

Update Report

**ENVIRONMENTAL IMPACT ASSESSMENT**

*MARINE 2D SEISMIC 2012-2017 REFLECTION SURVEY*

**Area:**

**Northeast Newfoundland  
Slope**

**Client:**

**Multi Klient Invest AS**

**Prepared For:**

**Canada-Newfoundland and  
Labrador Offshore Petroleum  
Board**



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## 1 Introduction

Multi Klient Invest AS (MKI), a wholly owned subsidiary of Petroleum Geo-Services ASA (PGS), and TGS-NOPEC Geophysical Company ASA (TGS), entered into a cooperation agreement to conduct a multi-year regional marine two-dimensional (2D) seismic reflection survey offshore Newfoundland. The surveys occur in an offshore region that encompasses portions of the Labrador Shelf Orphan Basin (east and west), Flemish Pass Basin and Jeanne d'Arc Basin described as the Northeast Newfoundland Slope in the Atlantic Ocean (Figure 1 - 2D Program Area 2015). Through the environmental assessment process under the *Accord Act*, the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) determined the project would not result in significant effects, as indicated in a Determination of Significance letter dated September 4, 2012. MKI submitted an Amendment to the EA Report to include the acquisition of 3D seismic surveys in the Project Area. The C-NLOPB approved this Amendment on April 30, 2015; their review concluded that the report provided a satisfactory assessment of environmental effects associated with this activity. The C-NLOPB is of the opinion that, taking into account the implementation of mitigation measures committed to by MKI during the environmental assessment, the project is not likely to cause significant adverse environmental effects. On June 10, 2015 MKI filed an Amendment with the C-NLOPB to allow concurrent surveys within the project area.

This document provides an update of the environmental assessment (EA) report (YOLO Environmental Inc. 2012) prepared on behalf of MKI for the 2D and 3D seismic reflection surveys. The C-NLOPB requested a validation of the EA predictions relative to the 2015 program. MKI acknowledged in the EA report that the scope of the Project being assessed extends over several years, during which time the regulatory, biophysical, and socio-economic environment may change from that assessed in the report. MKI has annually reviewed the EA report, as directed by the C-NLOPB, for current applicability and will work with regulatory authorities to ensure that the EA remains fit for purpose.

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## 1.1 Regulatory Context

The *Canada - Newfoundland and Labrador Offshore Petroleum Resources Accord Implementation Act*, was amended to incorporate changes in occupational health and safety. The amendments were added to Part III.I, and the associated Transitional Regulations were entered into force on Dec. 31, 2014.

The C-NLOPB released the final Eastern Newfoundland Strategic Environmental Assessment (SEA) in August 2014 (AMEC 2014). The Eastern Newfoundland SEA (EN SEA) updates the 2003 Orphan Basin SEA and extends the geographic coverage to include additional areas to the south and east. The MKI EA Study area falls within most of the EN SEA area.

## 2 Project Overview

The proposed 2015 survey season remains between May 1 and November 30, as previously assessed. The exact dates will depend on the weather conditions and vessel availability. However; based on previous work on the Northeast Newfoundland Slope, the weather usually allows productive recording until early November. The vessels will be at sea and operate continuously (i.e., 24-hour operations) during survey operations. Seismic vessels typically operate on a 5 week crew change schedule, which will be maintained for these projects.

All mitigations measures listed in the 2012 EA will continue to be adhered to as demonstrated in the 2012 to 2014 programs. About 30 minutes prior to arriving at the start of a seismic acquisition line, the source array is slowly brought up to a specified power; a ramp-up procedure referred to as a “soft start”. This procedure is an environmental protection measure to provide marine animals the opportunity to temporarily vacate that area if the sound levels are perceived as a disturbance. The source array will be shut down or reduced to a smaller source while the vessel is turning and between survey lines. Environmental Observers and Fisheries Liaison Officers will be onboard the vessels for the duration of the programs.

### 2.1 Program Locations

MKI has planned both 2D and concurrent 3D seismic operations in the 2015 season. Both programs are well within the assessed area and are shown below in Figure 1 and Figure 2.

The duration of a 3D survey is estimated at 100 to 150 days in a given year. A survey would typically commence at the beginning of the summer but the exact dates will depend on the location and weather conditions.

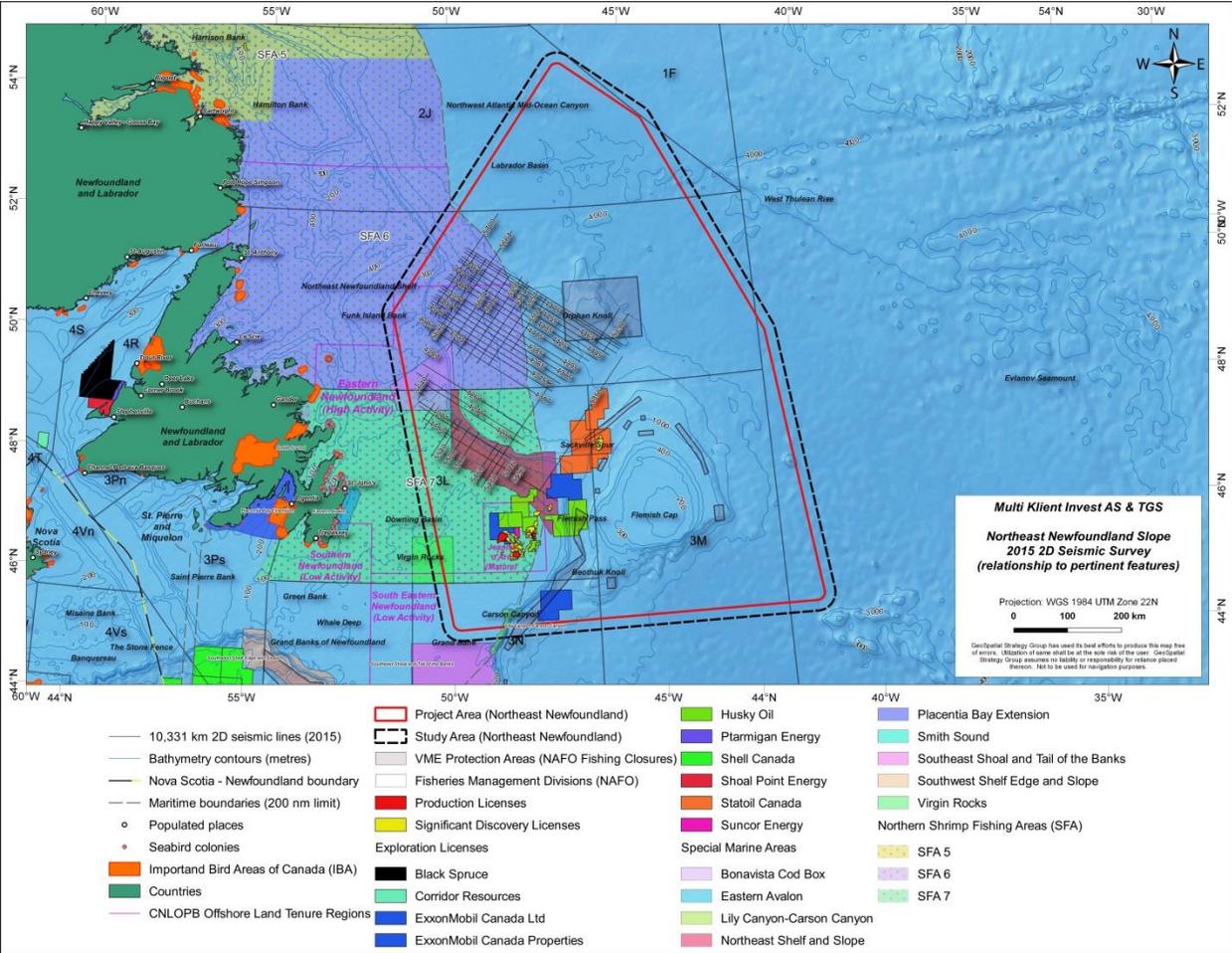


Figure 1 - 2D Program Area 2015

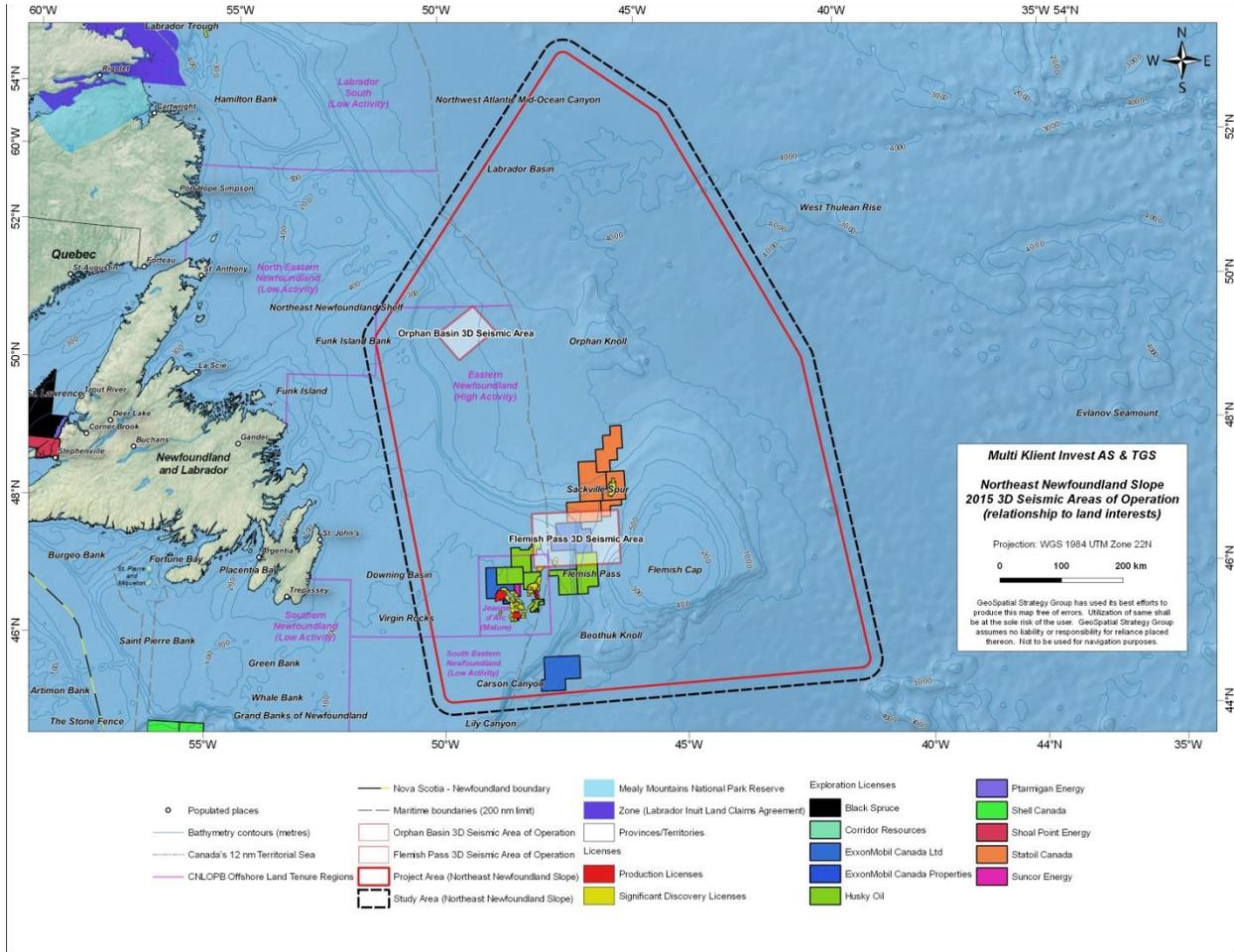


Figure 2 - 3D Program Areas 2015

## 2.2 Seismic Vessels

### 2.2.1 M/V Sanco Spirit

The M/V Sanco Spirit will return to the Northeast Newfoundland Slope this 2015 season to conduct the 2D program. The 2D seismic program for the Northeast Newfoundland Slope is anticipated to start work in late June. The total line kilometres to be acquired are 10,332km. All crew changes will occur at the dock. The vessel is shown below in photo 1.



Photo 1: Seismic Survey Vessel M/V Sanco Spirit

### 2.2.2 M/V Ramform Valiant / Ramform Viking

The acquisition of proposed 3D programs will be carried out by the Ramform Valiant and sister ship Ramform Viking. Both vessels will tow the sound source (airgun array) and multiple streamers (10 to 16) containing receiving hydrophones. Ramform design seismic vessels are powerful and have a long at sea duration and as a result the fuel capacity of these ships can range up to 1,550 t.

The first of the two concurrent 3D seismic programs to be acquired in the Northeast Newfoundland Slope area is anticipated to commence in early June and is anticipated to take approximately 100 days to complete. The second 3D survey approximately 300km to the north is anticipated to start in early July. The two 3D locations are shown above in Figure 2.

All crew changes will occur at sea and the vessels are shown below in Photos 2 & 3.



Photo 2: Seismic Survey vessel M/ V Ramform Valiant



Photo 3: Seismic Survey vessel M/ V Ramform Viking

Both vessels will have equipment, systems, and protocols in place for prevention of pollution by oil, sewage, and garbage in accordance with international standards and certification authorities' requirement. The officers and crew of the survey vessels will comply with all applicable regulations concerning management of waste and discharges of materials into the marine environment.

### 2.3 2D Seismic Survey Towed Array

The seismic air source array for the 2D program is the same equipment as in the previous three years. The guns have a working pressure of 2000 psi and the typical array is a single source array made up of 4

sub-arrays. The source was towed approximately 127 m astern of the seismic vessel at a depth of about 9 m. Typical survey parameters for the program are shown below in Table 1. The vessel will also passively collect gravity data as was the case in previous years.

**Table 1: Typical 2D Seismic Source Array Specs**

Specification	Value
Number of Airgun Arrays	1
Number of Airgun Subarrays	4
Maximum Operating Volume	3000 to 5000 in <sup>3</sup>
Operating Pressure	2000 psi
Shotpoint Interval	25 m
Maximum Source Output (peak to peak)	179.48 bar-m
Peak Frequency	206 Hz

### 2.3.1 Air Source Array and Hydrophone System

The 3D vessels will tow two sources each of three subarrays at equal distance, 100 to 200 m behind the ship. The sources will be activated alternately approximately every 25 m. Behind the source are the 10 to 16 streamer cables, each 8,100 m to 10,000 m in length and spread out over a width of 1500 m to 2400 m. The 3D seismic surveys provide data with greater resolution for the detection of potential existing oil and gas reservoirs, and in order to provide this greater resolution, the survey lines are in closer proximity, spaced about 600 m apart. However, data is not collected in consecutive lines. Upon completion of a survey line, the vessel runs out for the vessel turn around. The streamers extend a long distance behind the vessel. It will take about four hours for the vessels to turn around and collect another line. This may take 10-15 kilometre radius to complete before commencing the run in for the next survey line. Therefore, the next acquisition line in the grid may be spaced 10 to 15 kilometres from the previous acquisition line. Table 2 provides the typical 3D parameters.

**Table 2: Typical 3D Specifications**

Parameter	3D
Number and Length of Streamers	10 to 16 x 8100 m
Streamer Separation	100 – 150 m between each streamer
Air Source Array total volume	3000 to 5000 cu in

Source Array Tow Depth	7 - 9 m
Record Length	8 - 13 sec
Receiver Tow Depth	15-25 m
Vessel Turning Radius	10-15 km

In general the sound pressure level from a 3D source array is the same as a 2D source array. Sound attenuation was discussed in Sections 2 and 6 in the original EA report.

All streamers will be filled with polyurethane foam, thus “solid”. As a result there is no potential for leakage of fluids to the sea from in water equipment.

## 2.4 Streamer

All vessels will use the same type of streamer as in the previous three years - the PGS GeoStreamer® which is a solid streamer. Solid streamers are less sensitive to weather-related noise than liquid streamers and eliminate the environmental impact of fluid loss from breaks or tears in conventional fluid-filled streamers.

## 2.5 Logistical Support

MKI will continue to use shore facilities in Newfoundland for refuelling and crew changes for 2D surveys. Bunkering of the 3D vessels in port will likely be at the commencement and conclusion of the survey, as required. No new shore base facilities will be established as part of this Project. MKI has dedicated representatives in St. John’s for day-to-day survey management and liaison with fisher organizations, local services and regulators for both the 2D and 3D programs.

### 2.5.1 Helicopters

Ramform vessels are equipped with a helicopter platform and whilst it is not planned to use helicopters for crew changes or re-supply they could be used in case of medical and other emergencies.

## 2.6 Support Vessels / Guard Vessels

The 2D vessel will be supported with a dedicated supply vessel, the Blaine M. Two support vessels will be required for a 3D seismic survey; one to serve as a guard vessel and the other to serve as a shared supply, re-fuelling and crew change vessel. The support vessel for 3D operations this season is the Thor

Magni which will re supply both 3D vessels. The Polar Prince and the Strait Hunter will serve as Guard vessels.

## 2.7 Emissions and Waste Discharges

Discharges and emissions from the vessels during these programs will be similar to those of any standard marine vessels. The towed arrays will generate underwater noise, and the vessels will also have a variety of other emissions including: engine exhaust, light, and liquid, and solid emissions. These emissions and discharges are further described below.

### 2.7.1 Atmospheric Emissions

Atmospheric emissions will result from the vessels and onboard equipment diesel engine exhaust. These emissions are minor and will be reduced through best management practices and preventive maintenance procedures such as properly maintaining and routinely inspecting ship equipment, controlling vapour loss from fuel tanks, and avoiding engine idling when not in use. Emissions from ship engines and onboard equipment will comply with the Air Pollution Control Regulations (*Newfoundland and Labrador Environmental Protection Act, 2002*) and the Ambient Air Quality Objectives (*Canadian Environmental Protection Act, 1999*).

### 2.7.2 Liquid Emissions

Ballast water is stored in dedicated ballast tanks to improve the vessels stability. No oil will be present in these tanks or in any discharged ballast/preload water. It will be tested and if oil is detected to be in the water, it will be treated to ensure that oil concentrations in the discharge do not exceed 15 mg/L as required by IMO's MARPOL 73/78 (International Convention for the Prevention of Pollution from Ships, 1973, and the Protocol of 1978 related thereto) and the Canada – Newfoundland and Labrador Offshore Petroleum Board Offshore Waste Treatment Guidelines, 2010 (OWTG).

Bilge water often contains oil and grease that originate in the engine room and machinery spaces therefore, prior to its discharge, bilge water is treated in accordance with IMO's MARPOL 73/78 and OWTG, using an oil/water separator. The extracted water is tested to ensure that the discharges contain no more than 15 mg/L of oil.

### 2.7.3 Solid Waste

All solid waste will be transferred to shore and disposed of at an approved facility. Any hazardous materials (e.g., oily rags) will be handled separately in hazardous materials containers. Sanitary and food wastes will be macerated to a particle size of 6 mm or less and then discharged as per the OWTG.

### 2.7.4 Light Emissions

The survey vessels will carry operational, navigation, and warning lights. Working areas will be

illuminated with floodlights as required for compliance with occupational health and safety standards and will be fully equipped with emergency lighting. These surveys will not require a helicopter for routine crew changes or supply. Therefore, helicopter guidance lighting will not be turned on.

PGS's vessels operate under strict "dark ship" routines at night, whenever operations allow, enabling the lookouts to retain their night vision to locate obstructions and see the navigation lights of other vessels. Working areas will be illuminated with floodlights and will be fully equipped with emergency lighting in compliance with occupational health and safety standards. All deck working lights are shielded and only operate while personnel are present to prevent light pollution that may affect the lookouts. A by-product of this mode of operation is that it is optimal for the safety of migrating birds.

The vessels do use flashing 'safety lantern' lighting on their towed equipment. These lanterns flash the letter U in Morse code as required by maritime authorities. They are low intensity (intensity is governed by latitude and day length) and close down completely between flashes.

## 2.8 Potential Malfunctions and Accidental Events

There are unplanned situations that may be encountered during seismic operations. MKI developed procedures to ensure that such events are managed in a safe and environmentally sound manner. MKI has policies, plans, and procedures to prevent or mitigate effects of malfunctions and accidents. Potential hazards are addressed during site-specific planning as part of emergency response management. These policies, plans, and procedures will be located on the seismic vessel and in MKI's St. John's shore office.

During seismic surveys, there will be limited amounts of marine fuel and lube oil onboard that could potentially be spilled to the ocean. The vessels involved in the survey will use diesel fuel. Any accidental spill will be immediately reported to the C-NLOPB and the Canadian Coast Guard. The vessels will be equipped with solid-streamer technology, thus eliminating the risk of an accidental spill from a damaged streamer.

Other accidental events could include damage or loss of seismic equipment, entanglement of seismic equipment with fishing gear, and vessel collisions. Best management practices and communications will be used on the survey vessels to avoid equipment loss or damage. Towed gear may be retrieved if wave heights reach or exceed unacceptable limits. Generally unacceptable limits may occur when wave heights reach or exceed 4 to 5 metres height, although unacceptable limits may occur at lower wave heights depending upon operational considerations. In the case of severe weather, the vessels may return to shore until conditions improve.

### 3 Stakeholder Consultations and Discussions

MKI is maintaining ongoing communications with fishing representatives and organizations, representatives from users of alternative resource sectors within the Study Area, with an interest in the Project. Minutes of the consultation meetings relative to this EA update report are provided in Appendix A.

On December 16, 2014, a meeting was held with Fisheries and Oceans Canada (DFO), the Fish Food and Allied Workers Union (FFAW/Unifor), Ocean Choice International (OCI) and Newfoundland Resources Ltd., unfortunately the One Ocean representative was unable to attend the FFAW meeting as planned. A copy of the 2015 survey program presentation was sent to FFAW, OCI and Newfoundland Resources and One Ocean for their information and referencing.

In the initial consultation planning, several attempts were made to contact, by email and phone, the following groups: the Association of Seafood Producers (ASP), Canadian Association of Prawn Producers (CAPP), Groundfish Enterprise Allocation Council (GEAC), Netukulimk Fisheries Ltd, and Nataaqaq Fisheries Inc. Unfortunately no responses were received from any of the groups. As OCI is a representative of ASP, CAPP and GEAC, they assured that the information would be passed along to the organizations.

The meeting between MKI and the DFO snowcrab and shrimp researchers was held to gain their input on the current status of those key fisheries. At this meeting, a Powerpoint presentation of the 2015 survey programs was presented. Phone conversations were held with DFO representatives to gain information on DFO fisheries research surveys. The DFO industry liaison managers advised that they will participate in the EA review lead by the C-NLOPB, and they will offer comments on the project throughout the process.

## 4 Environmental Settings

### 4.1 Physical Setting

There have been no significant changes in meteorology, climate, physical oceanography, or ice condition in the Study Area from that reported in the 2012 EA report.

Comments on water temperature shifts from fishing organizations indicate recent significant warming of bottom waters that was attributed to affecting location of abundant shrimp catches.

### 4.2 Biological Environment

There are no changes in populations of plankton, marine birds, marine mammals or sea turtles since submission of the June 2012 EA report.

With the recent warming of offshore waters, fishers and scientists note shifting of fish abundance by the declines in snow crab and shrimp catches in traditional fishing areas, and the potential recovery of some groundfish species.

#### 4.2.1 Species at Risk

Since the EA update in 2014, no new species were listed on Schedule 1 of the *Species at Risk Act, 2002* (SARA). SARA Schedule 1-Listed and COSEWIC list the Schedule 1 species at risk within the Study Area.

**Table 3: SARA Schedule 1-Listed and COSEWIC Assessed Species Expected to Occur Within the Study Area**

Common Name	Scientific Name	SARA Risk Category Schedule 1	COSEWIC Status
<b>Marine Mammals</b>			
Blue Whale	<i>Balaenoptera musculus</i>	Endangered	Endangered
Fin Whale	<i>Balaenoptera physalus</i>	Special Concern	Special Concern
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered	Endangered
Sowerby's Beaked Whale	<i>Mesoploden bidens</i>	Special Concern	Special Concern
<b>Marine Reptiles</b>			
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered
<b>Marine Fish</b>			
Atlantic Wolffish	<i>Anarhichas lupus</i>	Special Concern	Special Concern
Northern Wolffish	<i>Anarhichas denticulatus</i>	Threatened	Threatened
Spotted Wolffish	<i>Anarhichas minor</i>	Threatened	Threatened
White Shark	<i>Carcharodon carcharias</i>	Endangered	Endangered
<b>Seabirds and Migratory Birds</b>			

Common Name	Scientific Name	SARA Risk Category Schedule 1	COSEWIC Status
Ivory Gull	<i>Pagophila eburnea</i>	Endangered	Endangered
Red Knot <i>rufa</i> spp.	<i>Calidris canutus rufa</i>	Endangered	Endangered

Source: Species at Risk website

MKI submitted the 2014 Environmental Report of their 2D Seismic Program on the Northeast Newfoundland Slope, May 30 to November 30 2014 to the C-NLOPB in February 2015. This report describes the outcome of the monitoring of marine mammals, sea turtles, seabirds and fishing vessel interactions. No significant adverse effects on those marine species at risk were evident. This monitoring program will continue in 2015.

#### 4.2.2 Sensitive Areas

No new Ecologically or Biologically Significant Marine Areas (EBSA) or unique features of the bioregion which overlap with the Study Area that have been identified or designated by DFO since 2013.

The NAFO Scientific Council recommended to the Fisheries Commission consideration for the expansion of vulnerable marine ecosystem (VME) areas 2, 7, 8 and 10 and for closures in Areas 12, 13 and 14 (NAFO 2013a) based on survey findings of large gorgonians and sea pens. Closures that apply to candidate areas remain unresolved in 2014. The Working Group noted that protection provided to VMEs was achieved, yet some further work is warranted in this area (NAFO 2014).

Also in 2012, the Scientific Council recognized that there is an issue with the impact of scientific survey sampling in closed areas. Until an impact analysis is available, the Council suggests that consideration be given to the following:

- (1) Survey tows in strata overlapping closed areas are conducted with the minimum acceptable time on bottom as dictated by the survey protocol.
- (2) Consideration is given to conducting the minimum number of tows per stratum.
- (3) Avoid creating new survey footprints, by reusing precisely those already used.
- (4) Moving a randomly pre-selected sampling station as far as necessary if the position has been identified as a hotspot for a VME.

A risk assessment on VME elements is currently ongoing and the results are not due until 2016 (NAFO 2014).

### 4.3 Ocean Resources Users

#### 4.3.1 Commercial Fisheries

Figure 4.1 shows the Project and Study Areas relative to the NAFO Divisions and Shrimp Fishing Areas.

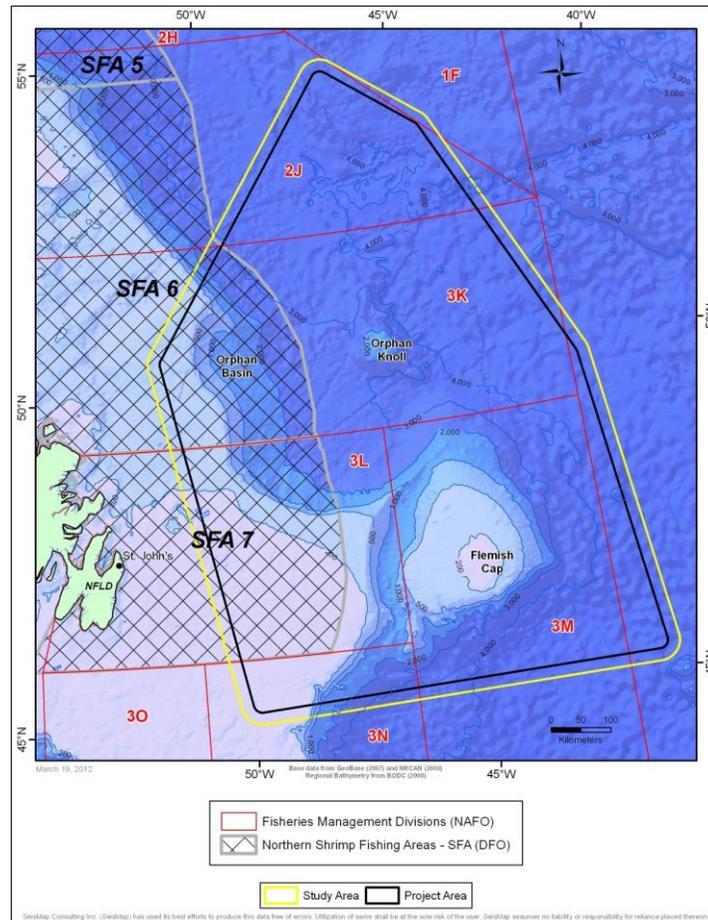


Figure 4.1: NAFO Divisions and Shrimp Fishing Areas in the Study Area

#### 4.3.1.1 Data Sources

The domestic fisheries analysis is typically based on logbook records from commercial vessels maintained as a multi-region and multi-year catch and effort dataset by DFO (ZIFF data). In prior years ( $\leq 2010$ ) this data was available in raw form, but recent privacy concerns have resulted in more restricted access. The data is now provided as proportional catch values summarized by 6 minute grid squares which limits the usability of the data for detailed and customized mapping and analysis.

Available data on foreign and domestic catches within NAFO areas was reviewed for this update report. The data summarizes catch by country to the level of NAFO Divisions. This level of geography only provides a general quantification of fishing activity, since the relatively large NAFO Divisions typically straddle the 200 mile EEZ and the Study Area. Although the foreign vessel locations are monitored, the data are not available for planning by Operators as the information is only provided to contracting parties such as DFO.

## 4.3.1.2 Total Landings – Domestic and Foreign

Table 4: Statlant Total Landings (MT) by Division All species (2010 – 2013)

Country	NAFO Division						Grand Total	% of Total
	1F	2J	3K	3L	3M	3N		
Canada Newfoundland	0	111902	258262	224626	225	33727	628742	72%
Spain	12	0	0	14988	30268	34524	79792	9%
Portugal	363	0	0	8784	32067	7020	48234	6%
Russia	4774	33	0	9062	9495	4332	27696	3%
Canada Maritimes	1	18168	5146	2970	4	257	26546	3%
Faroe Islands	0	0	0	7285	13255	41	20581	2%
Estonia	0	0	0	5784	4712	1782	12278	1%
Norway	1284	0	0	320	4001	0	5605	1%
United Kingdom	125	0	0	0	4048	0	4173	0%
Denmark Greenland	3260	10	0	535	0	0	3805	0%
France St. Pierre et Miquelon	0	0	0	1255	686	1495	3436	0%
Lithuania	632	74	1	469	1558	518	3252	0%
Cuba	0	0	0	220	1916	307	2443	0%
Latvia	95	0	0	857	685	0	1637	0%
Denmark Mainland	0	1002	208	0	0	0	1210	0%
Federal Republic of Germany	850	0	0	301	0	0	1151	0%
United States of America	0	0	0	334	0	1308	1642	0%
Iceland	0	0	0	402	0	0	402	0%
<b>Grand Total</b>	<b>11396</b>	<b>131189</b>	<b>263617</b>	<b>278192</b>	<b>102920</b>	<b>85311</b>	<b>872625</b>	<b>100%</b>

Besides Canada, 16 countries fish the NAFO Divisions within the Study Area. Canadian fishers from Newfoundland and Labrador account for 72% of the landings in the Study Area between 2010 and 2013. In order of percent landed weight, foreign fishers from Spain, Portugal, Russia and the Faroe Islands made up much smaller single digit landings. Other east coast Canadian fishers took the same amount of landings as the Russians, at 3%. The remaining foreign take was less than 1%.

Table 4 and Table 5 show changes in total domestic and foreign landings between 2010 and 2013 of the dominant fisheries (per NAFO Division) within the Study Area. Note, that these values are not spatially geo-referenced relative to the Study Area; therefore, no further analysis can be performed spatially or temporally. There is also no means of differentiating catches in shrimp fishing areas (SFAs) or crab fishing areas (CFAs) from the catches in the NAFO areas.

Geographical change on the effort of commercial fisheries in 2012 and 2013, as compared to the 2005 to 2010 dataset is unknown due to the lack of high precision data formally available through DFO-Ottawa.

**Table 5: Change in Domestic Landings (MT) from 2010 to 2013 for Main Species in Selected NAFO Divisions within the Study Area**

Species	Year	2J	3K	3L	3M	3N	Grand Total
Shrimp	2010	30593	43307	13212	0	0	87112
	2011	27644	36257	9276	0	0	73177
	<b>Change</b>	<b>-9.6%</b>	<b>-16.3%</b>	<b>-29.8%</b>	-	-	<b>-16.0%</b>
	2012	32654	40641	8075	0	0	81370
	<b>Change</b>	<b>18%</b>	<b>12%</b>	<b>-13%</b>			<b>11%</b>
	2013	19313	36540	5792	0	0	61645
<b>Change</b>	<b>-41%</b>	<b>-10%</b>	<b>-28%</b>			<b>-24%</b>	
Snow Crab	2010	2031	12427	26308	1	2626	43393
	2011	1896	10771	27266	0	3273	43206
	<b>Change</b>	<b>-6.6%</b>	<b>-13.3%</b>	<b>3.6%</b>	-	<b>24.6%</b>	<b>-0.4%</b>
	2012	1604	8390	28169	0	3474	41637
	<b>Change</b>	<b>-15%</b>	<b>-22%</b>	<b>3%</b>		<b>6%</b>	<b>-4%</b>
	2013	1380	8519	28739	0	3562	42200
<b>Change</b>	<b>-14%</b>	<b>2%</b>	<b>2%</b>	-	<b>3%</b>	<b>1%</b>	
Greenland Halibut	2010	2893	2266	1302	0	0	6461
	2011	1835	2579	1664	0	0	6078
	<b>Change</b>	<b>-36.6%</b>	<b>13.8%</b>	<b>27.8%</b>	-	-	<b>-5.9%</b>
	2012	2962	1775	1268	0	0	6005
	<b>Change</b>	<b>61%</b>	<b>-31%</b>	<b>-24%</b>	-	-	<b>-1%</b>
	2013	3645	832	1648	13	0	6138
<b>Change</b>	<b>23%</b>	<b>-53%</b>	<b>30%</b>	-	-	<b>2%</b>	
Yellowtail Flounder	2010	0	0	115	0	5581	5696
	2011	0	0	167	0	2850	3017
	<b>Change</b>	-	-	<b>45.2%</b>	-	<b>-48.9%</b>	<b>-47.0%</b>
	2012	0	0	199	0	1171	1370
	<b>Change</b>	-	-	<b>19%</b>	-	<b>-59%</b>	<b>-55%</b>
	2013	0	0	82	0	6036	6118
<b>Change</b>	-	-	<b>-59%</b>	-	<b>415%</b>	<b>347%</b>	
Atlantic Cod	2010	58	1075	1572	4	70	2779
	2011	47	1271	1613	202	34	3167
	<b>Change</b>	<b>-19.0%</b>	<b>18.2%</b>	<b>2.6%</b>	<b>4950.0%</b>	<b>-51.4%</b>	<b>14.0%</b>

Species	Year	2J	3K	3L	3M	3N	Grand Total
	2012	60	1589	1511	0	11	3171
	<b>Change</b>	<b>28%</b>	<b>25%</b>	<b>-6%</b>	0	<b>-68%</b>	<b>0%</b>
	2013	113	2043	1920	0	95	4171
	<b>Change</b>	<b>88%</b>	<b>29%</b>	<b>27%</b>	-	<b>764%</b>	<b>32%</b>
Redfish	2010	4	57	113	0	2	176
	2011	17	56	1958	2	-	2033
	<b>Change</b>	<b>325.0%</b>	<b>-1.8%</b>	<b>1632.7%</b>	-	-	<b>1055.1%</b>
	2012	39	64	909		11	1023
	<b>Change</b>	<b>129%</b>	<b>14%</b>	<b>-54%</b>	-	-	<b>-50%</b>
	2013	61	4	2728		-	2793
<b>Change</b>	<b>56%</b>	<b>-94%</b>	<b>200%</b>	-	-	<b>173%</b>	
Skate	2010	-	3	17	-	1	21
	2011	-	3	1	-	-	4
	<b>Change</b>	-	<b>0%</b>	<b>-94%</b>	-	-	<b>-81%</b>
	2012	-	11	4	-	-	15
	<b>Change</b>	-	<b>267%</b>	<b>300%</b>	-	-	<b>275%</b>
	2013	-	-	2	-	-	2
<b>Change</b>	-	<b>-100%</b>	<b>-50%</b>	-	-	<b>-87%</b>	

Table 6: Change in Foreign Landings (MT) for Main Species in Selected NAFO Divisions within the Study Area

Species	Year	2J	3K	3L	3M	3N	Grand Total
Atlantic Cod	2010	-	-	61	5241	542	5844
	2011	-	-	292	9775	546	10613
	<b>Change</b>	-	-	<b>378.7%</b>	<b>86.5%</b>	<b>0.7%</b>	<b>81.6%</b>
	2012	-	-	135	9138	535	9808
	<b>Change</b>	-	-	<b>-54%</b>	<b>-7%</b>	<b>-2%</b>	<b>-8%</b>
	2013	-	-	135	16244	632	17011
<b>Change</b>	-	-	<b>0%</b>	<b>78%</b>	<b>18%</b>	<b>73%</b>	
Redfish	2010	-	-	473	8154	2484	11111
	2011	74	-	1590	9670	1819	13153
	<b>Change</b>	-	-	<b>236.2%</b>	<b>18.6%</b>	<b>-26.8%</b>	<b>18.4%</b>
	2012	32	-	1881	7708	1524	11145
	<b>Change</b>	<b>-57%</b>	-	<b>18%</b>	<b>-20%</b>	<b>-16%</b>	<b>-15%</b>
	2013	1	-	1782	6775	1886	10444
<b>Change</b>	<b>-97%</b>	-	<b>-5%</b>	<b>-12%</b>	<b>24%</b>	<b>-6%</b>	
Greenland Halibut	2010	-	-	6035	2315	765	9115

Species	Year	2J	3K	3L	3M	3N	Grand Total
	2011	-	-	6296	2022	1314	9632
	<b>Change</b>	-	-	<b>4.3%</b>	<b>-12.7%</b>	<b>71.8%</b>	<b>5.7%</b>
	2012			5890	1815	1293	8998
	<b>Change</b>	-	-	<b>-6%</b>	<b>-10%</b>	<b>-2%</b>	<b>-7%</b>
	2013	-	-	6701	1692	776	9169
	<b>Change</b>	-	-	<b>14%</b>	<b>-7%</b>	<b>-40%</b>	<b>2%</b>
Shrimp	2010	-	-	6533	1976	-	8509
	2011	1002	208	3738	-	-	4948
	<b>Change</b>	-	-	<b>-42.8%</b>	-	-	<b>-41.8%</b>
	2012	10	-	2129	-	-	2139
	<b>Change</b>	<b>-99%</b>	<b>-100%</b>	<b>-43%</b>	-	-	<b>-57%</b>
	2013	-	-	2405	-	-	2405
<b>Change</b>	<b>-100%</b>	-	<b>13%</b>	-	-	<b>12%</b>	
Skates	2010	-	-	146	255	4787	5188
	2011	-	-	95	193	5126	5414
	<b>Change</b>	-	-	<b>-34.9%</b>	<b>-24.3%</b>	<b>7.1%</b>	<b>4.4%</b>
	2012	-	-	132	139	3844	4115
	<b>Change</b>	-	-	<b>39%</b>	<b>-28%</b>	<b>-25%</b>	<b>-24%</b>
	2013	-	-	34	62	3515	3611
<b>Change</b>	-	-	<b>-74%</b>	<b>-55%</b>	<b>-9%</b>	<b>-12%</b>	
Blue Shark	2010	-	-	-	1219	1202	2421
	2011	-	-	-	1753	872	2625
	<b>Change</b>	-	-	-	<b>43.8%</b>	<b>-27.5%</b>	<b>8.4%</b>
	2012	-	-	5	4339	1860	6204
	<b>Change</b>	-	-	-	<b>148%</b>	<b>113%</b>	<b>136%</b>
	2013	-	-		3524	2637	6161
<b>Change</b>	-	-	<b>-100%</b>	<b>-19%</b>	<b>42%</b>	<b>-1%</b>	
Yellowtail Flounder	2010	-	-	4	-	1186	1190
	2011	-	-	-	-	1220	1220
	<b>Change</b>	-	-	-	-	<b>3%</b>	<b>3%</b>
	2012	-	-	-	1	1609	1610
	<b>Change</b>	-	-	-	-	<b>32%</b>	<b>32%</b>
	2013	-	-	1	-	2555	2556
<b>Change</b>	-	-	-	-	<b>59%</b>	<b>59%</b>	

### 4.3.1.3 Domestic Harvesting of Main Species

#### **Northern Shrimp**

By weight, northern shrimp landings are the most important resource to the fishery. NAFO sets the northern shrimp quota for SFA 1 and 7; and DFO sets the northern shrimp quota for all other SFAs. SFAs 2, 4, 5 and 6 are the principal shrimp fishing areas with more than 75% of the total allowable catch (TAC) and account for about 80% of the catch. The Study Area falls within SFAs 6 and 7. The NAFO Division (Div.) 3L portion of the SFA 7 is a NAFO managed stock. Div. 2J and Div. 3K produce the highest weight landed of northern shrimp in the Study Area. Both areas fluctuate in landings, but Div. 2J had a significant decrease of 41% in 2013. There has been a steady decline in Div. 3L northern shrimp landings in 2010 from 13,212 tonnes to 5792 tonnes in 2013. This decline commenced in 2007 and FFAW informed MKI during the consultation meeting that the Div. 3L area will be closed to shrimp fishing in 2015.

The shrimp stock in Div. 3L, Div. 3N, and Div. 3O is experiencing poor recruitment and high fishing mortality. NAFO considers that other human sources (i.e. pollution, shipping, oil industry) to be minor impacts. Stock development and the rate at which changes may take place can be affected by changes in cod stock. Although the size of the cod stocks in Div. 2J, Div. 3K, Div. 3L, Div. 3N and Div. 3O have increased, they remain at low levels so the impact of cod predation is considered small. Some other shrimp consuming groundfish stocks have increased, but the impact on shrimp stock has not yet been quantified.

Recent catches of northern shrimp in Div. 3M are zero. Effort allocations were reduced by 50% in 2010 (see foreign landings in Figure 4.3) and a moratorium was imposed in 2011. The significant decline of shrimp biomass since 2007 correlates with the increase of the cod stock in Div. 3M.

#### **Snow Crab**

By weight, landing of snow crab is the second most important commercially fished species. DFO manages this fishery. Div. 2J, Div. 3K, Div. 3L, Div. 3N and Div. 3O exploitable snow crab biomass has not changed in recent years, but declined by 74% in Div. 2J from 2006 to 2011 (DFO 2014). Table 4.3 shows that domestic snow crab landings, by weight, in the Study Area have decreased in Div. 2J since 2010 (landings declined by 37% from 2006 to 2011). They decreased in Div. 3K until 2013 (exploitable biomass decreased by 68% from 2008 to 2013 and landings declined by 50%), when snow crab landings were steady compared to 2012. There was no change in domestic snow crab landings in Div. 3L and there was an increase in landings in Div. 3N.

An increasing percentage of Div. 2J, Div. 3K, Div. 3L, Div. 3N, and Div. 3O snow crab exploitable biomass was accounted for in Div. 3L, Div. 3N and Div. 3O, up to 75% in 2013 (DFO 2014). The exploitable biomass is expected to decline in Div. 3L, Div. 3N and Div. 3O over the next five years, along with a decline in recruitment in the short term. Recent warm oceanographic conditions were considered likely to affect recruitment in the long term. This decline would be exacerbated if the current level of fishery

removals is maintained (DFO 2014).

Unknown levels of future fishing mortality introduces uncertainty while other sources of mortality including predation, bottom trawl fisheries, seismic exploration and disease are likely to have relatively little impact on short term changes in the snow crab exploitable biomass (Mullowney et al. 2014)

### **Greenland Halibut (Turbot)**

By weight, landings of Greenland halibut (turbot) remain the third most important commercially fished species. NAFO manages this fishery in Subarea 2 and in Div. 3K, Div. 3L, Div. 3M, Div. 3N and Div.3O. The harvest control rule is computed using Canadian Fall Div. 2J, and Div. 3K index, the Canadian Spring Div. 3L, Div. 3N and Div. 3O index and the EU Flemish Cap index (NAFO 2014). In the Study Area, turbot landings by weight increased in Div. 2J and Div. 3L, but decreased in Div. 3K from 2579 tons in 2011 to 832 tons in 2013. Greenland halibut management strategy in Subarea 2 and in Div. 3K, Div. 3L, Div. 3M, Div. 3N and Div. 3O was adopted by NAFO in 2010 and shall initially be in force until 2014 (NAFO 2014). NAFO Contracting parties recommended to the NAFO Fisheries Commission, that they continue using the current management strategy for three additional years 2015 – 2017 (NAFO 2014).

### **Other Groundfish**

Groundfish landings by weight of cod, yellowtail flounder, and redfish increased in the Study Area in 2013. However, there is considerable uncertainty in the recent DFO survey data on cod stocks to estimate stock trends (DFO 2014) and the spawning stock biomass index remains below the limit reference point.

NAFO manages redfish stocks in Div. 3L, Div. 3N, Div. 3M, and Div. 3O, and it co-manages Subarea 2 and Div. 1F and Div. 3K stock with North East Atlantic Fisheries Commission (NEAFC). Catches declined to low levels in the early 1990s and have since varied between 450 and 3000 tons. From 1998 to 2009 a moratorium was in place. In 2010 with the reopening of the fishery, redfish catches increased and had reached 6000 tons in 2013 - the highest level recorded in 20 years. Fishing intensity on redfish has impacts on Div. 3N and Div. 3O cod, Div. 3L, Div 3N and Div. 3O American plaice, and Subarea 2 and Div. 3K, Div. 3L, Div. 3M, Div. 3N and Div. 3O Greenland Halibut through by-catch (NAFO 2014).

In Div. 3M, due to weaker incoming recruitment and uncertainty regarding current levels of natural mortality, the Scientific Council recommends not increasing the current TAC (6500 tons) (NAFO 2013b).

In Div. 3O, there is insufficient information on which to base predictions of annual yield potential and stock dynamics and recruitment patterns are also poorly understood. Catches have averaged about 13000 tons since the 1960s and over the long term, this level appears to have been sustainable. At this time, the Scientific Council is unable to provide advice on a more specific TAC level. The stock appears to have increased since the early 2000s. Current fishing mortality appears low and recent recruitment is unknown (NAFO 2013b).

Yellowtail flounder in Div. 3L, Div. 3N and Div. 3O are assessed by the NAFO Scientific Council every two

years. Assessment results indicated that the stock spawning biomass was above maximum sustainable yield and fishing mortality was below the maximum sustainable yield (DFO 2012).

#### 4.3.1.4 Domestic Harvesting Locations

Figures 4.2 to 4.4 show the harvesting locations and relative landing volumes in 2013 by month for shrimp, snow crab and turbot. The fishing effort has not changed significantly from previous years. As noted above, shrimp fishing in Div. 3L will be closed in 2015.

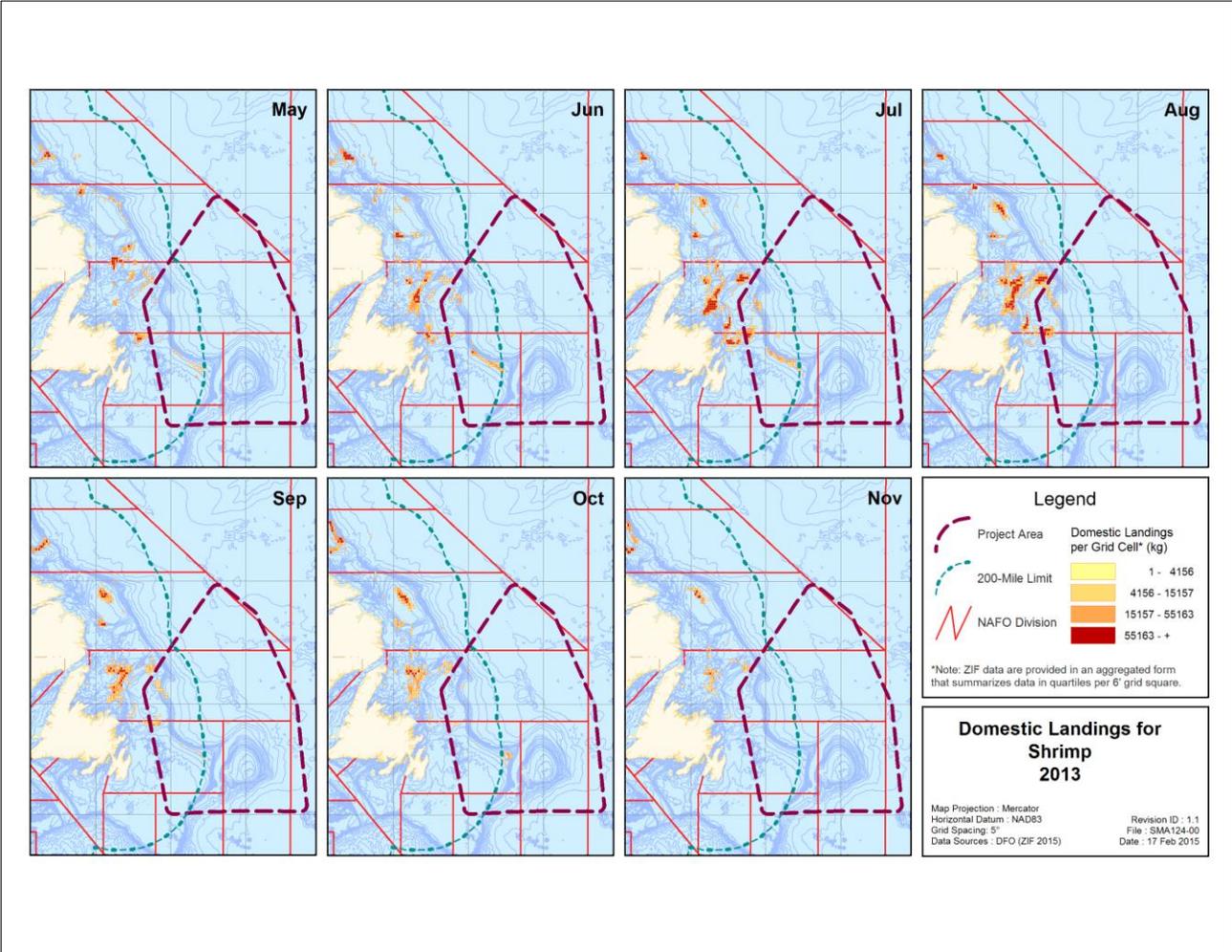


Figure 4.2: Monthly Domestic Landings for Northern Shrimp in the Study Area – 2013

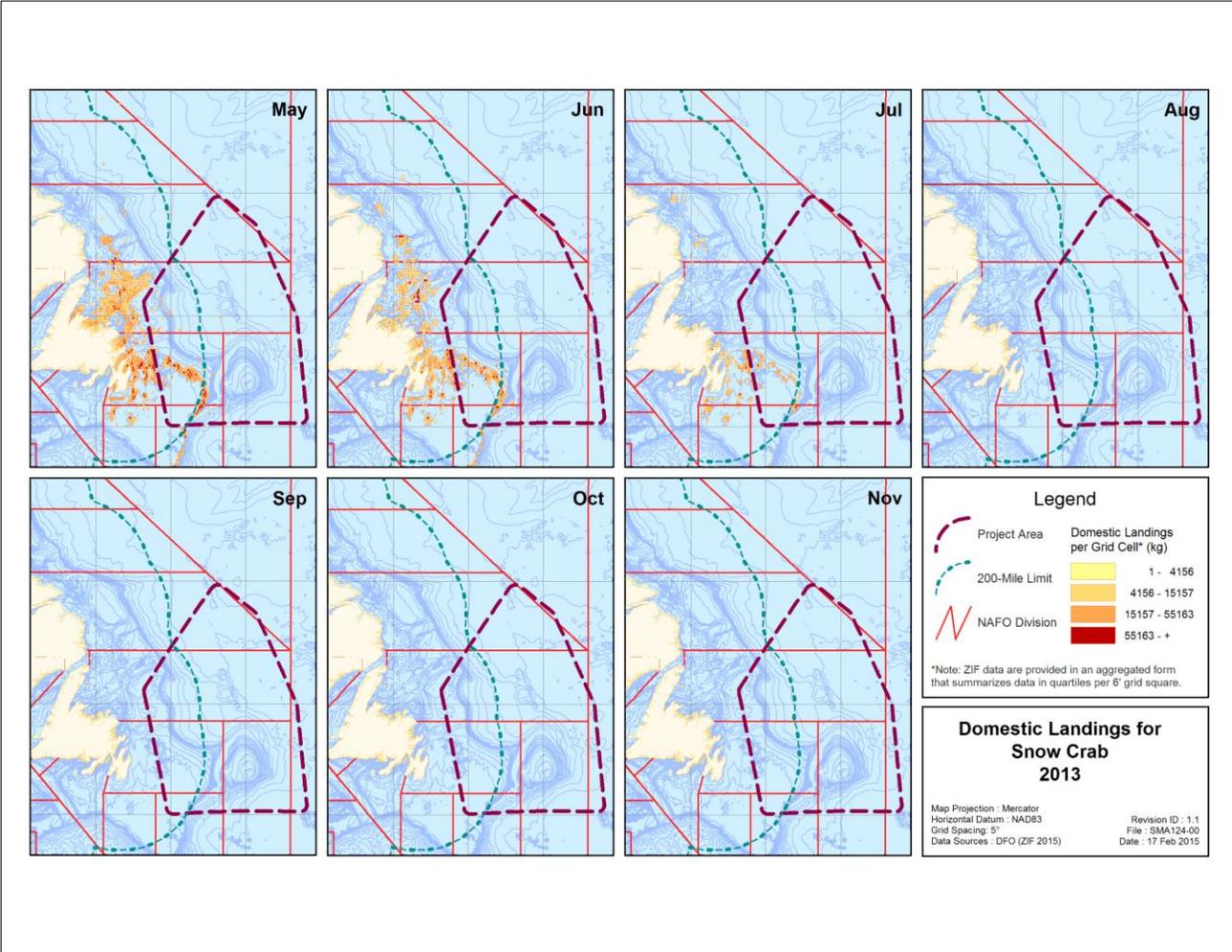


Figure 4.3: Monthly Domestic Landings for Snow Crab in the Study Area – 2013

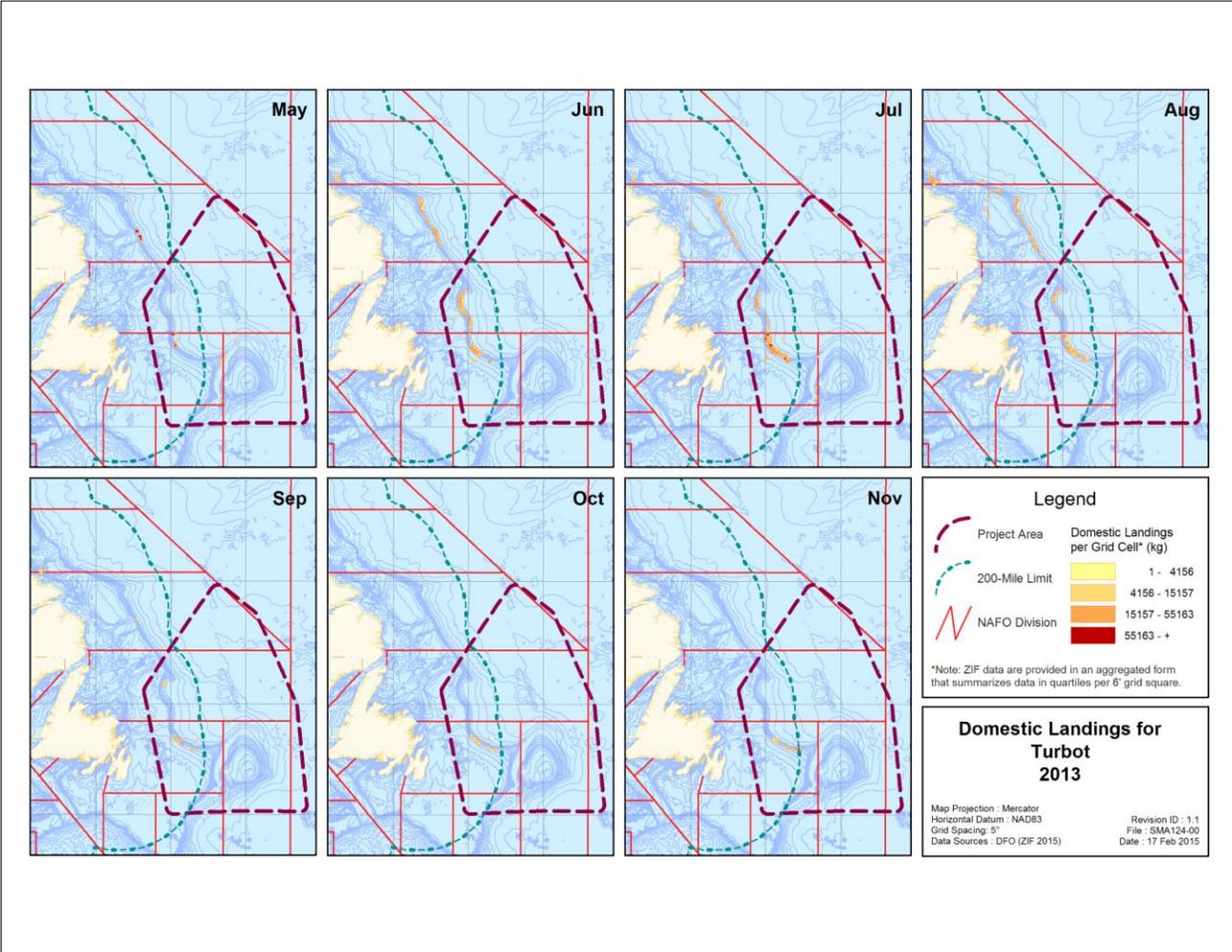


Figure 4.4: Monthly Domestic Landings for Turbot in the Study Area - 2013

## 5 Cumulative Effects Assessment

Individual environmental effects can accumulate and interact to result in cumulative environmental effects. Past and ongoing human activities have affected the region's natural and human environments. The description of the existing environment reflects the effects of these other actions. Past, present, and future activities that might have the potential to impact cumulatively with the Projects are outlined in Table 7 and Table 8.

**Table 7: Summary of Petroleum Activities**

Operator	Program	Region	Schedule
<b>Exploration Projects</b>			
Husky Energy	2D, 3D or 4D seismic, well site geohazard surveys, and vertical seismic profiling (VSP)	Jeanne d'Arc Basin and Flemish Pass	Mar 1-Nov 30 2012-2020 20 to 60 days
Statoil Canada	3D, 2D profiles including geohazard and electromagnetic surveys	Jeanne d'Arc and Flemish Pass Basins	Apr 1 to Oct 31 2011-2019 40 to >100 days seismic 5 days geohazard
Statoil Canada	Exploration well drilling	Jeanne d'Arc and Flemish Pass Basins	Year round 2008 to 2016
Chevron Canada	2D and 3D seismic geohazard	Northern Grand Banks to the Orphan Knoll	May to Nov 2012 to 2017 30 to 120 days seismic 14 days geohazard
Husky Energy	Exploration well drilling	Jeanne d'Arc Basin	Year round 2008 – 2017
Suncor Energy	Exploration well drilling	Jeanne d'Arc Basin	Year round 2009 2017
Suncor Energy	2D, 3D, 4D seismic, geohazard, VSP	Jeanne d'Arc Basin, geohazard, VSPs	May 1 to Dec 31 2014-2024 Mar 1 to Dec 31 geohazard
HMDC	2D, 3D, 4 D seismic	Grand Banks	May to Dec 2013 to 2036
GXT	2D, gravity, magnetic	Grand Banks and wider NL offshore area	May 1 to Dec 31 2014 to 2018
MKI	2D and 3D seismic	Labrador Sea	May 1 to Nov 30 2014 to 2018
MKI	2D and 3D seismic	Southern Grand Banks	May 1 to Nov 30 2014 to 2018
MKI	2D and (2) 3D concurrently.	NE NL Slope	May to Nov 30 2012 - 2017
ExxonMobil Canada	2D, 3D, 4D seismic,	Eastern Newfoundland	May to November, 2015 to

	wellsite and geotechnical	EL1135, EL1136, EL1137	2024 30 to 100 days
Western Geco	2D, 3D 4D seismic	Flemish Pass, Flemish Cap, Orphan Basin	May 1 to November 30 210 days
Western Geco	2D, 3D 4D seismic	Southern Grand Banks	May 1 to November 30 210 days
<b>Operating Projects</b>			
Exxon Mobil - Hebron	Development - Production	Jeanne d'Arc Basin, Grand Banks	Production by 2017
Suncor Energy-Terra Nova	Production	Jeanne d'Arc Basin, Grand Banks	2027
Husky Energy - White Rose	Production	Jeanne d'Arc Basin, Grand Banks	2020
Hibernia MDC	Production	Grand Banks	2036

**Table 8: Other Ocean User Interaction with the Survey Project**

Activity	Information	Interaction with Project
Offshore Petroleum Production	Exxon Mobil's HMDC, further production drilling 2012 – 2014. Ongoing production until 2036.	The active production platform is located in the study area.
Offshore Petroleum Drilling	Exxon Mobil Hebron Project commence offshore 2016-ongoing Exxon Mobil HMDC production drilling 2012-2014 Husky exploration drilling 2008-2017 Suncor exploration drilling 2009-2017 Statoil exploration drilling 2008-2016	Four drilling rigs planned to operate on the Grand Banks presently and in the future.  No spatial overlap anticipated due to distance between programs. Temporal overlap.

Activity	Information	Interaction with Project
Seismic Exploration	<p>Husky 2D, 3D, 4D + geophysical surveys, in 2013 – 2020, March to November, Statoil 3D, 2D + geophysical surveys in 2011-2019, April to October</p> <p>Chevron 2D, 3D + geophysical in 2012-2017, May to November, 30 to 120 days</p> <p>EMGS CSEM survey in 2014-2018 from April to November over 60-150 days</p> <p>GXT Ion 2D+gravity+magnetic surveys in 2014-2018 May to December</p> <p>MKI 2D and (2) concurrent 3D in 2015-2018 May to December, 60 to &lt;120 days</p> <p>HMDC 2D+3D+4D in 2013 to life of field May to December</p> <p>Suncor 2D+3D+4D in 2014-2024 in May to December over 30 to 120 days; VSP in 2014-2024 in March to December over 7 to 14 days; geohazard in 2014-2024 any time over a few days</p> <p>ExxonMobil 2D, 3D+4D, well site in 2015-2024</p> <p>Western GECO 2D, 3D+4D in 2015-2024, May to November</p>	11 potential programs in the same region with the potential for overlap in 2015 to 2017.
Marine Traffic	<p>Heavy domestic and international marine traffic over the Grand Banks.</p> <p>Two cable laying vessels will operate between Halifax and Ireland, commencing April 1, 2015.</p>	<p>Project not in shipping channels</p> <p>Spatial and temporal overlap may occur</p>
Commercial Fishing	Fishing effort is diverse and shifting in response to stock locations	Temporal and spatial overlaps may occur.

In addition to consideration of these projects and activities, the cumulative effects assessment also considers past biological and/or anthropogenic pressures that may have contributed to existing conditions within the Study Area (i.e., commercial whaling). Where applicable, these pressures and the resulting effects are reflected in the description of existing conditions.

## 5.1 Ocean Resources

### 5.1.1 Species at Risk

With the possibility of 11 other seismic programs occurring over the Eastern Newfoundland Area and Grand Banks in the next three years, resident and migratory species may be affected. However, it is highly unlikely that all programs will be concurrent as seismic vessels are limited in availability and the recent continued slump in the price of oil may limit operator's project resources. The actual planning schedules, locations and coordination of the surveys with stakeholders are not provided in the EA documents of each Operator.

Species at risk are capable of avoiding an ensouled area to prevent harmful and disruptive effects provided there are alternative productive areas available, and the animals are not deterred by concurrent seismic programs. Critical habitats have not been identified on the Eastern Newfoundland region, although the DFO EBSAs identify important feeding, aggregation, and spawning areas.

In general, the seismic survey vessels activities and noise will contribute a minor percentage to the overall noise generated by other such sources and space-user conflict, and will be of short duration in local areas. Based on current knowledge, and by continuing to follow the mitigation procedures, the 2015 2D and 3D seismic surveys are not expected to result in or contribute to any significant cumulative impacts on species at risk.

### 5.1.2 Marine Fish

Although non-significant, the residual effects of the Project components on finfish or shellfish (that may be cumulative with the effects of other human activities in the region) are expected to be very limited, consisting primarily of short-term avoidance behaviour. The predicted cumulative effects of the proposed seismic survey with other seismic projects, drilling programs, noise from vessel traffic, and commercial fishing are similar to those discussed in the assessment. Seismic surveys produce repetitive, localized and short-term increases in ambient noise levels, with the period between potential exposures ranging from hours to days.

Communication and cooperation between operators are key to avoiding each other's programs. As indicated, there are only a few vessels available to conduct these surveys; therefore, not all 11 seismic surveys will be underway at the same time. Given the existing and future seismic survey activity, the incremental sound made by fishing vessels and commercial vessel traffic will not add significantly to existing ambient noise levels in the Study Area. MKI is diligently avoiding the EBSAs during fish spawning periods. Therefore, MKI will not cumulatively add to other seismic operations that may operate in those areas in the spring to early summer.

Considering the significance criteria provided for fish and shellfish, and given that impacts from cumulative vessel traffic, individual projects and other activities in the Study and Regional Areas are not

likely to contribute to significant adverse effects, the Project components are predicted to have minimal interaction with fish species and are not anticipated to result in significant cumulative adverse effects to marine fish species. The main cumulative impact on fish population is the fishing activities that potentially occur at the same time as the seismic exploration. Fish and shellfish are subject to mortality (direct and indirect) and population (stock) decreases as a result of harvesting in the order of 100s to 100,000s of tons. In some species, harvesting is conducted at unsustainable levels and may affect species that are listed as species-at-risk. NAFO notes that the impact to the main fish stocks by non-fishing activities, such as the oil industry, is minor or unknown.

Research indicates that adverse seismic related effects are largely at a temporary behavioural level effect. Therefore, seismic surveys are not predicted to contribute significant adverse effects to fish and shellfish populations that are cumulative to the removal effects of fishing. In general, any cumulative effect on fish populations would be short-term and localized, therefore not significant to the overall well-being of the fish and shellfish invertebrate species. The proposed Project components are not expected to result in, or contribute to, any significant cumulative impacts on fish species at risk populations.

### 5.1.3 Seabirds

Routine discharges from marine vessels containing petroleum hydrocarbons could cumulatively influence avifauna. Survey vessels used for this Project will comply with discharge regulations established by OWTG and should not significantly add to short-term or long-term effects of oil spillage on marine avifauna.

Overall, there are no cumulative adverse effects from this seismic exploration Project expected to occur on the distribution, abundance, breeding status and general well-being of marine avifauna inside and outside the Study Area.

### 5.1.4 Marine Mammals

In general, because the sounds generated by seismic surveys are transient and do not accumulate in the environment, the most likely cumulative effects will be associated with other concurrent activities (e.g., cargo ships, tankers, petroleum drilling and production activities, other seismic surveys and fishing vessels). The cumulative effect would be short term, intermittent and localized, and therefore, not significant with respect to effects on marine mammal species at risk.

In general, the individual seismic survey vessels activities and noise will constitute a minor contribution to the overall percentage of noise generated by other such sources and space-user conflict, and will be of short duration in local areas. Based on current knowledge, and with the proposed mitigation procedures in place, the proposed Project is not expected to result in, or contribute to, any significant cumulative impacts on marine mammal species at risk.

### 5.1.5 Sea Turtles

The air source array will be shut down if a sea turtle is observed within 500 m of the seismic vessel (500 m from the vessel is more conservative than 500 m from the arrays, as the vessel is moving forward at approximately 4 to 5 knots). A trained Environmental Observer will keep records of marine turtles within visual range, weather permitting. Given the lack of systematic surveys for marine turtles in the Study Area, this opportunity for observation of marine turtles will add to the understanding of their distribution in the area and may provide additional insight into their behavioural response to seismic activities.

### 5.1.6 Sensitive Areas

The EBSAs in and adjacent to the Study Area support habitats for some species at risk as well as species that are not at risk. The threats identified to these EBSAs are considered to result from the proven overfishing and the perceived risk of oil spills from offshore oil production facilities. These seismic programs are not changing preferred habitats within the EBSAs, nor resulting in mass removal of species and their offspring/eggs and or larvae. The Projects will not change the physical or chemical requirements that dictate bird, fish, sea turtle and marine mammal presence, and their ability to reproduce. Major impact producing factors that are relative to marine mammals in the EBSAs under cumulative effects include offshore vessel traffic (i.e., from petroleum exploration production activities, other seismic projects, military activities, commercial shipping traffic, commercial fishing, and commercial fishing traffic) and its associated noise and ship strike potential. Seismic surveys produce repetitive, localized and short term increases in ambient noise levels, with the period between potential exposures ranging from hours to days.

Operators will be cooperating in conducting their seismic programs to minimize spatial and temporal interference. MKI has committed to avoiding the EBSAs before end of July, thus the Project activities are not likely to contribute to significant cumulative adverse effects.

## 5.2 Ocean Resource Users

### 5.2.1 Marine Traffic

Effects from vessel traffic under the cumulative scenario are potentially adverse, but not significant. Seismic survey vessels activities represent a very small portion of total vessel activity on the Grand Banks. Commercial fishing, commercial shipping and ocean study activities also contribute to the cumulative vessel activity level further reducing the relative contribution from seismic surveys. Therefore, the cumulative incremental impact attributed to the Project vessel operations is considered to be negligible.

## 5.2.2 Offshore Petroleum Activity

Table 7: Summary of Petroleum Activities shows 11 other seismic programs, four exploration drilling programs, and one development drilling program to potentially overlap on a temporal basis. The additional seismic related exploration programs have schedules that suggest they may be operational in 2015. Spatial overlap will require close cooperation between operators. MKI has been operating the seismic vessels within the Project Area successfully since 2012 and in each of these years there have been other geophysical programs being acquired by other operators within the same area and time frame. In previous years' information sharing, program planning and good communications were established with the other geophysical operations and these practices will continue. MKI are also aware that, as has been the practice in previous years, prior to conducting seismic operations within 10 km of another simultaneous geophysical operation written simultaneous procedures need to be agreed with other operators and approved by the C-NLOPB. MKI as the operator of both 2D and 3D seismic surveys within the project area will plan accordingly to avoid the need for simultaneous operations procedures to be necessary between concurrent MKI operations.

## 5.2.3 Commercial Fisheries

Cumulative effects on commercial fisheries are related to space-use conflicts and noise associated with other users of the offshore resources. Seismic vessels activities are a minor component of total marine transportation. The additional vessel activity from the survey is negligible compared to the other vessels and thus, cumulative effects on fishing by vessel presence are not anticipated to be significant.

In general, the sounds generated by seismic surveys are intermittent and non-stationary, the most likely cumulative effects will be associated with other concurrent activities (e.g., cargo ships, tankers, oil and gas exploration and production activities, other seismic surveys, fishing vessels). The cumulative effect is expected to be short term, intermittent and localized, and therefore, not significant to the success of commercial fisheries.

There is considerable effort from stakeholders to discuss temporal and spatial surveys related to their activities in order to minimize space conflicts and effects to each other's activities. In the event of another seismic survey being conducted in the vicinity, within the proposed timeframe, a significant distance between surveys will be necessary to prevent both operational conflict and acoustical interference. This will reduce or eliminate the likelihood that the sound levels from two surveys will be additive in a particular area, and reduce the potential for cumulative effects on fishing activities.

In general, the seismic survey vessels activities and noise will constitute a minor incremental contribution to the overall noise generated by other such sources and space-user conflict, and will be of short duration in local areas. Based on current knowledge, and with the proposed mitigation procedures in place, the proposed Project is not expected to result in or contribute to any significant cumulative effects on commercial fisheries.

## 6 Effects Assessment of Project Activities

The potential effects of the MKI seismic surveys were assessed in the EA report and 3D Amendment, which concluded that the vessel presence, noise emissions, and accidental events associated with the proposed seismic surveys are not predicted to result in significant adverse environmental effects on fish and shellfish, marine and migratory birds, marine mammals, sea turtles, species-at-risk, sensitive areas, or fisheries in the Northeast Newfoundland Slope Study Area following mitigation (Table 9). Ecological processes are not expected to be disturbed beyond the range of natural variability, and ecosystem structure and function should not be critically affected. All effects were concluded to be reversible, of limited duration, limited magnitude, and limited geographic extent.

**Table 9: VEC – Specific Mitigation Measures and Follow-Up**

VEC	Mitigation Measures	Follow-Up
Marine Mammals, Sea Turtles, Species at Risk	<p>Environmental Observers will be present throughout the duration of the survey and will record sightings of marine mammals, seabirds and sea turtles on a daily basis.</p> <p>The Statement of Canadian Practice with Respect to Mitigation of Seismic Sound in the Marine Environment will be adhere to, including:.</p> <p>A 30 minute ramp-up procedure will be undertaken. Ramping up will be delayed if a marine mammal at risk or sea turtle is observed in the 500 m safety zone.</p> <p>The air source will be shut down or reduced to a smaller source while the vessel is doing turns between survey lines.</p> <p>The Environmental Observers will ensure the delay or shut down of seismic operations if SARA Schedule 1 listed endangered or threatened whales are present within 500 m.</p> <p>Any re-start of the source array will follow the ramping up procedure.</p> <p>The vessel will maintain a steady course and speed, and use existing travel routes, where possible.</p> <p>Compliance with the vessel’s Waste Management Plan, <i>Canada Shipping Act</i> and MARPOL for all discharges will be ensured.</p> <p>A turtle guard will be attached to tail buoy of streamers</p>	<p>Sighting data for seabirds, marine mammals, and sea turtles will be summarized in the Environmental Report provided to C-NLOPB, DFO and EC.</p> <p>The operator provides a final report to CWS, based on their Bird Handling Permit empowered by the Migratory Birds Convention Act</p> <p>Report all safety and unauthorized discharges or spills in accordance with the Incident Reporting and Investigation Guidelines (2012)</p>

VEC	Mitigation Measures	Follow-Up
Marine Birds	Light direction and level controls Shielded deck lighting Strobes fixed on towed equipment Low intensity lighting Dark Ship operations at night	Environmental Observers will be present throughout the duration of the survey and they will record sightings of seabirds on a daily basis. Stranding information for birds on the vessel will be summarized in an Environmental Observations Report which will be provided to C-NLOPB, DFO and EC. The operator provides a final report to CWS, based on their Bird Handling Permit empowered by the Migratory Birds Convention Act
Sensitive Areas	Operations will not take place within the Southeast Shoal; and Tail EBSA until after July.	
Ocean Resource Users	Before the start of operations, a meeting will be held between fisher organizations and MKI representatives to review sail lines, scheduling, anticipated fishing vessels and gear types, mitigating measures, expectations of all parties and Emergency Response Plans.  The Fisheries Liaison Officer (FLO) will be onboard the seismic vessel to monitor fishing activity and serve as a liaison between the fishing and seismic vessels; Communication mechanisms will be developed with the fishing industry and DFO research surveys.  A Notice to Mariners, a Notice to Shipping and notification on the CBC Fisheries Broadcast on the location and scheduling of seismic activities will be issued.  MKI will comply with C-NLOPB’s compensation guidelines.	FLO reporting is summarized in the Final Environmental Report provided to the C-NLOPB each year after operations have concluded.

## 6.1 Summary of 2014 Environmental Report

MKI submitted the 2014 Environmental Report which included an FLO summary and weekly FLO reporting to the C-NLOPB which described all encounters with vessels and gear. The report described

the marine mammal observation, seabird observations, fisheries liaison officer communications with commercial vessels for the 2014 survey program and also all mitigation and compliance actions taken.

### 6.1.1 FLO Observations

The *M/V Sanco Spirit* encountered 10 fishing vessels transiting through the area and had one reported incident of seismic equipment entanglement with fishing debris. MKI experienced restricted access to certain acquisition lines in the south west of the survey as a result of the annual DFO post-season snow crab survey.

### 6.1.2 Seabird and Migratory Bird Observations

A total of 31 Leach's Storm-Petrels were found stranded on the vessel over the survey period. Twenty-six of the birds were in good condition and released soon after recovery. All of the released birds appeared in good shape and were expected to live. The remaining five Leach's Storm-petrels were found dead and were disposed of at sea through incineration. Of the 1,131 Leach's Storm-petrels enumerated by the Environmental Observers during the daylight hours in the area of the vessel, 0.4% were stranded and died. This number is likely very conservative as it does not include bird presence at night. Four small terrestrial birds were found dead on the vessel. These small numbers of birds affected by the vessel presence are adverse effects, but not significant to the populations as defined in the EA significance criteria. Ivory Gulls were not observed during the survey.

### 6.1.3 Marine Mammal Observations

When the array was active, a total of 2,100 marine mammals were observed. When the air source array was not active, a total of 621 marine mammals were observed. Based on sighting rate, about 61% of the marine mammals identified to species were observed more frequently during the periods when the air source array was active and included: blue whale, fin whale, sei whale, minke whale, killer whale, long-fin pilot whale, harp seal and white-sided dolphin.

Based on the sighting rate, about 30% of the marine mammals identified to species were observed less frequently while the air source array was active and included humpback whale, sperm whale, harbour porpoise and Atlantic white-sided dolphin. The sighting rates for northern bottlenose whale was the same under both conditions. Schedule 1 listed species at risk and none-listed species appeared not to be significantly adversely affected by the air source array, in keeping with the significance rating criteria and as predicted in the EA report.

### 6.1.4 Commercial and Research Fisheries

Weekly meetings were held between MKI representatives and the fishery representatives (FFAW and OCI). Additional contacts with local fishers groups were made by the shore-based Manager. Updates of the operations were submitted to Canning and Pitt Ltd., which was the Single Point of Contact (SPOC) for

the vessel and liaison with the fishing communities. The vessel information was distributed at noon and midnight every day and included: vessel position, heading, and estimated position at the end of each 12 hour period. Daily and weekly reports from the onboard FLO were submitted to MKI and FFAW.

In summary, there were no observed significant adverse effects on any VECs, no compensation claims made for gear damage or loss, and no spills were reported. The effects assessment remains consistent with the predictions in the EA report. In conclusion, the residual effects summaries of the EA and addendum reports remain valid.

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- Amendment to the MKI NE NL Slope Seismic Survey EA, (RPS Energy Canada February 13, 2015 & March 23, 2015) and Multi Klient Invest's (MKI's) March 23 and April 14, 2015 response to review comments.
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- DFO. 2007. Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment.
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- NAFO (Northwest Atlantic Fisheries Organization). 2013a. Report of the Fisheries Commission Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems. 23-25 April 2013. NAFO/FC Doc 13/3. Serial No. N6148.
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- YOLO Environmental Inc. 2012. Environmental assessment Northeast Newfoundland Slope 2-D Seismic Survey Programme. Report prepared for RPS Energy Group on behalf of Multi Klient Invest AS.



# Appendix A Consultation Report

## INTRODUCTION

MKI received approval from the C-NLOPB for a 2D multi-year seismic survey offshore Newfoundland and Labrador in 2012. MKI is proposing to return to the Northeast Newfoundland Slope survey in late May of 2015. It is anticipated that the *M/V Sanco Spirit or an equivalent PGS Vessel* will arrive in Newfoundland late May 2015. The 2D program will be well within the previously assessed Study Area, defined in the multi-year Environmental Assessment. Additionally MKI is in the process of filing an Amendment with the C-NLOPB to collect 3D data within the assessed area. For the 2015 survey, an additional vessel will be brought to Newfoundland to collect 3D data. The vessel will be one of the PGS owned Ramform class vessels. It is expected to arrive in Newfoundland in the later part of May 2015, and to commence operations upon approval from the C-NLOPB.

## CONSULTATIONS

In preparation to provide the C-NLOPB with an update on the existing 2D multi-year Environmental Assessment and the 3D Amendment, MKI representatives travelled to Newfoundland to begin the consultations with stakeholders. The MKI representatives included Jerry Witney, Neil Paddy (Petroleum Geo-Services), Darlene Davis (RPS Energy) and Sue Belford (Keel HSE Management Inc.).

**Table 1 – Stakeholder Meeting Schedule**

Date	Time	Stakeholder	Attendees
Dec 16 <sup>th</sup>	11:00 am-12:30pm	FFAW / Unifor FFAW / Unifor One Ocean	Mr. Johan Joensen Ms. Robynn Saunders Ms. Maureen Murphy (Absent)
Dec 16 <sup>th</sup>	1:30 pm-2:30 pm	Ocean Choice Int'l Newfound Resource	Mr. Rick Ellis Mr. Joel Hickey
Dec 16 <sup>th</sup>	3:30pm– 4:30pm	Department of Fisheries & Oceans	Mr. Earl Dawe Mr. Darrell Mallowney

**MEETING MINUTES**

**Fish Food & Allied Workers Union (FFAW/Unifor)**

**1368 Topsail Road**

**St. John's, NF**

Date: December 16, 2014

Time: 11:00 a.m. to 12:30 p.m.

Attendance:

- |                    |   |
|--------------------|---|
| 1) Jerry Witney    | MKI Representative / Petroleum Geo-Services (PGS) |
| 2) Darlene Davis   | MKI Representative/ RPS Energy Canada Ltd. (RPS)  |
| 3) Neil Paddy      | MKI Representative/Petroleum Geo-Services (PGS)   |
| 4) Robynn Saunders | FFAW  |
| 5) Johan Joensen   | FFAW  |
| 6) Maureen Murphy  | One Ocean (Absent)                                |
| 7) Sue Belford     | Keel HSE Management Inc.                          |

The meeting opened with brief introductions.

MKI representative (JW) gave a presentation that outlined the multi year program (EA 2012-2017) which is a six year program. MKI is the Operator, has a cooperation agreement with TGS, and as a reminder MKI is a subsidiary of PGS. The program is funded by MKI and TGS. Data is licensed to interested companies.

MKI (JW) explained that Nalcor has a vested interest in the project as a pre-committing company. Pre-funding allows Nalcor to work with PGS on the design of the survey lines, etc., like any other company that has pre-commits to license the data ahead of acquisition.

MKI (JW) explained that the company has been active for three seasons, 2012, 2013 and 2014 utilizing the 2D vessel M/V Sanco Spirit on the Northeast Newfoundland Slope. It is MKI's intention to return in late May 2015 to resume the multi year program with the same vessel M/V Sanco Spirit, and MKI is currently working on an EA update and an amendment to the program for 2015.

MKI (JW) shared data collection details on three (3) current surveys.

**North East Newfoundland Slope (Orphan Basin and Flemish Pass Basin)**

2012 & 2013	22,489 km data acquired and processed
2014	21,750 km data acquired, to be processed

**Labrador Sea**

2011, 2012 & 2013      25,350 km data acquired and processed

2014                      4,618 km data acquired, to be processed

**Southern Grand Banks**

2014                      10,522 km data acquired, to be processed

MKI (JW) reviewed the reporting structure relating to the fishing community used in the previous years, and FFAW concurred that good communications have been maintained in the past years with the fishery. Communication with FFAW and One Ocean have entailed:

- Twice daily vessel position and status information sent to stakeholders;
- Weekly communications meetings held between MKI, FFAW and Ocean Choice to review look ahead acquisition plan; and
- Updates of the operations were submitted to Single Point of Contact (SPOC) for the vessel and liaison with the fishing communities.

MKI (JW) reported that there were no incidents with fishing vessels during 2014 survey operations.

- The fisheries liaison officers' (FLOs'), supplied by the Fish, Food and Allied Workers, reports show that the M/V Sanco Spirit vessel encountered 9 fishing vessels on 6 separate days during the season.
- Drifting fishing debris was snagged on a source array door on August 10th and reported to the C-NLOPB.
- Other seismic operations (Statoil, EMGS) outside the 200 nm limit did have a number of encounters and incidents with foreign fishing vessels.

MKI (JW) noted that the seismic survey experienced restricted access to certain lines due to the DFO end of season crab survey, and this resulted in some incomplete survey lines.

MKI (JW) explained that the C-NLOPB Land Tenure system is driving seismic exploration. MKI's 2014 seismic survey was focused over new Sectors for future Call for Bids announced last December: NL01-EN and NL01-LS. Nominations are now closed to subdivide the NL01-EN Sector into 9 Parcels each around 2,000 sq km. Nominations are also closed for the NL14-01EN Areas of Interest (AOI) to be announced March 15; the Call for Bids for this AOI will take place in December 2016. Another call for an AOI will be introduced for Labrador South in 2015.

MKI (JW) intends to collect further 2D seismic in the area in 2015 and complete the lines not acquired in 2014. NL14-01 should be announced March/April 2015. MKI potentially will infill the existing 10 X 10 km grid over this area, and potential extend the 10 x 10 km grid in the Project Area.

Additionally MKI is planning to conduct a 3D Multi Client Survey. The exact location is under review at

this time. Other prospective areas are based on initial interpretation of previously acquired 2D seismic, and industry interest and feedback. All data collection will be within the Study Area.

(JW) The vessel for the 3D survey will be one of the PGS Ramform-class vessels.



MKI discussed to its knowledge other activity the area and FFAW added its input into what the fishing Industry expects in 2015.

Seismic projects expected to occur in 2015:

- Statoil: 3D over EL blocks
- ExxonMobil: 3D over Hibernia

EMGS: EM program continuation in the Flemish Pass Basin

GXT: 2D Grand Span – possibly using two survey vessels

Suncor/ExxonMobil: Potential 3D over NL13-01

- Husky : Unsure at this time with their intentions

Drilling projects:

- Statoil : Continued Flemish Pass exploration program
- Other operators: Jeanne d’Arc Basin activity

FFAW provided information on a two vessel cable laying project (Hibernia Express) between New Jersey to Halifax, to Cape Race commencing April 1, followed by a leg to Ireland. TE Subcom is tasked with the trans- Atlantic cable installation on behalf of Hibernia Networks.

(JW) In summary to the meeting MKI will return to NE Newfoundland Slope in 2015

- Planning for both 2D and 3D seismic acquisition
- Decision will be based upon; Location of NL14-01, Various Business Drivers, other Land Tenure Announcements
- Expected that M/V Sanco Spirit and a “V Class” Ramform vessel will commence on NE Newfoundland Slope Survey late May 2015

Upon arrival, MKI will:

- Continue weekly communication meetings with FFAW, OCI and others
- Continue with avoidance of fixed gear and actively heavily fished areas
- Establish and circulate weekly acquisition plan

As in previous seasons, the following measures will be in place:

- Support vessels
- FLO present on seismic vessels
- Twice daily broadcast of seismic vessel position and status
- MMO’s present on seismic vessels
- Inuit observers/Inuit MMO on board support vessel and seismic vessel

(JW) MKI has a shore manager stationed in St. John’s for the duration of the project, and he is always available for assistance.

(SB) shared information and discussion on shrimp, snow crab and turbot fisheries.

(RS) Comment: The shrimp landings is decreasing in the south. Shrimp are moving north.

(FFAW) Comment: There will be no shrimp fishing in Div. 3L in 2015. Fishing operations are more north. They are losing their quota in Div. 3L including the area called the shrimp triangle. They await allocation from the DFO Ottawa in March/April. 200-400 m water depth is where they usually catch shrimp in Div. 3L.

(RS) Comment: There is an increase in groundfish fishing, as fish are moving from the Gulf of Maine

seeking cooler water masses. Groundfish activity will be increasing in Div. 3L and Div. 3K – “the Bonavista Corridor” for cod.

(FFAW) Comment: the 2014 snow crab season was a really good year in Div. 3L. Water temperatures at the bottom were really cold. Hydrographic studies of Div. 3L, Div. 3N and Div. 3O show that they are colder on the bottom than Div. 3K. The Grand Banks Div. 3L and Div. 3D are also shallower than Div. 3K. Terminally moulted crab is a smaller size and will not be allowed in the fishery.

(FFAW)Comment: We are losing shrimp in Div. 3L but crab is good. We are losing crab in Div. 3K but good on shrimp.

(FFAW) Comment: They prefer to see old data used; it is pertinent that an EA is informed by the species in the past for context mapping spatial distribution.

(FFAW) Comment: Turbot fishermen had a good year. Turbot is Greenland halibut, haddock is a by-catch in Newfoundland.

(FFAW) Comment: For any foreign vessel that does not respond to attempted radio communication, FFAW wants operators to try to get vessel name to report to the Federal Agencies. They want to look into this issue. All FLO’s will be asked to deliver more detail regardless if the vessel is inside or outside Canadian limits but within the NAFO regulated boundaries

(NP) MKI shared its policies on appropriate training for FLO’s to work on their projects.

(FFAW) and (NP) discussed FLO availability for 2015, given the number of vessels and projects.

(JW) and (FFAW) agreed that future meetings would take place when MKI had more details to share on its 2D and 3D acquisition maps for discussion on the 2015 season

Meeting adjourned.

**MEETING MINUTES**

**Ocean Choice and Newfound Resources**

**1315 Topsail Road**

**St. John’s, NF**

Date: December 16, 2014

Time: 11:00 a.m. to 12:30 p.m.

Attendance:

- 1) Jerry Witney           MKI Representative / Petroleum Geo-Services (PGS)
- 2) Darlene Davis        MKI Representative/ RPS Energy Canada Ltd. (RPS)
- 3) Neil Paddy            MKI Representative/Petroleum Geo-Services (PGS)
- 4) Sue Belford           Keel HSE Management Inc.
- 5) Joel Hicks             Newfound Resources Ltd.
- 6) Rick Ellis             Ocean Choice International

The meeting opened with brief introductions.

An MKI representative (JW) gave a presentation that outlined the multi year program (EA 2012-2017) which is a six year program. MKI is the Operator, has a cooperation agreement with TGS, and as a reminder MKI is a subsidiary of PGS. The program is funded by MKI and TGS.

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MKI (JW) explained that Nalcor has a vested interest in the project as a pre-committing company. Pre-funding allows Nalcor to work with PGS on the design of the survey lines, etc., like any other company that has pre-commits to license the data ahead of acquisition.

(JW) MKI has been active for three seasons, 2012, 2013 and 2014 in the Northeast Newfoundland Slope. It is MKI's intention to return this 2015 season on June 1<sup>st</sup> to resume the multi year program with the same vessel Sanco Spirit or suitable vessel, and MKI is currently working on an EA update and 3D Amendment to the program for 2015.

(JW) MKI shared data collection details on three (3) current surveys:

**North East Newfoundland Slope (Orphan Basin and Flemish Pass Basin)**

- 2012 & 2013            22,489 km data acquired and processed
- 2014                    21,750 km data acquired, to be processed

**Labrador Sea**

- 2011, 2012 & 2013    25,350 km data acquired and processed

2014 4,618 km data acquired, to be processed

#### **Southern Grand Banks**

2014 10,522 km data acquired, to be processed

(JW) Reviewed the reporting structure used in the previous years, and Ocean Choice concurred that good communications have been maintained in the past years with the fishery;

- Twice daily vessel position and status information sent to stakeholders
- Weekly communications meetings held between MKI, FFAW and Ocean Choice to review look ahead acquisition plan
- Updates of the operations were submitted to SPOC for the vessel and liaison with the fishing communities

(JW) Reported no incidents with fishing vessels during 2014 survey operations

- The fisheries liaison officers (FLO's) were supplied by the Fish, Food and Allied Workers
- Reports show that the M/V Sanco Spirit vessel encountered 9 fishing vessels on 6 separate days during the season
- Lost/drifted gear was snagged on source array door on August 10th – reported
- Other seismic operations (Statoil, EMGS) outside the 200 nm limit did have a number of encounters and
- incidents with foreign fishing vessels

(JW) MKI had restricted access to certain lines due to the DFO end of season crab survey, and this resulted in some incomplete survey lines

MKI (JW) explained that the Land Tenure system is driving seismic exploration. The MKI 2014 seismic survey was focused over Sectors for future Call for Bids announced last December: NL01-EN and NL01-LS. Nominations are now closed to subdivide the NL01-EN Sector into 9 Parcels each around 2,000 sq km. Nominations are also closed for the NL14-01EN Area of Interest (AOI) to be announced March 2015; and the Call for Bids for this AOI will take place in December 2016

MKI (JW) indicated that other regions will be introduced in the coming year;

MKI (JW) intends to collect further 2D seismic in the area in 2015 and complete lines not acquired in 2014. NL14-01 should be announced March/April 2015. MKI potentially will infill of existing 10 X 10 km grid over this area, and potential extend the 10 x 10 km grid in the Project Area.

(JW) Additionally MKI is planning to conduct a 3D Multi Client Survey. The exact location is under review at this time. Other prospective areas are based on initial interpretation of previously acquired 2D seismic and Industry interest and feedback. All data collection will be well within the Study Area.

(JW) The vessel for the 3D survey will be one of the PGS Ramform-class vessels.

(JW and OCI) MKI discussed to its knowledge other activity the area and OCI added its input into what Industry expects in 2015;

#### Seismic

Statoil: 3D over EL blocks

ExxonMobil: 3D over Hibernia

EMGS: EM program continuation in the Flemish Pass Basin

GXT: 2D Grand Span

Suncor/ExxonMobil: Potential 3D over NL13-01

Husky: Unsure at this time with their intentions

#### Drilling

Statoil: Continued Flemish Pass exploration program

Other operators: Jeanne d'Arc Basin activity

(JW) In summary to the meeting MKI will return to NE Newfoundland Slope in 2015

- Planning for both 2D and 3D seismic acquisition
- Decision will be based upon; Location of NL14-01, Various Business Drivers, other Land Tenure Announcements
- Expected that the M/V Sanco Spirit and a "V Class" Ramform will commence on NE Newfoundland Slope Survey late May 2015

Upon Arrival, MKI will:

- Continue weekly communication meetings with FFAW, OCI and others
- Continue with avoidance of fixed gear and actively heavily fished areas
- Establish and circulate weekly acquisition plan established and circulated

As in previous seasons, the following measures will be in place:

- Support vessels
- FLO present on seismic vessels
- Twice daily broadcast of seismic vessel position and status
- MMO's present on seismic vessels
- Inuit observers/Inuit MMO on board support vessel and seismic vessel

(JW) MKI has a shore manager stationed in St. John's for the duration of the project, and he is s always

available for assistance.

(JW) and (OCI) had further discussion as with FFAW with regard to foreign fishing vessels not responding to attempted radio contact.

(OCI) Comment: This is a NAFO regulated area, foreign fishing vessels are not responding. PGS offered to provide OCI with additional information.

(JW) One way communication does not work. No one really seemed to know where these vessels seemed to be.

(OCI) OCI owns 93% of the yellowtail quota. OCI also fishes for plaice, cod, and haddock west of the Grand Banks. Redfish are fished in Div. 3L and not in Div. 3M, and Div. 3N. A new grey sole quota was released by NAFO. Turbot fishing in Div. 2J and Div. 3L was exceptional in 2014. Turbot are fished mostly in May and June in Div. 3L.

(OCI) Comment: Area Div. 3L will be closed for shrimp in 2015. Then it will be re-assessed for 2016. He suspects in his opinion it won't re-open until approximately 2018.

(OCI) Comment: The shrimp catch is decreasing and the cod catch is increasing. Fishers are experiencing a lot of cod by-catch.

(OCI) Comment: Small research produced for DFO on haddock, Div. 2J, Area 6. Quota cuts are expected.

(OCI & SB) Comment: Snow crab remains steady in terms of landings based on 2010-2013 data.

(SB) No data yet available for 2014.

(SB) Comment: It is a struggle to gather effort specific data from DFO.

(MKI) and (OCI) discussion on the brick wall to try and obtain Fisheries Catch Data.

(OCI) Comment: Ground fish behaviour activity needs research sometime in the future as seismic moves forward.

(MKI) One Ocean, CAPP, needs the involvement of the IAGC (seismic) to try and have a meaningful research program. MKI can check with Houston Environmental Manager whom is a member of the IAGC on any discussions with regards to future research.

(NP) Comment: MKI may have a presentation on an accumulation of everything it knows regarding seismic source and the fishing industry. I will look into this.

(OCI) Comment: Georges Bank has an abundant amount of small scallops in the deep water. Fishing is changing and we can't explain it

(JW) and (OCI) agreed that future meetings would take place when MKI had more details to share on their 2D and 3D acquisition maps for discussion for the 2015 season.

Meeting adjourned.

**MEETING MINUTES**

**Department of Fisheries and Ocean**

**St. John's, NF**

Date: December 16, 2014

Time: 3:30 p.m. - 4:30pm

Attendance:

- 1) Jerry Witney                      MKI Representative / Petroleum Geo-Services (PGS)
- 2) Darlene Davis                    MKI Representative/ RPS Energy Canada Ltd. (RPS)
- 3) Neil Paddy                        MKI Representative/Petroleum Geo-Services (PGS)
- 4) Sue Belford                        Keel HSE Management Inc.
- 5) Earle Dawe                        Department of Fisheries and Oceans
- 6) Darrell Mallowney                Department of Fisheries and Oceans

The meeting opened with brief introductions.

MKI representative (JW) gave a presentation that outlined the multi year program (EA 2012-2017) which is a six year program. MKI is the Operator, has a cooperation agreement with TGS, and as a reminder MKI is a subsidiary of PGS. The program is funded by MKI and TGS.

Data is licensed to interested companies.

MKI (JW) explained that Nalcor has a vested interest in the project as a pre-committing company. Pre-funding allows Nalcor to work with PGS on the design of the survey lines, etc., like any other company that has pre-commits to license the data ahead of acquisition.

(JW) MKI has been active for three seasons, 2012, 2013 and 2014 in the Northeast Newfoundland Slope. It is MKI intention to return this season in late May 2015 to resume the multi year program with the same vessel M/V Sanco Spirit or suitable vessel, and MKI is currently working on an EA update and 3D Amendment to the program for 2015.

(JW) MKI shared data collection details on three (3) current surveys.

**North East Newfoundland Slope (Orphan Basin and Flemish Pass Basin)**

- 2012 & 2013                      22,489 km data acquired and processed
- 2014                                21,750 km data acquired, to be processed

**Labrador Sea**

- 2011, 2012 & 2013                25,350 km data acquired and processed
- 2014                                4,618 km data acquired, to be processed

### Southern Grand Banks

2014 10,522 km data acquired, to be processed

(JW) Reviewed the reporting structure used in the previous years, and indicated that FFAW has concurred that good communications have been maintained in the past years with the fishery. Communications had included:

- Twice daily vessel position and status information sent to stakeholders
- Weekly communications meetings held between MKI, FFAW and Ocean Choice to review look ahead acquisition plan
- Updates of the operations were submitted to SPOC for the vessel and liaison with the fishing communities

MKI (JW) reported no incidents with fishing vessels during 2014 survey operations

- The fisheries liaison officers (FLO's) were supplied by the Fish, Food and Allied Workers
- Reports show that the M/V Sanco Spirit vessel encountered 9 fishing vessels on 6 separate days during the season
- Lost/drifted gear was snagged on source array door on August 10th – Reported
- Other seismic operations (Statoil, EMGS) outside the 200 nm limit did have a number of encounters and incidents with foreign fishing vessels

(JW) MKI noted that it had restricted access to certain lines due to the DFO end of season crab survey, and that this had resulted in some incomplete lines

(JW) explained that the Land Tenure system is driving seismic exploration. MKI's 2014 seismic survey was focused over Sectors for future Call for Bids announced last December: NL01-EN and NL01-LS, Nominations are now closed to subdivide the NL01-EN Sector into 9 Parcels each around 2,000 sq km. Nominations are also closed for the NL14-01EN Area of Interest (AOI) to be announced March 2015. The Call for Bids for this AOI will take place in December 2016.

(JW) other Regions will be introduced in the coming year.

(JW) MKI intends to collect further 2D seismic in the area in 2015 and complete lines not acquired in 2014. NL14-01 should be announced March/April 2015. MKI potentially will infill the existing 10 X 10 km grid over this area, and potential extend the 10 x 10 km grid in the Project Area.

(JW) Additionally MKI is planning to conduct a 3D Multi Client Survey. The exact location is under review at this time. Other prospective areas are based on initial interpretation of previously acquired 2D seismic and Industry interest and feedback. All data collection will be well within the Study Area.

(JW) The vessel for the 3D survey will be one of the PGS Ramform class vessels.

(JW) MKI discussed to its knowledge other activity in the area and what Industry expects in 2015.

#### Seismic

Statoil: 3D over EL blocks

ExxonMobil: 3D over Hibernia

EMGS: EM program continuation in the Flemish Pass Basin

GXT: 2D Grand Span

Suncor/ExxonMobil: Potential 3D over NL13-01

Husky: Unsure at this time with their intentions

#### Drilling

Statoil: Continued Flemish Pass exploration program

Other operators: Jeanne d 'Arc Basin activity

(SB) shared information and discussion on shrimp, snow crab and turbot landings.

(JW) In summary to the meeting indicated that MKI will return to NE Newfoundland Slope in 2015.

MKI is planning for both 2D and 3D seismic acquisition.

Decisions will be based upon; location of NL14-01, various business drivers, and other Land Tenure Announcements.

It is expected that the M/V Sanco Spirit, (or suitable vessel) and a "V Class" Ramform will commence work on the NE Newfoundland Slope Survey in late May 2015

Upon arrival in St. John's, MKI will:

- Continue weekly communication meetings with FFAW & OCI
- Continue with avoidance of fixed gear and actively heavily fished areas
- Establish and circulate weekly acquisition plan

#### As in previous seasons:

- Support vessels
- FLO present on seismic vessels
- Twice daily broadcast of seismic vessel position and status
- MMO's present on seismic vessels

- Inuit observers/Inuit MMO on board support vessel and seismic vessel

(JW) MKI has a shore manager stationed in St. John's for the duration of the project, and he is s always available for assistance.

(DFO) Comment; DFO is definitely of the opinion that the shrimp are shifting north.

(SB) Comment: We have been attempting to get DFO data to show where the effort is by month and volume of landings.

(DFO)Comment: Data requests are sent to management to obtain the data creates a tremendous amount of work. It takes DFO quite some time to put this together. DFO 2014 data may be completed by February 2015. To obtain fishing effort distribution information, you need to go to specific individuals and several individuals work on this. Commercial fishery data can only come from formal request and this can take some time. DFO needs to key in manually all data and based on staffing and the nature of the data this can be very time consuming.

(DFO) Comment: Div. 3L quotas have not changed much. May and June are prime time for crab and DFO appreciates that PGS continues to avoid this time frame.

(MKI) Comment: The snow crab study continues to present difficulty in the collection of survey data in this area.

(DFO) Comment: DFO agreed that there is nothing that can be done.

Meeting adjourned.