

St. Pierre et Miquelon Aerial Surveys

September and November, 2010

Association SPM Frag'îles



A Collaborative Project with Dr. Jack Lawson, Department of Fisheries and Oceans, Canada

The SPM Aerial Survey - Rationale

Association SPM Frag'iles funded an aerial survey of the ocean to estimate the distribution and abundance of marine fauna. The study area covered waters near and adjacent to the French islands of St. Pierre et Miquelon. Additional equipment and technical expertise was provided by the Department of Fisheries and Oceans in St. John's, Newfoundland.

A large-scale aerial survey (TNASS) was flown in this area by DFO scientists on 17 July - 24 August, 2007. Relative to the rest of the Newfoundland survey areas, the 2007 effort reported the highest rate and number of sightings on the Newfoundland south coast - especially in Placentia Bay and near St. Pierre (Figure 1). On the south coast the most commonly sighted species were humpback whales, dolphin species, sunfish, fin and minke whales, and leatherback turtles.

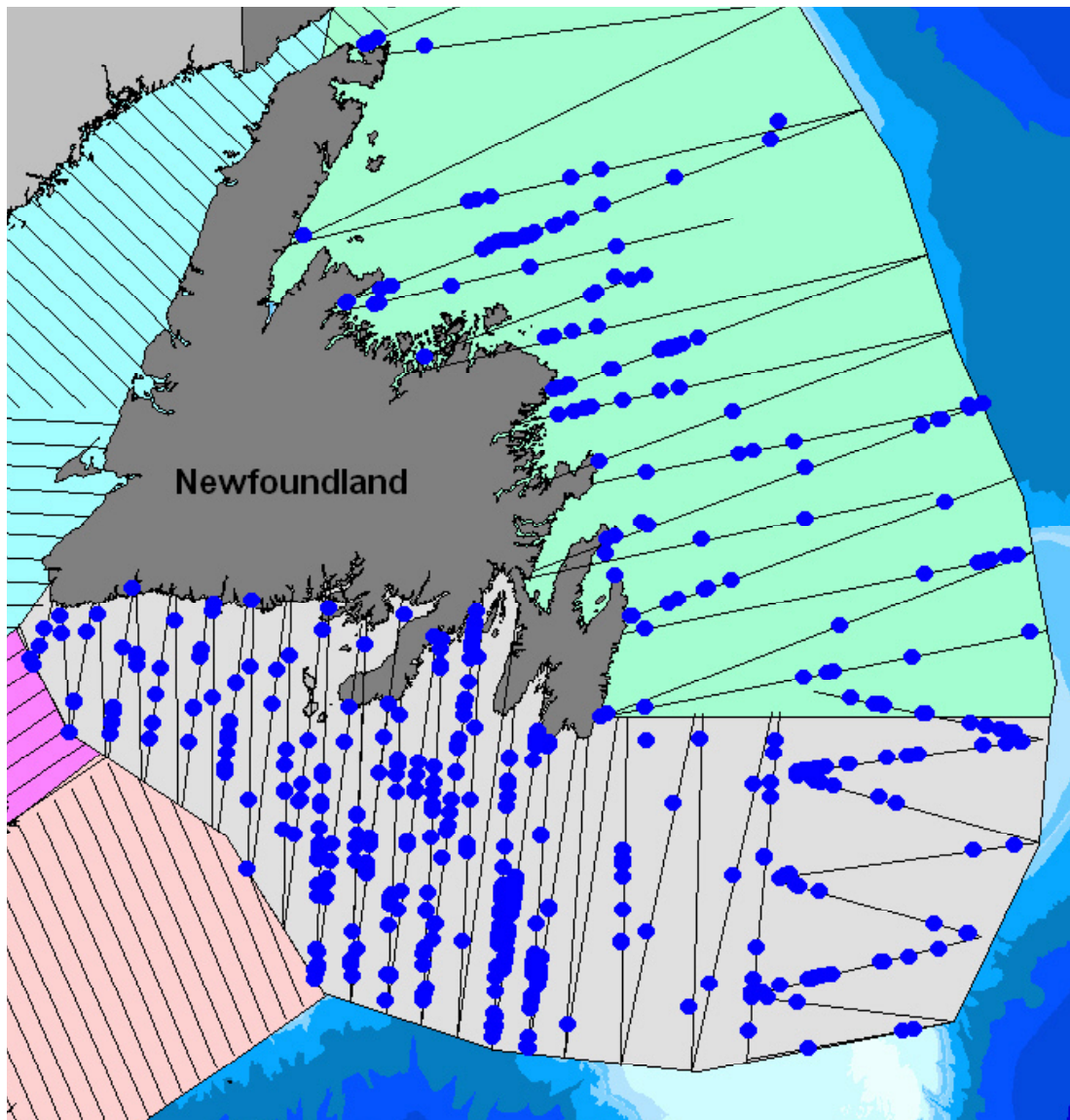


Figure 1. Sightings during the 2007 TNASS aerial survey off the east and south coasts of Newfoundland.

Endangered species such as blue whales, right whales, and leatherback sea turtles have been seen in this area during other aerial and shipboard surveys as well.

The SPM Aerial Survey - Study Area and Methods

The aerial survey near St. Pierre et Miquelon took place in the territorial and adjacent waters of the French islands, as a single stratum based on logistical and geographical grounds. Survey effort varied depending on weather conditions, with (2,843 nautical miles) flown on effort during 26.3 hours of flight (Table 1).

Table 1. Survey distance and time flown during SPM aerial survey in September and November, 2010.

Date	Transect Distance Flown (nautical miles)	Time in Flight (hours)
September 1, 2010	316	2.5
September 2, 2010	350	3.1
September 3, 2010	533	4.8
November 2, 2010	120	1.1
November 3, 2010	930	9.2
November 4, 2010	594	5.6
Total	2,843	26.3

Within this stratum transect lines were designed to orient north/south, across bathymetry gradients, and were spaced 10 nautical miles apart (except for an extra line in the French territorial water corridor)(Figure 2). Not all planned lines were flown due to weather constraints, but the central lines were completed, except for the most distal ends.

Observers rotated into/out of the survey team on a per-flight basis depending on experience levels and the decisions of the French project partners. The planned timing was three days to complete the survey stratum in September, repeated again in November.

The survey was flown using a Twin Otter 300 aircraft, operating at an altitude of 183 metres (600 ft). This aircraft will be equipped with three bubble windows {one left front (Figure 3), one right front, and a right rear bubble door (Figure 4)}. Three observers were stationed at the windows, with a fourth team member acting as navigator/recorder; observers rotated positions during the flight to improve comfort and provide additional survey experience. Crew were able to communicate via headsets (see below for a list of observers).

The observers collected sightings data during the survey, which were fed to the recorder's laptop via USB keypads and oral reports. Sightings were recorded on a survey laptop using special software (VOR).

Sightings of marine megafauna could include whales, dolphins, seals, sea turtles, large sharks, tuna and other species. On November 2nd an additional observer aboard recorded the locations and numbers of seabirds - a partial summary is included in Table 4). Observers kept track of sighting conditions and weather at regular intervals or when conditions changed.

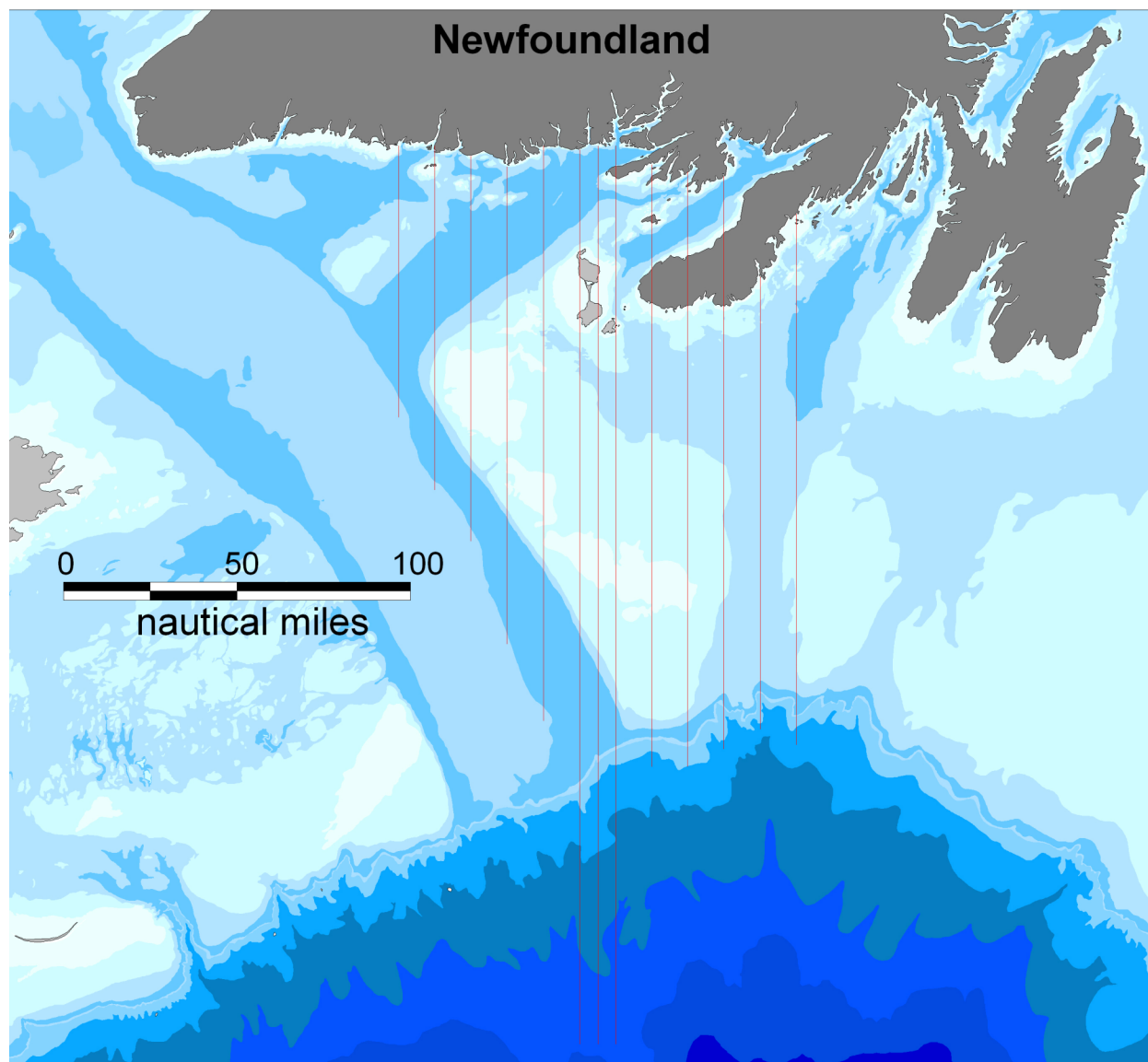


Figure 2. Survey stratum for the SPM aerial survey, with possible 13 north-south transects (red lines) spaced 10 nautical miles apart, except for an extra coverage line in the centre.



Figure 3. Joël Detcheverry on effort at the left front bubble window observation position.



Figure 4. Frank Urtizberea on effort at right rear bubble door observation position.

The SPM Aerial Survey - Survey Results

Effort and Sightings Rate

Total survey effort was 2,843 nautical miles, with 1,199 nautical miles flown in September and 1,644 nautical miles flown in November. November 3rd was flown in the best survey conditions and two flights were completed for a total of 930 nautical miles (Table 1).

Despite there being more effort flown in November, observers recorded approximately 36% of the total sightings during this month (81 sighting events out a total of 227 for both months), although sightings conditions were occasionally worse in November (Figures 5 and 6).

Most sightings were made near and to the south of SPM, particularly in November. Animals were clumped along the transect lines, with no apparent relationship with water depth observed. It was apparent that some of the multi-species aggregations seen were feeding, likely on fish, but we did not observe the prey.

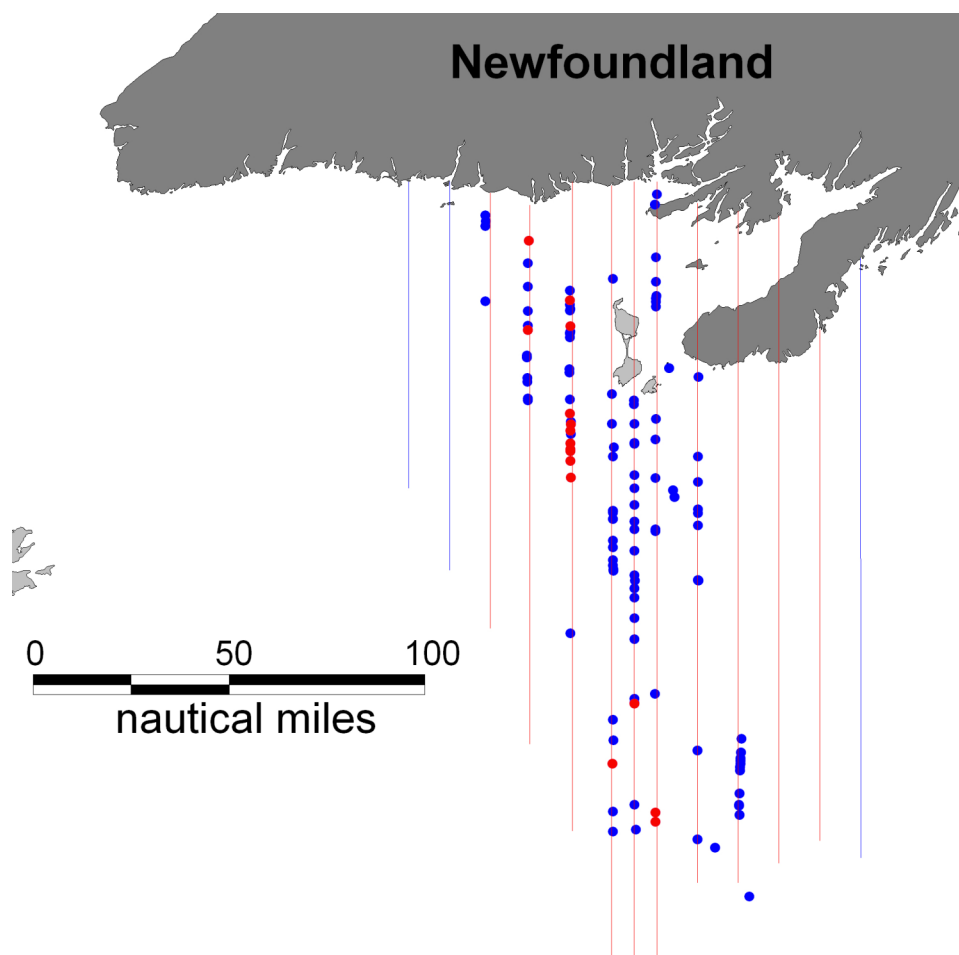


Figure 5. Survey stratum for the SPM September aerial survey, with sighting events indicated by blue circles and leatherback sightings by red circles. Flown transects are indicated by red lines, unflown transects are indicated by blue lines.

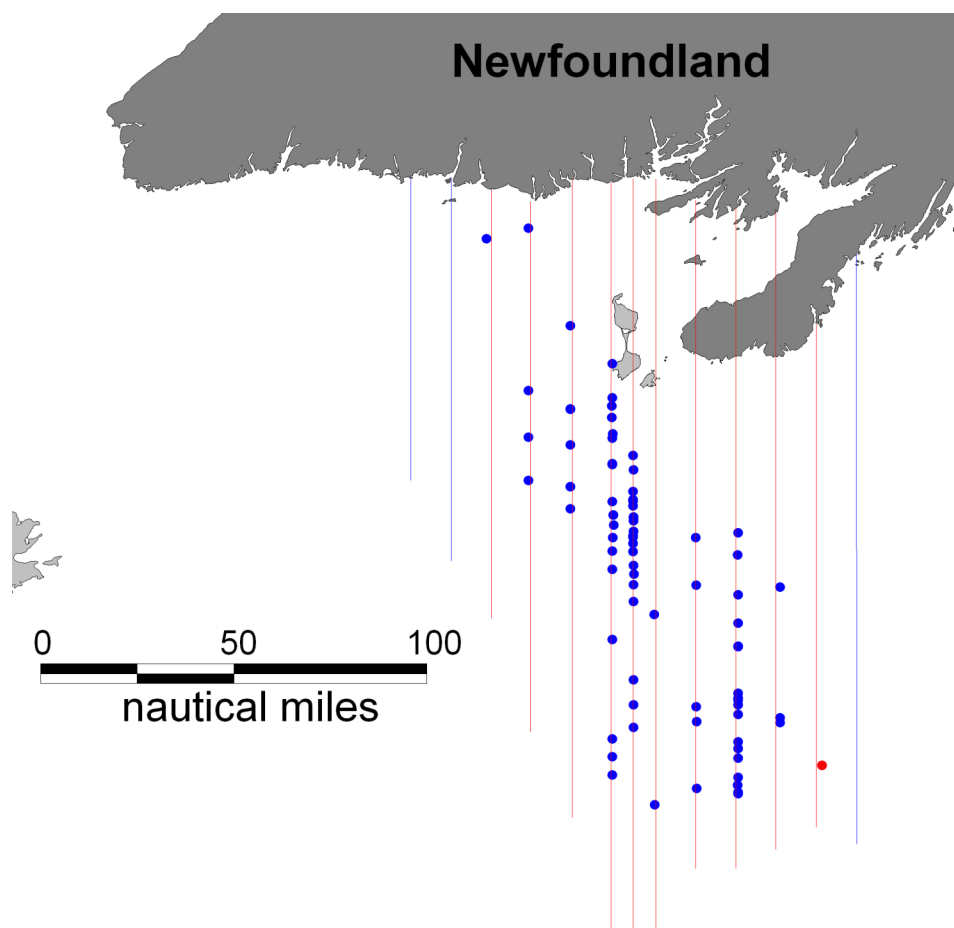


Figure 6. Survey stratum for the SPM November aerial survey, with sighting events indicated by blue circles and the single leatherback sighting by a red circle. Flown transects are indicated by red lines, unflown transects are indicated by blue lines.

Species Sightings

Observers recorded 227 sighting events (see Table 2), totalling an estimated 2,927 individual animals (see Table 3).

Leatherback Sea Turtles

Almost all (95%) leatherback sea turtles (*Dermochelys coriacea*) were sighted in September (Table 2 and Figure 5), which was likely a function of both the time of year (August to October is known as the peak season for leatherback turtle feeding in this area) and better sighting conditions. Only a single turtle was seen during the November survey flights.

Leatherback turtles were seen more than 150 nautical miles offshore, with most to the southwest of SPM, and a small aggregation directly south. While difficult to assess from the air, it was apparent that at least some of these animals were feeding when they were sighted in September. This matches the time frame when previous studies have shown this species to come to these waters to feed on the seasonally abundant jellyfish.

Large Cetaceans

Several large cetacean species were sighted (Tables 1 and 2), with the observation of three endangered blue whales (*Balaenoptera musculus*) (a pair and a lone animal) to the south of SPM being the most exciting. The blue whales were seen in September.

Another large baleen whale, the fin whale (*Balaenoptera physalus*), was seen in September and November, in groups and singly, and primarily to the south of SPM (Figure 7).

The humpback whale (*Megaptera novaeangliae*) was, as expected based on previous surveys in the area, accounted for the most large baleen whale sightings events and individuals seen (Tables 2 and 3). Like the fin whales, most humpbacks were sighted to the south of SPM (Figure 8).

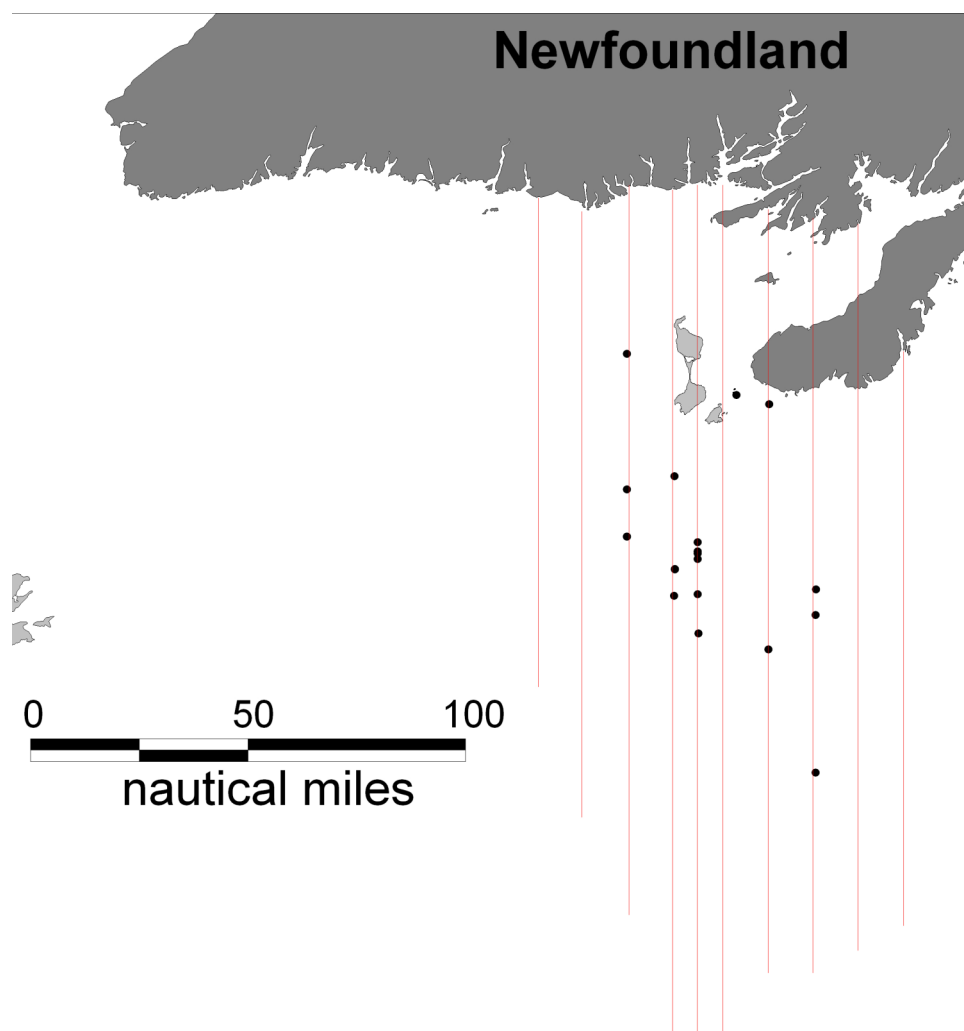


Figure 7. Fin whale sighting events, indicated by black circles, observed during the SPM aerial survey. Flown transects are indicated by red lines.

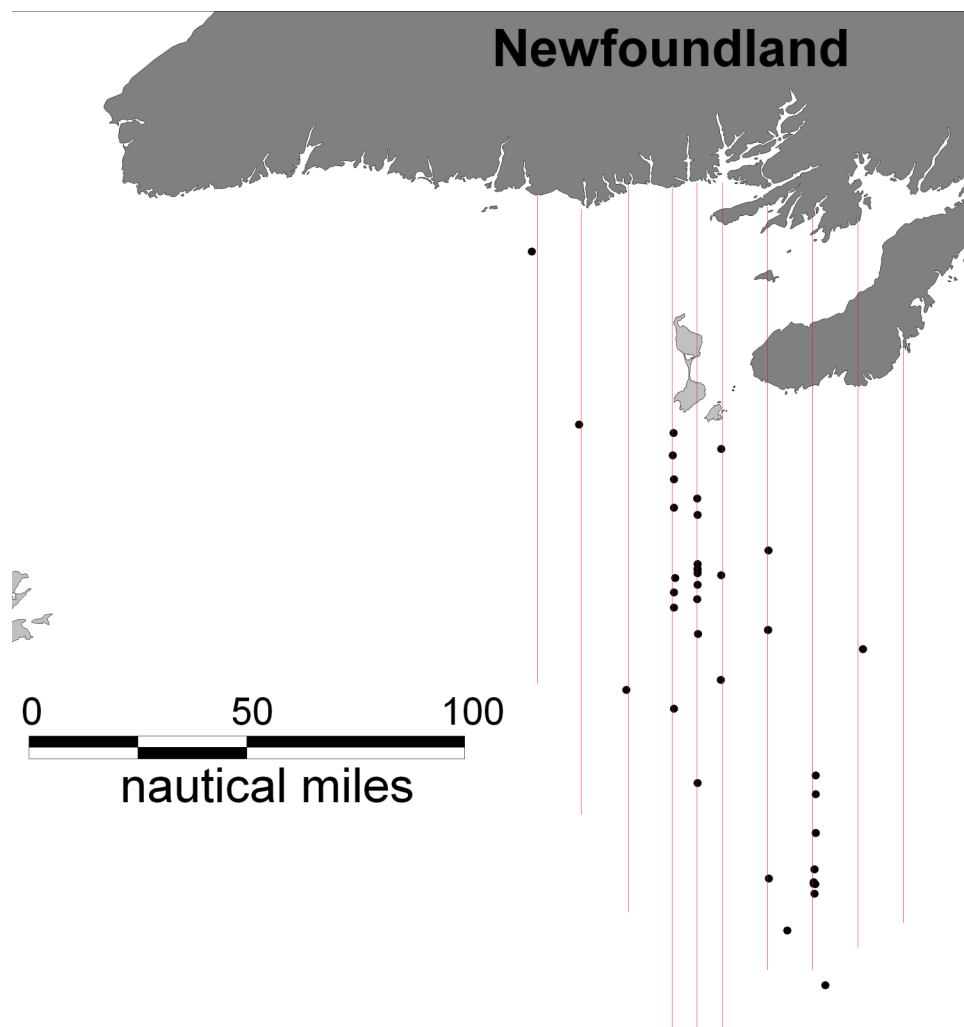


Figure 8. Humpback whale sighting events, indicated by black circles, observed during the SPM aerial survey. Flown transects are indicated by red lines.

Small Cetaceans

The minke whale (*Balaenoptera acutorostrata*) was the most common baleen whale species sighted, accounting for 24 sightings of 55 individuals (Tables 2 and 3); one scattered group of minke whales totalled 25 individuals. Like the larger whales most minkes were seen south of SPM, although a cluster of minkes was seen several kilometres to the northeast of Miquelon.

Killer whales (*Orcinus orca*) were seen three times, with the largest group containing six whales. They were seen in an area that contained small cetaceans and seabirds, so it is possible they could have been mammal or fish eating types.

Common dolphins (*Delphinus delphis*) were indeed common (Tables 2 and 3, Figure 10) with animals sighted on almost all transects. Unexpectedly, Atlantic white-sided dolphins (*Lagenorhynchus acutus*) and white-beaked dolphins (*Lagenorhynchus albirostris*) were seen very infrequently during this survey (Table 2).

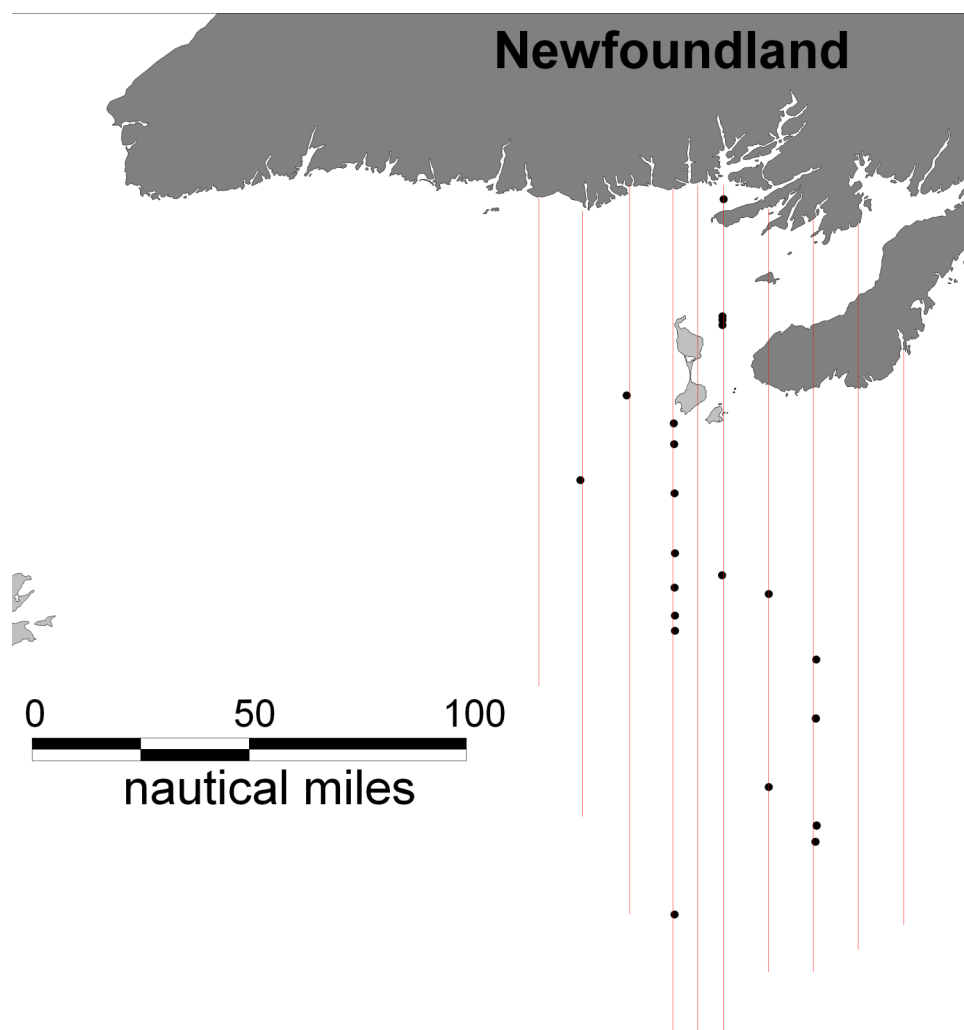


Figure 9. Minke whale sighting events, indicated by black circles, observed during the SPM aerial survey. Flown transects are indicated by red lines.

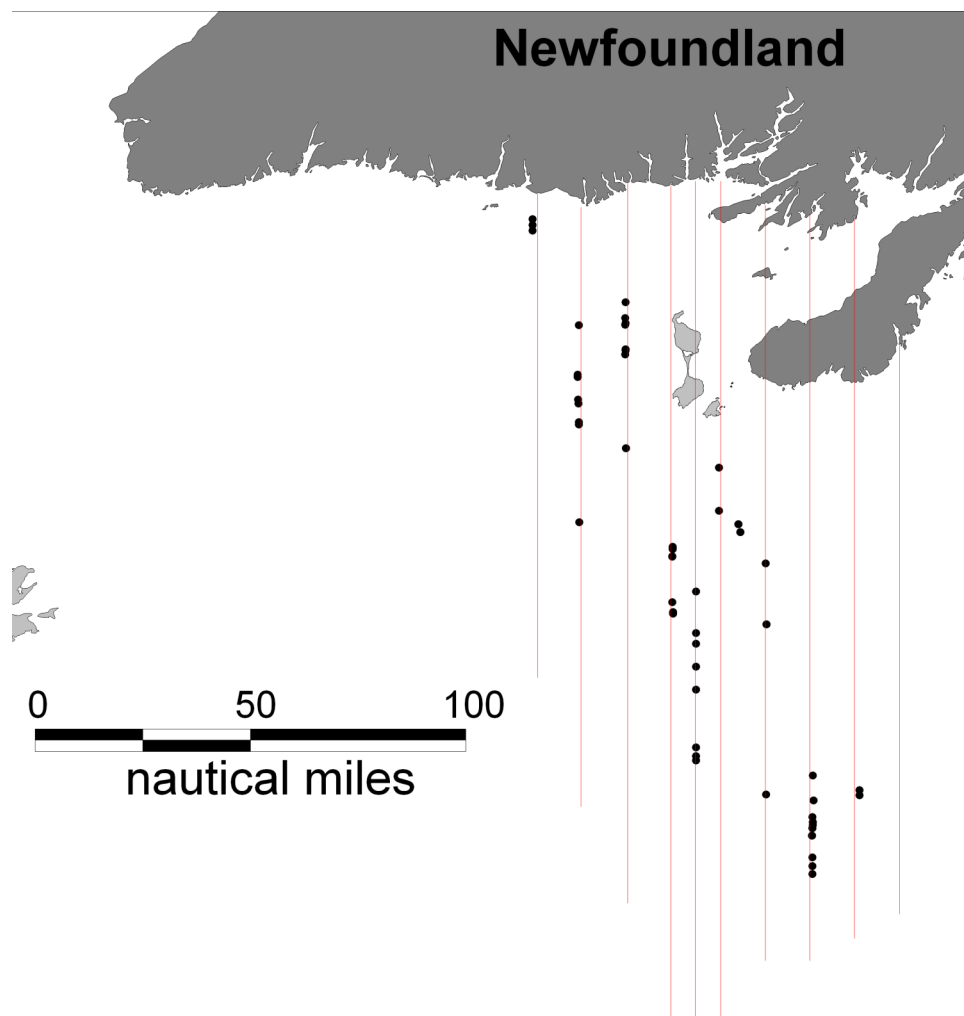


Figure 10. Common dolphin sighting events, indicated by black circles, observed during the SPM aerial survey. Flown transects are indicated by red lines.

Other Species

Three basking sharks (*Cetorhinus maximus*) were sighted in September. As well, eight sunfish (*Mola mola*) (which specialize in jellyfish and other coelenterates) were observed in September. Neither of these species were seen during the subsequent November survey flights.

A dedicated seabird sightings flight was made on the afternoon flight of November 2nd (Table 4). The most commonly sighted species was the common eider, with over 2,246 birds seen. Gannets (*Morus bassanus*), oldsquaw (*Clangula hyemalis*), loons (*Gavia immer*), a small falcon, and Iceland gulls (*Larus glaucoideus*) were also sighted. Seabirds were also sighted very day during the transect efforts in September and November; species included gannets, murres, puffins, shearwaters, dovekeys and gull species.

Table 2. Number of sighting events for each species, per survey and overall.

	September				November			Grand
Species	1	2	3	Total	3	4	Total	Total
Atlantic White-sided Dolphin		1	1	2				2
Blue Whale		3		3				3
Common Dolphin	9	30	11	50	2	9	11	61
Fin Whale	1	2	2	5	11	4	15	20
Fin/Sei Whale		1		1	2		2	3
Harbour Seal					1		1	1
Humpback Whale	3	8	7	18	20	5	25	43
Killer Whale		1	1	2	1		1	3
Large Whale	2			2	11	1	12	14
Minke Whale	1	8	6	15	4	5	9	24
White-beaked Dolphin						1	1	1
Unknown Dolphin	8	7	5	20	2	1	3	23
Leatherback Turtle	3	13		16		1	1	17
Basking Shark		2	1	3				3
Sunfish	4	1	4	9				9
Grand Total	31	77	38	146	54	27	81	227

Table 3. Number of animals sighted for each species, per survey and overall.

	September				November			Grand
Species	1	2	3	Total	3	4	Total	Total
Atlantic White-sided Dolphin		3	30	33				33
Blue Whale		4		4				4
Common Dolphin	231	1,412	400	2,043	21	204	225	2,268
Fin Whale	1	2	2	5	13	4	17	22
Fin/Sei Whale		1		1	3		3	4
Harbour Seal					2		2	2
Humpback Whale	4	12	9	25	25	5	30	55
Killer Whale		2	2	4	6		6	10
Large Whale	2			2	11	2	13	15
Minke Whale	1	32	12	45	4	6	10	55
White-beaked Dolphin						10	10	10
Unknown Dolphin	72	111	107	290	107	20	127	417
Leatherback Turtle	3	16		19		1	1	20
Basking Shark		2	1	3				3
Sunfish	4	1	4	9				9
Grand Total	318	1,598	567	2,483	192	252	444	2,927

Table 4. Bird sighting events made during 2 November, 2010 afternoon survey.

Species	Number	Sighting Time	Observer	Latitude	Longitude
Common eider	10	16:39:50	LJ	47.07006	-56.27167
Gannet	2	16:51:05	Lawson	46.77906	-56.32725
Oldsquaw?	3	16:57:10	Stevens	46.87646	-56.36219
Oldsquaw	1	16:59:22	LJ	46.92936	-56.34710
Loon	1	16:59:44	Etcheberry	46.93811	-56.34951
Oldsquaw	1	17:01:00	LJ	46.96590	-56.36681
Oldsquaw	1	17:01:17	LJ	46.97203	-56.37037
Unk species	1	17:04:36	Etcheberry	47.04777	-56.40395
Common eider	800	17:13:31	Etcheberry	47.02956	-56.51174
Small, dark falcon	1	17:23:09	Lawson	46.85863	-56.24503
Oldsquaw	150	17:27:42	LJ	46.86866	-56.08723
Common eider	25	17:38:10	Lawson	46.74286	-56.22987
Common eider	300	17:38:14	LJ	46.74302	-56.23108
Common eider	700	17:38:25	LJ	46.74473	-56.23780
Common eider	11	17:38:43	LJ	46.74821	-56.24699
Common eider	400	17:39:25	LJ	46.76414	-56.25476
Iceland Gull	3	17:43:47	Etcheberry	46.82053	-56.14000

The SPM Aerial Survey - Summary

The survey flights were a success in terms of the numbers and diversity of marine species seen, and the chance for participants from SPM to gain valuable survey experience.

As expected the September surveys yielded more sightings, although there was still a diverse range of marine mammals seen in November - including a leatherback sea turtle. The large whales included several endangered blue whales, thus the importance of this area for conservation and continued monitoring and study.

The SPM Aerial Survey - Participants and Coordination

Association SPM Frag'îles, St. Pierre, France – CP: Frank Urtizbéréa.

DFO partenaires: Dr. Jack Lawson et Tara Stevens.

Les officiels: Le Préfet M. Jean Regis Borius; Le Sénateur, M. Denis Detcheverry; La Députée, Mme Annick Girardin; DAF, M. Jean Louis Blanc; le Ministère de l'environnement.

Les médias: RFO (Jérôme Anger, Stephane Bry, Loïs Mussard); Echo des caps, l'horizon.

Adhérents: Joel, Roger, Frank, Patrick, Sylvie, Véronique, Laurent, Véro, Cathy, Manu, Paul, et Denis.

Employés: Colin, Morgane, Amael, Gilles, Pierrick, Axel, Marion, Lise, Tristan, et Thibaut.

Appendix 1

SPM Planned Aerial Survey Transect List

Transect ID	Length (nmi)	North Lat.	North Long.	South Lat.	South Long.	
1	76	47 38.750	57 39.375	46 22.563	57 39.375	West
2	96	47 38.750	57 24.375	46 1.500	57 24.375	
3	108	47 35.875	57 9.375	45 49.188	57 9.375	
4	133	47 32.750	56 54.375	45 19.438	56 54.375	
5	160	47 38.750	56 39.375	44 59.625	56 39.375	
6	250	47 37.688	56 24.375	43 28.500	56 24.375	SPM Line
7	250	47 38.750	56 16.750	43 28.500	56 16.750	SPM Line
8	250	47 38.750	56 9.375	43 28.500	56 9.375	SPM Line
9	168	47 33.250	55 54.375	44 46.375	55 54.375	East
10	166	47 31.250	55 39.375	44 46.375	55 39.375	
11	159	47 29.875	55 24.375	44 51.500	55 24.375	
12	126	47 0.813	55 9.375	44 57.188	55 9.375	
13	148	47 19.063	54 54.375	44 52.750	54 54.375	
Total	2,090					