by COSEWIC, but currently have no status under SARA (COSEWIC 2008).

Killer whales exhibit marked sexual dimorphism, with adult males having a much more pronounced and taller dorsal fin and being generally larger than females (Ford *et al.* 2000). Generally, killer whale movements are linked to the distribution and abundance of their primary prey, which can include fish, marine mammals, seabirds and cephalopods (Ford *et al.* 2000). Sympatric killer whales populations in some regions have developed prey strategies that target different prey species, presumably as a mechanism of resource sharing (Baird 2000). Killer whales in Atlantic Canada have been observed approaching, attacking, and/or consuming other cetaceans, seals, seabirds and several species of fish; it is not known if local populations specialize on particular prey groups (Lawson *et al.* 2007). Most groups in Newfoundland and Labrador are comprised of three to seven individuals, and some individuals have been documented moving as much as hundreds of kilometres between re-sightings from year to year (Lawson *et al.* 2007).

Killer whales are considered a year-round resident of eastern Newfoundland, although they occur in relatively low densities (Goff and Lien 1988; Lawson *et al.* 2007). In the Jeanne d'Arc Basin, there were four killer whale sightings (totalling 21 individuals) during the 2008 seismic monitoring program; two sightings occurred in each of June and September, group sizes ranged from 1 to 12 individuals, and water depths ranged from 65 to 153 m (Stantec 2010). There was also one sighting of three individuals in August 1999 during a supply vessel transit between oil platforms in the Jeanne d'Arc Basin and St. John's (Wiese and Montevicchi 1999).

Whitehead and Glass (1985) recorded two sightings (one of 15 individuals and the other of 12) during surveys of the Southeast Shoal (southeastern Grand Banks) during June and July in 1982 and 1983. The available information suggests that killer whales occur year-round at low densities in the Hibernia South Extension Study Area, but are most common during summer.