

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 (<i>Eubalaena glacialis</i>)	E, Sched1	E	EN	Rare	Summer	Coastal and shelf
Humpback whale (<i>Megaptera novaeangliae</i>)	NS	NAR	LC	Common	Spring to fall	Coastal and banks
Blue whale (<i>Balaenoptera musculus</i>)	E, Sched1	E	EN	Common	Year-round, mostly spring and fall	Coastal and pelagic
Fin whale (<i>Balaenoptera physalus</i>)	SC, Sched1	SC	EN	Common	Spring to fall	Continental slope and pelagic
Sei whale (<i>Balaenoptera borealis</i>)	NS	DD	EN	Uncommon	Summer	Offshore and pelagic
Minke whale (<i>Balaenoptera acutorostrata</i>)	NS	NAR	LC	Common	Year-round, mostly spring to fall	Continental shelf and coastal
Toothed Whales (Odontocetes)						
Sperm whale (<i>Physeter macrocephalus</i>)	NS	NAR	VU	Common	Year-round, mostly summer	Pelagic, deep, continental slope, canyon
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>) ^d	E, Sched1	E	DD	Uncommon	Year-round	Pelagic, deep, canyon, continental slope
Sowerby's beaked whale (<i>Mesoplodon bidens</i>)	SC, Sched3	SC	DD	Rare	Year-round	Pelagic, deep, continental slope, canyon
Beluga whale (<i>Delphinaptera leucas</i>) ^e	T, Sched1	T	NT	Very rare	Year-round	Coastal estuaries, bays, rivers
Common bottlenose dolphin (<i>Tursiops truncatus</i>)	NS	NAR	LC	Uncommon	Summer	Coastal and pelagic
Killer whale (<i>Orcinus orca</i>)	NS	SC	DD	Uncommon	Year-round	Coastal and pelagic
Long-finned pilot whale (<i>Globicephala melas</i>)	NS	NAR	DD	Common	Year-round	Mostly pelagic
Short-beaked common dolphin (<i>Delphinus delphis</i>)	NS	NAR	LC	Common	Summer	Continental shelf and pelagic
Atlantic white-sided dolphin (<i>Lagenorhynchus acutus</i>)	NS	NAR	LC	Common	Year-round, mostly spring and fall	Continental shelf and slope
White-beaked dolphin (<i>Lagenorhynchus albirostris</i>)	NS	NAR	LC	Common?	Year-round	Continental shelf
Striped dolphin (<i>Stenella coeruleoalba</i>)	NS	NAR	LC	Uncommon	Summer	Continental shelf and pelagic
Risso's dolphin (<i>Grampus griseus</i>)	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 (<i>Phocoena phocoena</i>)	T, Sched2	SC	LC	Common	Year-round?	Continental shelf
True Seals (Phocids)						
Harp seal (<i>Phoca groenlandica</i>)	NS	NC	LC	Uncommon	Late winter/early spring	Ice, pelagic
Harbour seal (<i>Phoca vitulina</i>)	NS	NAR	LC	Uncommon	Year-round	Coastal
Hooded seal (<i>Cystophora cristata</i>)	NS	NAR	VU	Uncommon	Late winter	Ice, pelagic
Grey seal (<i>Halichoerus grypus</i>)	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	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 *cautions* 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.

^aTwo pygmy sperm whales were sighted in June 2001 within the SEA Area, in waters 1000-1500 m deep.

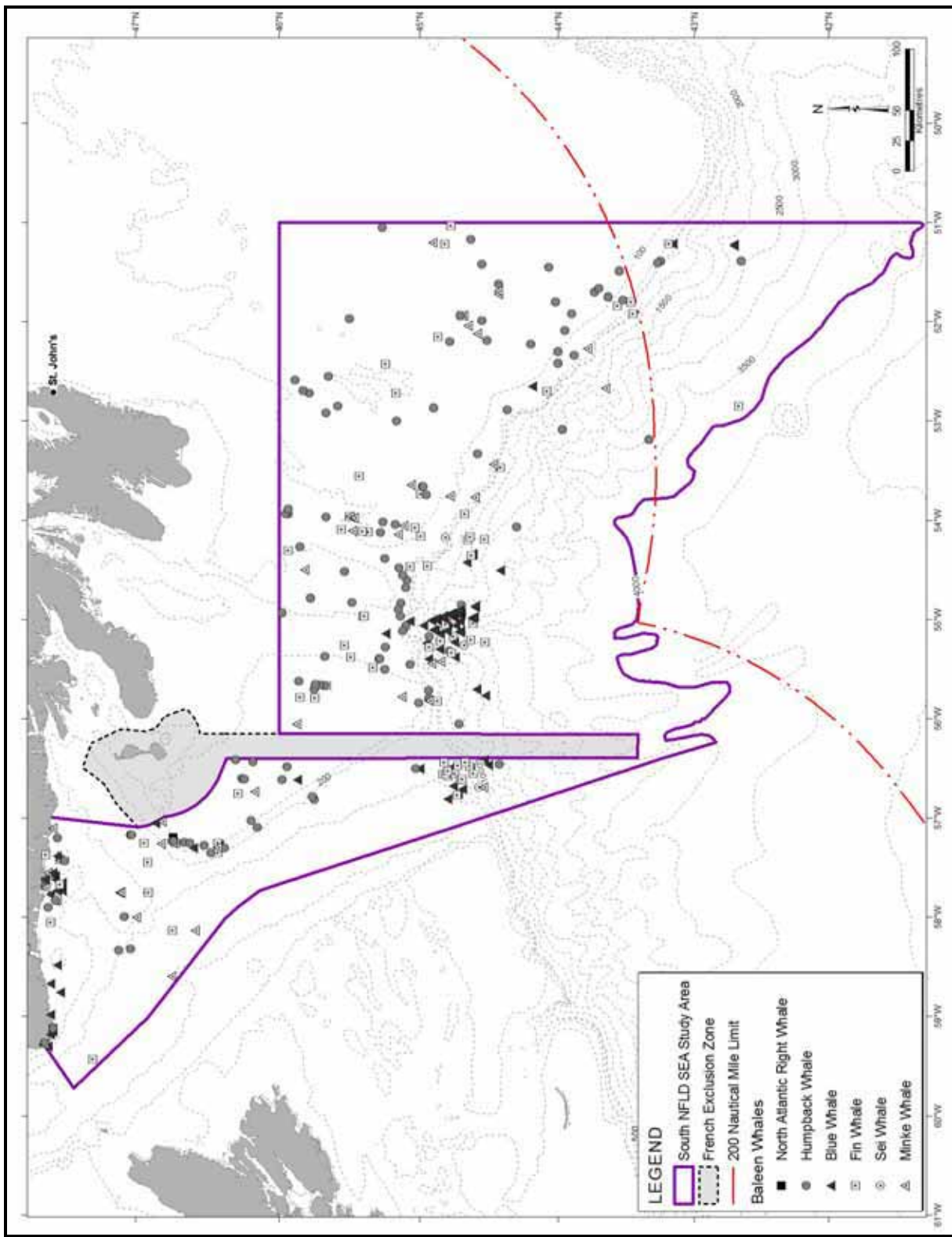


Figure 3.81. Distribution of Baleen Whale Sightings within the SEA Area (based on DFO sightings database 1975-2007).

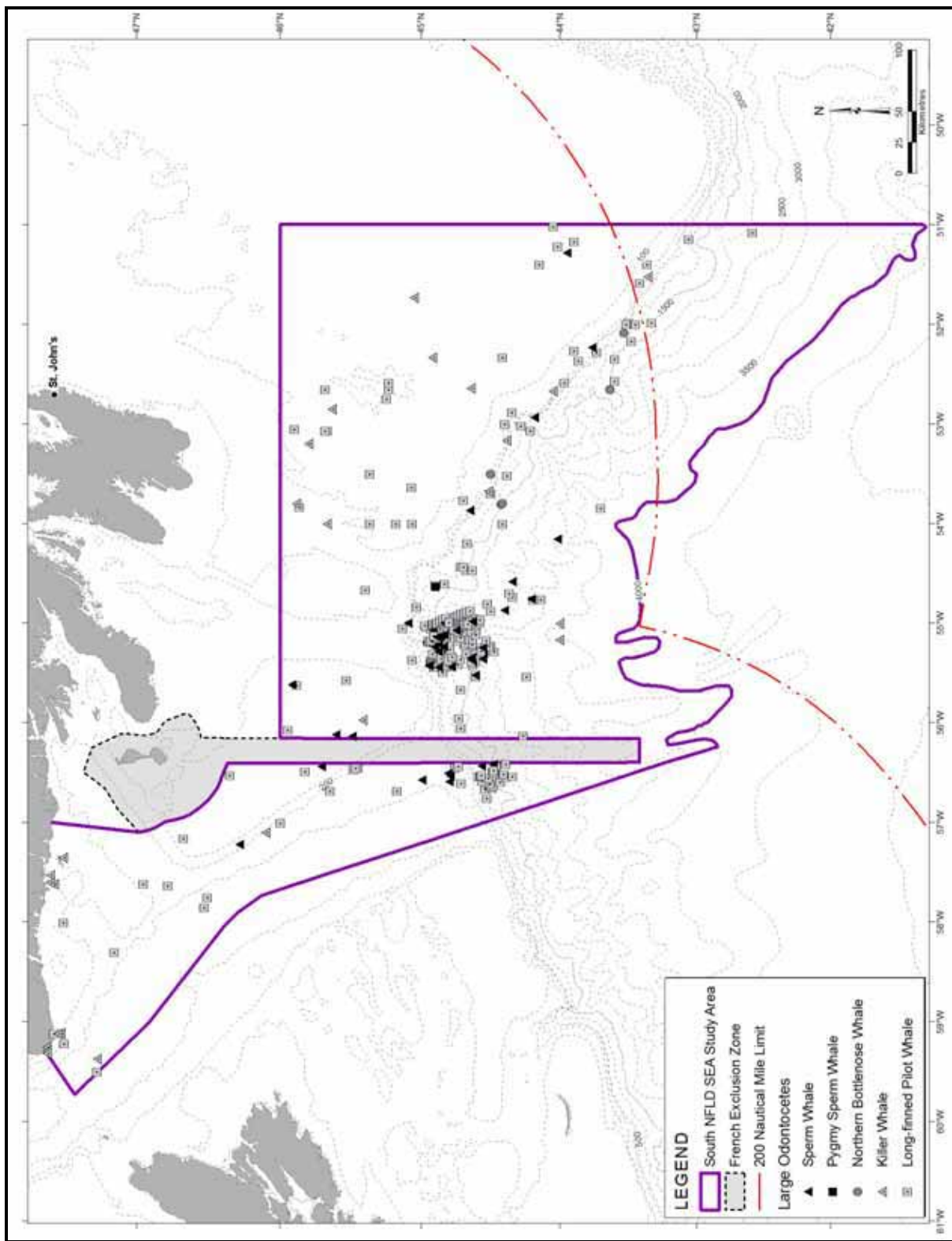


Figure 3.82. Distribution of Large Toothed Whale Sightings within the SEA Area (based on DFO sightings database 1975-2007).

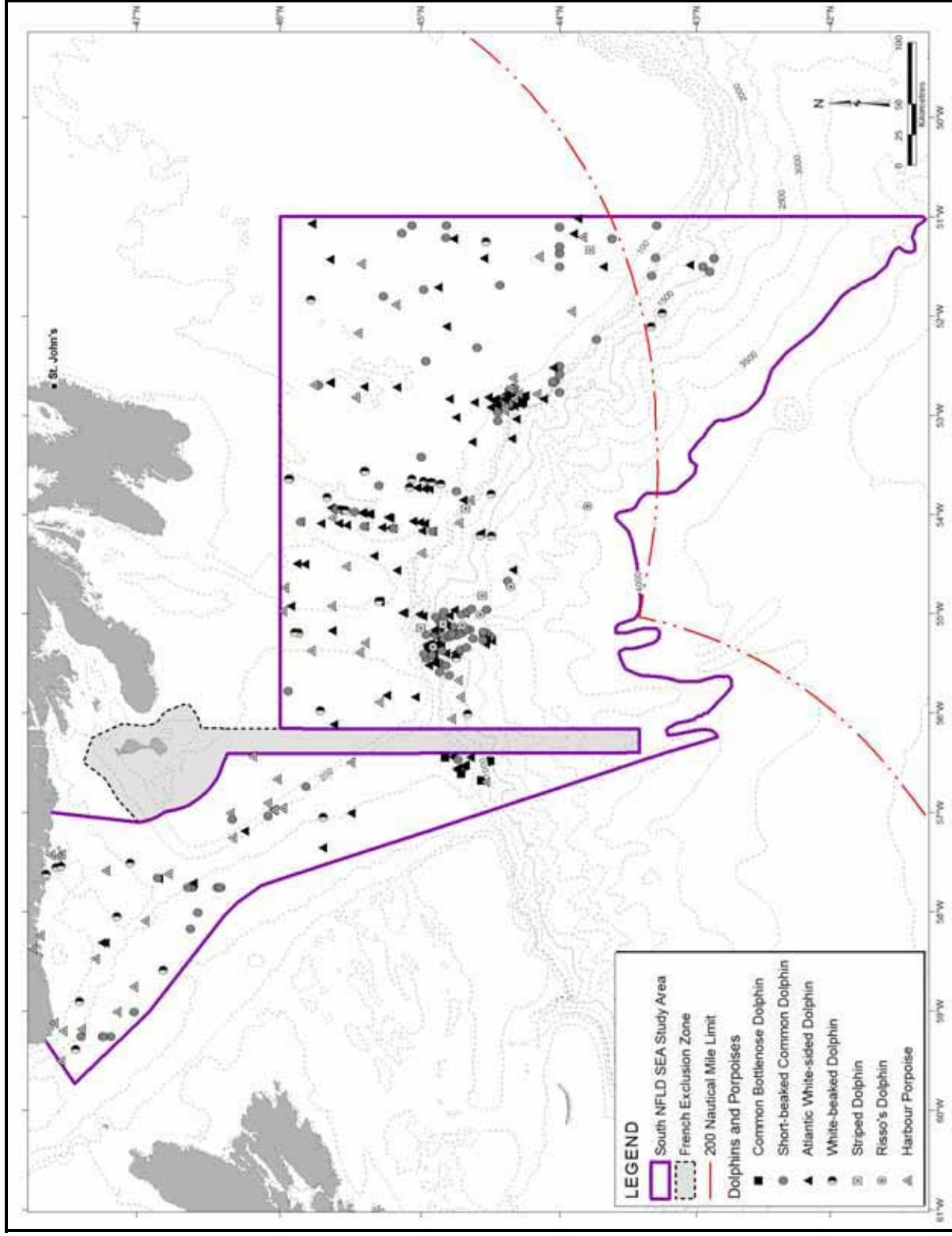


Figure 3.83. Distribution of Dolphin and Porpoise Sightings within the SEA Area (based on DFO database from 1975-2007).

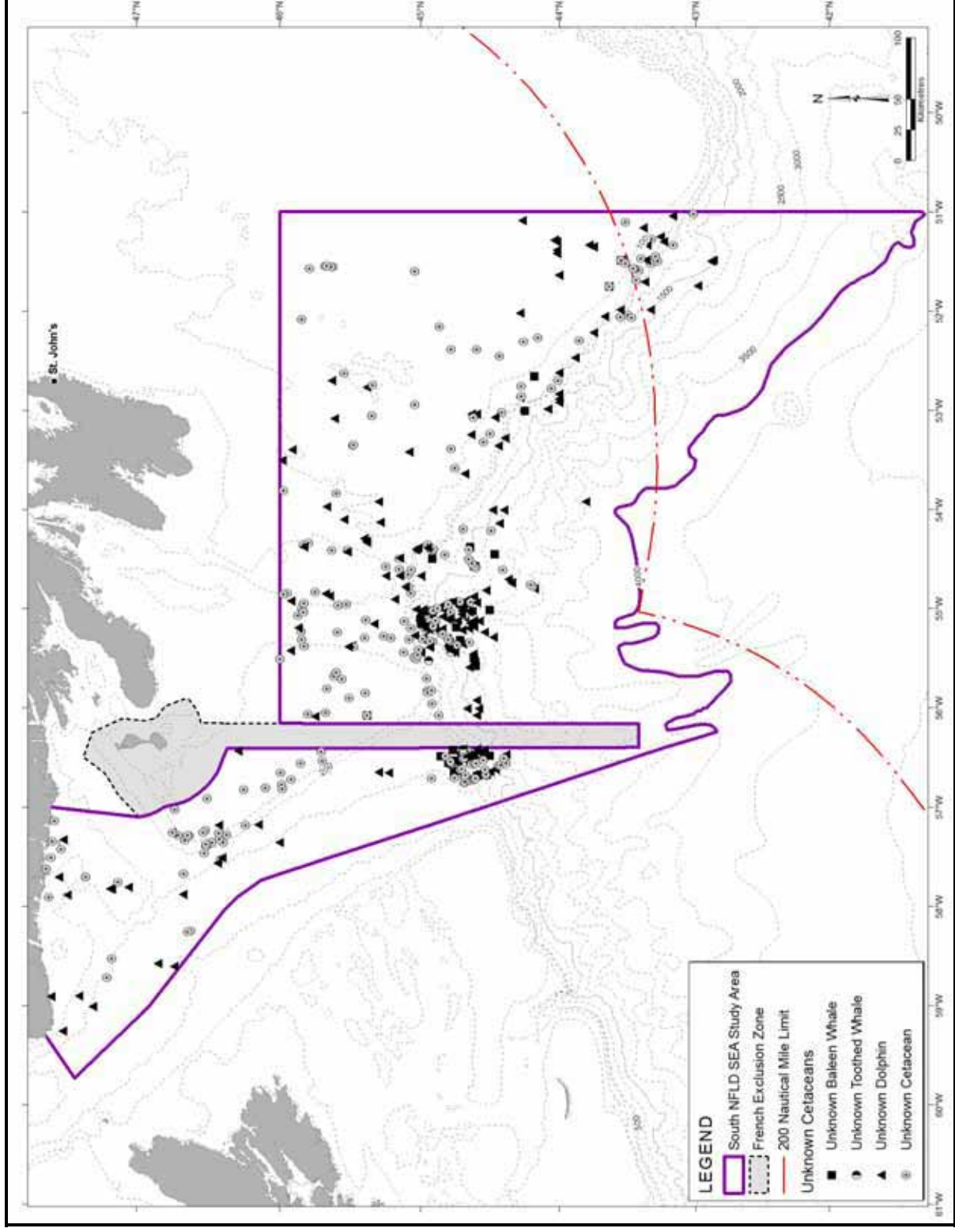


Figure 3.84. Distribution of Unidentified Cetacean Sightings within the SEA Area (based on DFO database from 1975-2007).

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 km² 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/km². 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/km². 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 (0.21 sightings/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 euphausiids 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 NW Atlantic 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 >15°C (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)	<i>SARA</i> Status ^a	COSEWIC Status ^b	Occurrence	Season	Habitat
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	E, Sched1	E	Uncommon	Summer	Channel
Loggerhead sea turtle (<i>Caretta caretta</i>)	NS	NC	Rare	Summer	Channel
Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>)	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.