

## 3.0 Biological Environment

The biological environment overview in the SEA (C-NLOPB 2005, Section 3.0) is somewhat limited to the SEA Area considered in that document. Therefore, the following sections provide some additional biological information specific to the Amendment Area.

This section presents an overview of the Amendment Area ecosystem with emphasis on valued ecosystem components (VECs). Typical VECs in east coast EAs include fish and fish habitat, fisheries, marine birds, marine mammals, sea turtles, and *Species at Risk* as listed under the Species at Risk Act (SARA) and other legislation.

Water depths in the Amendment Area range from approximately 300 to >500 m and between 400 and 500 m where Parcel 1 is located.

### 3.1 Plankton

Information on plankton communities, whose geographic distribution is large scale, as provided in the SEA (C-NLOPB 2005, Section 3.2) remains relevant to this SEA Amendment.

#### 3.1.1 Planning Implications Related to Plankton

There are no specific planning issues associated with plankton alone, although there may be areas of enhanced production being utilized by higher trophic levels (e.g., Cod Spawning Area). The SEA Amendment does not consider plankton to be a VEC *per se* but has examined plankton production from the perspective that known or recognizable areas of enhanced production may be indicative of potentially important areas for fish, marine birds, marine mammals, and sea turtles. No such areas have been identified in the scientific literature for the Amendment Area, but these issues would be analyzed in more detail in site-specific EAs.

#### 3.1.2 Data Gaps Related to Plankton

One data gap with respect to plankton concerns the spatial and temporal distributions of ichthyoplankton in the Amendment Area. Spawning by some fish species (e.g., Atlantic cod, redfish) is thought to occur in the vicinity of the Amendment Area (see Section 3.3), but limited research has been conducted on the passive movements of planktonic fish and/or invertebrate eggs and larvae in this area. Since 1983, an egg survey has been conducted in the southern Gulf of St. Lawrence to study the biomass of Atlantic mackerel spawning (Grégoire et al. 2006). The easternmost sampling stations of the egg survey are located approximately 10 to 15 km west of the Amendment Area. Relative to other sampling stations of the egg survey, particularly those in the western part of the survey area, mackerel egg abundance at the stations most proximate to the Amendment Area have been some of the lowest (e.g., 0.0 to 158.1 eggs/m<sup>2</sup>). More research of this type might help to identify the plankton drift routes and, subsequently, more fish and invertebrate nursery areas.

## 3.2 Benthic Invertebrates

Some of the information on benthic invertebrates provided in the SEA (Section 3.3; C-NLOPB 2005) remains relevant to this SEA Amendment. This includes the sections on “Sensitive Species/Communities” (Section 3.3.4; C-NLOPB 2005) and “Deep-water Corals” (Section 3.3.6; C-NLOPB 2005).

### 3.2.1 Sensitive Species/Communities

All of the benthic habitat in the Amendment Area occurs in areas where water depths range between 300 and >500 m. Based on water depth and bottom slope, it is likely that a substantial amount of soft sediment is present in the area. Consistent responses of soft-sediment macrofaunal communities to anthropogenic disturbances, such as bottom trawling, generally include structural and functional changes, loss of habitat complexity, reduced diversity and productivity, and changes in the community composition to favour opportunistic species (Ellis et al. 2000). These types of responses to physical disturbance would likely be exhibited by benthic communities occurring in the Amendment Area. The most vulnerable seabed habitats may be those with a high degree of structural complexity containing an abundance of surface-dwelling flora and fauna such as soft or hard corals and sponges. These habitats are specialized and may require a relatively long time to regenerate; as such, they could sustain long-term damage from limited physical disturbance or sedimentation.

### 3.2.2 Deep-water Corals

It is perhaps not generally known that corals (e.g., scleractinians and gorgonians) are widespread in cold temperate waters (Buhl-Mortensen and Mortensen 2004). Similar to tropical coral reefs, these corals have diverse faunal assemblages associated with them (Jensen and Frederiksen 1992; Mortensen 2001). In general, there is limited knowledge of the distribution, habitat, age composition, and biological aspects of these deep water (>200 m) corals (Mortensen et al. 2002). However, it is known that deep-water gorgonians occur off Atlantic Canada on the continental slope, in submarine canyons, and in channels between offshore banks (Verrill 1922; Deichman 1936; Breeze et al. 1997; MacIssac et al. 2001; Mortensen et al. 2002). The development of remotely operated vehicles (ROV) or submersibles has provided the ability to sample deep-water habitats although investigations are still limited due to the expense of sampling.

Based on the local ecological knowledge (LEK) of Newfoundland fishers, gold-banded coral (a.k.a. bamboo coral or birch trees) (*Keratoisis ornata*) occurs in the deep-water areas in the vicinity of the east side of the Amendment Area (Gass 2002 in Mortensen et al. 2006). This coral species typically grows attached to gravel on muddy seabeds, especially in channels and canyons where water depth exceeds 300 m (Mortensen et al. 2006). However, numerous Department of Fisheries and Oceans (DFO) groundfish trawl survey data and observer reports (1999-2001) associated with the Amendment Area region of the Laurentian Channel did not indicate the capture of any corals (Gass 2002 in Mortensen

2006). In general, the low abundance of corals in the Laurentian Channel (other than the Stone Fence at the southern end of the Laurentian Channel) probably reflects the low cover of cobble and boulder in the area (Mortensen 2006).

The recent analyses of two datasets obtained from DFO Newfoundland Region (i.e., Fisheries Observer Program 2004-2006, and Scientific Survey, 2003-2005) indicated relatively low coral density in the NAFO Unit 3 side of the Laurentian Channel (Edinger et al. 2007). While the scientific survey data were available only as far north as NAFO Division 3Pn, the Fisheries Observer Program data included sets at the intersection of NAFO Unit Areas 4Ss and 4Tf, and NAFO Division 4Vn (i.e., within the southern part of the Amendment Area, proximate to Parcel 1). The highest density of corals in the eastern part of the Laurentian Channel was indicated towards the southeastern end of the channel.

There is growing concern from environmental groups and some benthic ecologists that fishing, and oil and gas exploration activities are moving into deep water (>200 m) and that these activities may damage the potentially sensitive deep-water coral habitats (Probert et al. 1997; Reed 2002). While there is limited research on the effects of oil exploration activities, evidence of physical damage to coral reefs, where sea-fans and coral 'trees' are broken or removed due to trawling and longline fishing activities, have been documented in Atlantic Canadian waters (Mortensen et al. 2002). While not documented, the occurrence of deep-water corals in the Amendment Area is very likely.

### **3.2.3 Planning Implications Related to Benthic Invertebrates**

Consideration of benthos is relevant to offshore planning, because benthic communities (including coral reef communities) are relatively immobile, are directly affected by drilling discharges and accidental spills of drill muds, and are an important link to commercial fisheries. Benthic communities generally exhibit some level of zonation in their distribution. There is potential for suitable habitat to support corals in the Amendment Area. It is known that benthic invertebrate community characteristics are directly linked to the physical characteristics of an area.

Visual surveys can be used to assess areas where coral communities occur at relatively high abundances. For example, in June 2002, DFO established a "Coral Conservation Area" in the Northeast Channel off Nova Scotia after reviewing preliminary results from video records and photographic transects taken using an ROV. Currently fine scale visual information is limited for the Grand Banks and offshore continental slope areas in Newfoundland and Labrador waters.

Possible mitigative measures, including spatial avoidance, are discussed in Section 4.0.

### **3.2.4 Data Gaps Related to Benthic Invertebrates**

Because of the commercial importance of macrobenthic invertebrates, more is known about these species compared to non-commercial infauna and epifauna. Obvious data gaps for benthic invertebrates in the Amendment Area relate to the distribution and biology of corals. The interactions between benthic invertebrates and both lower and higher trophic organisms are also poorly understood.

### 3.3 Fish and Fisheries

#### 3.3.1 Macroinvertebrates and Fish

According to commercial fishery catch statistics (see Section 3.3.2), most of the limited commercial catches in the Amendment Area since 2002 have been accounted for by redfish (*Sebastes* spp.) (~61%), snow crab (*Chionoecetes opilio*) (~22%), and Atlantic cod (*Gadus morhua*) (~11%). Other notable species commercially caught in the Amendment Area during this period include Greenland halibut (*Reinhardtius hippoglossoides*), Atlantic halibut (*Hippoglossus hippoglossus*), and white hake (*Urophycis tenuis*). Sections 3.4.1, 3.4.2, and 3.4.3 in the of SEA (C-NLOPB 2005) provide information (e.g., distribution, life history) on important commercial macroinvertebrate and fish species, and important non-commercial fish species that likely occur in the Amendment Area, including the species that have dominated the limited commercial catches in the Amendment Area since 2002 (see Section 3.3.2).

At Environment Canada's "Biodiversity Portrait of the St. Lawrence" website ([http://www.qc.ec.gc.ca/faune/biodiv/en/recherche/especes/PO\\_EN.asp](http://www.qc.ec.gc.ca/faune/biodiv/en/recherche/especes/PO_EN.asp)), numerous fish species in addition to those referred to above also occur in the vicinity of the Amendment Area. They include the following:

- Atlantic hagfish (*Myxine glutinosa*);
- Black dogfish (*Centroscyllium fabricii*);
- Skates (*Raja* spp.);
- Atlantic argentine (*Argentina silus*);
- White barracudina (*Notolepsis rissoi*);
- Marlin-spike (*Nezumia bairdi*);
- Roughnose grenadier (*Trachyrhynchus murrayi*);
- Fourbeard rockling (*Enchelyopus cimbrius*);
- Haddock (*Melanogrammus aeglefinus*);
- Silver hake (*Merluccius bilinearis*);
- Pollock (*Pollachius virens*);
- Longfin hake (*Urophycis chesteri*);
- Goosefish (*Lophius americanus*);
- Sea raven (*Hemitripteris americanus*);
- Lumpfish (*Cyclopterus lumpus*);
- Greater eelpout (*Lycodes esmarki*);
- Atlantic softpout (*Melanostigma atlanticum*); and
- Windowpane (*Scophthalmus aquosus*).

The life histories of these additional fish species are quite variable. Susceptibility to impact from oil and gas activities varies widely by species, life stage and activity.

### 3.3.1.1 Spawning in the Amendment Area

Atlantic cod and redfish are two fish species known to spawn in the general vicinity of the Amendment Area.

#### Atlantic Cod

In 2002, a new zone known as the Cod Spawning Area was established west of Port au Port Peninsula, abutting the northern part of the eastern boundary of the Amendment Area (see Figure PSA-1 in Section 3.7). This area is closed to all groundfish fishing between April 1 and June 15, the peak time of cod spawning in the area. The Cod Spawning Area is presently defined by the following corner coordinates:

48° 15' N, 59° 20' W

49° 10' N, 59° 20' W

49° 10' N, 60° 00' W

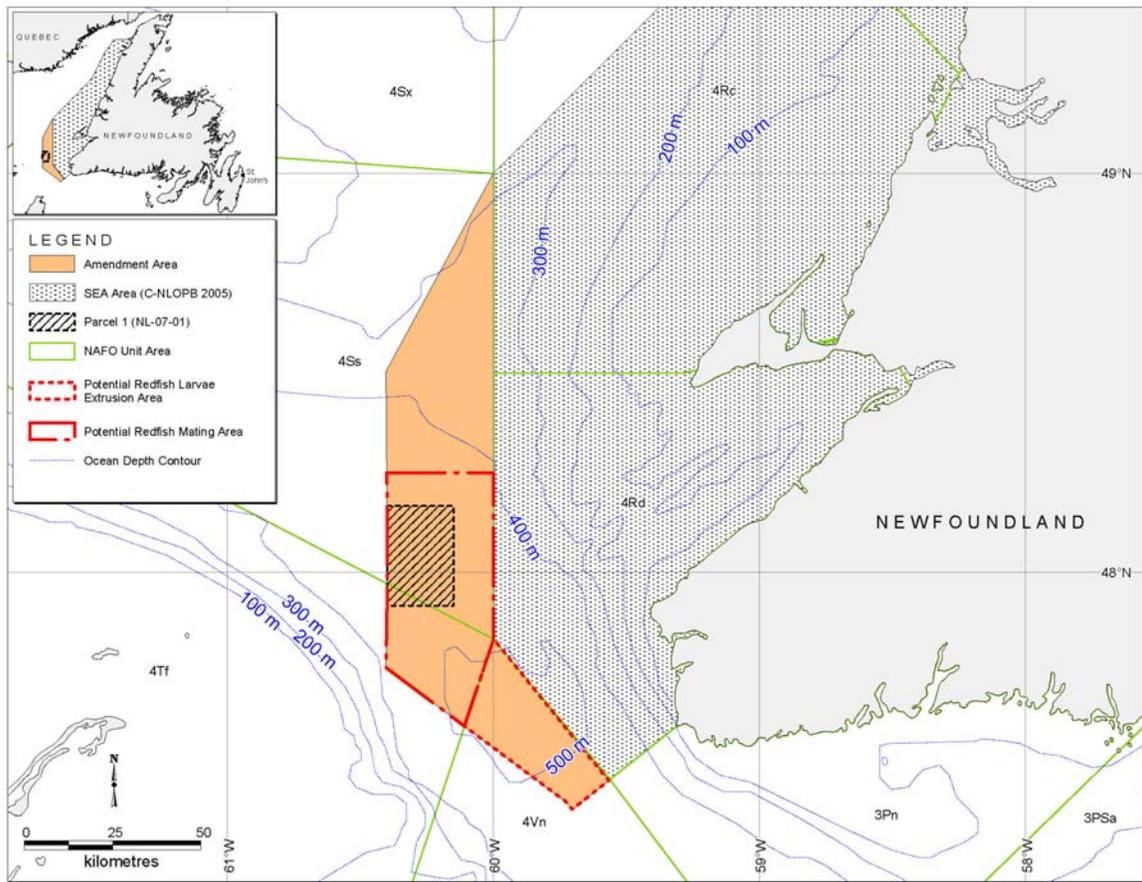
48° 15' N, 60° 00' W

Uncertainty regarding the specific timing and route of the northern Gulf cod migration has also been a past issue with oil and gas activities in the part of the Amendment Area containing Parcel 1 (Figure 3.1 from Canning & Pitt 2002). However, DFO did recognize the fact that there is sufficient fish passage area outside of the 'survey area' to allow migration to occur unimpeded.

#### Redfish

Redfish mating is believed to occur in the fall, likely during the September to December period. The females carry the developing embryos until the spring, at which time larval extrusion occurs (April to July period, depending on the area) (Morin et al. 2004). *Sebastes mentella* typically releases its larvae approximately three to four weeks earlier than *S. fasciatus* in the Gulf of St. Lawrence (Gagné 1995, Sévigny et al. 2000 in Morin et al. 2004). It has been suggested that stress (e.g., fishing, seismic surveying) on females prior to larval release may affect survival of the larvae (DFO 2000 in Morin et al. 2004). Based on DFO research vessel survey data collected from 1995 to 2002, Ollerhead et al. (2004) indicated the release of the young in NAFO Subdivisions 3Ps and 4Vn, particularly along some of the slope region of the St. Pierre Bank and in the deeper waters of the Laurentian Channel. Although Ollerhead et al (2004) referred to an area of the Laurentian Channel south of the Amendment Area, the release of young redfish might also occur in the deep water areas of the Amendment Area. Figure 3.1 indicates likely areas of redfish mating and larval extrusion within the Amendment Area based on published DFO documents.

COSEWIC included *S. mentella* and *S. fasciatus* in its fall 2006 call for bids for a status report and DFO is, therefore, commencing an assessment process. Some targeted work on redfish has begun so more information on these species may become available in the near future.



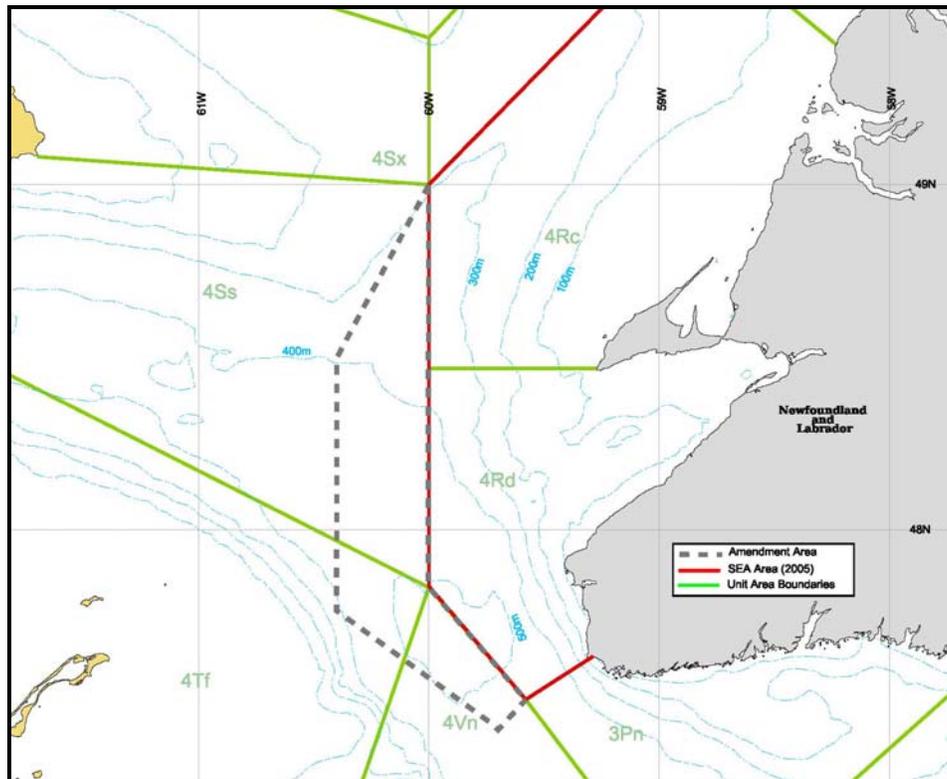
**Figure 3.1. Approximate Areas of Redfish Mating and Larval Extrusion Within the Amendment Area.**

### Other Species

There is some belief that Greenland halibut spawn during the winter in the Laurentian Channel (Scott and Scott 1988). Various species of wolffish also likely spawn in the Amendment Area. Wolffish are briefly discussed in Section 3.6 on *Species at Risk*. It is likely that many other non-commercial invertebrate and fish species also spawn in the vicinity of the Amendment Area.

### 3.3.2 Commercial Fisheries

This section provides a description of the commercial fisheries within the Amendment Area. It supplements the regional description in the SEA (C-NLOPB 2005) and focuses on Amendment Area harvesting since 2002. The SEA focused on 2002-2004 for its main fisheries analysis. The following map (Figure 3.2) shows the Amendment Area in relation to regional fisheries management areas. As this map indicates, the Amendment Area includes portions of NAFO Divisions 4S, 4T, and 4Vn.



**Figure 3.2. Amendment Area in Relation to Regional Fisheries Management Areas.**

### 3.3.2.1 Information Sources and Data Areas

The Amendment Area boundaries are adjacent to fisheries managed, for certain species, by four DFO Regions: Quebec, Gulf, Maritimes, and Newfoundland and Labrador. Consequently, georeferenced catch and effort datasets for all these regions are used in this report for 2002 to 2004. At the time of writing, these datasets were also available for 2005 and 2006 from Maritimes and Newfoundland and Labrador Region. The DFO datasets record domestic and foreign harvests landed in Canada.

The collective DFO 2002 to 2004 (DFO 2002 to 2004) datasets indicate that, during this period, 63.3% of the harvest by quantity was landed in Maritimes Region (Cape Breton Island and Queen’s County, Nova Scotia), 20.5% in Newfoundland and Labrador Region (Fortune Bay and on the Burin Peninsula), 15.0% in Quebec Region (Gaspé Peninsula and Îles de la Madeleine), and 1.3% in Gulf Region (Cape Breton Island). There has been no Newfoundland and Labrador harvest reported from the Amendment Area since 2003 (i.e., none in 2004, 2005, or 2006).

Most of the DFO data are georeferenced in two ways: (1) by latitude and longitude (degrees and minutes) of the gear set location, and (2) by the Unit Area in which the catch was harvested. Georeferencing by latitude and longitude allows the mapping of specific harvesting locations. Areas farther from shore, generally fished by larger boats, tend to have a greater proportion of their catch georeferenced, while those closer to shore have less. Also, certain inshore species (e.g., lobster) are not georeferenced, while most of the deeper water species (e.g., shrimp) are referenced.

The maps in the following sections show harvesting locations, based on the latitude and longitude (lat/long) data, as dark points. The points are not “weighted” by quantity of harvest, but show where fishing effort was recorded. Such location information has been groundtruthed with fishers in many consultations and has proven, in past assessments, to be particularly useful for petroleum industry operators in understanding the likely location of gear concentrations and timing of fisheries in order to eliminate or minimize potential mutual interference.

Fisheries consultations were conducted with representatives of the Fish, Food and Allied Workers Union (FFAW), St. John’s and Corner Brook, One Ocean Corporation, and DFO managers from Newfoundland Region and Quebec Region (Mont Joli). Agency and industry managers consulted for the SEA Amendment did not raise any concerns or issues. Appendix 1 provides a list of the agencies and individuals consulted for this SEA Amendment.

Other sources consulted for this SEA Amendment include DFO species management plans and stock status reports.

### **3.3.2.2 Amendment Area Harvest, 2002-2006**

The quantity of the domestic harvest recorded within the Amendment Area from 2002 to 2006, by species is shown in Table 3.1. As noted above, for this and other DFO datasets in this commercial fisheries section, the 2002 to 2004 data are for all four DFO regions (DFO 2002 to 2004), while the 2005 and 2006 are from DFO Maritimes Region and Newfoundland and Labrador Region only (DFO 2005 to 2006).

The Amendment Area has recorded very little commercial harvesting activity in the past five years, as the tables and figures in following sections illustrate. For example, compared to the SEA Area (C-NLOPB 2005), the Amendment Area accounted for less than 0.02% of the overall harvest during 2002–2006, though it represents 10 to 15% of the geographical area. Table 3.1 also compares the Amendment Area harvest to the SEA Area harvest for each year since 2002.

The small harvest that was recorded in the Amendment Area was primarily composed of three species – Atlantic cod, redfish, and snow crab. These were the only species fisheries to record more than 1 tonne in any year since 2002. As discussed above, during 2002 to 2004, 85% of the harvest was landed in Nova Scotia or Newfoundland, with the majority going to Nova Scotia.

**Table 3.1. 2002-2006 Harvest in the Amendment Area vs. SEA Area Harvest (Unit Areas 4Rb,c,d).**

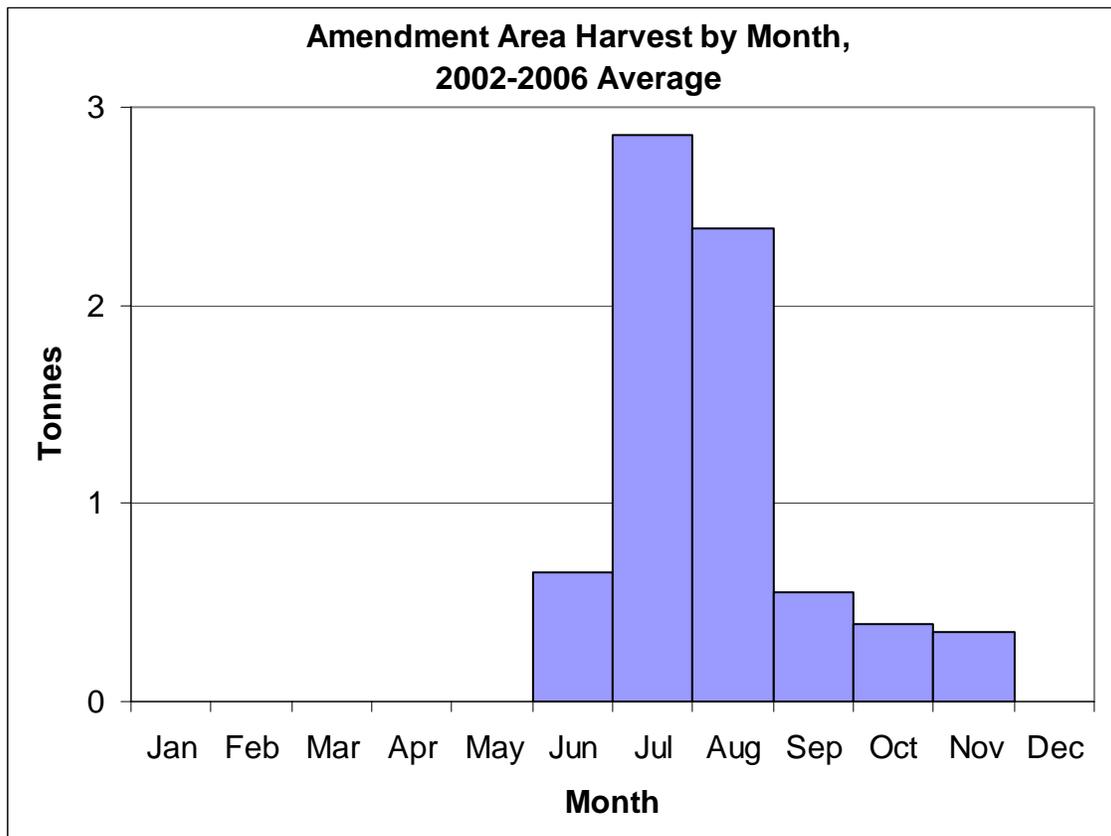
Species	Amendment Area Harvest (tonnes)	% of Annual Total	SEA Area Harvest (tonnes)	Amendment Area as a % of SEA Area Harvest
2002				
Atlantic Cod	3.6	15.1%	40,036.9	0.06%
Redfish (sp)	12.8	53.8%		
Halibut	0.1	0.5%		
Turbot/Greenland hal.	0.2	0.6%		
Rock Crab	0.9	3.9%		
Snow Crab	6.2	26.1%		
<b>Total</b>	<b>23.7</b>	<b>100.0%</b>		
2003				
Redfish (sp)	3.1	89.9%	54,997.5	0.01%
Turbot/Greenland hal.	0.1	3.7%		
Rock Crab	0.2	6.3%		
<b>Total</b>	<b>3.5</b>	<b>100.0%</b>		
2004				
Redfish (sp)	2.1	52.7%	53,911.6	0.01%
Halibut	0.3	6.2%		
Turbot/Greenland hal.	0.1	3.4%		
White Hake	0.1	3.4%		
Snow Crab	1.4	34.2%		
<b>Total</b>	<b>4.1</b>	<b>100.0%</b>		
2005				
Atlantic Cod	0.1	100.0%	45,640.8	0.00%
<b>Total</b>	<b>0.1</b>	<b>100.0%</b>		
2006				
Atlantic Cod	0.2	5.3%	46,973.9	0.01%
Redfish (sp)	4.2	94.7%		
<b>Total</b>	<b>4.4</b>	<b>100.0%</b>		

### Seasonality

In most areas, the timing of the harvest is dictated by weather and ice conditions, the availability of the resource, fisheries management plans, and other resource conservation considerations, as well as individual fishers' harvesting plans (e.g., harvesting lobster before turning to snow crab). The following graph (Figure 3.3) shows the harvest from the Amendment Area by month, averaged for 2002 to 2006. As the graph shows, no harvesting occurred between December and May in any of these years, and most of the harvesting that did occur was in July and August.

The lack of winter and spring harvesting is primarily due to ice in the Gulf. More information on the timing and other aspects of the three principal fisheries is provided in the following sections.

The SEA (C-NLOPB 2005) contains maps of the harvest locations by month for 2004 in the SEA Area and to the west (i.e., the Amendment Area).



**Figure 3.3. Amendment Area Average Harvest by Month, 2002 – 2006.**

### **Fishing Gear**

The Amendment Area’s fisheries use both fixed (longlines and crab pots) and mobile (stern otter trawls) fishing gear, though – on average – the harvest has been about 70% otter trawling. Table 3.2 shows the breakdown of the harvest (quantities) by gear type. As discussed in the SEA (C-NLOPB 2005), in general, fixed gear poses a much greater potential for conflicts with exploration activities (particularly seismic surveys) since it is often hard to detect when there is no fishing vessel nearby, and the gear may be set out over long distances in the water. Because mobile gears are towed behind a vessel, they pose less risk of conflict because the activity can be more easily observed and located on the water. For example, a survey ship and a fishing vessel should be able to communicate with each other and exchange information about their operating areas and activities.

**Table 3.2. Amendment Area Average Harvest by Gear Type, 2002-2006.**

<b>Gear</b>	<b>Tonnes</b>	<b>% of Total</b>
Bottom otter trawl (stern)	4.98	69.2%
Longline*	0.47	6.5%
Trap*	1.75	24.3%
Total	7.20	100.0%

\*fixed gear

The SEA (C-NLOPB 2005) contains maps of the harvest locations by fixed and mobile gears for 2004 in the SEA Area and to the west (i.e., area of Amendment Area).

### **Landed Value**

The landed value of the domestic harvest recorded within the Amendment Area averaged for 2002 to 2006 is shown in Table 3.3.

These values are based on Newfoundland and Labrador Region average prices for 2006 (as of mid-June) derived from DFO statistical reports for quantity and value (see [http://www.nfl.dfo-mpo.gc.ca/publications/reports\\_rapports/Land\\_All\\_2006.htm](http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_All_2006.htm)). They are approximate values, since prices for some species may vary slightly from region to region, as well as within regions. Prices for some species also vary throughout the fishing season, so that the value of the same quantity of a species landed at the beginning of its harvesting season may be higher or lower than that landed at the end.

The landed value is the value of the catch “at the wharf”, generally the price paid to the harvesting sector. It does not show, for instance, the “downstream” indirect or induced economic benefits of the harvest, during or after processing or value-added manufacturing of fish-based products.

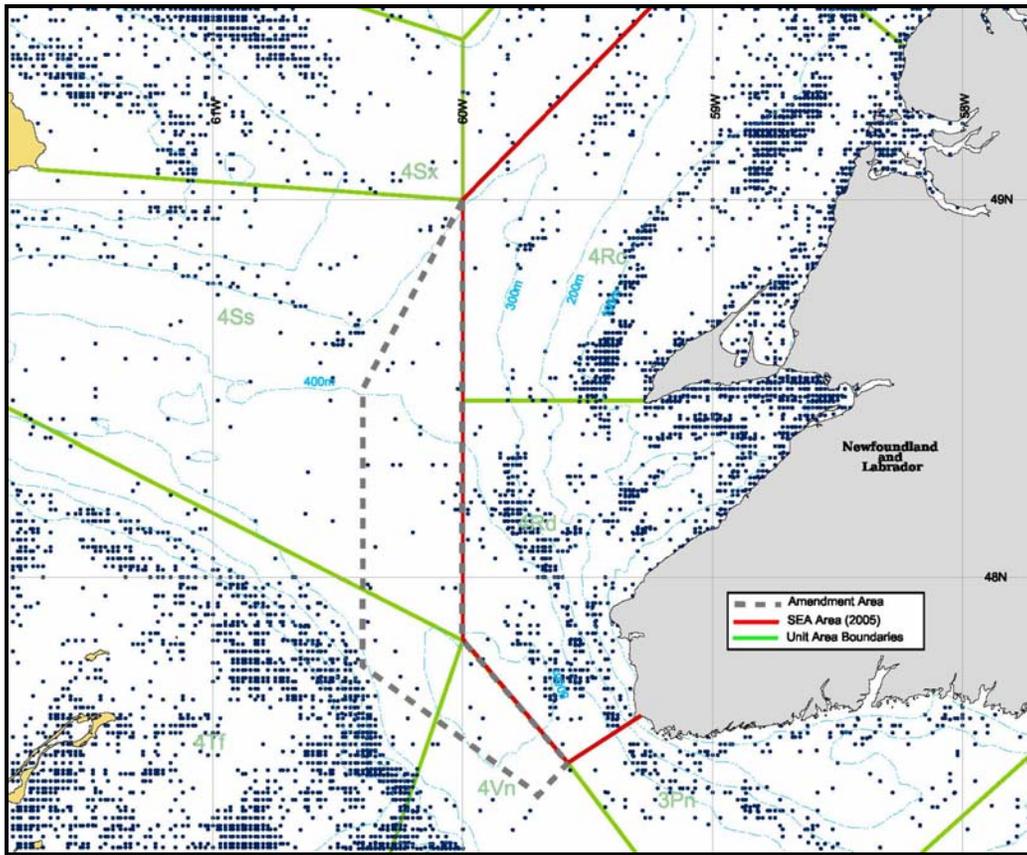
**Table 3.3. Landed Value, Amendment Area, 2002-2006 average, 2006 NL prices.**

<b>Species</b>	<b>Tonnes</b>	<b>\$/Tonne</b>	<b>Landed Value</b>
Atlantic Cod	0.78	1,155.58	\$901.35
Redfish (Sp.)	4.43	635.08	\$2,813.39
Rock Crab	0.23	771.17	\$177.37
Snow Crab	1.52	2,131.41	\$3,239.74
Totals	6.96		\$7,131.86

### **Harvest Locations**

This section provides data and maps for the 2002 to 2006 DFO datasets that are georeferenced by latitude and longitude. These maps are composites of 60 months of harvesting (all months, in each of 2002, 2003, 2004, 2005, and 2006), and thus any given year would have much less activity than these maps indicate. The maps illustrate that, over this period, fishing activity in the Amendment Area was

particularly low compared to many other areas in the Gulf of St. Lawrence and the SEA Area. Figure 3.4 indicates the distribution of harvesting locations in the Amendment Area and adjacent waters for all species during all months for 2002 to 2006.



**Figure 3.4. Harvesting Locations in Amendment Area and Adjacent Waters, All Species, All Months, 2002-2006 Aggregated.**

### **Principal Species Fisheries**

As discussed, the harvest recorded in the Amendment Area was primarily composed (94% by quantity) of three species – Atlantic cod, redfish, and snow crab. Of these, redfish made up more than 60%, though snow crab was the highest value fishery. This section provides additional information on these three species fisheries. Maps presented are based on the georeferenced data for 2002 to 2006 (aggregated), as described above.

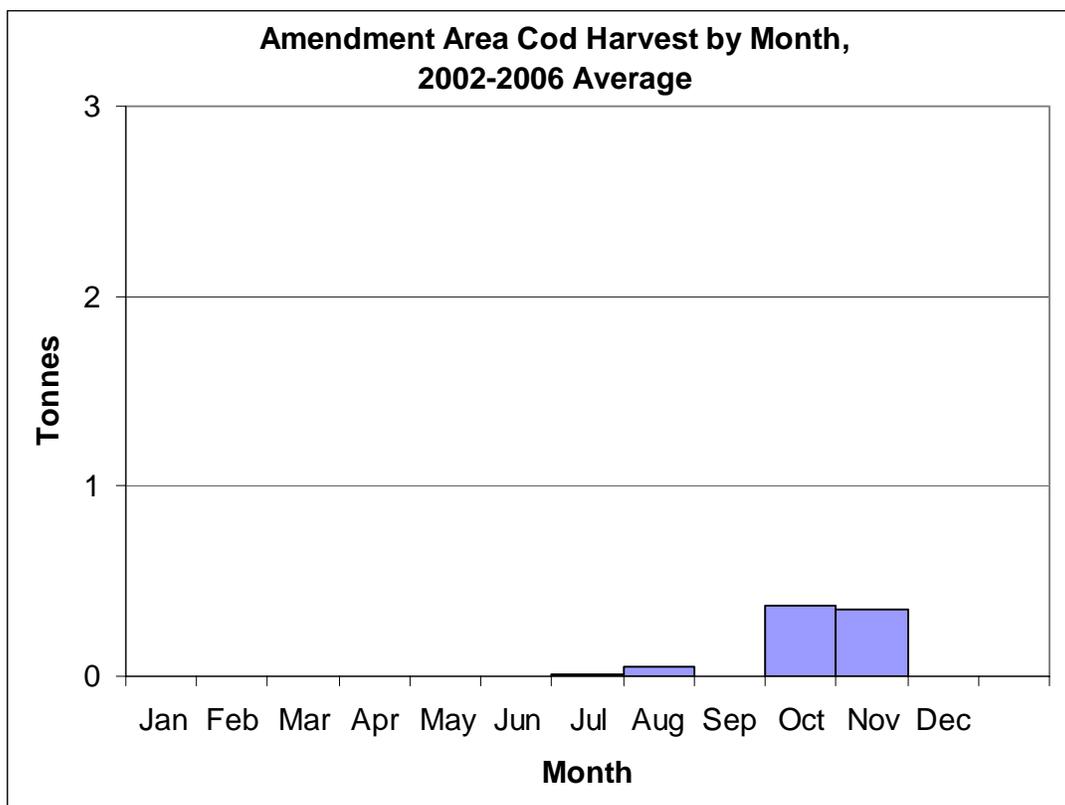
#### **Atlantic Cod**

Although, on average, less than one tonne of cod has been caught annually in the Amendment Area since 2002, it was the third largest catch recorded. Half of the catch was taken with longlines and half with stern trawls.

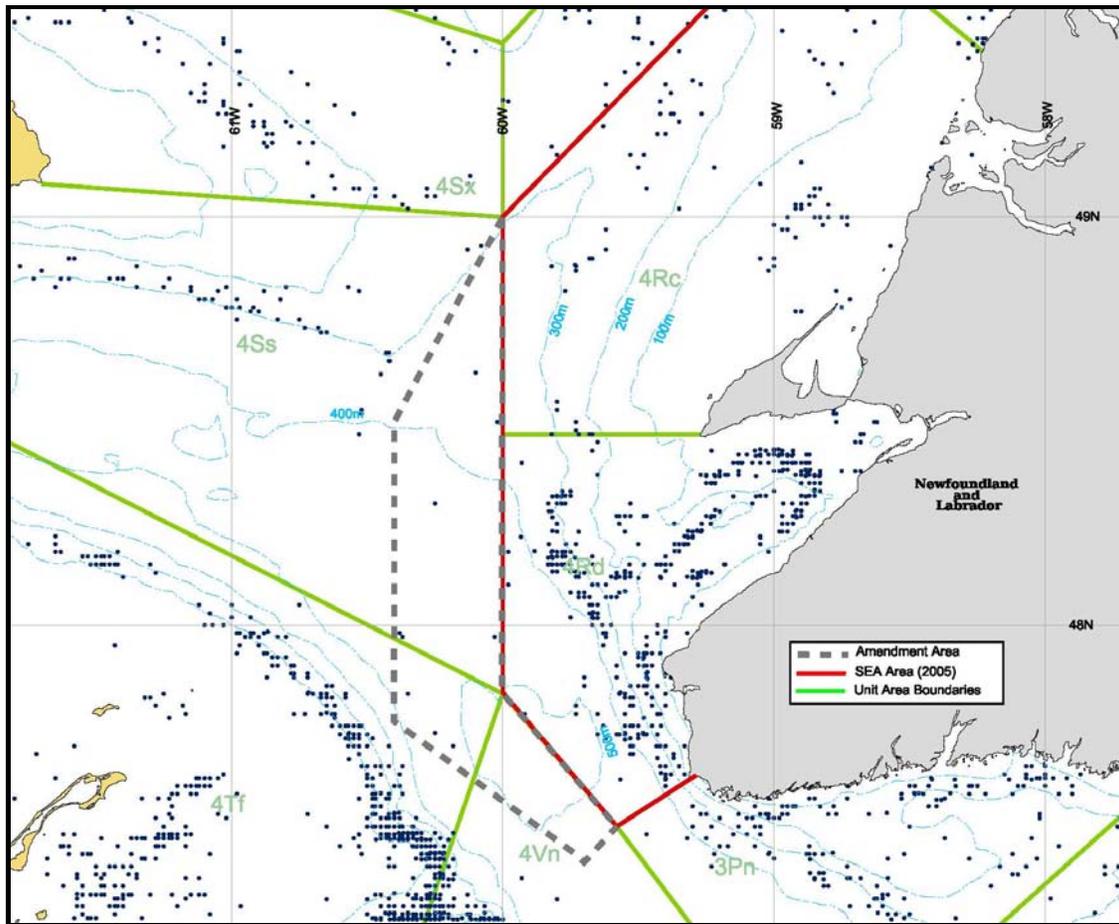
As in Division 4R, over the last two decades, Gulf cod harvests have been greatly reduced largely to changes in species management policy in response to the weak status of the northern and southern Gulf stocks (see SEA; C-NLOPB 2005).

The northern Gulf of St. Lawrence cod stock (3Pn,4RS) was under moratorium from 1994 to 1996. After this, directed fishing was again allowed, except in 2003 when the fishery was closed again. Like the northern Gulf stock, the southern Gulf cod fishery (4T) was closed in 1993. An index fishery was allowed in 1998, and a directed fishery was allowed from 1999 to 2002, was closed again in 2003 because of lack of recovery, but re-opened again in 2004, and remains open at present (DFO 2007a,b).

Figure 3.5 shows the timing of cod harvesting in the Amendment Area during 2002–2006 (averaged), and Figure 3.6 shows the locations of the georeferenced harvest for this species.



**Figure 3.5. Amendment Area Atlantic Cod Harvest by Month, 2002-2006 Average.**



**Figure 3.6. Harvesting Locations, Atlantic Cod, All Months 2002-2006, Aggregated.**

### **Redfish**

Redfish (ocean perch) species made up the largest single harvest, by quantity, in the Amendment Area over the last five years, though this averaged less than five tonnes a year. The three species of redfish that occur in Atlantic Canada -- Acadian redfish (*Sebastes fasiatus*), golden redfish (*S. marinus*) and beaked or deepwater redfish (*S. mentella*) -- are managed and harvested together. All of the harvests reported in the last five years in the Amendment Area have been taken using mobile stern otter trawls by vessels based in Nova Scotia (Liverpool and Bedford, in Maritimes Region).

The Amendment Area (and the SEA Area) are within redfish manage Unit 1. This includes all of the Gulf of St. Lawrence (NAFO Divisions 4RST and 3Pn; and 4Vn during January to May each year). Unit 1 has been closed to directed redfish fishing since 1995 (except for science index fisheries) because of low stock levels.

Figure 3.7 shows the timing of redfish harvesting in the Amendment Area during 2002 to 2006 (averaged), and Figure 3.8 shows the locations of the georeferenced harvest for redfish.

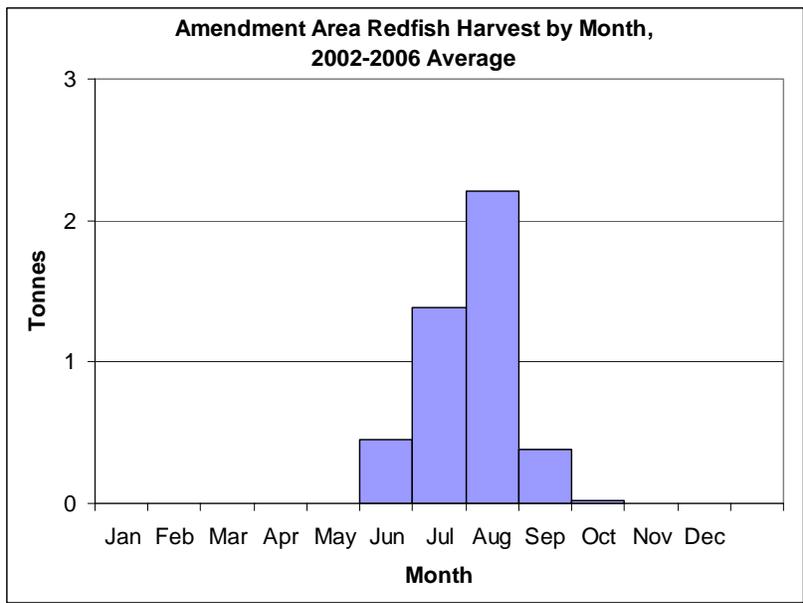


Figure 3.7. Amendment Area Atlantic Redfish Harvest by Month, 2002-2006 Average.

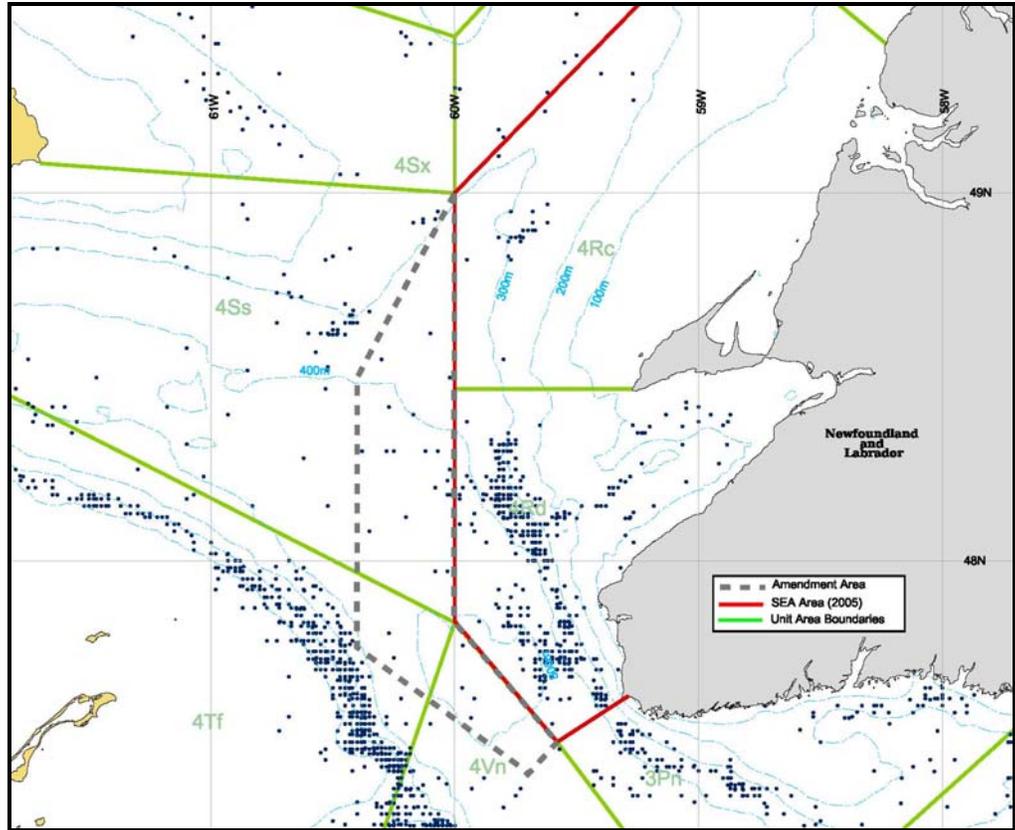


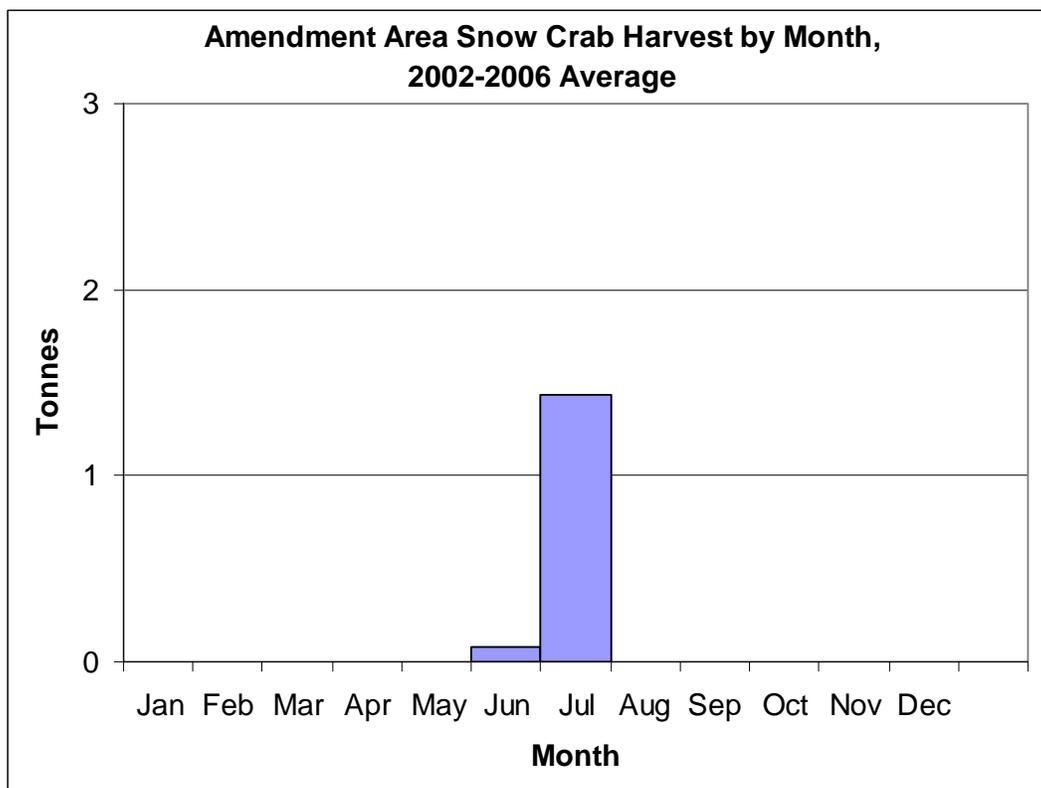
Figure 3.8. Harvesting Locations, Redfish, All Months 2002-2006, Aggregated.

## **Snow Crab**

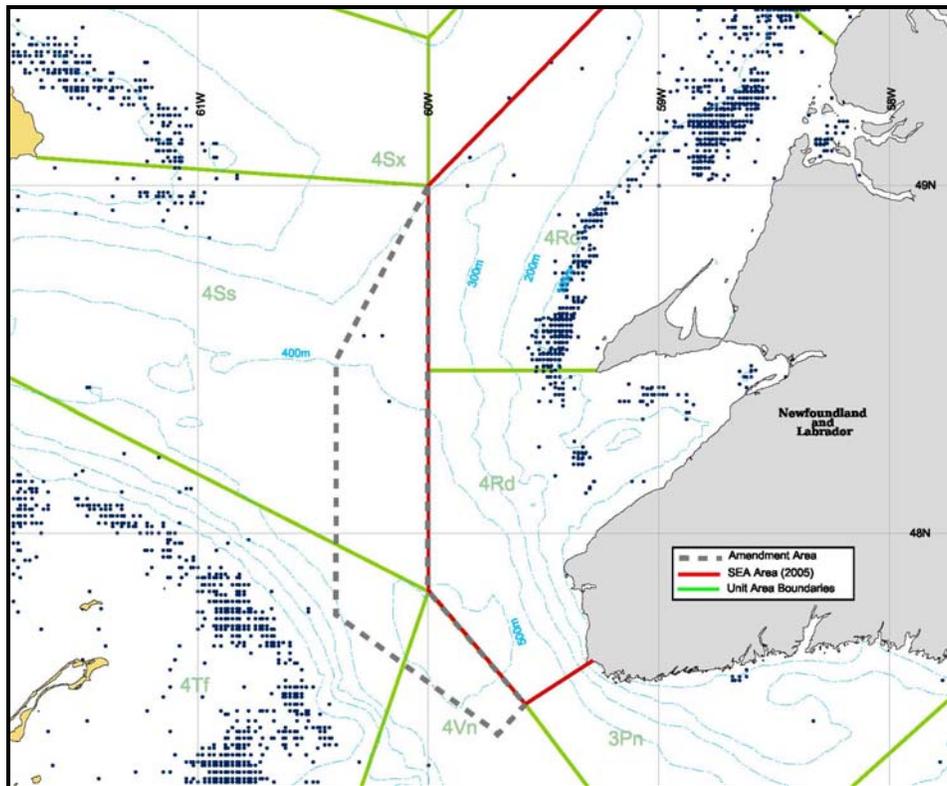
The DFO data indicate that snow crab have been harvested occasionally in the Amendment Area during the last five years (two years out of the last five). These catches were all landed by Maritimes Region vessels with home ports in Cape Breton.

Although the quantities are small, the value of the harvest is comparatively high, owing to the market price for the species.

Figure 3.9 shows the timing of the snow crab harvest in the area. The small level of snow crab fishing which did occur in this area was concentrated in July. Figure 3.10 shows the recorded harvesting locations for snow crab over the 2002 to 2006 period.

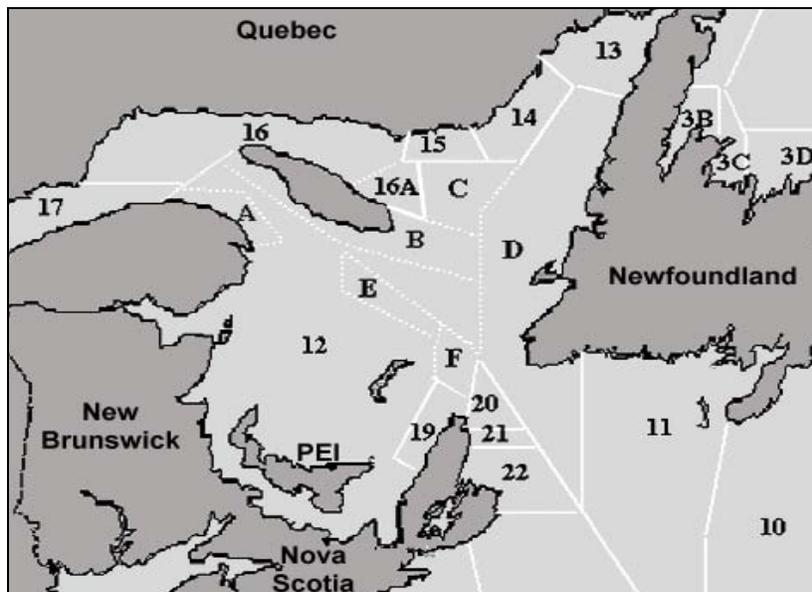


**Figure 3.9. Amendment Area Snow Crab Harvest by Month, 2002-2006 Average.**



**Figure 3.10. Harvesting Locations, Snow Crab, All Months 2002-2006, Aggregated.**

The Amendment Area includes portions of Crab Fishing Areas (CFA) 12 F, B, and C, and 20, as indicated on Figure 3.11. In 2005, Area 20 was combined with CFAs 21 and 22, and is now designated “North-Eastern Nova Scotia” (N-ENS) management area.



**Figure 3.11. Gulf Crab Fishing Areas (based on FRCC 2005).**

In CFA 12F, the 2005 fishing season opened in Area F on 28 April and ended 16 July. DFO (2006a) notes that in Area F, the fishing effort decreased more than 50% from 10,775 trap hauls in 2004 to 5,112 trap hauls in 2005, and the quota decreased from 808 tonnes to 450 tonnes.

The CFA 12B 2005 fishery opened 21 March and closed on 30 June. DFO (2006b) reports that CFA 12B has eight regular fishers. In 2005, the total allowable catch (TAC) was not taken as one fisher quit operations before reaching his individual quota. CFA 12C's fishery opened on 18 April and closed on 6 August in 2005. The Area has five regular fishers and features two banks (north and south sectors) separated by a deep channel that is part of the Jacques-Cartier Strait (DFO 2006b).

In the N-ENS area, the total landed in 2005 was 562 tonnes. Compared to 2004, this represented a decline of 60% resulting from a significant drop in the TAC. In 2005, the distribution of fishing effort continued to increase in offshore areas and decline in inshore areas (DFO 2006c).

### **3.3.2.3 Fisheries Research (DFO and Industry Science Surveys)**

The northern Gulf multi-species research survey takes place during August every year and is conducted by DFO-Québec region out of the Maurice Lamontagne Institute in Mont-Joli. This survey covers all areas of the Gulf north of the Laurentian Channel (as well as the Laurentian Channel area and the St. Lawrence Estuary). It does not include 3Pn.

The southern Gulf RV survey takes place annually in September. It is conducted by DFO-Gulf and covers the southern Gulf area (M. Castonguay, pers comm., June, 2007).

The Maurice Lamontagne Institute's Cod Assessment Biologist reports that the RV *Teleost* undertakes the 30-day August multi-species northern Gulf survey. The survey uses the Campelan trawl and involves 200 to 250 tows. DFO and industry participants are also involved in an annual Mobile Gear Sentinel Survey. This usually takes place over a 10-day period in July during the regular fishing season; it involves five vessels from Newfoundland and four from Quebec. The survey utilizes 150 stations within Newfoundland waters and 150 in the Quebec area (A. Fréchet, pers comm., June 2007). The Fish, Food and Allied Workers' (FFAW) Science Co-ordinator reports that the Newfoundland portion of the Mobile Gear Sentinel Survey usually starts July 1. He further notes that the DFO RV part of the 4RST survey covers water depths up to 20 fathoms, while the industry portion includes water depths up to 10 fathoms (J. Spingle, pers comm., June 2007).

Consultations with DFO and industry science managers during any exploration project planning stages should identify any potential for overlap between DFO and industry research surveys and the Amendment Area. The project planners and DFO/industry would be expected to exchange detailed locational information. If necessary, temporal and spatial separation can be implemented between activities and any research surveys to ensure that they do not overlap, as has been done in the past.

### **3.3.3 Planning Implications Related to Fish and Fisheries**

Two potential sensitive areas directly associated with fish occur in or proximate to the Amendment Area: (1) the Cod Spawning Area located west of the Port au Port Peninsula, abutting the Amendment Area, and (2) an area overlapping with Parcel 1 in which redfish might mate during September to December. Project-specific mitigative measures may be established during site-specific EAs to ensure protection of these areas. Possible mitigative measures are discussed in Section 4.0.

Considering the low level of commercial fishing expected in the Amendment Area, there should be relatively few potential fisheries issues in this area. Otherwise, the relevant planning implications for this area will be similar to those described for the SEA Area (C-NLOPB 2005); no new issues are expected. As for the 4R fisheries, contact will need to be maintained with the various DFO regions that might conduct fisheries research in the vicinity of the Amendment Area.

### **3.3.4 Data Gaps Related to Fish and Fisheries**

The distribution of invertebrate and fish eggs and larvae is poorly understood in the Amendment Area. The occurrence of spawning by some species in the vicinity of the Amendment Area has been identified, but there is limited available information related to the passive movements of the resulting ichthyoplankton.

There are still considerable data gaps related to the movements of fish within the Amendment Area, and most of what is known comes from commercial fishery data.

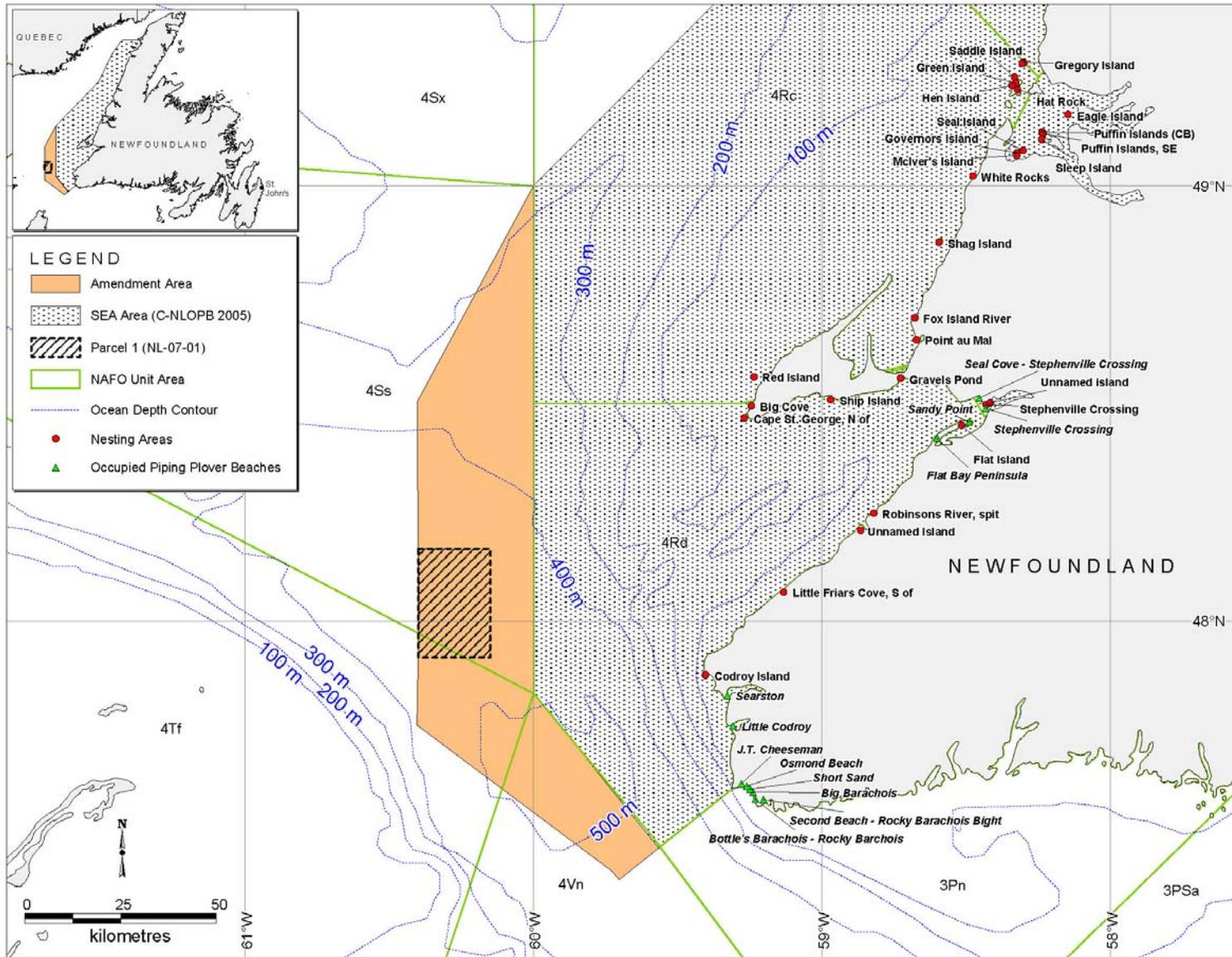
## **3.4 Marine-associated Birds**

Only seabirds are considered in this section of the SEA Amendment.

### **3.4.1 Seabirds**

As discussed in Section 3.5.1 of the SEA (C-NLOPB 2005), the marine coast and waters of western Newfoundland have lower abundances of pelagic seabirds than other coastal areas of Newfoundland (Lock et al. 1994). This is likely so, because these areas are less influenced by the major oceanic currents than other areas such as the east coast. This also may be due to a lack of breeding habitat along the west coast and the lower productivity of the adjacent waters compared to the east coast (Lock et al. 1994).

Nonetheless, numerous species of seabirds are present within the Amendment Area, including shearwaters, fulmars, petrels, jaegers, skuas, phalaropes, gannets, cormorants, alcids, kittiwakes, and gulls (Lock et al. 1994). During the nesting season, some of these seabirds come from colonies in the SEA Area (Figure 3.12), but many, particularly Northern Gannets, Razorbills, Common Murres, and fewer numbers of Atlantic Puffins, are from larger colonies in the Îles de la Madeleine, such as the large



**Figure 3.12. Seabird Nesting Areas Closest to the Amendment Area.**

gannet colony there, and along the Québec North Shore, such as Bonaventure Island (Rail and Chapdelaine 2002). Only the large gulls, terns, and gannets are reported to be common in the Amendment Area (see Table 3.10 in SEA; C-NLOPB 2005).

Lock et al. (1994) noted the abundance of seabirds off the west coast of Newfoundland in 15°N by 30°W blocks by season; nine of the blocks (or parts thereof) fall within the Amendment Area, but not all blocks were surveyed each season (Figure 3.13). The highest abundance of seabirds in the Amendment Area occurs from January through September; at that time, seabirds would be most vulnerable to perturbations. The abundance of seabirds within the Amendment Area varies seasonally as follows: 0.10 to 9.99 individuals per linear kilometre from January through March (four blocks surveyed), 0 to 9.99 birds per kilometre from April through June (seven blocks surveyed), 0.10 to 9.99 birds per kilometre from July through September (six blocks surveyed), and 0.10 to 0.99 birds per kilometre from October through December (three blocks surveyed).

#### **3.4.1.1 Nesting Populations and Breeding Biology**

A comprehensive review of the nesting populations can be found in Section 3.5.1.1 of the SEA (C-NLOPB 2005) and updated colony data are provided in Figure 3.12 and Table 3.4 of this document. Common Terns, Arctic Terns, Great Black-backed Gulls, Herring Gulls, Ring-billed Gulls, Black-legged Kittiwakes, and Black-headed Gulls nest in colonies scattered along the west coast of Newfoundland (Figure 3.12; Table 3.4).

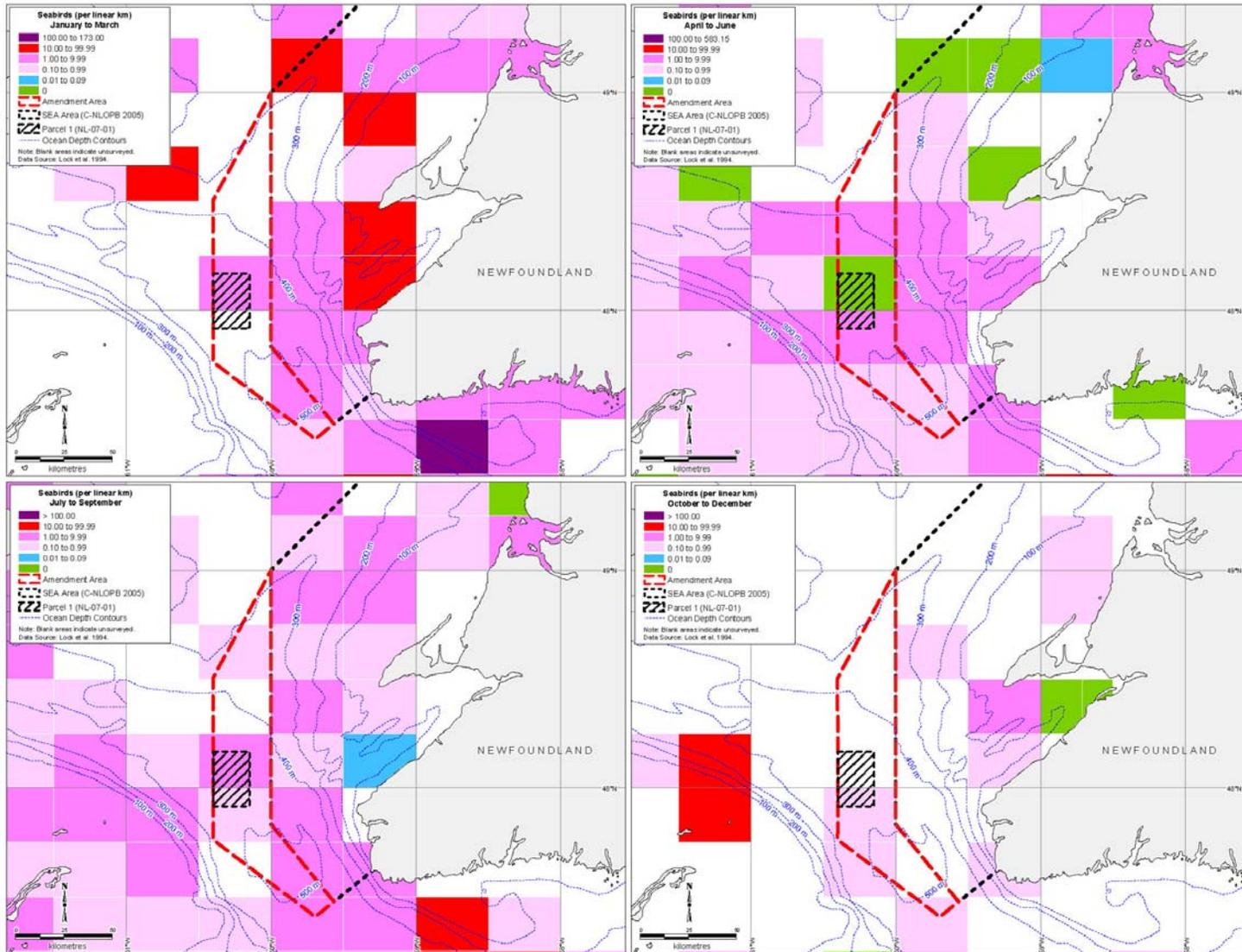
Seabirds nesting nearest to the Amendment Area are long-lived with low rates of population growth, as shown in Table 3.12 of the SEA (C-NLOPB 2005). Egg-laying commences in mid to late May and into June, and most species are fledged by July–August with Northern Gannets fledging into October and November (see Table 3.13 in SEA; C-NLOPB 2005). Most nesting is on coastal islands, and terns and gulls also nest at many of the sandy beaches and peninsulas along the west coast of Newfoundland.

#### **3.4.1.2 Prey and Foraging Habits**

Seabirds in the Amendment Area feed on a variety of prey species including fish, crustaceans, and cephalopods, as outlined in Section 3.5.1.2 of the SEA (C-NLOPB 2005). The foraging strategies of seabirds vary by species; terns and phalaropes specialize in foraging in shallow depths at the surface, while species such as alcids may dive to great depths (20 to 180 m) (Piatt and Nettleship 1985). For more detail regarding prey and foraging habits, see Section 3.5.1.2 and Table 3.14 in the SEA (C-NLOPB 2005).

#### **3.4.1.3 Geographic and Seasonal Distribution**

During the nesting season, data from at-sea surveys show that the majority of seabirds are concentrated around large nesting colonies (Lock et al. 1994). Since most species do not breed until four or five years of age, there are large cohorts of immature birds, which summer in adjacent waters and offshore. Large



**Figure 3.13. Geographic and Seasonal Distributions and Abundances of Seabirds in the Amendment Area and Surrounding Area.**

**Table 3.4. Estimated Numbers of Pairs of Colonial, Marine-associated Birds and Bird Species of Conservation Concern Nesting in Coastal Western Newfoundland in the Study Area.**

Nesting Areas and Important Bird Areas	Decimal Latitude	Decimal Longitude	Species										Black Guillemot	TOTAL	
			Waterfowl	Cormorants		Shorebirds	Gulls, Kittiwakes and Terns								Alcids (Auks)
			Common Eider	Double-crested Cormorant	Unidentified Cormorant	Piping Plover <sup>2</sup>	Black-headed Gull <sup>3</sup>	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake	Arctic Tern <sup>5</sup>			Unidentified Tern <sup>5</sup>
No. of Nesting Sites			8	2	4	12	1	10	31	30	5	2	27	1	124
Second Beach – Rocky Barachois Bight <sup>1</sup>	47.59	59.20				Nesting									≥ 1
Bottle's Barachois – Rocky Barachois <sup>1</sup>	47.59	59.23				Nesting									≥ 1
Big Barachois <sup>1</sup>	47.61	59.24				Nesting									≥ 1
Short Sand <sup>1</sup>	47.61	59.25				Nesting									≥ 1
Osmond Beach <sup>1</sup>	47.62	59.26				Nesting									≥ 1
J.T. Cheeseman <sup>1</sup>	47.63	59.28				Nesting									≥ 1
Little Codroy <sup>1</sup>	47.76	59.31				Nesting									≥ 1
Searston	47.83	59.33				Nesting									≥ 1
Codroy Island	47.88	59.40						11-100	11-100						22-200
S of Little Friars Cove	48.07	59.13			11-100										11-100
Unnamed island, Crabbes Estuary	48.21	58.87						11-100	11-100		25				47-225
Robinsons River sandspit	48.25	58.82										9			9
Flat Bay Peninsula	48.42	58.60				Nesting									≥ 1
Flat Island	48.45	58.52						101-500	11-100		50				165-653
Sandy Point	48.46	58.49				Nesting									≥ 1
N of Cape St. George	48.47	59.27								501-1000					501-100
Big Cove (Port-au-Port Bay)	48.49	59.24								> 1000					> 1000
Stephenville Crossing	48.49	58.43				Nesting									≥ 1
Stephenville Crossing	48.50	58.43					≥10 <sup>4</sup>					225			≥ 235
Seal Cove – Stephenville Crossing	48.51	58.46				Nesting									≥ 1
Ship Island (Port-au-port Bay)	48.51	58.97						11-100	11-100						22-200
Gravels Pond, unnamed island	48.56	58.73										210			210
Red Island (Port-au-port Bay)	48.56	59.24						101-500	11-100						112-600
Point au Mal	48.70	58.67										50			50
Fox Island River	48.70	58.68										10			10
Shag Island (N of Port-au-port Bay)	48.87	58.59	12		101-500			101-500	101-500	11-100				11-100	337-1700
White Rocks	49.02	58.48							11-100						11-100

Nesting Areas and Important Bird Areas	Decimal Latitude	Decimal Longitude	Species													TOTAL
			Waterfowl	Cormorants		Shorebirds	Gulls, Kittiwakes and Terns						Alcids (Auks)			
			Common Eider	Double-crested Cormorant	Unidentified Cormorant	Piping Plover <sup>2</sup>	Black-headed Gull <sup>3</sup>	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake	Arctic Tern <sup>5</sup>	Unidentified Tern <sup>5</sup>	Black Guillemot		
McIver's Island	49.07	58.32												435		435
Governors Island (Bay of Islands)	49.08	58.32								501-1000	11-100					512-1000
Seal Island (Bay of Islands)	49.08	58.30								101-500	11-100					112-600
Sleep Island	49.11	58.24								101-500	11-100					112-600
Puffin Islands, SE	49.12	58.23								11-100	11-100					22-200
Puffin Islands	49.12	58.24								11-100	11-100					22-200
Eagle Island	49.16	58.15								101-500	11-100	11-100				123-700
Hat Rock	49.22	58.32									11-100	11-100				22-200
Hen Island	49.23	58.34	50								11-100	11-100				72-200
Green Island (Bay of Islands)	49.24	58.33									11-100					11-100
Saddle Island	49.25	58.33			101-500						11-100	11-100	501-1000			624-1700
Unnamed island SW of Gregory Island	49.28	58.31			11-100											11-100
Gregory Island	49.28	58.30			101-500	101-500					202-1000	11-100				415-2100
Unnamed island SW of Trout River Bay	49.48	58.14									11-100	11-100				22-200
Western Island (St. Paul's Inlet)	49.83	57.79												155		155
Middle Island (St. Paul's Inlet)	49.83	57.78												460		460
Little Island (St. Paul's Inlet)	49.85	57.79								11-100				2375		2386-2475
Sandbar in St. Pauls Bay	49.87	57.80												9		9
Steering Island	49.94	57.83								11-100	12-700	11-100				34-900
Belldowns Islands	49.94	57.79									11-100	11-100	11-100			33-300
Gull Island (Hawkes Bay)	50.62	57.16												95		95
Keppel Island	50.63	57.32												6		6
Querre Island	50.72	57.32									202-1000			700		902-1700
Round Island	50.72	57.32														101-500
Savage Island	50.73	57.31								101-500	22-100	202-1000				325-1600
Green Island (St. John Bay)	50.75	57.24									11-100	11-100				22-100
S of Green Island (St. John Bay)	50.75	57.25	20													20
Seal Rocks	50.79	57.28												30		30
Horn Island	50.80	57.22												1200		1200
Sheep Island (Good Bay)	50.82	57.20												270		270
Hare Island	50.82	57.15									11-100					11-100
Off of Hare Island	50.83	57.16	6													6

Nesting Areas and Important Bird Areas	Decimal Latitude	Decimal Longitude	Species													TOTAL	
			Waterfowl	Cormorants		Shorebirds	Gulls, Kittiwakes and Terns						Alcids (Auks)				
			Common Eider	Double-crested Cormorant	Unidentified Cormorant	Piping Plover <sup>2</sup>	Black-headed Gull <sup>3</sup>	Ring-billed Gull	Herring Gull	Great Black-backed Gull	Black-legged Kittiwake	Arctic Tern <sup>5</sup>	Unidentified Tern <sup>5</sup>	Black Guillemot			
Flat Island	50.83	57.31							11-100	11-100							22-200
Turr Island (west)	50.83	57.11							101-500	112-600							213-1100
Turr Island (east)	50.84	57.10								11-100	101-500						112-600
Flat Island, NE tip of	50.84	57.29	22														22
Whale Island (west)	50.88	57.15								101-500	11-100				145		257-745
Dolman Island	50.89	57.15								101-500							101-500
Twin Islands (south)	50.89	57.28	20							11-100	11-100				30		72-200
Twin Islands (north)	50.89	57.29									213-1100	22-200					235-1300
SW of Fox Islands	50.92	57.13	10														10
Fox Islands (south)	50.92	57.12														155	155
Fox Island (east)	50.92	57.11									101-500	11-100				55	167-655
Fox Islands (east)	50.92	57.10									202-1000						202-1000
E of Fox Islands	50.92	57.14	24														24
James Island	50.92	57.18									112-600	213-1100					325-1700
White Island (St. John Bay)	50.93	57.02													160		160
Black Island	50.96	57.05													285		285
Rase Island	51.01	56.96									11-100				50		61-150
Rock SE of Bird Islands (St Margaret Bay)	51.01	56.93													85		85
Bird Islands, middle (St. Margaret Bay)	51.02	56.93									11-100						11-100
Bird Islands, E of (St. Margaret Bay)	51.02	56.93	60														60
Green Islands (east)	51.03	56.96													35		35
Green Islands, large (St. Margaret Bay)	51.03	56.96													50		50
Green Islands, west (St. Margaret Bay)	51.03	56.97									22-200						22-200
Rock NW of Wooded Island	51.03	56.96													105		105

Source: Peter Thomas, Canadian Wildlife Service, unpubl. 2002 survey data, unless noted.

<sup>1</sup> Important Bird Area.

<sup>2</sup> Endangered, *Species at Risk Act*, Schedule 1.

<sup>3</sup> Rare.

<sup>4</sup> Bruce Mactavish, LGL, 2007, pers. comm.

<sup>5</sup> Provincially Sensitive.

aggregations of alcids may include individuals from both Québec North Shore and Newfoundland colonies (Rail and Chapdelaine 2002). Large numbers of the Southern Hemisphere breeding seabirds such as Greater Shearwater, Sooty Shearwater, and Wilson's Storm-Petrel spend the austral winter in Newfoundland waters.

However, only a small proportion of these populations occur in the western Newfoundland offshore region, and an even smaller proportion occur in the Amendment Area. During the northern winter, Arctic-nesting species winter south of the ice in Newfoundland waters. These consist of Northern Fulmar, Glaucous Gull, Black-legged Kittiwake, Thick-billed Murre, and Dovekie (Lock et al. 1994).

### **3.4.2 Important Bird Areas**

The Important Bird Area (IBA) program identifies habitat important to the survival of bird species. Three coastal IBAs in the west-southwest Newfoundland were identified in the SEA (C-NLOPB 2005), including the Codroy Valley Estuary, Grand Bay west to Cheeseman Provincial Park, and Gros Morne National Park. No additional IBAs are located in the Amendment Area. For a more detailed summary of IBA sites on the west coast of Newfoundland, refer to Section 3.5.4 of the SEA (C-NLOPB 2005).

### **3.4.3 Bird Species at Risk**

None of the seabirds that occur in the Amendment Area are considered to be at risk.

### **3.4.4 Rare Species**

Rare species in the SEA Area, as noted in Section 3.5.6 of the SEA (C-NLOPB 2005), include Black-headed Gulls and Willets that breed in some bays and estuaries along the southern part of the west coast of Newfoundland. As the Amendment Area is located offshore, no breeding rare species are expected to occur there.

### **3.4.5 Planning Implications Related to Marine-associated Birds**

The abundance of pelagic birds is low in the Amendment Area compared to other parts of Newfoundland and Labrador. The peak vulnerability of these species occurs from January through September. Coastal concentrations of other marine-associated species occur at various sites along the west coast of Newfoundland. Common Eiders, Harlequin Ducks, Black Ducks, and Canada Geese occur in coastal waters and estuaries. Harlequin Ducks are listed as a *species of concern* by SARA and are considered *vulnerable* by the Government of Newfoundland and Labrador. Nationally significant concentrations of Canada Geese occur at Codroy estuary, and those wetlands also support an abundance of breeding and staging Black Ducks, Pintail, Wigeon, and other waterfowl that are designated as internationally significant (RAMSAR Convention). As detailed in the SEA, shorebirds are also common at various locations along the west coast of Newfoundland. The Piping Plover is the highest profile shorebird; this species is listed as *endangered* by SARA and by the Government of Newfoundland and Labrador.

Nearshore shallow water areas are important to most marine-associated birds at some time of the year. Although the Amendment Area is well offshore, coastal birds are vulnerable to oil spills and blowouts originating in that area, depending on spill trajectories. Appropriate mitigations may have to be developed to minimize any impact of oil and gas activities in the Amendment Area.

For most exploration, delineation, and production drilling programs in recent years, the C-NLOPB has required that the Operator undertake seabird monitoring from drilling rigs during the drilling program. For seismic programs, mitigation includes seabird monitoring and a stranded bird release program in the Newfoundland and Labrador offshore area. Therefore, it is anticipated that the Board will require similar monitoring programs during the exploration, seismic and drilling programs in the Amendment Area.

Protocols and data sheets for offshore seabird monitoring programs conducted from fixed installations and moving vessels are provided by the Canadian Wildlife Service.

Possible mitigative measures are discussed in Section 4.0.

### **3.4.6 Data Gaps Related to Marine-associated Birds**

As discussed in the Section 3.5.1 of the SEA (C-NLOPB 2005), there was, and continues to be, relatively little information on seabirds for this area of offshore Newfoundland. Data on seabirds off coastal Newfoundland rely mainly on Brown et al. (1975) and Brown (1986), and are therefore historical in context. These ship-based data are now two to three decades old, and may not be representative of current abundance and distribution (Lock et al. 1994). Additional temporal and spatial data on pelagic seabirds off the west coast of Newfoundland are desirable as they are the most sensitive group to oil spills. Operators will be encouraged to utilize suitable qualified personnel to collect marine-associated bird data during exploratory and production activity.

## **3.5 Marine Mammals and Sea Turtles**

### **3.5.1 Marine Mammals**

At least 18 species of marine mammals are known or expected to occur in or proximate to the Amendment Area, including 14 species of cetaceans (whales, dolphins, and porpoises) and four species of phocids (seals; Table 3.5). Additional marine mammal species may occur rarely. Most marine mammals are seasonal inhabitants, the waters of the Gulf of St. Lawrence and surrounding areas being important feeding grounds for many of them.

**Table 3.5. Marine Mammals Likely to Occur in the Amendment Area and Respective COSEWIC and SARA Status.**

Common Name	Scientific Name	COSEWIC Status <sup>a</sup> (SARA listing/status)
<b>Baleen Whales</b>	<b>Mysticetes</b>	
Blue Whale	<i>Balaenoptera musculus</i>	<i>Endangered</i> (Schedule 1)
Fin Whale	<i>Balaenoptera physalus</i>	<i>Special Concern</i> (Schedule 1)
Sei Whale	<i>Balaenoptera borealis</i>	<i>Data Deficient</i> (No status)
Humpback Whale	<i>Megaptera novaeangliae</i>	<i>Not At Risk</i> (No status)
Minke Whale	<i>Balaenoptera acutorostrata</i>	<i>Not At Risk</i> (No status)
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	<i>Endangered</i> (Schedule 1)
<b>Toothed Whales</b>	<b>Odontocetes</b>	
Sperm Whale	<i>Physeter macrocephalus</i>	<i>Not At Risk</i> (No status)
Northern Bottlenose Whale	<i>Hyperoodon ampullatus</i>	<i>Endangered</i> —Scotian Shelf Population (Schedule 1); <i>Not At Risk</i> —Davis Strait Population (No status)
Belua Whale	<i>Delphinapterus leucas</i>	<i>Threatened</i> —St. Lawrence Estuary Population (Schedule 1)
Killer Whale	<i>Orcinus orca</i>	<i>Data Deficient</i> (No status)
Long-finned Pilot Whale	<i>Globicephala melas</i>	Not assessed (No status)
Short-beaked Common Dolphin	<i>Delphinus delphis</i>	Not assessed (No status)
Atlantic White-sided Dolphin	<i>Lagenorhynchus acutus</i>	Not assessed (No status)
White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	Not assessed (No status)
Harbour Porpoise	<i>Phocoena phocoena</i>	<i>Special Concern</i> (No schedule or status; referred back to COSEWIC)
<b>True Seals</b>	<b>Phocids</b>	
Harbour Seal	<i>Phoca vitulina</i>	Not assessed (No status)
Grey Seal	<i>Halichoerus grypus</i>	Not assessed (No status)
Harp Seal	<i>Phoca groenlandica</i>	Not assessed (No status)
Hooded Seal	<i>Cystophora cristata</i>	Not assessed (No status)

<sup>a</sup> Based on COSEWIC (2007).

### 3.5.1.1 DFO Cetacean Sightings Database

DFO in St. John's (J. Lawson, DFO Marine Mammal Research Scientist, 2007, pers. comm.) is compiling a database of cetacean sightings in waters around Newfoundland and Labrador. These data provide some indication of what species can be expected to occur in the area but they cannot, at this point in the development of the database, provide any fine-scale quantitative information as the database typically does not include observation effort. Table 3.6 contains the coarse summary data pertaining to sightings in the SEA and the Amendment Areas; caveats associated with the DFO data are also presented. While the database contains sightings recorded from 1945 to 2007, sightings in the SEA and Amendment Areas were recorded from 1974 to 2006. None of the sightings from the DFO Maritimes cetacean sightings database occur within the SEA (C-NLOPB 2005) or Amendment Areas.

**Table 3.6. Cetecean and Sea Turtle Sightings in the SEA and Amendment Areas (from the NL DFO database).**

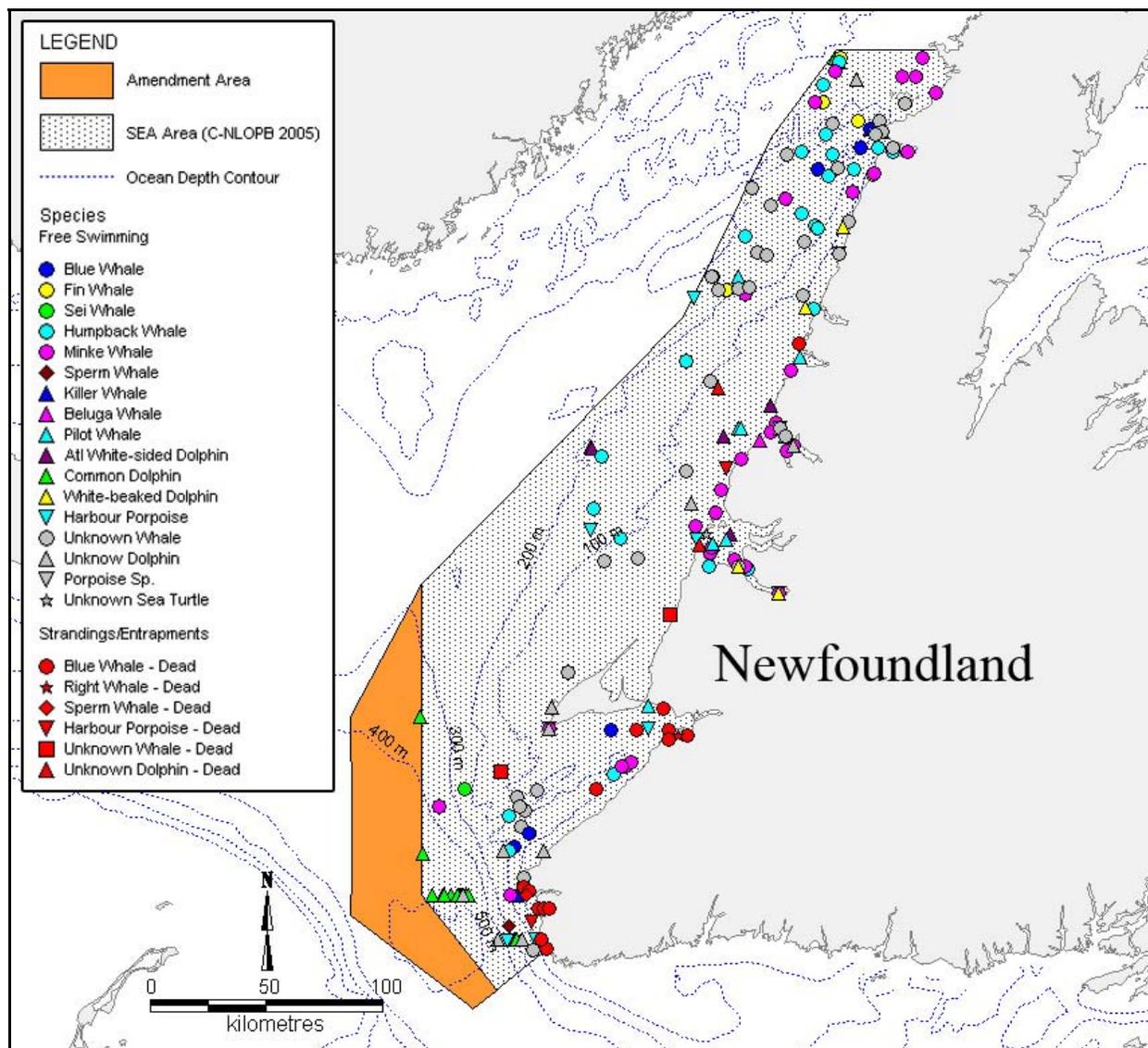
Species	Free-swimming Sightings		Strandings/ Entrapments		Months
	No. of Sightings	No. of Individuals	No. of Sightings	No. of Individuals	
Blue Whale	13	20	16	27	Feb. - Oct.
Fin Whale	17	43			May - Sept.
Sei Whale	1	1			Feb.
Humpback Whale	57	191			Feb. - Oct.
Right Whale			1	1	?
Minke Whale	73	130			May - Sept.
Sperm Whale	1	1	1	1	May & Sept.
Killer Whale	3	5			June & Oct.
Beluga Whale	3	18			June - July
Pilot Whale	10	92			April - August
White-sided Dolphin	7	133			July - Sept.
Common Dolphin	19	108			Sept.
White-beaked Dolphin	7	49			June - July
Harbour Porpoise	12	92	2	4	June - Oct.
Porpoise Sp.	4	60			July & Sept.
Unknown Dolphin	13	44	2	4	June - Sept.
Unknown Whale	52	91	2	2	Jan. - Dec.
Unknown Sea Turtle	1	1			August
<b>Total</b>	<b>293</b>	<b>1079</b>	<b>24</b>	<b>39</b>	

Source: DFO (2007d).

\*Note the following caveats associated with the tabulated data:

- (1) The sighting data have not yet been completely error-checked.
- (2) The quality of some of the sighting data is unknown.
- (3) Most data have been gathered from platforms of opportunity that were vessel-based. The inherent problems with negative or positive reactions by cetaceans to the approach of such vessels have not yet been factored into the data.
- (4) Sighting effort has not been quantified (i.e., the numbers cannot be used to estimate true species density or areal abundance).
- (5) Both older and some more recent survey data have yet to be entered into this database. These other data will represent only a very small portion of the total data.
- (6) Numbers sighted have not been verified (especially in light of the significant differences in detectability among species).
- (7) For completeness, these data represent an amalgamation of sightings from a variety of years (e.g., since 1945) and seasons. Hence, they may obscure temporal or areal patterns in distribution (e.g., the number of pilot whales sighted in nearshore Newfoundland appears to have declined since the 1980s but the total number sighted in the database included here suggest they are relatively common).

Minke whales accounted for most sightings followed by humpback whales (Figure 3.14). Most sightings of minke and humpback whales in the DFO database were recorded from research cruises. Common dolphins, fin whales, blue whales, harbour porpoise, and long-finned pilot whales were also regularly sighted within the SEA Area (Figure 3.14). There are relatively few sightings of white-sided and white-beaked dolphins recorded in the SEA Area, and only limited sightings of sei whales, sperm whales, killer whales, and belugas (Figure 3.14). There was only one sighting recorded in the Amendment Area; three common dolphins were recorded in September 2002 during a DFO aerial survey.



**Figure 3.14. Sightings of Cetaceans and Sea Turtles in the Amendment and SEA Areas, Including Strandings and Entrapments (from the NL DFO Cetacean Sightings Database).**

Many of the blue whale sightings shown in Figure 3.14 that occur in the SEA Area were whales that stranded or were entrapped (16 of 29 sightings), and do not necessarily represent individuals that were foraging in the area. Blue whales in the Gulf of St. Lawrence (GSL) are known to concentrate in the Estuary and North Shore region during summer (see COSEWIC 2002). COSEWIC (2002) does not consider the Amendment and SEA Areas to be areas of known concentration for blue whales but further study is likely required. Given the nomadic nature of blue whales in Atlantic Canada it is quite possible they may occur in the SEA and Amendment Areas to forage. No studies to date have clearly documented the timing and exact location of the migration route of blue whales in and out of the GSL. Available information suggests that blue whales enter the GSL via the Cabot Strait by the end of March and early April (see COSEWIC 2002).

A limited number of sightings are also available through a database managed by DFO in Mont-Joli, Quebec (Jean-François Gosselin, Marine Mammal Technician, 2007, pers. comm.). Sightings were recorded from two Canadian Coast Guard vessels, the *Martha L. Black* in October-November 2002 and the *Teleost* in July-August 2005. In total, seven sightings of marine mammals were recorded in the SEA Area (Figure 3.15). These seven sightings included one sighting of two blue whales, one sighting of three fin whales, two sightings totaling ~23 Atlantic white-sided dolphins, one white-beaked dolphin, one grey seal, and one sighting of three unidentified whales (Figure 3.15). No cetacean sightings were recorded in the Amendment Area.

### 3.5.1.2 Other Sighting Sources

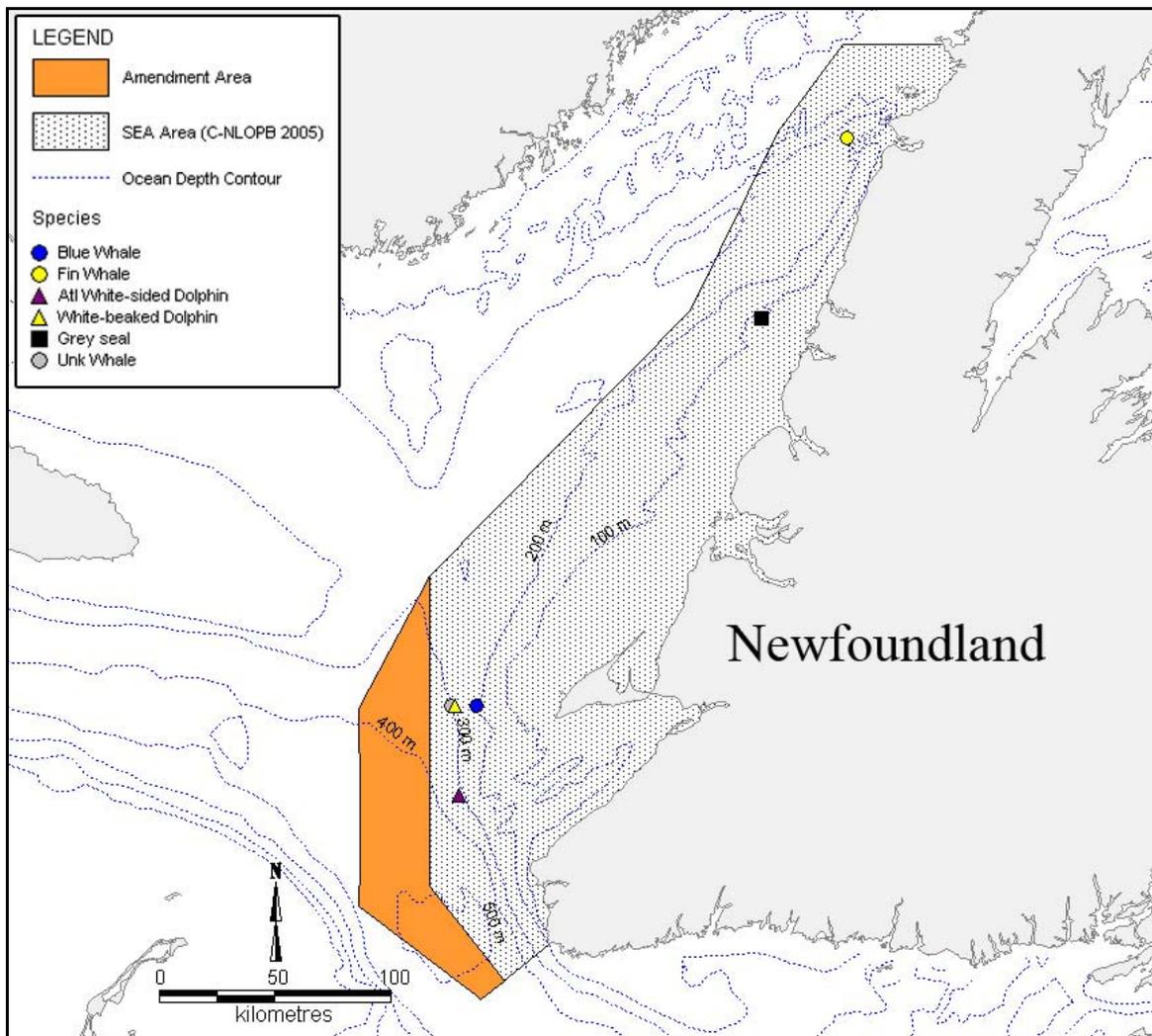
Kingsley and Reeves (1998) flew aerial line-transect surveys of cetaceans in the Gulf of St. Lawrence in late August and early September of 1995 and in late July and early August of 1996. Twenty sightings were recorded within the SEA and Amendment Areas, including 14 in 1995 and six in 1996. The 20 sightings included: one fin whale, two sightings of single minke whales, two sightings totaling 52 long-finned pilot whales, five sightings totaling 73 Atlantic white-sided dolphins, six sightings totaling 103 harbour porpoise, one unidentified large whale, and three sightings of a total of 19 unidentified small cetaceans (Kingsley and Reeves 1998). Four of these sightings were recorded in the Amendment Area; one of long-finned pilot whales, two of Atlantic white-sided dolphins, and one of unidentified small cetaceans.

### 3.5.1.3 Species Profiles

Two cetacean species that were not described in the SEA (C-NLOPB 2005) were recorded in both the SEA Area and the Amendment Area in the NL DFO cetacean sightings database; sei whales and common dolphins. Descriptions for these two species are provided here.

#### Sei Whale

Sei whales (*Balaenoptera borealis*) typically occur in offshore, pelagic habitats and appear to be associated with the continental shelf edge in the northwest Atlantic (Hain et al. 1985 in COSEWIC 2003). Sei whales are known for their high mobility and unpredictable appearances (Reeves et al. 1998). They are not considered deep divers and eat a variety of prey including copepods, euphausiids, and small fish. Incursions into nearshore waters of the Gulf of Maine, associated with high copepod densities, are well documented (Payne et al. 1990; Schilling et al. 1992). Two stocks have been proposed in the northwest Atlantic, one off Nova Scotia and one in the Labrador Sea (Mitchell and Chapman 1977). There is no reliable population estimate for sei whales. COSEWIC (2007) lists the species as *data deficient*.



**Figure 3.15. Sightings of Cetaceans and Sea Turtles in the Amendment and SEA Areas (from the Quebec DFO Cetacean Sightings Database).**

### **Common (Short-beaked) Dolphin**

The short-beaked dolphin (*Delphinus delphis*) has a northwest Atlantic range that extends from Venezuela and the Gulf of Mexico to Newfoundland. These dolphins occur rather commonly offshore Newfoundland, usually in groups ranging from 50 to 200 individuals. Most of the population in U.S. waters is located south of Georges Bank in areas where water depth ranges between 100 and 200 m, although they are also known to occur at the 2000-m isobath. A best estimate of abundance for the northwest Atlantic common dolphin is 120,743 (Waring et al. 2006). Short-beaked dolphins eat a variety of fishes and squids (Katona et al. 1993). COSEWIC (2007) lists this species as *not at risk*.

### 3.5.2 Sea Turtles

Three species of sea turtle could potentially occur in the Amendment Area (Table 3.7). In order of decreasing abundance in North American waters, they include: (1) the loggerhead turtle (*Caretta caretta*), (2) the leatherback turtle (*Dermochelys coriacea*), and (3) the Kemp's ridley turtle (*Lepidochelys kempii*).

**Table 3.7. Sea Turtles Likely to Occur in the Amendment Area and Respective COSEWIC and SARA Status.**

Common Name	Scientific Name	COSEWIC Status <sup>a</sup> (SARA listing/status)
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered (Schedule 1)
Loggerhead turtle	<i>Caretta caretta</i>	Not assessed (No status)
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	Not assessed (No status)

<sup>a</sup> Based on COSEWIC (2007).

#### 3.5.2.1 DFO Cetacean Sightings Database

A single sea turtle sighting (that could not be identified to the species level) from the NL DFO cetacean sightings database was recorded in the SEA Area (Figure 3.14). No sea turtles were recorded in the Amendment Area in the NL and Quebec DFO cetacean sightings databases.

#### 3.5.2.2 Other Sighting Sources

No sea turtles were recorded from aerial line-transect surveys of cetaceans in the Gulf of St. Lawrence in late August and early September of 1995 or in late July and early August of 1996 (Kingsley and Reeves 1998).

#### 3.5.2.3 Species Profiles

All sea turtle species were described in the SEA (C-NLOPB 2005).

### 3.5.3 Planning Implications Related to Marine Mammals and Sea Turtles

For most exploration, delineation, and production drilling operations, the C-NLOPB has required that the Operator undertake whale monitoring from drilling rigs during the drilling program. For seismic programs, it has been a standard mitigative measure in recent years to conduct marine mammal monitoring for all seismic programs in the Newfoundland and Labrador offshore area. Observational data on sea turtles in conjunction with any marine mammal monitoring will be required.

The blue whale, fin whale, North Atlantic right whale, the Scotian Shelf population of the northern bottlenose whale, the St. Lawrence Estuary population of the beluga whale, and leatherback sea turtle are currently listed under Schedule 1 of SARA (the harbour porpoise is under consideration for

Schedule 1). Blue whales, North Atlantic right whales, the Scotian Shelf population of the northern bottlenose whale, and leatherback sea turtles are listed as *endangered*. The St. Lawrence Estuary population of the beluga is listed as *threatened*. The fin whale and harbour porpoise are listed as *special concern*.

Possible mitigative measures are discussed in Section 4.0.

### **3.5.4 Data Gaps Related to Mammals and Sea Turtles**

No critical habitat for marine mammal or sea turtle species has been identified for the area but information on such habitats is sparse in general. In the case of marine mammal and sea turtle *Species at Risk*, a Recovery Strategy only exists for the leatherback sea turtle. A proposed Recovery Strategy was released by DFO in June 2006 and finalized in December 2006 (ALTRT 2006); critical habitat has not been identified but studies are underway to do so. Studies to define critical habitats for large whale species off Newfoundland and Labrador are also currently underway (P. Abgrall, LGL marine mammalogist 2007, pers. comm.). These studies, however, lack current dedicated distribution and abundance surveys. Cetacean aerial surveys off Newfoundland and Labrador, including the SEA and Amendment Areas, are planned for July–August 2007 (J. Lawson, DFO Marine Mammal Research Scientist, 2007, pers. comm.).

## **3.6 Species at Risk**

All of the following SARA and COSEWIC *Species at Risk* designations are current as of 25 June 2007 (Table 3.8).

See Section 3.7 of the SEA (C-NLOPB 2005) for more details on *Species at Risk*.

### **3.6.1 Planning Implications Related to Species at Risk**

At present, no critical habitat for any *Species at Risk* has been identified in the Amendment Area. However, operators are required to be SARA-compliant over the lifespan of a project. Mitigations currently being employed include delayed ramp-up and shutdown of seismic arrays when a marine mammal or sea turtle designated as either *endangered* or *threatened* under SARA Schedule 1 is within either 500 or 1,000 m of the seismic array. The radius of the monitoring safety zone is project-specific. Any marine mammals or sea turtles that become listed on SARA Schedule 1 as *endangered* or *threatened* during an ongoing project immediately qualify as species requiring the above mitigations.

It is also important that Operators use spatial and temporal scheduling mitigations to avoid critical life stages of *Species at Risk*. This mitigation applies to invertebrate, fish, and bird species, as well as to marine mammals and sea turtles.

**Table 3.8. SARA- and COSEWIC-listed Species with Reasonable Likelihood of Occurrence in the Amendment Area.**

	SARA <sup>a</sup>			COSEWIC <sup>b</sup>		
	Endangered	Threatened	Special Concern	Endangered	Threatened	Special Concern
<i>Marine-associated</i>						
Blue whale ( <i>Balaenoptera musculus</i> ) (Atlantic population)	Schedule 1			X		
North Atlantic right whale ( <i>Eubalaena glacialis</i> )	Schedule 1			X		
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	Schedule 1			X		
Northern bottlenose whale ( <i>Hyperoodon ampullatus</i> ) (Scotian Shelf population)	Schedule 1			X		
Beluga whale ( <i>Delphinapterus leucas</i> ) (St. Lawrence Estuary population)		Schedule 1			X	
Northern wolffish ( <i>Anarhichas denticulatus</i> )		Schedule 1			X	
Spotted wolffish ( <i>Anarhichas minor</i> )		Schedule 1			X	
Atlantic wolffish ( <i>Anarhichas lupus</i> )			Schedule 1			X
Fin whale ( <i>Balaenoptera physalus</i> ) (Atlantic population)			Schedule 1			X
Sowerby's beaked whale ( <i>Mesoplodon bidens</i> )			Schedule 3			X
Atlantic cod ( <i>Gadus morhua</i> )			Schedule 3			
Ivory Gull ( <i>Pagophila eburnea</i> )				X		
Porbeagle shark ( <i>Lamna nasus</i> )				X		
White shark ( <i>Carcharodon carcharias</i> )				X		
Winter skate ( <i>Leucoraja ocellata</i> ) (Southern Gulf of St. Lawrence population)				X		
Atlantic cod ( <i>Gadus morhua</i> ) (Laurentian North population)					X	
Cusk ( <i>Brosme brosme</i> )					X	
Shortfin mak ( <i>Isurus oxyrinchus</i> )					X	
Striped bass ( <i>Marone saxatilis</i> ) (Southern Gulf of St. Lawrence population)					X	
Harbour porpoise ( <i>Phocoena phocoena</i> ) (Northwest Atlantic population)						X
Blue shark ( <i>Prionace glauca</i> )						X
Harbour porpoise ( <i>Phocoena phocoena</i> )						X
American eel ( <i>Anguilla rostrata</i> )						X

Sources: <sup>a</sup> SARA website ([http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)) (May 2007).

<sup>b</sup> COSEWIC website (<http://www.cosepac.gc.ca/index.htm>) (May 2007).

Critical habitat of *Species at Risk* is also protected under *SARA*. The protection of critical habitats is a major aspect of *SARA* Recovery Strategies. Species listed in Table 3.8 for which Recovery Strategies have been prepared include the leatherback sea turtle (ALTRT 2006) and northern and spotted wolffish (Kulka et al. 2007). Mitigations to protect critical habitat in such areas will have to be employed and monitored. A Management Plan for Atlantic wolffish has also been completed (Kulka et al. 2007).

Possible mitigative measures are discussed in Section 4.0.

### **3.6.2 Data Gaps Related to Species at Risk**

As is the case with most marine biota, much of the basic biological information related to species identified as being at risk is lacking (e.g., critical habitat, movement patterns, inter-relationships with other species, critical life stage behaviours).

## **3.7 Potentially Sensitive Areas**

One key area of potential sensitivity proximate to the Amendment Area has been identified: the Cod Spawning Area located west of the Port au Port Peninsula. While not in the Amendment Area, it does abut the northeastern part of the Amendment Area (Figure 3.16) and could potentially fall within spill trajectories, being generally down-wind of potential oil and gas activities in the Amendment Area.

The Cod Spawning Area is closed to groundfish fishing between 1 April and 15 June because of the occurrence of spawning by 4RS/3Pn cod. The area was established in 2002 and has been resized since that time. Corner coordinates of the Cod Spawning Area are as follow:

48° 00' N, 59° 20' W  
49° 10' N, 59° 20' W  
49° 10' N, 60° 00' W  
48° 00' N, 60° 00' W

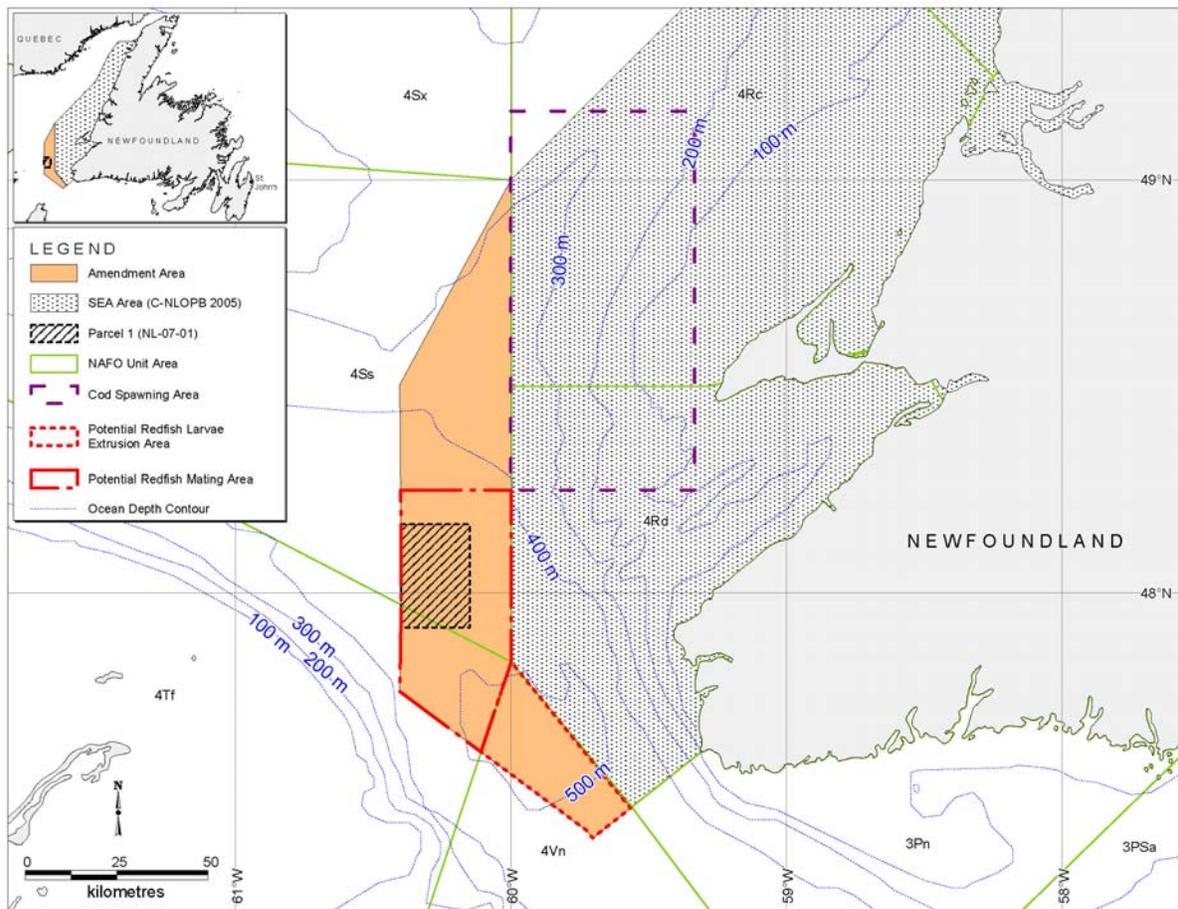
As discussed in Section 3.3.1, it has been suggested that redfish mate during the September to December period in portions of the Amendment Area, in particular where Parcel 1 is located (Figure 3.16). There is also some likelihood that larval extrusion by redfish occurs in the southern portion of the Amendment Area, specifically where NAFO Division 4Vn overlaps with the Amendment Area (Figure 3.16). Larval extrusion is thought to occur during the April to July period.

No potentially sensitive areas in the Amendment Area were identified by the Gulf of St. Lawrence Integrated Management (GOSLIM) initiative. In a recently released DFO Science Advisory Report that identified and characterized ecologically and biologically significant areas (EBSA) in the Gulf of St. Lawrence (DFO 2006d), no identified EBSAs overlapped with the Amendment Area. The identified EBSAs closest to the Amendment Area are the “Southern Fringe of the Laurentian Channel” to the west, and the “West Coast of Newfoundland” to the east. However, most of the West Coast of Newfoundland EBSA (No. 10) overlaps with the original SEA Study Area (C-NLOPB 2005). EBSA 10 is an area that

experiences minimal ice coverage (<60 days per year). Contrary to what is typically observed in the Estuary and Gulf of St. Lawrence (EGSL), water temperature in EBSA 10 is slightly above the freezing point. This EBSA is mostly characterized for the role it plays for groundfish (maximum uniqueness, concentration and adaptive values). At times, entire populations of particular species concentrate in EBSA 10. Western Newfoundland is the main concentration area for juvenile Atlantic cod, redfish, American plaice and Atlantic wolffish. The West Coast of Newfoundland EBSA is also important for certain pelagic species (e.g., capelin, Atlantic herring, ribbon barracudina, spiny dogfish, silver hake and pollock), meroplankton (e.g., Atlantic cod eggs, capelin larvae, Atlantic herring larvae), and marine mammals. The Amendment Area also includes a potential EBSA in the Laurentian Channel and associated slope.

Castonguay and Valois (2007) identified part of the Amendment Area as an important biological zone for benthic fishes including witch flounder, Atlantic halibut, Atlantic cod, spinytail skate, white hake, black dogfish, and marlin-spike.

Environment Canada’s “Biodiversity Portrait of the St. Lawrence” website ([http://www.qc.ec.gc.ca/faune/biodiv/en/recherche/especes/PO\\_EN.asp](http://www.qc.ec.gc.ca/faune/biodiv/en/recherche/especes/PO_EN.asp)) indicates high species richness in the vicinity of the Amendment Area.



**Figure 3.16. Potentially Sensitive Areas Within and Near the Amendment Area.**

### **3.7.1 Planning Implications Related to Sensitive Areas**

Operators should be aware of the potentially sensitive areas in and proximate to the Amendment Area. Parcel 1 does not overlap with the Cod Spawning Area, but does occur within 10 km of its western boundary. Parcel 1 does overlap with an area suspected of being the location of redfish mating during the fall months. Various mitigations would likely be employed to minimize impact on the area. These mitigations are discussed in Section 4.0.

### **3.7.2 Data Gaps Related to Sensitive Areas**

As discussed in the previous sections, there are data gaps relating to both the physical and biological environment. Later sections of the SEA Amendment address the knowledge gaps relating to the potential effects of oil and gas exploratory and production activities on the environment. All of these data gaps apply to the identified potentially sensitive areas.