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REPORT OF THE RESULTS OF THE 2002 SURVEY FOR NORTH PACIFIC RIGHT WHALES

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INTRODUCTION

The eastern population of the North Pacific right whale (*Eubalaena japonica*) is one of the most endangered whale populations in the world. They were the target of intensive commercial exploitation during the 19th and early 20th centuries, and were severely depleted by the mid-20th century. In spite of protection for right whales by international treaty, illegal takes by Soviet whalers during the 1960s further decimated the population (Brownell *et al.* 2001). Since that time, even single sightings of right whales in the eastern North Pacific warranted publications (e.g., Carretta *et al*. 1994, Gendron *et al.* 1999). Based on several opportunistic sightings of right whales in the southeastern Bering Sea (Goddard and Rugh 1998, Tynan 1998), a core area within the southeastern Bering Sea was identified as a place where right whales might be found on a regular basis. In 1998, the SWFSC began annual survey efforts in the area to collect data and samples from this extremely endangered population. Aerial survey efforts have been conducted every year since 1998 through 2002, augmented by a two-week vessel survey in 1999. Research activities through 2000 are summarized in LeDuc *et al*. (2001). In 2002, in addition to the approximately two weeks of aerial survey, approximately 60 sea days of the NOAA R/V McArthur was spent on the North Pacific right whale cruise. The primary goals of the vessel survey were to detect and locate right whales, obtain biopsy samples and acoustic recordings from them, and record appropriate data for characterizing the whales' habitat. The author summarizes the 2002 research efforts on North Pacific right whales in Alaskan waters, SWFSC cruise number 1620.

CRUISE DESCRIPTION AND OBJECTIVES

The cruise was a marine mammal survey of the waters of the Bering Sea and Aleutian Islands, sponsored by NOAA Fisheries, Southwest Fisheries Science Center (SWFSC), Protected Resources Division. The overall objective of the NORTHPAC cruise was to locate, collect data on, and understand the distribution of North Pacific Right Whales (*Eubalaena japonica*), which are found in the waters of the study area. Other species studied in the Bering Sea and Northern Gulf of Alaska were humpback whales (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus*) and killer whales (*Orcinus orca*). In addition, sperm whales (*Physeter macrocephalus*) were the focus of research on Leg 1, the transit between Seattle and Kodiak. The primary research platform was the research vessel NOAA Research Vessel *McArthur*.

ITINERARY:

LEG 1: Depart: 02 July – Seattle, WA Arrive: 08 July – Kodiak, AK
LEG 2: Depart: 09 July – Kodiak, AK Arrive: 02 August – Seward, AK
LEG 3: Depart: 10 August – Seward, AK Arrive: 02 September – Kodiak, AK

EQUIPMENT AND PROCEDURES
(Modified from Appler and Barlow 2003)

STUDY AREA: The primary study area (the Box) was the waters of the southeastern Bering Sea in an area bounded by 56°30' N and 57°30' N, and by 162°30' W and 166°00' W. This area encompasses the positions of all the Bering Sea right whale sightings since 1997. In addition to this primary study area, the survey also covered the waters of Albatross Banks off Kodiak Island

and the shelf break west of the Pribilof Islands, areas which contained historical concentrations of right whales, although few have been seen in these areas in recent decades. Although a grid of predetermined tracklines was used as a guideline, actual effort tracklines varied considerably and should not be used for line-transect calculations of abundance or density. Leg 1 effort was focused on sperm whales and basically followed a great circle route from across the Gulf of Alaska from Seattle to Kodiak. Actual tracklines are shown in Figures 1-3.

SURVEY PROCEDURES – VISUAL: Although SWFSC line-transect survey methods (Kinzey *et al*. 2000) were used for data collection, survey operations on Legs 2 and 3 did not strictly follow line transect protocols. Specifically, the search effort on Legs 2 and 3 did not adhere to any predetermined tracklines. The ships travelled at 9-10 knots along the designated trackline until the direction was altered by the cruise leader based on acoustic cues and/or environmental conditions. In the primary study area, expendable sonobuoys were deployed nightly. The vessel's course was decided each morning by the cruise leader based on the presence or absence of nighttime acoustic detections.

A daily watch for marine mammals was maintained during daylight hours by scientific observers on the flying bridge (approximately 0730 to 2030, occasionally until 2300), except when the ship stopped to conduct other sampling operations, or when precluded by weather. A team of three observers searched with 25x150 binoculars, 7X binoculars, and unaided eye. Sighting conditions, watch effort, sightings, and other required information were entered into a computer, which was patched to the ship's GPS for course, speed and position information.

A grid of tracklines to be covered was established prior to the survey. The actual lines of effort that were followed are shown in Figures 1-3. It was not intended that the *a priori* grid of tracklines be followed during the course of survey; the actual daily course of the ship was determined by the cruise leader in consultation with the Command after a review of weather information and reports of the nighttime acoustic efforts. If weather precluded survey effort, the Cruise Leader occasionally decided to wait at that position for better weather, or directed the ship to another location in the survey area based on weather forecasts. With severe weather conditions, the ship would leave the survey area for safe haven at the discretion of the Command. The Cruise Leader was responsible for working with the Command to ensure that the vessel arrived at designated ports at designated times.

On sighting a marine mammal school or other feature of biological interest, the Cruise Leader or marine mammal observer team on watch requested that the vessel be maneuvered to approach the school or feature for investigation. When the ship approached a group of marine mammals, the observers made estimates of school size. Biopsy and photographic operations were occasionally conducted from the bow. In some instances, the Cruise Leader requested the deployment of a small boat for biopsy, photographic or other operations.

Because of the rarity of North Pacific right whales, adherence to the tracklines was not of primary importance. Acoustic detections of right whales, some of which were at a considerable distance off the trackline, would result in a change in course long before visual detection. In some cases, when the exact location of a call could not be determined, the vessel would follow an *ad hoc* search pattern of the area in the direction of the call. When the observers completed scientific operations for the sighting, the ship generally resumed the original course and speed.

At times during the cruise, visual survey operations were not possible due to high winds,

high seas, or fog. Usually, survey operations were suspended at Beaufort Sea State 6. Also, if fog made the visibility one nautical mile or less, visual observations were suspended until visibility increased.

SURVEY PROCEDURES – ACOUSTIC: On Leg 1, the transit from Seattle to Kodiak, acoustic operations focused on detecting sperm whales. A hydrophone array was towed at a distance of 200 m behind the *McArthur* at an approximate depth of 6 m and a speed of 10 knots. The array was a 3-element hydrophone array (built in-house). Signals received from the array were amplified and were monitored by an acoustic technician. Three acoustic technicians rotated on three-hour shifts during daylight hours. Clear cetacean sounds were recorded on a DAT (Digital Audio Tape) recorder, and occasionally high frequency vocalizations were recorded directly to the computer hard disk. A record was kept of acoustic effort, comments and five-minute acoustic updates using the program WHALTRAK (J. Barlow, SWFSC). Real-time visual displays of sounds were monitored using ISHMAEL software (Mellinger 2001), which also allows for localization of vocalizing animals via beamforming and phone-pair (cross-correlation) algorithms. These angles were then plotted on the WHALTRAK display and saved to file.

Information regarding sperm whale detections was not shared between visual and acoustic teams until the animals had clearly passed abeam of the vessel; therefore, the visual and acoustic detections of this species can be considered to be independent. Visual observers frequently relayed information about delphinid sightings to the acoustic team to aid them in their documentation of delphinid whistle recordings. The acoustics team would report dolphin schools that had passed the beam within 3 nautical miles if there was an opportunity to chase the animals using localization of the vocalizations. Acoustic chases were made opportunistically, as time allowed.

Acoustic operations during Legs 2 and 3 consisted mainly of the deployment of navy-surplus DIFAR (Directional Fixing and Ranging) sonobuoys. Most of these were expendable but a small number of them were modified to be recoverable and reusable. The primary goal of the acoustic efforts was to detect right whales for the purposes of sampling by biopsy and photographs. Previous experiences (McDonald and Moore 2002) have shown that acoustic monitoring is a more efficient method for detecting right whales than visual survey alone. Not only are the vocalizations detectable at much greater distances (>10nm) than possible with optimal visual efforts, but also the latter are more hampered in the southeastern Bering Sea by fog and/or rain.

Preliminary analyses of data from a previous cruise indicated that right whales are more likely to call in the early, pre-dawn hours. Therefore, at the end of each day's effort, the cruise leader, in consultation with the acoustician, would determine an area to be monitored that night. After the vessel reached the designated position, usually sometime after midnight, the acousticians would deploy and monitor a sonobuoy until after sunrise. As discussed above, the results of the nighttime monitoring would be used to determine the vessel's efforts during the following day. Sonobuoys were also occasionally deployed during the day. This was often done while the vessel was underway conducting visual search effort. However, when the vessel was in an area where right whales had been detected previously, or when the weather conditions compromised visual effort, the vessel would remain within radio distance of the sonobuoy (<5nm) in order to maximize the monitoring time. In these situations the visual effort was reduced or suspended. Sonobuoy signals were recorded on a DAT recorder and were monitored using a scrolling spectrographic display. When a right whale was detected acoustically, the vessel would proceed along the compass bearing indicated by the directional sonobuoys. Frequently additional

sonobuoys would be deployed to triangulate on the position of the calls. The results of the sonobuoy deployment and monitoring during Legs 2 and 3 are given in Appendices 1 and 2.

SURVEY PROCEDURES – AERIAL SURVEY: During Leg 2, there was a concurrent aerial survey of the box. Survey methods were as described in Perryman *et al.* (1999), except that the aerial team was based out of Cold Bay, AK, rather than Dillingham. The team flew as conditions allowed between 13 July and 24 July. No right whales were seen from the aircraft and none from the ship during this period. Aerial survey tracklines are shown in Appendix 3.

SURVEY PROCEDURES – BIOPSY AND PHOTOGRAPHIC SAMPLING: A small boat was often used for biopsy sampling and photography. Deployment was requested by the Cruise Leader on an opportunistic basis, occasionally multiple times in a single day, providing the Commanding Officer concurred that operating conditions were safe. The small boat remained within radar range and radio contact at all times while deployed.

Biopsies for genetic analyses of cetaceans were collected on an opportunistic basis. Necessary permits were aboard the vessel. The animals sampled were either approached by the research vessel during normal survey operations, or approached the vessel on their own, or were approached in a small boat. Samples were collected from animals within 10m to 30m of the bow of the vessels using a dart fired from a crossbow or a dart rifle. With the exception of the small boat and its requisite safety equipment, all gear was furnished and deployed by the scientific party.

Photographs of marine mammals were taken on an opportunistic basis. Necessary permits were present on the vessel. The animals photographed were either approached by the research vessel during normal survey operations, approached the vessel on their own, or were approached in a small boat. With the exception of the small boat and its requisite safety equipment, all gear was furnished by the scientific party.

SURVEY PROCEDURES – OCEANOGRAPHY: Oceanographic sampling was done by the Chief Survey Technician and other designated scientists.

The vessel provided and maintained a thermosalinograph (TSG), which was calibrated and in working order, for continuous measurement of surface water temperature and salinity. A data acquisition system (WinDACS), furnished and maintained by scientific personnel, was connected directly to the TSG output from the Seabird interface box. This computer (laptop) received the raw data, with the position string from the ship's GPS attached to each record. Additionally, the laptop was connected to the ship's LAN (Local Access Network), in order to synchronize with the ship's timeserver. The ship's Scientific Computing System (SCS) also collected this information. The oceanographer provided the ship's Operations Officer and Electronics Technician with detailed acquisition information before departure.

A chronological record of oceanographic and net tow stations was kept by the ship with dates and times in GMT. The vessel provided a copy of the electronic marine operations log and cruise weather logs to the SWFSC at the completion of the cruise. The SeaBird CTD system was provided and operated by the vessel. The collection of oceanographic data, samples, and their processing was conducted by the Chief Survey Technician. The crew of the vessel operated all deck equipment and was responsible for the proper termination (and any necessary

re-terminations) of the CTD cable pigtail to the conducting cable of the winch. All instruments, their spares and spare parts provided by the ship were required to be maintained in working order and, if applicable, to have current calibrations (within previous 12 months).

In total, there were 24 CTD (conductivity, temperature, depth) stations during the cruise, primarily in the Box. Cast times were usually at the termination of search effort at the end of the day, with some variation due to weather, sunset time, and sightings (casts near right whale sightings were high priority). The exact starting time was determined in advance by the Operations Officer, or by the Officer of the Deck, in consultation with the cruise leader. CTD data were collected using a SeaBird 9/11+ CTD with rosette. In the Box, the average depth is approximately 35 fathoms; safe cast depths were determined by the Operations Officer and/or the Officer of the Deck.

The scientific EQ-50 was operated by the Chief Survey Technician to estimate micronekton biomass between 0 and 500 m. An acoustic data acquisition system (ADA) collected 38 kHz and 200 kHz acoustic backscatter data from the EQ50 echosounder. The Acoustic Doppler Current Profiler (ADCP) ran continuously, and was logged to a data acquisition system. Complete system settings were provided by the oceanographer, but included 5-minute averaging of currents, AGC and four beam returns in 60 8-meter bins.

On Leg 3, net tows were conducted by the scientific party, with the assistance of a winch operator from the vessel. All samples were preserved in formalin, labeled, and transferred to the Alaska Fisheries Science Center upon completion of the cruise. Five Tucker trawls were conducted along the Bering Sea shelf break west of the Pribilof Islands. Five Bongo tows were conducted, all within the Box.

When scientific operations were completed for the night, the ship either resumed course and proceeded along the trackline, or proceeded to a designated position for nighttime acoustic monitoring for right whales. The Cruise Leader had the flexibility to determine the transit speed on a daily basis, depending on planned scientific operations.

SCIENTIFIC PERSONNEL

CHIEF SCIENTIST: Dr. Rick LeDuc, SWFSC; phone (858) 546-7072.

PARTICIPATING SCIENTISTS

Leg 1:

Name	**Position**
Jay Barlow	Cruise Leader
Bob Pitman	ID Specialist
Jim Cotton	ID Specialist
Juan Carlos Salinas	Mammal Observer
Miriam O	Mammal Observer
Nathalie Patenaude	Mammal Observer
Megan Ferguson	Mammal Observer

Shannon Rankin	Acoustician
Julie Oswald	Acoustician
Lisa Munger	Acoustician

Leg 2:

Name	**Position**
Rick LeDuc	Cruise Leader
Bob Pitman	ID Specialist
Jim Cotton	ID Specialist
Lori Mazzuca	Mammal Observer
Nathalie Patenaude	Mammal Observer
Amy Knowlton	Mammal Observer
Eric Archer	Mammal Observer
Josh Fluty	Mammal Observer
Lisa Munger	Acoustician
Kate Stafford	Acoustician

Leg 3:

Name	**Position**
Lisa Ballance	Cruise Leader
Bob Pitman	ID Specialist
Jim Cotton	ID Specialist
Susan Chivers	Mammal Observer
Adam Jenkins	Mammal Observer
Kathy Hough	Mammal Observer
Kerri Danil	Mammal Observer
Jenna Borberg	Mammal Observer
Allan Sauter	Acoustician
Jan Benson	Acoustician

RESULTS

VISUAL SEARCH EFFORT: A total of 8040 kilometers of trackline was surveyed in on-effort searching mode, for an average of 178.67 km per on-effort day. These totals do not include the off-effort searching conducted in pursuit of right whales detected acoustically. The daily record of km surveyed is given in Table 1, and the effort tracklines are shown in Figures 1-3. Seven days of effort were lost due to weather (Table 2). Mechanical problems on the ship led to the loss of three sea days; however, repairs required replacing Dutch Harbor as the second port call with Seward, the nearest port with a drydock. The required additional transit to Seward resulted in a total loss of approximately eight survey days in the Bering Sea. A summary of effort and sighting rates by sea state and observer is given in Table 3. Information on each marine mammal sighting is given in Table 4. Table 5 summarizes the sightings by species, and Figures 4-16 depict the locations of all sightings by species.

As seen in Table 4 and Figure 4, all of the right whale sightings occurred during Leg 3, and all

occurred within the Box. Despite considerable visual and acoustic effort, no right whales were detected in any of the other areas. The most noteworthy sighting is #723, which was of an adult right whale accompanied by a calf. The conclusion that a calf was present was based on the considerably smaller size of the body and the blow of one animal compared to the other. In addition, the smaller animal kept close to the larger animal, as in a mother/calf configuration. Sightings of right whale calves are very rare in the North Pacific, although the sighting in Goddard and Rugh (1998) included a possible calf, and the animal photographed in Carretta *et al.* (1994) measured 12.2 m, nearly 3 m less than the inferred size at sexual maturity (Klumov 1962, Omura *et al.* 1969).

ACOUSTICS: Acoustic effort was focused on sperm whales during the Leg 1 and right whales during Legs 2 and 3. On Leg 1, towed array acoustic effort corresponded to locations of visual search effort (Figure 1). Right whale calls were only heard in the Box; none were detected in any other areas. The acoustic detections during Leg 2 did not lead to any right whale sightings; all the right whale sightings occurred during Leg 3. Acoustic results from Legs 2 and 3 are given in Appendices 1 and 2, respectively.

BIOPSY SAMPLING: A total of 54 biopsies from six different species were collected during the cruise and are listed in Table 6. All samples are archived at SWFSC, and subsamples of the killer whale samples were sent to NMML for additional analyses.

35MM PHOTOGRAPHY: Photographs from 24 sightings were collected for identification of individual whales and are summarized in Table 7. The number of sightings with usable photographs will no doubt be reduced upon review of the images. Photographs of humpback and killer whales were sent to the National Marine Mammal Laboratory (NMML) for inclusion in their catalogues for those species. Photographs of right whales were archived at the SWFSC, where the catalogue of right whales is currently maintained.

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Table 1. Kilometers of effort by day.

Date	Km
3 Jul	251
4 Jul	292
5 Jul	237
6 Jul	237
7 Jul	190
8 Jul	66
10 Jul	240
11 Jul	266
12 Jul	36
13 Jul	90
14 Jul	68
15 Jul	209
16 Jul	120
17 Jul	269
18 Jul	99
19 Jul	115
20 Jul	138
24 Jul	231
25 Jul	101
27 Jul	185
28 Jul	55
29 Jul	278
30 Jul	189
31 Jul	311
1 Aug	245
2 Aug	35
11 Aug	273
12 Aug	259
13 Aug	238
14 Aug	196
15 Aug	240
16 Aug	242
17 Aug	164
18 Aug	79
22 Aug	257
23 Aug	117
24 Aug	172
25 Aug	91
26 Aug	211
27 Aug	188
28 Aug	177
29 Aug	202
30 Aug	161
31 Aug	207
1 Sep	13
Total	8040

Table 2:
Days Lost to Weather – (Less than 35 km of usable search effort, excepting days entering or leaving port)

Leg	Dates
2	21-23 Jul
2	26 Jul
3	19-21 Aug
Total	7 days

Table 3. Levels of effort and sighting rates for different sea states and observers.

	Kilometers of effort	No. of sightings	Sightings per 1000 km
Total	8040.3	873	108.58
By sea state (Beaufort)			
0	68.5	18	262.69
1	428.1	87	203.22
2	2189.4	322	147.07
3	1884.2	213	113.04
4	2255.8	179	79.35
5	1082.8	52	48.02
6	131.5	2	15.21
By observer number			
1	4.1	0	.00
4	3384.8	210	62.04
7	3613.8	120	33.21
15	27.4	7	255.73
21	14.8	0	.00
29	1518.2	51	33.59
56	3.7	1	272.71
85	1333.0	41	30.76
120	48.9	2	40.92
126	530.1	26	49.05
127	11.1	0	.00
184	23.5	1	42.57
188	1524.0	70	45.93
199	135.7	6	44.20
207	1459.2	31	21.25
209	572.8	28	48.88
210	1392.5	52	37.34
213	1474.2	19	12.89

217	628.8	21	33.40
218	1948.8	70	35.92
219	1383.2	30	21.69
220	1605.9	40	24.91
221	8.3	3	362.12
222	1474.3	41	27.81

Table 4. List of marine mammal sightings during the 2002 North Pacific right whale cruise.

Species name Code	Other Codes	Sighting Number	Date	Time	Lat.	Long.	Bft.	Obs. no.	School size	Ef-fort
Lagenorhynchus obliquidens										
022		35	3 Jul 02	1925	N49:12.11	W127:26.90	3	4	3	On
022		37	3 Jul 02	1944	N49:13.79	W127:31.32	3	4	70	On
022		41	3 Jul 02	2043	N49:19.19	W127:45.32	2	218	30	On
022		223	10 Jul 02	1235	N57:15.40	W151:47.82	3	210	5	On
Orcinus orca										
037		196	8 Jul 02	711	N57:27.25	W151:32.85	2	126	6	On
037		299	13 Jul 02	746	N54:19.41	W164:39.17	3	218	2	On
037		309	13 Jul 02	1009	N54:34.40	W165:09.07	2	218	3	On
037		320	13 Jul 02	2000	N55:38.70	W163:53.60	2	4	50	Off
037		399	18 Jul 02	1056	N56:55.71	W164:26.53	2	4	14	Off
037		407	18 Jul 02	2232	N56:57.88	W165:13.32	2	218	5	On
037		435	29 Jul 02	814	N56:32.22	W164:26.77	3	218	5	On
037		458	30 Jul 02	1216	N54:16.58	W166:08.68	5	220	20	On
037		474	30 Jul 02	1750	N54:17.08	W164:43.93	1	210	2	On
037		477	30 Jul 02	2121	N54:12.06	W163:45.68	2	210	5	On
037		526	1 Aug 02	831	N56:19.92	W152:54.52	3	219	59	On
037		534	1 Aug 02	1203	N56:29.23	W152:28.89	1	4	10	On
037		541	1 Aug 02	1316	N56:37.38	W152:06.20	1	7	12	On
037		550	2 Aug 02	808	N59:28.42	W149:30.48	2	4	20	On
037		572	11 Aug 02	1620	N58:00.69	W154:09.15	3	207	4	On
037		606	13 Aug 02	1519	N54:24.74	W166:05.52	2	7	1	On
037		608	13 Aug 02	1609	N54:22.80	W166:15.77	3	188	2	On
037		642	14 Aug 02	1322	N55:00.47	W168:22.22	1	188	4	On
037		730	26 Aug 02	839	N57:01.96	W164:48.45	4	188	8	On
037		732	26 Aug 02	1441	N57:13.32	W164:18.39	4	7	1	On
037		756	29 Aug 02	1116	N53:55.48	W164:28.96	3	29	7	On
037		762	29 Aug 02	1825	N53:49.14	W163:38.13	3	29	20	On
Phocoena phocoena										
040		18	3 Jul 02	1219	N48:37.87	W125:48.83	2	4	2	On
040		365	16 Jul 02	1833	N56:52.36	W164:06.31	2	210	2	On
040		369	16 Jul 02	1905	N56:52.09	W163:57.30	2	219	2	On
040		370	16 Jul 02	1910	N56:52.07	W163:55.86	2	218	2	On
040		371	16 Jul 02	1912	N56:52.06	W163:55.20	2	218	2	On
040		373	16 Jul 02	1919	N56:52.08	W163:52.80	2	218	10	On
040	CU	375	16 Jul 02	2033	N56:44.33	W163:45.20	1	7	13	On
040		377	16 Jul 02	2156	N56:44.80	W163:59.24	1	4	1	On
040		381	16 Jul 02	2229	N56:47.13	W163:59.51	1	210	1	On
040		382	16 Jul 02	2234	N56:48.05	W163:59.72	1	4	2	On
040		385	16 Jul 02	2239	N56:48.94	W163:59.91	1	4	2	On
040		386	16 Jul 02	2241	N56:49.32	W163:59.99	1	4	3	On
040		387	16 Jul 02	2247	N56:50.41	W164:00.22	1	210	1	On
040		388	17 Jul 02	758	N56:38.34	W164:50.79	1	210	1	On
040		389	17 Jul 02	809	N56:38.36	W164:54.35	2	218	1	On
040		489	31 Jul 02	1115	N55:27.58	W159:56.99	2	7	1	On
040		490	31 Jul 02	1136	N55:29.93	W159:51.26	2	4	1	On
040		727	25 Aug 02	1611	N57:12.21	W164:40.56	2	4	2	On
040		744	28 Aug 02	1300	N56:37.61	W164:08.81	5	29	2	On

Phocoenoides dalli

044	1	3	Jul	02	800	N48:27.60	W124:34.59	2	15	7	Off
044	2	3	Jul	02	809	N48:28.33	W124:37.26	3	4	2	On
044	3	3	Jul	02	812	N48:28.58	W124:38.20	3	4	6	On
044	4	3	Jul	02	813	N48:28.66	W124:38.49	3	4	2	On
044	5	3	Jul	02	819	N48:29.13	W124:40.04	3	4	2	On
044	6	3	Jul	02	1055	N48:34.74	W125:26.35	2	4	2	On
044	20	3	Jul	02	1258	N48:38.87	W125:59.10	2	7	4	On
044	32	3	Jul	02	1741	N49:03.04	W127:02.96	4	7	2	On
044	34	3	Jul	02	1915	N49:11.19	W127:24.40	3	209	2	On
044	42	4	Jul	02	604	N50:05.10	W129:47.74	3	199	4	On
044	43	4	Jul	02	619	N50:06.37	W129:51.26	3	126	2	On
044	44	4	Jul	02	711	N50:10.34	W130:01.94	3	199	2	On
044	45	4	Jul	02	719	N50:11.22	W130:04.13	2	199	1	On
044	46	4	Jul	02	726	N50:11.90	W130:06.04	2	4	3	On
044	47	4	Jul	02	730	N50:12.25	W130:06.91	2	4	2	On
044	48	4	Jul	02	735	N50:12.81	W130:08.50	2	199	2	On
044	49	4	Jul	02	737	N50:12.96	W130:08.92	2	218	1	On
044	50	4	Jul	02	743	N50:13.56	W130:10.63	2	199	1	On
044	51	4	Jul	02	743	N50:13.59	W130:10.70	2	218	3	On
044	52	4	Jul	02	748	N50:14.05	W130:11.98	2	218	10	On
044	53	4	Jul	02	753	N50:14.55	W130:13.37	1	199	5	On
044	55	4	Jul	02	757	N50:14.97	W130:14.51	1	4	3	On
044	56	4	Jul	02	801	N50:15.37	W130:15.64	1	4	5	On
044	57	4	Jul	02	805	N50:15.74	W130:16.66	1	217	1	On
044	59	4	Jul	02	823	N50:17.43	W130:21.67	2	218	6	On
044	60	4	Jul	02	825	N50:17.66	W130:22.36	2	4	4	On
044	61	4	Jul	02	825	N50:17.71	W130:22.49	2	217	2	On
044	62	4	Jul	02	850	N50:20.37	W130:29.02	2	217	2	On
044	63	4	Jul	02	851	N50:20.58	W130:29.51	2	7	2	On
044	64	4	Jul	02	900	N50:21.50	W130:31.77	2	217	3	On
044	66	4	Jul	02	904	N50:21.99	W130:33.07	2	7	3	On
044	69	4	Jul	02	937	N50:25.30	W130:42.27	2	126	5	On
044	71	4	Jul	02	953	N50:26.84	W130:46.51	2	7	6	On
044	72	4	Jul	02	1011	N50:28.79	W130:51.76	2	7	5	On
044	73	4	Jul	02	1026	N50:30.28	W130:55.67	2	126	2	On
044	74	4	Jul	02	1041	N50:31.88	W130:59.99	2	126	1	On
044	75	4	Jul	02	1055	N50:33.34	W131:03.98	2	126	2	On
044	77	4	Jul	02	1109	N50:34.87	W131:08.18	3	126	3	On
044	78	4	Jul	02	1122	N50:36.21	W131:11.75	3	4	7	On
044	80	4	Jul	02	1131	N50:37.09	W131:14.19	3	209	1	On
044	83	4	Jul	02	1321	N50:48.02	W131:43.87	2	7	1	On
044	84	4	Jul	02	1329	N50:48.88	W131:46.20	2	7	1	On
044	90	4	Jul	02	1837	N51:28.23	W132:37.38	4	209	7	On
044	91	4	Jul	02	1900	N51:31.26	W132:42.29	4	4	4	On
044	92	4	Jul	02	1904	N51:31.78	W132:43.12	4	126	2	On
044	93	4	Jul	02	1910	N51:32.59	W132:44.41	4	209	2	On
044	95	4	Jul	02	1923	N51:34.26	W132:47.03	4	4	4	On
044	97	4	Jul	02	1933	N51:35.56	W132:49.14	4	4	5	On
044	98	4	Jul	02	1940	N51:36.44	W132:50.72	4	4	4	On
044	100	4	Jul	02	2110	N51:48.07	W133:09.20	4	218	3	On
044	101	4	Jul	02	2117	N51:48.96	W133:10.71	4	217	4	On
044	104	5	Jul	02	741	N53:13.26	W135:28.81	4	218	5	On
044	106	5	Jul	02	1754	N54:00.36	W138:06.03	4	7	2	On
044	108	6	Jul	02	913	N55:07.18	W141:58.49	2	7	1	On
044	110	6	Jul	02	942	N55:09.97	W142:05.98	2	126	8	On
044	111	6	Jul	02	1000	N55:11.55	W142:10.60	2	126	2	On
044	113	6	Jul	02	1013	N55:12.81	W142:13.86	1	209	1	On
044	115	6	Jul	02	1050	N55:16.49	W142:23.60	2	4	1	On
044	117	6	Jul	02	1102	N55:17.78	W142:26.82	2	4	1	On
044	121	6	Jul	02	1237	N55:26.93	W142:51.93	2	126	2	On
044	122	6	Jul	02	1252	N55:28.30	W142:55.65	2	7	2	On
044	123	6	Jul	02	1300	N55:29.11	W142:57.87	2	7	2	On
044	124	6	Jul	02	1314	N55:30.38	W143:01.31	2	209	1	On
044	126	6	Jul	02	1353	N55:34.18	W143:11.56	2	4	2	On
044	132	6	Jul	02	1517	N55:42.24	W143:33.57	1	4	5	On
044	133	6	Jul	02	1519	N55:42.42	W143:34.05	1	4	3	On
044	134	6	Jul	02	1526	N55:43.05	W143:35.80	1	7	2	On
044	137	6	Jul	02	1608	N55:47.26	W143:47.26	2	126	5	On
044	138	6	Jul	02	1622	N55:48.70	W143:51.17	2	126	1	On
044	141	6	Jul	02	1728	N55:49.76	W144:10.70	2	209	1	Off

044		145	6	Jul	02	2004	N56:00.04	W144:37.22	1	126	2	On
044		147	6	Jul	02	2218	N56:03.20	W144:36.65	1	209	1	On
044		149	6	Jul	02	2225	N56:04.09	W144:38.30	1	218	1	On
044		150	6	Jul	02	2228	N56:04.54	W144:39.12	1	209	1	On
044		155	7	Jul	02	845	N56:53.10	W148:02.75	2	126	4	On
044		156	7	Jul	02	927	N56:56.67	W148:14.57	2	209	1	On
044		159	7	Jul	02	1021	N57:00.07	W148:31.42	2	217	2	On
044		160	7	Jul	02	1022	N57:00.12	W148:31.67	2	217	2	On
044		161	7	Jul	02	1042	N57:01.30	W148:38.04	2	7	1	On
044		164	7	Jul	02	1236	N57:08.23	W149:11.13	3	209	3	On
044		165	7	Jul	02	1258	N57:09.61	W149:17.87	2	184	2	On
044		166	7	Jul	02	1304	N57:09.96	W149:19.67	2	4	2	On
044		168	7	Jul	02	1330	N57:11.55	W149:27.61	2	4	2	On
044		169	7	Jul	02	1343	N57:12.33	W149:31.56	2	4	4	On
044		170	7	Jul	02	1425	N57:14.96	W149:45.12	2	217	2	On
044		172	7	Jul	02	1633	N57:17.42	W150:10.39	2	126	2	On
044		173	7	Jul	02	1652	N57:18.64	W150:16.50	2	217	4	On
044		174	7	Jul	02	1653	N57:18.70	W150:16.78	2	126	2	On
044		176	7	Jul	02	1658	N57:19.02	W150:18.28	2	15	5	On
044		177	7	Jul	02	1708	N57:19.64	W150:21.36	2	126	4	On
044		179	7	Jul	02	1712	N57:19.89	W150:22.71	2	209	7	On
044		180	7	Jul	02	1714	N57:20.06	W150:23.53	2	209	3	On
044		181	7	Jul	02	1722	N57:20.99	W150:21.55	2	15	12	On
044		182	7	Jul	02	1726	N57:21.38	W150:20.59	2	218	2	On
044		183	7	Jul	02	1739	N57:22.80	W150:16.87	3	7	6	On
044		184	7	Jul	02	1740	N57:22.87	W150:16.76	3	209	1	On
044		185	7	Jul	02	1744	N57:23.48	W150:15.82	3	218	2	On
044		186	7	Jul	02	1745	N57:23.69	W150:15.48	3	218	1	On
044		187	7	Jul	02	1830	N57:24.47	W150:10.83	4	218	2	Off
044		188	7	Jul	02	1840	N57:24.46	W150:08.20	4	184	7	Off
044		216	10	Jul	02	953	N57:33.45	W151:04.25	2	218	1	On
044		218	10	Jul	02	1044	N57:27.57	W151:18.21	2	7	3	On
044		226	10	Jul	02	1410	N57:05.08	W152:11.19	4	7	4	On
044		234	10	Jul	02	1502	N56:59.46	W152:24.15	4	85	8	On
044		236	10	Jul	02	1520	N56:57.73	W152:28.62	3	4	6	On
044		237	10	Jul	02	1522	N56:57.52	W152:29.13	3	4	10	On
044		238	10	Jul	02	1540	N56:55.66	W152:33.51	3	210	6	On
044		239	10	Jul	02	1603	N56:53.27	W152:39.05	2	210	2	On
044		240	10	Jul	02	1621	N56:51.29	W152:43.70	2	210	3	On
044		247	10	Jul	02	1735	N56:44.93	W152:57.44	2	221	2	Off
044		252	10	Jul	02	2035	N56:47.35	W153:17.59	4	56	5	On
044		254	10	Jul	02	2058	N56:44.38	W153:19.84	2	220	5	On
044		255	10	Jul	02	2130	N56:38.68	W153:18.58	2	218	2	On
044		265	11	Jul	02	930	N56:07.77	W153:50.52	4	7	4	On
044		266	11	Jul	02	940	N56:06.87	W153:53.56	5	4	6	On
044		269	11	Jul	02	1448	N55:47.52	W155:03.80	4	218	3	On
044		279	11	Jul	02	1712	N55:34.94	W155:44.81	4	219	1	On
044	74	281	11	Jul	02	1741	N55:34.69	W155:54.97	3	219	2	On
044		283	11	Jul	02	1822	N55:34.45	W156:08.90	4	210	1	On
044		284	11	Jul	02	1848	N55:34.26	W156:17.67	3	220	3	On
044		294	12	Jul	02	730	N55:30.83	W159:45.88	4	219	3	On
044		295	12	Jul	02	751	N55:30.74	W159:51.65	4	220	12	On
044		296	12	Jul	02	755	N55:30.72	W159:52.96	4	210	1	On
044		298	13	Jul	02	738	N54:19.18	W164:36.50	3	7	2	On
044		300	13	Jul	02	838	N54:20.93	W164:55.47	2	4	1	Off
044		301	13	Jul	02	839	N54:20.97	W164:55.83	2	4	6	On
044		302	13	Jul	02	850	N54:21.33	W164:58.95	2	4	8	On
044		303	13	Jul	02	853	N54:21.47	W164:59.90	2	4	5	On
044		304	13	Jul	02	911	N54:24.38	W165:02.58	1	219	3	On
044		305	13	Jul	02	927	N54:26.98	W165:04.66	1	85	4	On
044		306	13	Jul	02	932	N54:27.74	W165:05.25	1	210	3	On
044		307	13	Jul	02	933	N54:28.04	W165:05.48	1	4	5	On
044		308	13	Jul	02	940	N54:29.14	W165:06.31	1	210	2	On
044		310	13	Jul	02	1014	N54:35.37	W165:09.50	2	210	6	On
044		311	13	Jul	02	1146	N54:37.66	W165:10.62	3	220	2	On
044		317	13	Jul	02	1736	N55:22.39	W164:13.77	2	220	3	Off
044		340	16	Jul	02	1155	N57:11.68	W164:40.90	2	210	1	Off
044		362	16	Jul	02	1824	N56:52.54	W164:09.27	2	4	1	On
044		418	24	Jul	02	1250	N54:28.65	W165:40.91	4	4	8	On
044		420	24	Jul	02	1256	N54:29.83	W165:40.58	4	210	6	On
044		423	24	Jul	02	1310	N54:32.89	W165:39.52	4	219	7	On
044		426	24	Jul	02	1337	N54:38.16	W165:37.32	4	7	8	On

044	431	25	Jul	02	1228	N56:57.11	W165:45.96	4	4	2	On
044	436	29	Jul	02	1154	N56:07.21	W164:07.17	3	220	3	On
044	437	29	Jul	02	1412	N55:41.95	W163:47.75	2	210	6	On
044	438	29	Jul	02	1522	N55:33.30	W163:41.02	2	7	3	On
044	439	29	Jul	02	1540	N55:29.90	W163:38.57	2	7	15	On
044	440	29	Jul	02	1605	N55:25.22	W163:35.03	2	220	4	On
044	441	29	Jul	02	1607	N55:24.79	W163:34.72	2	4	6	On
044	447	29	Jul	02	1917	N55:01.87	W164:23.94	2	85	5	On
044	448	29	Jul	02	2047	N54:50.97	W164:48.40	4	4	1	On
044	455	30	Jul	02	1204	N54:14.68	W166:11.36	5	4	5	On
044	456	30	Jul	02	1209	N54:15.39	W166:10.36	5	85	3	On
044	459	30	Jul	02	1219	N54:17.05	W166:08.03	5	85	4	Off
044	462	30	Jul	02	1510	N54:23.54	W165:39.55	4	7	3	On
044	467	30	Jul	02	1558	N54:22.75	W165:23.76	4	220	5	Off
044	468	30	Jul	02	1559	N54:22.72	W165:23.52	4	85	3	Off
044	469	30	Jul	02	1606	N54:22.41	W165:20.95	3	219	10	On
044	470	30	Jul	02	1624	N54:21.38	W165:14.74	4	4	4	On
044	471	30	Jul	02	1631	N54:20.87	W165:12.28	4	4	5	On
044	473	30	Jul	02	1726	N54:17.91	W164:52.81	2	218	7	On
044	487	31	Jul	02	1055	N55:24.63	W160:01.94	2	7	3	On
044	491	31	Jul	02	1139	N55:29.96	W159:50.23	2	220	6	On
044	494	31	Jul	02	1244	N55:30.02	W159:27.07	3	219	4	On
044	495	31	Jul	02	1250	N55:30.02	W159:24.79	3	210	3	On
044	498	31	Jul	02	1454	N55:30.05	W158:44.07	4	85	4	On
044	499	31	Jul	02	1534	N55:30.02	W158:29.93	3	4	1	On
044	501	31	Jul	02	1559	N55:30.10	W158:20.88	3	4	1	On
044	505	31	Jul	02	1733	N55:29.99	W157:47.08	2	218	1	On
044	513	31	Jul	02	1959	N55:29.99	W156:53.55	3	4	5	On
044	514	31	Jul	02	2025	N55:30.11	W156:44.24	3	218	7	On
044	518	31	Jul	02	2114	N55:29.98	W156:26.61	2	7	6	On
044	519	1	Aug	02	715	N56:11.97	W153:16.42	2	85	6	On
044	521	1	Aug	02	737	N56:14.36	W153:09.86	2	220	8	On
044	525	1	Aug	02	828	N56:19.65	W152:55.22	3	219	6	On
044	528	1	Aug	02	1108	N56:23.57	W152:45.95	2	220	3	On
044	530	1	Aug	02	1120	N56:24.68	W152:42.09	2	4	5	On
044	531	1	Aug	02	1149	N56:27.79	W152:33.16	1	219	3	On
044	546	1	Aug	02	1952	N57:15.58	W150:20.12	4	219	22	On
044	548	2	Aug	02	719	N59:18.41	W149:31.02	3	4	3	On
044	549	2	Aug	02	748	N59:24.54	W149:31.01	3	219	3	On
044	556	11	Aug	02	839	N58:46.51	W151:52.20	2	213	3	On
044	560	11	Aug	02	1045	N58:46.50	W152:34.59	2	4	5	On
044	562	11	Aug	02	1104	N58:46.50	W152:41.60	2	188	3	On
044	563	11	Aug	02	1304	N58:30.52	W153:16.51	3	4	3	On
044	564	11	Aug	02	1306	N58:30.20	W153:17.17	3	4	3	On
044	565	11	Aug	02	1328	N58:27.69	W153:24.71	3	4	9	On
044	566	11	Aug	02	1336	N58:26.82	W153:27.88	3	188	2	On
044	567	11	Aug	02	1339	N58:26.59	W153:28.72	3	207	10	On
044	568	11	Aug	02	1402	N58:22.69	W153:33.79	3	4	2	On
044	569	11	Aug	02	1517	N58:10.32	W153:52.37	2	7	3	On
044	570	11	Aug	02	1519	N58:10.04	W153:52.88	2	29	3	On
044	574	11	Aug	02	1633	N57:58.64	W154:12.52	3	7	1	On
044	575	11	Aug	02	1641	N57:57.66	W154:14.79	3	4	2	On
044	577	11	Aug	02	1706	N57:54.11	W154:21.03	2	188	4	On
044	578	11	Aug	02	1719	N57:52.11	W154:24.31	1	188	3	On
044	579	11	Aug	02	1735	N57:49.75	W154:28.43	2	4	4	On
044	580	11	Aug	02	1809	N57:44.58	W154:37.50	2	188	2	On
044	581	11	Aug	02	1834	N57:40.66	W154:44.26	2	29	3	On
044	584	12	Aug	02	1305	N55:29.98	W159:47.48	4	4	4	On
044	587	12	Aug	02	1345	N55:26.24	W159:59.27	4	188	5	On
044	603	13	Aug	02	1235	N54:22.45	W165:21.25	2	188	3	On
044	604	13	Aug	02	1248	N54:22.89	W165:25.10	2	207	8	On
044	609	13	Aug	02	1612	N54:22.68	W166:16.75	3	188	8	On
044	611	13	Aug	02	1654	N54:21.80	W166:28.57	3	7	3	On
044	613	13	Aug	02	1722	N54:21.19	W166:36.92	3	188	3	On
044	614	13	Aug	02	1748	N54:20.67	W166:44.47	3	7	8	On
044	615	13	Aug	02	1756	N54:20.55	W166:46.81	3	7	2	On
044	616	13	Aug	02	1807	N54:20.25	W166:50.17	3	213	3	On
044	617	13	Aug	02	1851	N54:19.33	W167:03.01	3	7	8	On
044	620	13	Aug	02	1926	N54:18.46	W167:13.97	3	4	5	On
044	621	13	Aug	02	1937	N54:18.26	W167:17.05	3	188	6	On
044	624	13	Aug	02	2018	N54:17.48	W167:28.46	4	4	3	On
044	625	13	Aug	02	2021	N54:17.42	W167:29.24	4	4	6	On

044		626	13	Aug	02	2028	N54:17.26	W167:31.19	4	29	10	On
044		628	13	Aug	02	2036	N54:17.10	W167:33.26	4	29	2	On
044		629	13	Aug	02	2044	N54:16.94	W167:35.24	4	188	6	On
044	77	631	13	Aug	02	2109	N54:16.45	W167:41.93	4	29	3	On
044		632	14	Aug	02	832	N54:12.99	W168:19.91	2	213	5	On
044		633	14	Aug	02	950	N54:25.94	W168:20.56	2	188	9	On
044		634	14	Aug	02	1005	N54:28.46	W168:20.60	2	29	3	On
044		635	14	Aug	02	1007	N54:28.82	W168:20.61	2	4	2	On
044		636	14	Aug	02	1024	N54:31.59	W168:20.77	2	188	4	On
044		638	14	Aug	02	1141	N54:44.38	W168:21.43	2	222	4	On
044		639	14	Aug	02	1204	N54:48.17	W168:21.64	1	188	10	On
044		640	14	Aug	02	1229	N54:52.23	W168:21.81	1	7	1	On
044		641	14	Aug	02	1318	N54:59.95	W168:22.21	1	188	2	On
044		644	14	Aug	02	1916	N55:51.81	W168:51.46	4	7	12	On
044		645	14	Aug	02	1953	N55:52.82	W169:02.61	4	4	5	On
044		647	15	Aug	02	1006	N55:55.91	W170:18.56	3	188	10	On
044		648	15	Aug	02	1048	N55:57.39	W170:30.66	3	29	2	On
044		650	15	Aug	02	1126	N55:58.55	W170:41.62	3	222	2	On
044		652	15	Aug	02	1136	N55:58.85	W170:44.31	3	7	3	On
044		658	15	Aug	02	1350	N56:01.79	W171:12.53	3	188	5	On
044		660	15	Aug	02	1412	N56:04.62	W171:14.73	3	222	4	On
044		665	15	Aug	02	1459	N56:12.24	W171:18.42	4	222	2	On
044		667	15	Aug	02	1507	N56:13.46	W171:18.99	4	7	1	On
044		670	15	Aug	02	1620	N56:25.40	W171:25.73	4	188	11	On
044		672	15	Aug	02	1758	N56:27.30	W171:49.18	4	7	1	On
044		673	15	Aug	02	1815	N56:26.66	W171:53.89	4	222	2	On
044		674	15	Aug	02	1834	N56:25.72	W171:59.28	4	7	9	On
044		676	15	Aug	02	1927	N56:23.54	W172:12.32	4	4	8	On
044		677	15	Aug	02	1949	N56:22.47	W172:18.55	4	188	20	On
044		679	15	Aug	02	2059	N56:19.06	W172:38.97	4	188	6	On
044		681	15	Aug	02	2109	N56:18.55	W172:41.98	4	7	37	On
044		682	15	Aug	02	2217	N56:23.23	W172:53.55	4	7	5	On
044		683	16	Aug	02	930	N56:30.30	W173:02.10	3	188	5	On
044		684	16	Aug	02	938	N56:31.57	W173:02.55	3	188	41	On
044		685	16	Aug	02	1313	N56:56.69	W173:36.70	3	188	7	On
044		686	16	Aug	02	1321	N56:57.25	W173:38.68	3	188	6	On
044		687	16	Aug	02	1330	N56:57.91	W173:40.99	3	222	16	On
044	74	689	16	Aug	02	1355	N56:59.80	W173:47.54	3	29	12	On
044		690	16	Aug	02	1359	N57:00.11	W173:48.63	3	29	4	On
044		691	16	Aug	02	1407	N57:00.72	W173:50.65	3	222	39	On
044		695	16	Aug	02	1532	N57:07.	W174:11.	1	207	61	On
044		698	16	Aug	02	1637	N57:15.26	W174:11.09	2	222	59	On
044		699	16	Aug	02	1735	N57:24.78	W174:08.55	2	7	6	On
044		700	16	Aug	02	1755	N57:28.09	W174:08.01	2	222	1	On
044		702	16	Aug	02	1813	N57:31.26	W174:07.36	2	207	25	On
044		703	16	Aug	02	2009	N57:48.98	W174:13.43	2	222	26	On
044		704	16	Aug	02	2056	N57:54.12	W174:24.87	2	29	2	On
044		705	16	Aug	02	2130	N57:58.01	W174:33.13	2	7	47	On
044		707	17	Aug	02	915	N58:19.64	W175:14.53	2	222	2	On
044		708	17	Aug	02	1234	N58:38.33	W175:08.52	3	188	4	On
044		709	17	Aug	02	1320	N58:43.90	W174:58.47	3	29	4	On
044		710	17	Aug	02	1352	N58:47.83	W174:50.89	3	222	5	On
044		711	17	Aug	02	1544	N58:35.62	W174:47.02	4	4	23	On
044		714	17	Aug	02	1854	N58:21.68	W174:12.33	2	4	4	On
044		715	17	Aug	02	1900	N58:21.64	W174:10.55	2	4	4	On
044		716	18	Aug	02	1015	N58:05.47	W173:49.91	3	7	4	On
044		718	18	Aug	02	1139	N58:01.17	W173:53.93	3	4	2	On
044		719	18	Aug	02	1253	N57:51.55	W173:37.41	4	29	1	On
044		722	23	Aug	02	1758	N56:50.18	W164:22.94	5	188	5	On
044		745	28	Aug	02	1400	N56:29.63	W164:00.23	5	4	2	On
044		757	29	Aug	02	1706	N53:41.64	W163:56.29	3	4	1	On
044		761	29	Aug	02	1806	N53:47.36	W163:42.41	3	4	1	On
044		763	29	Aug	02	1828	N53:49.61	W163:37.41	3	188	4	On
044		782	30	Aug	02	1750	N53:59.03	W161:33.74	5	188	2	On
044		783	30	Aug	02	2016	N54:02.35	W160:53.28	4	4	2	On
044		787	31	Aug	02	1212	N54:41.91	W158:54.22	4	207	2	On
044		792	31	Aug	02	1649	N54:44.10	W157:46.58	4	188	1	On
044		796	31	Aug	02	2003	N54:41.91	W157:01.98	5	4	2	On
044		797	31	Aug	02	2025	N54:41.96	W156:55.87	5	188	4	On

Physeter macrocephalus

046		25	3	Jul	02	1521	N48:51.02	W126:30.40	2	4	1	On

046		28	3	Jul	02	1553	N48:53.50	W126:37.92	3	218	1 On
046		107	5	Jul	02	2002	N54:09.72	W138:40.11	4	7	2 On
046		146	6	Jul	02	2055	N55:59.94	W144:35.69	2	209	2 Off
046		189	7	Jul	02	1936	N57:21.25	W149:51.79	3	15	1 Off
046		190	7	Jul	02	2033	N57:20.78	W149:50.63	3	184	1 Off
046		191	7	Jul	02	2039	N57:20.00	W149:51.16	3	184	1 Off
046		192	7	Jul	02	2135	N57:23.41	W149:47.69	3	218	1 Off
046		267	11	Jul	02	1132	N55:55.92	W154:30.09	4	221	1 Off
046		270	11	Jul	02	1516	N55:44.64	W155:11.86	3	4	1 Off
046		649	15	Aug	02	1052	N55:57.49	W170:31.70	3	7	2 On
046		655	15	Aug	02	1249	N56:02.15	W170:58.92	3	188	1 On
046		693	16	Aug	02	1512	N57:05.67	W174:07.76	1	213	3 On
046		696	16	Aug	02	1610	N57:11.35	W174:13.18	2	188	1 On
046		769	30	Aug	02	1343	N54:00.95	W162:37.29	2	207	1 On
ziphiid whale											
049		58	4	Jul	02	806	N50:15.89	W130:17.09	1	4	1 On
049		158	7	Jul	02	1018	N56:59.86	W148:30.28	2	4	3 On
Mesoplodon sp.											
051		120	6	Jul	02	1141	N55:21.53	W142:37.31	2	7	2 On
Ziphius cavirostris											
061		139	6	Jul	02	1628	N55:49.25	W143:52.76	02	15	2 Off
Berardius bairdii											
063		171	7	Jul	02	1435	N57:15.56	W149:48.28	2	4	73 On
063		542	1	Aug	02	1601	N56:56.34	W151:13.80	2	219	10 On
063		545	1	Aug	02	1842	N57:10.28	W150:34.60	3	219	1 On
Eubalaena japonica											
066		723	24	Aug	02	1951	N57:01.80	W164:25.40	2	4	2 On
066		724	25	Aug	02	809	N57:15.44	W164:29.80	2	99	2 Off
066		725	25	Aug	02	1208	N57:08.75	W164:34.11	3	120	1 Off
066		738	27	Aug	02	1043	N57:24.37	W164:05.53	4	7	1 On
066		746	28	Aug	02	1424	N56:29.79	W163:54.89	5	213	1 On
066		747	28	Aug	02	1433	N56:30.43	W163:54.10	5	213	1 Off
066		749	28	Aug	02	1718	N56:35.31	W163:52.26	5	7	2 On
Balaenoptera sp.											
070		153	6	Jul	02	2253	N56:08.33	W144:45.98	1	217	1 On
070		214	10	Jul	02	811	N57:45.57	W150:35.36	2	4	1 On
070		257	11	Jul	02	728	N56:19.05	W153:13.08	5	210	6 On
070		259	11	Jul	02	809	N56:15.33	W153:25.78	4	218	1 On
070		268	11	Jul	02	1351	N55:53.50	W154:46.86	4	7	1 On
070		272	11	Jul	02	1543	N55:42.94	W155:16.65	4	7	2 On
070		276	11	Jul	02	1622	N55:38.73	W155:28.54	4	7	2 On
070		297	12	Jul	02	937	N55:18.33	W160:12.31	4	85	1 Off
070		324	15	Jul	02	1921	N56:58.39	W163:38.88	2	210	1 On
070		325	15	Jul	02	1923	N56:58.54	W163:39.56	2	210	4 On
070	74	326	15	Jul	02	1937	N56:59.55	W163:43.96	3	218	3 On
070		357	16	Jul	02	1639	N56:52.64	W164:43.11	2	220	2 On
070		409	19	Jul	02	1152	N57:03.67	W165:42.29	2	220	1 Off
070		594	12	Aug	02	1625	N55:03.09	W160:22.79	4	4	1 On
070		675	15	Aug	02	1838	N56:25.52	W172:00.29	4	207	2 On
070		743	28	Aug	02	822	N57:00.74	W164:23.99	4	188	1 On
070		752	29	Aug	02	950	N54:09.28	W164:31.72	2	207	1 On
Balaenoptera acutorostrata											
071		203	8	Jul	02	922	N57:28.43	W151:39.11	2	217	1 On
071		406	18	Jul	02	2020	N56:54.37	W164:40.82	2	4	2 On
071		443	29	Jul	02	1627	N55:21.03	W163:32.01	2	4	1 On
071		444	29	Jul	02	1652	N55:17.99	W163:39.28	2	219	1 On
071		484	31	Jul	02	929	N55:10.74	W160:18.35	2	210	1 Off
071		485	31	Jul	02	1014	N55:18.57	W160:11.84	2	7	1 On
071		571	11	Aug	02	1557	N58:04.25	W154:03.22	3	7	1 On
071		754	29	Aug	02	1046	N54:00.27	W164:29.96	2	207	1 On
Balaenoptera borealis											
073		87	4	Jul	02	1449	N50:57.35	W132:01.19	3	4	1 On
Balaenoptera physalus											

074		86	4	Jul	02	1430	N50:54.38	W132:01.30	3	7	1	On
074		99	4	Jul	02	2030	N51:42.79	W133:00.87	4	217	2	On
074		140	6	Jul	02	1716	N55:50.64	W144:07.22	2	4	3	Off
074		162	7	Jul	02	1131	N57:04.34	W148:53.13	3	217	1	On
074		163	7	Jul	02	1200	N57:06.17	W149:01.63	3	209	1	On
074	76	195	8	Jul	02	704	N57:26.30	W151:33.24	2	209	3	Off
074		208	10	Jul	02	702	N57:52.57	W150:16.64	3	7	10	On
074		213	10	Jul	02	751	N57:47.70	W150:30.18	3	85	1	On
074		249	10	Jul	02	2015	N56:49.56	W153:13.49	2	219	3	Off
074		271	11	Jul	02	1540	N55:43.25	W155:15.78	4	220	4	On
074	76	273	11	Jul	02	1557	N55:41.53	W155:20.82	4	7	5	On
074		277	11	Jul	02	1625	N55:38.42	W155:29.42	4	7	1	On
074		278	11	Jul	02	1711	N55:34.95	W155:44.30	4	219	1	On
074	44	281	11	Jul	02	1741	N55:34.69	W155:54.97	3	219	2	On
074		285	11	Jul	02	1854	N55:34.23	W156:19.31	3	220	3	On
074		292	11	Jul	02	2126	N55:33.24	W157:12.15	4	210	2	On
074		322	15	Jul	02	1453	N56:50.20	W164:17.42	3	4	3	On
074	79	323	15	Jul	02	1519	N56:53.90	W164:12.32	3	85	54	On
074	70	326	15	Jul	02	1937	N56:59.55	W163:43.96	3	218	3	On
074		328	15	Jul	02	2019	N57:02.52	W163:57.04	3	220	3	On
074	76	329	15	Jul	02	2029	N57:03.31	W164:00.32	3	220	9	On
074	79	331	15	Jul	02	2050	N57:03.94	W164:07.19	2	218	2	Off
074	76	332	15	Jul	02	2100	N57:03.96	W164:10.42	2	218	18	Off
074		333	16	Jul	02	642	N57:10.99	W164:38.21	2	7	2	Off
074		336	16	Jul	02	903	N57:09.52	W164:57.58	2	210	2	Off
074		338	16	Jul	02	934	N57:09.60	W165:01.41	2	218	1	Off
074		339	16	Jul	02	1137	N57:11.72	W164:46.83	2	210	1	Off
074		342	16	Jul	02	1506	N57:02.65	W164:52.83	2	4	1	On
074		344	16	Jul	02	1517	N57:00.68	W164:53.43	2	210	1	On
074		348	16	Jul	02	1526	N56:59.13	W164:53.94	2	210	1	On
074		354	16	Jul	02	1601	N56:52.93	W164:55.81	1	210	3	On
074		359	16	Jul	02	1739	N56:52.63	W164:23.73	1	4	1	On
074		361	16	Jul	02	1808	N56:52.64	W164:14.20	2	85	2	On
074		363	16	Jul	02	1825	N56:52.52	W164:08.92	2	85	2	On
074		364	16	Jul	02	1826	N56:52.50	W164:08.41	2	85	1	On
074		366	16	Jul	02	1834	N56:52.35	W164:06.10	2	4	1	On
074		367	16	Jul	02	1841	N56:52.17	W164:03.72	2	210	2	On
074		380	16	Jul	02	2227	N56:46.78	W163:59.43	1	4	3	On
074	76	383	16	Jul	02	2235	N56:48.21	W163:59.75	1	210	5	On
074	76	390	17	Jul	02	921	N56:44.02	W165:07.98	3	218	26	On
074		393	17	Jul	02	1518	N57:30.00	W164:37.61	2	219	1	On
074		397	18	Jul	02	931	N57:01.15	W164:28.60	2	85	3	Off
074		398	18	Jul	02	1040	N56:57.20	W164:27.05	2	210	1	Off
074		400	18	Jul	02	1313	N56:49.44	W164:21.73	2	85	1	Off
074		401	18	Jul	02	1417	N56:57.46	W164:20.49	2	4	1	Off
074		402	18	Jul	02	1454	N56:57.88	W164:13.44	2	99	1	Off
074		404	18	Jul	02	1539	N56:57.23	W164:04.04	2	218	2	Off
074	76	405	18	Jul	02	1819	N56:54.32	W164:02.01	2	218	3	On
074		408	19	Jul	02	910	N57:02.67	W165:39.82	2	4	1	Off
074		412	19	Jul	02	1752	N56:58.44	W165:06.11	4	219	1	On
074		414	19	Jul	02	2144	N56:58.27	W163:51.02	4	210	1	On
074		429	25	Jul	02	759	N57:07.06	W164:42.44	4	4	2	Off
074		430	25	Jul	02	1110	N56:57.04	W165:21.69	4	4	1	On
074		497	31	Jul	02	1410	N55:29.30	W158:59.70	4	218	3	On
074		502	31	Jul	02	1619	N55:30.00	W158:13.59	3	4	3	On
074		507	31	Jul	02	1757	N55:30.01	W157:38.52	2	220	3	On
074		508	31	Jul	02	1810	N55:30.00	W157:33.66	2	7	2	On
074		509	31	Jul	02	1841	N55:29.99	W157:22.36	2	4	2	On
074		510	31	Jul	02	1849	N55:30.01	W157:19.55	2	4	5	On
074		511	31	Jul	02	1905	N55:29.99	W157:13.56	3	85	3	On
074		512	31	Jul	02	1915	N55:29.99	W157:10.11	3	219	2	On
074		517	31	Jul	02	2053	N55:30.01	W156:33.99	2	7	1	On
074	76	552	11	Aug	02	741	N58:46.47	W151:30.88	2	222	2	On
074	76	557	11	Aug	02	909	N58:46.46	W152:02.36	3	7	7	On
074		573	11	Aug	02	1627	N57:59.67	W154:10.85	3	7	2	On
074		582	12	Aug	02	709	N55:48.37	W157:53.21	2	99	7	Off
074		583	12	Aug	02	937	N55:29.99	W158:32.21	5	188	2	Off
074		588	12	Aug	02	1348	N55:25.70	W160:00.15	4	29	1	On
074		618	13	Aug	02	1908	N54:19.06	W167:08.56	3	4	1	On
074		619	13	Aug	02	1917	N54:18.69	W167:11.13	3	4	4	On
074		622	13	Aug	02	1957	N54:17.79	W167:22.76	3	4	2	On
074		627	13	Aug	02	2033	N54:17.16	W167:32.38	4	222	3	On

074		637	14	Aug	02	1128	N54:42.22	W168:21.34	2	222	2	On
074		651	15	Aug	02	1127	N55:58.57	W170:41.89	3	213	1	On
074		653	15	Aug	02	1140	N55:58.99	W170:45.57	3	7	1	On
074		657	15	Aug	02	1323	N56:00.46	W171:07.75	3	4	2	On
074		659	15	Aug	02	1356	N56:02.84	W171:13.12	3	222	1	On
074		661	15	Aug	02	1414	N56:04.92	W171:14.87	3	29	4	On
074		662	15	Aug	02	1427	N56:07.12	W171:15.96	3	29	2	On
074		663	15	Aug	02	1432	N56:07.79	W171:16.29	3	7	1	On
074		664	15	Aug	02	1435	N56:08.25	W171:16.51	3	29	3	On
074		666	15	Aug	02	1502	N56:12.63	W171:18.61	4	213	5	On
074		668	15	Aug	02	1514	N56:14.50	W171:19.50	4	7	1	On
074		669	15	Aug	02	1606	N56:23.15	W171:24.44	4	4	16	On
074		671	15	Aug	02	1735	N56:28.46	W171:42.28	4	7	2	On
074		678	15	Aug	02	2018	N56:21.07	W172:26.96	4	188	3	On
074		680	15	Aug	02	2104	N56:18.78	W172:40.62	4	7	1	On
074		688	16	Aug	02	1341	N56:58.72	W173:43.82	3	29	1	On
074	44	689	16	Aug	02	1355	N56:59.80	W173:47.54	3	29	12	On
074		692	16	Aug	02	1447	N57:03.85	W174:00.81	3	207	1	On
074		694	16	Aug	02	1530	N57:07.	W174:11.	1	188	1	On
074		697	16	Aug	02	1632	N57:14.48	W174:11.26	2	188	2	On
074		701	16	Aug	02	1808	N57:30.36	W174:07.53	2	213	1	On
074		706	16	Aug	02	2155	N58:00.90	W174:39.34	2	4	1	On
074		717	18	Aug	02	1124	N58:03.30	W173:57.39	3	207	1	On
074		720	22	Aug	02	1110	N57:20.63	W170:03.69	6	4	2	On
074	79	721	22	Aug	02	1353	N57:17.95	W169:08.72	6	4	6	On
074		731	26	Aug	02	1157	N57:17.33	W164:51.55	4	4	1	On
074		735	26	Aug	02	2037	N57:14.25	W164:52.67	5	29	2	On
074		751	28	Aug	02	1933	N56:21.63	W164:03.71	4	222	2	On
074		777	30	Aug	02	1627	N54:00.01	W161:54.24	5	7	2	On
074		788	31	Aug	02	1258	N54:41.91	W158:41.04	4	207	1	On
074	76	790	31	Aug	02	1433	N54:41.92	W158:13.11	4	29	4	On
074	79	793	31	Aug	02	1706	N54:43.54	W157:41.63	4	29	46	On
Megaptera novaeangliae												
076		8	3	Jul	02	1102	N48:34.95	W125:28.33	2	4	2	On
076		10	3	Jul	02	1120	N48:35.89	W125:33.08	2	4	1	On
076		11	3	Jul	02	1131	N48:36.38	W125:36.07	2	4	1	On
076		14	3	Jul	02	1151	N48:37.62	W125:41.18	2	209	2	On
076		15	3	Jul	02	1158	N48:37.67	W125:43.14	2	209	1	On
076		17	3	Jul	02	1205	N48:37.73	W125:44.92	2	209	2	On
076		30	3	Jul	02	1644	N48:58.03	W126:49.72	3	218	1	On
076		31	3	Jul	02	1700	N48:59.45	W126:53.46	3	218	1	On
076		33	3	Jul	02	1848	N49:08.94	W127:18.33	3	126	3	On
076		144	6	Jul	02	1850	N55:50.59	W144:19.01	2	199	1	Off
076		175	7	Jul	02	1657	N57:18.96	W150:17.99	2	126	1	On
076		194	8	Jul	02	653	N57:25.35	W151:35.55	2	7	2	On
076	74	195	8	Jul	02	704	N57:26.30	W151:33.24	2	209	3	Off
076		197	8	Jul	02	844	N57:23.58	W151:28.24	2	15	2	On
076		198	8	Jul	02	845	N57:23.63	W151:28.38	2	217	1	On
076		199	8	Jul	02	852	N57:24.50	W151:30.43	2	15	1	On
076		200	8	Jul	02	856	N57:25.06	W151:31.71	2	7	1	On
076		201	8	Jul	02	857	N57:25.14	W151:31.88	2	15	1	On
076		204	8	Jul	02	1012	N57:35.47	W151:51.09	2	217	1	On
076		205	8	Jul	02	1023	N57:37.23	W151:54.15	2	217	1	On
076		206	8	Jul	02	1033	N57:38.70	W151:56.85	2	217	1	On
076		209	10	Jul	02	720	N57:51.09	W150:21.58	3	7	2	On
076		217	10	Jul	02	1035	N57:28.69	W151:15.59	2	7	3	On
076		219	10	Jul	02	1109	N57:24.79	W151:24.86	2	85	1	On
076		220	10	Jul	02	1124	N57:23.13	W151:28.80	2	85	1	On
076		221	10	Jul	02	1148	N57:20.45	W151:35.12	2	4	1	On
076		222	10	Jul	02	1233	N57:15.59	W151:47.40	3	210	1	On
076		225	10	Jul	02	1407	N57:05.44	W152:10.30	4	7	9	On
076		227	10	Jul	02	1415	N57:04.59	W152:12.51	4	85	3	On
076		228	10	Jul	02	1418	N57:04.34	W152:13.15	4	85	3	On
076		229	10	Jul	02	1427	N57:03.31	W152:15.58	4	85	3	On
076		231	10	Jul	02	1446	N57:01.29	W152:20.12	4	85	1	On
076		232	10	Jul	02	1449	N57:00.87	W152:21.02	4	85	2	On
076		233	10	Jul	02	1458	N56:59.89	W152:23.10	4	85	3	On
076		235	10	Jul	02	1510	N56:58.78	W152:26.08	4	4	3	On
076		241	10	Jul	02	1637	N56:49.66	W152:47.59	2	218	2	On
076		242	10	Jul	02	1654	N56:47.92	W152:51.55	2	220	3	On
076		244	10	Jul	02	1725	N56:45.77	W152:55.03	2	220	50	On

076		245	10	Jul	02	1730	N56:45.33	W152:56.21	2	220	1	On
076		246	10	Jul	02	1732	N56:45.14	W152:56.72	2	220	3	On
076		248	10	Jul	02	1829	N56:49.07	W153:05.43	2	4	30	Off
076		250	10	Jul	02	2021	N56:48.98	W153:14.98	2	85	2	On
076		253	10	Jul	02	2041	N56:46.47	W153:18.28	4	218	1	On
076		256	10	Jul	02	2135	N56:37.88	W153:18.17	2	85	5	On
076		258	11	Jul	02	745	N56:17.39	W153:18.33	5	210	1	On
076		261	11	Jul	02	821	N56:14.24	W153:29.58	4	218	1	On
076		262	11	Jul	02	834	N56:12.99	W153:33.42	4	220	1	On
076		264	11	Jul	02	901	N56:10.57	W153:41.14	4	220	2	On
076	74	273	11	Jul	02	1557	N55:41.53	W155:20.82	4	7	5	On
076		280	11	Jul	02	1730	N55:34.77	W155:51.19	3	221	1	On
076		286	11	Jul	02	1926	N55:34.01	W156:29.86	2	220	2	On
076		290	11	Jul	02	2020	N55:33.67	W156:48.47	2	85	3	On
076		291	11	Jul	02	2106	N55:33.36	W157:05.10	4	210	2	On
076		312	13	Jul	02	1222	N54:43.89	W165:11.64	3	4	2	On
076		313	13	Jul	02	1249	N54:47.32	W165:13.52	3	4	2	Off
076		314	13	Jul	02	1253	N54:47.66	W165:12.66	3	4	2	Off
076		315	13	Jul	02	1256	N54:48.02	W165:11.79	3	4	1	On
076	79	327	15	Jul	02	2005	N57:01.57	W163:52.78	3	220	5	On
076	74	329	15	Jul	02	2029	N57:03.31	W164:00.32	3	220	9	On
076	74	332	15	Jul	02	2100	N57:03.96	W164:10.42	2	218	18	Off
076		335	16	Jul	02	653	N57:10.36	W164:41.87	1	7	1	Off
076		347	16	Jul	02	1525	N56:59.27	W164:53.91	2	4	1	On
076		360	16	Jul	02	1753	N56:52.65	W164:19.03	1	4	1	On
076		368	16	Jul	02	1900	N56:52.10	W163:58.95	2	4	1	On
076		374	16	Jul	02	1934	N56:52.11	W163:48.00	1	7	1	On
076		376	16	Jul	02	2122	N56:39.99	W163:55.03	2	220	2	On
076		379	16	Jul	02	2211	N56:44.90	W163:59.30	1	210	4	Off
076	74	383	16	Jul	02	2235	N56:48.21	W163:59.75	1	210	5	On
076		384	16	Jul	02	2236	N56:48.40	W163:59.79	1	4	2	On
076	74	390	17	Jul	02	921	N56:44.02	W165:07.98	3	218	26	On
076		392	17	Jul	02	1155	N57:01.32	W164:54.42	3	219	2	On
076		394	17	Jul	02	1525	N57:30.00	W164:35.43	2	218	2	On
076		395	17	Jul	02	1538	N57:29.99	W164:30.85	3	7	1	On
076		396	17	Jul	02	1857	N57:30.03	W163:21.31	3	218	1	On
076	74	405	18	Jul	02	1819	N56:54.32	W164:02.01	2	218	3	On
076		410	19	Jul	02	1241	N57:06.53	W165:47.74	2	4	1	Off
076		413	19	Jul	02	2035	N56:58.43	W164:12.20	3	4	1	On
076		415	20	Jul	02	803	N56:52.38	W164:26.46	4	7	1	On
076		416	24	Jul	02	1108	N54:17.02	W165:43.80	5	7	41	On
076		417	24	Jul	02	1246	N54:27.76	W165:41.17	4	4	3	On
076		422	24	Jul	02	1308	N54:32.44	W165:39.69	4	219	1	On
076		424	24	Jul	02	1312	N54:33.31	W165:39.35	4	210	1	On
076		425	24	Jul	02	1316	N54:33.93	W165:39.11	4	219	1	On
076		427	24	Jul	02	1437	N54:50.32	W165:31.97	4	7	2	On
076	79	428	24	Jul	02	2107	N56:08.80	W164:54.81	3	220	2	On
076		432	27	Jul	02	1553	N56:31.74	W165:02.28	5	7	1	On
076		433	27	Jul	02	1840	N56:38.45	W164:51.81	5	210	2	On
076		442	29	Jul	02	1613	N55:23.70	W163:33.92	2	4	1	On
076		445	29	Jul	02	1704	N55:16.59	W163:43.01	2	210	1	On
076		446	29	Jul	02	1804	N55:09.80	W164:01.36	3	210	1	On
076		449	29	Jul	02	2144	N54:44.02	W165:03.49	5	218	2	On
076		450	30	Jul	02	923	N53:58.37	W166:26.80	2	85	2	Off
076		451	30	Jul	02	934	N53:59.60	W166:25.97	2	85	30	Off
076		452	30	Jul	02	1100	N54:07.92	W166:29.91	4	220	17	On
076		457	30	Jul	02	1210	N54:15.61	W166:10.02	5	4	3	On
076		460	30	Jul	02	1240	N54:17.50	W166:05.89	5	4	22	Off
076		461	30	Jul	02	1429	N54:21.32	W165:52.23	5	210	15	On
076		463	30	Jul	02	1513	N54:23.27	W165:38.57	4	85	35	On
076		464	30	Jul	02	1531	N54:22.37	W165:32.74	4	220	2	On
076		472	30	Jul	02	1636	N54:20.49	W165:10.57	4	4	1	On
076		475	30	Jul	02	1952	N54:14.69	W164:16.05	2	4	1	On
076		478	30	Jul	02	2135	N54:11.62	W163:40.75	2	220	4	On
076		479	31	Jul	02	739	N54:53.67	W160:40.65	2	85	5	On
076		480	31	Jul	02	806	N54:56.99	W160:33.06	2	220	1	On
076		481	31	Jul	02	815	N54:58.11	W160:30.60	2	4	2	On
076		482	31	Jul	02	818	N54:58.51	W160:29.88	2	4	1	On
076		483	31	Jul	02	833	N55:00.63	W160:26.47	2	85	2	On
076		488	31	Jul	02	1100	N55:25.34	W160:00.70	2	218	3	On
076		492	31	Jul	02	1155	N55:30.02	W159:44.73	1	220	1	On
076		506	31	Jul	02	1745	N55:30.01	W157:42.86	2	218	2	On

076		520	1	Aug	02	718	N56:12.29	W153:15.49	2	7	6	On
076		522	1	Aug	02	745	N56:15.13	W153:07.72	2	220	3	On
076		524	1	Aug	02	755	N56:16.28	W153:04.56	2	220	1	On
076		527	1	Aug	02	1059	N56:22.85	W152:48.67	2	85	1	On
076		529	1	Aug	02	1109	N56:23.66	W152:45.58	2	4	1	On
076		533	1	Aug	02	1159	N56:28.86	W152:30.14	1	85	1	On
076		535	1	Aug	02	1204	N56:29.37	W152:28.45	1	210	1	On
076		536	1	Aug	02	1213	N56:30.27	W152:25.58	1	218	1	On
076		538	1	Aug	02	1227	N56:31.81	W152:21.39	1	210	1	On
076		540	1	Aug	02	1245	N56:33.99	W152:15.80	1	221	1	On
076	74	552	11	Aug	02	741	N58:46.47	W151:30.88	2	222	2	On
076		553	11	Aug	02	746	N58:46.48	W151:32.53	2	188	1	On
076	74	557	11	Aug	02	909	N58:46.46	W152:02.36	3	7	7	On
076		559	11	Aug	02	935	N58:46.49	W152:10.87	3	213	2	On
076		589	12	Aug	02	1416	N55:21.55	W160:07.02	4	222	2	On
076		590	12	Aug	02	1456	N55:15.20	W160:09.02	4	7	8	Off
076		591	12	Aug	02	1533	N55:10.85	W160:15.36	4	207	5	On
076		592	12	Aug	02	1605	N55:06.06	W160:18.97	4	207	2	On
076		593	12	Aug	02	1614	N55:04.64	W160:20.79	4	4	1	On
076		595	12	Aug	02	1629	N55:02.39	W160:23.69	4	4	8	On
076		596	12	Aug	02	1703	N54:57.84	W160:28.98	4	7	6	On
076		597	12	Aug	02	1730	N54:57.86	W160:36.67	5	4	2	On
076		598	12	Aug	02	1738	N54:56.56	W160:38.31	5	222	2	On
076		600	12	Aug	02	2016	N54:36.15	W161:18.96	4	188	1	On
076		602	13	Aug	02	1159	N54:21.50	W165:09.12	4	7	24	On
076		605	13	Aug	02	1518	N54:24.79	W166:05.23	2	207	5	On
076		607	13	Aug	02	1557	N54:23.37	W166:12.58	2	213	2	On
076		610	13	Aug	02	1616	N54:22.61	W166:17.87	3	120	4	On
076		623	13	Aug	02	2005	N54:17.70	W167:24.95	4	4	3	On
076		630	13	Aug	02	2057	N54:16.68	W167:38.75	4	222	2	On
076		646	15	Aug	02	919	N55:58.01	W170:09.28	2	188	2	On
076		729	25	Aug	02	2040	N57:04.60	W164:27.87	3	222	1	On
076		733	26	Aug	02	1608	N56:59.43	W164:18.42	5	29	1	On
076		734	26	Aug	02	1632	N56:55.77	W164:15.26	5	29	2	On
076		737	27	Aug	02	949	N57:24.90	W164:16.93	3	7	1	On
076		742	27	Aug	02	1804	N57:25.73	W164:01.18	5	4	1	On
076		753	29	Aug	02	1038	N54:01.59	W164:30.22	2	188	4	On
076		764	29	Aug	02	1936	N53:54.11	W163:28.65	5	222	2	On
076		765	29	Aug	02	2050	N53:57.76	W163:19.26	5	4	1	On
076		767	29	Aug	02	2109	N53:59.28	W163:14.36	2	207	1	On
076		768	30	Aug	02	830	N54:00.01	W163:05.17	4	29	10	On
076		771	30	Aug	02	1415	N54:00.63	W162:30.25	2	4	2	On
076		772	30	Aug	02	1420	N54:00.59	W162:28.67	2	4	1	On
076		774	30	Aug	02	1528	N54:00.28	W162:09.51	4	29	1	On
076		775	30	Aug	02	1549	N54:00.23	W162:04.49	4	99	2	On
076		778	30	Aug	02	1644	N53:59.96	W161:49.93	5	213	1	On
076		780	30	Aug	02	1705	N53:58.20	W161:45.35	5	188	1	On
076		781	30	Aug	02	1718	N53:58.42	W161:42.11	5	188	2	On
076		784	31	Aug	02	838	N54:52.26	W159:39.92	2	7	4	On
076		785	31	Aug	02	853	N54:52.52	W159:35.75	2	207	2	On
076	79	786	31	Aug	02	943	N54:49.48	W159:28.98	3	207	2	On
076		789	31	Aug	02	1426	N54:41.92	W158:15.24	4	222	2	On
076	74	790	31	Aug	02	1433	N54:41.92	W158:13.11	4	29	4	On
076		799	1	Sep	02	1330	N57:00.20	W153:00.96	5	188	6	Off
076		800	1	Sep	02	1341	N57:01.57	W152:57.45	2	188	25	On
unid. dolphin												
077		39	3	Jul	02	1959	N49:15.10	W127:34.94	3	209	5	On
077		65	4	Jul	02	904	N50:21.94	W130:32.94	2	218	5	On
077		67	4	Jul	02	913	N50:22.90	W130:35.58	2	217	1	On
077		70	4	Jul	02	946	N50:26.19	W130:44.81	2	217	2	On
077		288	11	Jul	02	2005	N55:33.79	W156:43.22	2	4	1	On
077		372	16	Jul	02	1915	N56:52.06	W163:54.22	2	219	2	On
077		411	19	Jul	02	1259	N57:07.57	W165:45.46	2	4	2	Off
077		493	31	Jul	02	1211	N55:29.94	W159:38.77	2	219	2	On
077		523	1	Aug	02	755	N56:16.21	W153:04.75	2	4	1	On
077		532	1	Aug	02	1153	N56:28.16	W152:32.27	1	85	4	On
077	44	631	13	Aug	02	2109	N54:16.45	W167:41.93	4	29	3	On
unid. small whale												
078		136	6	Jul	02	1555	N55:46.00	W143:43.81	2	218	1	On
078		215	10	Jul	02	910	N57:38.56	W150:52.09	2	210	1	On

078		543	1	Aug	02	1716	N57:01.11	W151:00.61	3	218	5	On
078		555	11	Aug	02	836	N58:46.51	W151:50.74	2	7	1	On
078		656	15	Aug	02	1303	N56:01.53	W171:02.49	3	29	1	On
unid. large whale												
079		7	3	Jul	02	1102	N48:34.95	W125:28.33	2	4	1	On
079		9	3	Jul	02	1114	N48:35.57	W125:31.64	2	126	2	On
079		12	3	Jul	02	1133	N48:36.55	W125:36.73	2	218	1	On
079		13	3	Jul	02	1148	N48:37.51	W125:40.44	2	209	1	On
079		16	3	Jul	02	1201	N48:37.70	W125:44.02	2	218	1	On
079		21	3	Jul	02	1445	N48:47.78	W126:22.85	3	4	1	On
079		24	3	Jul	02	1518	N48:50.87	W126:29.89	2	126	1	On
079		26	3	Jul	02	1530	N48:51.68	W126:32.67	2	209	1	On
079		27	3	Jul	02	1543	N48:52.63	W126:35.61	2	218	1	On
079		29	3	Jul	02	1612	N48:55.23	W126:42.21	2	4	1	On
079		40	3	Jul	02	2010	N49:16.00	W127:37.47	3	217	1	On
079		88	4	Jul	02	1452	N50:57.81	W132:01.07	3	126	1	On
079		96	4	Jul	02	1924	N51:34.44	W132:47.32	4	209	1	On
079		142	6	Jul	02	1747	N55:47.27	W144:15.10	2	4	2	Off
079		178	7	Jul	02	1708	N57:19.67	W150:21.52	2	15	1	On
079		210	10	Jul	02	733	N57:49.67	W150:25.44	3	4	2	On
079		212	10	Jul	02	739	N57:49.03	W150:27.02	3	4	2	On
079		224	10	Jul	02	1322	N57:10.16	W151:59.27	3	218	3	On
079		260	11	Jul	02	816	N56:14.70	W153:28.02	4	218	2	On
079		263	11	Jul	02	858	N56:10.82	W153:40.38	4	220	2	On
079		282	11	Jul	02	1742	N55:34.68	W155:55.15	3	210	1	On
079		287	11	Jul	02	1934	N55:33.98	W156:32.63	2	85	2	On
079		289	11	Jul	02	2007	N55:33.74	W156:43.80	2	4	1	On
079		293	11	Jul	02	2131	N55:33.17	W157:13.76	4	210	1	On
079		321	14	Jul	02	954	N56:29.95	W163:27.86	6	218	1	Off
079	74	323	15	Jul	02	1519	N56:53.90	W164:12.32	3	85	54	On
079	76	327	15	Jul	02	2005	N57:01.57	W163:52.78	3	220	5	On
079	74	331	15	Jul	02	2050	N57:03.94	W164:07.19	2	218	2	Off
079		378	16	Jul	02	2207	N56:44.91	W163:59.26	1	210	1	Off
079	76	428	24	Jul	02	2107	N56:08.80	W164:54.81	3	220	2	On
079		434	27	Jul	02	1849	N56:37.28	W164:51.79	5	218	1	On
079		453	30	Jul	02	1139	N54:11.96	W166:18.79	5	7	9	On
079		465	30	Jul	02	1534	N54:22.31	W165:31.75	4	220	1	On
079		466	30	Jul	02	1537	N54:22.32	W165:30.81	4	220	1	On
079		476	30	Jul	02	2003	N54:14.41	W164:12.61	2	4	2	On
079		486	31	Jul	02	1042	N55:22.71	W160:05.08	2	218	1	On
079		500	31	Jul	02	1542	N55:30.05	W158:27.06	3	219	1	On
079		503	31	Jul	02	1650	N55:29.34	W158:02.98	3	219	1	On
079		504	31	Jul	02	1655	N55:29.43	W158:01.22	3	221	3	On
079		515	31	Jul	02	2027	N55:30.05	W156:43.41	3	219	1	On
079		516	31	Jul	02	2043	N55:29.96	W156:37.80	2	210	1	On
079		547	2	Aug	02	716	N59:17.76	W149:31.07	3	220	1	On
079		551	11	Aug	02	709	N58:49.62	W151:20.16	2	29	1	On
079		554	11	Aug	02	807	N58:46.45	W151:40.19	2	222	1	On
079		558	11	Aug	02	911	N58:46.43	W152:02.94	3	207	1	On
079		585	12	Aug	02	1325	N55:29.28	W159:54.18	4	188	1	On
079		586	12	Aug	02	1329	N55:28.72	W159:55.16	4	207	2	On
079		599	12	Aug	02	1740	N54:56.28	W160:38.65	5	188	1	On
079		601	13	Aug	02	1143	N54:21.06	W165:03.18	4	29	2	On
079		612	13	Aug	02	1714	N54:21.31	W166:34.50	3	222	1	On
079		654	15	Aug	02	1240	N56:01.16	W170:56.67	3	207	1	On
079	74	721	22	Aug	02	1353	N57:17.95	W169:08.72	6	4	6	On
079		736	26	Aug	02	2141	N57:25.01	W164:52.69	4	207	1	On
079		739	27	Aug	02	1330	N57:19.62	W164:05.43	4	29	1	On
079		740	27	Aug	02	1344	N57:19.31	W164:00.39	4	7	1	On
079		748	28	Aug	02	1455	N56:32.43	W163:54.04	5	222	1	Off
079		755	29	Aug	02	1102	N53:57.82	W164:29.49	3	4	1	On
079		758	29	Aug	02	1743	N53:45.10	W163:47.81	3	4	1	On
079		759	29	Aug	02	1747	N53:45.57	W163:46.70	3	4	1	On
079		760	29	Aug	02	1751	N53:45.95	W163:45.75	3	188	1	On
079		766	29	Aug	02	2057	N53:58.33	W163:17.48	5	213	1	On
079		770	30	Aug	02	1358	N53:59.82	W162:33.92	2	29	1	On
079		773	30	Aug	02	1437	N54:00.54	W162:23.90	3	188	1	On
079		776	30	Aug	02	1619	N54:00.08	W161:56.41	5	7	1	On
079		779	30	Aug	02	1646	N53:59.95	W161:49.33	5	4	2	On
079	76	786	31	Aug	02	943	N54:49.48	W159:28.98	3	207	2	On
079		791	31	Aug	02	1557	N54:46.07	W158:01.47	4	207	1	On

079	74	793	31	Aug	02	1706	N54:43.54	W157:41.63	4	29	46	On
079		794	31	Aug	02	1831	N54:41.98	W157:19.37	4	222	1	On
079		795	31	Aug	02	1844	N54:42.98	W157:16.81	4	213	2	On
079		798	31	Aug	02	2049	N54:41.97	W156:48.89	5	29	1	On
unid. cetacean												
096		544	1	Aug	02	1729	N57:02.52	W150:56.71	3	220	1	On
unid. whale												
098		36	3	Jul	02	1942	N49:13.63	W127:30.87	3	218	1	On
098		157	7	Jul	02	931	N56:56.89	W148:15.68	2	218	1	On
098		207	8	Jul	02	1103	N57:41.84	W152:06.69	1	209	1	On
098		211	10	Jul	02	735	N57:49.48	W150:25.91	3	85	1	On
098		275	11	Jul	02	1616	N55:39.41	W155:26.64	4	85	1	On
098		421	24	Jul	02	1256	N54:29.92	W165:40.56	4	4	1	On
098		496	31	Jul	02	1349	N55:30.01	W159:04.16	4	99	1	On
098		643	14	Aug	02	1732	N55:39.52	W168:30.08	4	188	1	On
unid. porpoise												
477		19	3	Jul	02	1223	N48:37.90	W125:49.82	2	4	2	On
Callorhinus ursinus												
CU		54	4	Jul	02	754	N50:14.69	W130:13.73	1	218	2	On
CU		68	4	Jul	02	915	N50:23.06	W130:36.03	2	218	1	On
CU		76	4	Jul	02	1105	N50:34.35	W131:06.77	3	126	1	On
CU		79	4	Jul	02	1125	N50:36.49	W131:12.50	3	209	1	On
CU		89	4	Jul	02	1546	N51:06.80	W132:04.47	3	218	1	On
CU		94	4	Jul	02	1911	N51:32.72	W132:44.62	4	4	1	On
CU		109	6	Jul	02	922	N55:08.01	W142:00.69	2	4	1	On
CU		112	6	Jul	02	1008	N55:12.29	W142:12.58	1	218	1	On
CU		114	6	Jul	02	1025	N55:14.10	W142:17.14	2	209	1	On
CU		119	6	Jul	02	1123	N55:19.69	W142:32.44	1	7	1	On
CU		125	6	Jul	02	1340	N55:32.90	W143:08.10	2	4	1	On
CU		127	6	Jul	02	1403	N55:35.07	W143:14.01	1	218	1	On
CU		128	6	Jul	02	1404	N55:35.26	W143:14.48	1	218	1	On
CU		129	6	Jul	02	1416	N55:36.34	W143:17.39	1	218	1	On
CU		130	6	Jul	02	1437	N55:38.39	W143:23.07	1	209	1	On
CU		131	6	Jul	02	1512	N55:41.76	W143:32.19	1	4	1	On
CU		135	6	Jul	02	1532	N55:43.66	W143:37.43	2	218	1	On
CU		148	6	Jul	02	2224	N56:03.93	W144:38.01	1	209	1	On
CU		151	6	Jul	02	2235	N56:05.55	W144:40.94	1	209	1	On
CU		152	6	Jul	02	2237	N56:05.95	W144:41.67	1	209	1	On
CU		154	7	Jul	02	718	N56:47.57	W147:35.77	2	218	1	On
CU		167	7	Jul	02	1313	N57:10.47	W149:22.26	2	4	1	On
CU		193	8	Jul	02	645	N57:24.02	W151:34.73	2	7	1	On
CU		202	8	Jul	02	914	N57:27.42	W151:36.84	2	15	1	On
CU		319	13	Jul	02	1907	N55:34.08	W163:56.10	2	85	1	Off
CU		330	15	Jul	02	2040	N57:03.91	W164:03.78	2	7	1	Off
CU		337	16	Jul	02	913	N57:09.52	W164:58.74	2	4	1	Off
CU		341	16	Jul	02	1504	N57:02.90	W164:52.75	2	4	1	On
CU		343	16	Jul	02	1510	N57:01.88	W164:53.05	2	210	2	On
CU		345	16	Jul	02	1522	N56:59.84	W164:53.71	2	210	1	On
CU		346	16	Jul	02	1522	N56:59.78	W164:53.73	2	4	1	On
CU		349	16	Jul	02	1526	N56:59.03	W164:53.97	2	210	1	On
CU		350	16	Jul	02	1527	N56:58.85	W164:54.01	2	4	2	On
CU		351	16	Jul	02	1528	N56:58.84	W164:54.01	2	4	1	On
CU		352	16	Jul	02	1531	N56:58.29	W164:54.15	2	210	1	On
CU		353	16	Jul	02	1551	N56:54.77	W164:55.27	1	218	1	On
CU		355	16	Jul	02	1603	N56:52.82	W164:55.16	1	210	1	On
CU		356	16	Jul	02	1609	N56:52.78	W164:53.32	1	4	12	On
CU		358	16	Jul	02	1724	N56:52.65	W164:28.68	1	85	1	On
CU	40	375	16	Jul	02	2033	N56:44.33	W163:45.20	1	7	13	On
CU		901	17	Jul	02	1101	N56:51.44	W164:54.35	3	4	1	On
CU		902	17	Jul	02	1931	N57:30.01	W163:09.94	3	7	1	On
CU		903	17	Jul	02	2013	N57:30.01	W162:55.69	3	85	1	On
CU		904	19	Jul	02	1302	N57:07.38	W165:45.08	2	4	2	Off
CU		905	19	Jul	02	2012	N56:58.42	W164:19.50	3	4	2	On
CU		906	24	Jul	02	1504	N54:54.23	W165:30.02	4	85	1	On
CU		907	24	Jul	02	1652	N55:16.74	W165:19.59	5	85	1	On
CU		909	24	Jul	02	1958	N55:54.75	W165:01.53	4	219	1	On
CU		912	27	Jul	02	1352	N56:40.67	W165:08.22	5	85	1	On
CU		913	27	Jul	02	1746	N56:44.96	W164:56.08	5	4	1	On

CU	914	27	Jul	02	1808	N56:43.79	W164:51.76	5	4	2	On
CU	915	28	Jul	02	2036	N57:07.83	W165:32.35	4	85	1	On
CU	916	28	Jul	02	2050	N57:06.86	W165:28.40	4	85	1	On
CU	917	28	Jul	02	2137	N57:03.50	W165:14.60	4	218	1	On
CU	918	28	Jul	02	2151	N57:02.55	W165:10.53	4	218	2	On
CU	919	28	Jul	02	2153	N57:02.38	W165:09.86	4	210	2	On
CU	921	29	Jul	02	1128	N56:12.10	W164:10.88	3	7	1	On
CU	922	29	Jul	02	1143	N56:09.11	W164:08.62	3	218	1	On
CU	923	29	Jul	02	1332	N55:49.41	W163:53.56	2	210	1	On
CU	924	29	Jul	02	1538	N55:30.28	W163:38.85	2	7	2	On
CU	925	29	Jul	02	1551	N55:27.72	W163:36.93	2	85	2	On
CU	926	30	Jul	02	1640	N54:20.17	W165:09.25	3	210	1	On
CU	927	30	Jul	02	1935	N54:15.21	W164:22.00	2	219	1	On
CU	928	31	Jul	02	721	N54:51.43	W160:45.62	2	220	1	On
CU	929	31	Jul	02	947	N55:14.05	W160:15.69	2	218	2	Off
CU	930	1	Aug	02	741	N56:14.71	W153:08.91	2	220	1	On
CU	938	12	Aug	02	2036	N54:33.57	W161:24.42	3	4	1	On
CU	940	13	Aug	02	948	N54:17.18	W164:20.30	2	29	1	On
CU	941	13	Aug	02	949	N54:17.20	W164:20.44	2	188	1	On
CU	943	13	Aug	02	1607	N54:22.85	W166:15.37	3	188	2	On
CU	944	13	Aug	02	1636	N54:22.19	W166:23.55	3	4	1	On
CU	945	13	Aug	02	1709	N54:21.46	W166:33.24	3	29	1	On
CU	946	13	Aug	02	1733	N54:20.96	W166:40.08	3	222	1	On
CU	947	13	Aug	02	1739	N54:20.81	W166:42.09	3	7	1	On
CU	949	13	Aug	02	1841	N54:19.48	W166:59.82	3	213	1	On
CU	950	13	Aug	02	1855	N54:19.32	W167:04.52	3	7	1	On
CU	951	14	Aug	02	1037	N54:33.89	W168:20.96	2	188	1	On
CU	952	14	Aug	02	1058	N54:37.35	W168:21.11	2	188	1	On
CU	953	14	Aug	02	1132	N54:42.92	W168:21.51	2	222	1	On
CU	954	14	Aug	02	1138	N54:43.98	W168:21.45	2	222	1	On
CU	955	14	Aug	02	1154	N54:46.47	W168:21.51	2	4	1	On
CU	956	14	Aug	02	1155	N54:46.74	W168:21.54	2	4	2	On
CU	957	14	Aug	02	1158	N54:47.14	W168:21.59	2	4	1	On
CU	958	14	Aug	02	1205	N54:48.35	W168:21.65	1	4	1	On
CU	959	14	Aug	02	1215	N54:50.05	W168:21.67	1	207	2	On
CU	960	14	Aug	02	1317	N54:59.70	W168:22.20	1	188	1	On
CU	961	14	Aug	02	1354	N55:05.48	W168:22.51	2	4	2	On
CU	962	14	Aug	02	1407	N55:07.41	W168:22.42	2	222	1	On
CU	963	14	Aug	02	1952	N55:52.83	W169:02.20	4	4	1	On
CU	964	14	Aug	02	1957	N55:52.80	W169:03.67	4	4	2	On
CU	965	14	Aug	02	2026	N55:52.63	W169:13.41	3	188	1	On
CU	966	14	Aug	02	2121	N55:52.25	W169:31.93	3	29	2	On
CU	967	14	Aug	02	2128	N55:52.24	W169:34.12	3	188	1	On
CU	968	15	Aug	02	948	N55:55.15	W170:13.61	2	4	1	On
CU	969	15	Aug	02	955	N55:55.45	W170:15.55	3	29	1	On
CU	971	15	Aug	02	1310	N56:01.15	W171:04.40	3	4	1	On
CU	972	15	Aug	02	1314	N56:00.94	W171:05.48	3	29	1	On
CU	973	15	Aug	02	1325	N56:00.37	W171:08.19	3	4	2	On
CU	974	15	Aug	02	1344	N56:00.86	W171:12.03	3	188	1	On
CU	975	15	Aug	02	1417	N56:05.37	W171:15.10	3	7	1	On
CU	976	15	Aug	02	1423	N56:06.47	W171:15.64	3	7	1	On
CU	977	15	Aug	02	1430	N56:07.51	W171:16.15	3	7	1	On
CU	978	15	Aug	02	1653	N56:26.60	W171:34.18	4	4	1	On
CU	979	15	Aug	02	1734	N56:28.49	W171:42.09	4	7	1	On
CU	980	15	Aug	02	1848	N56:25.03	W172:02.86	4	7	1	On
CU	981	15	Aug	02	2141	N56:17.86	W172:50.58	4	213	1	On
CU	982	16	Aug	02	1025	N56:38.97	W173:05.24	3	222	1	On
CU	984	16	Aug	02	1257	N56:55.50	W173:32.62	3	4	1	On
CU	985	16	Aug	02	1309	N56:56.36	W173:35.60	3	188	1	On
CU	986	16	Aug	02	1504	N57:05.05	W174:05.59	1	4	1	On
CU	987	16	Aug	02	1614	N57:11.68	W174:12.56	2	29	2	On
CU	988	16	Aug	02	1619	N57:12.42	W174:12.05	2	4	1	On
CU	989	16	Aug	02	1619	N57:12.46	W174:12.03	2	29	1	On
CU	990	16	Aug	02	1629	N57:14.09	W174:11.36	2	4	2	On
CU	991	16	Aug	02	1633	N57:14.72	W174:11.21	2	4	1	On
CU	992	16	Aug	02	1836	N57:35.17	W174:06.51	2	4	1	On
CU	993	16	Aug	02	1837	N57:35.34	W174:06.46	2	4	1	On
CU	994	16	Aug	02	2049	N57:53.32	W174:23.04	2	29	1	On
CU	995	16	Aug	02	2133	N57:58.32	W174:33.85	2	4	1	On
CU	997	17	Aug	02	2136	N58:05.45	W173:41.93	2	4	2	On
CU	998	22	Aug	02	1908	N57:10.85	W167:30.85	5	29	1	On
CU	999	22	Aug	02	2122	N57:07.58	W166:46.66	5	188	1	On

CU	1000	23	Aug	02	1708	N56:53.80	W164:37.39	5	207	1	On
CU	1001	23	Aug	02	1752	N56:50.67	W164:24.69	5	4	1	On
CU	1002	23	Aug	02	2143	N56:32.98	W163:15.42	4	29	1	On
CU	1003	24	Aug	02	1030	N56:49.85	W162:59.22	3	29	1	On
CU	1004	24	Aug	02	1209	N56:50.91	W162:30.57	2	188	1	On
CU	1005	24	Aug	02	1222	N56:52.95	W162:30.62	2	188	1	On
CU	1006	24	Aug	02	1229	N56:54.14	W162:30.60	2	7	1	On
CU	1007	24	Aug	02	1452	N57:01.81	W162:56.23	1	7	1	On
CU	1008	24	Aug	02	1516	N57:01.80	W163:03.33	1	222	1	On
CU	1009	24	Aug	02	1527	N57:01.80	W163:06.72	1	7	2	On
CU	1010	24	Aug	02	1528	N57:01.81	W163:07.08	1	222	1	On
CU	1011	24	Aug	02	1534	N57:01.81	W163:08.86	1	7	1	On
CU	1012	24	Aug	02	1544	N57:01.78	W163:12.03	1	207	1	On
CU	1013	24	Aug	02	1545	N57:01.78	W163:12.19	1	7	1	On
CU	1014	24	Aug	02	1614	N57:01.80	W163:21.28	2	4	1	On
CU	1015	24	Aug	02	1616	N57:01.80	W163:21.66	2	4	1	On
CU	1016	24	Aug	02	1632	N57:01.79	W163:26.81	2	188	1	On
CU	1017	24	Aug	02	1637	N57:01.79	W163:28.21	2	207	1	On
CU	1018	24	Aug	02	1702	N57:01.80	W163:35.89	2	4	1	On
CU	1019	24	Aug	02	1708	N57:01.81	W163:37.73	2	29	1	On
CU	1020	24	Aug	02	1716	N57:02.38	W163:38.85	2	4	1	On
CU	1021	24	Aug	02	1723	N57:02.76	W163:39.10	2	4	1	On
CU	1022	24	Aug	02	1727	N57:02.71	W163:40.03	2	4	2	On
CU	1023	24	Aug	02	1737	N57:02.58	W163:42.62	2	29	1	On
CU	1024	24	Aug	02	1737	N57:02.58	W163:42.75	2	222	2	On
CU	1025	24	Aug	02	1740	N57:02.54	W163:43.57	2	29	2	On
CU	1026	24	Aug	02	1742	N57:02.51	W163:44.27	2	188	2	On
CU	1027	24	Aug	02	1745	N57:02.48	W163:45.00	2	188	1	On
CU	1028	24	Aug	02	1757	N57:02.33	W163:48.58	2	188	1	On
CU	1029	24	Aug	02	1757	N57:02.32	W163:48.83	2	29	1	On
CU	1030	24	Aug	02	1801	N57:02.28	W163:49.79	2	7	1	On
CU	1031	24	Aug	02	1803	N57:02.25	W163:50.44	2	7	1	On
CU	1032	24	Aug	02	1815	N57:02.11	W163:54.04	2	222	1	On
CU	1033	24	Aug	02	1822	N57:02.00	W163:56.32	2	29	2	On
CU	1034	24	Aug	02	1828	N57:01.91	W163:58.02	2	7	3	On
CU	1035	24	Aug	02	1830	N57:01.88	W163:58.74	2	7	2	On
CU	1036	24	Aug	02	1847	N57:01.82	W164:04.43	2	222	1	On
CU	1037	24	Aug	02	1904	N57:01.80	W164:09.98	2	207	1	On
CU	1038	24	Aug	02	1932	N57:01.79	W164:19.00	2	4	1	On
CU	1039	24	Aug	02	1934	N57:01.79	W164:19.64	2	4	1	On
CU	1040	24	Aug	02	1935	N57:01.79	W164:20.16	2	4	1	On
CU	1041	25	Aug	02	1540	N57:08.07	W164:38.77	3	213	1	On
CU	1042	25	Aug	02	2116	N57:02.00	W164:25.50	4	29	1	On
CU	1043	26	Aug	02	1259	N57:20.00	W164:37.58	5	4	1	On
CU	1044	26	Aug	02	1840	N56:57.16	W164:43.21	5	4	1	On
CU	1045	27	Aug	02	925	N57:27.39	W164:20.33	3	222	1	On
CU	1046	27	Aug	02	1016	N57:24.37	W164:10.73	4	99	1	On
CU	1047	27	Aug	02	1711	N57:25.26	W164:17.07	5	213	1	On
CU	1048	27	Aug	02	1955	N57:10.39	W163:54.74	4	188	1	On
CU	1049	27	Aug	02	2021	N57:07.47	W163:57.42	4	222	1	On
CU	1050	27	Aug	02	2103	N57:04.61	W164:08.95	4	213	1	On
CU	1051	27	Aug	02	2143	N57:03.40	W164:21.58	4	4	1	On
CU	1052	28	Aug	02	934	N56:51.78	W164:12.14	4	222	1	On
CU	1053	28	Aug	02	1237	N56:41.17	W164:11.44	5	7	1	On
CU	1054	28	Aug	02	2027	N56:20.39	W164:03.61	4	222	1	On
CU	1055	28	Aug	02	2053	N56:15.61	W164:08.04	4	213	1	On
CU	1058	29	Aug	02	1742	N53:45.05	W163:47.94	3	188	1	On
CU	1061	18	Jul	02	1458	N56:57.88	W164:12.63	2	218	1	Off
CU	1062	18	Jul	02	1842	N56:54.33	W164:09.17	2	210	1	On
CU	1064	18	Jul	02	1956	N56:54.37	W164:32.83	2	85	1	On
CU	1065	18	Jul	02	2016	N56:54.38	W164:39.56	2	4	1	On
Eumetopias jubatus											
EJ	105	5	Jul	02	1630	N53:46.48	W137:15.95	4	218	1	On
EJ	936	11	Aug	02	1430	N58:17.69	W153:39.47	2	29	1	On
Mirounga angustirostris											
MA	81	4	Jul	02	1301	N50:46.08	W131:38.58	2	7	1	On
MA	118	6	Jul	02	1116	N55:19.09	W142:30.60	1	4	1	On
MA	537	1	Aug	02	1221	N56:31.14	W152:23.10	1	4	1	On
MA	539	1	Aug	02	1227	N56:31.87	W152:21.23	1	4	1	On
MA	931	1	Aug	02	1406	N56:43.22	W151:50.34	1	7	1	On

	MA	932	1	Aug	02	1453	N56:48.54	W151:35.71	1	4	1	On
	MA	933	1	Aug	02	1456	N56:48.89	W151:34.72	1	4	1	On
	MA	934	1	Aug	02	1537	N56:53.60	W151:21.45	1	4	1	On
	MA	935	1	Aug	02	1913	N57:10.05	W150:28.98	3	4	1	On
	MA	1056	29	Aug	02	1714	N53:42.37	W163:54.50	3	4	1	On
	MA	1059	30	Aug	02	2106	N54:06.21	W160:40.77	4	4	1	On
unid. pinniped												
	PU	22	3	Jul	02	1455	N48:48.57	W126:25.04	3	4	1	On
	PU	23	3	Jul	02	1505	N48:49.39	W126:27.25	3	126	1	On
	PU	102	4	Jul	02	2130	N51:50.65	W133:13.47	4	217	1	On
	PU	316	13	Jul	02	1437	N54:59.09	W164:48.93	3	7	1	On
	PU	318	13	Jul	02	1745	N55:23.49	W164:12.08	2	218	1	Off
	PU	908	24	Jul	02	1942	N55:51.65	W165:02.98	4	210	1	On
	PU	910	25	Jul	02	727	N57:07.32	W164:35.02	4	7	1	On
	PU	911	25	Jul	02	1059	N56:57.03	W165:18.02	4	7	1	On
	PU	920	29	Jul	02	757	N56:35.37	W164:28.97	3	7	1	On
	PU	937	12	Aug	02	741	N55:44.28	W158:01.51	5	222	1	On
	PU	939	12	Aug	02	2113	N54:28.87	W161:34.74	3	120	5	On
	PU	942	13	Aug	02	1546	N54:23.96	W166:09.70	2	4	1	On
	PU	948	13	Aug	02	1834	N54:19.74	W166:57.85	3	207	1	On
	PU	983	16	Aug	02	1256	N56:55.35	W173:32.12	3	4	2	On
	PU	996	16	Aug	02	2212	N58:02.79	W174:43.51	2	207	1	On
	PU	1057	29	Aug	02	1741	N53:44.92	W163:48.26	3	188	1	On
	PU	1060	18	Jul	02	0919	N57:02.41	W164:29.00	2	7	1	Off
	PU	1063	18	Jul	02	1952	N56:54.36	W164:31.55	2	7	1	On
unid. sea lion												
	UO	38	3	Jul	02	1945	N49:13.89	W127:31.63	3	218	1	On
	UO	82	4	Jul	02	1317	N50:47.69	W131:42.94	2	218	1	On
	UO	85	4	Jul	02	1350	N50:50.89	W131:51.75	2	126	1	On

Table 5:
Summary of Marine Mammal School Sightings

Species Code	Name	No. of Schools Sighted			Average School size
		Pure	Mixed	Total	
022	*Lagenorhynchus obliquidens*	4	0	4	27.0
037	*Orcinus orca*	22	0	22	11.8
040	*Phocoena phocoena*	18	1	19	2.3
044	*Phocoenoides dalli*	280	3	283	5.1
046	*Physeter macrocephalus*	15	0	15	1.3
049	ziphiid whale	2	0	2	2.0
051	*Mesoplodon* sp.	1	0	1	2.0
061	*Ziphius cavirostris*	1	0	1	1.5
063	*Berardius bairdii*	3	0	3	27.8
066	*Eubalaena japonica*	7	0	7	1.4
070	*Balaenoptera* sp.	16	1	17	1.8
071	*Balaenoptera acutorostrata*	8	0	8	1.1
073	*Balaenoptera borealis*	1	0	1	1.0
074	*Balaenoptera physalus*	87	17	104	2.8
076	*Megaptera novaeangliae*	152	13	165	3.8
077	unid. dolphin	10	1	11	2.4
078	unid. small whale	5	0	5	1.8
079	unid. large whale	64	7	71	2.0
096	unid. Cetacean	1	0	1	1.0
098	unid. Whale	8	0	8	1.0
477	unid. Porpoise	1	0	1	2.0
CU	*Callorhinus ursinus*	182	1	183	1.3

EJ	*Eumetopias jubatus*	2	0	2	1.0
MA	*Mirounga angustirostris*	11	0	11	1.0
PU	unid. Pinniped	18	0	18	1.3
UO	unid. sea lion	3	0	3	1.0

Schools of Mixed Species Composition

Species 1	Species 2	Total
070 UNID_RORQL	074 FIN_WHALE	1
074 FIN_WHALE	044 DALLS_PORP	2
074 FIN_WHALE	076 HUMPBACK_W	10
074 FIN_WHALE	079 UNID_LG_WH	4
077 UNID_DOLPH	044 DALLS_PORP	1
079 UNID_LG_WH	076 HUMPBACK_W	3
CU NO_FURSEAL	040 HARBR_PORP	1

Table 6. Summary of biopsy samples collected during the 2002 North Pacific right whale cruise.

Species name	Lab ID no.	Field ID no.	Sighting no.	Date	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.
Berardius bairdii	28394	MAC020707.01	171	7/7/02	57	15	149	48
Berardius bairdii	28395	MAC020707.02	171	7/7/02	57	15	149	48
Berardius bairdii	28396	MAC020707.03	171	7/7/02	57	15	149	48
Berardius bairdii	28397	MAC020707.04	171	7/7/02	57	15	149	48
Balaenoptera physalus	28409	MAC020710.06	249	7/10/02	56	50	153	13
Eubalaena japonica	28424	MAC020824.01	723	8/24/02	57	2	164	25
Eubalaena japonica	28425	MAC020825.01	724	8/25/02	57	15	164	30
Eubalaena japonica	28426	MAC020825.02	724	8/25/02	57	15	164	30
Eubalaena japonica	28427	MAC020825.03	724	8/25/02	57	15	164	30
Eubalaena japonica	28428	MAC020825.04	725	8/25/02	57	9	164	34
Eubalaena japonica	28430	MAC020827.01	738	8/27/02	57	24	164	6
Eubalaena japonica	28431	MAC020828.01	746	8/28/02	56	30	163	55
Eubalaena japonica	28432	MAC020828.02	749	8/28/02	56	35	163	52
Eubalaena japonica	28433	MAC020828.03	749	8/28/02	56	35	163	52
Megaptera novaeangliae	28401	MAC020708.04	195	7/8/02	57	26	151	23

Megaptera novaeangliae	28402	MAC020708.05	197	7/8/02	57	24	151	28
Megaptera novaeangliae	28405	MAC020710.01	246	7/10/02	56	45	152	57
Megaptera novaeangliae	28410	MAC020710.02	246	7/10/02	56	45	152	57
Megaptera novaeangliae	28406	MAC020710.03	248	7/10/02	56	49	153	5
Megaptera novaeangliae	28407	MAC020710.04	248	7/10/02	56	49	153	5
Megaptera novaeangliae	28408	MAC020710.05	248	7/10/02	56	49	153	5
Megaptera novaeangliae	28434	MAC020830.01	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28435	MAC020830.02	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28436	MAC020830.03	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28437	MAC020830.04	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28438	MAC020830.05	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28439	MAC020830.06	768	8/30/02	54	0	163	5
Megaptera novaeangliae	28440	MAC020901.01	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28441	MAC020901.02	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28442	MAC020901.03	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28443	MAC020901.04	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28444	MAC020901.05	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28445	MAC020901.06	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28446	MAC020901.07	800	9/1/02	57	2	152	57
Megaptera novaeangliae	28447	MAC020901.08	800	9/1/02	57	2	152	57
Orcinus orca	28400	MAC020708.01	196	7/8/02	57	27	151	33
Orcinus orca	28403	MAC020708.02	196	7/8/02	57	27	151	33
Orcinus orca	28404	MAC020708.03	196	7/8/02	57	27	151	33
Orcinus orca	28412	MAC020713.01	309	7/13/02	54	33	165	10
Orcinus orca	28413	MAC020713.02	320	7/13/02	55	39	163	54
Orcinus orca	28414	MAC020713.03	320	7/13/02	55	39	163	54
Orcinus orca	28415	MAC020718.01	399	7/18/02	56	56	164	26
Orcinus orca	28416	MAC020718.02	399	7/18/02	56	56	164	26
Orcinus orca	28417	MAC020730.01	474	7/30/02	54	17	164	44
Orcinus orca	28418	MAC020730.02	474	7/30/02	54	17	164	44

Orcinus orca	28419	MAC020801.01	526	8/1/02	56	20	152	54
Orcinus orca	28420	MAC020802.01	550	8/2/02	59	28	149	30
Orcinus orca	28421	MAC020802.02	550	8/2/02	59	28	149	30
Orcinus orca	28422	MAC020802.03	550	8/2/02	59	28	149	30
Orcinus orca	28423	MAC020802.04	550	8/2/02	59	28	149	30
Orcinus orca	28429	MAC020826.01	730	8/26/02	57	2	164	48
Physeter macrocephalus	28393	MAC020705.01	107	7/5/02	54	10	138	40
Physeter macrocephalus	28399	MAC020707.05	189	7/7/02	57	21	149	52
Physeter macrocephalus	28411	MAC020711.01	267	7/11/02	55	54	154	43

Table 7. Sightings in which photographs were taken for individual identification.

Sighting no.	Date	Species	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.
249	10-Jul-02	*Balaenoptera physalus*	56	50	153	13
723	24-Aug-02	*Eubalaena japonica*	57	2	164	25
724	25-Aug-02	*Eubalaena japonica*	57	15	164	30
725	25-Aug-02	*Eubalaena japonica*	57	9	164	34
738	27-Aug-02	*Eubalaena japonica*	57	24	164	6
746	28-Aug-02	*Eubalaena japonica*	56	30	163	55
749	28-Aug-02	*Eubalaena japonica*	56	35	163	52
246	10-Jul-02	*Megaptera novaeangliae*	56	45	152	57
248	10-Jul-02	*Megaptera novaeangliae*	56	49	153	5
416	24-Jul-02	*Megaptera novaeangliae*	54	17	165	44
451	30-Jul-02	*Megaptera novaeangliae*	54	00	166	26
764	29-Aug-02	*Megaptera novaeangliae*	53	54	163	29
768	30-Aug-02	*Megaptera novaeangliae*	54	00	163	5
800	01-Sep-02	*Megaptera novaeangliae*	57	2	152	57
458	30-Jul-02	*Orcinus orca*	54	17	166	9
756	29-Aug-02	*Orcinus orca*	53	55	164	29
762	29-Aug-02	*Orcinus orca*	53	49	163	38
309	13-Jul-02	*Orcinus orca*	54	34	165	9
320	13-Jul-02	*Orcinus orca*	55	39	163	54
399	18-Jul-02	*Orcinus orca*	56	56	164	26
474	30-Jul-02	*Orcinus orca*	54	17	164	44
526	01-Aug-02	*Orcinus orca*	56	20	152	54
550	02-Aug-02	*Orcinus orca*	59	28	149	30
730	26-Aug-02	*Orcinus orca*	57	2	164	48

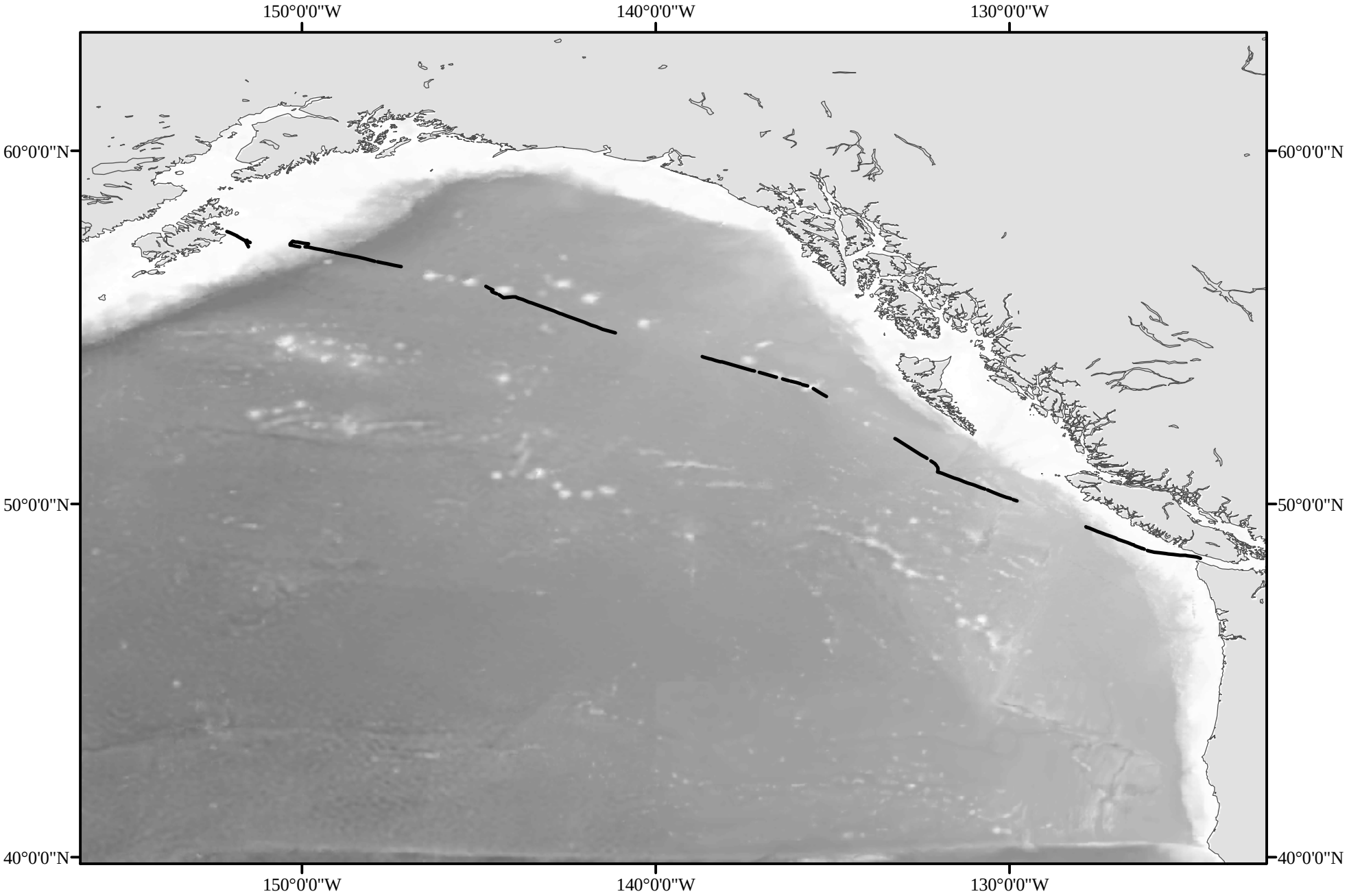


Figure 1. Survey effort from Leg 1: 2 July - 8 July.

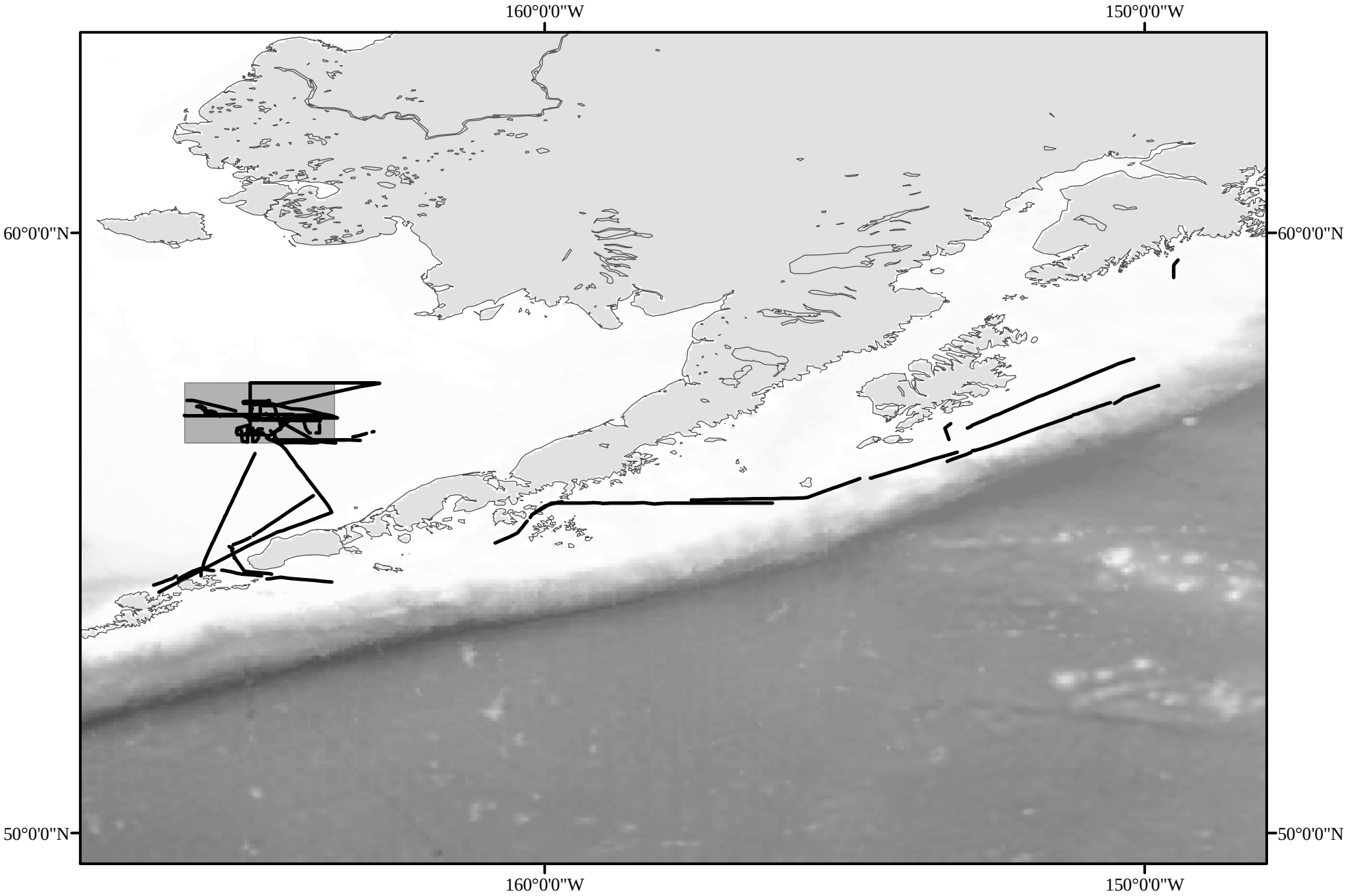


Figure 2. Survey effort from Leg 2: 9 July - 2 August. Shaded area denotes the "Box".

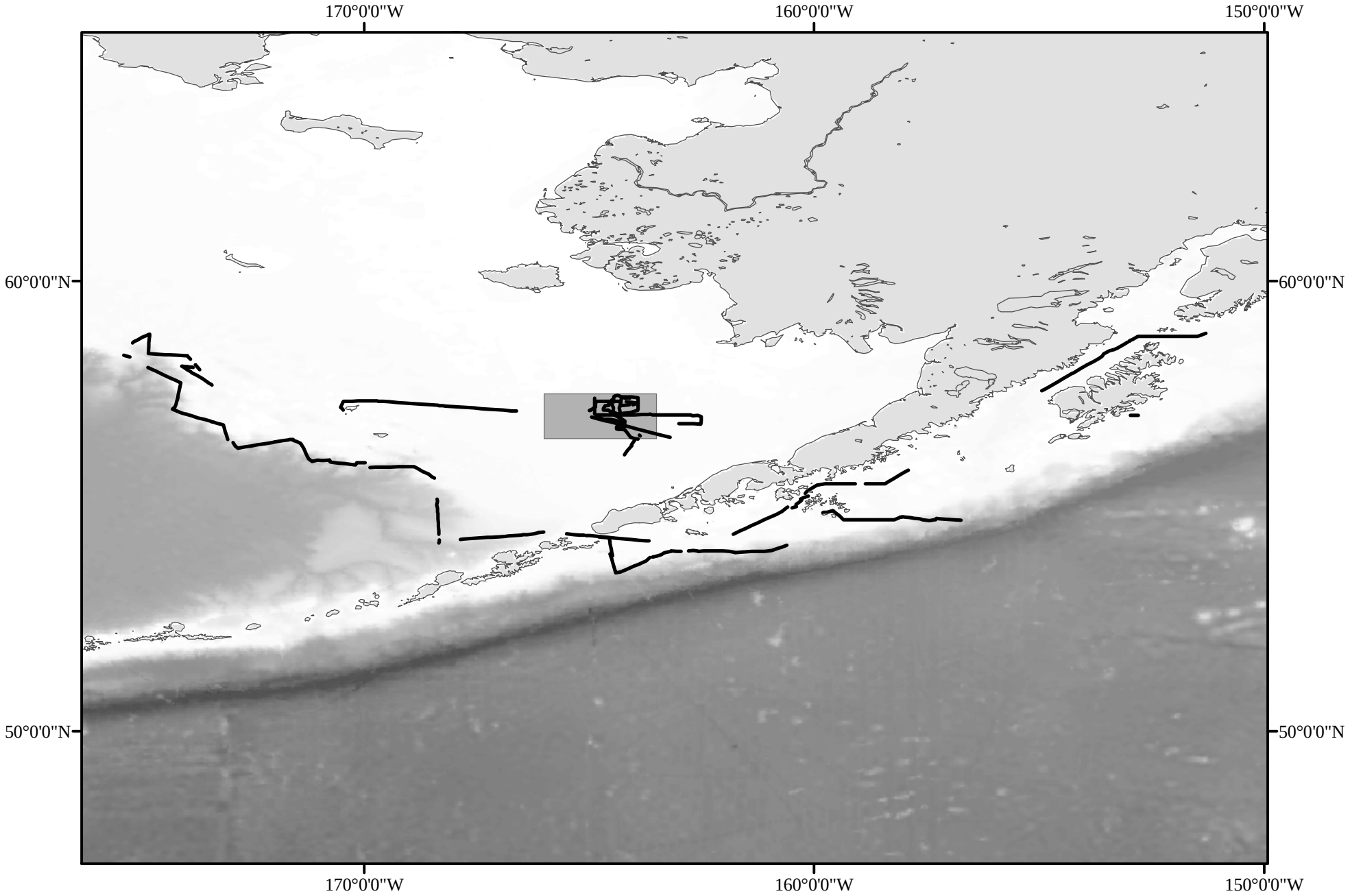


Figure 3. Survey effort from Leg 3: 10 August - 2 September. Shaded area denotes the "Box".

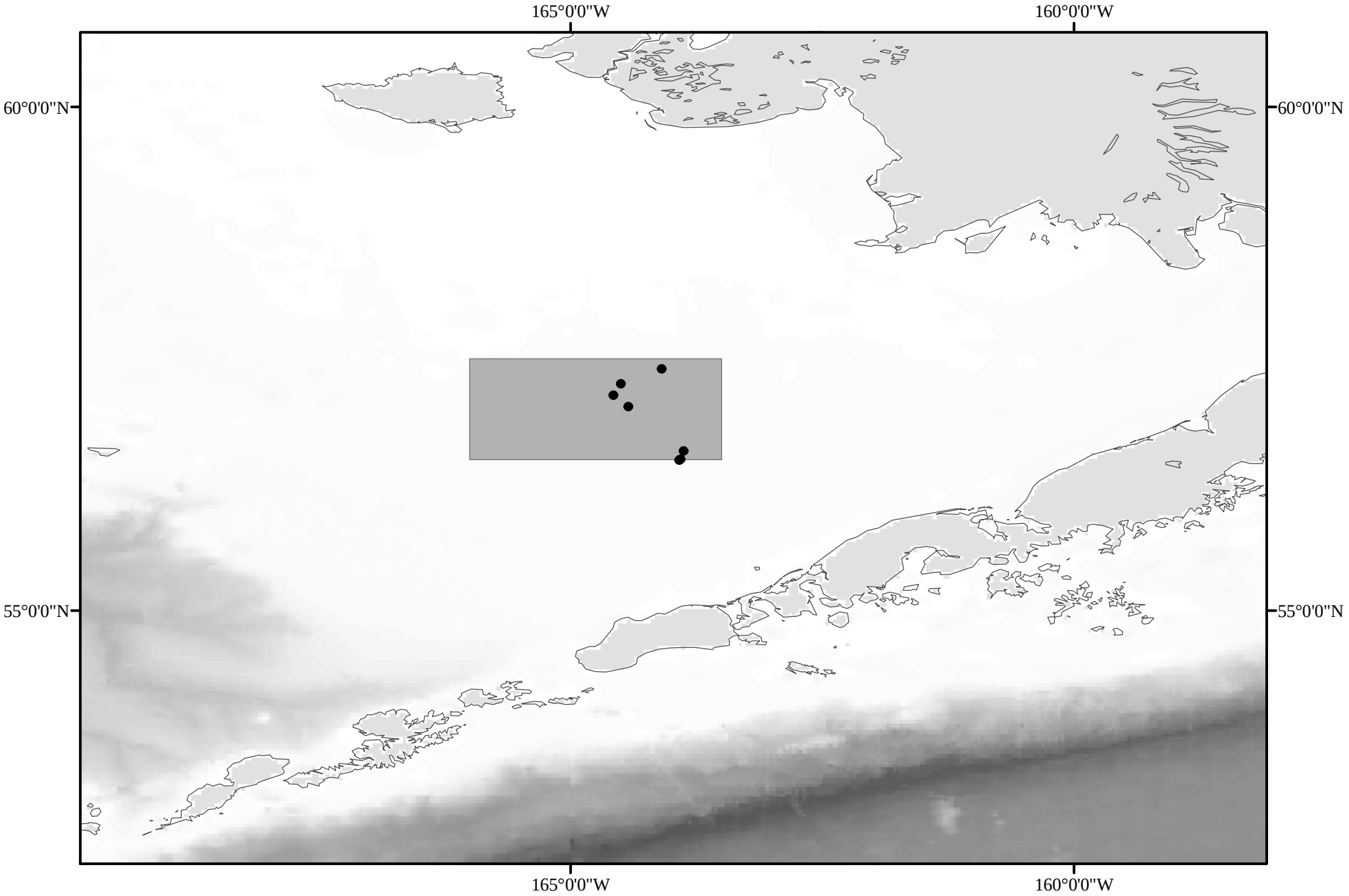


Figure 4. Sightings of North Pacific right whales. Shaded area denotes the "Box".

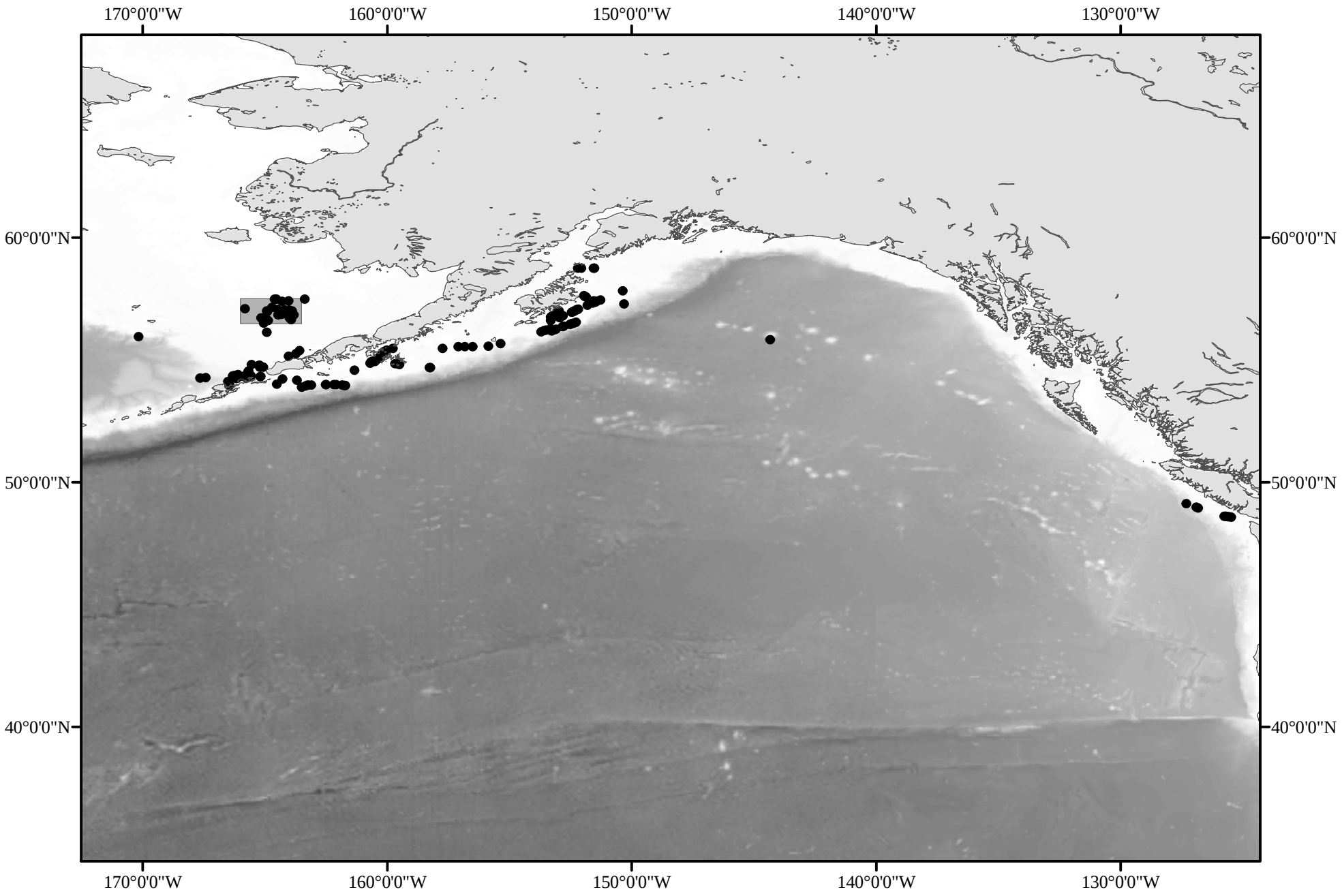


Figure 5. Sightings of humpback whales. Shaded area denotes the "Box".

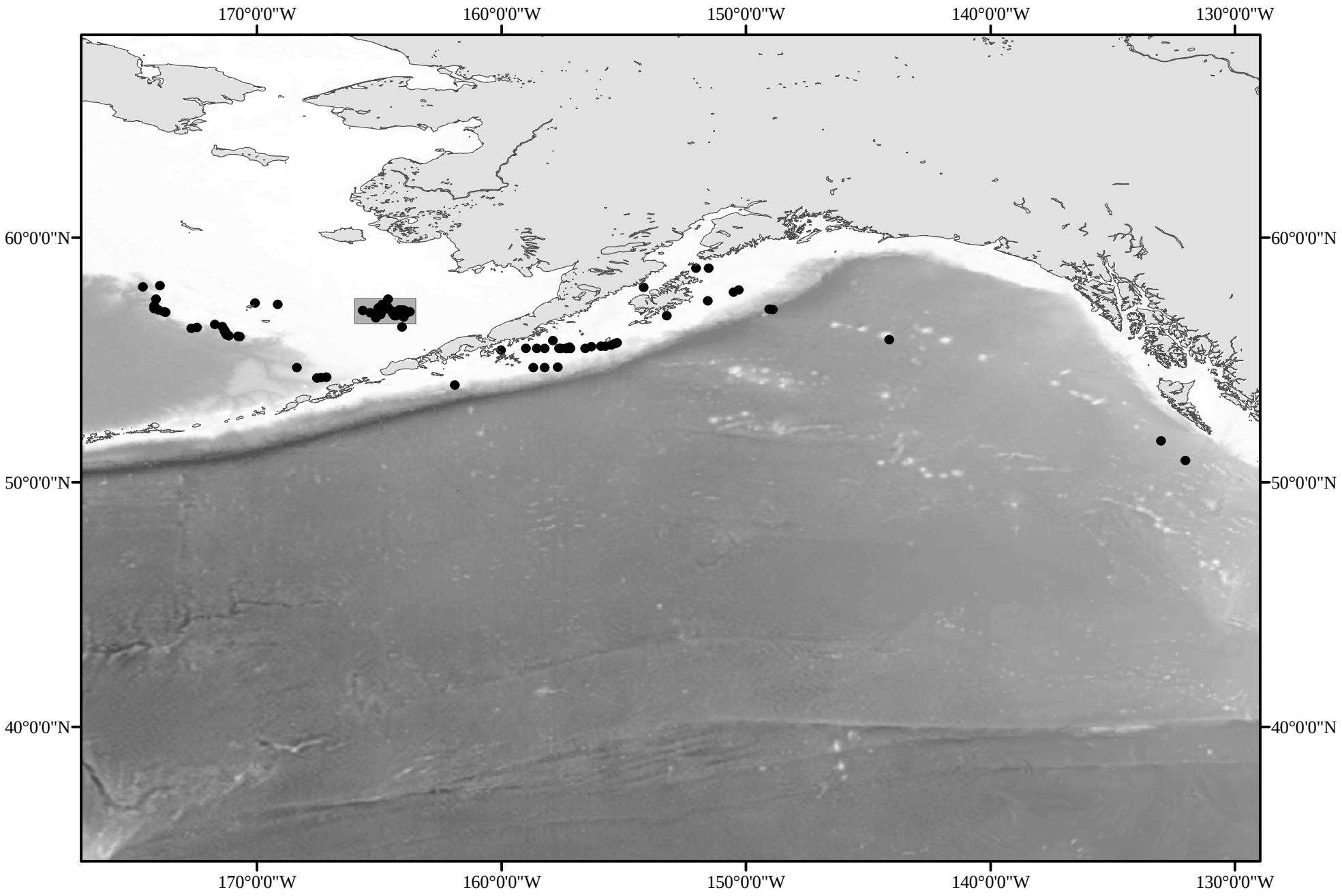


Figure 6. Sightings of fin whales. Shaded area denotes the "Box".

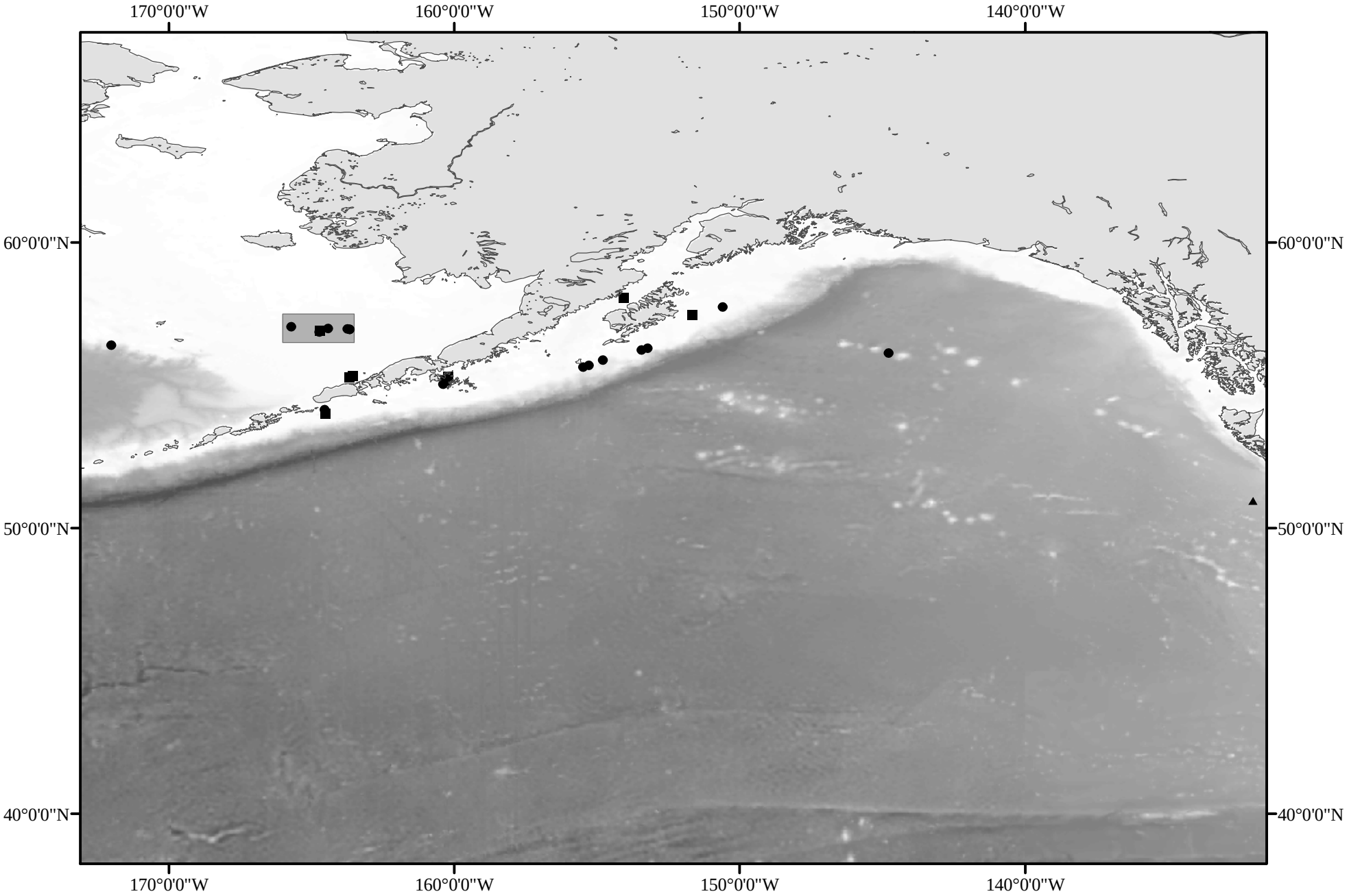


Figure 7. Sightings of unidentified rorquals (circles), minke whales (squares) and sei whale (triangle). Shaded area denotes the "Box".

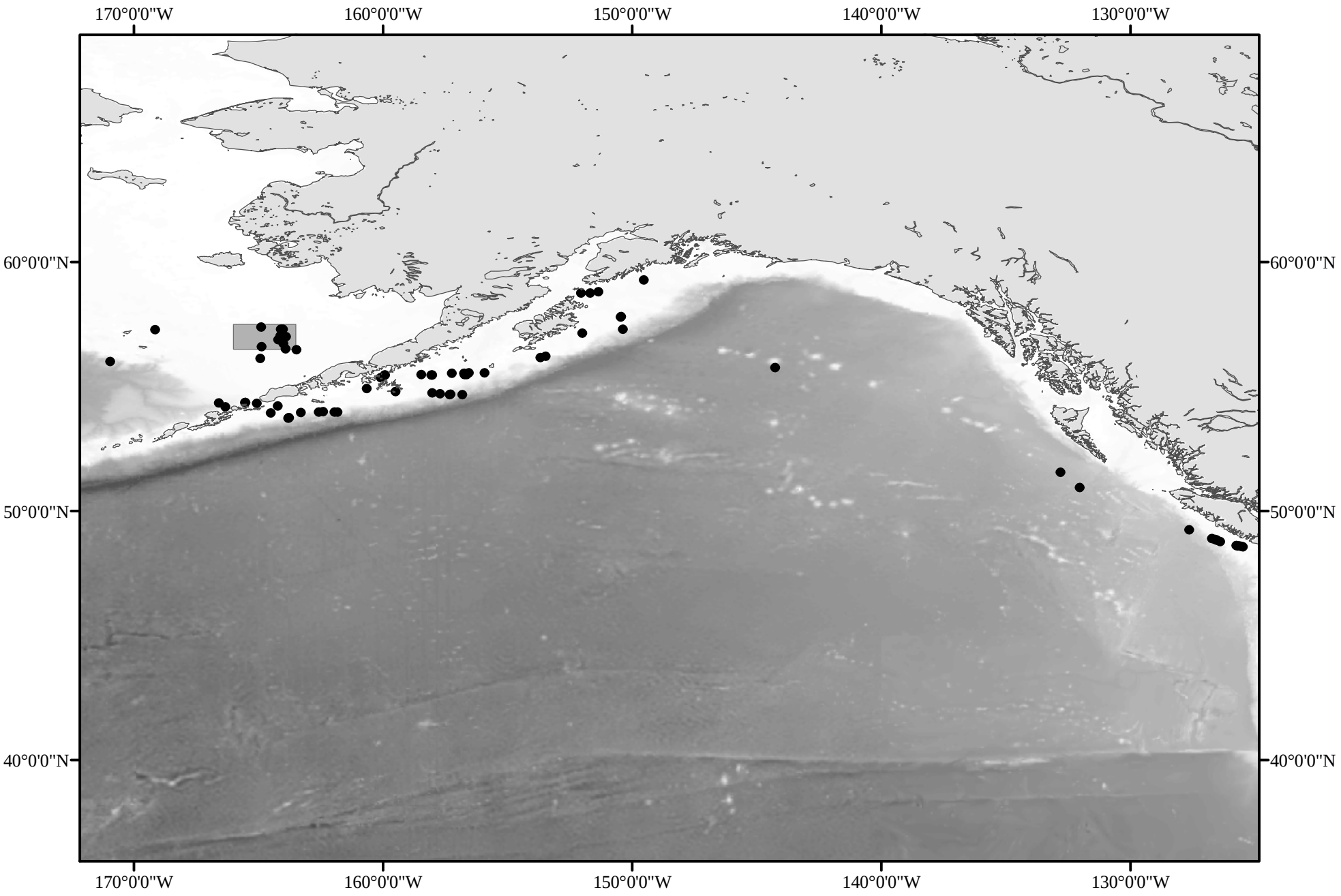


Figure 8. Sightings of unidentified large whales. Shaded area denotes the "Box".

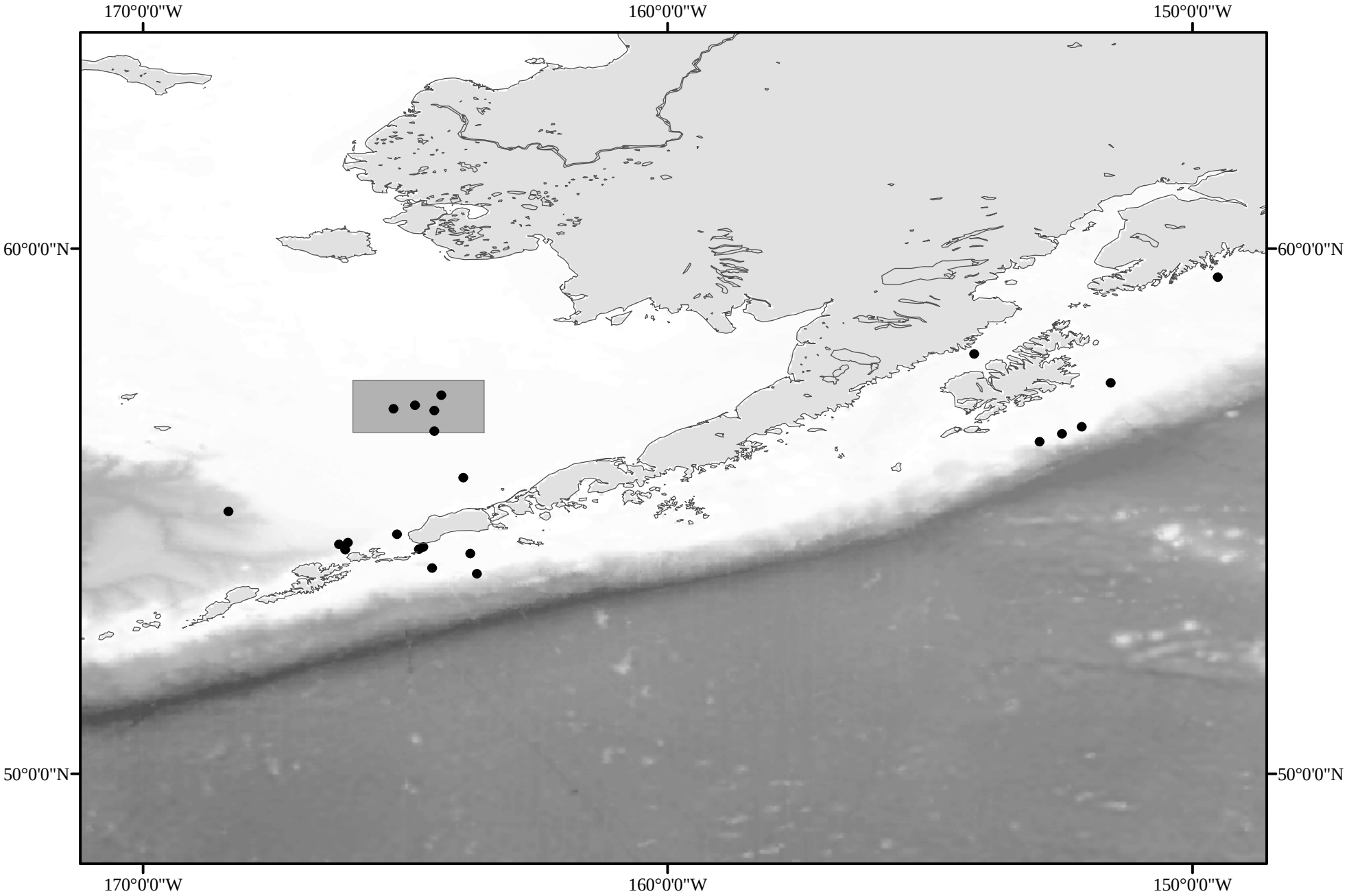


Figure 9. Sightings of killer whales. Shaded area denotes the "Box".

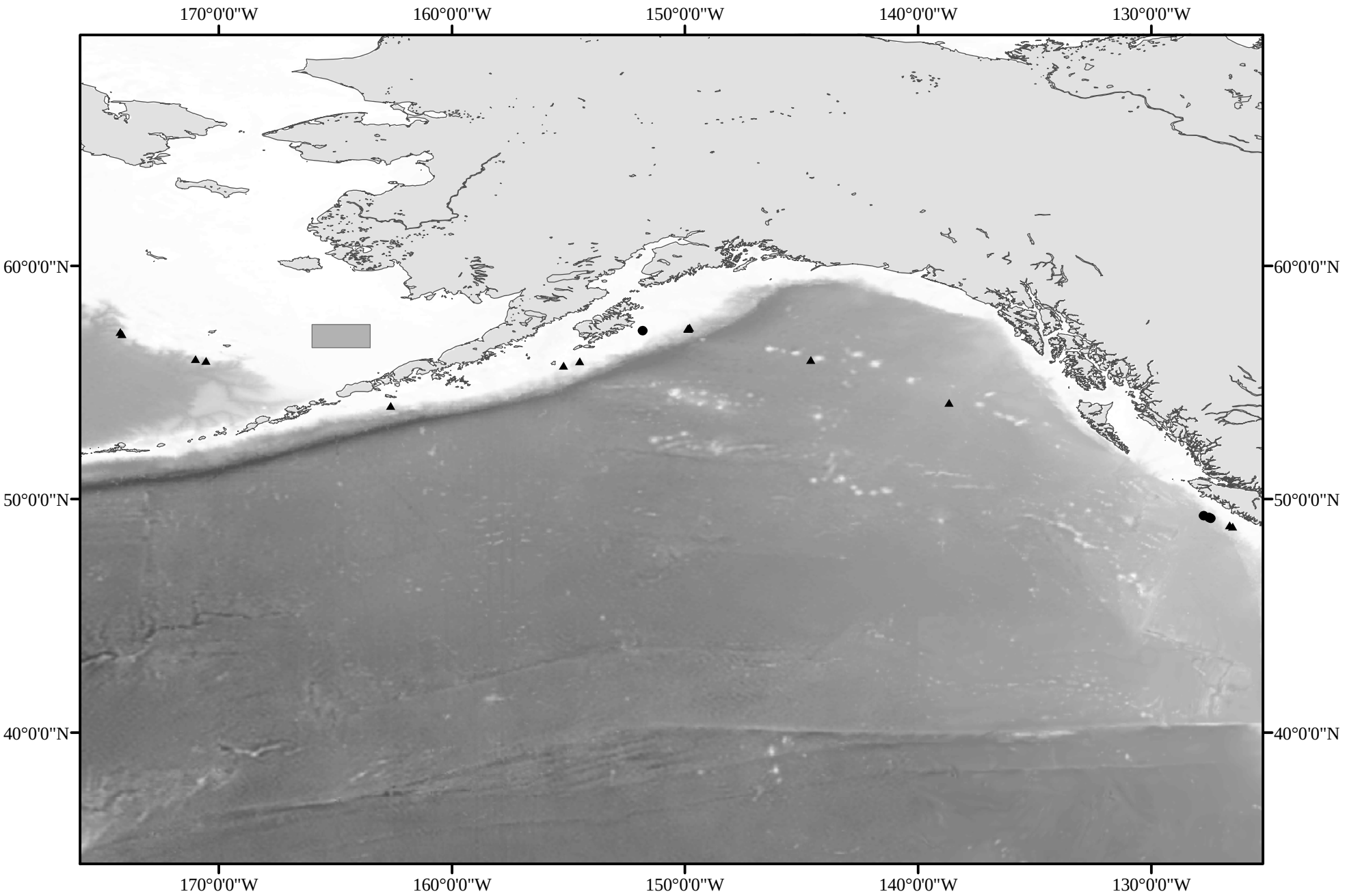


Figure 10. Sightings of sperm whales (triangles) and Pacific white-sided dolphins (circles). Shaded area denotes the "Box".

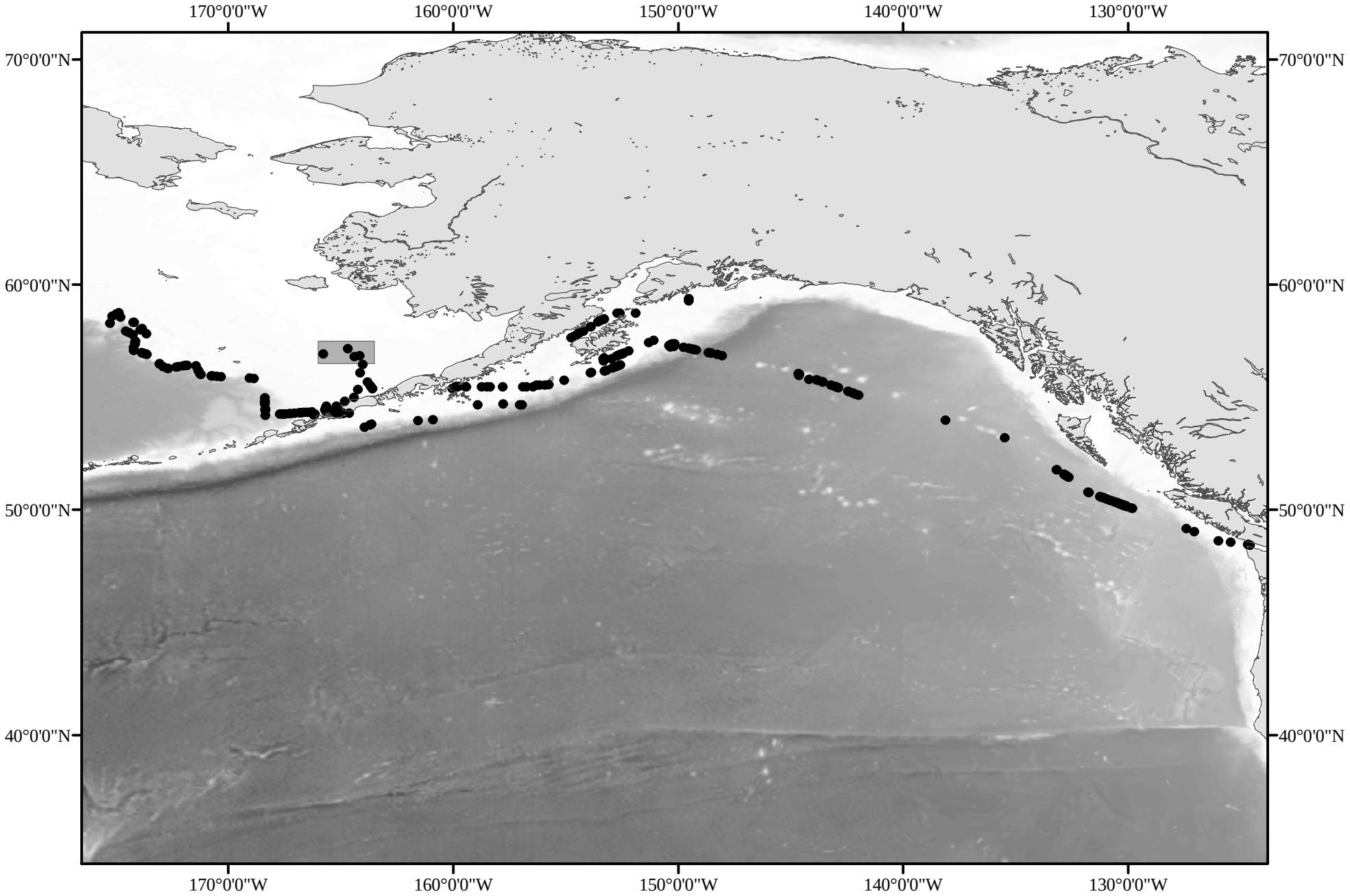


Figure 11. Sightings of Dall's porpoises. Shaded area denotes the "Box".

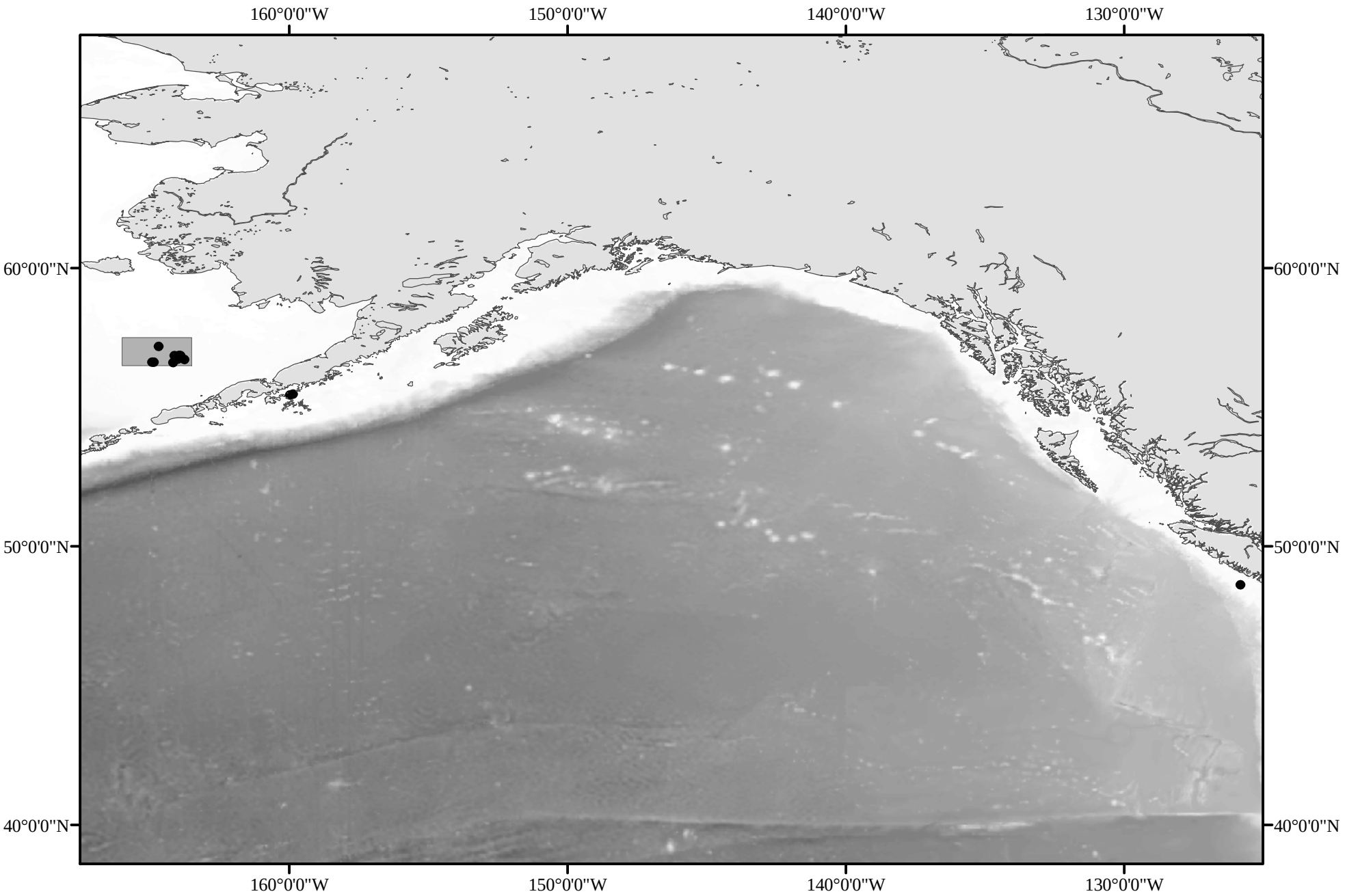


Figure 12. Sightings of harbor porpoises. Shaded area denotes the "Box".

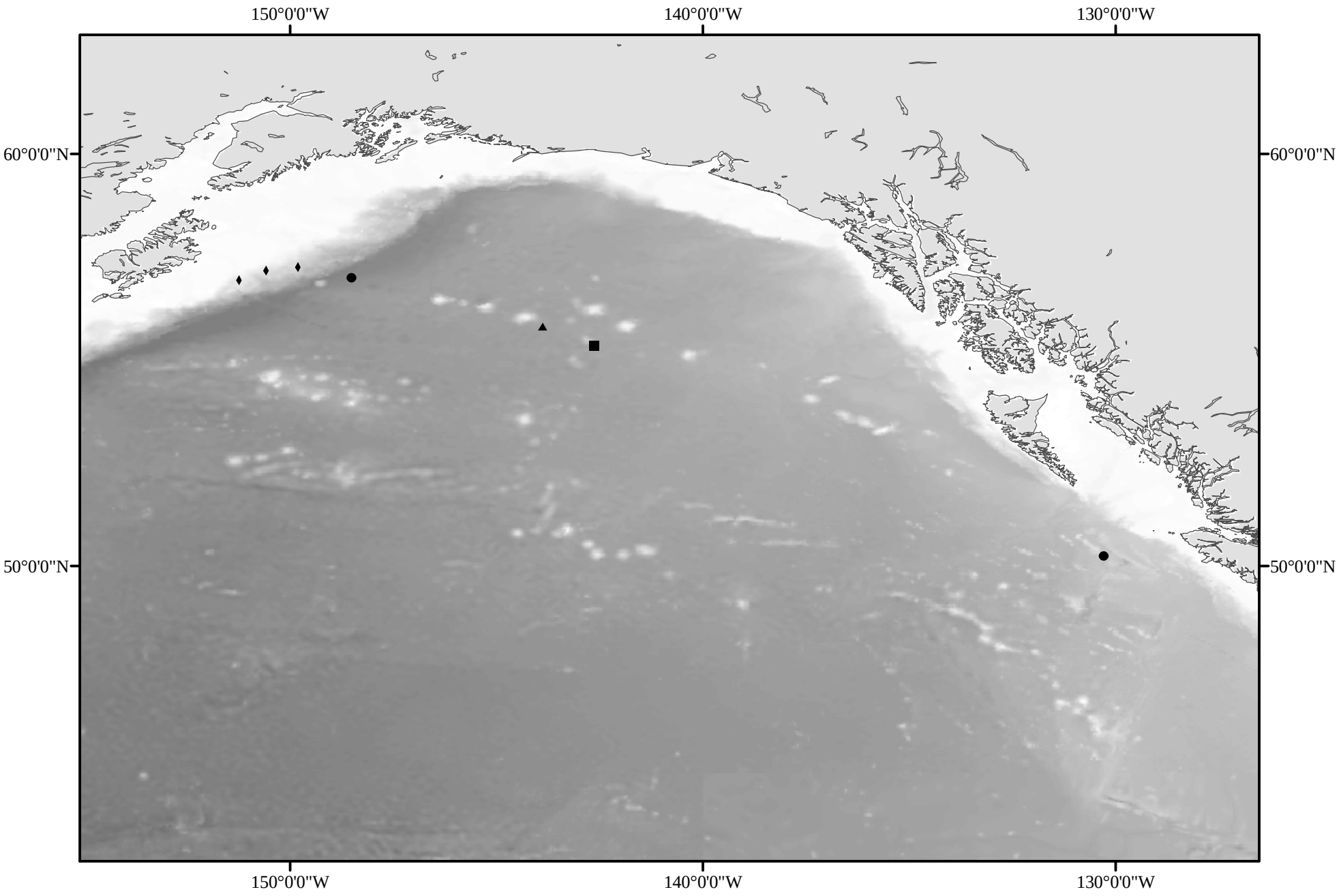


Figure 13. Sightings of dwarf sperm whales (circles), unidentified mesoplodont (square), Cuvier's beaked whale (triangle) and Baird's beaked whales (diamonds).

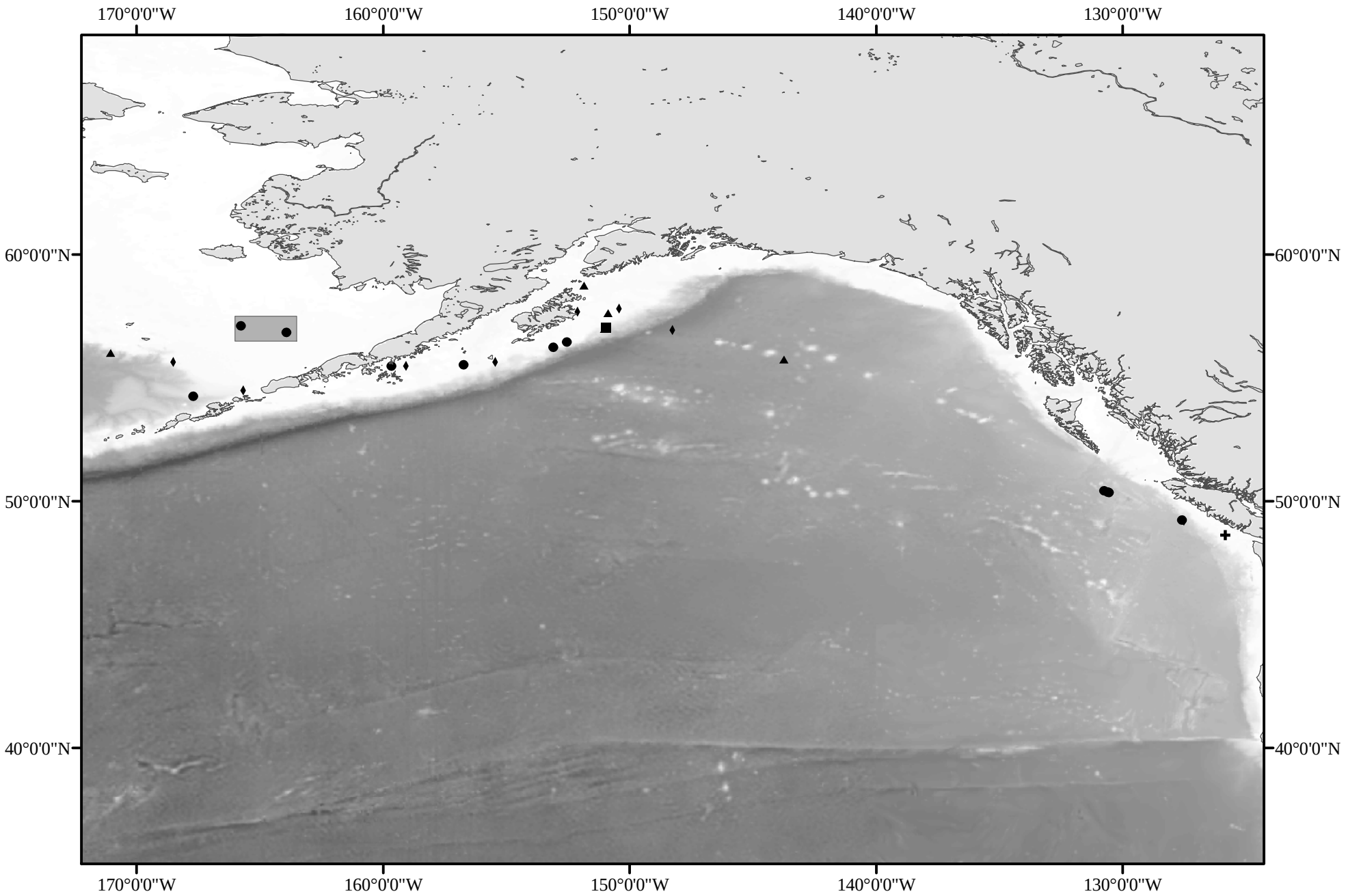


Figure 14. Sightings of unidentified dolphins (circles), unidentified small whales (triangles), unidentified cetacean (square), unidentified whales (diamonds) and unidentified porpoise (cross). Shaded area denotes the "Box".

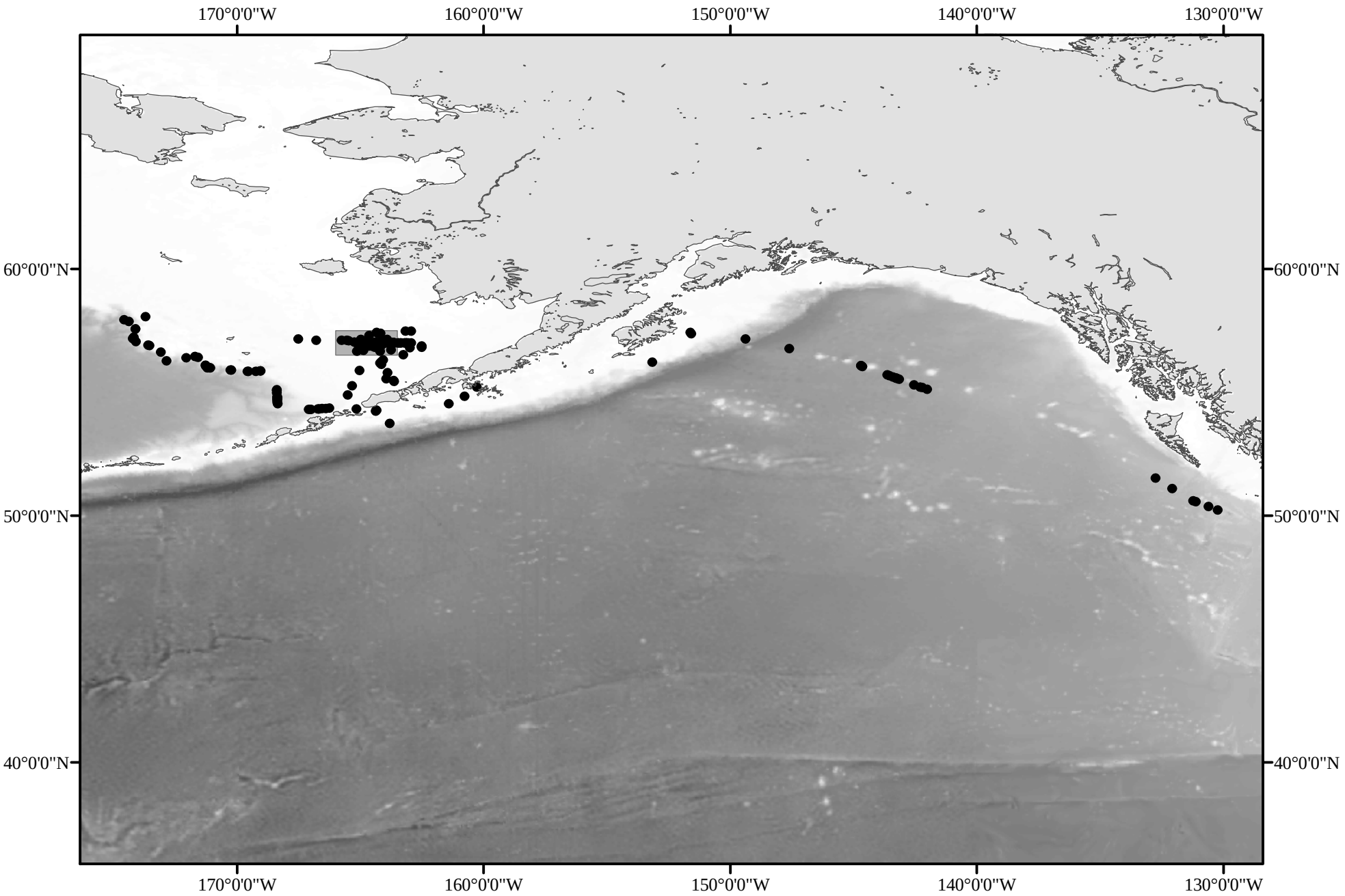


Figure 15. Sightings of northern fur seals. Shaded area denotes the "Box".

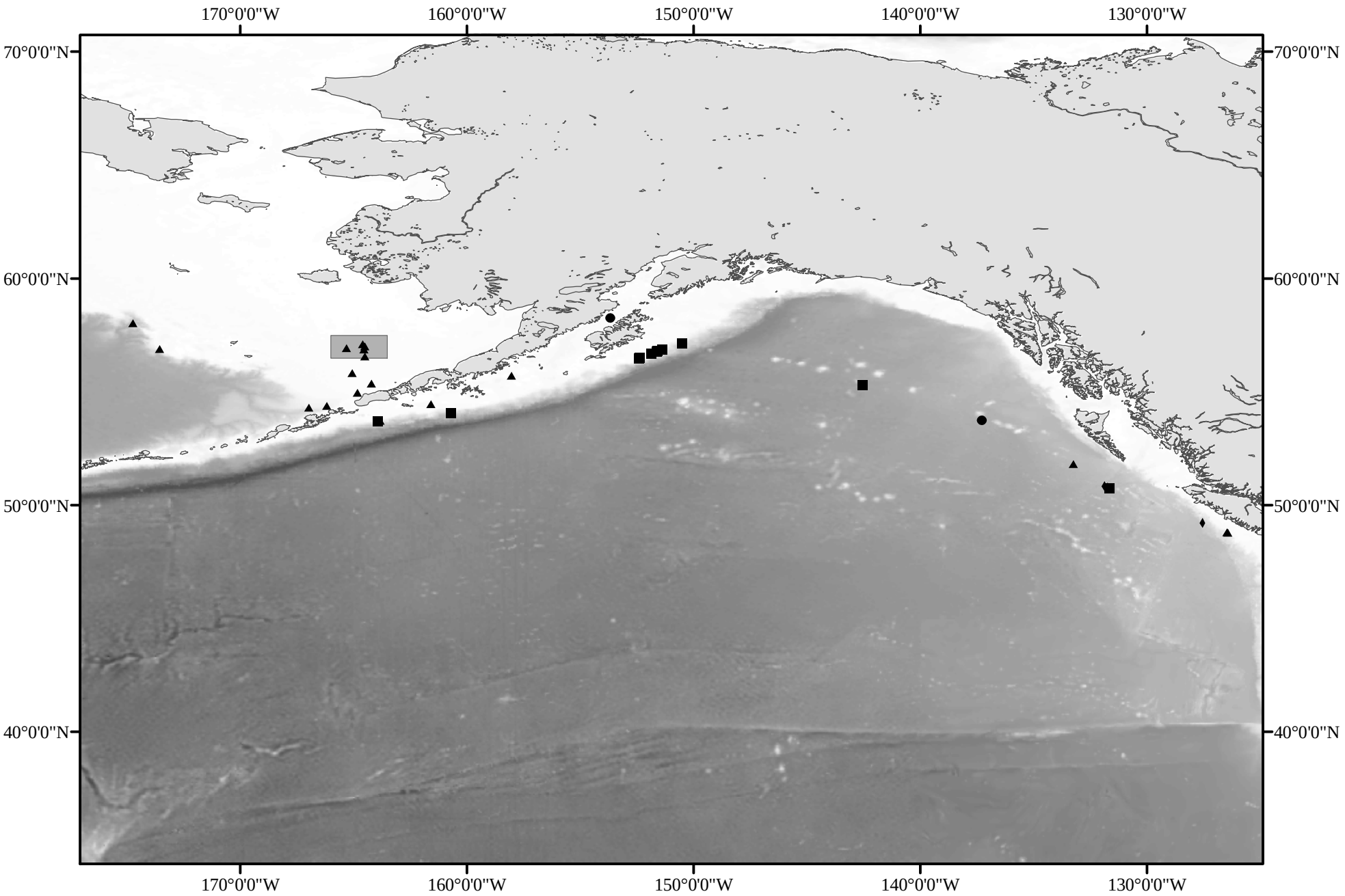


Figure 16. Sightings of Steller's sea lions (circles), northern elephant seals (squares), unidentified pinnipeds (triangles) and unidentified sea lions (diamonds). Shaded area denotes the "Box".

APPENDIX 1

Acoustics Cruise Report
North Pacific Right Whale Research Cruise
NOAA ship McArthur
Leg 2: Kodiak to Seward
July 9- Aug 2, 2002
Acousticians: Lisa Munger (SIO)
Kate Stafford (NOAA - Seattle)

Albatross Bank: listened 7/10 and 7/11. Unimak Pass: listened 7/13. Box: listened evening of 7/13– 7/20 morning, then 7/25 – 7/29 morning. Total of 12 mornings in box. Heard right whales on four occasions: 7/16, 7/18, 7/19, and 7/27. Definite calls were recorded on 6 sonobuoys; questionable calls were recorded on 3 additional buoys. Right whale calls were usually detected during dark early morning hours (fig. 2). We recorded only a few right whale calls, most of which were questionable, during daylight hours after about 0800 or 0900, although we listened during daylight hours on 7/15, 7/16, 7/18, 7/19, 7/25, 7/26, 7/27, and 7/28.

On 7/16/02, we detected at least two right whales acoustically, based on two distinct range curves based on the timing of mode arrivals within each call (n=27 calls, fig. 3). Further analysis is underway to determine the number of individual whales heard on subsequent nights.

Sonobuoy #13 recorded right whale calls 57:10.61 N, 164:31.26 W. 7/16/02 Start 0047 End 0704 (definite). Sonobuoy #14 recorded questionable right whale calls 7/16/02, 57:7.48 N, 164:51.38 W 0801 to 1347. Sb #16 (df) recorded right calls, 57:11.44 N, 164:31.57 W, on 7/18/02, from 0511 to 0943. Sb #17 recorded questionable right calls, 56:57.95 N, 164:23.40 W, on 7/18, from 1150 to 1402. Sb #20 (56:56.47 N, 165:28.10 W) and Sb #21 (56:54.64 N, 165:37.11 W) recorded definite right calls on 7/19/02 from 0514 to 0815. Sb #22 recorded questionable right calls 57:4.33 N, 165:45.20 W, 7/19, 1043 to 1538. Sb #29 (56:44.85 N, 164:45.83 W) and sb #30 (56:50.31 N, 164:52.65 W) recorded right whale calls on 7/27/02 from 2317 (7/26/02) to 0635.

List of sonobuoys, North Pacific Right Whale cruise 2002, Leg 2.

Sonobuoy #	Tape Label	Date	Time(s)	Comments
Sb#1 (df) 57:53.6 N 150:12.20 W	Alb Bank #1	7/10/02	Start 0405 End 0607	Fin calls?
Sb #2 (df) 56:28.29 N 153:06.69 W	Alb Bank #2	7/10/02- 7/11/02	Start 2314 End 0116	Ns
Sb #2	Alb Bank #3	7/11/02	Start 0118 End 0320	Ns
Sb #2	Alb Bank #4	7/11/02	Start 0323 End 0525	PM clicks? Fin (near end)?
Sb #2	Alb Bank #5	7/11/02	Start 0527 End 0710	Fin calls Faint PM?

			(1:43:14)	
Sb #3 (df) 54:23.12 N 165:01.62 W Sb #4 (Omni) 54:34.8 N 165:10.33 W	Unimak #6	7/13/02	0908 to 1008 (:00 to 1:00:00) 1041 to 1143 (1:00 to end)	Ns Ns
Sb #5 (Omni) 55:38.55 N 163:53.99 W Sb #6 (df) 56:29.68 N 163:57.78 W	Bering #7	7/13/02 7/14/02	2056 to 2157 (:00 to 1:01:23) 0419 to 0520 (1:01 to end)	Orca calls Ns
Sb #6	Bering #8	7/14/02	Start 0522 End 0723	Fin calls
Sb #7 (df) 56:33.26 N 163:22.89 W Sb #8 (df) 56:40.52 N 162:53.94 W Sb #10 (df) 56:35.12 N 162:57.49 W	Bering #9	7/14/02 7/15/02	1026 to 1052 (:00 to 0:26) 2118 to 2129 (0:26 to 0:37) 0505 to 0630 (0:37 to end)	Sb #7 and #8 bad, rec'd radio signal but no sound Sb #9 bad, not recorded at all Fin calls
Sb #10 Sb #11 (df) 56:56.04 N 163:56.12 W	Bering #10	7/15/02	0632 to 0757 (:00 to 1:25:35) 1615 to 1650 (1:25 to end)	Fin calls Fin calls
Sb #11 Sb #12 (df) 57:8.97 N 164:27.28 W Sb #13 (df) 57:10.61 N 164:31.26 W	Bering #11	7/15/02 7/16/02	1650 to 1730 (:00 to 0:40:00) 2254 to 2257 (40: to 44:00) 2328 to 0047 (44:00 to end)	Fin calls Dud buoy; rec'd radio but no sound Fin calls
Sb #13	Bering #12	7/16/02	Start 0047 End 0249	RW calls Fin calls
Sb #13 Sb #13b (df), L 57:14.5 N 164:31.22 Sb #13	Bering #13	7/16/02	0257 to 0310 0310 to 0315? (13:17 to 18?) 0315 to 0459 (18:00 to end)	 Sb #13b failed RW calls Fin calls
Sb #13	Bering #14	7/16/02	Start 0500 End 0704	RW calls Fin calls
Sb #13 Sb #14 (df)	Bering #15	7/16/02	0704 to 0726 (:00 to 22:46) 0801 to 0940	Fin calls Fin calls

57:7.48 N 164:51.38 W			(22:46 to end)	1:27:17 RW??
Sb #14	Bering #16	7/16/02	Start 0941 End 1143	Fin calls 2:01:00 RW??
Sb #14	Bering #17	7/16/02	Start 1145 End 1347	Fin calls A few RW??
Sb #14	Bering #18	7/16/02	Start 1348 End 1550	Fin calls
Sb #15 (df) 56:39.36 N 164:31.44 W	Bering #19	7/17/02	Start 0421 End 0622	Fin calls
Sb #15	Bering #20	7/17/02	Start 0622 End 0810 (1:47:00)	Fin calls Broadband sounds 1:12:00
Sb #16 (df) 57:11.44 N 164:31.57 W	Bering #21	7/18/02	Start 0308 End 0510	Fin calls
Sb #16	Bering #22	7/18/02	Start 0511 End 0713	Fin calls RW calls
Sb #16	Bering #23	7/18/02	0713 to 0730 (:00 to 17:00) 0759 to 0943 (17:00 to end)	Ns Fin calls RW calls
Sb #16 Sb #17 (df) 56:57.95 N 164:23.40 W	Bering #24 Bering #24 (cont'd)	7/18/02 7/18/02	0943 to 1013 (0:00 to 29:30) 1024 to 1156 (29:30 to end)	Ns Ns except RW at end (?), orca calls
Sb #17	Bering #25	7/18/02	Start 1200 End 1402	Orca calls, RW??
Sb #17 Sb #18 (df) 56:57.10 N 164:1.53 W	Bering #26	7/18/02	1409 to 1543 (:00 to 1:34:08) 1552 to 1554 (1:34 to 1:36)	Orca calls, Fin calls Sb #18 = dud Sb #19 = dud
Sb #20 (df) 56:56.47 N 165:28.10 W Sb #20, L Re-Sb, R Sb #20	Bering #27	7/19/02	0410 to 0510 (:00 to 1:00:) 0510 to 0514 (1: to 1:14) 0514 to 0612 (1:14 to end)	Faint fin calls Test retrv.buoy, not enough wt. Fin calls, RW??
Sb #20 Sb #20, L Sb #21 (df), R 56:54.64 N 165:37.11 W	Bering #28	7/19/02	0612 to 0659 (:00 to 47:00) 0659 to 0815 (47:00 to end)	0:12:00 RW 1:44:00 RW

Sb #20, L Sb #21, R Sb #20, L Sb #21, R Sb #22 (df) 57:4.33 N 165:45.20 W	Bering #29	7/19/02	0815 to 0903 (:00 to 47:34) 0912 to 0938 (47:34 to 1:13) 1043 to 1133 (1:13 to end)	Fin calls RW??
Sb #22	Bering #30	7/19/02	Start 1133 End 1335	1:32 RW?? Fin call 1:45
Sb #22	Bering #31	7/19/02	Start 1336 End 1538	Fin calls Un-I.D. dnswps 1:01:00 RW?
Sb #22 Sb #23(df) 56:58.40 N 164:30.14 W	Bering #32	7/19/02 7/20/02	1539 to 1605 (:00 to 25:00) 0410 to 0549 (25:08 to end)	Un-I.D. dnswps Fin calls, Un-I.D. blips
Sb #23	Bering #33	7/20/02	Start 0549 End 0752	Un-I.D. dnswps Fin calls
Sb #23 Sb #24 (df) 57:00.06 N 164:30.06 W	Bering #34	7/20/02 7/25/02	0752 to 0843 0307 to 0419 (51:18 to end)	Un-I.D. dnswps Fin calls, Un-I.D. dnswps
Sb #24	Bering #35	7/25/02	Start 0419 End 0622	Fin calls, Un-I.D. dnswps
Sb #24 Sb #24, L Sb #25 (df), R 57:7.25 N 164:42.40 W	Bering #36	7/25/02	0622 to 0757 (:00 to 1:34) 0757 to 0824 (1:34 to end)	Fin calls, Un- I.D. dnswps Fin calls
Sb #24, L Sb #25, R Sb #26 (df) 57:4.16 N 165:49.50 W	Bering #37	7/25/02	0824 to 0924 (:00 to 1:00) 1428 to 1530 (1:00 to end)	Un-I.D. sounds Ns
Sb #26	Bering #38	7/25/02	Start 1531 End 1734	Fin calls
Sb #26 Sb #27 (df) 57:4.74 N 163:29.76 W	Bering #39	7/25/02 7/26/02	1734 to 1751 (:00 to 16:33) 0312 to 0457 (16:33 to end)	Ns Un-I.D. noise at 36:00
Sb #27	Bering #40	7/26/02	Start 0500 End 0702	Ns
Sb #27	Bering #41	7/26/02	0703 to 0823	Ns

Sb #28 (df) 56:54.07 N 162:47.26 W			(:00 to 1:19) 1210 to 1254 (1:19 to end)	Crackly signal, bad weather (Beauf. 6)
Sb #28	Bering #42	7/26/02	Start 1254 End 1457	Crackly signal, Beaufort 6
Sb #28 Sb #29 (df) 56:44.85 N 164:45.83 W	Bering #43	7/26/02 7/27/02	1457 to 1549 (:00 to 51:12) 2317 to 0026 (51:12 to end)	Bad noise RW calls
Sb #29 Sb #29, L Sb #30 (df), R 56:50.31 N 164:52.65 W	Bering #44	7/27/02	0026 to 0129 (:00 to 1:02) 0129 to 0229 (1:02 to end)	RW calls RW calls
Sb #29, L Sb #30, R	Bering #45	7/27/02	Start 0230 End 0432	RW calls
Sb #29, L Sb #30, R	Bering #46	7/27/02	Start 0432 End 0635	Faint few RW calls
Sb #29, L Sb #30, R	Bering #47	7/27/02	Start 0707 End 0909	Not monitored
Sb #31 (df) 56:40.73 N 164:51.35 W	Bering #48	7/27/02	Start 1053 End 1256	Ns
Sb #31	Bering #49	7/27/02	Start 1256 End 1458	Ns
Sb #31 Sb #31	Bering #50	7/27/02	1459 to 1536 (:00 to 38:00) 1808 to 1859 (38: to 1:28:44)	Ns Un-I.D. upswps harmonics
Sb #33 (df) 56:49.05 N 164:46.22 W	Bering #51	7/28/02	Start 0134 End 0342 (0336?)	Sb #32 a dud Ns on sb #33
Sb #34 (df) 56:37.30 N 164:28.68 W	Bering #52	7/28/02	Start 0426 End 0628	Ns
Sb #34 Sb #35 (df) 57:04.83 N 165:40.78 W	Bering #53	7/28/02	0629 to 0759 (:00 to 1:30) 1617 to 1635 (1:30 to 1:50)	Ns Sb #35 died after 20 min.
Sb #36 (df) 57:07.97 N 165:48.11 W	Bering #54	7/28/02	Start 1700 End 1901	Ns
Sb #36 Sb #38 (df)	Bering #55	7/28/02	1901 to 2040 (:00 to 1:37) 2338 to 0003	Ns Sb #37 a dud Ns

56:59.09 N 164:55.33 W		7/29/02	(1:37 to end)	
Sb #38	Bering #56	7/29/02	Start 0003 End 0205	Ns
Sb #38 Sb #39 (df) 56:46.87 N 164:27.37 W	Bering #57	7/29/02	0209 to 0239 (:00 to 30:00) 0331 to 0504 (30:00 to end)	Ns Ns
Sb #39	Bering #58	7/29/02	0504 to 0604 (:00 to 1:00)	Ns

APPENDIX 2

Acoustics Report
North Pacific Right Whale Research Cruise
NOAA ship McArthur
Leg 3: Seward to Kodiak
Aug 10 – Sept 30, 2002
Acousticians: Allan Sauter (SIO)
Jan Benson (NOAA - Seattle)

Setup:
We sailed on the NOAA Research Vessel McArthur out of Seward, Alaska on Saturday August 10, 2002. Our mission was twofold: 1) to use sonobuoys to detect and approach Right Whales in order to identify individuals and study their endangered population, and 2) to recover two ARP moorings that had been left on the bottom of the Bering Sea the previous summer. A pair of sonobuoy radio receivers and laptop for running the spectrogram program used to identify whale calls was already set up in the plot room directly aft of the bridge by Lisa Munger on the previous leg. We also used the oceanography lab forward of the fantail to modify sonobuoys so they could be reused. We had materials to make 10 reusable sonobuoys in addition to 23 expendable sonobuoys left over from the previous leg.

Summary of work:
After 2 days steaming we headed north through the Unimak pass into the Bering sea where we started a daylight routine of steaming along the shelf break with observers on the flying bridge looking for whales, and a night-time routine of holding station, doing a CTD cast and net tow, and then deploying 1 or 2 modified recoverable sonobuoys and listening for whales. The recoverable sonobuoys were assembled by placing the surface electronic cards into a sealed PVC pipe. All connector wires - radio antenna, seawater ground, sea battery, and sensor - entered into the tube through a rubber stopper sealed with RTV. The scuttle command lines were disabled. Deploying the recoverable sonobuoys consisted of slowing the ship, lowering the sensor and 90' of coiled - elastic wire into the water, and then dropping the PVC tube tied with a 10' line to a 10-12' spar buoy with a Radar reflector attached. We were able to track the sonobuoy from the ship out 2 or 3 miles on calm nights by radar. The spar (1 aluminum and 1 fiberglass) and reflector had no noticeable effect on radio transmission from the sonobuoy. Overall, we had a 50% success rate with the recoverable sonobuoys transmitting good data for several hours. The major cause of failure was seawater getting into the electronics, the reason being it is difficult to seal the Teflon wires going into the plug with RTV. Additional problems with the recoverables occurred during recovery. Several were lost in the ship's propeller - always caused by backing into the sonobuoy. Other sensor wires were unusable after recovery because the ship was moving too fast and strained the wire, causing it to irretrievably tangle when pulled up and unstrained.

From August 13 to the 18th we worked the shelf break, hearing Killer, Sperm, Humpback and Fin whales, but no Right calls. The weather deteriorated on the 18th and we took shelter in the lee of St. Paul Island, Pribilofs from the 19th thru the 22nd. We arrived at ARP site A on the morning of the 23rd in moderate swell conditions. I deployed 1 sonobuoy and then tried to put the over-the-side transducer on the starboard side. Ship handling with only the port screw on was not adequate to accomplish this, so we waited to talk to the ARP until the 12KHz hull transducer was connected to the Acoustics Deck unit. We drove a pattern over the site and extending out all directions, transponding enable commands from 7:00am till 11:00am interspersed with transmit pulses. From 11 until 2pm we sent release commands with the observers looking at all points for

a surfaced ARP. We received no acoustical or visual signs that the ARP was still in the area. During the search for the ARP the first Right whale of the leg was acoustically recorded. The morning of the 24th of August was spent trying to recover the ARP at site C, again with no success.

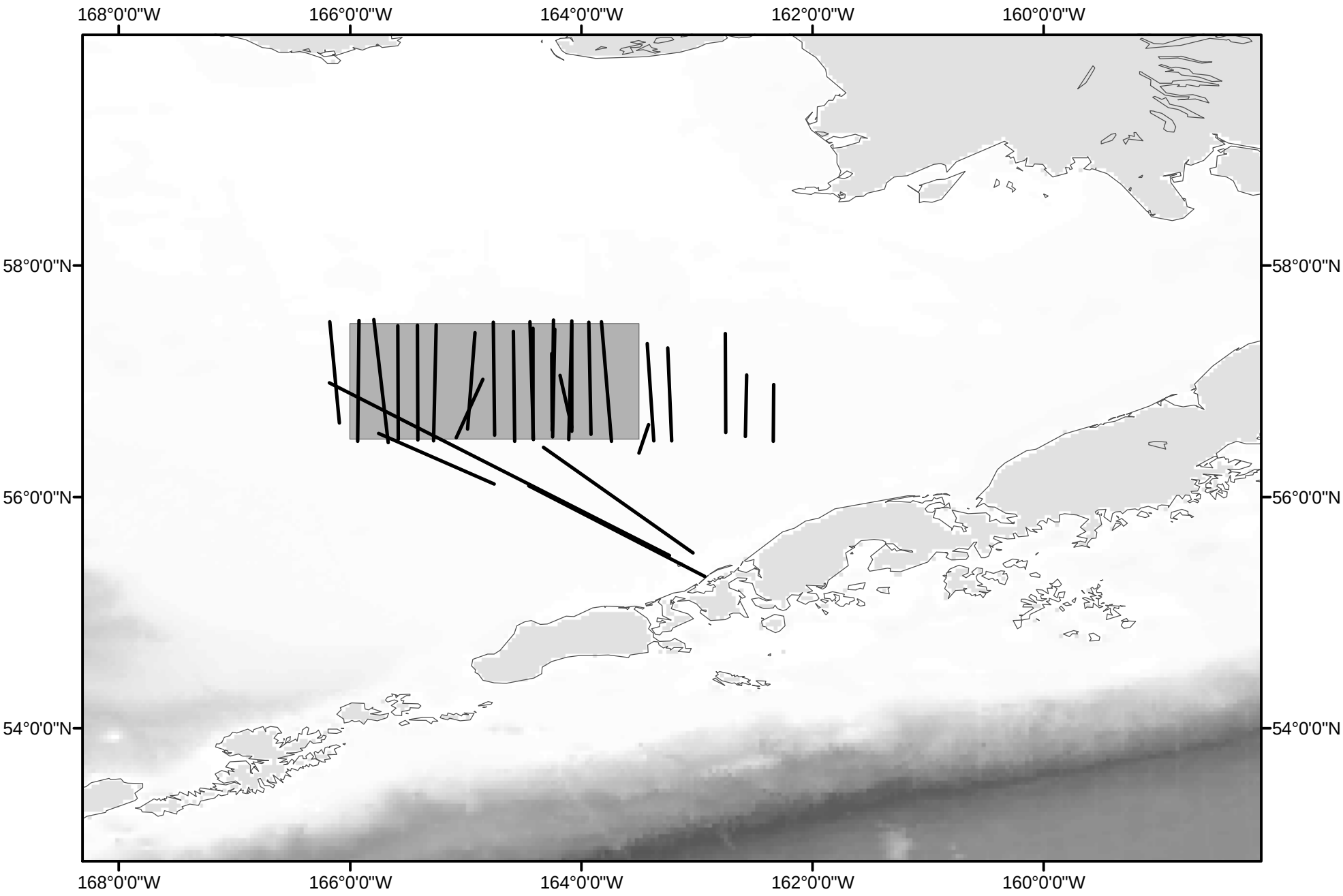
At 8pm on the 24th, the observers spotted the first Right whale of the season. We immediately deployed an expendable sonobuoy at N57 1.84', W164 27.71'. We heard many downsweep calls and the first truly identifiable Right whale upsweep calls at 23:18pm from one general area. We listened to sonobuoys all night, hearing RW calls up until about 2:30am the 25th. There was an acoustical lull and then more upsweeps started at 5:21am. Many upsweeps were recorded from 5:30 through 8:00am - mostly to the NW. Then a pair of Rights (cow and calf) was sighted at first light close to the ship. We pursued the animals, recording more calls that were coming from a different animal to the NW of the sonobuoys 18 and 19. Anther Right' calls to the SW were recorded in the afternoon, continuing on until about 8:30pm. After a 4-5 hour lull in calling, we began picking up Right calls again on the 26th at 1:00am. A few calls were followed by a lull that lasted until 5:50am when the Right called again to the NE. We continued to get faint Right whale upsweeps (probably 40 miles away) until 8:45am. No more calls were heard on the 26th and no Rights were sighted.

We deployed an expendable sonobuoy at 4am on the 27th at N57 25.82' W164 40.24' and heard a good Right whale call at 5am - we had many calls through 6:30am to the E or ENE. Include in the calls was a humpback call. More Right calls, still to the E continued until 9:30am. At 10am a Humpback whale was seen breeching at the location of the Right/humpback calls. An hour later, a Right whale was seen in the same vicinity. At 2pm, a second Right was heard calling to the SE and was sighted on that bearing line. The 28th of August was our last day in the study box. We deployed an expendable sonobuoy at 3:30am at N56 57.37' W164 40.85' and began receiving weak upsweeps at a bearing of 165mn. Only a single mode was visible in the call and no dispersion was obvious. Some very interesting 70Hz pulses spaced like Blue A calls, but shorter in total duration were recorded at 6:03am. When it was light enough to begin visual observation, we began steaming towards a location on the bearing line 15 miles from the sonobuoy that picked up the weak Right calls. When we reached the bearing line, we deployed another sonobuoy and proceeded up the bearing line to the NW. The whale was not sighted nor heard until it recalled at noon - again to the SE. We were already on a SE course, after checking to make sure the whale wasn't to the NW and we threw in one more expendable when we had travelled some 30 miles from the original hearing site. The Right calls were very abundant at this time and were changing bearing indicating they were travelling NE. We turned in that direction and deployed one more sonobuoy, got a cross bearing, headed for that site - only a few miles away and 3 Right whales were sighted at the target site at 14:52. We stayed on the Rights, doing visual and biopsy operations until 21:00. Many calls were recorded from 2 near-by sonobuoys that have not been analyzed yet, but which should provide interesting data when merged with the ship track line and whale sighting locations. At 21:00 we left the study site and began our transit to port in Kodiak.

No acoustical operations were done between Aug 29th and 31st, but on the 1st of September, we came across a group of Humpbacks near Sitkalidak and Kodiak Islands, so we threw in an expendable sonobuoy. For the great number of whales in the area (estimated at 14 or more) there were very few calls - perhaps only 2 or 3 weak calls in the 4 hours we recorded. We docked in Kodiak the next day - the 2nd of September.

In summary, we deployed Recoverable sonobuoys 10 times with 6 that worked; we deployed 25 Magnavox (pop-stick) Expendable sonobuoys and all but 1 of those worked. Without calculating bearings to all the Right whale calls, we estimate we received calls from at least 11 separate

(temporally or spatially) group or individual Right whales. Our morning operations helped get the observers in range of Right whales on 3 separate days. On a less bright note, we were unsuccessful at recovering either of the ARP's that were deployed in the Bering Sea the previous year whales.



Appendix 3. Aerial survey effort: 13 July - 24 July. Shaded area denotes the "Box".