



**Stantec**

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

**2013 Environmental  
Assessment Update  
Hibernia Drill Centres  
Construction and Operations  
Program  
(2013 – Remaining Life of  
Field)**

Prepared for:

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

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## 1.0 INTRODUCTION

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### 1.1 Background

This is an environmental assessment update for geohazard (geotechnical and geophysical) and seismic survey activity and is intended to reflect an update to Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program, Hibernia Management and Development Company (HMDC) (Jacques Whitford 2009; Stantec 2011) (CEAR No. 08-01-42279).

This update also includes an updated project description for the geohazard surveys to be undertaken in 2013 as well as in the future for the remaining life of the project. These activities were generally described in the Hibernia Drill Centres Construction and Operations Environmental Assessment (CEAR No. 08-01-42279).

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 are still accurate and valid, the information on the Valued Environmental Components (VECs) commercial fisheries and species at risk has also been updated (information current to of May 24, 2013).

### 1.2 Activities Assessed in 2009 Environmental Assessment

The following activities proposed for the Hibernia offshore drilling and production facility in 2013 were previously assessed in the 2009 environmental assessment or the original 1985 Environmental Impact Assessment:

- Vertical seismic profiling and 2DHR
- Drilling from the Hibernia platform and MODU (and associated releases to sea)
- Anchors and anchor chains
- ROV
- Geohazard surveys (geotechnical and geophysical for wellsites and flowline corridors)
- Installation/placement of subsea equipment
- Rock berm installation / concrete mattresses
- High-resolution 2D seismic surveys
- Engineering geophysical/geotechnical data at EDC and
- Hibernia Platform operations installations associated with the 2013 HSE activities.

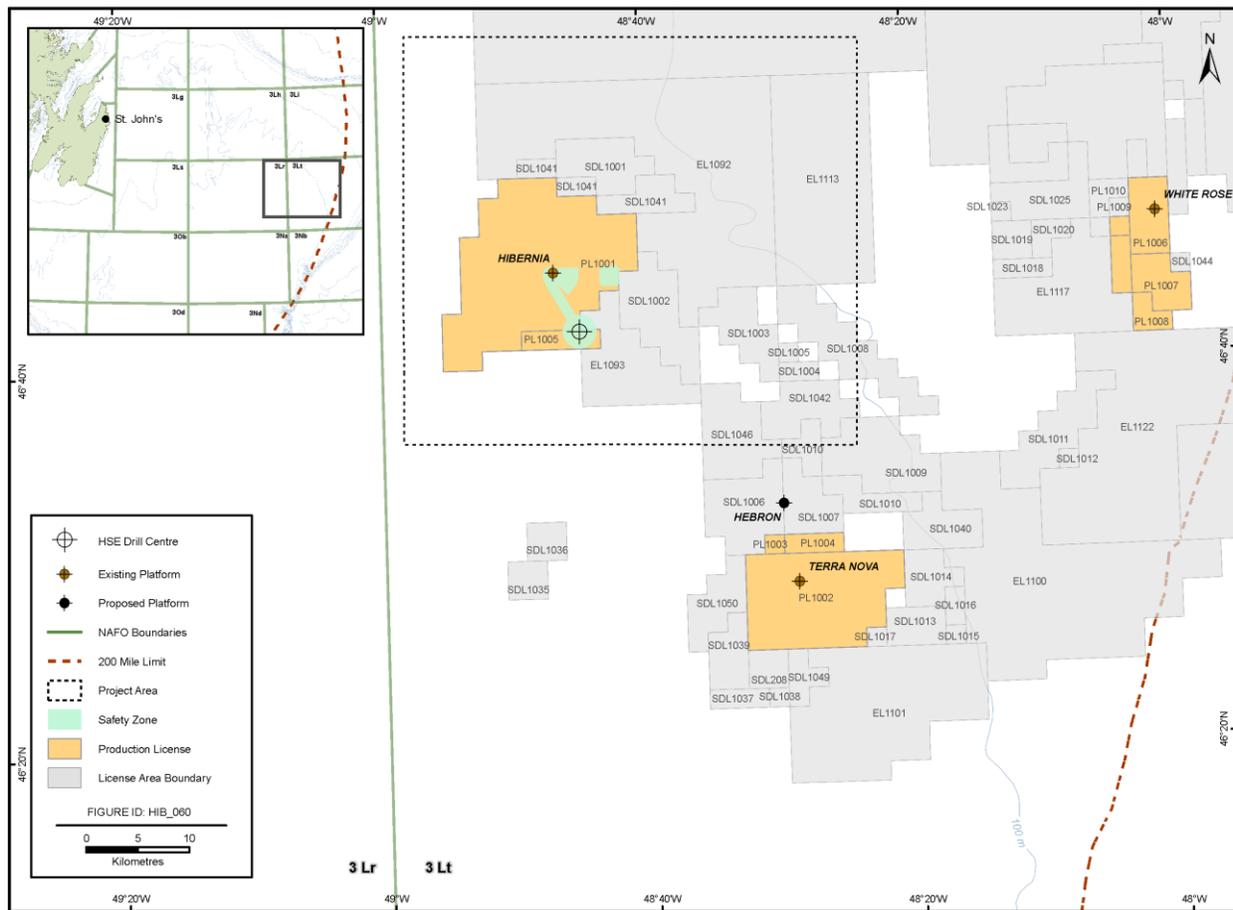
The following activities proposed for 2013 were not specifically assessed in the 2009 environmental assessment (although a generic 'geophysical survey' to be conducted in summer and fall 2009 was listed as an activity in the 2009 environmental assessment):

- Engineering geophysical/geotechnical data along flowline (pipeline) route and
- Seismic surveys.

For completeness the proposed seismic surveys are identified herein as an activity for which a full environmental assessment is required. The potential environmental effects of the proposed seismic surveys are assessed under a separate environmental assessment (LGL 2013).

## 2.0 GEOHAZARD AND SEISMIC SURVEYS PROJECT DESCRIPTION

The following sections provide a more detailed and current project description for the geohazard (geophysical and geotechnical) surveys in support of subsea developments than originally was provided in Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009). All activities will be conducted within the original project area (see Figure 2-1). Any geohazard survey activities over the life of the Project will occur within this area. The activities considered in this update are described briefly below. An overview of the planned 4D seismic survey is also provided.



**Figure 2-1 2013 Activities Project Area**

## **2.1 Flowline Surveys**

For the survey of a flowline corridor, a 500 to 1,000 m wide (possibly greater) survey will be acquired using a multibeam echosounder (>100 kHz), sidescan sonar (100/500 kHz), sub-bottom profiler (3 to 20 kHz), magnetometer and seabed physical properties sampling. Geophysical survey line spacing and geotechnical seabed sampling frequencies have yet to be determined. In 2013, the water injection flowline corridor for the HSE subsea development will be surveyed for geohazards. This will be completed prior to installation of the flowline infrastructure and rock berm, which is scheduled to begin in mid-July.

## **2.2 2013 4D Seismic Survey**

HMDC will acquire a 225 km<sup>2</sup> 4D monitor seismic survey of the development area. The equipment components of a 4D survey include: a seismic vessel; the air source array; receiver (hydrophone) towed array; two picket vessels; and a shorebase.

There will be two air source arrays (3,000 to 6,000 in<sup>3</sup>) at a towed depth of 6 m. The air source arrays are discharged alternately at approximately 10 to 15 second intervals. The streamer array is comprised of 12 towed streamers (6,000 m length, 7 to 24 m depth, 75 m separation between streamers). The survey will use solid streamers.

The proposed program is scheduled to commence early to mid-August and conclude by late September 2013. The water depth ranges at the Hibernia development area from 88 to 102 m. Further details on the assessment of potential environmental effects of the 4D seismic survey are available in LGL (2013).

## **2.3 Consultation**

HMDC met with the Fish, Food and Allied Workers (FFAW) Petroleum Industry Liaison, offshore fishers and One Ocean to provide an overview of the 2013 activities and to discuss any questions or concerns that these organizations may have with the upcoming programs.

The attendees did not express any concerns with the project area and activities proposed for 2013. The key topic of the Hibernia presentation was the new Safety Zone illustrated around the flowline from the HSE EDC to the Hibernia Platform and how that having that type of information digitally would be very useful to fishers transiting the area. Hibernia indicated that there would be a large closest point of approach (CPA) around Hibernia during the critical period of pulling the flowlines into the J-tubes on the Hibernia GBS that would apply to all vessels and helicopters. The only other point of discussion was a query about drilling at the HSE EDC.

HMDC has notified seafood processors (Groundfish Enterprise Allocation Council, Association of Seafood Producers, Clearwater Seafoods, Ocean Choice International and Iceswater Seafoods) of the survey start and completion dates. No comments or concerns have been expressed to date.

## 2.4 Mitigations for Geohazard Surveys

The primary potential environmental effect of this undertaking would relate to noise and potential interference with fishing activity/gear. These activities were previously assessed under the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009). Mitigation measures proposed in the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) to reduce the potential for adverse environmental effects remain unchanged and include:

- compliance with DFO's Statement of Canadian Practice on the Mitigation of Seismic Noise in the Marine Environment, as appended to the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012);
- all ship operations will adhere to Annex I of the *International Convention for the Prevention of Pollution from Ships* (MARPOL 73/78);
- minimizing any effects of VSP/seismic surveys on commercial fish harvesting as per guidance in the environmental mitigative measures appended to the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2012);
- publicizing the locations of the project safety zones and continue to communicate with fishers and DFO about fishing and survey activities in these areas;
- providing fishers who may be operating in the vicinity of the Project Area with the timing and locations of planned project activities via a Canadian Coast Guard "Notice to Shippers";
- fisheries liaison officer;
- marine mammal observers(s);
- single point of contact;
- use of Vessel Movement System data;
- ongoing communications with FFAW and fishers throughout seismic survey program; and
- applying the HMDC *Fisheries Code of Practice* and the *Fisheries Compensation Program for Gear and Vessel Damage and Oil Spills* to this project.

Mitigation measures for the 4D seismic surveys are also provided in LGL (2013).

## 3.0 BIOLOGICAL ENVIRONMENT UPDATES

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As noted in Section 1.0, in addition to updates to Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009), the commercial fisheries and species at risk information has been updated to reflect the most current information (as of May 24, 2013). These updates are contained within Appendices A and B, respectively.

### 3.1 Commercial Fisheries

Fisheries activities within the Study Area identified in Hibernia Drill Centres Construction and Operations Program, Hibernia Management and Development Company (HMDC) (Jacques Whitford 2009) are little changed since the environmental assessment report was accepted in 2009. The key fishery for the Northwest Atlantic Fisheries Organization (NAFO) Unit area 3Lt remains snow crab (*Chionoectes opilio*). However, it should be noted that for 2011, there were no snow crab or northern shrimp catches from within the identified Project Area (see Figures 2.1, A.1 and A.2). Fisheries activities within the Study Area were reported and graphically depicted for 2005 to 2007 in the original environmental assessment (Jacques Whitford 2009) and graphically depicted 2008 to 2011 in the 2011 Update (Stantec 2011).

DFO Ottawa statistical division has a new policy that prohibits release of data that can be mapped (N. Johnson, pers. comm.) because it is considered a breach of privacy for the fishers. Due to new DFO policy, spatial data are now released at an aggregated 1/10th degree 'cell' level only. No absolute values of weight and value are provided; the actual weight and value of a catch within each box will be given as a range and actual catch will be restricted to portions caught within a given cell.

Therefore, the figures for 2011 data for snow crab and northern shrimp (see Figures A-1 and A-2; Appendix A) illustrate an average percentage of the weight percentage data provided by DFO. The weight percent for a specific cell has been summed and divided by the number of months that specific cell was fished (*i.e.*, when the cell was fished, x% of species A was caught in the boundaries).

Commercial fisheries data for 2012 for NAFO Division 3L from 2012 was requested from DFO, but validated data are not available at this time.

The 2012 post-season crab survey ran from August 29 to November 17. The 2013 post-season crab survey will collect samples from the same locations as the 2012 survey. As far as the DFO scientists are aware, the timing will also be similar to last year (D. Power, pers. comm.).

### 3.2 Species at Risk Updates

Since the submission of the environmental assessment for the Hibernia Drill Centres Construction and Operations Program (Jacques Whitford 2009) and the 2011 update (Stantec 2011), there have been seven additions or changes to the list of species included under the *Species at Risk Act* (SARA) or assessed as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (SARA 2012).

Of the species previously described in either Jacques Whitford 2009 or Stantec 2011, the following have had a designation change:

- the white shark (*Carcharodon carcharias*) has been included under Schedule 1 of SARA (formerly no status under SARA);
- Sowerby's beaked whale has been included under Schedule 1 of SARA (formerly on Schedule 3);

- American eel (*Anguilla rostrata*) was upgraded to threatened status under COSEWIC (formerly special concern) due to continuing declines in abundance and degradation of habitat;
- Cusk (*Brosme brosme*) was upgraded to endangered status under COSEWIC (formerly threatened) due to continuing declines in abundance and degradation of habitat.

The following species were not previously described in either Jacques Whitford (2009) or Stantec (2011):

- COSEWIC assessed spiny dogfish (*Squalus acanthias*) as a species of special concern;
- COSEWIC assessed smooth skate (*Malacoraja senta*) (Funk Island Deep population) as endangered; and
- COSEWIC assessed thorny skate (*Amblyraja radiata*) as a species of special concern (this species was included in the original environmental assessment (Jacques Whitford 2009), but was discussed under the fish and fish habitat chapter, not species at risk).

None of these three species have status under SARA.

Updates to Section 4.5 of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) and 2011 Environmental Assessment Review Hibernia Drill Centres Construction and Operations Program (Stantec 2011) are provided in Appendix B.

None of the new/updated SARA/COSEWIC species have final recovery strategies, action 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 Environmental Assessment (Jacques Whitford 2009).

## **4.0 ENVIRONMENTAL EFFECTS ASSESSMENT**

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A general overview of the activity assessed was provided in the scope of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009). A review of the environmental effects assessment (Section 6.0) predictions and mitigations that were assessed as part of this 2009 assessment was conducted on all the VECs studied. For the VECs commercial fisheries and species at risk the latest available information was compiled and considered in this assessment. The environmental effects predictions and significance determinations for the VECs fish, shellfish and fish habitat were based on an Affected Area analogous to the Project Area (see Figure 2-1). Effects predictions and significance determinations for the VECs commercial fisheries, marine mammals, sea turtles, marine birds and species at risk were based on Affected Area defined as 10 nm around the Project Area (see Figure 2-1). The same Affected Areas are used in this environmental effects assessment update.

The environmental effects predictions and significance determinations cited in Jacques Whitford (2009) are valid for the planned 2013 and beyond project activities. The mitigations for the activities planned to be carried out under the scope assessed in the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) are still appropriate and HMDC reaffirms its commitment to the mitigation measures cited in the assessment and the associated Screening Report (C-NLOPB 2009). Those activities related to 4D seismic activities are being assessed under a separate environmental assessment (LGL 2013).

## 5.0 REFERENCES

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### 5.1 Personal Communications

Johnson, N., Statistical Analyst, Statistical Services, DFO, Ottawa, ON.

Power, D., Project Manager/Programmer, DFO, St. John's, NL.

### 5.2 Literature Cited

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.

C-NLOPB (Canada-Newfoundland and Labrador Offshore Petroleum Board). 2012. *Geophysical, Geological, Environmental and Geotechnical Program Guidelines*. 38 pp. + Appendices.

Colbourne, E.B., J. Craig, C. Fitzpatrick, D. Senciall, P. Stead and W. Bailey. 2006. An assessment of the physical oceanographic environment on the Newfoundland and Labrador Shelf in NAFO Subareas 2 and 3 during 2005. *NAFO Science Council Research Document 06/11*.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2010. *COSEWIC Assessment and Status Report on the Spiny Dogfish *Squalus acanthias*, Atlantic Population, in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. vii + 50 pp.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2012. *COSEWIC assessment and status report on the Smooth Skate *Malacoraja senta* in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. xix + 77 pp.

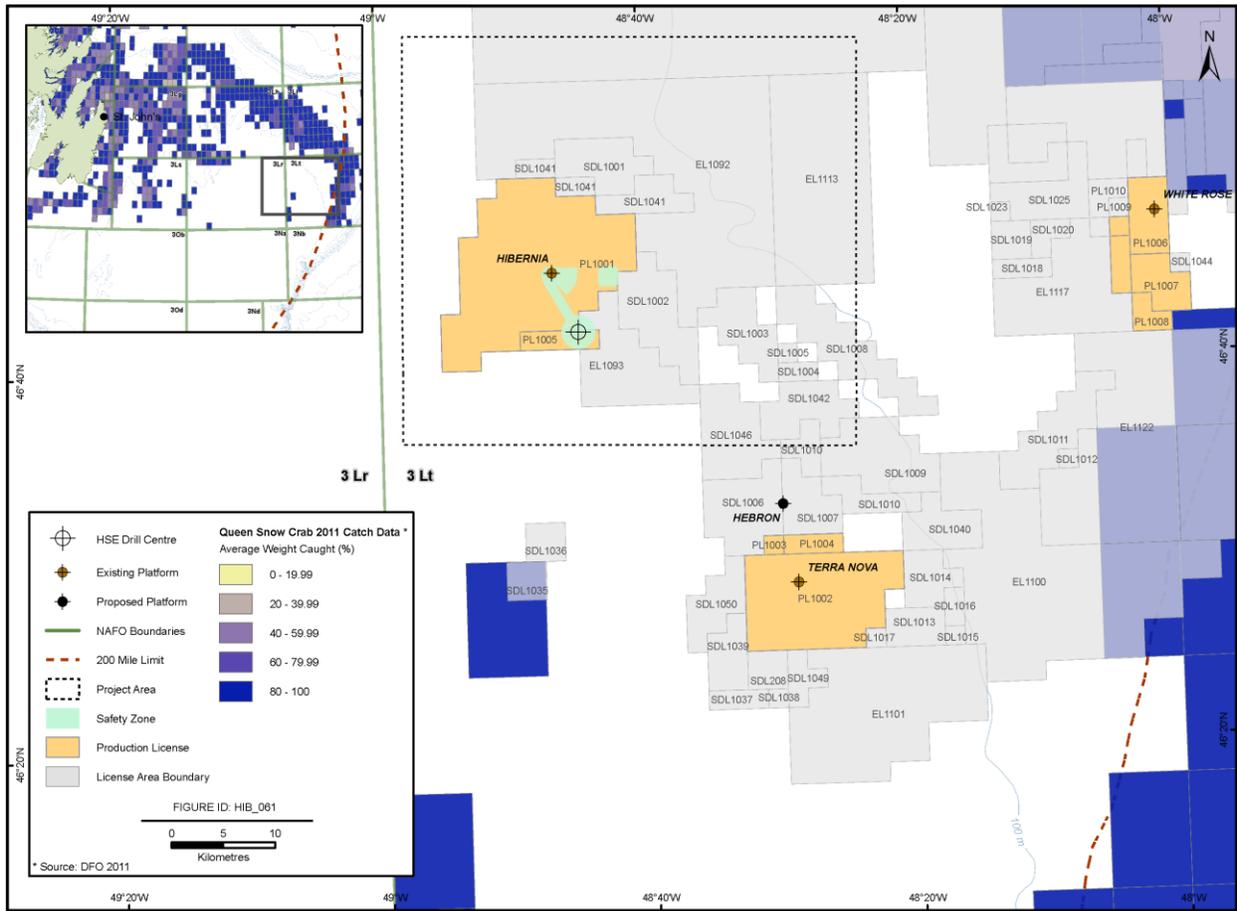
Jacques Whitford Limited. 2009. *Hibernia Drill Centres Construction and Operations Program Screening Report*. Prepared for Hibernia Management and Development Company, St. John's, NL.

Kulka, D.W., E.M. DeBlois and D.B. Atkinson. 1996. Non-traditional groundfish species on Labrador Shelf and Grand Banks -- skate. *DFO Atlantic Fisheries Research Document 96/98*: 29 pp.

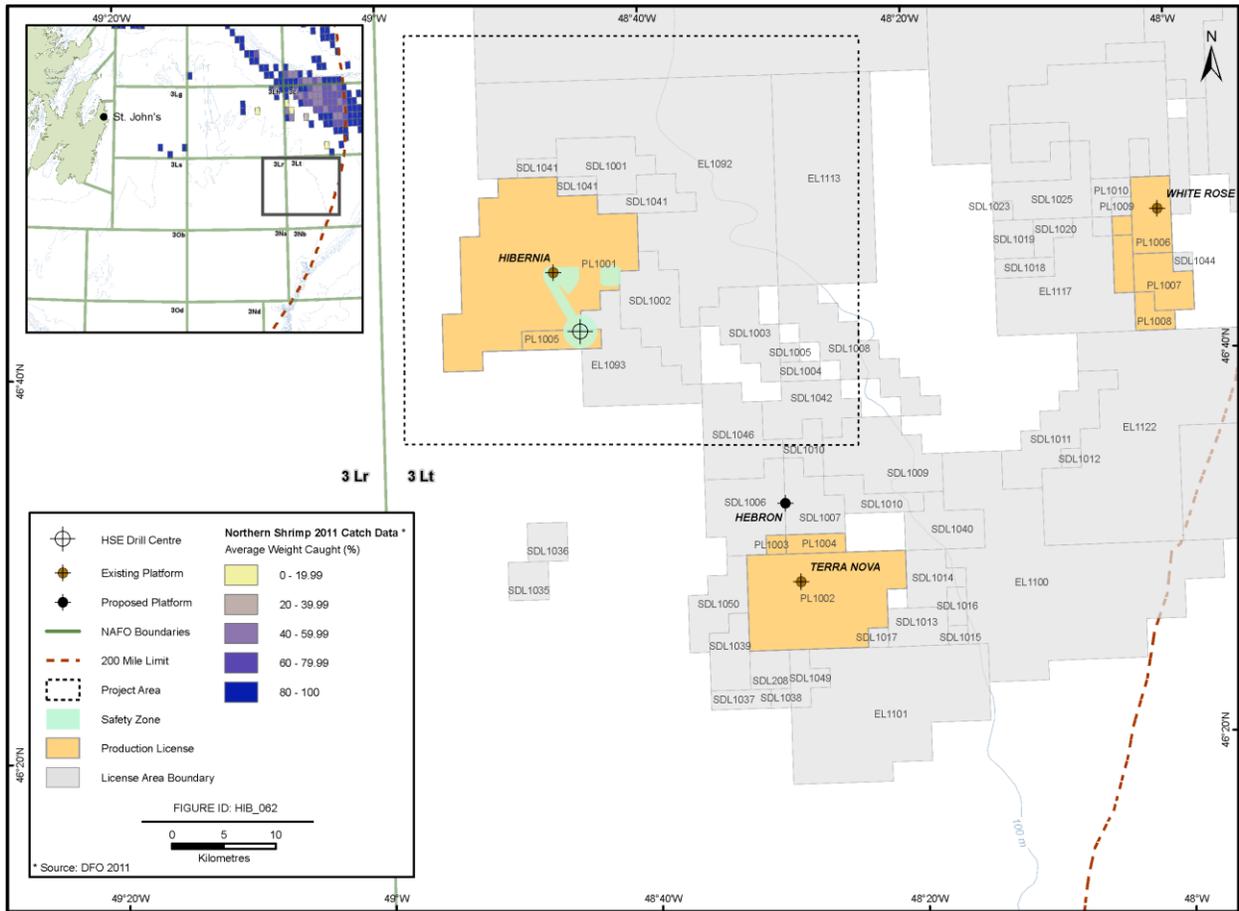
- Kulka, D.W., D. Swain, M.R. Simpson, C.M. Miri, J. Simon, J. Gauthier, R. McPhie, J. Sulikowski, and R. Hamilton. 2006. Distribution, abundance, and life history of *Malacoraja senta* (smooth skate) in Canadian Atlantic waters with reference to its global distribution. *CSAS Research Document 06/93*: 140 pp.
- McPhie, R.P. and S.E. Campana. 2009. Reproductive characteristics and population decline of four species of skate (Rajidae) off the eastern coast of Canada. *Journal of Fish Biology* 75: 223-246. doi:10.1111/j.1095-8649.2009.02282.
- LGL Limited. 2013. *Environmental Assessment of HMDC's 2D/3D/4D Seismic Projects (2013-Life of Field), Newfoundland Offshore Area*. Prepared for Hibernia management Development Company, St. John's, NL.
- Simpson, M.R., L.G.S. Mello, C.M. Miri, M. Treble and T. Siferd. 2012. Distribution, abundance, and life history of smooth skate (*Malacoraja senta* Garman 1885) in Northwest Atlantic waters. *DFO Canadian Science Advisory Secretariat Research Document 2011/116*: iv + 40 pp.
- Stantec Consulting Ltd. 2011. *2011 Environmental Assessment Review Hibernia Drill Centres Construction and Operations Program*. Prepared for Hibernia management Development Company, St. John's, NL. ii + 14 pp. + Appendices.
- TRAC. 2010. Northwest Atlantic spiny dogfish. *TRAC Status Report 2010/02*.

# **APPENDIX A**

## Commercial Fisheries



**Figure A.1 Snow Crab Harvesting Locations (2011)**



**Figure A.2 Northern Shrimp Harvesting Locations (2011)**

# **APPENDIX B**

## Species at Risk

**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 Environmental Assessment (Jacques Whitford 2009) and Appendix B of 2011 Environmental Assessment Review Hibernia Drill Centres Construction and Operations Program (Stantec 2011). The information contained within this section is current as of May 24, 2013. Table B.1 is an updated Table B.1 from Stantec 2011 and has three species added to the list and four species that have had a change to their SARA status or COSEWIC designation. A brief description of each of the **added** species **not** previously described in Jacques Whitford (2009) or Stantec (2011) is provided after Table B.1 (note that thorny skate were included in the original environmental assessment (Jacques Whitford 2009), but was discussed under the fish and fish habitat chapter, not species at risk).

**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>	<b>Schedule 1 – Special Concern</b>	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
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea pop)	<i>Hyperoodon ampullatus</i>	No Schedule – No Status	Special Concern	May occur in small numbers 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 (NL Pop)	<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	<b>Threatened</b>	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

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
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 Shark	<i>Lamna nasus</i>	No Schedule – No Status	Endangered	Occurs but area is not known to 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	<b>Endangered</b>	Not likely to occur
White Shark	<i>Carcharodon carcharias</i>	<b>Schedule 1 - Endangered</b>	Endangered	Not likely to occur
Deepwater Redfish (northern population)	<i>Sebastes mentella</i>	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species
Acadian Redfish (Atlantic population)	<i>Sebastes fasciatus</i>	No Schedule – No Status	Threatened	May occur in small numbers but area is not known to be critical habitat for the species
Atlantic Salmon (South NL pop)	<i>Salmo salar</i>	No Schedule – No Status	Threatened	Not likely to occur
Atlantic Bluefin Tuna	<i>Thunnus thynnus</i>	No Schedule – No Status	Endangered	May occur in small numbers but area is not known to be critical habitat for the species
<b>Smooth Skate (Funk Island Deep, NL population)</b>	<b><i>Malacoraja senta</i></b>	<b>No Schedule – No Status</b>	<b>Endangered</b>	<b>Occurs but area is not known to be critical habitat for the species</b>
<b>Thorny Skate</b>	<b><i>Amblyraja radiata</i></b>	<b>No Schedule – No Status</b>	<b>Special Concern</b>	<b>Occurs but area is not known to be critical habitat for the species</b>
<b>Spiny Dogfish</b>	<b><i>Squalus acanthias</i></b>	<b>No Schedule – No Status</b>	<b>Special Concern</b>	<b>Occurs but area is not known to be critical habitat for the species</b>
<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
Loggerhead Sea Turtle	<i>Caretta caretta</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Update to Table B.1 (Stantec 2011) <b>Bolded</b> species are new to the table Changed status is <b>bolded and italicized</b>				

## Smooth Skate

Smooth skate is a small elasmobranch that occurs from the Labrador Shelf and Gulf of St. Lawrence as far south as South Carolina (Kulka et al. 1996, 2006; Simpson et al. 2012). Data from Atlantic Canadian waters indicate smooth skate occurs as several geographically distinct and persistent concentrations (Designatable Units) and is concentrated around Funk Island Deep, NL. This population was abundant until the early 1980s (NAFO Division 2J3K), but has shown steep declines since the 1990s (Simpson et al. 2012). Kulka et al. (1996) noted a southerly shift in distribution: it appeared to be more common on the southern Grand Bank during 1991 to 994 (collected during 1981 to 1994). This species occurs in 200 to 600 m water in the northern part of its range (NAFO Division 2HJ3K) and in shallower (50 to 500 m) in the southern part of its range (NAFO Division 3NOPs) and at 200 to 300 m in intermediate waters (NAFO Division 3LM (Simpson et al. 2011). McPhie and Campana (2009) reported length at 50 percent maturity was 10 years for females and 12 years for males.

Smooth skate (Funk Island Deep, NL population) was assessed by COSEWIC as endangered in May 2012 (COSEWIC website) due to steep declines in the abundance of juveniles and adults since the early 1980s (COSEWIC 2012). Mean catch rates for the Funk Island Deep Designatable Units peaked in 1978/1979 and then declined for both juveniles and adults until 1994. Catch rates remained consistently low but stable through to 2005. Slight increases have been observed since 2005 (Simpson et al. 2012); however, the overall abundance remains very low. Smooth skate will be considered for listing under SARA, but does not have any status at this time. It is vulnerable to increased mortality as it is long-lived, slow-growing and late maturing (Simpson et al. 2012). Smooth skate is taken as bycatch in other fisheries, although the amount of bycatch has been declining since the early 1980s (COSEWIC 2012). The period of decline also corresponds with the coldest water temperatures reported (Colbourne et al. 2006), and other factors may also be driving declines (Simpson et al. 2012).

## Spiny Dogfish

The spiny dogfish (Atlantic population), was recently assessed as special concern by COSEWIC (2010), but is not yet listed under SARA. This small shark is widely distributed over the continental shelf of temperate and boreal regions, preferring waters 5°C to 15°C. The Atlantic population extends from Labrador to Cape Hatteras (TRAC 2010). The population remains relatively abundant in Canadian waters, and is most abundant in southwest Nova Scotia (COSEWIC 2010), with areas of concentration around Newfoundland and Labrador as well.

Like other elasmobranchs, dogfish are vulnerable to increased rates of mortality as it has an extremely long gestation period (18 to 24 months), long generation time (23 years), and low fecundity (average of six pups every two years), and is vulnerable to exploitation. Additionally, there is uncertainty about long-term trends in abundance, and particularly the abundance of mature females. This population is known to be broken into several well-defined 'groups', with concentrations in the southern Gulf of St. Lawrence, around Newfoundland, on the eastern and central Scotian Shelf, the Bay of Fundy, an southwest Nova Scotia, as well as in Massachusetts and North Carolina (COSEWIC 2010). These groups undertake seasonal migrations and it is not well understood how much mixing of these groups occurs. The distribution of spiny dogfish

is patchy. Dogfish can form dense aggregations, causing high variability in survey indices. The absence of young juveniles, as well as high variability in abundance estimates from surveys suggests that the early life history stages (pupping and juveniles) occur elsewhere.

Spiny dogfish are threatened by overfishing, as well as high discard rates. Large, sexually mature females are often targeted in commercial fisheries (COSEWIC 2010). Historically, the species has been caught for varied purposes including for its meat, for use as fertilizer, vitamins, fishmeal, and in the shark fin trade, as well as killed for being a 'pest' in commercial fisheries.