Environmental Assessment Update of the EMGS East Canada CSEM Survey, 2014–2018

Prepared by

LGL LIMITED
environmental research associates

for

emgs

25 May 2015
LGL Project No. FA0047

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1.0 Introduction

This document is an Update of the Environmental Assessment (EA) of the Electromagnetic Geoservices Canada Inc. (EMGS) East Canada CSEM Survey, 2014–2018 (LGL 2014a), the associated Addendum (LGL 2014b), and the two associated Amendments (LGL 2014c, 2015). This document addresses the validity of the EA and its Amendments (Table 1.1) as it pertains to EMGS's 2015 proposed CSEM survey. Since the second EA Amendment (LGL 2015) is still undergoing the C-NLOPB review process, review of this EA Update is subject to the outcome of the Amendment review process. The EA Update is intended to assist the C-NLOPB in its regulatory review process by demonstrating that both the scope of the assessment and the mitigation measures to which EMGS previously committed and implemented in 2014 remain technically valid for proposed CSEM survey operations in 2015.

Table 1.1 Active Environmental Assessment Approvals for the EMGS East Canada CSEM Survey, 2014-2018.

Screening Determination Reference	Temporal Scope	EA Document Title
C-NLOPB File No. 56006-020-001	1 May to 30 November, 2014-2018	Environmental Assessment East Canada CSEM Survey, 2014-2018 (LGL 2014a,b)[a]
	1 May to 31 December, 2014	Environmental Assessment East Canada CSEM Survey, 2014-2018 Amendment (LGL 2014c)[b]
	1 May to 31 December, 2015-2018	Environmental Assessment East Canada CSEM Survey, 2014-2018 Amendment No. 2 (LGL 2015)[c]

[a] The C-NLOPB made a positive determination on this EA document on 22 July 2014.
[b] The C-NLOPB made a positive determination on this EA Amendment document on 28 November 2014.
[c] This Amendment document, which includes an assessment of an extended temporal scope and concurrent operations by two CSEM vessels, is currently undergoing the C-NLOPB review process.

The following sections provide the information necessary to confirm the validity of the EA and its associated documents (see Table 1.1). This Update also includes new relevant information not included in the EA and its associated documents.

2.0 Project Description

2.1 VECs and Project Activities Assessed in the EA and its Amendment

The EA of the EMGS East Canada CSEM Survey, 2014-2018 (LGL 2014a) and its associated documents (LGL 2014b,c, 2015) assessed the potential effects of CSEM survey activities within the defined Project Area (Figure 2.1) on the following Valued Environmental Components (VECs):

- Fish and fish habitat;
- Fisheries;
- Seabirds;
- Marine mammals and sea turtles;
- Species at risk; and
- Sensitive areas.

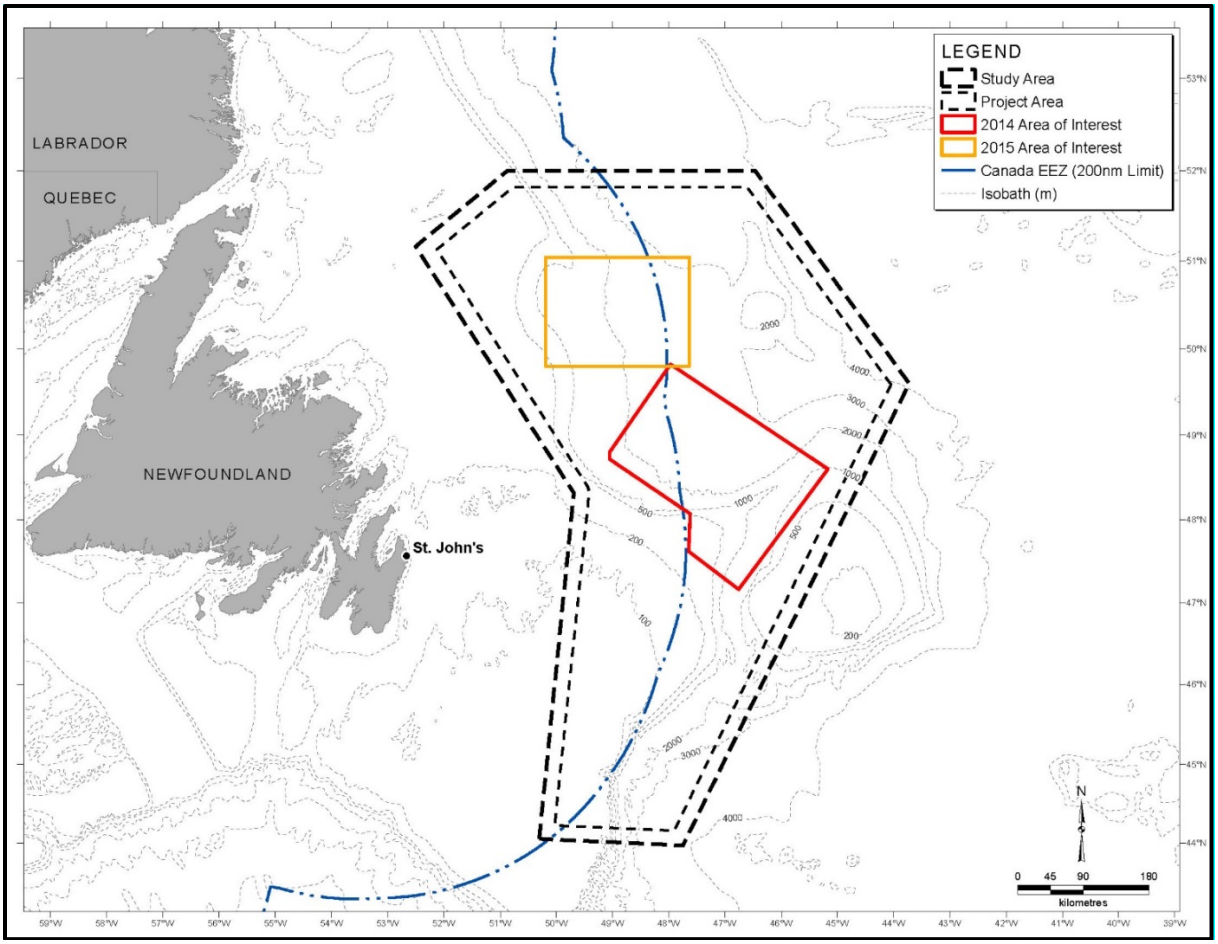


Figure 2.1 Locations of the Project Area, Study Area, 2014 Area of Interest and 2015 Area of Interest for the EMGS East Canada CSEM Survey, 2014 to 2018.

2.2 Vessels and Equipment

As described and assessed in the most recent Amendment to the EMGS EA (LGL 2015), there is potential for two CSEM survey vessels operating concurrently during surveys conducted in 2015-2018. Two scenarios are possible with respect to two CSEM vessels working concurrently.

1. The two vessels work together in that one deploys and recovers the receiver packages, while the other tows the source and acquires data; and
2. Each of the two vessels will operate autonomously in different parts of the Project Area.

For the second scenario, the two vessels will have sufficient separation to ensure that the source signal from one does not affect the data being collected by the other vessel. However, note that the use of two vessels concurrently is a possibility, not a certainty. In addition to the CSEM survey vessel(s), one support vessel will also be required during operations. It will be a supply vessel responsible for re-supply, refuelling and personnel transfer.

The CSEM survey equipment, including the CSEM source, streamer and receiver packages, is described in Section 2.0 of the original EA (LGL 2014a). The same equipment will be used during 2015 operations.

2.3 Spatial Scope

The Project and Study Areas considered in the EA remain unchanged and are presented in Figure 2.1. All CSEM survey activities will occur within the Project Area. The 2014 Area of Interest (see Figure 2.1) is where surveying operations occurred in 2014 and where EMGS proposes to acquire more data in 2015 to complete that survey. The 2015 Area of Interest is a new survey area within the Project Area where EMGS proposes to acquire CSEM data in 2015 (see Section 2.5 for further details).

2.4 Temporal Scope

The temporal scope indicated in the EA was defined by a 1 May to 30 November period during each year of the 2014 to 2018 period. The first Amendment to the EA (LGL 2014c) extended the temporal scope to 31 December in 2014 only. The second Amendment (LGL 2015) extended the temporal scope to 31 December for the four remaining years (i.e., 2015-2018).

2.5 Geophysical Activities Planned for 2015

In 2015, EMGS is planning to complete the CSEM survey begun in 2014 (see '2014 Area of Interest' in Figure 2.1) and commence a survey in the 2015 Area of Interest (AOI) which is also shown in Figure 2.1.

The estimated time to complete survey activities in the 2014 AOI is 50-55 days. It is most likely that only one vessel will be used to complete the 1,500 km^2 survey in the 2014 AOI. However, depending

on the arrival time of the second vessel, there is the possibility that both vessels would operate concurrently in the 2014 AOI. It is anticipated that about 166 receivers will be deployed in the 2014 AOI.

After completing the survey initiated in 2014, EMGS intends to commence a survey in the northern portion of the Project Area (see '2015 Area of Interest' in Figure 2.1). Survey effort in this AOI will be focused in the north-northwest portion of it. The intended area of survey coverage in the 2015 AOI is approximately 3,400 km^2, with a duration of 50-55 days. About 400 receivers will be deployed during the survey in the 2015 AOI.

As already indicated, as many as two CSEM survey vessels may operate concurrently. Whether or not the two vessels would operate together or separately will depend on the arrival time of the second vessel. Possible CSEM survey vessels for the 2015 exploration activities include the MV *Atlantic Guardian* and the MV *EM Leader*. The CSEM surveying will commence immediately after the proposed 2015 activities receive authorization.

All other project details presented in Section 2.0 of the original EA (LGL 2014a) apply to EMGS CSEM survey activities in 2015.

2.6 Mitigations

Mitigation measures that will be implemented during CSEM surveys have been described in prior documents associated with this program (LGL 2014a,b,c, 2015). Examples of mitigation measures include ramp-up (i.e., soft start) of the CSEM source, the use of qualified, dedicated Marine Mammal Observer(s) (MMOs) to monitor marine mammals and sea turtles and implement shut downs of the surveys when appropriate, and the use of a Fisheries Liaison Officer (FLO) and communication procedures to avoid conflicts with fisheries. Seabird observations will also be conducted by qualified personnel.

3.0 Physical Environment

A summary of the physical environment was provided in Section 3.0 of the EA (LGL 2014a). There is no new and relevant information available on the physical environment in the Study Area.

4.0 Biological Environment

Newly available background information not included in the previous documents associated with this program is included in this section.

4.1 Fish and Fish Habitat

This section includes new information describing the Fish and Fish Habitat VEC that was not included in Section 4.2 of the EMGS EA (LGL 2014a) and it's associated Addendum (LGL 2014b). Additional

information is related to the relationship between planktonic communities and oceanic conditions inclusive of the Study Area. The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and its Amendments (LGL 2014c, 2015).

The Atlantic Zone Monitoring Program (AZMP) was implemented by DFO in 1998 in an attempt to better understand, describe and forecast the state of the marine ecosystem. A critical element of the AZMP is an observation program designed to assess the variability in nutrients, phytoplankton and zooplankton (DFO 2014a). The AZMP findings in relation to oceanographic conditions in the Study Area during 2013 are summarized below.

- Sea-surface temperatures were at record highs in September 2013 on the Grand Banks, and generally above normal during ice-free months across the Atlantic zone. Bottom temperatures were generally above normal across the zone.

- Nitrate inventories in both surface and subsurface waters were below normal on the Newfoundland and Labrador Shelf and Grand Banks.

- Overall abundance of phytoplankton was near the long-term (1999-2010) average throughout much of the Atlantic Zone in 2013. Although chlorophyll anomalies had been below normal across much of the Newfoundland and Labrador Shelf since 2011, they increased slightly on the Grand Banks in 2013.

- High abundance levels of non-copepod zooplankton (e.g., larval stages of benthic invertebrates and carnivores that feed on other zooplankton) were observed on the Newfoundland Shelf and Grand Banks in 2013.

- The abundance levels of zooplankton species *Pseudocalanus* spp. and *Calanus finmarchicus* have demonstrated above normal levels since 2009, including in 2013.

4.2 Fisheries

This section includes updates to the description of the Fisheries VEC in Section 4.3 of the EMGS EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and it's associated Amendments (LGL 2014c, 2015).

4.2.1 Commercial Fisheries

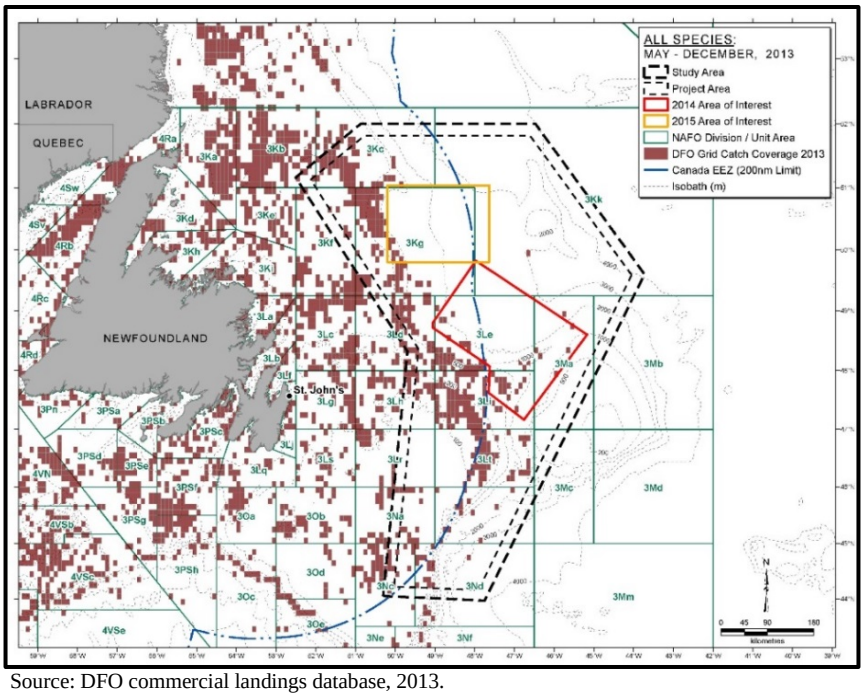
Analysis of the 2013 commercial fisheries landings data did not indicate any major differences in distribution of harvest locations for May–December 2013 (Figures 4.1 to 4.4) compared to the distributions for May-November 2005–2012 (see Figures 4.5 to 4.15 *in* LGL 2014a). Figures 4.1 to 4.4 show the distribution of 2013 harvest locations for all species, snow crab (*Chionoecetes opilio*), northern shrimp (*Pandalus borealis*) and Greenland halibut (*Reinhardtius hippoglossoides)*, respectively. The

majority of harvesting occurred between the 100 and 1,000 m depth contours, with relatively few harvest locations within the 2014 and 2015 Areas of Interest. As in previous years (see Table 4.2 *in* LGL 2014a), snow crab (37% of total catch in the Study Area in terms of total catch weight quartile code counts), northern shrimp (26%) and Greenland halibut (15%) were the most important commercial species in the Study and Project areas in 2013 (Table 4.1). There were no reported catches of cockles (*Serripes groenlandicus*), Icelandic scallops (*Chlamys islandica*) or Atlantic wolfish (*Anarhichas lupus*) in 2013, while there were reported harvests of Atlantic cod (*Gadus morhua*), witch flounder (*Glyptocephalus cynoglossus*) and capelin (*Mallotus villosus*) (see Table 4.1 below and Table 4.2 *in* LGL 2014a). Species harvested in the Project Area, the 2014 Area of Interest and the 2015 Area of Interest, are presented in Tables 4.2 to 4.4, respectively. Greenland halibut was the most important commercial species in the 2014 and 2015 Areas of Interest, representing about half of the total catch in terms of total catch weight quartile code counts.

During May-December 2013, the general distribution of harvest locations for snow crab in the Study Area was consistent with that observed during May-November, 2005 to 2012 (see Figure 4.2 below and Figures 4.8 to 4.9 *in* LGL 2014a). The total allowable catch (TAC) for snow crab in NAFO Divisions 3K and 3LNO has remained somewhat consistent since 2011, although there is a decreasing trend in 3K (from 12,053 mt in 2011 to 7,980 mt in 2014) and increasing trend in 3LNO (from 33,222 mt in 2011 to 35,193 mt in 2014; DFO 2014b).

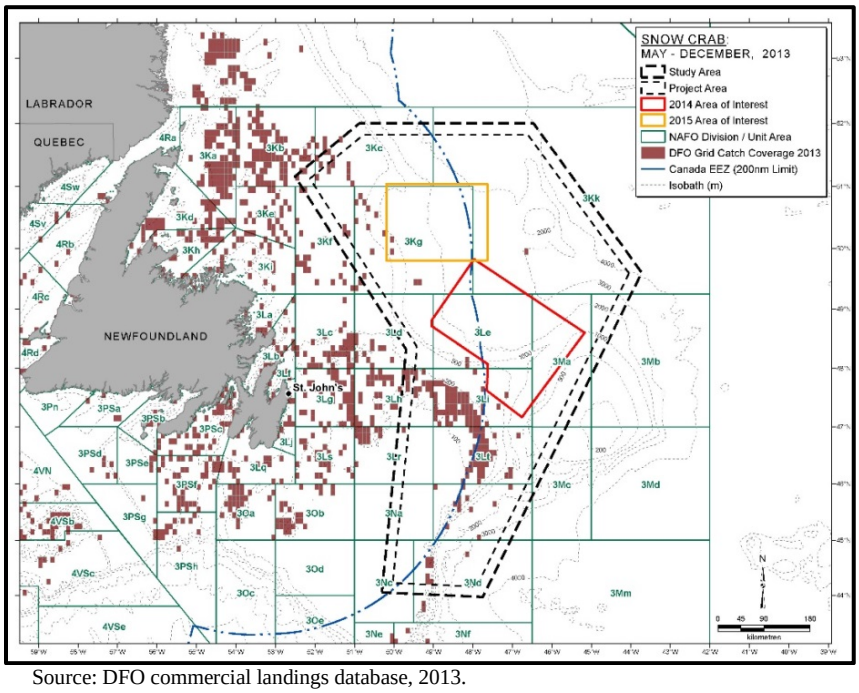
During May–December 2013, the overall distribution of harvest locations for northern shrimp in the Study Area was consistent with that observed during May–November, 2005 to 2012 (see Figure 4.3 below and Figures 4.6 and 4.7 *in* LGL 2014a). In May-December 2013, there were no reported harvests of northern shrimp in the 2015 Area of Interest. Northern shrimp stocks in the region have recently begun to decline, with poor recruitment and drastic declines in shrimp biomass in NAFO Divisions 3M and 3LNO since 2007 (NAFO 2013). There has been a moratorium on the shrimp fishery in Division 3M since 2010 (NAFO 2014), and there will be no shrimp fishery permitted within Division 3L in 2015 (NAFO 2015a). The decrease in shrimp biomass in 3M has been correlated with an increase in the cod stock in that Division; however, it is currently unclear whether this relationship is causal and/or the result of other environmental factors (NAFO 2013). From 2011 to 2014, the TAC set by DFO for northern shrimp in the Study Area (Shrimp Fishing Area (SFA) 6) has shown a generally decreasing trend (from 52,387 mt in 2011 to 48,196 mt in 2014). Similarly, the northern shrimp TAC in SFA 7 has been decreasing since 2011 (from 15,994 mt in 2011 to 7,162 mt as of 2013; TAC for 2014 not available on the DFO website; DFO 2014b).

During May-December 2013, the distribution of harvest locations for Greenland halibut in the Study Area was consistent with that observed during May-November, 2005-2010 (see Figure 4.4 below and Figures 4.10 and 4.11 *in* LGL 2014a), the majority of catches occurring between the 500 m and 1,000 m isobaths. NAFO and DFO manage the harvest for Greenland halibut in NAFO Divisions 3LMNO and 4RST, respectively (DFO 2014b; NAFO 2015b). Between 2011 and 2013, the TAC for Greenland halibut in NAFO Divisions 3LMNO decreased and has since remained relatively constant at ~11,500 mt (e.g., 11,543 mt in 2015; NAFO 2015b).



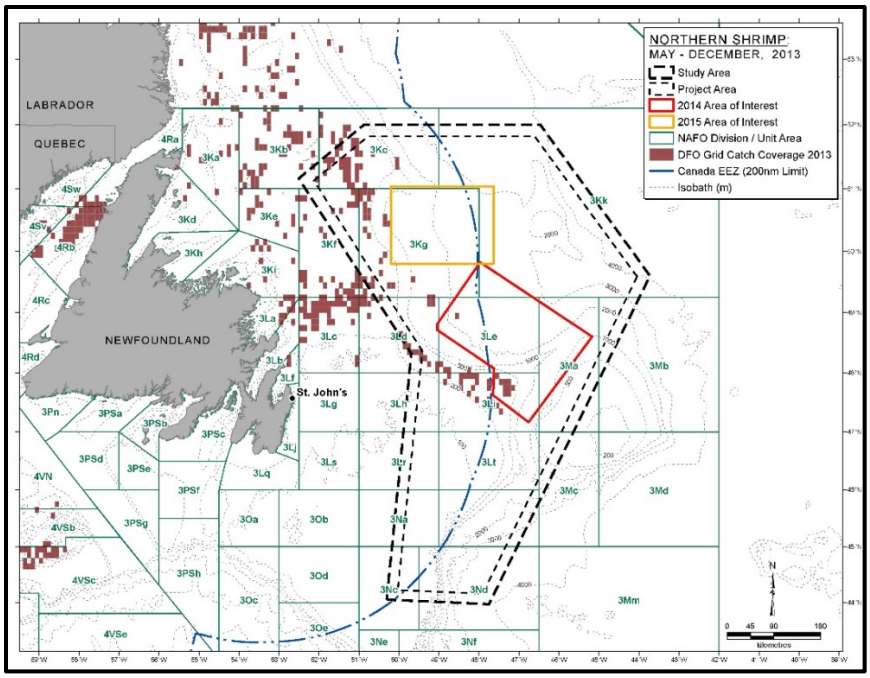
Source: DFO commercial landings database, 2013.

Figure 4.1 Distribution of Commercial Fishery Harvest Locations, All Species, May-December, 2013.



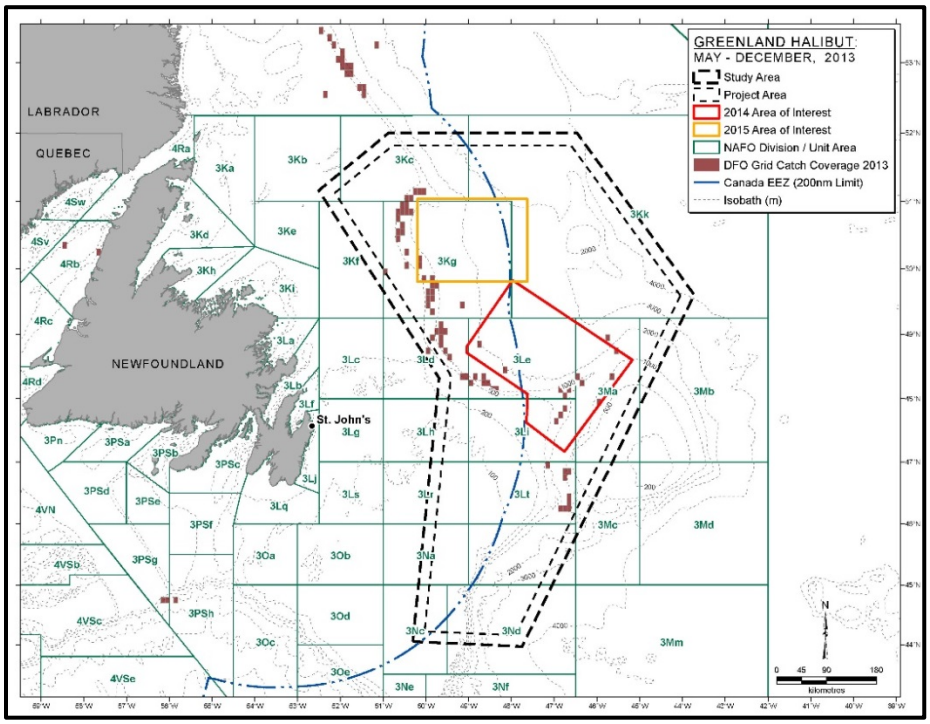
Source: DFO commercial landings database, 2013.

Figure 4.2 Distribution of Commercial Fishery Harvest Locations, Snow Crab, May-December, 2013.



Source: DFO commercial landings database, 2013.

Figure 4.3 Distribution of Commercial Fishery Harvest Locations, Northern Shrimp, May-December, 2013.



Source: DFO commercial landings database, 2013.

Figure 4.4 Distribution of Commercial Fishery Harvest Locations, Greenland Halibut, May-December, 2013.

Table 4.1 Commercial Catch Weights and Values in the Study Area, May–December, 2013 (Values indicate the frequency of catch weight quartile codes [i.e., 1–4] attributed to each species. Gear types and months of effort are also indicated).

Species	Catch Weight Quartile Code Counts [a]				Catch Value Quartile Code Counts [b]				Total Counts [c]	Month Caught	Gear Type	
	1	2	3	4	1	2	3	4			Fixed	Mobile
Snow Crab	39	67	62	17	33	58	57	37	185	May–Aug	Pot	-
Northern Shrimp	76	41	10	0	92	27	8	0	127	May–Oct; Dec	-	Trawl
Greenland Halibut	31	35	9	0	23	42	10	0	75	May–Aug	Gillnet	Trawl
Redfish	12	18	12	2	16	14	12	2	44	May–Nov	Gillnet	Trawl
Atlantic Cod	2	16	9	3	11	9	9	1	30	Jun–Jul; Sep–Nov	Longline	Trawl
American Plaice	3	11	2	1	7	7	3	0	17	May–Jun; Sep–Nov	-	Trawl
Atlantic Halibut	2	4	3	1	3	2	4	1	10	May–Aug	Gillnet; Longline	Trawl
Stimpson's Surf Clam	0	2	0	1	1	1	1	0	3	Dec	-	Dredge
Witch Flounder	2	0	1	0	2	0	1	0	3	May; Jul	Gillnet	Trawl
Capelin	0	1	1	0	2	0	0	0	2	Jul	-	Seine
Yellowtail Flounder	0	1	0	0	1	0	0	0	1	Nov	-	Trawl
Total	**167**	**196**	**109**	**25**	**191**	**160**	**105**	**41**	**497**	**-**	**-**	**-**

Source: DFO commercial landings database, 2013.

[a] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). 2013 quartile ranges: 1 = 0 – 2,565 kg, 2 = 2,566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg.

[b] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch values in a given year, all species combined). 2013 quartile ranges: 1 = $0 – $8,934, 2 = $8,395 – $35,699, 3 = $35,700 – $125,728, 4 = ≥ $125,729.

[c] Total counts of the number of catch records per species; the total quartile code counts for catch weight and catch value are equal.

Table 4.2 Commercial Catch Weights and Values in the Project Area, May–December, 2013 (Values indicate the frequency of catch weight quartile codes [i.e., 1–4] attributed to each species. Gear types and months of effort are also indicated).

Species	Catch Weight Quartile Code Counts [a]				Catch Value Quartile Code Counts [b]				Total Counts [c]	Month Caught	Gear Type	
	1	2	3	4	1	2	3	4			Fixed	Mobile
Snow Crab	32	59	58	16	27	51	51	36	165	May–Aug	Pot	-
Northern Shrimp	66	32	6	0	79	18	7	0	104	May–Oct; Dec	-	Trawl
Greenland Halibut	30	35	9	0	22	42	10	0	74	May–Aug	Gillnet	Trawl
Redfish	10	17	12	2	14	13	12	2	41	May–Nov	Gillnet	Trawl
American Plaice	1	11	2	1	5	7	3	0	15	May–Jun; Oct–Nov	-	Trawl
Atlantic Cod	1	5	5	3	6	3	4	1	14	Jun–Jul; Sep–Nov	-	Trawl
Atlantic Halibut	2	4	3	1	3	2	4	1	10	May–Aug	Gillnet; Longline	Trawl
Stimpson's Surf Clam	0	2	0	1	1	1	1	0	3	Dec	-	Dredge
Witch Flounder	2	0	1	0	2	0	1	0	3	May; Jul	Gillnet	Trawl
Capelin	0	1	1	0	2	0	0	0	2	Jul	-	Seine
Yellowtail Flounder	0	1	0	0	1	0	0	0	1	Nov	-	Trawl
Total	**144**	**167**	**97**	**24**	**162**	**137**	**93**	**40**	**432**	**-**	**-**	**-**

Source: DFO commercial landings database, 2013.

[a] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). 2013 quartile ranges: 1 = 0 – 2,565 kg, 2 = 2,566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg.

[b] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch values in a given year, all species combined). 2013 quartile ranges: 1 = $0 – $8,934, 2 = $8,395 – $35,699, 3 = $35,700 – $125,728, 4 = ≥ $125,729.

[c] Total counts of the number of catch records per species; the total quartile code counts for catch weight and catch value are equal.

Table 4.3 Commercial Catch Weights and Values in the 2014 Area of Interest, May-December, 2013 (Values indicate the frequency of catch weight quartile codes [i.e., 1–4] attributed to each species. Gear types and months of effort are also indicated).

Species	Catch Weight Quartile Code Counts [a]				Catch Value Quartile Code Counts [b]				Total Counts [c]	Month Caught	Gear Type	
	1	2	3	4	1	2	3	4			Fixed	Mobile
Greenland Halibut	11	3	0	0	7	7	0	0	14	May; Jul–Aug	Gillnet	Trawl
Northern Shrimp	4	3	4	0	3	3	5	0	11	Jun; Oct	-	Trawl
Redfish	4	2	0	0	6	0	0	0	6	Jun; Aug; Oct–Nov	Gillnet	Trawl
Snow Crab	1	0	0	0	1	0	0	0	1	May	Pot	-
Atlantic Cod	1	0	0	0	1	0	0	0	1	Sep	-	Trawl
Witch Flounder	1	0	0	0	1	0	0	0	1	May	-	Trawl
Total	**22**	**8**	**4**	**0**	**19**	**10**	**5**	**0**	**34**	-	-	-

Source: DFO commercial landings database, 2013.

[a] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). 2013 quartile ranges: 1 = 0 – 2,565 kg, 2 = 2,566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg.

[b] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch values in a given year, all species combined). 2013 quartile ranges: 1 = $0 – $8,934, 2 = $8,395 – $35,699, 3 = $35,700 – $125,728, 4 = ≥ $125,729.

[c] Total counts of the number of catch records per species; the total quartile code counts for catch weight and catch value are equal.

Table 4.4 Commercial Catch Weights and Values in the 2015 Area of Interest, May-December, 2013 (Values indicate the frequency of catch weight quartile codes [i.e., 1–4] attributed to each species. Gear types and months of effort are also indicated).

Species	Catch Weight Quartile Code Counts [a]				Catch Value Quartile Code Counts [b]				Total Counts [c]	Month Caught	Gear Type	
	1	2	3	4	1	2	3	4			Fixed	Mobile
Greenland Halibut	1	3	0	0	1	2	1	0	4	May–Jul	Gillnet	Trawl
Snow Crab	2	0	0	0	2	0	0	0	2	May	Pot	-
Redfish	0	1	0	0	0	1	0	0	1	May	-	Trawl
Atlantic Halibut	0	0	1	0	0	0	1	0	1	Jun	Gillnet	-
Total	**3**	**4**	**1**	**0**	**3**	**3**	**2**	**0**	**8**	-	-	-

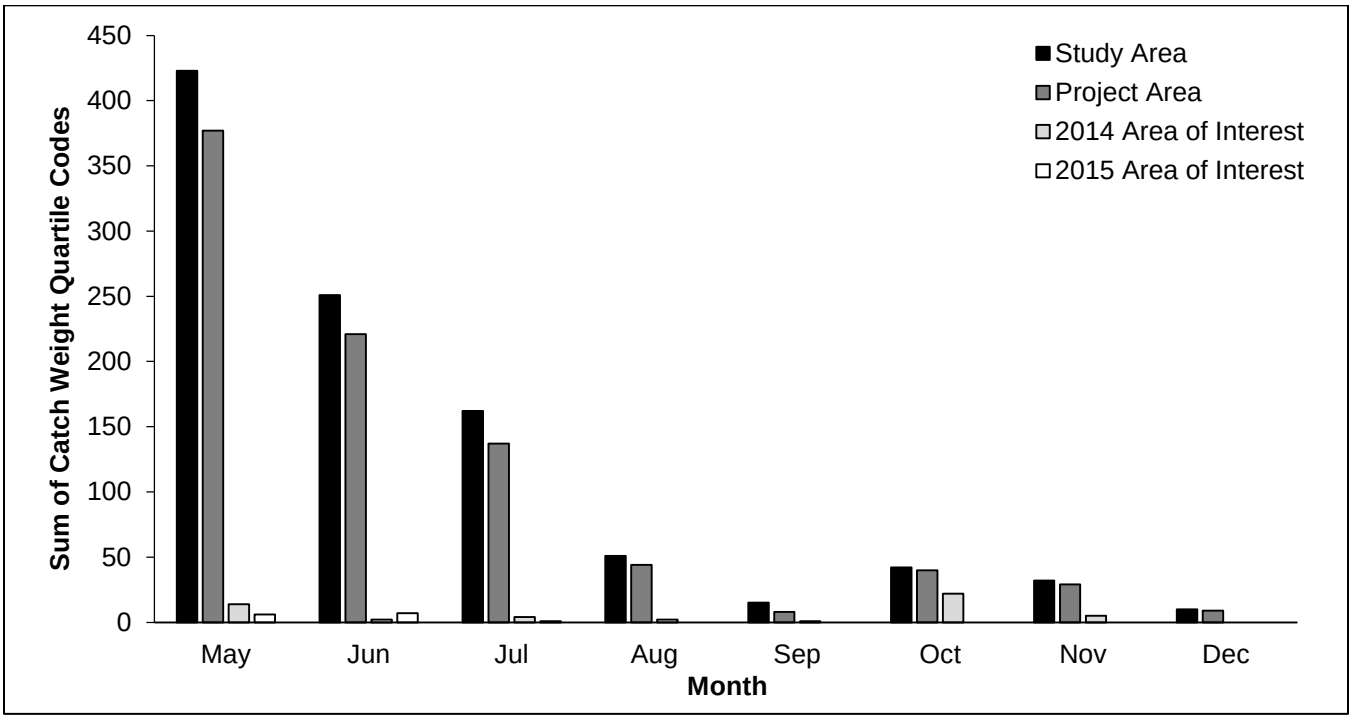
Source: DFO commercial landings database, 2013.

[a] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). 2013 quartile ranges: 1 = 0 – 2,565 kg, 2 = 2,566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg.

[b] Quartile ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch values in a given year, all species combined). 2013 quartile ranges: 1 = $0 – $8,934, 2 = $8,395 – $35,699, 3 = $35,700 – $125,728, 4 = ≥ $125,729.

[c] Total counts of the number of catch records per species; the total quartile code counts for catch weight and catch value are equal.

Similar to previous years, the majority of the 2013 harvest within the Study Area occurred during the May to July/August period, with least harvesting during the fall (see Figure 4.5 below and Figure 4.16 *in* LGL 2014a). There were no reported harvests in either the 2014 Area of Interest in December 2013, or in the 2015 Area of Interest during August to December. Gear types used in the 2013 harvest were typical of those used in the region's commercial fisheries in recent years (see Section 4.3.3.6 *in* LGL 2014a).



Source: DFO commercial landings database, 2013.
Sum of catch weight quartile codes is the summation of quartile codes (i.e., 1–4) for all catch records for all species; the greater the sum of quartile code counts, the greater the catch weight for a given month.

Figure 4.5 Monthly Sums of Catch Weight Quartile Codes in the Study Area, Project Area, 2014 Area of Interest, and 2015 Area of Interest, All Species, May-December, 2013.

4.2.2 Traditional and Aboriginal Fisheries

There is no new information regarding traditional and aboriginal fisheries in the Study Area since the preparation of the EA and publication of the Eastern Newfoundland Strategic Environmental Assessment (SEA) (see Section 4.3.5 *in* LGL 2014a and Section 4.3.4 *in* C-NLOPB 2014). The Nunatsiavut Government holds a Communal Snow Crab licence and allocation within NAFO Divisions 2GHJ; however, its area of allocation is located in waters north of the Study Area (i.e., north of 54º40'N; DFO 2010).

4.2.3 Recreational Fisheries

Recreational fisheries in Newfoundland and Labrador are described in Section 4.3.5 of the EA (LGL 2014a), and Section 4.3.4.4 of the Eastern Newfoundland SEA (C-NLOPB 2014). In 2015, the

recreational groundfish fishery will occur in all NAFO areas around Newfoundland and Labrador, including NAFO Divisions 2GH, 2J3KL, 3Ps, 3Pn and 4R (DFO 2014c). This fishery is largely conducted in coastal and inshore waters (C-NLOPB 2014), and will be open for three weeks in the summer beginning on 18 July 2015, and for nine days in the fall beginning on 19 September 2015 (dates are subject to change; DFO 2014c).

As in previous years, the retention of Atlantic halibut (*Hippoglossus hippoglossus*), spotted wolffish (*Anarhichas minor*), northern wolffish (*A. denticulatus*), and any species of shark is prohibited in the Newfoundland and Labrador 2015 recreational fisheries (DFO 2014c). While sculpins (Cottoidea) and cunners (*Tautogolabrus adspersus*) may be released, all other groundfish caught must be retained (DFO 2014c). Given the distance from shore, it is highly unlikely that any recreational fisheries will be conducted within the Study Area.

4.2.4 Aquaculture

As indicated in the Eastern Newfoundland SEA (see Section 4.3.4.3 *in* C-NLOPB 2014), there are currently no approved aquaculture sites within the Study Area. Aquaculture sites in eastern Newfoundland are coastal-based and occur west of the Study Area (see Section 4.3.4.3 and Figure 4.150 *in* C-NLOPB 2014; DFA 2014).

4.2.5 DFO and Industry Science Surveys

DFO Research Vessel (RV) data collected during annual multi-species trawl surveys between 2007 and 2011 were presented in the EA (see Section 4.3.4 *in* LGL 2014a). Analysis of the 2012 dataset for spring (May–June) and fall (October–December) RV surveys in the Study Area did not indicate any major differences in either the predominant species caught or the harvest locations compared to previous survey years (see Table 4.5 and Figure 4.19 *in* LGL 2014a). Contrary to previous survey years, there were no RV survey data collected within the Study Area during March, July or September.

Fisheries research surveys conducted by DFO and the fishing industry were described in Section 4.3.6 of the EA (LGL 2014a). The tentative schedule of the 2015 DFO multispecies science surveys (RV surveys) is presented below (Table 4.5) (G. Sheppard, DFO, pers. comm. 2015). Spring RV surveys are currently set to begin at the end of March and continue into mid-June, with surveys potentially occurring within the Study Area from mid-May to mid-June. DFO fall RV surveys will begin in mid-September and end in early-December, and may occur in the Study Area between late-September to early-December.

As indicated in the EA (see Section 4.3.6 *in* LGL 2014a), several DFO-Industry collaborative post-season snow crab trap survey stations are located in the west and south-central portions of the Study Area, in NAFO Divisions 3K and 3L (see Figure 4.35 *in* LGL 2014a). It is anticipated that sampling at these stations will occur annually during the September to November period throughout the remainder of the Project (i.e., 2015–2018).

Table 4.5 Tentative Schedule of DFO RV Surveys in 2015.

NAFO Division	Start Date	End Date	Vessel
3P	31 Mar	14 Apr	*Needler*
3P	14 Apr	28 Apr	*Needler*
3P + 3O	29 Apr	12 May	*Needler*
3O + 3N	12 May	26 May	*Needler*
3L + 3N	27 May	13 Jun	*Needler*
3O	16 Sep	29 Sep	*Needler*
3O + 3N	29 Sep	13 Oct	*Needler*
2H	04 Oct	13 Oct	*Teleost*
2H + 2J	14 Oct	27 Oct	*Teleost*
3N + 3L	14 Oct	27 Oct	*Needler*
2J + 3K	27 Oct	10 Nov	*Teleost*
3L	28 Oct	10 Nov	*Needler*
3K	11 Nov	24 Nov	*Teleost*
3K + 3L	11 Nov	24 Nov	*Needler*
3K + 3L Deep	24 Nov	08 Dec	*Teleost*

Start/end dates subject to change as trip plans are finalized.

4.3 Seabirds

This section includes updates to the description of the Seabird VEC in Section 4.5 of the EMGS EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and it's associated Amendments (LGL 2014c, 2015).

4.3.1 Update to EA Section 4.5.3: Breeding Seabirds in Eastern Newfoundland

Just over five million pairs of seabirds nest on the southeast and east coast of Newfoundland. This includes 4.2 million pairs of Leach's Storm-Petrels (*Oceanodroma leucorhoa*) and 758,000 pairs of Common Murres (*Uria aalge*) (Table 4.6). The seabird breeding colonies on Funk Island, Baccalieu Island, the Witless Bay Islands and Cape St. Mary's are among the largest in Atlantic Canada. More than 4.4 million seabird pairs nest at these three locations alone (Table 4.6). This includes the largest Atlantic Canada colonies of Leach's Storm-petrel (3,336,000 pairs on Baccalieu Island), Common Murre (470,000 pairs on Funk Island), Black-legged Kittiwake (*Rissa tridactyla*) (13,879 pairs on Witless Bay Islands), Thick-billed Murre (*Uria lomvia*) (1,000 pairs at Cape St. Mary's), and Atlantic Puffin (*Fratercula arctica*) (324,000 pairs on Witless Bay Islands). These breeding birds may use the western edge of the Study Area during the breeding season. After the nesting season and breeding seabirds disperse over a large area of the Newfoundland and Labrador offshore area including the Study Area.

Table 4.6 Numbers of Pairs of Marine Birds Nesting at Marine Bird Colonies in Eastern Newfoundland.

Species	Wadham Islands	Funk Island	Cape Freels and Cabot Island	Baccalieu Island	Witless Bay Islands	Mistaken Point	Cape St. Mary's	Middle Lawn Island	Corbin Island	Green Island
Northern Fulmar *Fulmarus glacialis*	-	13[a]	-	-	13[a]	-	Present[a]	-	-	-
Manx Shearwater *Puffinus puffinus*	-	-	-	-	-	-	-	7[d]	-	-
Leach's Storm-Petrel	6,000[a]	-	250[b]	3,336,000[b]	314,020[a]	-	-	13,879[e]	100,000[b]	103,833[b]
Northern Gannet		6,075[a]		2,564[a]	-	-	14,789[a]	-	-	-
Herring Gull *Larus argentatus*	-	150[a]	-	46[a]	2,045[c]	-	Present[b]	20[b]	5,000[b]	Present[b]
Great Black-backed Gull *Larus marinus*	Present[b]	75[a]	-	2[a]	15[e]	-	Present[b]	6[b]	25[b]	-
Black-legged Kittiwake	-	100[a]	-	5,096[a]	13,950[a]	4,750[g]	10,000[b]	-	50[b]	-
Arctic and Common Terns *Sterna paradisaea, Sterna hirundo*	376[b]	-	250[b]	-	-	--	-	-	-	Present[b]
Common Murre	-	470,000[a]	2,600[b]	1,440[a]	268,660[a]	100[g]	15,484[a]	-	-	-
Thick-billed Murre		250[a]	-	73[a]	240[a]		1,000[b]	-	-	-
Razorbill *Alca torda*	30[a]	200[a]	25[b]	406[a]	846[a]	Present[b]	100[b]	-	-	-
Black Guillemot *Cepphus grylle*	25[a]	1[b]	-	113[a]	20c	Present[b]	Present[b]	-	-	-
Atlantic Puffin	7,140[a]	2,000[a]	20[b]	45,300[a]	324,650[a]	50	-	-	-	-
TOTALS	13,511	478,864	3,145	3,391,040	924,459	4,900	41,373	13,912	105,075	103,833

Sources: [a]EC-CWS, unpubl. data; [b]Cairns et al. (1989); [c]Bond in press; [d]Fraser et al. (2013); [e]Robertson et al. (2002); [f]Russell (2008).

4.3.2 Update to EA Section 4.5.4.3: Sulidae (Gannets)

More than 23,000 pairs of Northern Gannet (*Morus bassanus*) nest on three colonies in eastern Newfoundland (see Table 4.6). Gannets are common near shore and scarce beyond 100 km from shore. The Study Area is beyond the range of most Northern Gannets. Very few were observed during seabird monitoring on the Orphan and Jeanne d'Arc basins in 2004–2007 (Abgrall et al. 2008a,b). This species is expected to be a scarce visitor from April to October within the Study Area.

4.3.3 Update to EA Section 4.5.4.7: Alcidae (Dovekie, Murres, Black Guillemot, Razorbill and Atlantic Puffin)

Murres

The two species of murre, Common and Thick-billed, are often difficult to tell apart with certainty at sea so are often lumped as "murres" during offshore seabird surveys. Common Murre is an abundant breeding species in eastern Newfoundland with just over three quarters of a million pairs nesting. Most of these occur at two colonies, Funk Island (470,000 pairs) (EC-CWS unpubl.) and the Witless Bay Islands (268,660 pairs; EC-CWS unpubl., Table 4.6). They spend the winter from eastern Newfoundland south to Massachusetts. Thick-billed Murre is an uncommon breeder in eastern Newfoundland with about 2,000 pairs (see Table 4.6); most nest much farther north. However, Newfoundland waters are an important wintering area for many of the two million Thick-billed Murre pairs breeding in Arctic Canada and Greenland.

Other Alcids (Atlantic Puffin, Razorbill and Black Guillemot)

There are more than 379,000 pairs of Atlantic Puffin nesting in eastern Newfoundland (see Table 4.6). Atlantic Puffins winter off southern Newfoundland and Nova Scotia and they occur in low densities as far offshore as the Study Area. Non-breeding sub-adults occur throughout the summer whereas adults and juveniles can occur in late summer and fall. Seabird surveys during monitoring seismic operations in 2004-2008 conducted within the period mid-May to late September on the Orphan Basin and Jeanne d'Arc Basin recorded very low densities of Atlantic Puffins (Abgrall et al. 2008a,b). During monitoring of a seismic survey of Jeanne d'Arc Basin from 1 October to 8 November 2005, there was an average density of 1.46 seabirds/km^2 (Abgrall et al. 2008a). Within the Study Area, Atlantic Puffin is expected to be scarce during the breeding season (April to August) and scarce to uncommon during the post-breeding season (September to December).

4.3.4 Additional References

Fledgling Atlantic Puffins were attracted to lighting in small coastal communities overlooking the Witless Bay Seabird Ecological Reserve in Newfoundland, which hosts the two largest Atlantic Puffin colonies in North America. The number of stranded puffins found during foggy nights and nights without fog were very similar but majority of strandings occurred within a two week period around a new moon (Wilhelm et al. 2013). In 2011, only 13 live Atlantic Puffins were captured despite nightly search efforts throughout the fledging period. This low capture rate was attributed to poor breeding

success at the colony. In contrast, 414 live fledgling puffins were captured in 2012 and successfully released between 6 August and 5 September. A reduction of artificial lighting during the period of fledging reduced the number of stranded puffins.

Adult and fledgling Short-tailed Shearwaters (*Ardenna tenuirostris*) were attracted to lights on a roadway at night near a breeding colony at Phillip Island, Australia (Rodriguez et al. 2014). Strandings occurred most often during moonless and windy nights. Turning off the street lights decreased the number of strandings.

The use of search lights on vessels sailing in Greenland waters during periods of darkness was found to attract seabirds, mainly Common Eider (*Somateria mollissima*) (Merkel and Johansen 2011). The birds were attracted to the search lights more than to the area being illuminated in front of the vessel by the search light. Some birds incurred lethal injuries when they impacted the ship's superstructure. It was recommended shielding search light from the sky and sides to reduce the number of birds attracted to the source.

The studies summarized above confirm that at least some seabird species are attracted to light and that appropriate monitoring and mitigation are required. EMGS will ensure that such monitoring for stranded seabirds occurs aboard Project vessels and that appropriate handling and release protocols are implemented.

4.4 Marine Mammals and Sea Turtles

This section includes updates to the description of the Marine Mammal and Sea Turtle VEC in Section 4.4 of the EMGS EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and it's associated Amendments (LGL 2014c, 2015).

4.4.1 Updated COSEWIC Designations

The following are updated COSEWIC designations for particular marine mammals included in Table 4.8 of the original EA (LGL 2014a). These changes in designation do not affect the effects assessment or requirement for mitigation measures.

- Sei whale (*Balaenoptera borealis*) (Atlantic population) – changed from *data deficient* to *high-priority candidate* species;
- Sperm whale (*Physeter microcephalus*) (Atlantic) – changed from *low-priority candidate* species to *mid-priority candidate* species;
- Harp seal (*Pagophilus groenlandicus*) (Atlantic) – changed from *mid-priority candidate* species to *high-priority candidate* species; and
- Hooded seal (*Cystophora cristata*) (Atlantic) – changed from *mid-priority candidate* species to *high-priority candidate* species.

4.4.2 Updated Population/Abundance Estimates

Some of the marine mammal and sea turtle population/abundance estimates included in the original EA (LGL 2014a) are updated below.

- Blue whale (*Balaenoptera musculus*) - it has been estimated that 400-600 blue whales may be found in the western North Atlantic; there are insufficient data to determine population trends for this species (Waring et al. 2011).
- Sperm whale - there is currently no reliable estimate of sperm whale abundance in the entire western North Atlantic. The best recent abundance estimate of 2,288 (CV = 0.28), based on aerial and shipboard surveys and uncorrected for dive-time, is likely an underestimate; a trend analysis has not been completed for this stock because the statistical power to detect a trend in abundance is poor due to the relatively imprecise abundance estimates and long survey interval (Waring et al. 2014).
- Long-finned pilot whale (*Globicephala melas*) – estimation of a summer abundance of 6,134 (CV = 0.28) for long-finned pilot whales in the area extending from northern Labrador to the Scotian Shelf. A trend analysis has not been conducted for the western North Atlantic stock of pilot whales; the statistical power to detect a trend in abundance for this stock is poor because of relatively imprecise abundance estimates and a long survey interval (Waring et al. 2014).
- Short-beaked common dolphin (*Delphinus delphis*) - the abundance of short-beaked common dolphins off the U.S. or Canadian Atlantic Coast estimated at 173,486 (CV=0.55) is considered the best recent abundance estimate. This estimate was derived from the Canadian Trans-North Atlantic Sighting Survey (TNASS) conducted in July-August 2007. Another abundance estimate of 84,000 (CV=0.36) common dolphins was obtained from 10,676 km of trackline data collected during an aerial survey in August 2006. This survey covered the region extending from the 2000 m depth contour on the southern edge of Georges Bank to the upper Bay of Fundy and the entrance to the Gulf of St. Lawrence. A trend analysis has not been conducted for the western North Atlantic stock of short-beaked common dolphins; the statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long survey interval (Waring et al. 2014).
- Bottlenose dolphin (*Tursiops truncatus*) - the best available estimate for the offshore stock of bottlenose dolphins in the western North Atlantic is 77,532 (CV=0.40). This estimate is based on 2011 summer surveys covering waters from central Florida to the lower Bay of Fundy. A trend analysis has not been conducted for the western North Atlantic offshore stock of bottlenose dolphins; the statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long survey intervals (Waring et al. 2014).
- Harp seal - the total population size for the Northwest Atlantic harp seal population was estimated at 7,411,000 in 2014 (SE = 656,000). Despite highly variable pup production among years, this population has shown little change in abundance since 2004 and is considered to be relatively stable (Hammill et al. 2014a).

4.4.3 Additional References

Kennedy et al. (2014) reported two humpback whales (*Megaptera novaeangliae*) outfitted with satellite transmitters near the Dominican Republic travelled near or within the Study Area. One whale was recorded on the eastern edge of Cabot Strait in May 2011, and the second whale was recorded on the Grand Banks in June 2012.

In 2008 and 2009, Prieto et al. (2014) deployed satellite tags on sei whales in Portugal, and subsequent analysis of tracking data revealed a well-defined migratory corridor between the Azores and the Labrador Sea. Tracking data also showed that sei whales in the Labrador Sea spend considerable time foraging, indicating that the Labrador Sea constitutes an important feeding ground for them. Recent satellite telemetry data also suggested a discrete feeding area for sei whales may be present off the Gulf of Maine and Nova Scotia (Prieto et al. 2014). These data support the hypothesis that separate stocks of sei whales exist off the coasts of the U.S. and Canada. Some of the sei whales tracked to the Labrador Sea by Prieto et al. (2014) arrived in the area in mid-May with some remaining there until mid-September, coinciding with the time when sei whales are known to occur in the Gulf of Maine (CETAP 1982; Baumgartner et al. 2011).

A single Sowerby's beaked whale (*Mesoplodon bidens*) stranded on the southern shore of Newfoundland in February 2015 (CBC 2015).

McCordic et al. (2014), using images from the North Atlantic Humpback Whale Catalogue (NAHWC), examined humpback whale flukes for the presence of rake marks from killer whales (*Orcinus orca*). They found that within the western North Atlantic, Canada (including the Newfoundland and Labrador region and the Quebec shore of the Gulf of St. Lawrence) humpback whales have a scarring rate that is almost twice that of either the Gulf of Maine or West Greenland. The authors suggested that the Canadian population of killer whales may prey preferentially on marine mammals.

Matthews and Ferguson (2014) analyzed stable isotopes in the tooth collagen of killer whales from the Eastern Canadian Arctic (ECA) and the north-west Atlantic (NWA; samples from Newfoundland). Significant differences in stable nitrogen isotope values between killer whales from the two areas support the hypothesis that ECA and NWA killer whales are from largely non-overlapping populations. Despite these inter-area differences, ECA and NWA killer whales were found to forage at similar trophic levels.

Stenson et al. (2011) examined bycatch data of marine mammals in the Canadian experimental Atlantic salmon (*Salmo salar*) driftnet fishery in the Northwest Atlantic from 1965 to 2001 in order to obtain information on marine mammal seasonal distribution and relative abundance; they reported bycatch records of long-finned pilot whales and Atlantic white-sided dolphins in the spring for the Newfoundland Basin and the southern Grand Banks.

Andersen et al. (2013) deployed satellite tags on 65 hooded seals during five field seasons (2004–2008) and analyzed tracking data in conjunction with a variety of environmental parameters. Male and female

hooded seals were found to prefer similar habitat conditions, but were separated temporally and spatially (geographically and by depth). Males were more localized in their habitat use patterns, and search effort was focused in areas of complex seabed relief (e.g., Baffin Bay, Davis Strait, and the Flemish Cap). Females concentrated their search effort along shelf areas (e.g., the Labrador shelf) and were found to use the Labrador shelf more intensively than males, especially in the autumn/winter season after moulting and prior to breeding. Some of the tagged hooded seals, particularly juveniles, were tracked within or near the Study Area in spring and fall/winter.

4.5 Species at Risk

This section includes updates to the description of the Species at Risk VEC in Section 4.6 of the EMGS EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and it's associated Amendments (LGL 2014c, 2015).

Recently, a report on the progress of the implementation of the recovery strategy and management plan for wolffishes was published (DFO 2013a). It reports that the recovery strategy (Kulka et al. 2007) is presently being updated and will include identified critical habitat for both northern and spotted wolffish. The progress report also states that the status of each of the three wolffish species was re-assessed by COSEWIC in November 2012 and that the recommendation was to retain the current designations as the species remain at low abundance levels compared to historic levels.

Table 4.7 summarizes species at risk that could potentially occur in the Study Area, based on available information as of February 2015 from the websites for *SARA* and COSEWIC. Changes in species designations since the EA was prepared in 2014 are noted in red font and light grey shading in Table 4.7 and detailed below:

- Smooth skate (*Malacoraja senta*) (Funk Island Deep population) added; it is assessed as endangered by COSEWIC; and
- White hake (*Urophycis tenuis*) (Atlantic population) added; it is assessed as threatened by COSEWIC.

As of February 2015, no additional species of special status that could potentially occur within the Study Area have been added to Schedule 1 of *SARA*. Additionally, no recovery strategies have been finalized since the recovery strategy for the *endangered* Ivory Gull (Environment Canada 2014), described in the EA Addendum (LGL 2014b). However, the recovery strategy for the *endangered* North Atlantic right whale (Brown et al. 2009) has been amended to incorporate changes made pertaining to the critical habitat of the population (DFO 2014d). Critical habitat for right whales has not been designated in or near the Study Area.

Table 4.7 *SARA*-Listed and COSEWIC-Assessed Marine Species that Potentially Occur in the Study Area.

SPECIES		*SARA*[a]			COSEWIC[b]		
Common Name	**Scientific Name**	**Endangered**	**Threatened**	**Special Concern**	**Endangered**	**Threatened**	**Special Concern**
Marine Mammals							
Blue whale (Atlantic population)	*Balaenoptera musculus*	Schedule 1			X		
North Atlantic right whale	*Eubalaena glacialis*	Schedule 1			X		
Northern bottlenose whale (Scotian Shelf population)	*Hyperoodon ampullatus*	Schedule 1			X		
Fin whale (Atlantic population)	*Balaenoptera physalus*			Schedule 1			X
Sowerby's beaked whale	*Mesoplodon bidens*			Schedule 1			X
Harbour porpoise (Northwest Atlantic population)	*Phocoena phocoena*		Schedule 2				X
Humpback whale (Western North Atlantic population)	*Megaptera novaeangliae*			Schedule 3			
Killer whale (Northwest Atlantic/ Eastern Arctic population)	*Orcinus orca*						X
Northern bottlenose whale (Davis Strait-Baffin Bay-Labrador Sea population)	*Hyperoodon ampullatus*						X
Sea Turtles							
Leatherback sea turtle	*Dermochelys coriacea*	Schedule 1			X		
Loggerhead sea turtle	*Caretta caretta*				X		
Fishes							
White shark (Atlantic population)	*Carcharodon carcharias*	Schedule 1			X		
Northern wolffish	*Anarhichas denticulatus*		Schedule 1			X	
Spotted wolffish	*Anarhichas minor*		Schedule 1			X	
Atlantic wolffish	*Anarhichas lupus*			Schedule 1			X
Atlantic cod	*Gadus morhua*			Schedule 3			
Atlantic cod (Newfoundland and Labrador population)	*Gadus morhua*				X		
Atlantic bluefin tuna	*Thunnus thynnus*				X		
Porbeagle shark	*Lamna nasus*				X		
Roundnose grenadier	*Coryphaenoides rupestris*				X		
Cusk	*Brosme brosme*				X		

SPECIES		*SARA*[a]			COSEWIC[b]		
Common Name	**Scientific Name**	**Endangered**	**Threatened**	**Special Concern**	**Endangered**	**Threatened**	**Special Concern**
Smooth skate (Funk Island Deep population)	*Malacoraja senta*				X		
American eel	*Anguilla rostrata*					X	
Shortfin mako shark (Atlantic population)	*Isurus oxyrinchus*					X	
American plaice (Newfoundland and Labrador population)	*Hippoglossoides platessoides*					X	
Atlantic salmon (South Newfoundland population)	*Salmo salar*					X	
Acadian redfish (Atlantic population)	*Sebastes fasciatus*					X	
Deepwater redfish (Northern population)	*Sebastes mentella*					X	
White hake (Atlantic population)	*Urophycis tenuis*					X	
Blue shark (Atlantic population)	*Prionace glauca*						X
Basking shark (Atlantic population)	*Cetorhinus maximus*						X
Spiny dogfish (Atlantic population)	*Squalus acanthias*						X
Roughhead grenadier	*Macrourus berglax*						X
Thorny skate	*Amblyraja radiata*						X
Birds							
Ivory Gull	*Pagophila eburnea*	Schedule 1			X		

Sources: [a]*SARA* website (http://www.sararegistry.gc.ca/species/default_e.cfm), accessed February 2015; [b]COSEWIC website (http://www.cosewic.gc.ca/index.htm); accessed February 2015; COSEWIC candidate species not included.

EMGS will monitor *SARA* issues through the law gazettes, the Internet, and communication with DFO and Environment Canada, and will adaptively manage any issues that may arise in the future. EMGS will comply with relevant regulations pertaining to *SARA* Recovery Strategies and Action Plans. EMGS will continue to exercise due caution to minimize impacts on species at risk during all of its operations. EMGS also understands that other marine species may be designated as *endangered* or *threatened* on Schedule 1 during the course of the Project and will continue to monitor any status change.

4.6 Sensitive Areas

This section includes updates to the description of the Sensitive Areas VEC in Section 4.7 of the EMGS EA (LGL 2014a) and the associated Addendum (LGL 2014b). The new information presented in this section does not change the effects predictions made in the EA (LGL 2014a) and it's associated Amendments (LGL 2014c, 2015).

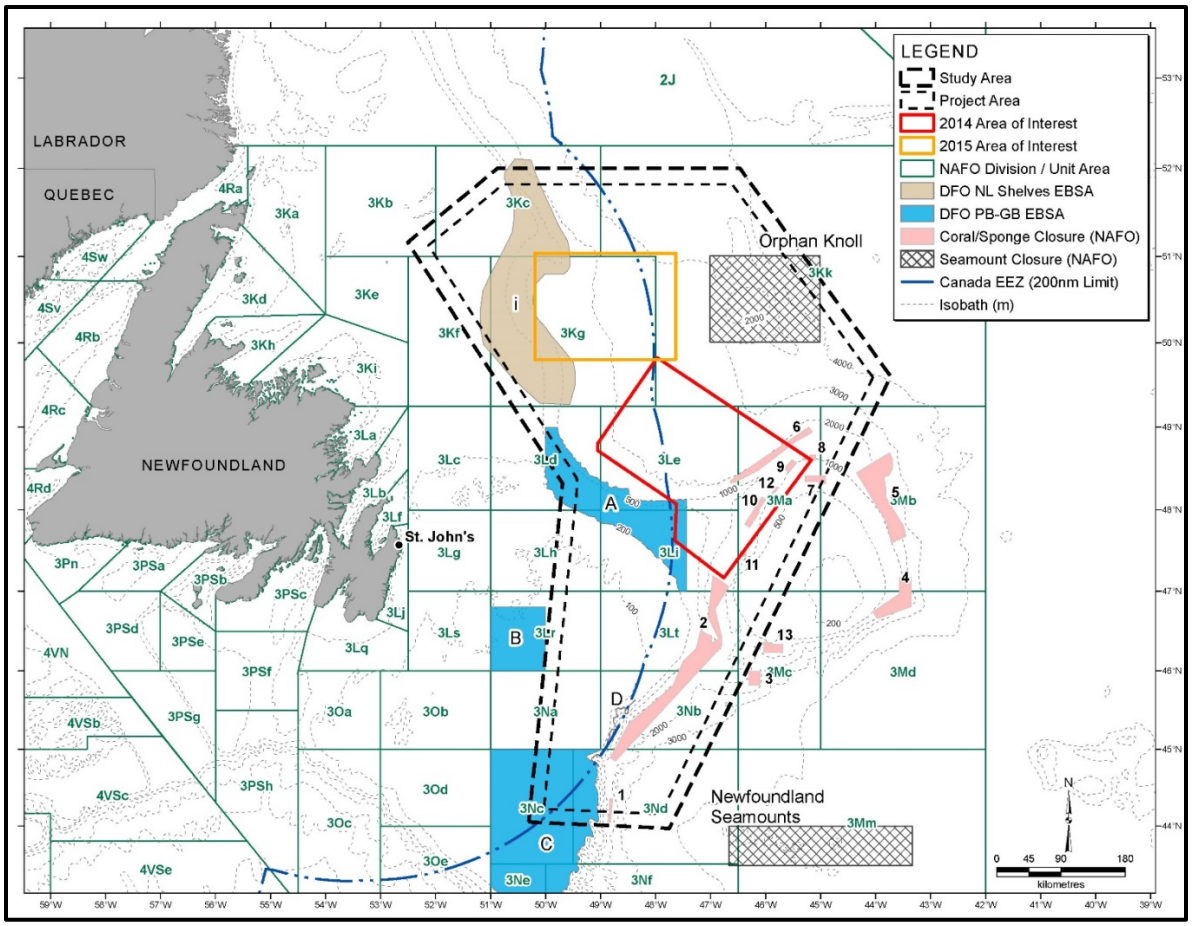
In 2008 and 2009, the North Atlantic Fisheries Organization (NAFO) Scientific Council identified areas of significant coral and sponge concentrations within the NAFO Regulatory Area. NAFO Coral/Sponge Closure Area Five was updated in 2015. Specifically, a new area of the Beothuk Knoll was designated as a closed area for bottom fishing bringing the total number of high sponge and coral concentration area closures to 13. These areas are closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015a).

There are five Ecologically and Biologically Significant Areas (EBSAs) associated with the Placentia Bay - Grand Banks Large Ocean Management Area (PB-GB LOMA; DFO 2012) and the Newfoundland and Labrador (NL) Shelves Bioregion (DFO 2013b) that either overlap or are proximate to (within 20 km) the Study Area (Figure 4.6; see Section 4.7 in LGL 2014a). There have been no additional EBSAs designated in the Study Area since the completion of the original EA (LGL 2014a). However, there have been several changes in the NAFO Conservation and Enforcement Areas (NAFO 2015a): the addition of Orphan Knoll as a NAFO Seamount Closure Area; the addition of a NAFO Coral/Sponge Closure Area near Beothuk Knoll (Figure 4.6, Area 13); and the extension of the Eastern Flemish Cap NAFO Coral/Sponge Closure Area (Figure 4.6, Area 4). In addition, the closure period for the NAFO Seamount Closure Areas and NAFO Coral/Sponge Closure Areas has been extended from 31 December 2014 until 31 December 2020 (NAFO 2015a).

4.6.1 Integrated Management Areas

Four PB-GB LOMA EBSAs either overlap or are proximate to the Study Area:

- Northwest Shelf and Slope;
- Virgin Rocks;
- Southeast Shoal and Tail of the Banks; and
- Lilly Canyon - Carson Canyon.



Notes: NL Shelves Bioregion EBSA: (i) Orphan Spur; and PB-GB LOMA EBSAs: (A) Northwest Shelf and Slope, (B) Virgin Rocks, (C) Southeast Shoal and Tail of the Banks, and (D) Lilly Canyon-Carson Canyon.

Figure 4.6 Sensitive Areas Overlapping or Proximate to the Study Area.

One NL Shelves Bioregion EBSA overlaps the Study Area:

- Orphan Spur.

The key attributes of the five EBSAs are presented in Table 4.8 (DFO 2007, 2013b).

4.6.2 NAFO Seamount Closure Areas

The term 'Vulnerable Marine Ecosystem (VME) Element' refers to topographical, hydrophysical, or geological features which potentially support VMEs including slopes, summits and flanks of seamounts and knolls, and canyons. One NAFO Seamount Closure Area, Orphan Knoll, occurs within the Study Area (see Figure 4.6). This area is closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015a).

4.6.3 NAFO Coral/Sponge Closure Areas

In 2008 and 2009, the NAFO Scientific Council identified areas of significant coral and sponge concentrations within the NAFO Regulatory Area. Based on these identifications, areas for closure to fishing with bottom contact gear were delineated. Nine of NAFO Coral/Sponge Closure Areas occur either entirely or partially within the Study Area. In addition, three of the NAFO Coral/Sponge Closure Areas, are proximate to the Study Area (see Figure 4.6). These areas are closed to all bottom fishing activities until at least 31 December 2020 (NAFO 2015a).

Table 4.8 Key Attributes of EBSAs Overlapping or Proximate to the Study Area.

EBSA	Key Attributes
Placentia Bay – Grand Banks Large Ocean Management Area	
Northwest Shelf and Slope	• Significant aggregation area for spotted wolffish (listed as *threatened* on Schedule 1 of *SARA* and by COSEWIC) in spring; • Important feeding area for Greenland halibut; and • Potentially important feeding area for marine mammals.
Virgin Rocks	• Unique geology; large, nearly exposed rocks found near middle of bank constitute one of a kind geological feature/habitat; • Important aggregation area for capelin and feeding seabirds; and • Spawning location for various groundfish, including Atlantic cod, American plaice, and yellowtail flounder.
Lily Canyon - Carson Canyon	• Important to the feeding and productivity of Iceland scallops; and • Significant aggregation area for marine mammals feeding and overwintering.
Southeast Shoal and Tail of the Banks	• Only shallow, sandy offshore shoal in the LOMA; • Spawning location for capelin, yellowtail flounder, American plaice, Atlantic cod, and sandlance; • Only known offshore spawning site for capelin; • Single nursery area for entire stock of yellowtail flounder; • Important nursery area for Atlantic cod and American plaice; • High density of Atlantic wolfish (listed as *special concern* on Schedule 3 of *SARA* and by COSEWIC); • Highest benthic biomass on the Grand Bank; • Relict populations of blue mussel, wedge clam, and capelin associated with beach habitats from the last glacial advance; • Large aggregations of marine mammals (especially humpback whales and northern bottlenose whales) and seabirds in response to presence of forage species; and • Area of high primary productivity.
Newfoundland and Labrador Shelves Bioregion	
Orphan Spur	• High diversity of species of coral, fish, marine mammals, and seabirds; • High concentrations of several coral species; • Important area for rare or endangered fish species (northern, spotted, and Atlantic wolffish, and roundnose grenadier); • High densities of witch flounder, American plaice, Atlantic cod, and redfish; • Important aggregation area for female hooded seals; and • Significant area for a number of seabird species (murres, petrels, skuas, jaegers, Black-Legged Kittiwake, Dovekie, and Greater Shearwater).

Source: DFO 2007, 2013b.

5.0 Consultations

The document One Ocean Protocol for Consultation Meetings: Recommendations for the Fishing and Petroleum Industries in Newfoundland and Labrador (One Ocean 2013a) outlines recommendations for preparing, convening and following up on consultation meetings.

The following stakeholders/agencies were contacted by EMGS on 19 March 2015 and provided information related to planned 2015 CSEM survey activities.

- Fisheries and Oceans Canada (DFO);
- Environment Canada (EC);
- Fish, Food and Allied Workers (FFAW)/Unifor;
- One Ocean;
- Nature Newfoundland and Labrador (NNL);
- Association of Seafood Producers (ASP);
- Ocean Choice International (OCI);
- Groundfish Enterprise Allocation Council (GEAC);
- Canadian Association of Prawn Producers (CAPP);
- Icewater Seafoods;
- Clearwater Seafoods; and
- Newfound Resources Ltd.

As of 26 March 2015, only the FFAW/Unifor and NNL had responded to EMGS. The FFAW/Unifor requested a map that showed the CSEM survey areas in relation to NAFO Unit Areas and the 200 nm limit. EMGS provide that map to the FFAW/Unifor. NNL thanked EMGS for the update information. None of the other stakeholder/agency recipients of the information related to 2015 activities responded to EMGS.

6.0 Environmental Assessment

6.1 Mitigation Measures

The mitigation measures described in the EA (see Sections 5.0 and 6.0 in LGL 2014a) and the associated Addendum (LGL 2014b) remain applicable to the CSEM survey activities planned for 2015.

In 2011, One Ocean reviewed fishing and petroleum industry processes and practices for offshore seismic survey operations in Newfoundland and Labrador with the intention of identifying opportunities to better understand and improve operational processes that would mutually benefit both industries. Results of the review are outlined in the document One Ocean Protocol for Seismic Survey Programs in Newfoundland and Labrador (One Ocean 2013b).

6.2 Validity of Significance Determinations

Based on careful consideration of newly available information presented in Section 4.0 and consultations with stakeholders, the determinations of significance of the residual effects of CSEM survey activities on VECs presented in the EA (LGL 2014a) and its associated Addendum (LGL 2014b) and Amendments (LGL 2014c, 2015) remain valid for the 2015 CSEM survey activities planned by EMGS.

7.0 Concluding Statement

The CSEM survey activities that EMGS plans to conduct in 2015 have been reviewed and assessed to be within the scope of the EA (LGL 2014a), and it's associated Addendum (LGL 2014b) and Amendments (LGL 2014c, 2015) (see Table 1.1).

The environmental effects predicted in the EA and its associated documents remain valid. EMGS reaffirms its commitment to implement the mitigation measures proposed in these assessment documents and in the Screening Decisions made by the C-NLOPB.

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