3.5 Marine Mammals

At least 23 marine mammals are known to occur within the Southern Newfoundland SEA Area, including 19 species of cetaceans (whales, dolphins, and porpoises) and four species of phocids (true seals). Additional marine mammal species, such as pygmy sperm whales and ringed or bearded seals, may occur very rarely. Several marine mammals are seasonal inhabitants, using the Grand Banks, coastal, and continental shelf waters from spring to fall (Table 3.15). Population estimates of many of the marine mammal species that occur in the SEA Area are indicated in Table 3.16.

Marine mammals within the Sydney Basin, Laurentian Sub-basin, and Laurentian Channel of the SEA Area were described in previous environmental assessments of the area (Meltzer Research and Consulting 1996; JWEL 2003; Buchanan et al. 2004, 2006; JW 2007). Incidental sightings of cetaceans during 1975 to 2006 were mapped for the Sydney Sub-basin in JW (2007). Additional information related to seasonal and spatial effort of these data sources was not provided, but may have been limited during winter months and possibly in offshore areas. Sightings included blue, fin, humpback, minke, pilot, and right whales, Atlantic white-sided dolphins, and harbour porpoises. Most sightings were concentrated close to shore or throughout the Sydney Basin offshore area. Meltzer Research and Consulting (1996) also compiled maps of cetacean sightings contributed by researchers based in St. John's, by month, for the south coast of Newfoundland, but did not indicate for which year's sightings occurred or spatial effort.

Historical and recent sightings of cetaceans within Newfoundland and Labrador waters have also been compiled by DFO in St. John's (J. Lawson, DFO, pers. comm., 2009). Cetacean sightings were also collected during monitoring programs conducted within the Laurentian Sub-basin of the SEA Area by LGL biologists in summer 2005 (Moulton et al. 2006). The results of these two new sources of data are summarized below.

3.5.1 DFO Cetacean Sighting Database

DFO in St. John's has compiled a database of cetacean sightings in waters around Newfoundland and Labrador (J. Lawson, DFO, pers. comm., 2009). Observations within the SEA Area included sightings occurring from 1975 to 2007. These data can be used to indicate what species can be expected to occur in the region, but they cannot provide fine-scale quantitative representations of marine mammal abundance or distribution in the SEA Area, at least not at this point in the development of the database. Table 3.17 contains a coarse data summary of seasonal sightings within the SEA Area, and Table 3.18 describes the general depths of cetacean sightings within the SEA Area. Figures 3.81 to 3.84 show general locations of all cetacean sightings.

A number of *caveats* should be noted when considering these 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 vessels of opportunity. The inherent problems with negative or positive reactions by cetaceans to the approach of vessels have not 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, albeit a small percentage of the total, have yet to be entered into the database
6. Numbers 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 various years (since 1975) and seasons. Effort (and number of sightings) is not necessarily consistent among months, years, and areas; thus, seasonal, depth, and distribution information should be interpreted with caution;
8. Many sightings could not be identified to species, but are listed to the smallest taxonomic group possible; and

9. Sightings from a marine mammal monitoring program in the Laurentian Sub-basin in 2005 are included in this dataset; thus, DFO data summaries and mapping includes all sightings from the Laurentian Sub-basin monitoring in 2005.

Table 3.15. Marine Mammals Likely to Occur within the SEA Area.

Species (Scientific Name)	*SARA* Status[a]	COSEWIC Status[b]	IUCN Status[c]	Occurrence	Season	Habitat
Baleen Whales (Mysticetes)						
North Atlantic right whale (*Eubalaena glacialis*)	E, Sched1	E	EN	Rare	Summer	Coastal and shelf
Humpback whale (*Megaptera novaeangliae*)	NS	NAR	LC	Common	Spring to fall	Coastal and banks
Blue whale (*Balaenoptera musculus)*	E, Sched1	E	EN	Common	Year-round, mostly spring and fall	Coastal and pelagic
Fin whale (*Balaenoptera physalus*)	SC, Sched1	SC	EN	Common	Spring to fall	Continental slope and pelagic
Sei whale (*Balaenoptera borealis*)	NS	DD	EN	Uncommon	Summer	Offshore and pelagic
Minke whale (*Balaenoptera acutorostrata*)	NS	NAR	LC	Common	Year-round, mostly spring to fall	Continental shelf and coastal
Toothed Whales (Odontocetes)						
Sperm whale (*Physeter macrocephalus*)	NS	NAR	VU	Common	Year-round, mostly summer	Pelagic, deep, continental slope, canyon
Northern bottlenose whale (*Hyperoodon ampullatus*)[d]	E, Sched1	E	DD	Uncommon	Year-round	Pelagic, deep, canyon, continental slope
Sowerby's beaked whale (*Mesoplodon bidens*)	SC, Sched3	SC	DD	Rare	Year-round	Pelagic, deep, continental slope, canyon
Beluga whale (*Delphinaptera leucas*)[e]	T, Sched1	T	NT	Very rare	Year-round	Coastal estuaries, bays, rivers
Common bottlenose dolphin (*Tursiops truncatus*)	NS	NAR	LC	Uncommon	Summer	Coastal and pelagic
Killer whale (*Orcinus orca*)	NS	SC	DD	Uncommon	Year-round	Coastal and pelagic
Long-finned pilot whale (*Globicephala melas*)	NS	NAR	DD	Common	Year-round	Mostly pelagic
Short-beaked common dolphin (*Delphinus delphis*)	NS	NAR	LC	Common	Summer	Continental shelf and pelagic
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	NS	NAR	LC	Common	Year-round, mostly spring and fall	Continental shelf and slope
White-beaked dolphin (*Lagenorhynchus albirostris*)	NS	NAR	LC	Common?	Year-round	Continental shelf
Striped dolphin (*Stenella coeruleoalba*)	NS	NAR	LC	Uncommon	Summer	Continental shelf and pelagic
Risso's dolphin (*Grampus griseus*)	NS	NAR	LC	Uncommon?	Year-round?	Continental slope

Species (Scientific Name)	*SARA* Status[a]	COSEWIC Status[b]	IUCN Status[c]	Occurrence	Season	Habitat
Harbour porpoise (*Phocoena phocoena*)	T, Sched2	SC	LC	Common	Year-round?	Continental shelf
True Seals (Phocids)						
Harp seal (*Phoca groenlandica*)	NS	NC	LC	Uncommon	Late winter/early spring	Ice, pelagic
Harbour seal (*Phoca vitulina*)	NS	NAR	LC	Uncommon	Year-round	Coastal
Hooded seal (*Cystophora cristata*)	NS	NAR	VU	Uncommon	Late winter	Ice, pelagic
Grey seal (*Halichoerus grypus*)	NS	NAR	LC	Common	Year-round, mostly summer	Coastal, continental shelf

Notes:
? indicates uncertainty.
[a] Species designation under the *Species at Risk Act* (Government of Canada 2009); E = Endangered; T = Threatened; SC = Special Concern; NS = No Status; Schedule 1, 2, or 3 indicated.
[b] Based on Atlantic stocks, unless otherwise noted, in COSEWIC (2008); E = Endangered; T = Threatened; SC = Special Concern; DD = Data Deficient; NAR = Not At Risk; NC = Not Considered.
[c] Status under the International Union for the Conservation of Nature's *Red List of Threatened Species* (IUCN 2009); CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern.
[d] Refers to Scotian Shelf population.
[e] Refers to St. Lawrence Estuary population.

Table 3.16. Population Estimates of Marine Mammals Likely to Occur within the SEA Area.

Species	NW Atlantic	Population Occurring in Regional Area		
	Est. Numbers[a]	Stock	Est. Numbers	Source
Baleen whales				
North Atlantic right whale	313	NW Atlantic	Very Rare	Knowlton et al. 1992
Humpback whale	11,570[b]	Newfoundland and Labrador	1700-3200	Whitehead 1982; Katona and Beard 1990; Baird 2003
Blue whale	Up to 1400[c]	Gulf of St. Lawrence	308	Sears et al. 1987
Fin whale	35,500[d]	NW Atlantic	2269-2814	COSEWIC 2005; Waring et al. 2007
Sei whale	Unknown	Nova Scotia	207	Waring et al. 2007
Minke whale	188,000[e]	Can. East Coast	100s-1000s	Dufault 2005
Toothed whales				
Sperm whale	4804[f]	North Atlantic	Unknown	Reeves and Whitehead 1997; Waring et al. 2007
Northern bottlenose whale	Unknown	Scotian Shelf	163	Whitehead and Wimmer 2005
Sowerby's beaked whale	Unknown			COSEWIC 2006a; Waring et al. 2007
Beluga whale	Unknown	St. Lawrence	952	Gosselin et al. 2001; COSEWIC 2004a
Common bottlenose dolphin	81,588[g]	NW Atlantic offshore	Unknown	Waring et al. 2007
Killer whale	Unknown	Newfoundland and Labrador	63	Lawson et al. 2007
Long-finned pilot whale	31,139[h]	NW Atlantic	Abundant	Nelson and Lien 1996
Short-beaked common dolphin	120,743	NW Atlantic	Unknown	Waring et al. 2007
Atlantic white-sided dolphin	63,368	NW Atlantic	Unknown	Palka et al. 1997; Waring et al. 2007
White-beaked dolphin	2003	NW Atlantic	Unknown	Waring et al. 2007
Striped dolphin	94,462	NW Atlantic	Unknown	Baird et al. 1993; Waring et al. 2007
Risso's dolphin	20,479	NW Atlantic	Rare	Baird and Stacey 1991
Harbour porpoise	Unknown	Newfoundland and Labrador	Unknown	Wang et al. 1996; COSEWIC 2006b
True seals				
Harp seal	5.5 million[i]	NW Atlantic	Unknown	DFO 2007e
Harbour seal	99,340	Newfoundland	1000	Sjare et al. 2005; COSEWIC 2007a
Hooded seal	593,500[j]	Canadian NW Atlantic	Unknown	Hammill and Stenson 2006
Grey seal	Unknown	Canadian NW Atlantic	300,000	Thomas et al. 2007

Notes:
[a] Estimates from the NW Atlantic (Waring et al. 2007) unless otherwise noted.
[b] Estimate for North Atlantic (Stevick et al. 2003).
[c] Estimate for North Atlantic (NMFS 1998).
[d] Estimate for North Atlantic (IWC 2007b; Waring et al. 2007).
[e] Estimate for North Atlantic (IWC 2007a; Waring et al. 2007).
[f] Estimate for North Atlantic.
[g] Estimate for NW Atlantic offshore stock, but may include coastal forms.
[h] Estimate may include both long- and short-finned pilot whales.
[I] Estimate for NW Atlantic (DFO 2007e).
[j] Estimate for Canadian NW Atlantic (Hammill and Stenson 2006).

Table 3.17. Number of Cetacean Sightings and Individuals within the SEA Area by Season, 1975-2007.

Species[a]	Winter (Jan-Mar)		Spring (April-May)		Summer (June-Sept)		Fall (Oct-Dec)		Unknown season		Total	
	No. Sightings	No. Indivs	No. Sightings	No. Indivs	No. Sightings	No. Indivs	No. Sightings	No. Indivs	No. Sightings	No. Indivs	No. Sightings	No. Indivs
Baleen whales												
North Atlantic right whale	0	0	0	0	1	1	0	0	0	0	1	1
Humpback whale	5	5	32	106	96	169	6	31	0	0	139	311
Blue whale	17	22	4	4	61	67	1	4	0	0	83	97
Fin whale	3	3	4	4	77	100	2	13	0	0	86	120
Sei whale	0	0	0	0	4	4	0	0	0	0	4	4
Minke whale	0	0	4	4	35	50	2	3	1	2	42	57
Toothed whales												
Sperm whale	0	0	6	12	37	43	0	0	0	0	43	55
Northern bottlenose whale	0	0	3	18	9	43	0		0	0	12	61
Sowerby's beaked whale	0	0	0	0	0	0	0	0	0	0	0	0
Beluga whale	0	0	0	0	0	0	0	0	0	0	0	0
Common bottlenose whale	0	0	0	0	5	86	0	0	0	0	5	86
Killer whale	0	0	5	12	16	114	5	15	0	0	26	141
Long-finned pilot whale	2	12	6	164	241	3028	2	45	0	0	251	3249
Short-beaked common dolphin	1	unknown	0	0	118	1774	6	89	0	0	125	1863
Atlantic white-sided dolphin	0	0	1	unknown	148	2428	2	65	0	0	151	2493
White-beaked dolphin	1	6	0	0	37	395	0	0	0	0	38	401
Striped dolphin	0	0	0	0	5	162	0	0	0	0	5	162
Risso's dolphin	0	0	0	0	5	41	0	0	0	0	5	41
Harbour porpoise	1	5	7	78	58	455	1	unknown	0	0	67	538
Unknown species												
Unknown baleen whale	0	0	2	2	42	46	0	0	0	0	44	48
Unknown toothed whale	0	0	0	0	4	10	0	0	0	0	4	10
Unknown dolphin	5	16	18	282	179	4588	11	2062	0	0	213	6948
Other unknown cetacean	25	25	24	38	152	244	31	178	0	0	232	485
Overall Total	**60**	**94**	**116**	**724**	**1330**	**13848**	**69**	**2505**	**1**	**2**	**1576**	**17171**

Source: DFO, St. John's, Newfoundland.

Notes: See the *caveats* associated with these data in Section 3.5.1. In particular, seasonal, annual, and distributional effort was not consistent throughout the SEA Area and these data represent an amalgamation of several data sources. Thus, the patterns presented here are limited by effort and should be regarded with caution.

[a] Two pygmy sperm whales were sighted in June 2001 within the SEA Area.

Table 3.18. Number of Cetacean Sightings by Depth within the SEA Area, 1975-2007.

Species[a]	Depth Category (m)					Total
	<500	500-1500	1500-2500	2500-3500	>3500	
Baleen whales						
North Atlantic right whale	1	0	0	0	0	1
Humpback whale	126	4	8	1	0	139
Blue whale	38	5	40	0	0	83
Fin whale	62	12	9	2	1	86
Sei whale	1	1	2	0	0	4
Minke whale	38	4	0	0	0	42
Toothed whales						
Sperm whale	13	8	20	2	0	43
Northern bottlenose whale	2	8	2	0	0	12
Sowerby's beaked whale	0	0	0	0	0	0
Beluga whale	0	0	0	0	0	0
Common bottlenose dolphin	2	3	0	0	0	5
Killer whale	24	0	0	2	0	26
Long-finned pilot whale	68	45	119	18	1	251
Short-beaked common dolphin	71	19	27	8	0	125
Atlantic white-sided dolphin	108	25	17	1	0	151
White-beaked dolphin	30	2	6	0	0	38
Striped dolphin	2	1	2	0	0	5
Risso's dolphin	0	1	2	1	1	5
Harbour porpoise	62	5	0	0	0	67
Unknown species						
Unknown baleen whale	25	10	8	1	0	44
Unknown toothed whale	2	1	1	0	0	4
Unknown dolphin	102	49	54	7	1	213
Other unknown cetacean	172	34	24	2	0	232
Overall Total	**949**	**237**	**341**	**45**	**4**	**1576**

Source: DFO, St. John's, Newfoundland.

Notes: See the *caveats* associated with these data in Section 3.5.1. In particular, seasonal, annual, and distributional effort was not consistent throughout the SEA Area and these data represent an amalgamation of several data sources. Thus, the patterns presented here are limited by effort and should be regarded with caution.

[a] Two pygmy sperm whales were sighted in June 2001 within the SEA Area, in waters 1000-1500 m deep.

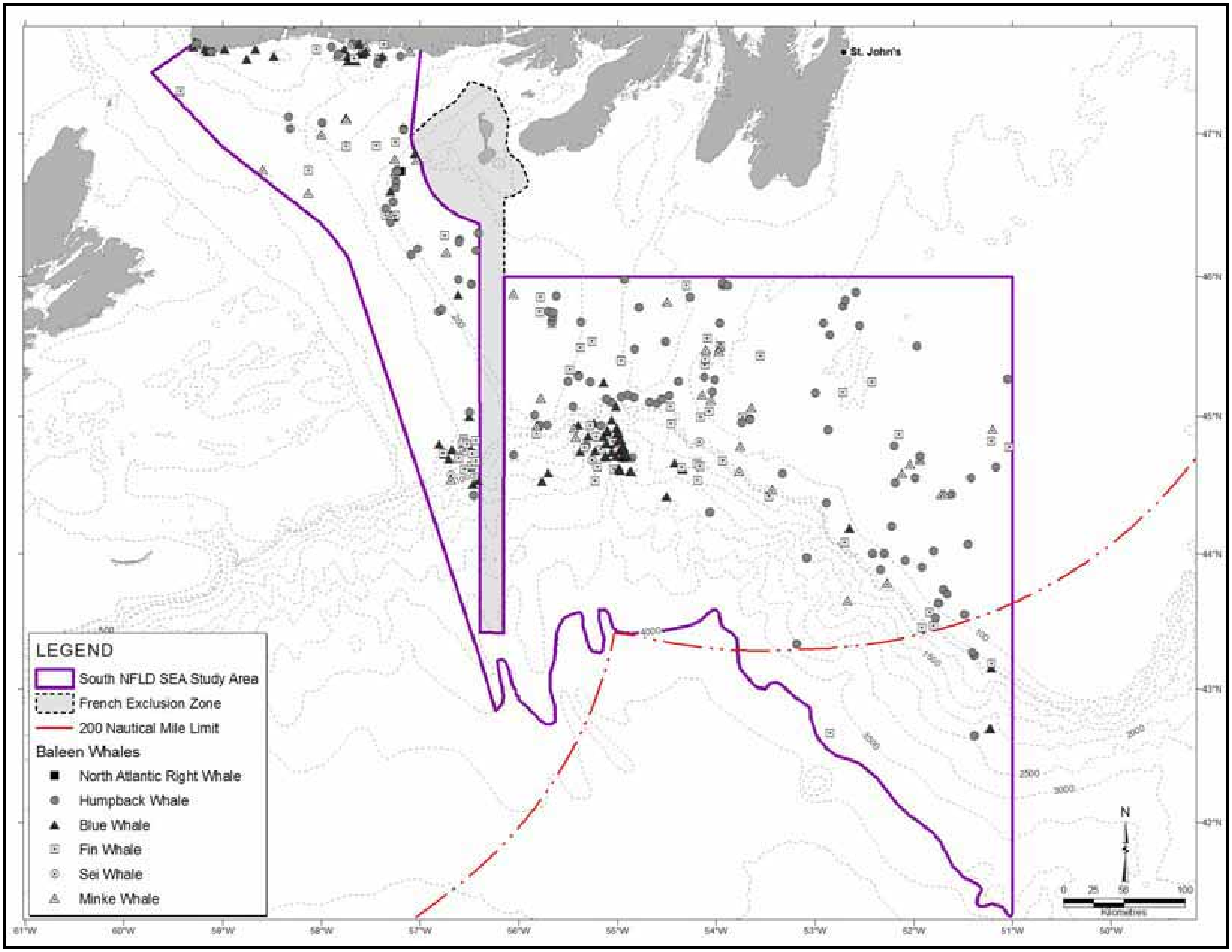


Figure 3.81. Distribution of Baleen Whale Sightings within the SEA Area (based on DFO sightings database 1975-2007).

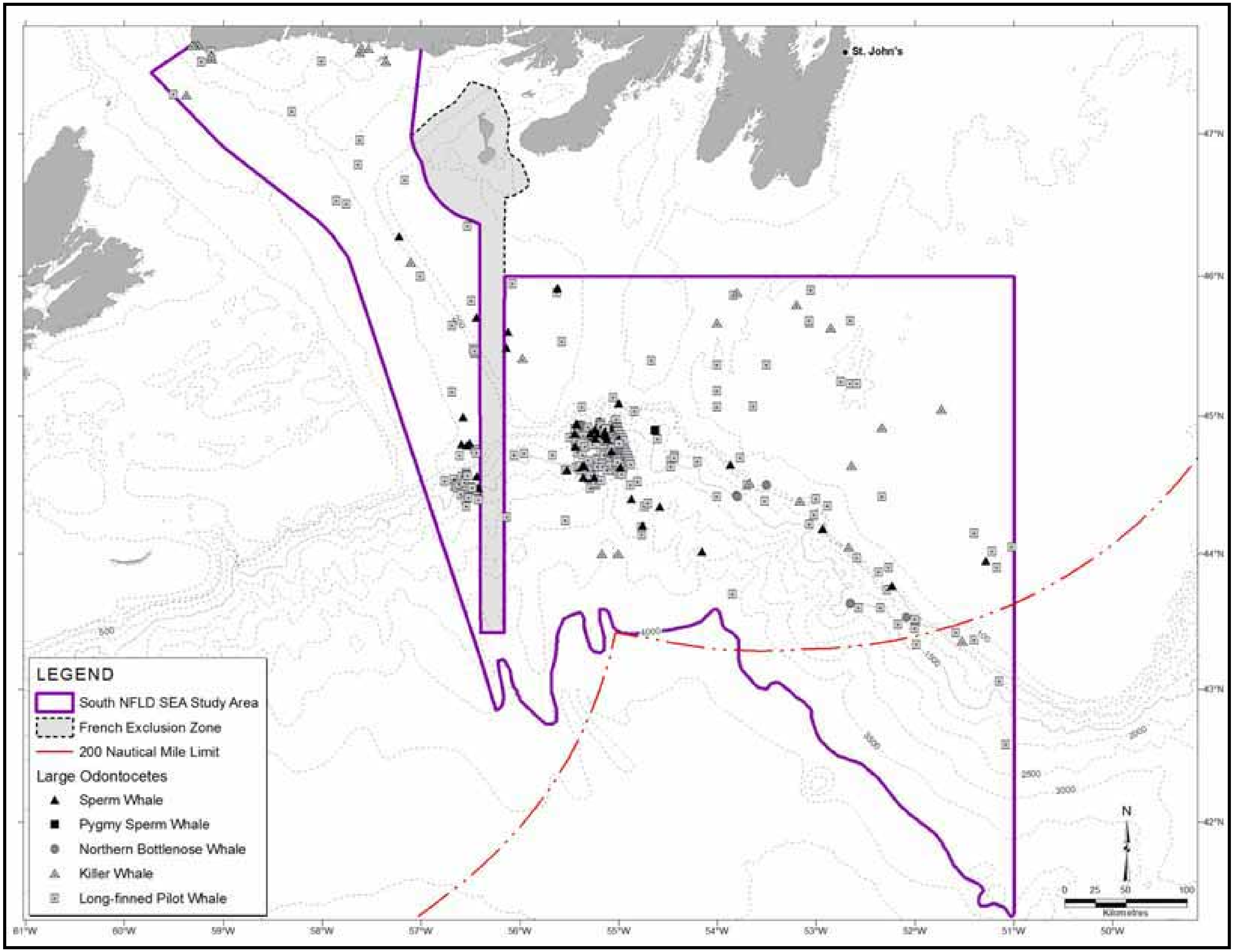


Figure 3.82. Distribution of Large Toothed Whale Sightings within the SEA Area (based on DFO sightings database 1975-2007).

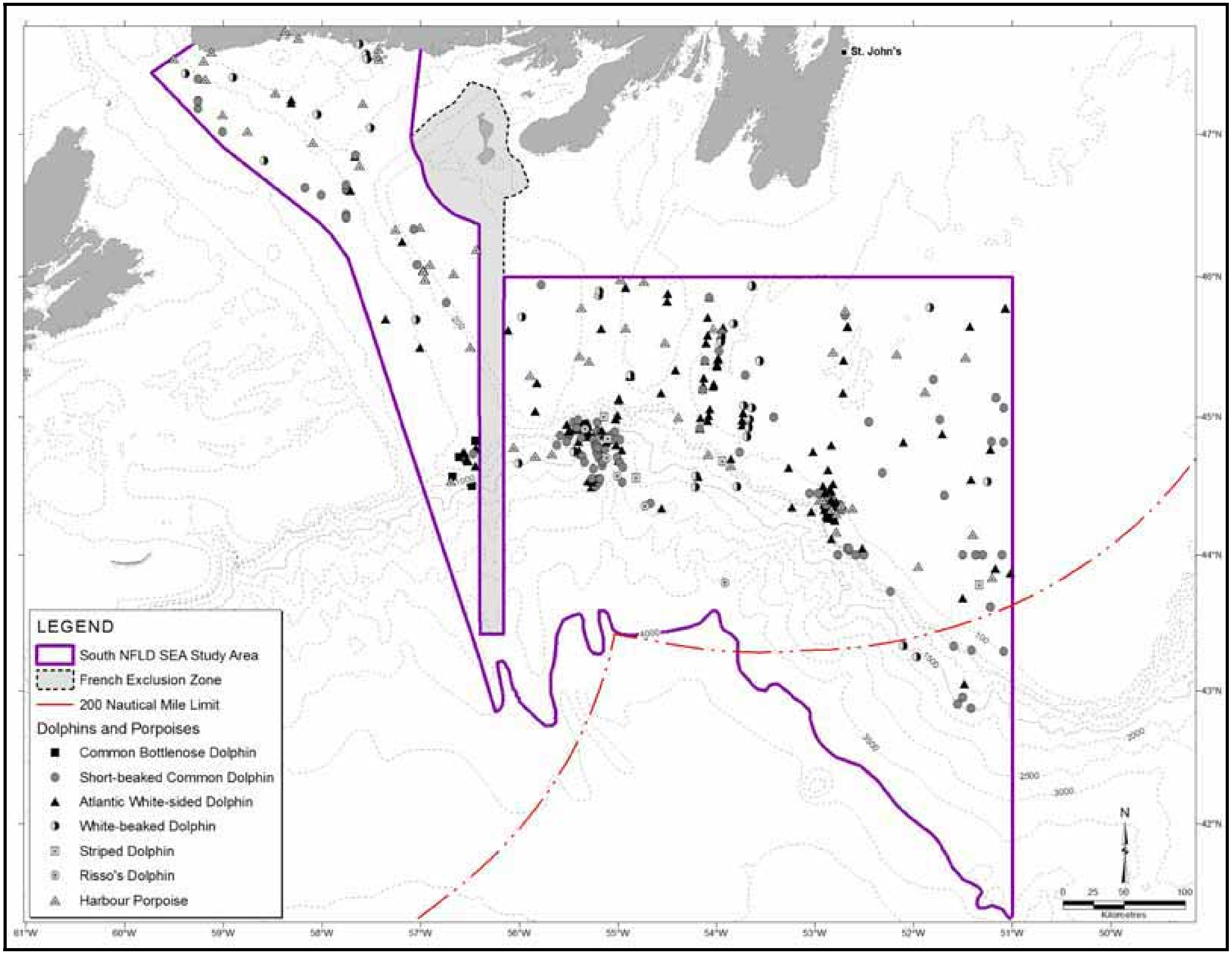


Figure 3.83. Distribution of Dolphin and Porpoise Sightings within the SEA Area (based on DFO database from 1975-2007).

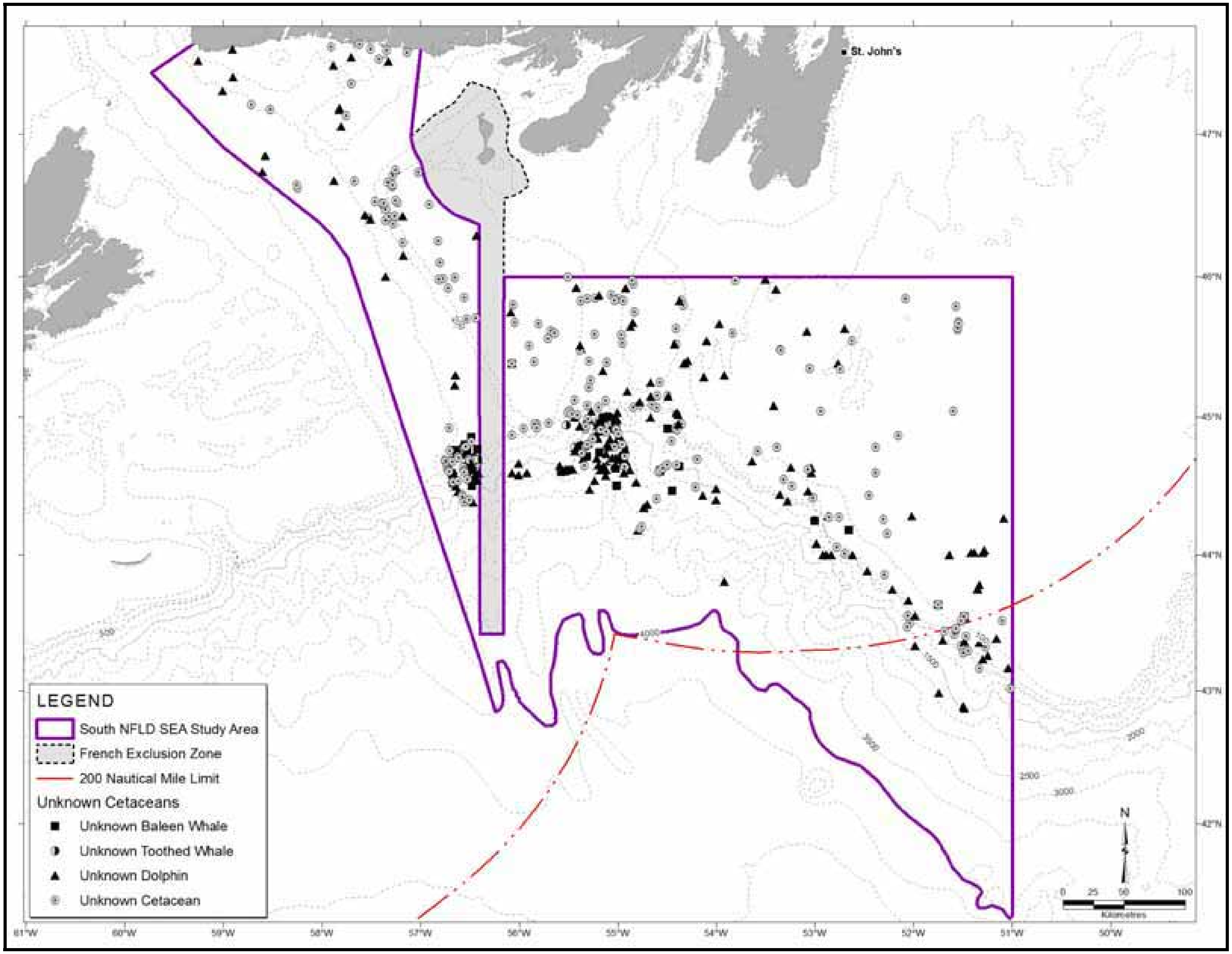


Figure 3.84. Distribution of Unidentified Cetacean Sightings within the SEA Area (based on DFO database from 1975-2007).

Given the limitations due to inconsistent seasonal, annual, and distributional effort (as noted in the above caveats), patterns in cetacean distribution should be regarded with caution. However, of the cetacean sightings identified to species, long-finned pilot whales were the most frequently observed cetacean species within the SEA Area (251 sightings of 3249 individuals). Atlantic white-sided dolphins, short-beaked common dolphins, and humpback whales were also frequently observed within the SEA Area (151 sightings of 2493 individuals, 125 sightings of 1863 individuals, and 139 sightings of 311 individuals, respectively). The most sightings occurred during summer (June-September; 1330 sightings of 13,848 individuals), followed by spring (April-May; 116 sightings of 724 individuals), although there was likely significantly higher observer effort during summer months. Cetaceans were most frequently observed in shallow waters (<500 m; 949 of 1576 sightings), although many sightings also occurred in waters 1500 to 2500 m deep (341 sightings). However, it should be noted that effort was not evenly distributed throughout the SEA Area and in shallow to deep waters. Baleen whales were distributed throughout the SEA Area, particularly along shelf edges and slope areas as well as coastal regions (Figure 3.81). Similarly, toothed whales and dolphins were found throughout the SEA Area (Figures 3.82 and 3.83). There were also several sightings of unidentified cetaceans in the SEA Area, including 44, 4, 213, and 232 sightings of unknown baleen whales, unknown toothed whales, unknown dolphins, and general unknown cetaceans, respectively. Sightings of unidentified cetaceans occurred throughout the SEA Area, although only rarely in deep waters (Figure 3.84). However, there may have been reduced search effort in offshore, deep waters.

There was a single sighting of a North Atlantic right whale within the SEA Area, from 1975 to 2006, on 28 September 2006 during a DFO aerial survey for marine mammals. The right whale was observed in waters <500 m deep near the northwestern edge of the St. Pierre Bank (Figure 3.81). Blue whales were the third most frequently observed baleen whale in the SEA Area, including a total of 83 sightings of 97 individuals. Most of these sightings (61 sightings) occurred during summer months and in waters either 1500 to 2500 m or <500 m deep (40 and 38 sightings, respectively). Blue whales were observed in both offshore and coastal waters of the SEA Area; offshore sightings appeared to be associated with slope areas and shelf breaks and several sightings occurred within the Laurentian Sub-basin (Figure 3.81). However, sightings within the Laurentian Sub-basin resulted from one localized survey in summer 2005, and effort did not encompass the broader SEA Area. There were 86 sightings of 120 individual fin whales within the SEA Area, and most occurred during summer months (77 sightings) and in waters <500 m deep. Fin whales were sighted over shallow banks, nearshore, near slope areas, and far offshore in the SEA Area (Figure 3.81). There were a total of 12 sightings of 61 individual Northern bottlenose whales within the SEA Area, most during summer (9 sightings) and in waters 500 to 1500 m deep (8 sightings). Bottlenose whales were observed primarily in offshore areas typically associated with shelf edges or slope areas (Figure 3.82). There were 67 sightings of 538 individual harbour porpoises within the SEA Area, including 58 sightings during summer months and 62 sightings in waters <500 m deep. Harbour porpoises were observed over many of the banks and shelf breaks within the SEA Area (Figure 3.83). There were no sightings of Sowerby's beaked whales or beluga whales within the SEA Area from 1975 to 2007.

Lawson and Gosselin (2009) provide preliminary abundance estimates, without the application of correction factors, for the most frequently sighted cetacean species detected during aerial surveys from Nova Scotia to Labrador in summer 2007. A total of 741,699 km^2 were surveyed off southern and eastern Newfoundland and off Labrador from 17 July to 24 August 2007, yielding a total of 584 cetacean sightings or density of 0.0008 sightings/km^2. The southern Newfoundland survey strata included most of the SEA Area. During 10,387 km of effort off of southern Newfoundland there were 430 cetacean sightings or a density of 0.002 sightings/km^2. These sightings included blue (3 sightings of 5 individuals), fin (55 sightings of 69 individuals), humpback (85 sightings of 116 individuals), minke (28 sightings of 31 individuals), northern bottlenose (8 sightings of 38 individuals), pilot (7 sightings of 65 individuals), sei (1 sighting of 1 individual), sperm (9 sightings of 9 individuals), unknown large (5 sightings of 6 individuals), and unknown small whales (2 sightings of 2 individuals), as well as common (25 sightings of 443 individuals), white-beaked (53 sightings of 474 individuals), white-sided (84 sightings of 1759 individuals), and unknown dolphins (30 sightings of 176 individuals), and harbour porpoises (35 sightings of 57 individuals). Humpback whales, followed by fin and minke whales, were the most common baleen whale observed within the southern Newfoundland survey strata while white-sided dolphins were the most frequently sighted odontocete. The locations of each species sightings were not provided, so it is not possible to describe the distribution of species relative to the SEA Area, water depth, or distance to shore.

3.5.2 Marine Mammal Monitoring in the Laurentian Sub-basin, 2005

Systematic marine mammal surveys were conducted in the Laurentian Sub-basin from mid-June through September 2005 during a 3-D marine seismic program (see Moulton et al. 2006). The results of this monitoring program are summarized here. During a total of 13,484 km (1483 h) of vessel trackline, there were a total of 624 cetacean sightings (of 4981 individuals) within or during transit to the Laurentian Sub-basin.

Dolphins were most frequently observed, including 382 sightings (4653 individuals) of six species; five sightings of 42 individuals occurred during transit to the SEA Area. Of the 290 dolphin sightings identified to the species level, 183 were long-finned pilot whales, 47 were Atlantic white-sided dolphins, 43 were common dolphins, 7 were bottlenose dolphins, 5 were striped dolphins, and 5 were Risso's dolphins. During periods with good sighting conditions, the overall dolphin sighting rate was 0.34 sightings/h, but sighting rates were highest in July and in water depths from 500 to 1000 m.

There were a total of 133 baleen whale sightings (149 individuals), 94 of which were identified to species. There were 49, 30, 3, 6, 5, and 2 sightings of blue, fin, sei, fin or sei, humpback, and minke whales. The overall sighting rate for baleen whales during periods with good sighting conditions was 0.124 sightings per hour. Baleen whales were observed from June to September, with the highest sighting rates in August (0.21sightings/h). Observations occurred in water depths ranging from 356 to 2713 m, but the highest rates occurred in waters <500 m deep.

There were 35 toothed whale sightings of 51 individuals. Animals were identified to species for 31 of these sightings, including 29 sightings of sperm whales and two of northern bottlenose whales, for an overall sighting rate of 0.033 sightings/h during good sighting conditions. Toothed whales were seen from June to August, with highest sighting rates in August (0.05 sightings/h) and in water depths ranging from 500 to 1500 m. There were an additional 69 sightings (85 individuals) of unidentified whales throughout the Laurentian Sub-basin area, occurring in water depths ranging from 372 to 2698 m.

3.5.3 Baleen Whales (Mysticetes)

Six species of baleen whales occur in the SEA Area, including the North Atlantic right, humpback, blue, fin, sei, and minke whale. Nearly all of these species became depleted in the North Atlantic due to commercial whaling, but many are recently showing positive indications of recovery (Best 1993). The Atlantic population of blue whale and the North Atlantic right whale are currently listed as *endangered* on Schedule 1 of *SARA*. The Atlantic population of fin whale is currently listed as a species of *special concern* on Schedule 1 of *SARA*. These species are discussed in Subsection 3.7.3 on Species at Risk.

3.5.3.1 Humpback Whale

The humpback whale is cosmopolitan in distribution; it migrates between coastal waters in high latitudes for foraging during summer months and the tropics for breeding in winter months (Jefferson et al. 2008). In the NW Atlantic, humpbacks feed during spring, summer, and fall in areas ranging from Massachusetts to Newfoundland. The best abundance estimate for the entire North Atlantic is 11,570 animals (Stevick et al. 2003; Waring et al. 2007), and Whitehead (1982) estimated the Newfoundland and Labrador population at 1700 to 3200 individuals. Approximately 900 humpbacks are estimated to use the Southeast Shoal of the Grand Banks as a summer feeding area, where their primary prey is capelin (Whitehead and Glass 1985). Humpback whales are considered *not at risk* by COSEWIC (COSEWIC 2008a).

Single animals or groups of two to three are commonly observed, but much larger groups can occur on foraging and breeding grounds (Clapham 2000). Extensive photo-identification studies of whales on the foraging grounds help to identify individual movement, population structure and abundance, and social associations (e.g., Stevick et al. 2006). Humpbacks appear to use deep, offshore migratory corridors between coastal and nearshore foraging and breeding grounds. During winter, whales from most of the Atlantic feeding areas are found in the West Indies for mating and calving with apparent genetic mixing among subpopulations (Clapham et al. 1993; Stevick et al. 1998). Some whales do not migrate to the West Indies every winter, and lower densities of humpbacks can be found in mid- and high-latitudes during this time (Clapham et al. 1993).

Humpback whales occur commonly within the SEA Area and adjacent regions, in both shallow and deep areas. Meltzer Research and Consulting (1996) mapped sightings of humpback whales along Newfoundland's south coast in all months of the year. Based on the DFO sighting database, they are particularly common from spring to fall, with sightings peaking from June to September, although they can occur in the region during any season (Table 3.17). They were the most frequently observed baleen whale in the SEA Area, and appear to prefer waters <500 m deep over banks and near shelf edges (Table 3.18; Figure 3.81). Therefore, humpback whales are considered common in the SEA Area and could occur year-round, although highest densities occur during the summer.

3.5.3.2 Sei Whale

The distribution of sei whales is not well known, but they are found in all oceans and appear to prefer mid-latitude temperate waters (Jefferson et al. 2008). Two stocks are recognized in the North Atlantic, a Labrador Sea and Nova Scotia stock; the latter has a distribution that includes continental shelf waters of the northeastern U.S. to areas south of Newfoundland (Waring et al. 2007). The best abundance estimate for the Nova Scotia stock is 207 animals (Waring et al. 2007). The sei whale is considered *data deficient* by COSEWIC (COSEWIC 2008a).

Sei whales tend to be pelagic and prefer areas with steep bathymetric relief like the continental shelf break, seamounts, canyons, or basins near banks and ledges (Kenney and Winn 1987; Gregr and Trites 2001). They are frequently seen singly or in groups of 2–5 (Jefferson et al. 2008). Sei whales sometimes eat fish, but are primarily planktivorous and forage on euphausids and copepods (Flinn et al. 2002).

Mitchell and Chapman (1977) hypothesized that sei whales in the NW Atlantic move from spring feeding grounds on or near Georges Bank to the Scotian Shelf in June and July, eastward to Newfoundland and the Grand Banks in late summer, back to the Scotian Shelf in fall, and offshore and south in winter. There were no opportunistic sightings of sei whales mapped along Newfoundland's south coast or in the Sydney Sub-basin from previous environmental assessments (Meltzer Research and Consulting 1996; JW 2007), although this species may be difficult to identify and detect at sea. Based on the DFO cetacean sightings database, there were relatively few sei whale sightings and all occurred during summer months; all sightings also occurred in offshore areas (Table 3.18; Figure 3.81). Current knowledge suggests that sei whales are uncommon in the SEA Area relative to other cetacean species.

3.5.3.3 Minke Whale

Minke whales have a cosmopolitan distribution that spans polar, temperate, and tropical regions (Jefferson et al. 2008). Four populations are recognized in the North Atlantic, including the Canadian East Coast stock that ranges from the eastern U.S. coast to the eastern half of Davis Strait (Waring et al. 2007). Waring et al. (2007) estimated 3312 animals for the Canadian East Coast stock, and Dufault (2005) suggested that the population ranges from the hundreds to thousands of animals. The populations of the Northeastern and Central Atlantic and West Greenland stocks are estimated to be 174,000 and 10,800, respectively (IWC 2007a), for a total of ~188,000 animals in the North Atlantic. They are considered *not at risk* in Atlantic Canada (COSEWIC 2008a).

The minke whale is a small baleen whale and tends to be solitary or in groups of two to three, but can occur in much larger aggregations around prey resources (Jefferson et al. 2008). Its small size, inconspicuous blows, and brief surfacings make the minke whale difficult to detect at sea, but it is also known to approach vessels at times (Stewart and Leatherwood 1985). Minke whales feed primarily on small schooling fish in the western North Atlantic, generally occupy waters over the continental shelf, and are known to make short-duration dives (Stewart and Leatherwood 1985).

Minke whales in the Gulf of St. Lawrence appear to associate with thermal fronts (Doniol-Valcroze et al. 2007). Some seasonal movements are apparent in many regions of the world, and movement patterns likely mirror the abundance and distribution of their primary prey species (Macleod et al. 2004). They are commonly found on the Grand Banks in summer (Piatt et al. 1989). Sightings of minke whales were mapped off Newfoundland's south coast or near the Miquelon Islands in all months of the year, other than from November to January (Meltzer Research and Consulting 1996). In the DFO sightings database, minke whales were sighted in spring, summer, and fall, although they were most frequently seen during summer periods (Table 3.17). They were commonly observed, appeared to prefer waters <500 m, and occurred in coastal and offshore areas (Table 3.18; Figure 3.81). Thus, minke whales are considered common, at least seasonally, within the SEA Area.

3.5.4 Toothed Whales (Odontocetes)

Thirteen species of toothed whales are found in the SEA Area (see Table 3.15) and include the largest living toothed whale, the sperm whale (~18 m for an adult male (Reeves and Whitehead 1997)), to one of the smallest whales, the harbour porpoise (~1.6 m for an average adult (COSEWIC 2006b)). Several of these species occur in the SEA Area seasonally, and little is known about their distribution and population sizes in the region. Some of these species are listed under Schedule 1 of *SARA*. Others are also considered SAR based on their COSEWIC designations and are therefore discussed in more detail in Subsection 3.7. There was a single sighting of two pygmy sperm whales in the DFO cetacean sighting database, but this species would be considered a vagrant in the area and is not discussed further.

The Scotian Shelf population of northern bottlenose whale is currently listed as *endangered* on Schedule 1 of *SARA*. The St. Lawrence Estuary beluga population is currently listed as *threatened* on Schedule 1. Sowerby's beaked whale is currently assessed as a species of *special concern* under COSEWIC. The NW Atlantic/Eastern Arctic population of the killer whale is currently assessed as a species of *special concern* under COSEWIC. Likewise, the harbour porpoise is also currently assessed as a species of *special concern* under COSEWIC. The sperm whale is currently designated as a *low priority candidate* species under COSEWIC. All of the above species, except for the sperm whale, are discussed in Subsection 3.7.

3.5.4.1 Common Bottlenose Dolphin

Bottlenose dolphins range worldwide in tropical and temperate waters and can occupy a variety of habitats (Jefferson et al. 2008). Two morphologically and genetically distinct stocks occur in the NW Atlantic, referred to as the coastal and offshore forms (Hoelzel et al. 1998). The offshore form primarily occurs along the outer continental shelf and slope in the NW Atlantic, and the coast form ranges along the Atlantic coast from New York to the Gulf of Mexico (Waring et al. 2007). The best population estimate for the offshore form is 81,588 (Waring et al. 2007), but abundance in the SEA Area is unknown. They are considered *not at risk* by COSEWIC (COSEWIC 2008a).

Bottlenose dolphins typically occur in groups of 2 to 15 animals, but can be observed offshore in groups of hundreds (Shane et al. 1986). They have a fluid and dynamic social organization, and habitat complexity and water depth is associated with group sizes; shallow-water areas tend to have smaller group sizes than open or pelagic regions (Shane et al. 1986). Bottlenose dolphins feed opportunistically on a range of fishes, cephalopods, and shrimp using a variety of foraging strategies (Jefferson et al. 2008).

Bottlenose dolphins sometimes occur in The Gully and along the eastern Scotian Shelf (Gowans and Whitehead 1995). There were only five bottlenose dolphin sightings in the DFO cetacean sighting database; all occurred during the summer in a portion of the Laurentian Sub-basin (Figure 3.83). Bottlenose dolphins likely occur in the SEA Area, particularly during summer months, but are less common than other dolphin species.

3.5.4.2 Long-finned Pilot Whale

The long-finned pilot whale is widespread in the North Atlantic (Jefferson et al. 2008). The best population estimate for the NW Atlantic is 31,139 animals (Waring et al. 2007), and they are abundant year-round residents of the SEA Area (Nelson and Lien 1996). They are considered *not at risk in* Canada (COSEWIC 2008a).

Pilot whales occur on the continental shelf break, in slope waters, and in areas of high topographic relief and have seasonal inshore/offshore movements coinciding with the abundance of their preferred prey, squid (Jefferson et al. 2008). Deep-diving occurs primarily at night when mesopelagic squid are closer to the surface (Mate 1989). Inshore observations of pilot whales in Newfoundland suggest that short-finned squid may also be a primary prey item in summer (Sergeant 1962). Pilot whales are highly social, appear to live in stable female-based groups, and group sizes most typically range from 20 to 100 animals (Jefferson et al. 2008).

Long-finned pilot whales are common in the SEA Area and may be encountered closer to shore if squid are abundant or further offshore (Kingsley and Reeves 1998). They were the most frequently sighted dolphin species (63% of the identified dolphin sightings) during marine mammal monitoring in the Laurentian Sub-basin in summer 2005 (Moulton et al. 2006); sightings occurred in all months of observations (June-September) and in all water depth categories (<500 m to >3000 m). Meltzer Research and Consulting (1996) included long-finned pilot whale sightings in July and August along Newfoundland's south coast. Long-finned pilot whales were the most frequently observed cetacean in the DFO sightings database and sighted in every season of the year and all depth categories (Tables 3.17 and 3.18). They appear to occur throughout the region, from the coast to far offshore (Figure 3.82). Thus, long-finned pilot whales are considered common in the SEA Area year-round.

3.5.4.3 Short-beaked Common Dolphin

The common dolphin is one of the most widely distributed cetaceans and occurs in temperate, tropical, and subtropical regions (Jefferson et al. 2008). The best abundance estimate of short-beaked common dolphins in the NW Atlantic is 120,743 animals (Waring et al. 2007), but the estimated number of common dolphins off the south coast of Newfoundland is unknown. They are considered *not at risk* in Canada (COSEWIC 2008a).

Groups of short-beaked common dolphins can range from several dozen to over 10,000, and they are typically fast-moving with many aerial behaviors such as jumping and bow-riding (Jefferson et al. 2008). Calving in the North Atlantic peaks in July and August, and females likely have a 2 to 3 yr calving interval (Waring et al. 2007). They can occupy a variety of habitats, but are most often found in a broad band of waters between 100 to 2000 m deep, areas with high seafloor relief, and in warmer, more saline waters than white-sided dolphins (Selzer and Payne 1988). They are also often associated with features of the Gulf Stream (Hamazaki 2002). Shifts in the seasonal distribution of short-beaked common dolphins also appear to coincide with peak abundances of mackerel, butterfish, and common squid (Selzer and Payne 1988).

Common dolphins were the third most frequently sighted dolphin during marine mammal monitoring in the Laurentian Sub-basin during summer 2005 (Moulton et al. 2006). Sighting rates were highest in July and in water depths from 2000 to 3000 m, although they were observed from June-August and in waters <500 to 3000 m deep. Common dolphins were also frequently sighted in the DFO sighting database, but observations predominantly occurred during the summer (Table 3.17). Sightings occurred within 100 km of shore as well as far offshore, over banks and slope areas, and in shallow to deep waters (Table 3.18; Figure 3.83). Short-beaked common dolphins are expected to occur throughout the SEA Area year-round, but are likely more common in summer.

3.5.4.4 Atlantic White-sided Dolphin

Atlantic white-sided dolphins inhabit temperate to sub-polar waters of the North Atlantic, primarily in deep waters of the outer continental shelf and slope (Jefferson et al. 2008). Three stocks may exist in the North Atlantic, including the Gulf of Maine, Gulf of St. Lawrence, and Labrador Sea stocks, but these have not been confirmed (Waring et al. 2007). The best available abundance estimate in the western North Atlantic is 63,368 (Waring et al. 2007), but there is an unknown number off the south coast of Newfoundland. They are considered *not at risk* in Canada (COSEWIC 2008a).

The 100-m depth contour over the continental shelf appears to be primary habitat, and white-sided dolphins are sighted more frequently in regions with high relief and where sea surface temperatures and salinities are low (Selzer and Payne 1988). On average, groups of Atlantic white-sided dolphins include 52.4 animals, but range from 2 to 2500 (Weinrich et al. 2001). Calving peaks in June and July, and groups sizes are larger in the fall (Weinrich et al. 2001). They have a range of prey items, primarily cephalopods and pelagic or benthopelagic fishes like capelin, herring, hake, sandlance, and cod (Selzer and Payne 1988; Weinrich et al. 2001).

Atlantic white-sided dolphins were the second most frequently sighted dolphin during marine mammal monitoring in the Laurentian Sub-basin during summer 2005 (Moulton et al. 2006). Sightings occurred from June-August and in water depths ranging from <500 m to 3000 m, but sighting rates were highest in July and waters 500 to 1000 m deep. White-sided dolphin sightings were mapped along Newfoundland's south coast in May, near the Miquelon Islands in August and October, and near Newfoundland in the entrance to Cabot Strait from July to November by Meltzer Research and Consulting (1996). White-sided dolphins were the second most frequently observed cetaceans in the SEA Area from the DFO sighting database, particularly during summer months (Table 3.17). Most sightings occurred in waters <500 m deep and over banks or within 100 km of shore (Table 3.18 and Figure 3.83). Atlantic white-sided dolphins are expected to be regular occupants of the SEA Area year-round, although higher densities are likely to occur from spring to fall.

3.5.4.5 White-beaked Dolphin

White-beaked dolphins have a more northerly distribution than most dolphins and occur in cold temperate to sub-polar waters of the North Atlantic (Jefferson et al. 2008). The best abundance estimate for the NW Atlantic is 2003 animals (Waring et al. 2007), but there is an unknown number off Newfoundland's south coast. They are considered *not at risk* in Canada (COSEWIC 2008a).

White-beaked dolphins sometimes associate with other cetacean species, and typically form groups of less than 30 animals, although groups of many hundreds have been recorded (Lien et al. 2001). Primary prey items include squid, crustaceans, and a range of small mesopelagic and schooling fishes like herring, cod, haddock, and hake (Jefferson et al. 2008).

White-beaked dolphins inhabit waters of both the continental shelf and slope, but have also been observed in shallow, coastal waters (Lien et al. 2001). They appear to remain at relatively high latitudes during fall and winter, but other seasonal movements are not well known. Meltzer Research and Consulting (1996) included white-beaked dolphin sightings along Newfoundland's south coast in February and May, around the Miquelon Islands in June and October, and near Newfoundland in the entrance to Cabot Strait in March and October. There were fewer sightings of white-beaked dolphins in the SEA Area than other species in the DFO sighting database, and most sightings occurred in the summer (Table 3.17). Sightings occurred most often over banks or areas within 100 km of shore in waters <500 m (Table 3.18; Figure 3.83). While white-beaked dolphins could occur within the SEA Area year-round, they appear to be less common than other cetacean species.

3.5.4.6 Striped Dolphin

Striped dolphins are distributed worldwide in warm temperate to tropical waters, but range as far north as the Grand Banks (Lens 1997; Jefferson et al. 2008). In the NW Atlantic, the best abundance estimate is 94,462 striped dolphins (Waring et al. 2007), but abundance off the south coast of Newfoundland is unknown (Baird et al. 1993). They are considered *not at risk* in Canada (COSEWIC 2008a).

Striped dolphins usually occur in group sizes of several dozen to 500, but can form groups of thousands of animals (Jefferson et al. 2008). They apparently feed in pelagic and benthopelagic zones along the continental slope or just outside in oceanic waters. Striped dolphins may feed at depths of 200 to 700 m (Archer and Perrin 1999). Small, mid-water fishes and squids are likely their primary prey. They are primarily a pelagic species, apparently preferring waters offshore of the continental shelf and typically over the continental slope in waters associated with upwelling or convergence zones (Au and Perryman 1985).

Off the northeastern U.S. coast, striped dolphins occur along the continental shelf edge as well as offshore over the continental slope and rise in the mid-Atlantic (Waring et al. 2007). In all seasons, striped dolphin sightings have been centered along the 1000-m depth contour, and sightings have been associated with the north edge of the Gulf Stream and warm core rings (Waring et al. 2007). Striped dolphins are encountered around The Gully, although they are observed less frequently than Atlantic white-sided and common dolphins and pilot whales (Gowans and Whitehead 1995). Winter strandings of striped dolphins at Sable Island have also been recorded (Lucas and Hooker 2000). There were only five sightings of striped dolphins in the DFO sighting database, all occurring during the summer and in offshore areas (Table 3.17; Figure 3.83). It is expected that striped dolphins could occur in the SEA Area during any month, but they are likely less common than other dolphin species and more abundant in summer and offshore areas.

3.5.4.7 Risso's Dolphin

Risso's dolphins are distributed from Florida to eastern Newfoundland in the NW Atlantic and appear to be primarily associated with steeper portions of the continental slope that may concentrate their cephalopod prey (Baumgartner 1997; Waring et al. 2007). The best abundance estimate for Risso's dolphins in the NWAtlantic is 20,479 (Waring et al. 2007), but there is no current population estimate off Newfoundland's south coast. They are considered rare in Atlantic Canada (Baird and Stacey 1991).

Risso's dolphins tend to occur in groups of 10 to 100 animals, but have been reported in groups of up to 4000 (Jefferson et al. 2008). They commonly associate with other cetacean species, and may be deep divers with dive times up to 30 min recorded (Jefferson et al. 2008). Risso's dolphins apparently prefer squid, but also forage on crustaceans and other cephalopods.

Off the northeast U.S. coast during spring, summer, and autumn, Risso's dolphins are distributed along the continental shelf edge and range into oceanic waters during the winter (Waring et al. 2007). The DFO sighting database contained five sightings of Risso's dolphins within the SEA Area, all in offshore deep areas during the summer (Tables 3.17 and 3.18; Figure 3.83). Risso's dolphins may occur in low densities within the SEA Area at any time of the year, although they may be more common from spring to fall.

3.5.4.8 Sperm Whale

Sperm whale is currently listed as a *low priority candidate* species under COSEWIC. The sperm whale has an extensive worldwide distribution (Jefferson et al. 2008). Sperm whales are considered *not at risk* by COSEWIC (COSEWIC 2008a). Whitehead (2002) estimated a total of 13,190 animals for the entire Iceland-Faeroes area, the area northeast of it, and the U.S. to Canadian east coast, but Waring et al. (2007) estimated a total of 4804 sperm whales in the North Atlantic. The abundance of sperm whales in the regions surrounding the SEA Area is unknown.

Sperm whales range as far north and south as the edges of the polar pack ice, although they are most abundant in tropical and temperate waters where temperatures are >15ºC (Jefferson et al. 2008). Sperm whale distribution and relative abundance can vary in response to prey availability, most notably mesopelagic and benthic squid (Jaquet and Gendron 2002). Sperm whales undertake some of the deepest-known dives for the longest durations among cetaceans. They can dive as deep as ~2 km and possibly deeper on rare occasions, for periods of over 1 h; however, most of their foraging occurs at depths of ~300 to 800 m during dives ranging 30 to 45 min (Whitehead 2003). Distribution of sperm whales can also be linked to social structure. Sperm whales occur singly (older males) or in groups, with a mean group size of 20–30 (Whitehead 2003). Groups of adult females and juveniles generally occur in warm waters, whereas males are commonly alone or in same-sex aggregations of 10 to 30 males and often occur in higher latitudes outside of the breeding season (Letteval et al. 2002; Whitehead 2003).

In the NW Atlantic, sperm whales generally occur in deep water along the continental shelf break as well as along the northern edge of the Gulf Stream (Waring et al. 2001). Shelf edge, oceanic waters, seamounts, and canyon shelf edges are also predicted habitats of sperm whales in the NW Atlantic (Waring et al. 2001). Off the eastern North American coast, they are also known to concentrate in regions with well-developed temperature gradients, such as along the edges of the Gulf Stream and warm core rings, which may aggregate their primary prey, squid (Jaquet 1996). Although sperm whales are likely most common during summer months, some occur throughout the year as shown by winter strandings on Sable Island (Lucas and Hooker 2000). Whitehead et al. (1992) described high densities of sperm whales along the edge of the eastern Scotian Shelf, particularly in The Gully. In a review of the Scotian Shelf ecosystem, sperm whales are considered as of "probable regular occurrence" along edges of the Scotian Shelf and into the Gulf of St. Lawrence along the Laurentian Channel (Breeze et al. 2002). Meltzer Research and Consulting (1996) mapped sightings of sperm whales primarily focused near the Miquelon Islands in January, February, and April. Based on the DFO sighting database, sperm whale sightings were common in offshore areas of the Study Area, particularly in slope areas (Figure 3.82). Sightings occurred in spring and summer, most frequently in waters 1500 to 2500 m deep (Tables 3.17 and 3.18). Thus, slope and offshore waters within the Study Area are potential primary habitats for sperm whales throughout the year, likely with higher numbers from spring to fall.

3.5.5 True Seals (Phocids)

Four species of seals are known to occur in the SEA Area (see Table 3.15). Seals consume a number of fish species (including cod, capelin, sand lance, and halibut) and invertebrates such as squid and shrimp, but diets can vary considerably among years, geographic regions, and seasonally (Hammill and Stenson 2000). Hooded and harp seals are currently designated as *low-priority candidate* species by COSEWIC.

3.5.5.1 Harbour Seal

Harbour seals are among the most widespread of pinnipeds, but they are primarily restricted to coastal regions (Jefferson et al. 2008). In the NW Atlantic, harbour seals are distributed from the eastern Canadian Arctic to southern New England (Waring et al. 2007). The best abundance estimate for western Atlantic harbour seals is 99,340 (Waring et al. 2007), and there is an estimated 1000 animals along Newfoundland's south coast (Sjare et al. 2005; COSEWIC 2007a). They are considered *not at risk* in Canada (COSEWIC 2008a).

Harbour seals occur in coastal waters and are rarely seen more than 20 km from shore; they often use bays, estuaries, and inlets, and sometimes follow anadromous prey upstream in coastal rivers (Baird 2001). Primary prey items in Newfoundland waters include winter flounder, cod, and sculpins (Sjare et al. 2005). Over 50% of dives by harbour seals tagged in the Gulf of St. Lawrence were to depths <4 m, and the rest of the dives could be categorized into five types based on descriptive characteristics like dive depth, ascent and descent rates, and bottom time; the deepest dives average ~20 m (Lesage et al. 1999). Pupping occurs in the spring, primarily in May or June, and pups are nursed for ~24 days (Bowen et al. 2001).

Harbour seals are considered year-round residents of coastal Newfoundland, with populations along the south coast (including near Burgeo, St. Pierre and Miquelon, Point May, Pass Island near Hermitage Bay, and the entirety of Placentia Bay) potentially declining in numbers (Sjare et al. 2005). However, there have not been recent surveys along most of the south coast. Meltzer Research and Consulting (1996) and JW (2007) also mapped the distribution of harbour seals along the south coast of Newfoundland, primarily in estuaries from Rose Blanche to Ramea. It is expected that small numbers of harbour seals occur within the SEA Area year-round, but are generally restricted to nearshore waters.

3.5.5.2 Grey Seal

Grey seals are found in cold temperate to sub-arctic waters of the North Atlantic, and they occur in the Gulf of St. Lawrence, off Nova Scotia and Newfoundland within Canadian waters (Jefferson et al. 2008). Thomas et al.

(2007) estimated a total population of 300,000 grey seals for the Canadian NW Atlantic, and grey seals are considered *not at risk* in Canada (COSEWIC 2008a).

The grey seal is primarily a coastal species, and foraging appears to be restricted to the continental shelf regions (Lesage and Hammill 2001). Foraging grey seals tagged on Sable Island, Nova Scotia, nearly always remained within the 100-m isobath and mostly over offshore banks (Austin et al. 2006). Diets primarily consist of herring, Atlantic cod, and sand lance (Lesage and Hammill 2001). There are two main breeding sites in the NW Atlantic where grey seals aggregate from December to February: Sable Island; and near the southern Gulf of St. Lawrence. Grey seals disperse widely after breeding but return for a spring molt (Lesage and Hammill 2001). Meltzer Research and Consulting (1996) described grey seal distribution as being continuous along the southern Newfoundland coast and up to 50 km offshore, with concentrations off the southwestern tip of the Island and near the northeastern portion of the Miquelon Islands. Based on their abundance and local distribution, grey seals are probably the most common seal within the SEA Area. However, they are generally more concentrated on the Scotian Shelf and in the Gulf of St. Lawrence. Grey seals may occur year-round in coastal and shelf regions of the SEA Area, although they are likely more common during summer months.

3.5.5.3 Hooded Seal

Hooded seal is currently listed as a *low priority candidate* species under COSEWIC. Hooded seals inhabit the Arctic and high latitudes of the North Atlantic, with four primary pupping areas found in the Gulf of St. Lawrence, northeast of Newfoundland, Davis Strait, and in Greenland (Jefferson et al. 2008). Pupping and breeding occurs in March (Waring et al. 2007). A total of 593,500 hooded seals are estimated in the Canadian NW Atlantic.

Hooded seals appear to prefer deeper water and occur farther offshore than harp seals (Lavigne and Kovacs 1988). Whelping occurs on the pack ice of the Gulf of St. Lawrence and off the Labrador and northeast Newfoundland coasts in the spring. Although they typically migrate northward for summer foraging, hooded seals are also known to wander widely, with animals occurring from New England to Puerto Rico on the U.S. east coast (Waring et al. 2007; Jefferson et al. 2008). Little is known about their winter distribution, but they are believed to remain offshore. Occurrences of hooded seals tend to be from January-May in New England waters (Harris et al. 2002; Waring et al. 2007). There is also some indication that post-breeding adult hooded seals use the north slope of the Laurentian Channel for 1.5 to 2 months before leaving the Gulf of St. Lawrence through Cabot Strait in late May or early June (Meltzer Research and Consulting 1996). Although uncommon, hooded seals may be found in the Study Area, particularly in late winter or spring. They may be associated with ice exiting the Gulf of St. Lawrence or found in offshore areas.

3.5.5.4 Harp Seal

Harp seal is currently listed as a *low priority candidate* species under COSEWIC. Harp seals have a widespread distribution in the Arctic and cold waters of the North Atlantic (Jefferson et al. 2008). They are the most abundant seal in the North Atlantic, with most seals aggregating off the east coast of Newfoundland and Labrador to pup and breed; the remainder whelp in the Gulf of St. Lawrence (Lavigne and Kovacs 1988). There is an estimated total of 5.5 to 5.9 million seals between these two areas (DFO 2005b, 2007e). Harp seal abundance off Newfoundland's south coast is not known.

Satellite tagging of harp seals suggests that the Grand Banks is an important wintering area for at least some seals (Stenson and Sjare 1997), and that they are also likely to occur south and west of the Grand Banks. Sightings of harp seals along the U.S. northeast coast are rare but have been increasing in recent years, particularly from January to May (Harris et al. 2002; Harris and Gupta 2006). They are also incidentally caught in the south coast lumpfish fishery (Walsh et al. 2000 in JWEL 2003). Harp seals are therefore likely uncommon, but do occur, within the Study Area. They may be associated with ice leaving the Gulf of St. Lawrence, post-breeding adults may exit the Gulf of St. Lawrence through Cabot Strait in the spring, or adults could be found in pelagic areas, particularly in late winter to early spring.

3.5.6 Planning Implications

Sightings and distribution information for marine mammals within the SEA Area is limited, which includes several species that are of international concern and are *SARA*-listed. As indicated in previous assessments, only general descriptions of occurrence, timing, and habitats are available within this region (see Table 3.15). Seals are likely to occur in low densities and are likely concentrated in coastal regions. Cetaceans may converge along current edges, shelf breaks, and underwater canyons. These generalities provide only limited insights for planning purposes, and marine mammal surveys and/or special mitigations may have to be conducted in association with exploration activities, particularly seismic.

Mitigations are available to lessen potential effects of offshore activities on marine mammals such as safety zones, airgun ramp-ups, marine mammal observers, and other techniques as discussed in later subsections.

3.5.7 Data Gaps

As indicated in previous assessments related to the portions of the SEA Area, there is limited information on the distribution and abundance of marine mammals within the SEA Area. Potential migration routes and foraging, breeding, and calving areas within the SEA Area are not well known. Accordingly, it is not surprising that a limited understanding of basic life history characteristics contributes to significant uncertainty in the global and regional abundance estimates and population trends for many species. No critical habitat has been identified but that does not necessarily mean that none exists. Existing information on most marine mammals is insufficient to identify specific areas and seasons of key relevance to population persistence. Most available data on species occurrence in the SEA Area are opportunistic or incidental in nature. Few directed surveys have been completed, and it is challenging to accurately predict the densities and occurrence of each species within the SEA Area.

Assessment of the impacts of anthropogenic activities on marine mammal behaviour, and spatial and temporal distribution patterns, is particularly challenging due to these data gaps. Marine mammal monitoring programs associated with offshore oil and gas activities will be instrumental in resolving the current data limitations as well as providing information crucial to understanding potential effects.

3.6 Sea Turtles

Three species have been reported in or near the SEA Area including leatherback, loggerhead, and Kemp's ridley sea turtles (Table 3.19). There is limited information on the degree of occurrence of these three species within the SEA Area, although leatherback is the more commonly reported of the three. The leatherback sea turtle is listed as *endangered* on Schedule 1 of *SARA* and is discussed in Subsection 3.7. Neither the loggerhead nor Kemp's ridley have been considered by COSEWIC.

Table 3.19. Sea Turtles Known to Occur within the SEA Area (adapted from Table 3.15 *in* JWEL (2003)).

Species (Scientific Name)	*SARA* Status[a]	COSEWIC Status[b]	Occurrence	Season	Habitat
Leatherback sea turtle (*Dermochelys coriacea*)	E, Sched1	E	Uncommon	Summer	Channel
Loggerhead sea turtle (*Caretta caretta*)	NS	NC	Rare	Summer	Channel
Kemp's ridley sea turtle (*Lepidochelys kempii*)	NS	NC	Very Rare	Summer	Channel

Notes: [a] Species designation under the *Species at Risk Act* (Government of Canada 2009); E = Endangered; T = Threatened; SC = Special Concern; NS = No Status; Schedule 1, 2, or 3 indicated.
[b] Based on Atlantic stocks, unless otherwise noted, in COSEWIC (2008); E = Endangered; T = Threatened; SC = Special Concern; DD = Data Deficient; NAR = Not At Risk; NC = Not Considered.

3.6.1 Loggerhead Sea Turtle

Loggerhead sea turtles are found in temperate and tropical areas of the Atlantic, Pacific, and Indian Oceans, with the majority of nesting occurring along the western rims of the mid- and equatorial Atlantic and Indian Oceans (Spotila 2004). Globally, Spotila (2004) estimated that there are 43,320 to 44,560 nesting females. Shoop and Kenney (1992) estimated that at least 8000 to 11,000 loggerheads occur in northeastern U.S. waters each summer. There is no estimate of loggerhead sea turtles in Newfoundland waters but they are likely very rare.

Adult loggerheads make considerable migrations between nesting beaches in the tropics to temperate foraging areas (Hawkes et al. 2007). Some individuals migrate with the Gulf Stream into the Canadian Atlantic. Loggerheads that appear in Canadian waters generally have a smaller body size than those found in the coastal U.S. waters, suggesting that they may be younger individuals (Witzell 1999). Nesting in the western Atlantic occurs from late April to early September, and major nesting areas include beaches in the southeastern U.S. (Spotilla 2004).

Using observer data from the U.S. pelagic longline fishery, that ranges from the Caribbean to Labrador, Witzell (1999) estimated that 70% of incidentally caught loggerheads between 1992 and 1995 were captured on or east of the 200 m contour of the Grand Banks. They were caught from June to November, but captures peaked in September. However, loggerhead captures mirrored the distribution of fishing effort. Breeze et al. (2002) indicated that loggerheads are not frequently observed on the Scotian Shelf. There are no other indications of loggerhead distribution and abundance in the vicinity of the SEA Area. It is possible that they occur rarely in the SEA Area, probably in the fall.

3.6.2 Kemp's Ridley Sea Turtle

Kemp's ridley turtles have a more restricted distribution than other sea turtles, with adults primarily located in the Gulf of Mexico and some juveniles also feeding along the U.S. east coast, sometimes ranging into the Canadian Atlantic (Spotila 2004). They are the smallest (40 to 50 kg) and rarest of all sea turtles that may be found in Newfoundland waters. There are an estimated ~5000 nesting females worldwide (Spotila 2004). Juveniles have been sighted near St. Mary's Bay along the southeast coast of Newfoundland and along southern Nova Scotia (Cook 1984). Nesting occurs primarily within a small region along the central and southern Gulf of Mexico coast during May to late July (Morreale et al. 2007). Following nesting, female Kemp's ridley turtles travel to foraging areas along the coast of the Gulf of Mexico, typically in waters <50 m deep and ranging from Mexico's Yucatan Peninsula to southern FL; males tend to stay nearby nesting beaches in the central Gulf of Mexico year-round (Morreale et al. 2007). Only juvenile and immature Kemp's ridley turtles appear to move beyond the Gulf of Mexico into more northerly waters.

Musick et al. (1994) suggested that juvenile and immature Kemp's ridley turtles that migrate northward of Cape Hatteras, North Carolina probably do so in April and return southward in November. There are historical summer sightings and strandings of Kemp's ridley turtles from Massachusetts into the Gulf of Maine, with a peak during summer and fall (Lazell 1980). It is expected that only very rarely would Kemp's ridley turtles occur within the SEA Area, and summer or fall occurrence would be most likely.

3.6.3 Planning Implications

There are limited existing sightings and distribution information for sea turtles within the SEA Area, which includes species that are of international concern, one of which is *SARA*-listed. As indicated in previous assessments within this region, only general descriptions of occurrence, timing, and habitats are reasonable (see Table 3.15). Sea turtles are most likely to occur during summer and fall. These generalities provide only limited insights for planning purposes, and sea turtle monitoring may have to be conducted in association with certain exploration activities. Mitigations are consistent with those used for marine mammals.

3.6.4 Data Gaps

There is limited information on the distribution and abundance of all sea turtles within the SEA Area. Potential migration routes and foraging areas within the SEA Area are not well known. Accordingly, it is not surprising that a limited understanding of basic life history characteristics contributes to significant uncertainty in the global and regional abundance estimates and population trends for many species.

Existing information on all sea turtles is insufficient to identify specific areas and seasons of key relevance to population persistence. Most available data on sea turtle species occurrence in the SEA Area are opportunistic or incidental in nature. Few directed surveys have been completed, and it is challenging to accurately predict the densities and occurrence of each species within the SEA Area. Assessment of the impacts of anthropogenic activities on sea turtle behaviour and spatial and temporal distribution patterns is particularly challenging due to these data gaps. Sea turtle monitoring programs associated with offshore oil and gas activities will be instrumental in resolving the current data limitations as well as providing information crucial to understanding potential impacts.

3.7 Species at Risk

Species at Risk (SAR) as defined in this SEA are those listed under *SARA* or COSEWIC. COSEWIC species are considered because some of these species may become legally listed under *SARA* in the future. The *Species at Risk Act* was assented in December 2002, with certain provisions coming into force in June 2003 (e.g., independent assessments of species by COSEWIC) and June 2004 (e.g., prohibitions against harming or harassing listed *endangered* or *threatened* species or damaging or destroying their critical habitat). The information provided in this subsection is current as of May 2009 on the websites for *SARA* (www.sararegistry.gc.ca/default_e.cfm) and COSEWIC (www.cosewic.gc.ca). It should be noted that the listings and designations are updated periodically and Proponents need to keep up to date on these issues.

Species are listed under *SARA* on Schedules 1 to 3 with only those listed as *endangered* or *threatened* on Schedule 1 having immediate legal implications. The four cetacean species/populations, three bird species/populations, two fish species/populations and one sea turtle species that are legally protected under *SARA,* and have potential to occur in the SEA Area, are listed in Table 3.20. Once a species/population is listed on Schedule 1, the measures to protect and recover it are implemented. Atlantic wolffish, the Atlantic population of fin whales, the eastern population of Harlequin Duck, and the Newfoundland population of banded killifish are listed as *special concern* on Schedule 1 (Table 3.20). Schedules 2 and 3 of *SARA* identify species that were designated "at risk" by COSEWIC prior to October 1999 and must be reassessed using revised criteria before they can be considered for addition to Schedule 1. Species that potentially occur in the SEA Area and are considered "at risk," but which have not received specific legal protection (i.e., proscribed penalties and legal requirement for recovery strategies and plans) under *SARA,* are also listed in Table 3.20 as *endangered*, *threatened* or species of *special concern* under COSEWIC. Other non-*SARA* listed marine species which potentially occur in the SEA Area and are designated by COSEWIC as *candidate* species are also included in Table 3.20.

Under *SARA*, a 'recovery strategy' and corresponding 'action plan' must be prepared for *endangered*, *threatened*, and *extirpated* species. A 'management plan' must be prepared for species listed as *special concern*. Recovery strategies have been prepared for three species currently listed as either *endangered* or *threatened* under Schedule 1: the leatherback sea turtle (ALTRT 2006); the spotted wolffish (Kulka et al. 2007); and the northern wolffish (Kulka et al. 2007). A management plan has also been prepared for the Atlantic wolffish (Kulka et al. 2007), currently listed as *special concern* on Schedule 1.

Species profiles and any related special or sensitive habitat related to Schedule 1 species (and key potential ones) are described in the following subsections

3.7.1 Fishes

Sixteen fish species/populations that could potentially occur in the SEA Area are considered as SAR. Five of these species are listed on Schedule 1 of *SARA*, three of which have legal implications (Table 3.20).

3.7.1.1 Atlantic Salmon (Inner Bay of Fundy Population)

The Inner Bay of Fundy (IBOF) population of Atlantic salmon is currently designated as *endangered* on Schedule 1 of *SARA* and COSEWIC. Though little is known about their use of marine waters, Atlantic salmon from the IBOF population may occur in the SEA Area (Amiro et al. 2008). Many Canadian populations typically migrate north to the waters off Newfoundland and Labrador and Greenland; however, the extent of marine habitat used by the IBOF salmon appears to be localized. The vast majority of IBOF smolts are thought to mature within the Bay of Fundy and northern Gulf of Maine (see Amiro et al. 2008). In a study of more than 40,000 tagged, hatchery-grown smolts released into IBOF rivers matching their genetic origins between 1985 and 1990, only two from the Gaspereau River were captured in the Newfoundland and Greenland fisheries (Amiro et al. 2008).

3.7.1.2 Wolffishes

Three species of wolffish (i.e., northern, spotted and Atlantic) are currently listed on Schedule 1 of *SARA*. Both the northern and spotted wolffishes are designated as *threatened* on Schedule 1. The Atlantic wolffish is designated as *special concern* on Schedule 1 of *SARA* and COSEWIC. A Recovery Strategy for northern and spotted wolffishes and a Management Plan for Atlantic wolffish have been published (Kulka et al. 2007).

Wolffish, also known as catfish, are solitary bottom-dwelling fish. They typically occur over hard clay and sand substrates (Scott and Scott 1988). The three species have a broad distribution in the NW Atlantic, inhabiting most of the shelves from the Davis Strait south to the Gulf of Maine (Kulka and DeBlois 1996; DFO 2002). Wolffish are distributed at northern latitudes in moderately deep water in the Atlantic, Pacific and Arctic Oceans. Northern wolffish occur in the Laurentian Channel along the slope of the St. Pierre Bank at depths of 90 to 200 m and prefer water temperatures of 1.6°C to 4°C (Scott and Scott 1988; Gomes et al. 1992; Simpson and Kulka 2001). Spotted wolffish occur in the deep waters of the Laurentian and Hermitage Channels at depths of 475 m and deeper and prefer water temperatures of 3°C to 4°C (Simpson and Kulka 2001; DFO 2002). Atlantic wolffish are found further south than either northern or spotted wolffish, occurring in low numbers at intermediate depths along the slope of the St. Pierre Bank, but have been found as deep as 350 m at temperatures as low as 0.4°C (Scott and Scott 1988; Gomes et al. 1992; Simpson and Kulka 2001; DFO 2002). Tagging studies conducted in the 1960s have shown that wolffish are sedentary and undergo limited migration. Most individuals were recaptured within eight kilometres of release (Templeman 1984).

Wolffish are bathypelagic and benthic predators, preying on jellyfish, comb jellies, crabs, bivalves, echinoderms and fish (primarily those discarded by trawlers). There are few predators of wolffish species. Northern wolffish have been found in the stomachs of redfish and Atlantic cod. Spotted wolffish have been found in the stomachs of pollock, Atlantic cod, and Greenland sharks (*Somniosus microcephalus*). Predation on Atlantic wolffish has not been observed; however, juveniles have been found in the stomachs of Atlantic cod (Scott and Scott 1988). Wolffish species have been reported by local fishers as being abundant in the SEA Area and to consume large amounts of shellfish there (Canning & Pitt 2006).

Table 3.20. *SARA* Schedule 1 and COSEWIC-listed Marine Species that Potentially Occur in the SEA Area.

Species		*SARA* Schedule 1			COSEWIC			
Common Name	**Scientific Name**	***Endangered***	***Threatened***	***Special Concern***	***Endangered***	***Threatened***	***Special Concern***	***Candidate***
Blue whale (Atlantic population)	*Balaenoptera musculus*	X			X			
North Atlantic right whale	*Eubalaena glacialis*	X			X			
Northern bottlenose whale (Scotian Shelf population)	*Hyperoodon ampullatus*	X			X			
Leatherback sea turtle	*Dermochelys coriacea*	X			X			
Piping Plover *melodus* subspecies	*Charadrius melodus melodus*	X			X			
Roseate Tern	*Sterna dougallii*	X			X			
Ivory Gull	*Pagophila eburnea*	X			X			
Atlantic salmon (Inner Bay of Fundy population)	*Salmo salar*	X			X			
Beluga whale (St. Lawrence Estuary population)	*Delphinapterus leucas*		X			X		
Northern wolffish	*Anarhichas denticulatus*		X			X		
Spotted wolffish	*Anarhichas minor*		X			X		
Atlantic wolffish	*Anarhichas lupus*			X			X	
Fin whale (Atlantic population)	*Balaenoptera physalus*			X			X	
Harlequin Duck (Eastern population)	*Histrionicus histrionicus*			X			X	
Barrow's Goldeneye (eastern population)	*Bucephala islandica*			X			X	
Banded killifish	*Fundulus diaphanus*			X			X	
Atlantic cod (Newfoundland and Labrador population)	*Gadus morhua*				X			
Porbeagle shark	*Lamna nasus*				X			
White shark	*Carcharodon carcharias*				X			
Roundnose grenadier	*Coryphaenoides rupestris*				X			
Winter skate (Southern Gulf population)	*Leucoraja ocellata*				X			
Red Knot *rufa* subspecies	*Calidris canutus rufa*				X			
Atlantic cod (Laurentian North population)	*Gadus morhua*					X		
Cusk	*Brosme brosme*					X		
Shortfin mako shark	*Isurus oxyrinchus*					X		
American plaice (NL population)	*Hippoglossoides platessoides*					X		

Species		*SARA* Schedule 1			COSEWIC			
Common Name	**Scientific Name**	***Endangered***	***Threatened***	***Special Concern***	***Endangered***	***Threatened***	***Special Concern***	***Candidate***
American plaice (Maritimes population)	*Hippoglossoides platessoides*					X		
Winter skate (Eastern Scotian Shelf population)	*Leucoraja ocellata*					X		
Sowerby's beaked whale	*Mesoplodon bidens*						X	
Harbour porpoise	*Phocoena phocoena*						X	
Killer whale (NW Atlantic/Eastern Arctic populations)	*Orcinus orca*						X	
Atlantic cod (Maritimes population)	*Gadus morhua*						X	
Blue shark	*Prionace glauca*						X	
American eel	*Anguilla rostrata*						X	
Roughhead grenadier	*Macrourus berglax*						X	
Ocean pout	*Zoarces americanus*							High priority
Semipalmated Sandpiper	*Calidris pusilla*							High priority
Red-necked Phalarope	*Phalaropus lobatus*							High priority
Spiny eel	*Notacanthus chemnitzi*							Mid priority
Pollock	*Pollachius virens*							Mid priority
Spinytail skate	*Bathyraja spinicauda*							Mid priority
Alewife	*Alosa pseudoharengus*							Mid priority
Capelin	*Mallotus villosus*							Mid priority
Haddock	*Melanogrammus aeglefinus*							Mid priority
Sperm whale	*Physeter macrocephalus*							Low priority
Harp seal	*Phoca groenlandica*							Low priority
Greater Scaup	*Aythya marila*							Low priority
Red Phalarope	*Phalaropus fulicarius*							Low priority
American Golden-Plover	*Pluvialis dominica*							Low priority

Sources: *SARA* website (http://www.sararegistry.gc.ca/default_e.cfm) (as of May 20009); COSEWIC website (http://www.cosepac.gc.ca/index.htm) (as of 20 May 2009).

There is little information on wolffish life history in Canadian waters because they are not the direct target of a commercial fishery. It is known that they have low productivity, with very few sperm and eggs produced per fish when compared with other fish species; although internal fertilization, nesting habits and egg guarding behavior increases the potential for survival of the large (2 cm long) larvae (Keats et al. 1985; Pavlov 1994; Wiseman 1997). As wolffish undergo limited migration, it is likely that they spawn within the SEA Area. Information regarding the spawning times and nesting and egg guarding behaviors of all wolffish is limited, but the northern wolffish appears to spawn in the late fall or early winter (Templeman 1985; 1986). Ollerhead and Lawrence (2007) indicate occurrence of Atlantic wolffish juveniles in the 3Pn portion of the SEA Area during 1995 to 2003 DFO RV surveys.

In the mid-1990s, a large decline in wolffish numbers was observed (Kulka and DeBlois 1996). COSEWIC reports published in 2001 determined that northern and spotted wolffish had each declined in abundance by more than 90 percent over three generations and that their geographic distribution had significantly decreased (Kulka et al. 2007). The reasons for this decline included mortality as bycatch and habitat alteration by trawlers. The northern and spotted wolffish were designated as *threatened* by COSEWIC, and were subsequently added to Schedule 1 of *SARA* in 2001, legally protecting the species and its critical habitat.

3.7.1.3 Banded Killifish

The Newfoundland and Labrador population of banded killifish is listed as a species of *special concern* on Schedule 1. The banded killifish is found in eastern North America, with ten known sites in Newfoundland and Labrador (DFO 2009i), primarily in clear lakes and ponds with a muddy or sandy bottom in coastal areas in the south and west coasts of the island (Chippett 2003; SAR 2006). Within the SEA Area, one population occurs on Ramea Island while another occurs in First Pond in the Grand Bay West area near Port aux Basques (Chippett 2003). Although it usually inhabits freshwater streams and lakes, it is infrequently found in estuarine or marine waters (Fritz and Garside 1974). Spawning occurs in freshwater from April to May when temperatures range from 19 to 23°C (Chippett 2003). The females lay eggs that adhere to aquatic vegetation by individual adhesive threads once released. It is unlikely that killifish would occur in the offshore portion of the SEA Area.

3.7.1.4 Atlantic Cod

Four populations of Atlantic cod are considered as SAR: the Newfoundland and Labrador (NL) population; the Laurentian North population; the Maritimes population; and the Arctic population. None of the four cod populations are currently listed on Schedule 1; however, the NL population is designated by COSEWIC as *endangered* while the Laurentian North population is considered *threatened.* The Maritimes population and Arctic population are both considered as *special concern* under COSEWIC. Cod occurring in 3O are considered part of the Southern Grand Bank stock in the NL population while cod from Subdiv. 4Vs are considered part of the Eastern Scotian Shelf stock in the Maritimes population. The Laurentian North population includes the cod stocks labelled St. Pierre Bank and the Northern Gulf of St. Lawrence (3Pn4RS). Cod in Subdiv. 0AB are part of the Arctic population and are unlikely to occur in the SEA Area. Recent stock assessments have been completed for Atlantic cod in 3Pn (DFO 2009j), 3Ps (DFO 2007d), 3O (Morgan et al. 2007), and 4Vs (DFO 2009j).

The Atlantic cod is a demersal fish which inhabits cold (10 to 15°C) and very cold (less than 0 to 5°C) waters in coastal areas and offshore waters overlying the continental shelf throughout the NW and NE Atlantic (COSEWIC 2003). The species is found contiguously along the east coast of Canada from Baffin Island to Georges Bank. Outside Canadian waters in the NW Atlantic, cod can be found on the northeast and southeast tips of the Grand Banks and on the Flemish Cap. During the first few weeks of life, cod eggs and larvae are found in the upper 50 m of the water column. As juveniles, cod are settled on the bottom and tend to occur in nearshore habitats with vertical structure such as eelgrass and macroalgae. As adults, the habitat requirements of cod are diverse.

Atlantic cod typically spawn over a period of less than three months in water that may vary in depth from tens to hundreds of metres (COSEWIC 2003). Cod are described as batch spawners because only a small percentage (5 to 25%) of the female's egg total is released at any given time during a three to six week period. After hatching, larvae obtain nourishment from a yolk sac until they have reached a length of 1.5 to 2.0 mm. During the larval stage, the young feed on phytoplankton and small zooplankton in the upper 10 to 50 m of the water column. After the larval stage, the juveniles settle to the bottom where they appear to remain for a period of one to four years. These settlement areas are known to range from very shallow (<10 to 30 m) coastal waters to moderately deep (50 to 150 m) waters on offshore banks. After this settlement period, it is believed that the fish begin to undertake seasonal movements and migrations characteristic of adults. Dispersal in Atlantic cod appears to be limited to the egg and larval phases of life, during which surface and near-surface water currents and turbulence are the primary determinants of horizontal and vertical displacement in the water column (COSEWIC 2003). For some cod populations, eggs and larvae are capable of dispersing very long distances. For example, cod eggs spawned off southeastern Labrador (NAFO Div. 2J) may possibly disperse as far south as the Grand Bank. By contrast, eggs spawned by cod in inshore, coastal waters, especially at the heads of large bays, may experience dispersal distances of a few kilometres or less. Ollerhead and Lawrence (2007) indicate occurrence of Atlantic cod juveniles in 3Pn portion of the SEA Area during 1995 to 2003 DFO RV surveys.

Long-term movements by cod take the form of seasonal migrations (COSEWIC 2003). These migrations can be attributed to geographical and seasonal differences in water temperature, food supply, and possibly spawning grounds. At one extreme, some inshore populations are suspected to have extremely short migrations, possibly limited to tens of kilometres, or less, in distance. By contrast, cod in other populations are known to traverse hundreds of kilometres during their seasonal migrations. . For example, the Northern Gulf of St. Lawrence cod (NAFO Divisions 3Pn and 4RS) undertake an extensive annual migration. In winter, they are found off southwestern (3Pn) and southern Newfoundland (3Ps) at depths of more than 366 m (DFO 2009j; see also Yvelin et al. 2005). In April and May, they migrate towards the Port au Port Peninsula on the west coast of Newfoundland (Division 4R), where spawning begins. During the summer, fish continue their migration and disperse in the coastal zones, along the west coast of Newfoundland (Division 4R) and towards Quebec's Middle and Lower North Shore (Division 4S). This migration to the coast is associated with warmer water and the presence of capelin (*Mallotus villosus*). Based on the results from numerous tagging experiments, this stock is generally isolated from adjacent stocks particularly the 4TVn and the 2J3KL stocks. There can be occasional mixing in the northwest part of the Gulf, (with 4TVn cod), in the Strait of Belle Isle (with 2J3KL cod), but mixing in the Burgeo Bank area (with 3Ps cod) is considered to occur every year during winter. It has been determined that 75% of cod present on the Burgeo Bank (3Psa and 3Psd) in winter might come from the northern Gulf. As mentioned, cod in the Northern Gulf of St. Lawrence and along the south coast of Newfoundland comprise an assemblage of stocks within which there is considerable mixing. They are currently at low levels as a group and overall have declined by about 80% over the past thirty years (DFO 2005c).

3.7.1.5 Porbeagle Shark

Although not listed on Schedule 1 of *SARA*, porbeagle shark is currently designated as *endangered* under COSEWIC. Porbeagle is a large cold-water pelagic shark distributed in the western Atlantic from Greenland to Bermuda (COSEWIC 2004b). Its distribution includes all the waters off Newfoundland and Labrador. In the SEA Area, porbeagle are specifically found on the St. Pierre Bank and in the Laurentian Channel in the spring, summer and fall months (Scott and Scott 1988). Mating occurs annually from September through November and live birth occurs eight to nine months later with an average litter size of four (Jensen et al. 2002). Porbeagle has an estimated lifespan of 25 to 46 years and a generation time, the mean age of female parents, of 18 years (Campana et al. 1999; Natanson et al. 2002 *in* COSEWIC 2004b).

Abundance of porbeagle has declined greatly since it was targeted commercially in the 1990s after an earlier collapse and partial recovery (COSEWIC 2004b). Its life history characteristics, including late maturity and low fecundity, make this species vulnerable to overexploitation (COSEWIC 2004b). Prior to 1991, the most abundant age-class off southern Newfoundland in the fall months was 10 to 15 years old. This is consistent with the use of the area as a mating ground. Between 1998 and 2000, the most abundant age classes in this area were less than age 3 (Campana et al. 2002). The population size of the NW Atlantic population was estimated to range from 94,309 to 195,230 fish in 2005, which is approximately 0.10 to 0.24% of the population size in the 1960s (DFO

2005d; Gibson and Campana 2005). The estimated number of mature females ranged from 9000 to 13,000 fish, or about 15% of the population (DFO 2005d; Gibson and Campana 2005).

3.7.1.6 White Shark

Although not listed on Schedule 1 of *SARA*, white shark is currently designated as *endangered* under COSEWIC. The white shark is a highly migratory fish whose occurrence has been recorded over a broad depth range of surface to 1280 m (Scott and Scott 1988). This shark is primarily a coastal and offshore inhabitant of continental and insular shelves but it also occurs off oceanic islands far from any mainland (Scott and Scott 1988). They are found rarely in Canadian waters, but have typically been seen in August and September when observed (DFO 2006g). Since 1874, a total of 34 white sharks have been recorded from eastern Canada (two since 1986) and 15 of these were captured in commercial fishing gear (e.g., gill nets and herring weirs). The species has been reported to occur on St. Pierre Bank and in the Laurentian Channel within the SEA Area (COSEWIC 2006c). Globally, there is a severe lack of information on abundance, distribution, and productivity of the species as well as insufficient data on bycatch, natural mortality, and reproductive rates (DFO 2006g). The recovery potential in Canadian waters appears to be dependent largely on the overall recovery of the species in U.S. and other North Atlantic waters (DFO 2006g).

3.7.1.7 Roundnose Grenadier

Although not listed on Schedule 1 of *SARA*, roundnose grenadier is currently designated as *endangered* under COSEWIC. Distributed in the NW Atlantic from Cape Hatteras to Greenland, the roundnose grenadier is a deepwater, demersal fish found in continental slope areas at depths of 180 to 2,600+ m (Atkinson 1995; COSEWIC 2008b), with greatest abundance reported to occur between 400 m and 1,200 m (COSEWIC 2008b). This species is thought to undergo seasonal migrations with individuals in northeast Newfoundland waters occupying deeper water in winter and shallower water in late summer. Diurnal vertical migrations also occur that may carry them more than 1000+ m off the bottom (COSEWIC 2008b). The long-lived, late-maturing, slow-growing species has a low fecundity and is potentially vulnerable to overfishing (Devine and Haedrich 2008). The roundnose grenadier harvest has been under a moratorium in Canadian waters in NAFO Subareas 2 and 3 since the 1990s, but may be harvested as by-catch in other fisheries (Power 1999). Roundnose grenadier spawning grounds are largely unknown and suspected to be in waters deeper than 850 m. Spawning is believed to occur either in different areas throughout the NW Atlantic (COSEWIC 2008b) or predominately in Icelandic waters with the passive eggs and larvae carried to other areas in the NW Atlantic by currents (Scott and Scott 1988). The spawning time is uncertain, but believed to occur throughout the year with more intense spawning occurring during particular periods. These periods appear to vary between areas (Atkinson 1995). Some researchers believe spawning occurs from May through September, peaking in late July and early August (COSEWIC 2008b). The roundnose grenadier feeds on a variety of small crustaceans and euphasiids, squid, and small fishes such as myctophids. Young feed primarily on copepods and amphipods, becoming more piscivorous with age (COSEWIC 2008b). Their feeding is believed to be somewhat seasonal, occurring predominately during the fall months. This slow swimming species, in turn, is possibly consumed by other fishes (COSEWIC 2008b).

3.7.1.8 Winter Skate

Two populations of winter skate are considered as SAR, the Southern Gulf (SG) population and the Eastern Scotian Shelf (ESS) population. While neither population is currently listed on Schedule 1 of SARA, the SG population is listed as *endangered* and the ESS population as *threatened* under COSEWIC. Distributed from southern Newfoundland to Cape Hatteras, the winter skate is a benthic species that resides over sand or gravel bottoms (Scott and Scott 1988). The species usually occurs in waters shallower than 111 m but has been caught as deep as 371 m in the Gulf of St. Lawrence (Scott and Scott 1988). Research vessel survey data for the Scotian Shelf suggest that winter skate are concentrated in deeper warmer waters in the winter and move into shallower waters during spring and summer (COSEWIC 2005a).

Like other elasmobranches, winter skate are slow-growing, produce very few young each year, and are believed to have a slow population growth rate (COSEWIC 2005a). Mating is believed to occur throughout the year. Although the exact number of purses laid is unknown, winter skate are thought to deposit from six to fifty egg cases. The greenish brown or olive-brown egg cases are believed to be deposited throughout the year off southern New England and from summer to autumn off Nova Scotia; however, such information is lacking for the SEA Area.

Rock crab and squid are prey favoured by winter skate; however, they also prey upon annelid worms, amphipods, shrimps, and razor clams. In addition, winter skate eat whatever small fish (e.g., sandlance) are readily available along with other small skate. Little is known about predation on winter skate, but the yare eaten by many predators including sharks, other skates, and grey seals (COSEWIC 2005a).

3.7.1.9 Cusk

Although not listed on Schedule 1, cusk is currently designated as *threatened* under COSEWIC. Cusk are solitary, slow-swimming groundfish that occur on both sides of the North Atlantic. In Canadian waters, this species is most common in the Gulf of Maine, Gulf of St. Lawrence and the southwestern Scotian Shelf (Scott and Scott 1988). Although most common within a depth range of 128 to 144 m, some have been caught as deep as 600 m. Adult cusk prefer structured hard bottom habitat and a depth range of 400 to 600 m (DFO 2008i). The preferred habitat of juvenile cusk is not known (DFO 2008i). Spawning occurs from May to August, peaking in June, in Scotian Shelf waters. The diet of cusk is not well documented because their stomachs usually evert when they are brought to the surface. Studies have shown that in European waters, cusk feed on crab, molluscs, krill, cod, and halibut. Their diet is presumed to be the same in Canadian waters (Scott and Scott 1988).

3.7.1.10 Shortfin Mako Shark

Although not listed on Schedule 1, shortfin mako shark is currently designated as *threatened* under COSEWIC. The shortfin mako is a large temperate and tropical pelagic shark species that occurs in the Atlantic, Pacific, and Indian oceans (Campana et al. 2006). The species occur from the surface to 500 m depths and typically well offshore, although it has been occasionally been observed in the littoral zone. In Canadian waters, the species is most closely associated with warm waters, such as in and around the Gulf Stream. These sharks are not abundant in Newfoundland waters because of this preference for warm waters. The species has been reported along the continental shelf waters of Nova Scotia, the Grand Banks, and into the Gulf of St. Lawrence (Templeman 1963 *in* Campana et al. 2006). The shortfin mako shark is highly migratory with tagging results suggesting that there is a single well-mixed population in the North Atlantic (Casey and Kohler 1992 *in* Campana et al. 2006). Atlantic Canada represents the northern extension of their range, and most of their population is believed to reside in more temperate waters (Campana et al. 2006). In addition, mature females and young of the year are rarely caught in Canadian waters (Campana et al. 2006).

3.7.1.11 American Plaice

Two populations of American plaice are being considered as SAR, the NL population and the Maritimes population (COSEWIC 2009). While neither population is currently listed in Schedule 1 of *SARA*, both are designated as *threatened* under COSEWIC. American plaice is a bottom-dwelling flatfish that resides on both sides of the Atlantic (DFO 2006h). American plaice that reside in the western Atlantic region range from the deep waters off Baffin Island and western Hudson's Bay south to the Gulf of Maine and Rhode Island (Scott and Scott 1988). In Newfoundland waters, plaice occurs both inshore and offshore over a wide variety of bottom types (Morgan 2000). They are tolerant of a wide range of salinities and have been observed in estuaries (Scott and Scott 1988; Jury et al. 1994). Plaice are typically found at depths of approximately 90 to 250 m (Scott and Scott 1988), but have been found as deep as 1383 m (Morgan and Bowering 2006). Most commercially harvested plaice are taken at depths of 125 to 200 m. They are a coldwater species, preferring water temperatures of 0°C to 1.5°C (Scott and Scott 1988). Tagging studies in Newfoundland waters suggest that, once settled, juveniles and adults are rather sedentary and do not undertake large scale migrations (DFO 2008j). However, older plaice have been known to move up to 160 km (Powles 1965). Migrations have been observed in Canadian waters to deeper offshore waters in the winter, returning to shallower water in the spring (Hebert and Wearing-Wilde 2002 *in* Johnson 2004).

In Newfoundland waters, American plaice spawn during the spring (Scott and Scott 1988). Within the SEA Area, there are limited data with respect to spawning times. American plaice in the Newfoundland Region have no specific spawning areas; rather spawning occurs over the entire area (DFO 2008j), with the most intense spawning coincident with areas where the higher abundance of adults are found (Busby et al. 2007). Limited data indicate that spawning occurs in April (and possibly other months) on Burgeo Bank, St. Pierre Bank, and along the slopes of the Laurentian Channel and Hermitage Channel (Ollerhead et al. 2004). Spawning is noted to begin in late April on Grand Bank (Scott and Scott 1988). Spawning on the St. Pierre Bank and SW Grand Bank typically occurs in water temperatures of 2.7°C and 2.8°C, respectively (Scott and Scott 1988). Most intensive spawning on Grand Bank and nearby fishing banks occur when near-bottom temperatures are in the range of 0°C to 2.5°C (Scott and Scott 1988). Large quantities of eggs are released and fertilized over a period of days on the seabed (Johnson 2004). Eggs are buoyant and drift into the upper water column, where they are widely dispersed, allowing for some intermingling of stocks. Intermingling of adults is minimal. Hatching time is temperature dependant, occurring in 11 to 14 days at temperatures of 5°C (Scott and Scott 1988). Larvae are 4 to 6 mm in length when they hatch and begin to settle to the seabed when they reach 18 to 34 mm in length and their body flattens (Fahay 1983). Ollerhead and Lawrence (2007) indicate occurrence of American plaice juveniles in the 3Pn portion of the SEA Area during 1995 to 2003 DFO RV surveys.

3.7.1.12 Blue Shark

Although not listed on Schedule 1, blue shark is currently designated as *special concern* under COSEWIC. The blue shark is found worldwide in temperate and tropical oceans, most often in the offshore waters between the surface and 350 m (COSEWIC 2006d). In Atlantic Canada they occur from northeastern Newfoundland southward and are regularly found in almost all waters with a peak occurrence in the late summer and fall. Mating appears to be most frequent in the spring to early summer season (COSEWIC 2006d), but mature females are not seen in Canadian waters (Campana et al. 2006). Blue sharks have a 9 to 12 month gestation period and females produce litters approximately every two years. Births have been observed to occur over a wide seasonal range from spring to fall (COSEWIC 2006d), presumably in the eastern Atlantic (O'Boyle et al. 1996). The species is reported to consume a wide variety of prey including bony fishes, squids, birds, and marine mammal carrion (COSEWIC 2006d). Blue shark is the most heavily fished shark species in the world and fishing is the single largest source of adult mortality.

3.7.1.13 American Eel

Although not listed on Schedule 1, American eel is currently designated as *special concern* under COSEWIC. The American eel is the NW Atlantic representative of the worldwide genus *Anguilla*, whose members spawn in ocean waters, migrate to coastal and inland continental waters to grow, and then return to ocean spawning grounds to reproduce and die (Cairns et al. 2008). The historic Canadian range encompassed all accessible fresh water, estuaries and coastal marine waters connected to the Atlantic as far north as the mid-Labrador coast. Continental shelves are used by juvenile eels arriving from spawning grounds, and by silver eels, after several years in fresh water, returning to the spawning grounds. Spawning takes place in the Sargasso Sea, located south of Bermuda and east of the Bahamas.

Hatched larvae develop a leaf-like shape and are termed leptocephali (COSEWIC 2006e). American eel leptocephali drift westward towards the continental shelf, where they metamorphose into small, transparent glass eels, which have the serpentine shape of the adult form. As glass eels move into inshore waters, they develop pigmentation and become elvers. Elver arrival generally occurs in May and early June on the Atlantic coast of the Maritime Provinces, and in summer in the Gulf of St. Lawrence. Some elvers remain in shallow protected salt water, some move into estuaries, and some move into fresh water. Elvers become yellow eels, which have a dark back and a yellowish belly. Sexual differentiation occurs during the yellow phase and appears to be controlled by environmental factors. Density appears to be the dominant influence, with high densities promoting the production of males. Females are dominant in many locations in Canada with the notable exceptions being the upper St. Lawrence River and Lake Ontario. When yellow eels reach a certain size, their bellies turn silver and they prepare for the spawning migration. Eels that occupy brackish and salt water tend to grow more rapidly than those in fresh water and thus return to spawning grounds at a younger age. Yellow eels in fresh water may continue to migrate for many years before returning to the spawning ground.

Newfoundland is the most data-poor area of the American eel's Canadian range, and has no data sets that indicate abundance trends or absolute abundance at any life stage.

3.7.1.14 Roughhead Grenadier

Although not listed on Schedule 1, roughhead grenadier is designated as *special concern* under COSEWIC. The roughhead grenadier occurs in deep water along coasts in subarctic to temperate waters on both sides of the North Atlantic. In the NW Atlantic, this species of grenadier occurs from Davis Strait along the continental slope, off Newfoundland, off Nova Scotia on Banquereau, Sable Island and Browns Bank, and on Georges Bank (Scott and Scott 1988). The roughhead grenadier is an abundant and widespread species in the northwest Atlantic. This fish generally occurs both on the shelf and on the continental slope at depths ranging from 400 to 1200 m. It has been found at depths as shallow as 200 m and as deep as 2700 m. In trawls off Newfoundland, densities tend to be highest at depths of about 500 m to 1500m (COSEWIC 2007b). Catches tend to be highest at water temperatures ranging between 2.0 and 3.5ºC (Scott and Scott 1988).

Spawning is thought to occur during the winter and early spring and may extend over the entire year (COSEWIC 2007b). Little is known about the spawning grounds of this slow-growing, late-maturing fish off Newfoundland although some believe that some spawning occurs on the southern and southeastern slopes of the Grand Banks (Scott and Scott 1988). Food on the roughhead grenadier consists of a variety of benthic invertebrates including bivalve molluscs, shrimp, seastars, polychaetes and some fish (COSEWIC 2007b). These very slow moving fish have been found in the stomachs of Atlantic cod and other predatory fish.

Since 1988, EU surveys have been conducted at the Flemish Cap in depths ranging between 200 and 730 m. These depths represent only part of the known vertical distribution of this species. Based on the results of these surveys, the estimated total biomass in 2001 was essentially the same as in 1988 (Murua 2003; Vázquez 2002). This grenadier species is quickly becoming an important commercial fish off Newfoundland. Presently its fishery is unregulated since it is usually taken as bycatch in the Greenland halibut fishery.

3.7.2 Marine-associated Birds

Six marine-associated bird species that could potentially occur in the SEA Area are considered as SAR. Five of them are listed on Schedule 1 of *SARA*, three of which have legal implications (Table 3.20).

3.7.2.1 Piping Plover *Melodus* Subspecies

The Piping Plover *melodus* subspecies is listed as *endangered* on Schedule 1 of *SARA*. It is also designated *endangered* by COSEWIC and under the *Endangered Species Act (ESA) of Newfoundland and Labrador, 2001*. It nests and forages on sandy beaches from April to September. A Proposed Recovery Strategy for the Piping Plover is outlined in Goossen (2002). Recommendations for protection of critical habitat under the *ESA* have been forwarded to the responsible provincial minister by the Newfoundland Piping Plover Working Group (J. Brazil, pers. comm.). This species nests in the SEA Area. Ten to 12 pairs breed on 14 km of sand-beach habitat from Cheeseman Provincial Park (Cape Ray Beach) to Grand Bay West. Sandy beach habitat is extensive in this area of the province and beaches known to support breeding pairs include Big Barasway Beach and Sand Banks Park Beach (2 to 6 pairs).

3.7.2.2 Roseate Tern

The Roseate Tern is listed as *endangered* on Schedule 1. A few pairs nest on Sable Island and mainland Nova Scotia coasts (JWEL 2003). The number of breeding pairs at the site closest to the SEA Area, Sable Island dwindled to one pair in 2001 (detailed in JWEL 2003). It forages by plunge diving in inshore waters (Kirkham and Nettleship 1986). This species occasionally occurs on the south coast of Newfoundland during migration, so it has the potential to occur in the SEA Area on rare occasions (B. Mactavish, LGL, pers. comm., 2009). Most species of terns nesting in Nova Scotia and Newfoundland and Labrador are regarded as *sensitive* by the governments of those provinces. Arctic and Common Terns nest at several coastal locations in and near the SEA Area (for details see JWEL 2003; JW 2007). Caspian Tern was recently de-listed by COSEWIC and may breed infrequently as single pairs in the SEA Area at locations such as the Penguin Islands (see above).

3.7.2.3 Ivory Gull

The Ivory Gull is listed as *endangered* on Schedule 1. It is an Arctic species that may occur in the SEA Area on rare occasions during winter, usually associated with sea ice. For example, a few occurred at Miquelon Island during the winter of 2008 to 2009 (www.spmaviavis.com/discus/messages/15/2390.html?1231948902). Its preferred food is seal carcasses.

3.7.2.4 Harlequin Duck (Eastern Population)

The Eastern population of Harlequin Duck is listed as a species of *special concern* on Schedule 1. It is also designated as *endangered* by the province of Nova Scotia, and designated *vulnerable* by the Government of Newfoundland and Labrador. This species winters along rocky coastlines near the SEA Area, where it dives for amphipods and other invertebrates among seaweed. This species concentrates at wintering sites that include the Avalon Peninsula at Cape St. Mary's and Chance Cove, and along the south coast of the Burin Peninsula. Small numbers occasionally summer in the Cape St. Mary's area. Small numbers are also sometimes seen during winter along Nova Scotia coastlines, including Cape Breton Island in the Northern Head to South Head area.

3.7.2.5 Barrow's Goldeneye (Eastern Population)

The eastern population of Barrow's Goldeneye is listed as a species of *special concern* on Schedule 1. This population nests on freshwater lakes in the Laurentian Highlands of Québec and in Labrador, and winters primarily in the Gulf of St. Lawrence (Robert et al. 2000). It is rare along the coastlines of Newfoundland and Nova Scotia perhaps occurring during migration and winter. Within the SEA Area, it has occurred at St. Mary's Bay, Newfoundland, and Sydney, Nova Scotia (Tufts 1986; Schmelzer 2006). During winter it feeds chiefly on amphipods and gastropods (Bourget et al. 2007).

3.7.2.6 Red Knot *Rufa* Subspecies

Although not listed on Schedule 1 of *SARA*, Red Knot *rufa* subspecies is currently designated as *endangered* under COSEWIC due to declines in food supply at its spring staging area on Chesapeake Bay. During migration, this subspecies occurs in very small numbers in and near the SEA Area, and more commonly during autumn than spring (Tufts 1986; Mactavish et al. 2003). In migration, this species prefers sandy areas near the mouths of bays, tidal inlets, and estuaries where it feeds on benthic and epifaunal bivalves and other invertebrates (Harrington 2001).

3.7.3 Marine Mammals

Eight marine mammal species/populations that could potentially occur in the SEA Area are considered as potential SAR (Table 3.20).

3.7.3.1 Blue Whale (Atlantic Population)

The Atlantic population of blue whale is listed as *endangered* on Schedule 1 and by COSEWIC (COSEWIC 2008a). The blue whale has a cosmopolitan distribution, but tends to be a pelagic species only coming nearshore to feed and possibly to breed (Jefferson et al. 2008). Blue whales became severely depleted during commercial whaling. A recent proposed Recovery Strategy for blue whales in the NW Atlantic is available with a long-term recovery goal to reach a total of 1000 mature individuals through the achievement of three five-year objectives (DFO 2009k). No Critical Habitat was identified.

Up to 1400 animals are thought to occur in the North Atlantic (NMFS 1998), and Sears et al. (1987) estimated a total of 308 animals from mark-recapture photo-identification studies in the Gulf of St. Lawrence. Little else is known about population size of blue whales in the North Atlantic, outside of the Gulf of St. Lawrence (Waring et al. 2007). Foraging blue whale distribution in the Gulf of St. Lawrence has been linked to hetero-geneous sub-surface topography and thermal fronts (Doniol-Valcroze et al. 2007). Most sightings of blue whales in Canadian waters include sightings during spring, summer, and fall in the Gulf of St. Lawrence or eastern Nova Scotia, and winter sightings off southern Newfoundland (Waring et al. 2007). In the Gulf of St. Lawrence, blue whales enter the area through Cabot Strait by late March or early April and are commonly encountered from May to December (Sears and Calambokidis 2002). They primarily feed on euphausids that are most common near the 100 m contour (Sears et al. 1987). Blue whales may be most common from spring to fall, they are likely found within the SEA Area throughout the year (Sears and Calambokidis 2002). Sightings were mapped along the south coast of Newfoundland from December through May by Meltzer Research and Consulting (1996). Blue whales were observed during every season in the DFO sighting database, but sightings peaked during the summer (Table 3.17). Blue whales were frequently observed in the Laurentian Sub-basin portion of the SEA Area during a 2005 seismic survey (Moulton et al. 2006). Throughout the SEA Area, sightings appeared in coastal, shallow areas as well as offshore, deep, slope areas (Table 3.18; Figure 3.81). Sightings appeared frequently in coastal, shallow areas as well as offshore, deep, slope areas (Table 3.18; Figure 3.81).

3.7.3.2 North Atlantic Right Whale

The North Atlantic right whale is listed as *endangered* on Schedule 1 and COSEWIC. The North Atlantic right whale population is one of the world's most critically endangered large whale populations (Clapham et al. 1999; IWC 2001). North Atlantic right whale populations were originally severely depleted by commercial whaling. The population is currently estimated below 350 individuals, and the lack of recovery has been attributed to direct and indirect impacts from human activities, especially collisions with ships and entanglement in fishing gear (IWC 2001; Brown et al. 2008). A recent Canadian Recovery Strategy noted a goal "to achieve an increasing trend in population abundance over three generations" via seven recovery objectives (Brown et al. 2009). Grand Manan Basin in the Bay of Fundy has been delineated as Critical Habitat, and Roseway Basin on the southwestern Scotian Shelf has been designated as a Conservation Area.

North Atlantic right whales are generally found in continental shelf waters off the eastern U.S. and Canada, but have been known to range as far north and east as Greenland, Iceland, and Norway (Winn et al. 1986; Knowlton et al. 1992). Within Canadian waters, important habitats include summer and fall feeding and nursery grounds in Grand Manan Basin in the lower Bay of Fundy and Roseway Basin on the western Nova Scotian Shelf (Brown et al. 2008). There is a general seasonal north-south migration, but right whales may be seen anywhere within their range throughout the year (Gaskin 1982). Sparse sightings or information from whaling logbooks include a few winter records from the Gulf of St. Lawrence and coasts of Newfoundland and Labrador (Lien et al. 1989; Knowlton et al. 1992). Historical whaling also occurred during summer in waters near the eastern edge of the Grand Banks (Reeves and Mitchell 1986). Animals migrate from northern feeding grounds to calving grounds off the southeastern U.S. in late fall to winter and return northward in late winter to early spring. Peak sightings on Canadian feeding grounds occur from August to early October, coinciding with the abundance of their primary prey, calanoid copepods (Baumgartner et al. 2003). Sightings in very deep, offshore waters of the NW Atlantic are rare. Right whales usually occur singly or in small groups, and aggregations are generally associated with feeding (Jefferson et al. 2008). Right whales are slow swimmers and exhibit surface behaviours that make them particularly susceptible to vessel strikes (summarized in Baumgartner and Mate 2003; Brown et al. 2008). There was a single sighting of a right whale in the entire historical database compiled by DFO (1975-2007) in September 2006. While right whales may have historically used portions of the SEA Area, they are likely only very rare visitors currently.

3.7.3.3 Northern Bottlenose Whale (Scotian Shelf Population)

The Scotian Shelf population of northern bottlenose whale is listed as *endangered* on Schedule 1 of *SARA* and COSEWIC. Northern bottlenose whales have two primary areas of known concentration in Canadian waters: The Gully, just north of Sable Island, Nova Scotia, and Davis Strait off northern Labrador (Reeves et al. 1993). There is currently no abundance estimate for northern bottlenose whales in the NW Atlantic (Waring et al. 2007), but there is an estimated 163 whales in the Scotian Shelf population (Whitehead and Wimmer 2005). The Scotian Shelf population appears to be highly concentrated in a small region of the eastern Scotian Shelf around the deep waters of three underwater canyons: The Gully; Shortland Canyon; and Haldimand Canyon (Wimmer and Whitehead 2004). The Gully has been designated as a Marine Protected Area in Canada, with a primary goal of protecting this population of bottlenose whales (Harris et al. 2007). Although most sightings occur during the summer, there are winter occurrences and the population presumably remains within this region year-round (Reeves et al. 1993). Current and historical ranges beyond these areas are unknown, but Harris et al. (2007) suggest that potential management plans should limit total allowable human-induced mortality to 0.3 animals per year, maintain at least the current population distribution, and target a stable or increasing population level. Northern bottlenose whales are deep-divers, and animals tagged off Nova Scotia dove every ~80 min to over 800 m, with a maximum dive depth of 1453 m (Hooker and Baird 1999a). They forage primarily on large-bodied squid and travel in small groups that may consist of individuals of different age and sex classes, although males appear to form long-term associations with other mature males (Gowans et al. 2001). Northern bottlenose whales have been detected acoustically between the eastern Scotian Shelf canyons and the Laurentian Channel (Harris et al. 2007). Harris et al. (2007) also report few opportunistic sightings along the southern Grand Banks, but it is unknown to which population these individuals belong. There were 12 sightings of Northern bottlenose whales within the SEA Area in the DFO sightings database; all occurred in offshore slope areas (Figure 3.82). Sightings occurred in spring and summer, primarily in waters 500 to 1500 m deep (Tables 3.17 and 3.18). Northern bottlenose whales are expected to, at least, enter the SEA Area occasionally but there is insufficient information to determine to which population whales in the SEA Area belong.

3.7.3.4 Beluga Whale (St. Lawrence Estuary Population)

The St. Lawrence Estuary population of beluga whale is listed as *threatened* on Schedule 1 of *SARA*. Beluga whales are circumpolar in distribution, and found in arctic and sub-arctic regions (Jefferson et al. 2008). Abundance in the NW Atlantic is unknown, but 952 individuals are estimated to comprise the St. Lawrence estuary population (Gosselin et al. 2001; COSEWIC 2004a). The primary distribution of the St. Lawrence Estuary population is located upstream of the Gulf of St. Lawrence near the outflow of the Saguenay River, but there have been individuals recorded as far away as the Bay of Fundy (COSEWIC 2004a). Thus, an occasional beluga could stray into the SEA Area at any time of the year. There were no beluga whale sightings in any of the cetacean sighting databases.

3.7.3.5 Fin Whale (Atlantic Population)

The Atlantic population of fin whale is listed as a species of *special concern* on Schedule 1 of *SARA* and by COSWEIC. The fin whale is found in all of the world's oceans, typically offshore in temperate to polar regions (Jefferson et al. 2008). It is one of the most commonly observed species in continental shelf waters from the U.S. mid-Atlantic coast to eastern Canada (Waring et al. 2007). There is an estimated 35,500 fin whales in the North Atlantic (IWC 2007b, Waring et al. 2007), with 2269 to 2814 found in the NW Atlantic (COSEWIC 2005b; Waring et al. 2007). Fin whales eat euphausids and small fish (Borobia et al. 1995), and tend to concentrate in areas near thermal fronts or shallow areas with high topographic variation which mix and stratify the water column (Woodley and Gaskin 1996; Doniol-Valcroze et al. 2007). They can be found as individuals or groups of

2 to 7 animals, but can form much larger feeding aggregations, sometimes with humpback and minke whales (Jefferson et al. 2008). Fin whales are common within the Gulf of St. Lawrence and off Nova Scotia during the summer (COSEWIC 2005b), primarily nearshore. Fin whales have also been commonly observed on the Grand Banks during summer months (Piatt et al. 1989). Fin whale sightings along Newfoundland's south coast were mapped in Meltzer Research and Consulting (1996) from January through May. Fin whales were commonly seen and sighted in all seasons in the DFO sighting database, but the majority of sightings occurred during summer (Table 3.17). Sightings were primarily in waters <500 m deep and occurred throughout the SEA Area in deep offshore, shallow coastal, bank, and slope regions (Table 3.18; Figure 3.81). Fin whales are expected to commonly occur in the SEA Area year-round, although fin whales are likely more common during the summer.

3.7.3.6 Sowerby's Beaked Whale

Although not listed on Schedule 1, Sowerby's beaked whale is currently considered a species of *special concern* under COSEWIC. Sowerby's beaked whale is the most northerly recorded *Mesoplodon* spp., and all but one record in the NW Atlantic have occurred between Labrador and New England (MacLeod 2000). There are no estimates of abundance for the NW Atlantic or within the SEA Area. Most information on the distribution of Sowerby's beaked whales is derived from stranding records or relatively few opportunistic sightings (MacLeod et al. 2006). This species is considered particularly challenging to detect at sea, with blows invisible or barely detectable, only short durations spent at the surface, and apparently offshore distribution (Hooker and Baird 1999b; Barlow et al. 2006). Sowerby's beaked whales are seen most frequently in deep waters and along continental shelf edges or slope (Kenney and Winn 1987). Hooker and Baird (1999b) described four sightings of Sowerby's beaked whales in The Gully during July and October of 1997 and 1998. Group sizes ranged from 3 to 10 individuals, and all but one of the sightings occurred in areas with water depths >1000 m (one was in 550 m of water). There have also been strandings of Sowerby's beaked whales on Sable Island (Lucas and Hooker 2000). There were no confirmed sightings of Sowerby's beaked whales in any of the known cetacean sightings databases. The SEA Area is considered part of the Canadian range for Sowerby's beaked whales (COSEWIC 2006a), and it may occur in the region at low densities year-round.

3.7.3.7 Harbour Porpoise

Although not listed on Schedule 1 of *SARA*, harbour porpoise is currently designated as a species of *special concern* under COSEWIC. Harbour porpoises are found from southern Baffin Island to the U.S. northeast coast in the North Atlantic (Jefferson et al. 2008). There are three sub-populations in Atlantic Canada, including populations in Newfoundland and Labrador, the Gulf of St. Lawrence, and the Bay of Fundy/Gulf of Maine (COSEWIC 2006b). Jefferson et al. (2008) estimated a total of ~500,000 harbour porpoises in the North Atlantic, but there is an unknown number in the NW Atlantic or the Newfoundland and Labrador population (Wang et al. 1996; COSEWIC 2006b). Harbour porpoises tend to remain in relatively cool waters, seldom being found in waters warmer than 17ºC, presumably because these temperatures are preferred by their primary prey, Atlantic herring (Read 1999). They prefer areas with coastal fronts or topographically generated upwellings, and generally occur on the continental shelf, but also have an offshore component to their distribution (Westgate et al. 1998; Read 1999). They make short dives which are generally less than five minutes, spend 3 to 7% of their time at two metres of the water column, and average dive depths range from 14 to 41 m (Westgate et al. 1995). Little is known about the movements of the Newfoundland and Labrador population of harbour porpoises (COSEWIC 2006b). Lawson et al. (2004) estimated that approximately 1500 to 3000 harbour porpoises were incidentally caught during Newfoundland's 2002 nearshore cod fishery, most of which occurred along the south coast around St. Mary's Bay and Placentia Bay. Harbour porpoise sightings were relatively common in the DFO sighting database, and occurred in all seasons (Table 3.17). They occurred in shallow areas, either over offshore banks or in coastal areas (Table 3.18 and Figure 3.83). Harbour porpoises are most likely to occur in coastal and shallow regions of the SEA Area, likely at low densities relative to other toothed cetaceans and possibly at any time of the year.

3.7.3.8 Killer Whale (NW Atlantic/Eastern Arctic Populations)

Although not listed on Schedule 1, the NW Atlantic/Eastern Arctic population of killer whale is currently designated as a species of *special concern* under COSEWIC. Killer whales are cosmopolitan in distribution, found in all oceans, and occur from polar pack-ice zones to the equator (Jefferson et al. 2008). Although they are found in tropical and offshore waters, they are more numerous in coastal waters and higher latitudes. Their general movements tend to mirror the distribution of their diverse prey, which can include marine mammals, seabirds, fish, and cephalopods (Ford et al. 2000). There is no current estimate for population abundance in the NW Atlantic (Waring et al. 2007), but Lawson et al. (2007) used opportunistic sightings of individuals to estimate a population of at least 63 individuals in Newfoundland and Labrador. The killer whale is thought to be a year-round resident of the SEA Area, but only in small numbers (Lien et al. 1988). Killer whales in Atlantic Canada have been observed approaching, attacking, or consuming other cetaceans, seabirds, seals, and several species of fish; individuals have also been documented to move as much as hundreds of kilometres between years (Lawson et al. 2007). Based on the DFO sighting database, killer whales have been observed in the SEA Area in spring, summer, and fall in coastal, banks, offshore, and slope areas (Table 3.17; Figure 3.82). However, sightings were less common in the region relative to several other cetacean species. Thus, it is likely that killer whales are found in low densities throughout the year within the SEA Area.

3.7.4 Sea Turtles

For the purposes of this SEA, one sea turtle is considered a SAR. The leatherback sea turtle is listed on Schedule 1 of *SARA* and thus has legal implications. Incidental sightings of leatherback sea turtles have been compiled by DFO in St. John's (J. Lawson, DFO, pers. comm.) and are summarized below. Additionally, incidences of leatherback sea turtle strandings and entrapments in fishing gear have been summarized by Ledwell and Huntington (2009). Sea turtles were also sighted during monitoring in the Laurentian Sub-basin during summer 2005 (Moulton et al. 2006). Information on sea turtles off the south coast of Newfoundland from these data sources is summarized in the following sections.

3.7.4.1 Leatherback Sea Turtle

Leatherback turtles are the largest and most widely distributed sea turtle, ranging from sub-polar waters to tropical and subtropical breeding grounds, and are found in all of the world's oceans (Spotila 2004). The worldwide population of leatherback sea turtles is currently estimated at 35,860 females (Spotila 2004). Kenney (1996) estimated that several hundred individuals use the continental shelf waters of the northeast U.S. There is no estimate of the number using Newfoundland waters. A minimum of 415 leatherback turtles have been preliminarily estimated to occur off southern Newfoundland, based on an August 2007 aerial survey in southern Newfoundland waters (J. Lawson, DFO Research Scientist, pers. comm.). However, this estimate has not yet been corrected for availability or perception bias. Leatherbacks have wide-ranging oceanic movements and predominantly feed on gelatinous zooplankton (Hays et al. 2004; Eckert 2006). Mating is thought to occur offshore during migrations, although mating has also been observed near nesting beaches. For North Atlantic leatherback turtles, nesting occurs from March to July on sandy beaches of the Caribbean and Central and South America. It is thought that leatherbacks follow the Gulf Stream in the NW Atlantic because their primary prey, jellyfish, are concentrated where the Gulf Stream meets the colder waters of the Labrador Current.

Leatherbacks tagged off of Cape Breton and mainland Nova Scotia during summer remained off eastern Canada and the northeastern U.S. coast before most began migrating south in October (James et al. 2005a). Some of these tags remained attached long enough to observe subsequent northward migrations, with animals leaving nesting grounds during February to March and typically arriving in the NW Atlantic (north of 38ºN) during June. These turtles usually returned to areas within several hundred kilometres of where they were observed in the previous year. During their movements in Atlantic Canada shelf and slope waters, leatherback turtles appear to have relatively slow travel rates, shallow diving (usually <50 m), and short dives (James et al. 2005b). Incidental sighting reports by commercial fishers and tour boat operators support the results of satellite telemetry studies (James et al. 2006). Although most of the incidental sightings described in James et al. (2006) occur around Nova

Scotia and across the Scotian Shelf, there are also several sightings extending into the SEA Area off Newfoundland's south coast and near the Laurentian Channel; sightings peaked in all years (1998 to 2005) on August 5, most were reported inshore of the continental shelf break, and mean sea-surface temperature associated with the sighting was 16.6°C. In addition, James et al. (2007) used tag returns to demonstrate that leatherback turtles from nesting beaches across South and Central American and the Caribbean forage in Canadian waters. Adult leatherbacks are often sighted in the waters off Nova Scotia and Newfoundland from June to October, with peak abundance in August and September, as evidenced in the data sources described above. Witzell (1999) described the distribution of leatherbacks incidentally caught in the U.S. pelagic longline fishery; nearly half of the leatherbacks caught between 1992 and 1995 from the Caribbean to Labrador were captured in waters on and east of the 200 m isobath off the Grand Banks. However, it should be noted that effort was also focused in these areas. Incidental catches occurred from June to November but peaked from July to September. Leatherbacks are the most common of the sea turtles that may occur in the SEA Area, perhaps due to the leatherback's ability to maintain a body temperature of 25ºC in sea water as much as 18ºC cooler. Therefore, it is expected that adult leatherback turtles will occur in the SEA Area, at least occasionally, from June to November.

Sightings and entanglements of sea turtles in Newfoundland waters from 1982 to 2007 have been compiled by DFO in St. John's (J. Lawson, DFO, pers. comm., 2009). These data can be used to indicate what species can be expected to occur in the region, but they cannot provide fine-scale quantitative representations of sea turtle abundance or distribution in the SEA Area, at least not at this point in the development of the database. Most are incidental sightings from platforms of opportunity or opportunistic reports of entanglements. Table 3.21 contains a coarse data summary of seasonal leatherback sea turtle observations within the SEA Area, and Figure 3.85 illustrates the distribution of leatherback sea turtle observations.

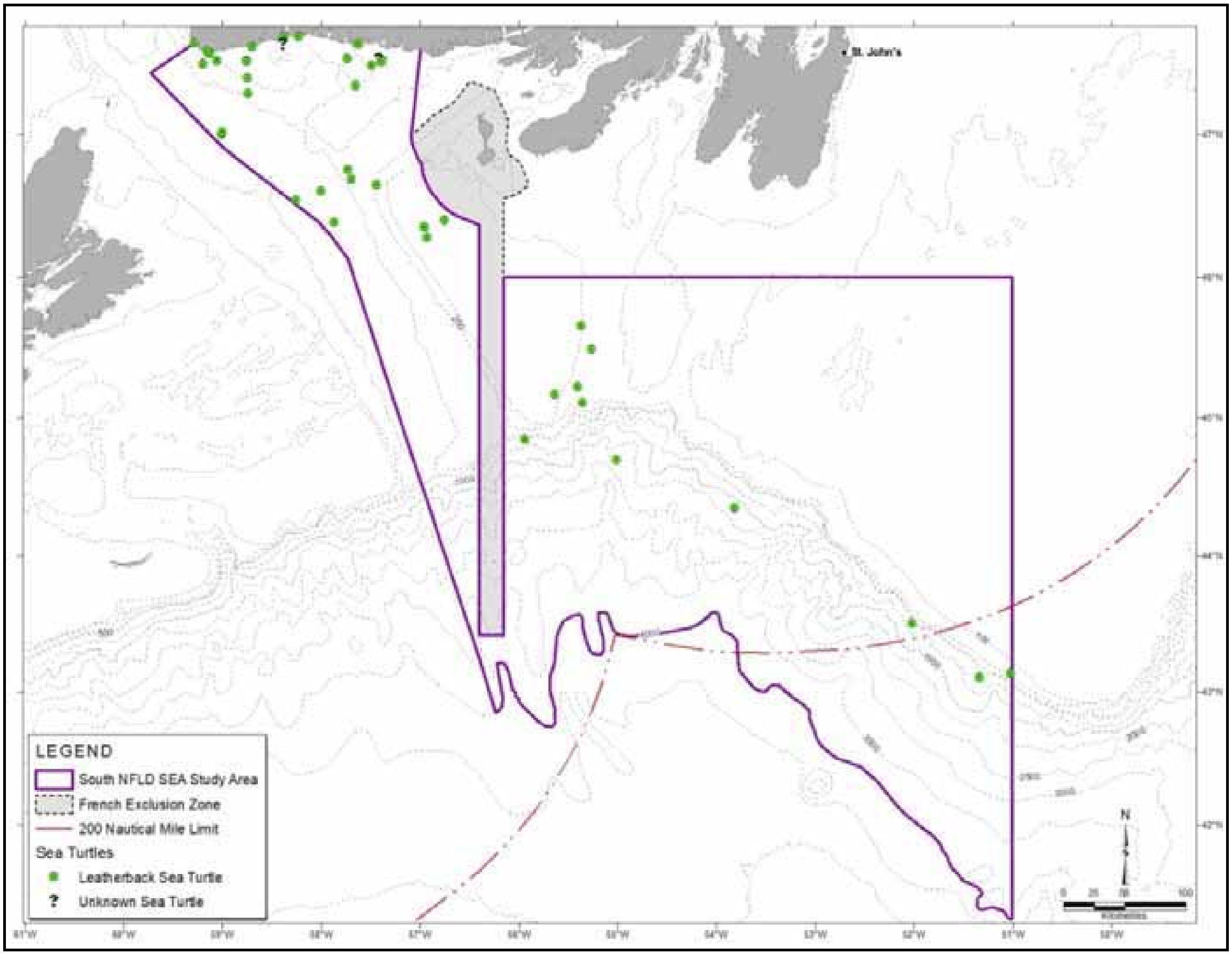
Table 3.21. Leatherback Sea Turtle Sightings and Entanglements in the SEA Area, 1982-2007.

	Depth Category (m)				
Month	**<500**	**500-1000**	**1000-2000**	**2000-2500**	**Total**
June	0	1	0	0	1
July	3	0	0	0	3
August	23	2	1	1	27
September	6	0	0	0	6
Unknown	4	0	0	0	4
Total	**36**	**3**	**1**	**1**	**41**

Source: DFO, St. John's, Newfoundland and Labrador.
Note: There were also two unidentified sea turtle observations, both in water <500 m with one in August and the other in September.

There were a total of 41 leatherback turtle records within the SEA Area. Over half of the observations occurred in August (27 sightings) and all occurred from June to September. Most sightings occurred in waters <500 m deep (36 sightings). Most sightings occurred within 200 km of shore, possibly reflecting the distribution of observers. However, there were also several sightings in offshore portions of the SEA Area over shelf edges and breaks. There were also two observations of unidentified sea turtles close to shore, one in August and a second in September.

Eight leatherback sea turtles were observed off the south coast of Newfoundland, including Placentia and St. Mary's bays in 2008 (Ledwell and Huntington 2009). There were two entanglements in fishing gear, both of which occurred during summer. Five records were sightings, one occurring in July, two occurring in August, and two occurring in September. There was a single observation of the remains of a leatherback sea turtle found on a beach in December. Observations of sea turtles were also recorded by LGL during routine marine mammal monitoring for a 3-D seismic survey in the Laurentian Sub-basin (Moulton et al. 2006). There were two sightings of sea turtles during the monitoring program. The first was of a leatherback sea turtle in late July, and the second occurred in early September and was an unidentified species other than a leatherback sea turtle.



Source: DFO, St. John's Newfoundland and Labrador.

Figure 3.85. Sightings and Entanglements of Leatherback Sea Turtles in the SEA Area, 1982-2007.

There is no publicly available information on leatherback turtle critical habitat designation in the Atlantic available for mapping or inclusion in the assessment of marine activities. Critical habitat is currently being identified, potentially including a portion of the southern coast of Newfoundland, and will be determined in a 2010 SARA Action Plan (M. James, DFO Research Scientist, pers. comm.).

3.7.5 Planning Implications

Operators may be required to use spatial and temporal mitigations to avoid critical life stages of SAR. This applies to fishes, birds, marine mammals and sea turtles. Critical habitats of SAR are also protected under *SARA* and are a major component of *SARA* Recovery Strategies and Plans. For example, this includes the identified Piping Plover habitat at Big Barasway, Sandbanks and Seal Cove in the SEA Area.

Operators are required to comply with *SARA* over the lifespan of a project. Mitigations currently used for offshore projects include delayed startup or shutdown of seismic shooting when a marine mammal or sea turtle listed as *endangered* or *threatened* on Schedule 1 of *SARA* is within 500 m of the array. Any marine mammals or sea turtles that are added to Schedule 1 of *SARA* as either *endangered* or *threatened* during the life of a project would be subject to mitigations listed in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines 2008* and DFO's *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment.*

The Harlequin Duck is listed as *vulnerable* under the Newfoundland and Labrador *ESA* (2002) and as a *special concern* under *SARA*. Harlequin Duck has been observed near Cape Ray, Ramea and the Penguin Islands in the SEA Area, so these areas would be especially sensitive to disturbance. This bird exhibits site fidelity for wintering sites, a period when they would be most vulnerable. Harlequin Ducks are migrating north through the region until May and are susceptible during that time. The only time this species is not susceptible is spring and summer, when the birds go inland to breed.

Critical habitat under the provincial *ESA* is defined as, "habitat that is critical to the survival of a species." Recovery habitat is defined as, "habitat that is necessary for the recovery of a species." Upon listing as vulnerable, threatened, endangered, or extirpated, the environment minister may set aside an area of land to be protected as recovery habitat and an area of land to be protected as critical habitat. Certain activities may be prohibited, or prohibited without the granting of a permit, within either recovery or critical habitat. The intent of *SARA* is to protect critical habitat. Under *SARA*, critical habitat is considered the "habitat necessary for the survival of a listed endangered, threatened or extirpated species on Schedule 1 of *SARA*." Within a few years of a species' listing, critical habitat is supposed to be described in recovery strategies or action plans that are developed in coordination with various agencies and in consultation with people who are directly affected.

A person may not destroy or disturb the residence of an individual of a designated species where residence is defined as a specific dwelling place habitually occupied by one or individuals during all or part of their life cycles. Critical habitat for Piping Plovers has been delineated by the Newfoundland Piping Plover Working Group, comprised of Government and non-government interest representatives, that has made recommendations to the national Piping Plover Recovery Team and the provincial responsible Minister for the Government of Newfoundland and Labrador. Options for conservation and management of identified critical habitat areas are presented to the responsible minister by the Newfoundland Piping Plover Working Group. These options can include things such as the *Provincial Park Act*, Wildlife Reserves, Ecological Reserves and others (J. Brazil, pers. comm.). Most beach areas known to support breeding habitat for Piping Plovers are likely to be identified as critical habitat. Approaches to conservation and/or protection are dependent on area-specific management plans that can vary. The responsible minister may issue permits to permit economic related activities in areas of critical habitat if the actions are considered sustainable. The *Accord Acts* between the Governments of Canada and Newfoundland and Labrador generally favour the responsible protection of critical habitat by the provincial jurisdiction. The federal Minister of Environment may in special circumstances invoke additional protection of critical habitat.

Operators should monitor *SARA* issues through the Canadian Association of Petroleum Producers (CAPP), the law gazettes, the Internet and communication with DFO and Environment Canada, and should adaptively manage any SAR issues that may arise in the future.

3.7.6 Data Gaps

NRC (2003a) indicates that migration routes, breeding grounds and feeding areas are known for relatively few marine mammal species. In order to predict the importance of noise effects on marine mammal behaviour, the seasonal and geographic distribution of mammals must be better known. Much of the basic biological and ecological information related to SAR is lacking, such as identification of critical habitat, migration patterns, behaviour of critical life stages, effects of ongoing human activities on species and their habitat, effects of events outside *SARA's* jurisdiction and inter-relationships with other species. The use of shutdown radii for seismic sound sources (i.e., safety zones) are intended to eliminate or limit sound energy exposure for marine mammals within a defined distance from the noise source (Lawson and McQuinn 2004). There are uncertainties determining the size of these shutdown radii as a result of the limited knowledge of marine mammal hearing capabilities, as well as understanding the intensity and characteristics of sound exposures that result in hearing changes or behavourial responses. Therefore, more scientific research is required to address gaps that prevent effective use of recovery strategies and the mitigation strategies for the protection of species at risks and other marine mammals.

There is also scarcity of data and knowledge regarding the presence of Harlequin Duck and Barrow's Goldeneye during all seasons within the SEA Area.

3.8 Potentially Sensitive Areas

For the purposes of this SEA, the term *sensitive area* is defined as:

- An area that is afforded some level of protection under federal or provincial legislation (e.g., National Parks, ecological reserves, DFO Integrated Management Areas (IMA) and Ecologically and Biologically Significant Areas (EBSA), DFO *Oceans Act* Marine Protected Areas (MPAs), National Marine Conservation Areas (NMCAs), National Historic Sites, fishery management areas);
- An area that may be under consideration for such legislative protection;
- An area that is known to have particular ecological or cultural importance and is not captured under federal or provincial regulatory framework (e.g., corals, spawning, nursery, rearing, or migratory areas, areas of high productivity, Important Bird Areas (IBAs), areas of traditional harvesting activities).

The description of an area as a sensitive area within the SEA Area, in itself, does not automatically imply that this area will require the application of non-typical mitigations or restrictions on activities. The timing and spatial extent of proposed oil and gas activities, in addition to mitigations prescribed by legislation will determine the level of restriction mitigation that will be required.

There are a number of different types of potentially sensitive areas occurring within or proximate to the SEA Area. These are described below.

3.8.1 Integrated Management Areas

The SEA Area includes a large area in the Placentia Bay Grand Banks (PBGB) Large Ocean Management Area (LOMA), overlaps and is adjacent to a portion of the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative Area, and as well, borders the Gulf of St. Lawrence Integrated Management (GOSLIM) Area at the most southerly point within the Cabot Strait. These Integrated Management bodies and processes are important from a planning perspective.

LOMAs are marine regions established for planning purposes and they form the planning basis for implementation of integrated-management plans. LOMAs are typically thousands of square kilometres in size. Their boundaries are determined using a combination of ecological and administrative considerations. For each LOMA, all levels of government, aboriginal groups, industry organizations, environmental and community groups, and academia work together to develop a strategic, long-term plan for sustainable management of resources within its boundaries. LOMAs are delineated so that ecosystem health and economic development issues within their boundaries can be addressed and suitably managed. This can best be accomplished using an integrated ocean management approach, an approach based on addressing the socio-economic needs of humankind while preserving the health of the marine ecosystem.

3.8.1.1 Placentia Bay Grand Banks Large Ocean Management Area

The PBGB LOMA has been recognized by DFO as one of five priority LOMAs in Canada. The PBGB LOMA Committee comprises a group of stakeholders partnering for the sustainable use and development of coastal and ocean resources within the LOMA.

Coastal Management Areas

There are two Coastal Management Areas (CMAs), Placentia Bay (PB) CMA and Coast of Bays (COB) CMA that compose a portion of the coastal area of the PBGB LOMA. While LOMAs primarily address large scale ecosystem and economic development issues, they also provide the context for nesting a network of smaller CMAs. These two CMAs are not located within the SEA Area, but the coastal communities are proximate to the SEA Area and will experience direct and indirect influences from any major development in the SEA Area and should be considered in planning and future developments.

The Placentia Bay Integrated Management Planning Committee (PBIMPC) initiative is a collaborative approach to maintaining the ocean and coastal waters of Placentia Bay as a flourishing place where a high quality of life is enjoyed by all. It is a multi-stakeholder group formed in 2005 to aid in addressing the issues and concerns caused by multiple ocean users within Placentia Bay. The Committee provides a mechanism whereby communications, dialogue, and information-sharing between sectors can occur with ease. The PBIMPC has developed a strategic plan to provide direction to the integrated and collaborative initiatives that have been taking place within the Placentia Bay region for the past number of years. The plan attempts to consider all oceans users and the health of the marine environment by managing Placentia Bay as a whole.

The Coast of Bays Coastal Planning Committee was established to promote coastal integrated planning in the Coast of Bays Region. It is a means of facilitating growth of coastal and inshore industries through user cooperation and sustainability. Its motivation stems from the desire to ensure a balanced approach to industrial diversification, as well as, recreational and local uses to enhance the quality of life without compromising the functional integrity of coastal/marine resource systems. A Coastal Integrated Management Plan has been developed to focus on regional management needs and priorities related to shared coastal/marine areas and resources, expanding industries, preserving healthy ecosystems, and collaborative planning and management coordination.

3.8.1.2 Eastern Scotian Shelf Integrated Management Initiative

The ESSIM Initiative is a collaborative ocean management and planning process being led and facilitated by DFO under Canada's *Oceans Act*. The primary aim of the Initiative is to develop and implement an Integrated Ocean Management Plan for this large marine region. This multi-year, strategic level plan provides long-term direction and a common basis for integrated, ecosystem-based and adaptive ocean management. The ESSIM planning process involves a broad range of interests, including government, aboriginal groups, ocean industry and resource users, environmental conservation groups, coastal communities, and university researchers. The aim of the ESSIM Initiative is to have an effective, collaborative process that provides integrated and adaptive management plans, strategies and actions for ecosystem, social, economic, and institutional sustainability.

3.8.1.3 Gulf of St. Lawrence Integrated Management Initiative

The Gulf of St. Lawrence is a complex multi-jurisdictional setting made up of the Government of Canada, five provincial governments (Newfoundland and Labrador, Nova Scotia, New Brunswick, Prince Edward Island and Quebec), and numerous municipal governments. GOSLIM has been established in order to bring interested and affected parties and regulators together to plan and manage human activities within the area. GOSLIM stems from the recognition that there are a number of issues, stakeholders and interests within the Gulf that need to be addressed on a Gulf-wide basis.

The Bay St. George/Port au Port Peninsula CMA encompasses St. George's Bay and occurs in the GOSLIM area. It also is located outside of the SEA Area but is notable for a number of reasons, including being an important spring and fall spawning/feeding area for Atlantic herring, being a migration/staging area for Atlantic salmon, having a lobster fishery that is a significant economic driver for communities in the area, and for containing the Grand Codroy Estuary, an important staging/nesting area for migrating waterfowl and shorebirds including the endangered Piping plover. General information on GOSLIM can be found in DFO (2007f).

3.8.2 Ecologically and Biologically Significant Areas

In 2007, as part of Canada's new National Water Strategy, the federal government announced five-year funding for various initiatives to protect fragile marine environments, counter pollution and strengthen preventive measures. One Health of the Oceans (HOTO) Initiative to accomplish this is by increasing protection of ecologically significant marine areas through the establishment of nine new MPAs. The nine new MPAs consist of **six** *Oceans Act* MPAs and three Parks Canada and Environment Canada initiatives. These areas will be important for further conservation planning and when given further consideration, may need some additional level of protection. Further information on the potential management implications of these initiatives can be obtained from the DFO Oceans Sector (http://www.dfo-mpo.gc.ca/oceans/marineareas-zonesmarines/mpa-zpm/index-eng.htm). DFO NL Region has identified 11 Ecologically and Biologically Significant Areas (EBSAs) within the PBGB LOMA as potential Areas of Interest (AOIs) for Marine MPA designation, four of which are found in the SEA Area. Based on previous regional experience with MPA designation, informal discussion with key stakeholder groups, and the application of technical and feasibility criteria, five of the 11 EBSAs were put forward for formal consultation with stakeholders to become potential AOIs. Of the five EBSAs put forward, for this formal consultation, three: the Southwest Shelf Edge and Slope; St. Pierre Bank; and the Laurentian Channel and Slope are located within or adjacent to the SEA Area. Following consultations, DFO NL Region will put forward one of the five EBSAs as the regional AOI for MPA designation by 2012.

As part of the DFO process to identify EBSAs in a number of regions, the Workshop on Inshore Ecosystems and Significant Areas of the Scotian Shelf was held to to identify Scotian Shelf areas of particularly high ecological significance based on EBSA criteria. On the offshore Scotian Shelf and environs, 42 proposed EBSAs were identified (Doherty and Horseman 2007).

Four EBSAs associated with the PBGB LOMA (Figure 3.86; Table 3.22) and three proposed EBSAs associated with the Scotian Shelf (i.e., Laurentian Channel Cold Seep, Laurentian Channel and Slope, and Stone Fence and Laurentian Environs) (Figure 3.86; Table 3.23) occur either partially or entirely within the SEA Area. The principal characteristics identified for each of these areas in terms of five criteria (i.e., uniqueness, aggregation, fitness consequences, sensitivity, and naturalness) are indicated in Tables 3.22 and 3.23.

Two other accepted and/or proposed EBSAs that abut the SEA Area include:

1. Southeast Shoal and Tail of the Banks (Placentia Bay-Grand Banks); and
2. Virgin Rocks (Placentia Bay-Grand Banks).

Details regarding these areas are provided in various DFO documents (DFO 2007f; Doherty and Horseman 2007; Templeman 2007). Three other PBGB LOMA EBSAs that are worthy of note include Lilly Canyon-Carson Canyon, Placentia Bay Extension, and Eastern Avalon. Although these areas are located at least 50 nm from the SEA Area (DFO 2007f), they are potentially vulnerable to large accidental releases of hydrocarbons.

DFO Maritimes Region is currently in the process of identifying and selecting an *Oceans Act* MPA on the eastern Scotian Shelf. Two of the areas under consideration, St. Annes Bank and Misaine Bank/Eastern Shoal, are adjacent to (i.e., nearby) but do not abut (i.e., touch) the SEA Area. The Shortland and Haldimand Canyons and Environs study area is also adjacent to but does not abut the SEA Area. These areas will eventually require cross-boundary coordination with both the C-NSOPB and C-NLOPB. These areas will have enhanced management measures (either under MPA designation or through other measures) and will require consideration in the event of oil and gas activity in the portion of the SEA Area proximate to these areas. Maritime's Region AOI consultation document can be found on-line at http:www.mar.dfo-mpo.gc.ca/oceans/e/ocmd/mpa/booklet-e.html.

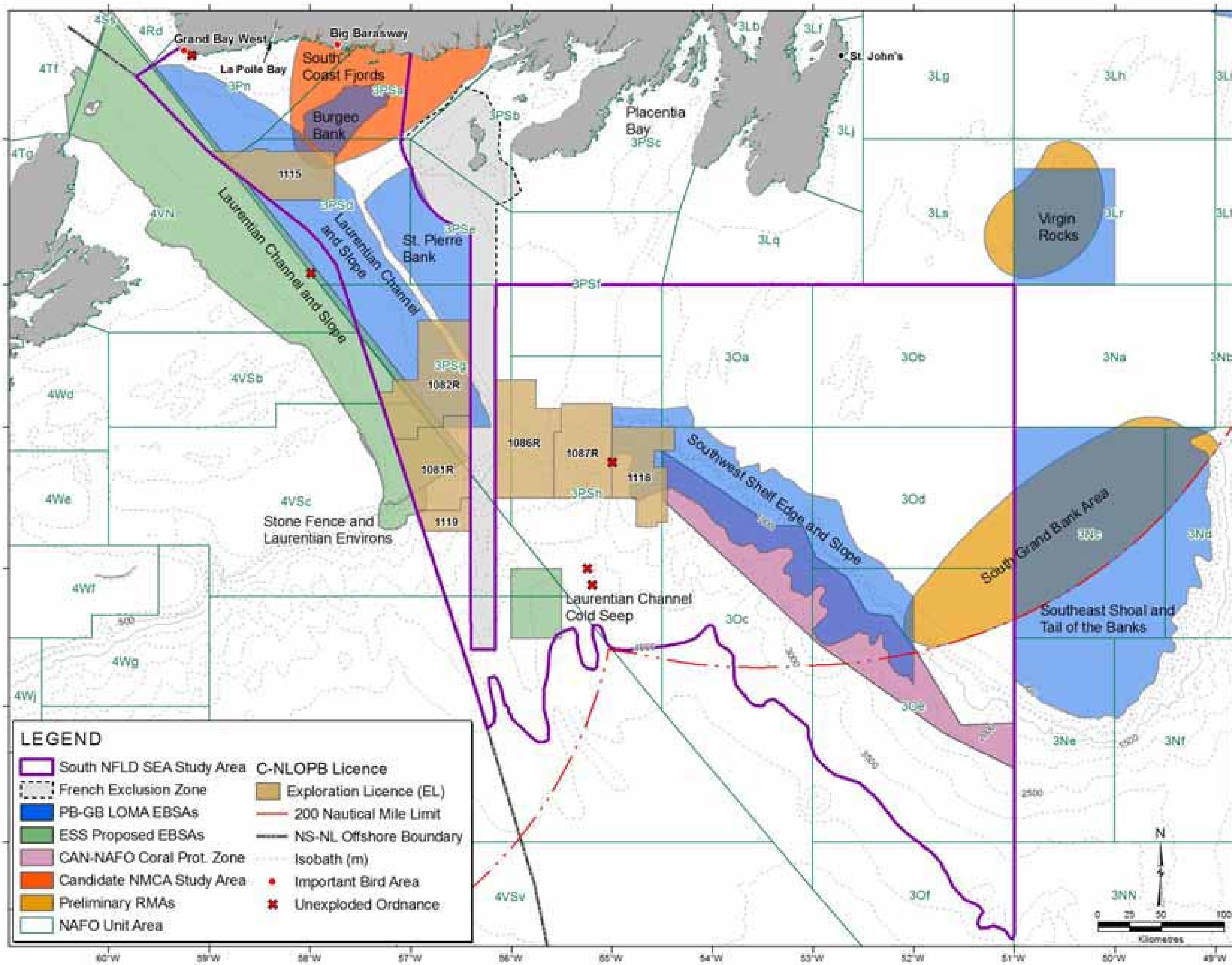


Figure 3.86. Potentially Sensitive Areas that Either Occur within or Abut the SEA Area.

Table 3.22. Specifics of Placentia Bay-Grand Banks LOMA EBSAs that Occur within the SEA Area.

EBSA /Area	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
Southwest Shelf Edge and Slope	**High- Feeding-** The highest density of pelagic seabird feeding within the LOMA occurs along the Southwest Shelf (WWF 2006). **HIgh- Feeding-** This area is host to the northernmost population of haddock in the NW Atlantic Ocean (WWF 2006). **High- Structural Habitat-** Cold-water coral species concentration is highest in this area (Edinger et al. 2007). **High- Biodiversity-** Cold-water coral species diversity is highest in this area (Edinger et al. 2007). **High- Biodiversity-** The greatest number of groundfish species on the banks occurs on the Southwest Slope (Kulka et al. 2003) **High- Biodiversity-** The highest density of pelagic seabirds within the LOMA is found here (WWF 2006). **Moderate- Oceanographic Processes-** Waters along the edge of an offshore bank are highly productive due to upwelling, which brings nutrient-rich deep water to the surface through a combination of factors including bottom topography, wind and currents—similar features are found at the edges of other banks in the region.	**High- Spawning/Breeding-** Haddock in the region spawn primarily along the edge of the Southwest slope in spring (Ollerhead et al. 2004) **High- Feeding-** The Southwest Shelf, with its high concentration of available prey, is an intense feeding area for a wide variety of seabird species **High- Feeding; Biodiversity-** Aggregation of many marine mammals and leatherback turtles - particularly in the summer **High- Feeding-** Haddock in the region are found primarily within the southern part of the Banks, with the highest concentrations along the Southwest slope (Kulka et al. 2003) **High- Feeding-** Atlantic Halibut in the region are found almost exclusively along the Southwest slope during spring (Kulka et al. 2003) **High- Structural Habitat-**Cold-water corals –are found in high concentrations in this area (Edinger et al. 2007). **High- Biodiversity-** A greater proportion of the biomass of most of the groundfish species present occurs along the Southwest Slope (Kulka et al. 2003).	**High- Spawning/Breeding-**The southwest slope of the Grand Bank is an important spawning area for redfish (Ollerhead et al. 2004). **High- Feeding-** Seabird feeding in the area occurs in a manner that is critical to fitness, productivity and population stability due to high energy requirements of obtaining food, reproduction, and nesting **High- Migration-** The Southwest Shelf and Slope constitutes a migration route for cod and therefore carries fitness consequences (WWF 2006). **High- Structural Habitat-** Structure-forming gorgonian corals are found in high concentrations in this area (Edinger et al. 2007). **High- Biodiversity-** The SW Slope is very important to the survival and reproduction of many species as a cumulative result of structural and oceanographic features and ecological functions in the area supporting a high diversity of species in a relatively defined (and often relatively exclusive) area.	**High to Moderate-** Hard substrates are found in the Southwest Slope area; along with sessile, brittle, slow-growing corals that are highly sensitive to disturbance. The bottom habitat in the Southwest Shelf area is less sensitive to disturbance but traditionally dominant species, such as haddock, have been depleted so the community and ecosystem is less resilient (WWF 2006). Off the bottom, the area is a naturally dynamic environment, with open access to larger oceanic areas.	**Moderate to Low-** A high rate of coral bycatch and high fishing effort in this area indicates that the ecosystem and habitats have already been heavily impacted.

EBSA /Area	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
		Moderate- Feeding- Monkfish, Pollock, and White Hake in the region occur exclusively along the Southwest Slope and within the Laurentian Channel, with higher concentrations in spring (Kulka et al. 2003). **Moderate- Feeding-** Although the species is broadly distributed, a proportion of the remnant high density of Atlantic Cod occurs along the Southwest edge and slope of the Grand Banks (Kulka et al. 2003).			
Laurentian Channel and Slope	**High – Structural Habitat** Interface of sea ice and open ocean in the late winter and early spring; occasional openings to St. George's Bay can lead to ice entrapments. **High- Nursery/Rearing-** This is the sole pupping grounds for black dogfish off Canada (Kulka 2006). **High- Feeding-** This area (the Laurentian Channel in the proximity of St. Pierre Bank) contains the highest concentration of black dogfish in waters of Canada (Kulka 2006). **High- Migration; Biodiversity-** Cabot Strait is an important migratory corridor for marine mammals moving in and out of the Gulf of St. Lawrence; no alternate route exists. **Moderate- Oceanographic processes-** Although not unique to the LOMA as a whole, upwelling along offshore slopes and channels leads to enhanced productivity year-round.	**High- Nursery/Rearing-** The Laurentian Channel is an important juvenile/nursery area for Smooth skate (<30cm) (Kulka et al 2007). **High- Migration-** While the Laurentian Channel is not identified as being used for migration by most of the individuals of any single population, a noteworthy percentage of several species are known to use the area on a regular basis (e.g., for movement to and from the Gulf of St. Lawrence seasonally). **High- Oceanographic processes-** Enhanced primary and secondary production in the area leads to aggregation of prey and consumers. **Moderate- Feeding-** Monkfish, Pollock, and White Hake in the region occur exclusively along the Southwest Slope and the region of the Laurentian Channel, with higher concentrations in spring (Kulka et al. 2003).	**High- Nursery/Rearing-** As the sole pupping grounds off Canada for black dogfish, the area supports increased survivorship/ fitness of juveniles compared to other areas. **High- Migration-** The Laurentian Channel as a migration route favors population fitness of many marine species through either the route itself or its endpoints; e.g., marine mammals migrating to feeding/breeding grounds seasonally and finfish to overwintering/spawning grounds. **High- Oceanographic processes-** Enhanced primary and secondary production has both direct and indirect impacts on local ecosystem function.	**Low-** While the area along the slope of the Laurentian Channel contains some corals and may be sensitive to the effects of bottom disturbance, the area as a whole is less sensitive.	**High-** While the area has been heavily fished and, the habitat is probably relatively intact compared to other areas in the LOMA.

EBSA /Area	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
St. Pierre Bank	**High- Feeding; Biodiversity-** Highest and only concentration Sea scallops on the Grand Banks—no alternate area is being used by this species in the region (F. Cahill, DFO, pers. comm.).	**High- Spawning/Breeding-** Highest proportion of Sea scallops spawning on St. Pierre bank in spring (F. Cahill, DFO, pers. comm.). **High- Feeding; Biodiversity-** Highest and only concentration Sea scallops on the Grand Banks (F. Cahill, DFO, pers. comm.). **High- Feeding-** At their northernmost extent in the NW Atlantic, the highest concentration of Spiny dogfish occurs at the western portion of St. Pierre Bank (Kulka 2006). **High- Feeding** Several species of cetaceans	**High- Feeding; Biodiversity-** St. Pierre Banks contains the highest and only concentration Sea scallops on the Grand Banks, therefore the area's contribution to annual growth and condition is great (F. Cahill, DFO, pers. comm.). **High- Feeding; Migration-** A potentially important spring feeding area for overwintering and migrating whales.	**Low-** While the area of St. Pierre Bank has been heavily dragged for scallops, the benthic community structure in the area appears to recover successfully due to its very sandy bottom habitat.	**Moderate-** While St. Pierre Bank is not without disturbance, community structure over the long-term appears to be stable.
Burgeo Bank	**High- Biodiversity-** The 3Pn4RS and 3PS Cod stocks mix in this area during spring (WWF pers. comm.).	**High- Spawning** – Cod aggregate in this area to spawn, with a peak in March and April (Ollerhead et al. 2004). **High- Seasonal Refugia-**Burgeo Bank is an important overwintering and mixing area for 3Ps cod (WWF pers. comm.).	**Moderate- Spawning** Although they are known to spawn in other areas, Burgeo Bank is an important spawning area for cod.	**Moderate-** The Burgeo Bank habitat is probably relatively resilient but the remaining cod population and ecosystem as a whole is sensitive to disturbance because it has been altered by fishing.	**Moderate-** The habitat is probably relatively intact but the ecosystem has been altered by fishing but not to the extent of other areas (e.g., southern Grand Bank).

Source: Modified from Templeman (2007).

Table 3.23. Specifics of Eastern Scotian Shelf Proposed EBSAs that Occur within the SEA Area.

Proposed EBSA	Rationale	Criteria				
		Uniqueness	Aggregation	Fitness Consequences	Sensitivity	Naturalness
Stone Fence and Laurentian Environs	Only confirmed location of *Lophelia* coral on the Scotian Shelf. A variety of other corals are also present. Potentially important habitat for juvenile fishes. High energy area. In entrances of channels, you expect to get a high diversity of whales. There are likely a variety of species from dolphins to deep diving whales (e.g., sperm whales).	*	*		*	*
Laurentian Channel and Slope	High fish diversity for demersal, pelagic & mesopelagic fishes. Overwintering area for 4Vs cod, *Calanus*, white hake, Dover sole, turbot (Greenland halibut), redfish and Greenland shark. Important migration route via Cabot Strait to Gulf. Unique migration corridor for white hake, cod, redfish, flatfish and Greenland shark. Portion of important mating area for porbeagle sharks. Primary overwintering area for 4T cod (COSEWIC) & white hake. Important aggregation area for krill. Important overwintering area for *Calanus* which supplies the entire Scotian Shelf. Important migration route from Scotian Shelf to Gulf of St. Lawrence & back.	*	*	*		*
Laurentian Channel Cold Seep	Large dense chemosynthetic communities of vesicomyid & thyasind clams, gastropods & galatheid crabs. New family of polychaetes identified. This community is unique to Atlantic Canada and found on crests of gravel waves. Species have specialized tissue with carbon fixing, sulfide oxidizing bacteria.	*				*

3.8.3 CAD-NAFO Coral Protection Zone

A CAD-NAFO Coral Protection Zone currently exists as a mandatory temporary closure (to 31 December 2012) on the slope of the Grand Bank in NAFO Div. 3O between 800 and 2000 m (Figure 3.86). The protection zone, which encompasses an area of 14,040 km^2, was initiated by the Canadian-NAFO Working Group and implemented by NAFO. The purpose of the closure is to protect corals found in the area and 'freeze the footprint' of fishing activities in deeper waters (Wareham 2009). [See Subsection 3.1 on the Fish Habitat VEC which discusses deep-sea corals for more detail regarding the corals known to occur within the protection zone.]

3.8.4 CPAWS Special Marine Areas

In a report recently released by the Canadian Parks and Wilderness Society (CPAWS), Newfoundland and Labrador Chapter (Rao et al. 2009), 73 Special Marine Areas (SMA) were identified for Newfoundland and Labrador. Ten of these occur within or immediately adjacent to the SEA Area. The SMAs in the CPAWS report were grouped by National Marine Conservation Area (NMCA) regions, which are from the system developed by Parks Canada. The ten SMAs that occur within or immediately adjacent to the SEA Area are as follows. The relevant NMCA region is provided in parentheses for each SMA.

1. Laurentian Channel (NMCA 7-Laurentian Channel);
2. J.T. Cheeseman (NMCA 7-Laurentian Channel);
3. North Cabot Strait (NMCA 7-Laurentian Channel);
4. Sandbanks (NMCA 7-Laurentian Channel);
5. Burgeo Bank (NMCA 7-Laurentian Channel),
6. Penguin Islands (NMCA 7-Laurentian Channel);
7. St. Pierre Bank (NMCA 8-The Grand Banks);
8. Grand Banks (NMCA 8-The Grand Banks);
9. Southeast Shoal (NMCA 8-The Grand Banks), and
10. Southwest Grand Banks (NMCA 8-The Grand Banks).

It is obvious from the names of the SMAs that a few of them overlap with some of the EBSAs discussed earlier in the SEA. Some of the key 'special' characteristics of each SMA, as identified by CPAWS, are indicated in Table 3.24. Many other SMAs identified by CPAWS are located relatively close to the SEA Area. Location maps and descriptive text for these areas are available in the CPAWS report 'Special Marine Areas in Newfoundland and Labrador' (Rao 2009).

3.8.5 Proposed National Marine Conservation Areas

National marine conservation areas (NMCAs) are a type of marine protected area administered by Parks Canada. They are established and managed under the *Canada National Marine Conservation Areas Act* for the purpose of protecting and conserving marine areas highly representative of each of the 29 marine regions in the Atlantic, Pacific and Arctic oceans, and the Great Lakes for the benefit, education and enjoyment of Canadians. Within each marine region, a two-step area identification and selection process leads to confirming an optimum, regionally representative marine area warranting consideration as a potential NMCA. (For details of the NMCA program and system plan, see http://www.pc.gc.ca/progs/amnc-nmca/systemplan/index_e.asp). The Southern Newfoundland SEA area overlaps two of Parks Canada's marine regions.

Table 3.24. Specifics of CPAWS Special Marine Areas that Occur within or Proximate to SEA Area.

Special Marine Area	Location within SEA Area	Some Key Characteristics
Laurentian Channel	West and northwest portion	• Highly saline and nutrient-rich water • Highest biodiversity off of Newfoundland • Major migration route for a variety of fishes and marine mammals • Diverse habitat types • Large concentrations of phytoplankton and zooplankton • Highly diverse invertebrate and fish communities–overwintering area for entire populations of groundfish • Spawning grounds for cusk, Greenland halibut, mackerel, redfish, capelin, Atlantic cod and herring • Pupping and aggregation area for black dogfish • Nursery and rearing area for smooth skate • Soft and deep-sea corals–proximate to Stone Fence • Diverse group of breeding seabirds • Summer feeding ground for diverse group of marine mammals • Overlaps with DFO EBSA
J.T. Cheeseman Provincial Park	Northwest portion (near Port aux Basques)	• Coastal marine habitats include sand dunes, beaches, sandy barachois, eelgrass beds • Diverse groups of invertebrates, fishes, birds (seabirds and shore birds including Piping Plover) and marine mammals (e.g., pinnipeds, blue whale) • Nesting by shorebirds, including Piping Plover • On flight path of many migratory bird species • Within '100 Fathom Edge', a 3Pn Fisheries Management and Conservation Closed Area banning mobile fishing gear • Within NAFO Fishing Area 3Pn Fisheries Conservation Closed Area aimed at protecting spawning redfish
North Cabot Strait	Northwest portion (coastal and nearshore area)	• Marine habitats include eelgrass beds and kelp beds • Numerous coastal islands • Pack ice in spring • Major deepwater upwelling associated with northerly winds in the winter • Diverse groups of invertebrates, fishes, birds and marine mammals (including blue whales) • Important breeding area for cod and other fish species, and seabirds/shorebirds • Within '100 Fathom Edge', a 3Pn Fisheries Management and Conservation Closed Area banning mobile fishing gear • Within NAFO Fishing Area 3Pn Fisheries Conservation Closed Area aimed at protecting spawning redfish
Sandbanks Provincial Park	Northwest portion (near Burgeo)	• Influenced by both the Labrador Current and the Gulf Stream • Coastal habitats include sand dunes and long, flat sandy beaches-very unique in Newfoundland • Marine habitats include eelgrass, kelp, rockweed and Irish moss beds • Diverse groups of invertebrates, fishes, birds (including Piping Plover) and marine mammals (including blue whales) • Contains one of the largest breeding areas in Newfoundland for Piping Plover • Within NAFO Fishing Area 3Pn Fisheries Conservation Closed Area aimed at protecting spawning redfish • Within a Fortune bay Fisheries Management Closed Area banning commercial scallop vessels ≥45 ft
Burgeo Bank	Northwest portion (off Burgeo)	• Fish species around Burgeo Bank include redfish, American plaice, witch flounder, pollock and Atlantic cod • Identified by DFO as an EBSA • Area of 3Pn4RS and 3PS cod stock mixing in spring and overwintering • Spawning by cod and redfish
Penguin Islands	Northwest portion (between St. Pierre and Miquelon and mainland Newfoundland near Ramea)	• Cluster of islands and sea stacks • Diverse groups of invertebrates, fishes, seabirds and marine mammals (including blue whales) • Site of a lobster reserve/closed area • High productivity, including some of the most productive and diverse wave-exposed kelp beds in Newfoundland • Sensitive bird area – seabird breeding colonies and overwintering area for birds • Within NAFO Fishing Area 3Pn Fisheries Conservation Closed Area aimed at protecting spawning redfish • Within a Fortune bay Fisheries Management Closed Area banning commercial scallop vessels ≥45 ft

Special Marine Area	Location within SEA Area	Some Key Characteristics
St. Pierre Bank	West and central portion	• Diverse group of invertebrates, including corals and sea pens • Diverse group of fishes
		• Identified by DFO as an EBSA • Has the highest and only concentration of scallops in the Grand Banks NMCA • Southern part of St. Pierre Bank important area for gorgonian corals • Has the highest concentration of spiny dogfish at their northernmost extent in the NW Atlantic – aggregation and pupping • Aggregation, feeding and migration area for many cetacean species • Within NAFO Fishing Area 3Ps Fisheries Conservation Area aimed at protecting spawning redfish-area closed to redfish harvesting by all gear types of vessels <65 ft from May 1 to June 30
Grand Banks	Northeast portion	• Upwellings and mixing of cold Labrador Current and warm Gulf Stream make the area highly productive and particularly important for seabirds and marine mammals • Zooplankton richness highest in NW Atlantic • Diverse groups of invertebrates, fishes, seabirds, marine mammals and sea turtles • Contains numerous DFO identified EBSAs
Southeast Shoal	Just east of SEA Area	• Highly nutrient-rich, productive area • Identified by DFO as an EBSA • Unique geology, high biodiversity, high primary productivity, and unique fauna and species assemblages that are more typical of inshore Newfoundland • Highest benthic biomass in the Grand Banks • Inhabited by several southern invertebrates that otherwise have not been recorded east of Sable Island • Contains relict populations of blue mussel and wedge clam • Shallow spawning habitat for numerous fish species, including Atlantic cod and capelin • Nursery habitat for many species including Atlantic cod, capelin, and yellowtail flounder • Haddock concentration • Important feeding and aggregation habitat for seabirds and marine mammals-estimated that 15 to 30% of NW Atlantic population of humpback whale feeds here
Southwest Grand Banks	Central and east portion	• Deep-sea coral concentration-high coral species richness-CAD-NAFO Coral Protection Zone in effect until December 31 2012 closed to commercial fishing
		• Identified as one of top three priority EBSAs of Placentia Bay-Grand Banks LOMA • Significant amount of groundfish biomass, with spawning areas for haddock and redfish • On migration route of cod • Concentration of Atlantic halibut • High biodiversity of seabirds, marine mammals and sea turtles

3.8.5.1 Laurentian Channel Marine Region

The South Coast Fjords area off southern Newfoundland has been identified by Parks Canada as an exceptional candidate for an NMCA to represent the Laurentian Channel marine region which extends along the southwestern and western coasts of Newfoundland. In support of a potential South Coast Fjords NMCA, the Burgeo Diversification Development Board submitted a report to Parks Canada in 2003 detailing the unique marine environment of the area and expressing their support for a study of the area (BDDB 2003).

Parks Canada's initial proposed study area for a potential South Coast Fjords NMCA extends from Couteau Bay to Baie d'Espoir and offshore (Figure 3.86). Appropriate boundaries for an NMCA within this study area would be determined over the course of a joint federal/provincial feasibility study including extensive public consultations. However, a formal feasibility study has not yet been announced, pending further senior level federal and provincial discussions (F. Mercier, Parks Canada, pers. comm.).

Key features of the South Coast Fjords which make it an important, highly representative area within the Laurentian Channel marine region include:

- A complex coast indented with bays and fjords, as well as sensitive features including tidal flats, sandy beaches, eelgrass meadows, kelp beds and salt marshes.
- The offshore has a variety of water depths from banks and subtidal platforms to deep channels, and is influenced by the Labrador Current and the Gulf stream. It generally remains ice free.
- Primary productivity is relatively high. The area includes long-term, stable, shore communities of plants and invertebrates, as well as varied biological communities such as subtidal coralline algae communities, coastal upwelling communities and Arctic refugia communities.
- There are unique, isolated inshore populations of deep-sea fauna such as deep sea shrimp and lantern fish, similar to those found on the continental slope and in ocean trenches.
- The area is a wintering zone for several groundfish species such as cod, Greenland halibut and redfish, as well as concentrations of lobster, scallops, snow crab and capelin.
- A variety of cetaceans and seals are observed year-round, as well as offshore wintering concentrations of seabirds.
- The area has been occupied over more than 4000 years by various cultures including Maritime Archaic Indian, Paleoeskimos, Recent Indian and historic European.

3.8.5.2 Grand Banks Marine Region

The Southern Newfoundland SEA area also overlaps part of Parks Canada's Grand Banks marine region where four representative marine areas have been identified, but where no specific candidate NMCA has yet been selected, pending further studies to be completed in the near term. The SEA area bisects the South Grand Bank preliminary representative marine area (RMA) and is immediately adjacent to the Virgin Rocks preliminary RMA (Figure 3.86). Details regarding these areas are provided in the Grand Banks marine region report done for Parks Canada by CBCL Limited (2009). These representative areas respectively overlap part of the Southwest Shelf Edge and Slope EBSA and CAN-NAFO Coral Protection Zone, and the Virgin Rocks EBSA discussed earlier.

3.8.6 Atlantic Salmon Rivers

There are 15 scheduled Atlantic salmon rivers on the south coast of Newfoundland within the SEA Area (Figure 3.87). The two Atlantic Salmon Management Areas, SFA 11 and 12 in the SEA Area are discussed in Subsection 3.2 on the Fish VEC.

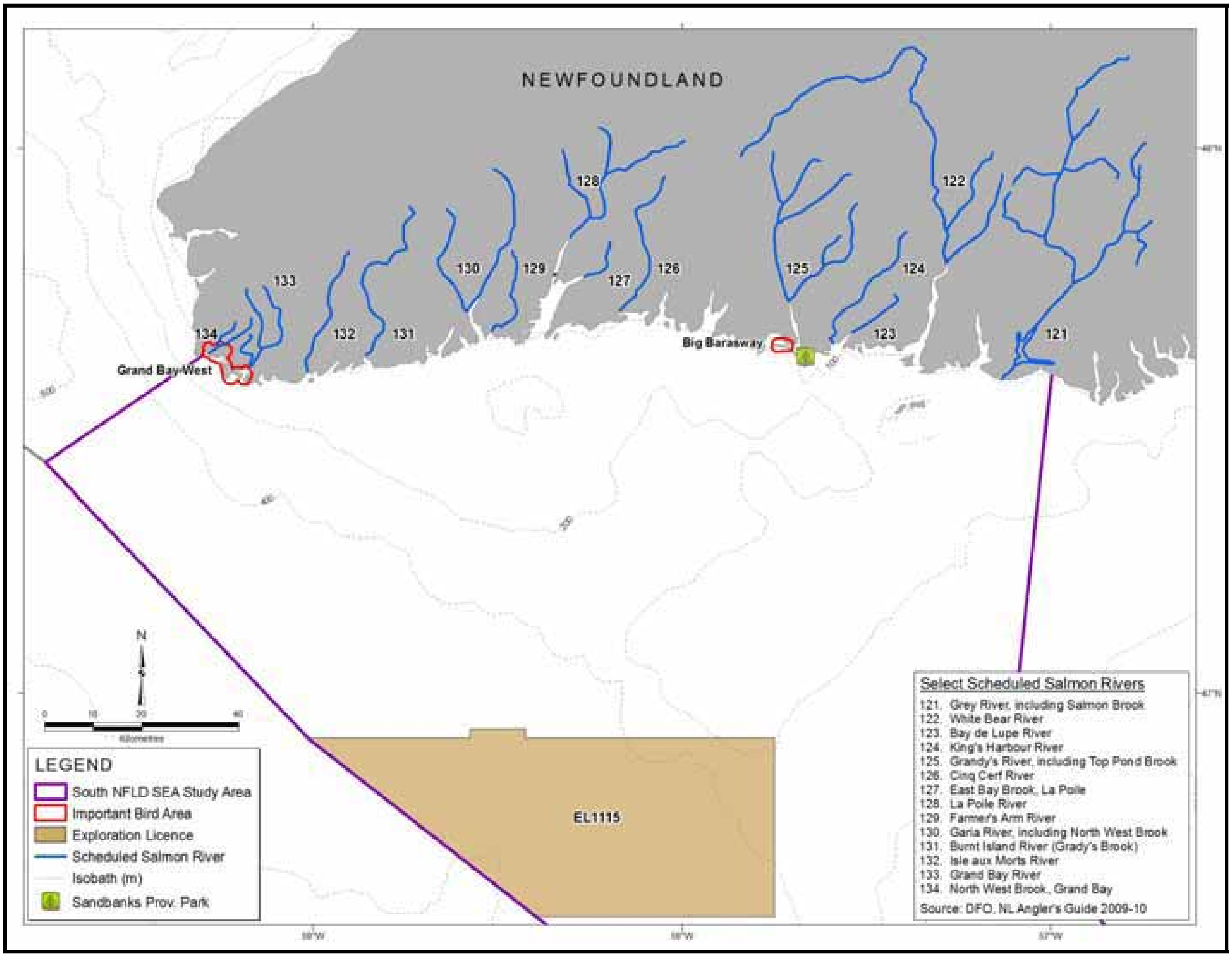


Figure 3.87. DFO Scheduled Atlantic Salmon Rivers in the SEA Area.

3.8.7 Planning Implications

There are a number of potentially sensitive areas within and abutting the SEA Area as detailed above. Offshore oil and gas activities, in or adjacent to these potentially sensitive areas, may be subject to various mitigations to minimize potential effects to these areas. Mitigations could include exclusion zones or times. For example, EBSAs have been identified by DFO Science for LOMA planning initiatives. These identifications do not necessarily mean restrictive conservation or management measures, but proponents should be aware that scientific and planning work is ongoing and EBSAs will be an important tool for further conservation planning (i.e., potential use for identifying future marine protected areas for MPA network planning, and developing integrated management objectives to support sustainable oceans management planning). Similarly, if a NMCA was established in the SEA Area, oil and gas development could be prohibited within it. Specifics of these mitigations would depend on the timing and nature of the offshore activity in or adjacent to these areas. Operators will need to be aware of special areas and keep abreast of developments that pertain to them.

3.8.8 Data Gaps

Data gaps exist in terms of detailed delineation of most special areas, their relative importance, and their eventual legal status. Perhaps most important to potential offshore operators is the future uncertainty in regard to these special or sensitive areas, some of which overlap biologically, geographically, and jurisdictionally. While there are data gaps/constraints, their relation to offshore oil and gas is dependent on the nature and timing of the particular activity, and the need to collect additional data will be determined at the project-specific environmental assessment stage.