

VAQF Scientific Report # 2015-06

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Marine Mammal and Sea Turtle Sightings in the Vicinity of the Maryland Wind Energy Area July 2013-June 2015



Submitted by:

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Introduction

There have been no consistent, year-round marine mammal surveys of the ocean waters off of Maryland since the late 1970s (Scott *et al.* 1979). Current survey efforts by the National Marine Fisheries Service and partner agencies as part of the Atlantic Marine Assessment Program for Protected Species (AMAPPS) include broad scale surveys that may not provide sufficient data for the Maryland Wind Energy Area. Data on protected species presence and seasonality are needed to inform state and federal agencies responsible for permitting offshore energy development and construction (BOEM 2013). The goal of this two year effort was designed to provide fine scale data on presence of protected species, especially large whales, for Maryland's wind development efforts.

Methods

We designed twelve track lines that ran from shore to 55 kilometers offshore in the north and nearly 70 km offshore in the south covering the Maryland Wind Energy Area (WEA) and areas to the east and west of the WEA (Figure 1). Aerial surveys were conducted by observers from the Riverhead Foundation for Marine Research and Preservation and were led by a team trained in aerial survey techniques employed by the National Marine Fisheries Service. Surveys were flown every month for two years beginning in July of 2013 and ending in June of 2015.



Figure 1: Survey lines numbered from north to south with the Maryland Wind Energy Area in the center of the survey area. The Maryland Wind Energy Area is shown in gray.

The survey platform was a DeHavilland twin otter DHC-6, a twin engine fixed-wing aircraft, capable of carrying two pilots in order to follow NOAA aviation safety policies (41 CFR 102-33.155-185). The aircraft had port and starboard side windows and a belly observer position. There were also positions for two independent data recorders to document all sightings and changes in effort. The aircraft was configured for two forward observers (port and starboard) with a data recorder on one communication system, designated as Team 1 and a second team, Team 2, consisting of a belly observer and one additional observer (either port or starboard) with a second data recorder on a separate communication system. This setup enabled the two teams to function independently allowing data to be collected as two individual surveys for mark-recapture purposes. Observers on Team 1 used convex 'bubble' windows to improve visualization of the trackline below the plane. Surveys were flown at 183m altitude and at an average of 175 km/h.

Each observer monitored his/her observation area for marine animal sightings. When an animal was sighted, the observer reported the sighting to the data recorder at the time when the animal was perpendicular to the aircraft. The observer also reported the angle to the animal, species (if determined), number of animals and swim direction. Side window observers used an inclinometer to determine angle of the sighting. Environmental data, such as sea state, glare, turbidity, cloud cover and overall sighting quality were collected during the survey and updated as changes occurred. When the data recorder entered a sighting, a computer automatically recorded aircraft altitude and speed as well as latitude and longitude of the aircraft.

To determine the best possible survey conditions, weather was monitored daily within a survey window, and survey days were chosen based on wind and precipitation, with optimal conditions being dry with winds less than 15 Kts. A survey was considered complete when all 12 lines were surveyed. Following the completion of each survey, data on effort and sightings were sent to the Centre for Research into Ecological and Environmental Monitoring at St. Andrews University. Methods for abundance estimation are discussed in the report from St. Andrews which is included as Appendix 1.

Results & Discussion

We flew 24 surveys with at least half of each of the 12 lines covered on each survey. In several months (*e.g.* May 2014, Sep 2014, Feb 2015, March 2015, May 2015), we were unable to conduct a survey, most often because of plane/pilot availability on the NOAA aircraft. In those cases, we conducted a survey in the nearest possible month to the missed survey. The surveys resulted in over 16,000km of track line surveyed and over 1,800 sightings, 551 of them cetaceans (Table 1). For duplicate detections, animals that both teams sighted, the teams occasionally had recorded different sighting angles and species. There did not appear to be any systematic bias in the group size and perpendicular distance estimates of the two teams, so where there were differences, we used the mean value for the duplicate pair. If differences occurred in the recorded species, then sightings were classified as 'unidentified' species group. For example, if two different species were recorded (*e.g.* loggerhead and green sea turtle) for a duplicate sighting, we classified it as unidentified. When one team recorded a species and the other team listed the animal as 'unidentified,' we used the recorded species (*e.g.* loggerhead and unidentified was classified as loggerhead). The majority of turtle detections (99%) were of solitary animals. Number of animals was missing for several turtle sightings and

since most turtle detections were of a single animal, we assigned them a group size of one. For other species, we did not assign a number of animals. Of the 1,609 sightings, 220 (13.6%) were made by both teams of observers making the use of two teams important for determining observer error or perception bias.

Table 1: Summary of survey effort, sightings and number of animals by animal group.

Month	Year	Kilometers Surveyed	Total Sightings	Cetaceans		Sea Turtles		Other Species	
				Sightings	Animals	Sightings	Animals	Sightings	Animals
July	2013	722.1	229	90	873	99	100	40	85
August	2013	632.1	30	10	33	20	22	0	0
September	2013	718.5	30	5	28	25	24	0	0
October	2013	702.1	32	4	15	25	25	3	3
November	2013	360.6	3	1	3	1	1	1	2
December	2013	661.5	3	2	6	1	1	0	0
January	2014	696.3	14	14	36	0	0	0	0
February	2014	735.5	21	18	61	2	2	1	1
March	2014	707.9	2	2	4	0	0	0	0
April	2014	705.9	8	8	106	0	0	0	0
June	2014	721.6	187	50	346	128	123	9	14
June	2014	716.8	177	37	216	129	127	11	13
July	2014	723.3	91	24	152	56	59	11	12
August	2014	712.1	131	21	443	100	100	10	13
August	2014	714.2	159	6	14	128	130	25	447
October	2014	720.6	20	16	26	3	3	1	1
November	2014	722.3	11	5	18	5	5	1	1
December	2014	605.6	1	1	3	0	0	0	0
January	2015	786.8	1	1	1	0	0	0	0
January	2015	713.8	20	20	58	0	0	0	0
April	2015	721.8	66	62	400	2	2	2	2
May	2015	645.5	46	17	61	25	25	4	4
June	2015	712.5	186	36	310	113	119	37	242
June	2015	719.5	141	23	60	92	96	26	26
Totals	24 surveys	16,578.9	1609	473	3273	954	964	182	866

Because of missed months, the number of kilometers surveyed varied slightly by season. The highest effort was in the spring (Apr-Jun) with 4,944km flown and the lowest effort was in the winter (Jan-Mar) with 3,640km flown. Similarly, the greatest number of sightings were in the spring (N=811) and the lowest were in winter (N=58). The total number of animals sighted however was highest in the summer (Jul-Sep; N=2,535) and the lowest was in the fall (Oct-Dec; N=113)(Figure 2). Much of the difference in the number of sightings was due to sea turtle and bottlenose dolphin sightings which were drastically different between spring (N=489 & 278 respectively) and winter (N=2 & 25 respectively). For cetaceans, the lowest number of sightings and animals occurred in the fall with 29 sightings of 71 animals, and the highest was in the spring

with 233 sightings of 1,499 animals. For large whales, the highest number of sightings and animals occurred in winter with 13 sightings of 25 animals. Summer had four sightings of five whales, all fin whales.

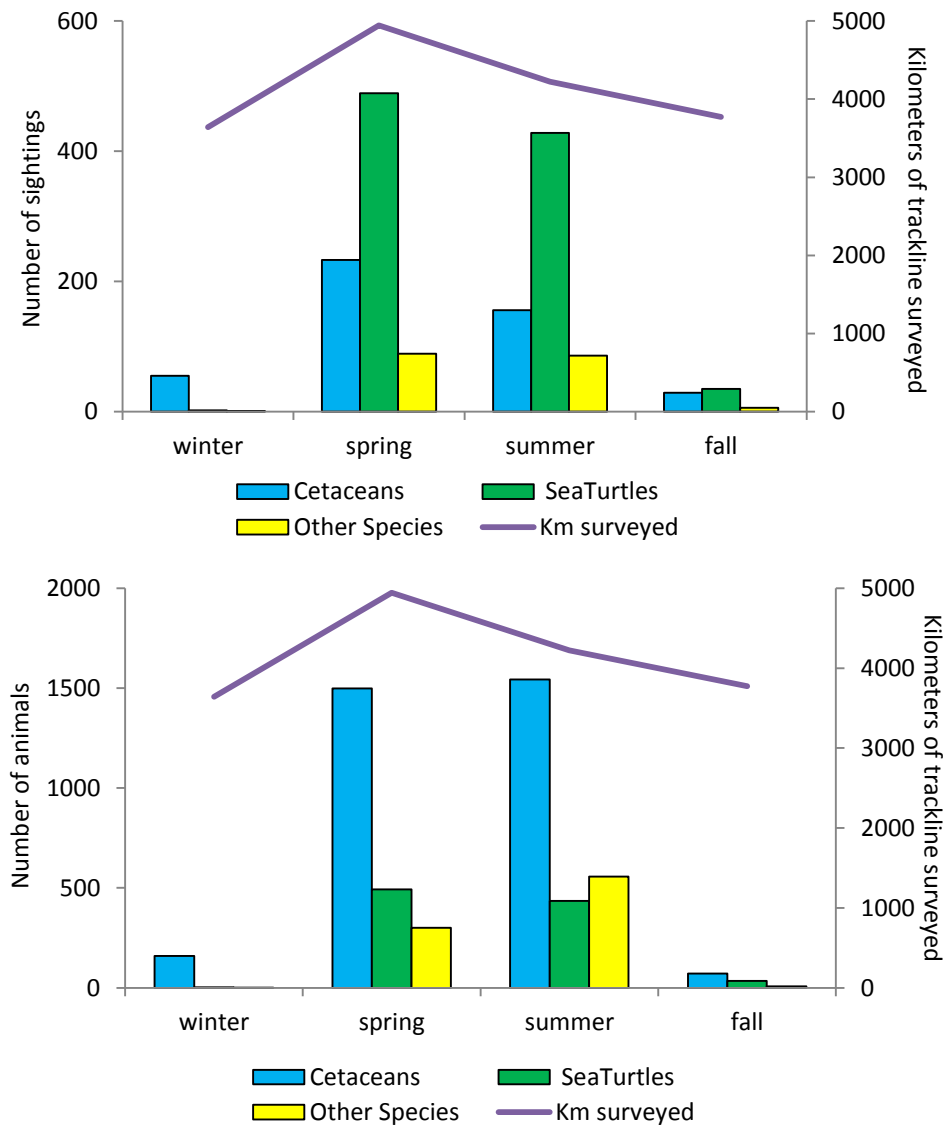


Figure 2: Number of sightings (top) and animals (bottom) by season. Winter=Jan-Mar, spring=Apr-Jun, summer=Jul-Sep, fall=Oct-Dec.

Large whale sightings

There were twenty large whale sightings during the survey period of four large whale species, North Atlantic right whale (*Eubalaena glacialis*) (5 sightings of 13 whales), humpback whale (*Megaptera novaeangliae*) (2 sightings of 2 whales), fin whale (*Balaenoptera physalus*) (9 sightings of 14 whales) and minke whale (*Balaenoptera acutorostrata*) (1 sighting of 1 whale; Table 2). In addition there were two sightings of 2 baleen

whales where the species could not be identified, although one was listed as a possible right whale and a single sighting of an unidentified whale which could have been a baleen whale or a sperm or beaked whale. The sightings were predominantly in the winter months (Jan-Mar) and all of the right whale sightings were in winter. Fin whales were seen in three seasons, winter, spring and summer. Humpbacks were seen in winter and spring and the one minke whale was sighted in winter. One of the unidentified baleen whales was seen in the fall and the other two unidentified species were in winter.

Seasonally, winter was when most of the baleen whale sightings were observed and when all of the right whale sightings occurred (Figure 4). Group sizes were largest for right whales (N=2.6) and were also larger for fin whales in winter (N=2.0) than in spring (N=1.0) and summer (N=1.3).

Table 2: Large whale sightings from July 2013 through June 2015. Sightings are ordered by date and time of observation.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	3	1/8/2014	19:33:28	winter	right whale	1	38.26891	-74.5255
8	3	1/8/2014	20:03:44	winter	unidentified whale	1	38.29455	-74.7819
11	1	2/22/2014	15:20:08	winter	humpback whale	1	38.20908	-74.6852
9	1	2/22/2014	16:08:53	winter	fin whale	3	38.26800	-74.6005
8	1	2/22/2014	16:26:18	winter	fin whale	1	38.29507	-74.5268
8	1	2/22/2014	16:27:40	winter	unidentified balaenopterid	1	38.29520	-74.5744
5	3	2/22/2014	19:09:04	winter	minke whale	1	38.38209	-74.5924
5	1	2/22/2014	19:09:22	winter	fin whale	2	38.38210	-74.5818
4	1	2/22/2014	19:21:35	winter	fin whale	2	38.41144	-74.5713
3	3	2/22/2014	19:53:11	winter	right whale	1	38.43925	-74.4294
5	1	6/12/2014	18:05:23	spring	humpback whale	1	38.38203	-74.9341
12	1	8/1/2014	18:13:38	summer	fin whale	1	38.17787	-74.4076
6	3	8/30/2014	15:10:10	summer	fin whale	2	38.35474	-74.7035
10	1	8/30/2014	18:32:09	summer	fin whale	1	38.23815	-74.4540
10	2	8/30/2014	18:37:48	summer	fin whale	1	38.23865	-74.4094
2	1	12/15/2014	19:22:24	fall	unidentified balaenopterid	1	38.47014	-74.5460
4	1	1/17/2015	16:41:51	winter	right whale	4	38.41070	-74.4224
7	1	1/17/2015	17:46:31	winter	right whale	4	38.32324	-74.4287
7	3	1/17/2015	18:03:29	winter	right whale	3	38.32218	-74.5023
9	3	5/21/2015	17:08:21	spring	fin whale	1	38.26680	-74.7167

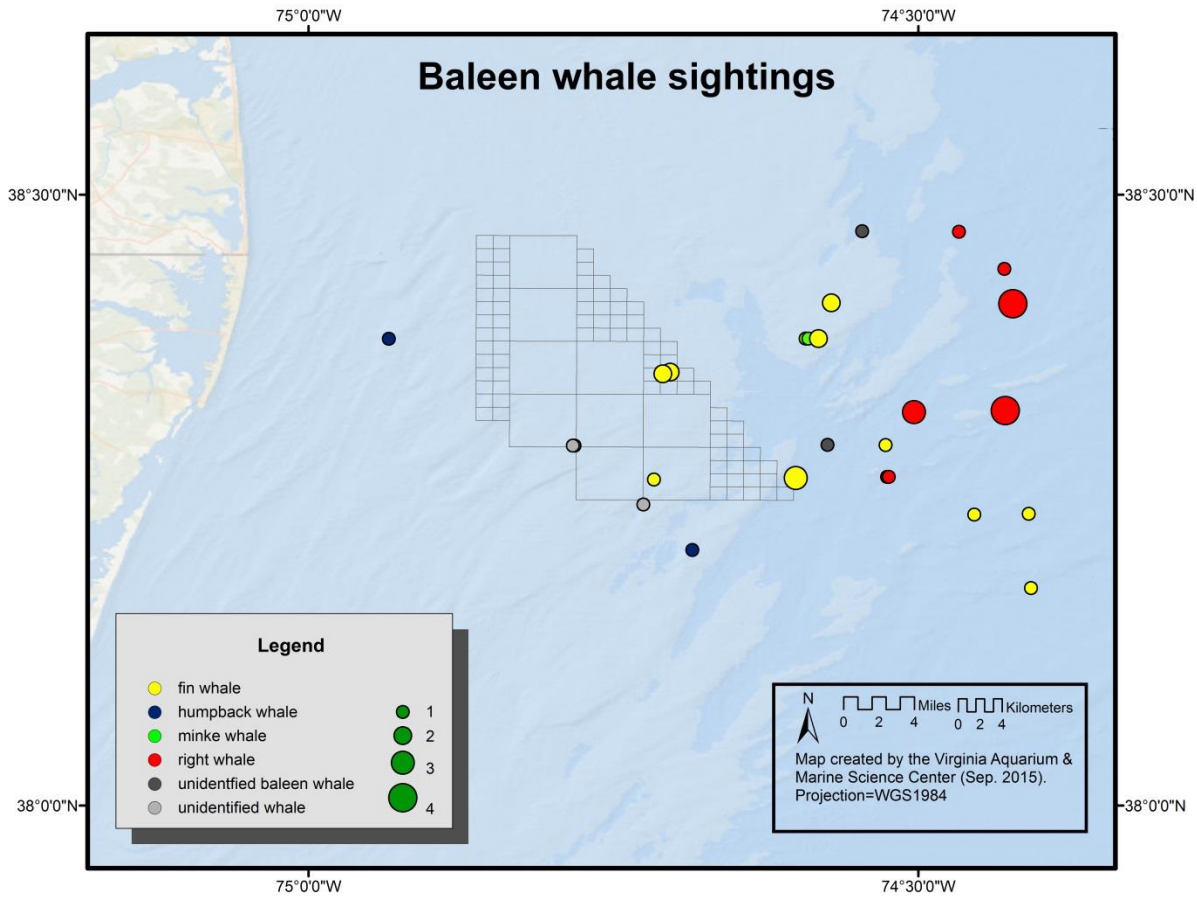


Figure 3: Map of large whale sightings from July 2013 through June 2015. The inland ‘unidentified whale’ sighting that is within the Wind Energy Area was listed in the survey data as a ‘possible right whale.’ Different colors represent different species and the size of the symbol indicates group size.

Endangered species

The north Atlantic right whale is critically endangered under the U.S. Endangered Species Act, and there are estimated to be 444 individuals in the northwest Atlantic (Waring *et al.* 2013). Northern right whales are a slow moving, coastal species that is susceptible to both vessel strikes and gear entanglements. Northern right whales spend the warm water months in high latitude waters feeding on copepods. In the fall, some individuals disperse from feeding areas in New England and Atlantic Canada. Breeding females travel to

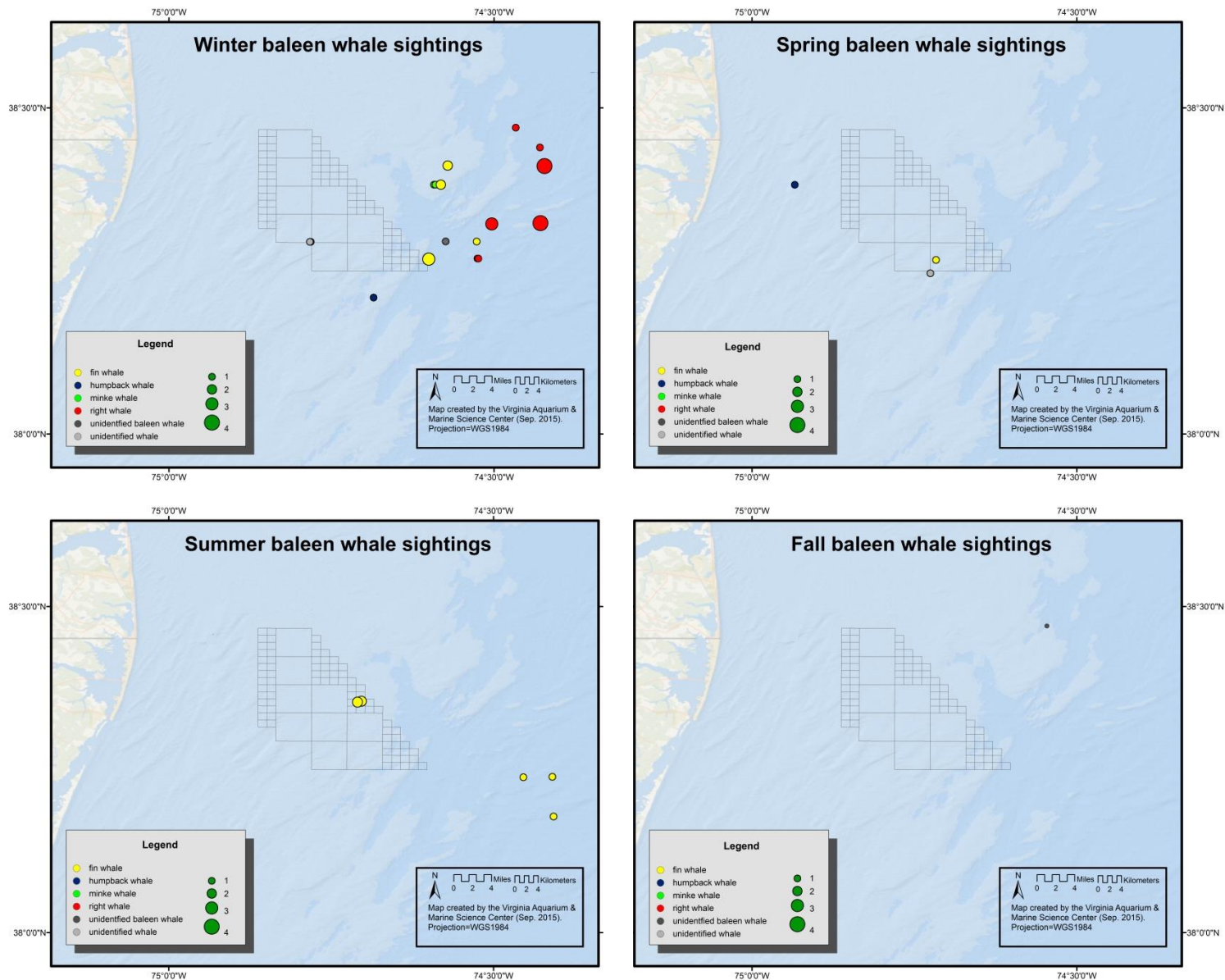


Figure 4: Baleen whale sightings occurred primarily in the winter, and most were east of the Wind Energy Area. However, sightings did occur in the Wind Energy area in winter, spring and summer. Winter=Jan-Mar, spring=Apr-Jun, summer=Jul-Sep, fall=Oct-Dec.

ocean waters off the Georgia/Florida border to calve. The winter distribution of non-breeding females, adult males and juvenile whales is unknown, but whales may move extensively between feeding and breeding areas. The mid-Atlantic region is part of the migratory corridor between summer feeding areas and winter breeding areas and may also be a destination for non-breeding individuals. Thirteen right whales were recorded on a single day in Jan. of 2015 suggesting that pulses of right whales may travel through the region. Several of the right whales were observed with open mouths, something that has also been observed in Virginia (VAQS unpublished data; Figure 5). Open mouth behavior is consistent with but not indicative of feeding.



Figure 5: Image of a right whale with an open mouth off the coast of Maryland on Jan.17, 2015. An open mouth can be an indication of active feeding (image taken by the Riverhead Foundation for Marine Research and Preservation; Permit #15575).

Humpback whales (*Megaptera novaeangliae*) have been sighted in the mid-Atlantic regularly in the winter months since the early 1900s (Swingle *et al.* 1993, Barco *et al.* 2002). There are five stocks of humpbacks described based on summer feeding distribution. The Gulf of Maine stock of humpback whales is estimated to include 823 individuals (Waring *et al.* 2013), but humpbacks that stranded or were observed live in the mid-Atlantic have been identified to three different stocks: primarily the Gulf of Maine stock, but also the Gulf of St. Lawrence and Newfoundland stocks (Barco *et al.* 2002). Interestingly, relatively few humpbacks were sighted on these surveys whereas humpbacks were the second most commonly sighted baleen whale after fin whales during the Virginia Wind Energy Area surveys that occurred from 2012-2015 (Malette *et al.* 2014, 2015). In Virginia, humpbacks were sighted in groups of up to three animals.

Fin whales (*Balaenoptera physalis*) are the second largest whale species after blue whales and are listed as endangered in the U.S. The North Atlantic population is considered to be a single population (stock) and the best available estimate of abundance is 3,522 whales from 2007 (Waring *et al.* 2013). Fin whales are most commonly found from Cape Hatteras northward and spend the warmer months feeding in high latitude waters. It has been suggested that calving takes place in the fall and winter offshore of the U.S. mid-Atlantic, but no concrete evidence of overwintering exists (Waring *et al.* 2013). Fin whales were the most commonly sighted endangered whale species during the survey period.

Minke whales are not considered endangered, and the single minke whale sighting occurred in February, east of the WEA.

Delphinid cetaceans

Delphinids, members of the cetacean family Delphinidae, were the most common cetacean group sighted, and accounted for the highest number of individual animals among all sightings. Delphinid sightings included bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*) and spotted dolphins (*Stenella frontalis*) as well as unidentified delphinids (Table 3). There were five bottlenose dolphin sightings where no group size was recorded.

Table 3: Delphinid sightings from July 2013 through June 2015. Sightings are ordered by date and time of the observation.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	1	7/30/2013	14:36:00	summer	bottlenose dolphin	16	38.50051	-75.0464
1	2	7/30/2013	14:36:10	summer	bottlenose dolphin	2	38.50036	-75.0437
1	1	7/30/2013	14:36:42	summer	bottlenose dolphin	20	38.50025	-75.0202
1	3	7/30/2013	14:36:45	summer	bottlenose dolphin	1	38.50033	-75.019
1	1	7/30/2013	14:38:12	summer	bottlenose dolphin	3	38.50013	-74.9672
1	3	7/30/2013	14:38:42	summer	bottlenose dolphin	120	38.50031	-74.9488
1	1	7/30/2013	14:42:41	summer	bottlenose dolphin	37	38.49863	-74.9267
1	1	7/30/2013	14:42:45	summer	bottlenose dolphin	75	38.49873	-74.9242
1	2	7/30/2013	14:42:48	summer	bottlenose dolphin	5	38.49868	-74.9255
1	1	7/30/2013	14:43:01	summer	bottlenose dolphin	25	38.49916	-74.9144
2	3	7/30/2013	15:07:24	summer	bottlenose dolphin	1	38.47049	-74.7585
2	2	7/30/2013	15:07:37	summer	bottlenose dolphin	1	38.47052	-74.7634
2	1	7/30/2013	15:11:08	summer	bottlenose dolphin	35	38.47035	-74.8984
2	3	7/30/2013	15:11:14	summer	bottlenose dolphin	4	38.47041	-74.9035
2	1	7/30/2013	15:11:40	summer	bottlenose dolphin	3	38.47018	-74.9185
2	1	7/30/2013	15:12:13	summer	bottlenose dolphin	3	38.47036	-74.9398
2	2	7/30/2013	15:12:19	summer	bottlenose dolphin	3	38.47036	-74.9398
2	2	7/30/2013	15:12:19	summer	bottlenose dolphin	3	38.47036	-74.9398
2	1	7/30/2013	15:12:22	summer	bottlenose dolphin	51	38.47035	-74.9448
2	1	7/30/2013	15:12:27	summer	bottlenose dolphin	14	38.47028	-74.9485
2	2	7/30/2013	15:12:31	summer	bottlenose dolphin	20	38.47031	-74.9472
2	1	7/30/2013	15:12:33	summer	bottlenose dolphin	51	38.47018	-74.9522
2	1	7/30/2013	15:12:38	summer	bottlenose dolphin	23	38.47012	-74.9547
2	3	7/30/2013	15:12:38	summer	bottlenose dolphin	15	38.47012	-74.9547
2	3	7/30/2013	15:12:57	summer	bottlenose dolphin	2	38.47011	-74.9670
2	1	7/30/2013	15:13:04	summer	bottlenose dolphin	5	38.47021	-74.9719

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
2	1	7/30/2013	15:13:28	summer	bottlenose dolphin	2	38.47017	-74.9868
2	1	7/30/2013	15:13:34	summer	bottlenose dolphin	1	38.47008	-74.9905
2	2	7/30/2013	15:13:34	summer	bottlenose dolphin	1	38.47017	-74.9868
2	2	7/30/2013	15:13:39	summer	bottlenose dolphin	1	38.47011	-74.9893
3	1	7/30/2013	15:18:05	summer	bottlenose dolphin	7	38.43938	-75.0455
3	2	7/30/2013	15:18:10	summer	bottlenose dolphin	15	38.43938	-75.0455
3	1	7/30/2013	15:18:37	summer	bottlenose dolphin	1	38.44059	-75.0244
3	1	7/30/2013	15:20:23	summer	bottlenose dolphin	2	38.4403	-74.9591
3	1	7/30/2013	15:20:30	summer	bottlenose dolphin	1	38.44014	-74.9554
3	1	7/30/2013	15:21:00	summer	bottlenose dolphin	5	38.44019	-74.9395
3	1	7/30/2013	15:21:10	summer	bottlenose dolphin	18	38.44043	-74.9297
3	3	7/30/2013	15:21:12	summer	bottlenose dolphin	2	38.44043	-74.9285
3	1	7/30/2013	15:21:43	summer	bottlenose dolphin	15	38.44015	-74.9101
3	2	7/30/2013	15:21:46	summer	bottlenose dolphin	1	38.44015	-74.9113
3	1	7/30/2013	15:21:50	summer	bottlenose dolphin	4	38.44021	-74.9052
3	1	7/30/2013	15:21:51	summer	bottlenose dolphin	10	38.44021	-74.9052
3	1	7/30/2013	15:21:59	summer	bottlenose dolphin	8	38.44033	-74.9003
3	1	7/30/2013	15:22:16	summer	bottlenose dolphin	1	38.44043	-74.8895
3	1	7/30/2013	15:22:19	summer	bottlenose dolphin	18	38.44041	-74.8882
3	1	7/30/2013	15:23:20	summer	bottlenose dolphin	12	38.44039	-74.8508
3	1	7/30/2013	15:23:24	summer	bottlenose dolphin	8	38.44036	-74.8495
3	1	7/30/2013	15:25:30	summer	bottlenose dolphin	1	38.43918	-74.8397
4	1	7/30/2013	15:52:56	summer	bottlenose dolphin	30	38.41121	-74.8451
4	1	7/30/2013	15:54:48	summer	bottlenose dolphin	1	38.41122	-74.9129
4	3	7/30/2013	15:54:50	summer	bottlenose dolphin	2	38.41118	-74.9154
4	1	7/30/2013	15:55:51	summer	bottlenose dolphin	1	38.41112	-74.9518
4	2	7/30/2013	15:55:58	summer	bottlenose dolphin	1	38.41111	-74.953
4	1	7/30/2013	15:56:18	summer	bottlenose dolphin	2	38.41129	-74.9677
4	2	7/30/2013	15:56:25	summer	bottlenose dolphin	2	38.4113	-74.9689
4	1	7/30/2013	15:56:42	summer	bottlenose dolphin	1	38.41112	-74.9824
4	3	7/30/2013	15:56:42	summer	bottlenose dolphin	4	38.41109	-74.9836
4	2	7/30/2013	15:56:48	summer	bottlenose dolphin	2	38.41109	-74.9836
12	3	7/31/2013	20:39:37	summer	bottlenose dolphin	10	38.17406	-75.1616
12	3	7/31/2013	20:39:44	summer	bottlenose dolphin	5	38.17332	-75.1567
12	1	7/31/2013	20:40:30	summer	bottlenose dolphin	2	38.17572	-75.1281
12	1	7/31/2013	20:40:34	summer	bottlenose dolphin	1	38.17599	-75.1256
12	1	7/31/2013	20:40:46	summer	bottlenose dolphin	1	38.17673	-75.1183
12	1	7/31/2013	20:40:54	summer	bottlenose dolphin	13	38.1772	-75.1134
12	2	7/31/2013	20:40:56	summer	bottlenose dolphin	12	38.17731	-75.1122
12	1	7/31/2013	20:46:16	summer	bottlenose dolphin	1	38.1780	-74.9214
11	3	7/31/2013	21:23:27	summer	bottlenose dolphin	3	38.20764	-75.1090

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
11	1	7/31/2013	21:23:30	summer	bottlenose dolphin	1	38.20763	-75.1114
10	2	7/31/2013	21:27:22	summer	bottlenose dolphin	2	38.23597	-75.0968
10	2	7/31/2013	21:27:24	summer	bottlenose dolphin	2	38.23592	-75.0955
10	1	7/31/2013	21:28:53	summer	bottlenose dolphin	5	38.23901	-75.0419
10	1	7/31/2013	21:29:01	summer	bottlenose dolphin	25	38.23876	-75.0384
10	3	7/31/2013	21:30:46	summer	bottlenose dolphin	2	38.23792	-74.975
10	3	7/31/2013	21:31:05	summer	bottlenose dolphin	10	38.23788	-74.964
10	1	7/31/2013	21:31:07	summer	bottlenose dolphin	12	38.2379	-74.9628
10	2	7/31/2013	21:31:07	summer	bottlenose dolphin	10	38.2379	-74.9628
10	2	7/31/2013	21:32:52	summer	bottlenose dolphin	3	38.2381	-74.8981
10	1	7/31/2013	21:32:55	summer	bottlenose dolphin	3	38.2381	-74.8969
10	1	7/31/2013	21:32:56	summer	bottlenose dolphin	3	38.23811	-74.8957
9	1	7/31/2013	22:05:02	summer	bottlenose dolphin	1	38.26782	-74.9637
9	1	7/31/2013	22:07:11	summer	bottlenose dolphin	2	38.26763	-75.0401
9	1	7/31/2013	22:07:15	summer	bottlenose dolphin	4	38.26763	-75.0436
9	1	7/31/2013	22:07:26	summer	bottlenose dolphin	1	38.26764	-75.0496
9	1	7/31/2013	22:08:40	summer	bottlenose dolphin	9	38.26748	-75.0934
9	3	7/31/2013	22:08:48	summer	bottlenose dolphin	4	38.26746	-75.0981
9	1	7/31/2013	22:08:55	summer	bottlenose dolphin	10	38.26745	-75.1016
9	2	7/31/2013	22:08:55	summer	bottlenose dolphin	3	38.26745	-75.1016
9	2	7/31/2013	22:08:56	summer	bottlenose dolphin	1	38.26745	-75.1028
7	1	7/31/2013	22:47:17	summer	bottlenose dolphin	1	38.32492	-74.9269
7	1	7/31/2013	22:51:13	summer	bottlenose dolphin	4	38.32455	-75.0684
5	1	7/31/2013	23:26:56	summer	bottlenose dolphin	1	38.38255	-74.9471
5	1	7/31/2013	23:28:14	summer	bottlenose dolphin	1	38.38244	-74.9957
1	2	8/1/2013	14:58:12	summer	bottlenose dolphin	1	38.50031	-74.8931
2	1	8/1/2013	15:28:10	summer	bottlenose dolphin	2	38.46999	-75.0006
2	2	8/1/2013	15:28:11	summer	bottlenose dolphin	1	38.46999	-75.0006
2	1	8/1/2013	15:28:12	summer	bottlenose dolphin	5	38.46999	-75.0006
2	2	8/1/2013	15:28:12	summer	bottlenose dolphin	1	38.46999	-75.0018
2	2	8/1/2013	15:28:14	summer	bottlenose dolphin	4	38.46999	-75.0030
2	2	8/1/2013	15:28:15	summer	bottlenose dolphin	7	38.46999	-75.0030
2	2	8/1/2013	15:28:27	summer	bottlenose dolphin	7	38.47000	-75.0101
7	2	8/1/2013	16:55:57	summer	bottlenose dolphin	3	38.32538	-74.9499
11	1	8/1/2013	18:17:01	summer	bottlenose dolphin	2	38.20839	-75.0905
3	1	9/29/2013	14:39:41	summer	bottlenose dolphin	5	38.44026	-74.999
3	1	9/29/2013	14:40:44	summer	bottlenose dolphin	10	38.44004	-74.9609
7	1	9/29/2013	15:55:56	summer	bottlenose dolphin	2	38.32274	-75.0601
11	2	9/29/2013	18:33:03	summer	bottlenose dolphin	5	38.20854	-75.0538
11	2	9/29/2013	18:33:07	summer	bottlenose dolphin	6	38.20852	-75.0564
8	1	10/19/2013	17:11:27	fall	bottlenose dolphin	2	38.28518	-75.0359

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
8	2	10/19/2013	17:11:27	fall	bottlenose dolphin	4	38.28524	-75.0372
2	3	10/19/2013	20:20:19	fall	bottlenose dolphin	4	38.46759	-75.0285
2	2	10/19/2013	20:20:22	fall	bottlenose dolphin	2	38.46752	-75.0273
3	2	11/26/2013	15:53:20	fall	bottlenose dolphin	3	38.44051	-74.8543
12	1	12/26/2013	19:49:52	fall	bottlenose dolphin	1	38.17833	-74.8918
9	1	12/26/2013	20:58:56	fall	bottlenose dolphin	5	38.26757	-74.7754
3	1	1/8/2014	15:32:12	winter	bottlenose dolphin	2	38.43390	-74.6681
3	1	1/8/2014	15:32:56	winter	bottlenose dolphin	15	38.43427	-74.6413
3	1	1/8/2014	15:36:27	winter	bottlenose dolphin	3	38.43374	-74.5025
7	1	1/8/2014	16:33:04	winter	bottlenose dolphin	1	38.32372	-75.0460
7	3	1/8/2014	16:44:00	winter	bottlenose dolphin	3	38.32370	-74.6210
7	1	1/8/2014	16:44:19	winter	bottlenose dolphin	2	38.32382	-74.6096
12	2	1/8/2014	18:40:56	winter	bottlenose dolphin	1	38.17749	-75.0966
12	2	1/8/2014	18:41:47	winter	bottlenose dolphin	1	38.17771	-75.0644
12	2	1/8/2014	18:46:10	winter	bottlenose dolphin	3	38.17801	-74.8916
9	1	1/8/2014	19:46:17	winter	bottlenose dolphin	1	38.26835	-74.7928
9	3	1/8/2014	19:46:35	winter	bottlenose dolphin	1	38.26836	-74.8042
9	2	1/8/2014	19:46:48	winter	bottlenose dolphin	1	38.26836	-74.8055
8	1	1/8/2014	19:56:01	winter	bottlenose dolphin	1	38.29517	-75.0811
12	1	2/22/2014	14:47:21	winter	bottlenose dolphin	15	38.15814	-74.552
12	2	2/22/2014	14:48:36	winter	bottlenose dolphin	4	38.15769	-74.5966
12	1	2/22/2014	14:51:24	winter	bottlenose dolphin	9	38.17561	-74.6915
12	1	2/22/2014	14:51:25	winter	bottlenose dolphin	6	38.17534	-74.6904
11	2	2/22/2014	15:25:56	winter	bottlenose dolphin	3	38.20873	-74.4789
10	1	2/22/2014	15:30:46	winter	bottlenose dolphin	3	38.23907	-74.3807
8	1	2/22/2014	16:22:08	winter	common dolphin	2	38.29771	-74.3811
8	1	2/22/2014	16:26:18	winter	common dolphin	4	38.29507	-74.5303
6	1	2/22/2014	17:05:47	winter	bottlenose dolphin	1	38.35293	-74.5001
7	2	2/22/2014	20:34:02	winter	unidentified dolphin	2	38.49977	-74.4402
11	3	3/27/2014	16:04:08	winter	common dolphin	2	38.20839	-74.8915
11	3	3/27/2014	16:04:10	winter	unidentified dolphin	2	38.20838	-74.8927
10	1	3/27/2014	16:28:44	winter	bottlenose dolphin	2	38.23868	-74.5199
1	1	4/25/2014	14:50:08	spring	common dolphin	1	38.50023	-74.4804
1	2	4/25/2014	15:02:03	spring	unidentified dolphin	1	38.50064	-74.9536
7	2	4/25/2014	16:44:03	spring	common dolphin	10	38.32418	-74.4506
7	1	4/25/2014	16:44:26	spring	common dolphin	12	38.32418	-74.4506
8	1	4/25/2014	17:26:41	spring	bottlenose dolphin	5	38.29487	-74.5646
8	1	4/25/2014	17:30:08	spring	common dolphin	75	38.29451	-74.4406
11	2	4/25/2014	19:50:13	spring	unidentified	1	38.20869	-74.8054

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
11	1	4/25/2014	19:50:33	spring	bottlenose dolphin	1	38.20869	-74.8054
10	1	6/12/2014	14:52:50	spring	bottlenose dolphin	5	38.23805	-74.9849
10	2	6/12/2014	14:52:54	spring	bottlenose dolphin	3	38.23803	-74.9875
10	2	6/12/2014	14:52:58	spring	bottlenose dolphin	3	38.23802	-74.9901
10	2	6/12/2014	14:52:59	spring	bottlenose dolphin	NA	38.23802	-74.9901
10	2	6/12/2014	14:53:08	spring	bottlenose dolphin	NA	38.23797	-74.9966
10	1	6/12/2014	14:53:09	spring	bottlenose dolphin	5	38.23795	-74.9979
10	2	6/12/2014	14:53:09	spring	bottlenose dolphin	4	38.23797	-74.9966
10	1	6/12/2014	14:53:12	spring	bottlenose dolphin	2	38.23794	-75.0004
10	1	6/12/2014	14:53:14	spring	bottlenose dolphin	3	38.23793	-75.0017
10	2	6/12/2014	14:53:16	spring	bottlenose dolphin	1	38.23793	-75.0017
10	2	6/12/2014	14:53:16	spring	bottlenose dolphin	100	38.23793	-75.0017
12	3	6/12/2014	15:42:37	spring	bottlenose dolphin	4	38.17756	-75.1263
12	2	6/12/2014	15:42:43	spring	bottlenose dolphin	3	38.17747	-75.1288
12	2	6/12/2014	15:42:44	spring	bottlenose dolphin	NA	38.17743	-75.1301
8	1	6/12/2014	15:49:52	spring	bottlenose dolphin	1	38.2975	-75.0345
8	2	6/12/2014	15:49:55	spring	bottlenose dolphin	2	38.2975	-75.0345
8	3	6/12/2014	15:52:23	spring	bottlenose dolphin	1	38.29568	-74.9417
8	2	6/12/2014	15:52:25	spring	bottlenose dolphin	1	38.29568	-74.9417
7	2	6/12/2014	16:23:07	spring	bottlenose dolphin	1	38.32403	-74.9615
6	3	6/12/2014	17:36:40	spring	bottlenose dolphin	1	38.35409	-74.9628
6	1	6/12/2014	17:37:22	spring	bottlenose dolphin	1	38.35367	-74.9366
6	1	6/12/2014	17:37:23	spring	bottlenose dolphin	8	38.35367	-74.9366
6	2	6/12/2014	17:37:25	spring	bottlenose dolphin	1	38.35369	-74.9354
5	1	6/12/2014	17:58:34	spring	bottlenose dolphin	1	38.38221	-74.6736
5	1	6/12/2014	17:59:08	spring	bottlenose dolphin	5	38.38222	-74.6954
5	1	6/12/2014	17:59:08	spring	bottlenose dolphin	1	38.38222	-74.6954
5	2	6/12/2014	17:59:08	spring	bottlenose dolphin	1	38.38222	-74.6941
5	3	6/12/2014	17:59:10	spring	bottlenose dolphin	8	38.38222	-74.6966
5	3	6/12/2014	17:59:13	spring	bottlenose dolphin	1	38.38222	-74.6979
5	3	6/12/2014	18:06:32	spring	bottlenose dolphin	4	38.38195	-74.9788
5	2	6/12/2014	18:06:34	spring	bottlenose dolphin	4	38.38195	-74.9788
4	3	6/12/2014	18:10:57	spring	bottlenose dolphin	1	38.41279	-75.0379
4	1	6/12/2014	18:12:59	spring	bottlenose dolphin	5	38.41148	-74.9606
4	2	6/12/2014	18:13:01	spring	bottlenose dolphin	5	38.41148	-74.9606
3	1	6/12/2014	18:39:05	spring	bottlenose dolphin	100	38.44012	-74.8369
3	1	6/12/2014	18:39:05	spring	bottlenose dolphin	3	38.44012	-74.8369
3	2	6/12/2014	18:39:07	spring	bottlenose dolphin	40	38.44012	-74.8369
3	2	6/12/2014	18:39:08	spring	bottlenose dolphin	NA	38.44012	-74.8369
3	2	6/12/2014	18:39:15	spring	bottlenose dolphin	3	38.44011	-74.8421
3	1	6/12/2014	18:53:27	spring	bottlenose dolphin	1	38.43973	-75.0069

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
3	2	6/12/2014	18:53:42	spring	bottlenose dolphin	1	38.43967	-75.0146
3	2	6/12/2014	18:53:45	spring	bottlenose dolphin	2	38.43966	-75.0171
3	2	6/12/2014	18:53:45	spring	bottlenose dolphin	2	38.43966	-75.0171
2	1	6/12/2014	18:56:36	spring	bottlenose dolphin	1	38.46999	-75.0338
2	1	6/12/2014	19:00:31	spring	bottlenose dolphin	2	38.4705	-74.8879
2	2	6/12/2014	19:00:35	spring	bottlenose dolphin	2	38.47051	-74.8867
2	1	6/12/2014	19:01:45	spring	bottlenose dolphin	1	38.4706	-74.8419
2	2	6/12/2014	19:01:59	spring	bottlenose dolphin	1	38.4706	-74.8345
1	2	6/12/2014	19:35:49	spring	bottlenose dolphin	1	38.66594	-74.9045
1	2	6/12/2014	19:40:31	spring	bottlenose dolphin	3	38.81455	-74.7553
1	1	6/19/2014	13:33:40	spring	bottlenose dolphin	1	38.50017	-74.7488
1	1	6/19/2014	13:34:24	spring	bottlenose dolphin	5	38.50011	-74.7742
1	3	6/19/2014	13:40:54	spring	bottlenose dolphin	2	38.50045	-74.9131
1	3	6/19/2014	13:41:31	spring	bottlenose dolphin	1	38.50043	-74.9352
1	2	6/19/2014	13:41:33	spring	bottlenose dolphin	NA	38.50043	-74.9365
1	1	6/19/2014	13:41:37	spring	bottlenose dolphin	7	38.50042	-74.9389
2	1	6/19/2014	13:47:51	spring	bottlenose dolphin	1	38.46996	-74.9868
2	1	6/19/2014	13:49:19	spring	bottlenose dolphin	1	38.47035	-74.9318
3	3	6/19/2014	14:19:41	spring	bottlenose dolphin	3	38.44047	-74.9464
3	2	6/19/2014	14:19:44	spring	bottlenose dolphin	1	38.44046	-74.9476
3	3	6/19/2014	14:19:45	spring	bottlenose dolphin	2	38.44046	-74.9500
3	2	6/19/2014	14:19:45	spring	bottlenose dolphin	1	38.44046	-74.9488
3	3	6/19/2014	14:19:47	spring	bottlenose dolphin	4	38.44046	-74.9500
3	3	6/19/2014	14:20:25	spring	bottlenose dolphin	1	38.44041	-74.9727
3	1	6/19/2014	14:21:12	spring	bottlenose dolphin	2	38.44025	-75.0012
3	2	6/19/2014	14:21:13	spring	bottlenose dolphin	2	38.44025	-75.0012
3	1	6/19/2014	14:21:14	spring	bottlenose dolphin	9	38.44024	-75.0024
3	2	6/19/2014	14:21:17	spring	bottlenose dolphin	4	38.44023	-75.0035
4	2	6/19/2014	14:31:44	spring	bottlenose dolphin	10	38.4105	-74.9545
4	3	6/19/2014	14:31:47	spring	bottlenose dolphin	5	38.41058	-74.9508
4	3	6/19/2014	14:34:11	spring	bottlenose dolphin	3	38.41113	-74.862
4	3	6/19/2014	14:39:12	spring	bottlenose dolphin	24	38.41141	-74.6795
5	3	6/19/2014	15:04:45	spring	bottlenose dolphin	13	38.38273	-74.8488
5	1	6/19/2014	15:09:00	spring	bottlenose dolphin	2	38.38237	-75.0099
5	1	6/19/2014	15:09:45	spring	bottlenose dolphin	3	38.38243	-75.0368
5	2	6/19/2014	15:09:58	spring	bottlenose dolphin	3	38.38251	-75.0442
6	1	6/19/2014	15:18:26	spring	bottlenose dolphin	6	38.3537	-74.8223
7	1	6/19/2014	15:43:47	spring	bottlenose dolphin	1	38.32471	-74.7133
7	3	6/19/2014	15:50:57	spring	bottlenose dolphin	35	38.3245	-74.9797
8	1	6/19/2014	16:00:51	spring	bottlenose dolphin	8	38.29369	-75.076
8	2	6/19/2014	16:00:57	spring	bottlenose dolphin	5	38.29385	-75.0721

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
8	2	6/19/2014	16:02:05	spring	bottlenose dolphin	3	38.29510	-75.0307
9	1	6/19/2014	16:37:29	spring	unidentified dolphin	1	38.26778	-74.9611
9	2	6/19/2014	16:40:50	spring	bottlenose dolphin	15	38.26694	-75.0851
9	1	6/19/2014	16:40:51	spring	bottlenose dolphin	15	38.26694	-75.0863
10	1	6/19/2014	18:11:56	spring	bottlenose dolphin	1	38.23813	-75.0464
12	1	6/19/2014	19:11:09	spring	common dolphin	10	38.17837	-74.4436
1	1	7/17/2014	13:45:36	summer	bottlenose dolphin	2	38.49978	-74.8202
1	1	7/17/2014	13:46:10	summer	bottlenose dolphin	1	38.49977	-74.841
1	1	7/17/2014	13:46:26	summer	bottlenose dolphin	1	38.49975	-74.8508
1	1	7/17/2014	13:46:40	summer	bottlenose dolphin	4	38.49977	-74.8594
1	1	7/17/2014	13:46:43	summer	bottlenose dolphin	11	38.49978	-74.8606
1	1	7/17/2014	13:52:36	summer	bottlenose dolphin	2	38.50069	-74.9164
1	1	7/17/2014	13:52:49	summer	bottlenose dolphin	3	38.50091	-74.9239
1	1	7/17/2014	13:54:36	summer	bottlenose dolphin	2	38.5000	-74.9898
1	2	7/17/2014	13:54:40	summer	bottlenose dolphin	11	38.50002	-74.9934
1	1	7/17/2014	13:54:42	summer	bottlenose dolphin	4	38.50002	-74.9934
1	1	7/17/2014	13:54:43	summer	bottlenose dolphin	2	38.50002	-74.9934
1	3	7/17/2014	13:54:43	summer	bottlenose dolphin	9	38.50002	-74.9958
1	1	7/17/2014	13:55:09	summer	bottlenose dolphin	1	38.49982	-75.0090
2	3	7/17/2014	13:59:50	summer	bottlenose dolphin	2	38.47058	-74.9784
3	3	7/17/2014	14:33:52	summer	bottlenose dolphin	1	38.43952	-75.0342
4	1	7/17/2014	14:36:18	summer	bottlenose dolphin	5	38.40977	-75.0384
4	1	7/17/2014	14:41:26	summer	bottlenose dolphin	3	38.41081	-74.9864
7	1	7/17/2014	16:05:15	summer	bottlenose dolphin	2	38.32401	-74.9956
7	1	7/17/2014	16:05:42	summer	bottlenose dolphin	10	38.32362	-75.0127
8	1	7/17/2014	17:24:31	summer	bottlenose dolphin	2	38.29557	-75.0387
8	1	7/17/2014	17:24:32	summer	bottlenose dolphin	8	38.29552	-75.0375
9	1	7/17/2014	17:50:18	summer	spotted dolphin	45	38.26643	-74.389
9	2	7/17/2014	18:14:17	summer	bottlenose dolphin	12	38.26752	-74.9475
11	1	7/17/2014	18:56:55	summer	bottlenose dolphin	2	38.20863	-74.5746
1	1	8/1/2014	13:52:33	summer	bottlenose dolphin	18	38.49984	-74.9874
1	3	8/1/2014	13:52:34	summer	bottlenose dolphin	14	38.49984	-74.9898
1	3	8/1/2014	13:57:46	summer	bottlenose dolphin	1	38.49984	-75.0006
3	1	8/1/2014	14:36:45	summer	bottlenose dolphin	1	38.44036	-75.0178
7	2	8/1/2014	15:53:34	summer	bottlenose dolphin	1	38.32383	-74.9538
7	1	8/1/2014	15:53:35	summer	bottlenose dolphin	1	38.32384	-74.9514
8	1	8/1/2014	15:59:48	summer	bottlenose dolphin	1	38.29605	-74.9625
8	3	8/1/2014	16:00:25	summer	bottlenose dolphin	20	38.29601	-74.941
8	1	8/1/2014	16:00:26	summer	bottlenose dolphin	17	38.29599	-74.9398
8	1	8/1/2014	16:00:33	summer	bottlenose dolphin	8	38.29596	-74.9362

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	2	8/1/2014	16:33:38	summer	bottlenose dolphin	20	38.26754	-74.9546
9	1	8/1/2014	16:33:39	summer	bottlenose dolphin	15	38.26758	-74.9522
9	2	8/1/2014	16:33:47	summer	bottlenose dolphin	15	38.26745	-74.9595
9	1	8/1/2014	16:33:48	summer	bottlenose dolphin	13	38.26747	-74.9583
9	1	8/1/2014	16:33:50	summer	bottlenose dolphin	13	38.26745	-74.9595
12	1	8/1/2014	18:03:09	summer	bottlenose dolphin	7	38.17862	-74.7824
11	3	8/1/2014	18:46:15	summer	bottlenose dolphin	1	38.20803	-75.0769
10	1	8/1/2014	18:52:53	summer	bottlenose dolphin	230	38.23802	-75.0536
10	1	8/1/2014	19:00:42	summer	bottlenose dolphin	45	38.23937	-75.0467
10	1	8/1/2014	19:17:53	summer	unidentified dolphin	1	38.23785	-74.4265
6	1	8/30/2014	15:21:00	summer	bottlenose dolphin	7	38.35461	-74.6742
12	1	8/30/2014	17:30:09	summer	bottlenose dolphin	1	38.17876	-74.905
9	3	8/30/2014	19:02:11	summer	bottlenose dolphin	2	38.2662	-75.1168
2	2	11/5/2014	15:40:08	fall	bottlenose dolphin	1	38.47015	-75.0019
2	1	11/5/2014	15:44:02	fall	bottlenose dolphin	1	38.47028	-74.8497
10	1	11/5/2014	17:04:26	fall	bottlenose dolphin	1	38.23853	-74.8887
8	1	11/5/2014	17:51:51	fall	bottlenose dolphin	2	38.29499	-75.0455
7	3	11/5/2014	19:07:41	fall	bottlenose dolphin	1	38.32484	-74.9843
6	2	11/5/2014	19:36:59	fall	bottlenose dolphin	1	38.35349	-74.8686
6	1	11/5/2014	19:37:19	fall	bottlenose dolphin	2	38.35347	-74.8807
6	2	11/5/2014	19:39:30	fall	bottlenose dolphin	1	38.35337	-74.9606
5	1	11/5/2014	19:47:21	fall	bottlenose dolphin	2	38.38258	-74.9534
5	3	11/5/2014	19:50:00	fall	bottlenose dolphin	2	38.38282	-74.8592
5	1	11/5/2014	19:50:08	fall	bottlenose dolphin	1	38.38285	-74.8544
5	2	11/5/2014	19:50:11	fall	bottlenose dolphin	1	38.38286	-74.852
4	1	11/5/2014	20:17:22	fall	bottlenose dolphin	1	38.41102	-74.9319
4	2	11/5/2014	20:17:22	fall	bottlenose dolphin	2	38.41102	-74.9319
4	2	11/5/2014	20:17:26	fall	bottlenose dolphin	1	38.41104	-74.9344
3	3	11/5/2014	20:26:29	fall	bottlenose dolphin	6	38.44068	-74.9204
5	1	12/15/2014	16:56:28	fall	common dolphin	2	38.38243	-74.5806
4	2	12/15/2014	17:06:23	fall	bottlenose dolphin	5	38.41129	-74.5635
4	2	12/15/2014	17:06:23	fall	bottlenose dolphin	5	38.41129	-74.5635
4	1	12/15/2014	17:06:24	fall	common dolphin	5	38.4113	-74.5623
2	1	12/26/2014	18:42:56	fall	common dolphin	2	38.47029	-74.6492
4	1	12/26/2014	19:25:21	fall	common dolphin	3	38.41177	-74.4306
7	2	1/11/2015	16:58:08	winter	bottlenose dolphin	1	38.32439	-74.5442
4	1	1/17/2015	16:41:51	winter	common dolphin	5	38.4107	-74.4224
4	1	1/17/2015	16:41:51	winter	common dolphin	7	38.4107	-74.4224
5	1	1/17/2015	17:09:30	winter	common dolphin	4	38.38264	-74.5863
5	2	1/17/2015	17:12:52	winter	unidentified dolp.	6	38.38152	-74.6266

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
5	2	1/17/2015	17:17:29	winter	common dolphin	1	38.38279	-74.7977
5	1	1/17/2015	17:17:33	winter	common dolphin	1	38.3828	-74.8003
6	1	1/17/2015	17:39:53	winter	common dolphin	3	38.35306	-74.5869
7	3	1/17/2015	18:11:27	winter	common dolphin	2	38.31974	-74.6059
9	2	1/17/2015	18:53:03	winter	common dolphin	3	38.26783	-74.5715
9	3	1/17/2015	18:53:04	winter	common dolphin	3	38.26783	-74.5728
9	1	1/17/2015	18:53:06	winter	common dolphin	1	38.26784	-74.5740
9	1	1/17/2015	18:53:13	winter	common dolphin	1	38.26785	-74.5778
9	1	1/17/2015	18:53:26	winter	common dolphin	1	38.26775	-74.5865
10	2	1/17/2015	20:22:17	winter	bottlenose dolphin	3	38.23851	-74.6732
11	1	1/17/2015	20:39:42	winter	bottlenose dolphin	1	38.20868	-74.6552
11	2	1/17/2015	20:39:42	winter	bottlenose dolphin	1	38.20868	-74.6552
12	2	1/17/2015	21:08:05	winter	bottlenose dolphin	1	38.17842	-74.6814
4	2	4/25/2015	14:38:12	spring	bottlenose dolphin	1	38.41041	-75.0415
4	2	4/25/2015	14:39:56	spring	bottlenose dolphin	1	38.41088	-74.9786
4	3	4/25/2015	14:40:39	spring	bottlenose dolphin	2	38.41091	-74.9525
5	2	4/25/2015	15:11:20	spring	bottlenose dolphin	1	38.38267	-74.9355
5	1	4/25/2015	15:11:20	spring	bottlenose dolphin	3	38.38267	-74.9355
5	1	4/25/2015	15:12:01	spring	bottlenose dolphin	1	38.38256	-74.9612
5	2	4/25/2015	15:12:26	spring	bottlenose dolphin	3	38.38263	-74.976
5	3	4/25/2015	15:12:26	spring	bottlenose dolphin	3	38.38263	-74.976
5	3	4/25/2015	15:12:48	spring	bottlenose dolphin	2	38.38269	-74.9895
5	2	4/25/2015	15:12:49	spring	bottlenose dolphin	1	38.38268	-74.9908
5	1	4/25/2015	15:12:51	spring	bottlenose dolphin	1	38.38268	-74.992
5	1	4/25/2015	15:13:53	spring	bottlenose dolphin	1	38.38243	-75.0296
5	1	4/25/2015	15:14:01	spring	bottlenose dolphin	1	38.38243	-75.0344
5	1	4/25/2015	15:14:29	spring	bottlenose dolphin	4	38.38235	-75.0509
5	1	4/25/2015	15:14:37	spring	bottlenose dolphin	2	38.38211	-75.0554
5	2	4/25/2015	15:14:40	spring	bottlenose dolphin	4	38.38202	-75.0566
5	2	4/25/2015	15:14:40	spring	bottlenose dolphin	2	38.38202	-75.0566
5	2	4/25/2015	15:15:23	spring	bottlenose dolphin	2	38.37258	-75.0796
6	1	4/25/2015	15:17:45	spring	bottlenose dolphin	1	38.35409	-75.0166
6	1	4/25/2015	15:18:18	spring	bottlenose dolphin	3	38.35359	-74.9963
6	1	4/25/2015	15:19:02	spring	bottlenose dolphin	3	38.35322	-74.9701
6	2	4/25/2015	15:19:04	spring	bottlenose dolphin	2	38.35321	-74.9689
7	1	4/25/2015	15:52:41	spring	bottlenose dolphin	1	38.32456	-75.0213
7	2	4/25/2015	15:52:44	spring	bottlenose dolphin	1	38.32456	-75.0224
7	1	4/25/2015	15:52:49	spring	bottlenose dolphin	4	38.32455	-75.0259
7	3	4/25/2015	15:53:04	spring	bottlenose dolphin	4	38.3245	-75.034
7	1	4/25/2015	15:53:05	spring	bottlenose dolphin	4	38.32449	-75.0351
7	3	4/25/2015	15:53:23	spring	bottlenose dolphin	1	38.32444	-75.0455

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
7	1	4/25/2015	15:54:20	spring	bottlenose dolphin	3	38.32371	-75.0778
8	1	4/25/2015	15:56:51	spring	bottlenose dolphin	1	38.29532	-75.0800
8	2	4/25/2015	15:56:52	spring	bottlenose dolphin	1	38.29532	-75.0800
8	3	4/25/2015	15:57:31	spring	bottlenose dolphin	2	38.2955	-75.0561
8	1	4/25/2015	15:57:56	spring	bottlenose dolphin	8	38.29502	-75.0419
8	1	4/25/2015	15:58:08	spring	bottlenose dolphin	6	38.2948	-75.0347
8	3	4/25/2015	15:58:09	spring	bottlenose dolphin	1	38.29477	-75.0335
8	2	4/25/2015	15:58:15	spring	bottlenose dolphin	1	38.29472	-75.0299
8	3	4/25/2015	15:58:27	spring	bottlenose dolphin	1	38.29467	-75.0226
8	1	4/25/2015	15:58:28	spring	bottlenose dolphin	4	38.29467	-75.0226
9	2	4/25/2015	16:35:52	spring	bottlenose dolphin	8	38.2677	-75.019
9	1	4/25/2015	16:36:01	spring	bottlenose dolphin	8	38.26766	-75.025
9	1	4/25/2015	16:36:08	spring	bottlenose dolphin	1	38.26764	-75.0286
9	1	4/25/2015	16:36:09	spring	bottlenose dolphin	15	38.26764	-75.0298
9	1	4/25/2015	16:36:12	spring	bottlenose dolphin	10	38.26763	-75.031
9	1	4/25/2015	16:36:15	spring	bottlenose dolphin	8	38.26763	-75.0334
9	2	4/25/2015	16:36:30	spring	bottlenose dolphin	8	38.26764	-75.042
9	1	4/25/2015	16:36:54	spring	bottlenose dolphin	2	38.26771	-75.0567
10	1	4/25/2015	17:36:24	spring	bottlenose dolphin	2	38.23752	-75.1341
10	2	4/25/2015	17:38:39	spring	bottlenose dolphin	10	38.23868	-75.0548
10	2	4/25/2015	17:38:42	spring	bottlenose dolphin	15	38.23864	-75.0524
10	3	4/25/2015	17:38:42	spring	bottlenose dolphin	20	38.23862	-75.0512
10	1	4/25/2015	17:38:43	spring	bottlenose dolphin	30	38.23862	-75.0512
10	1	4/25/2015	17:38:45	spring	bottlenose dolphin	30	38.24337	-75.0333
10	2	4/25/2015	17:38:47	spring	bottlenose dolphin	4	38.23860	-75.0500
10	1	4/25/2015	17:38:47	spring	bottlenose dolphin	80	38.23699	-75.0533
11	1	4/25/2015	18:26:14	spring	bottlenose dolphin	3	38.20819	-75.0791
11	2	4/25/2015	18:26:16	spring	bottlenose dolphin	3	38.20819	-75.0803
11	1	4/25/2015	18:26:21	spring	bottlenose dolphin	2	38.20823	-75.0839
11	1	4/25/2015	18:26:29	spring	bottlenose dolphin	8	38.20828	-75.0886
11	2	4/25/2015	18:26:32	spring	bottlenose dolphin	3	38.20829	-75.0898
12	1	4/25/2015	18:34:18	spring	bottlenose dolphin	2	38.17857	-74.9993
12	3	4/25/2015	18:45:20	spring	common dolphin	20	38.17861	-74.6061
1	3	5/21/2015	13:45:51	spring	bottlenose dolphin	6	38.50031	-75.0203
1	3	5/21/2015	13:45:53	spring	bottlenose dolphin	10	38.50031	-75.0215
3	2	5/21/2015	14:23:04	spring	bottlenose dolphin	1	38.44007	-75.0162
3	1	5/21/2015	14:23:05	spring	bottlenose dolphin	1	38.44003	-75.0176
3	1	5/21/2015	14:23:37	spring	bottlenose dolphin	4	38.43979	-75.0372
4	1	5/21/2015	14:28:05	spring	bottlenose dolphin	1	38.41135	-74.9635
4	2	5/21/2015	14:28:10	spring	bottlenose dolphin	1	38.4113	-74.9612
6	2	5/21/2015	15:04:35	spring	bottlenose dolphin	1	38.35394	-75.0425

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
6	2	5/21/2015	15:07:27	spring	bottlenose dolphin	2	38.35308	-74.9422
6	3	5/21/2015	15:07:30	spring	bottlenose dolphin	3	38.35308	-74.9411
6	1	5/21/2015	15:07:36	spring	bottlenose dolphin	2	38.35310	-74.9375
6	2	5/21/2015	15:07:40	spring	bottlenose dolphin	1	38.35310	-74.9351
7	1	5/21/2015	15:40:06	spring	bottlenose dolphin	10	38.32433	-75.0496
11	1	5/21/2015	17:23:13	spring	unidentified dolphin	1	38.20832	-74.4796
1	1	6/25/2015	18:30:26	spring	bottlenose dolphin	2	38.49251	-75.0421
1	3	6/25/2015	18:30:27	spring	bottlenose dolphin	35	38.49249	-75.0409
1	2	6/25/2015	18:31:56	spring	bottlenose dolphin	10	38.49511	-75.0402
1	1	6/25/2015	18:34:23	spring	bottlenose dolphin	10	38.49709	-74.9522
1	2	6/25/2015	18:34:27	spring	bottlenose dolphin	22	38.49714	-74.9499
1	1	6/25/2015	18:34:29	spring	bottlenose dolphin	5	38.49716	-74.9487
1	1	6/25/2015	18:34:30	spring	bottlenose dolphin	9	38.49716	-74.9487
1	2	6/25/2015	18:34:31	spring	bottlenose dolphin	8	38.49717	-74.9475
1	2	6/25/2015	18:35:17	spring	bottlenose dolphin	1	38.49702	-74.9199
2	1	6/25/2015	18:53:23	spring	bottlenose dolphin	1	38.47089	-74.5013
3	2	6/25/2015	19:12:33	spring	unidentified dolphin	1	38.44084	-74.9778
3	2	6/25/2015	19:15:13	spring	bottlenose dolphin	8	38.44090	-74.8863
3	1	6/25/2015	19:15:13	spring	bottlenose dolphin	10	38.44090	-74.8863
5	1	6/25/2015	19:49:55	spring	bottlenose dolphin	15	38.38241	-75.0507
7	1	6/25/2015	20:32:54	spring	bottlenose dolphin	6	38.32511	-74.9729
7	2	6/25/2015	20:32:55	spring	bottlenose dolphin	7	38.32511	-74.9717
9	2	6/25/2015	21:15:46	spring	bottlenose dolphin	20	38.26812	-75.0070
9	1	6/25/2015	21:15:50	spring	bottlenose dolphin	2	38.26812	-75.0047
9	2	6/25/2015	21:15:51	spring	bottlenose dolphin	5	38.26812	-75.0035
9	2	6/25/2015	21:15:54	spring	bottlenose dolphin	1	38.26811	-75.0024
9	2	6/25/2015	21:15:55	spring	bottlenose dolphin	3	38.26811	-75.0012
9	1	6/25/2015	21:15:55	spring	bottlenose dolphin	2	38.26811	-75.0012
9	2	6/25/2015	21:15:56	spring	bottlenose dolphin	8	38.26811	-75.0012
9	1	6/25/2015	21:16:00	spring	bottlenose dolphin	5	38.26811	-74.9990
9	3	6/25/2015	21:16:01	spring	bottlenose dolphin	4	38.26811	-74.9978
9	1	6/25/2015	21:16:04	spring	bottlenose dolphin	10	38.26811	-74.9967
9	1	6/25/2015	21:16:06	spring	bottlenose dolphin	2	38.26811	-74.9955
9	1	6/25/2015	21:16:08	spring	bottlenose dolphin	3	38.26811	-74.9944
9	1	6/25/2015	21:16:08	spring	bottlenose dolphin	3	38.26811	-74.9944
9	2	6/25/2015	21:16:26	spring	bottlenose dolphin	3	38.26810	-74.9841
9	2	6/25/2015	21:16:44	spring	bottlenose dolphin	2	38.26812	-74.9738
9	1	6/25/2015	21:16:45	spring	bottlenose dolphin	1	38.26812	-74.9727
10	3	6/25/2015	21:52:03	spring	bottlenose dolphin	79	38.23776	-74.9658

Table 3: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
10	1	6/25/2015	22:01:54	spring	bottlenose dolphin	8	38.23801	-75.0116
12	2	6/25/2015	22:48:21	spring	bottlenose dolphin	1	38.17746	-75.0597
12	3	6/25/2015	22:48:23	spring	bottlenose dolphin	2	38.17745	-75.0609
12	2	6/25/2015	22:49:03	spring	bottlenose dolphin	2	38.17735	-75.085
12	1	6/25/2015	22:52:44	spring	bottlenose dolphin	1	38.17774	-75.1540
12	3	6/25/2015	22:55:14	spring	bottlenose dolphin	1	38.17813	-75.0578
12	2	6/25/2015	23:06:52	spring	unidentified dolphin	1	38.17899	-74.6387
10	1	6/26/2015	19:49:24	spring	bottlenose dolphin	3	38.23593	-75.1173
8	2	6/26/2015	20:38:33	spring	bottlenose dolphin	2	38.28402	-74.9373
8	1	6/26/2015	20:38:37	spring	bottlenose dolphin	3	38.28414	-74.9361
2	2	6/26/2015	22:31:48	spring	bottlenose dolphin	2	38.46857	-74.9911
2	2	6/26/2015	22:32:01	spring	bottlenose dolphin	2	38.46925	-74.9846
2	2	6/26/2015	22:32:01	spring	bottlenose dolphin	1	38.46925	-74.9846
2	2	6/26/2015	22:32:01	spring	bottlenose dolphin	1	38.46925	-74.9846
2	2	6/26/2015	22:32:01	spring	bottlenose dolphin	1	38.46925	-74.9846
2	1	6/26/2015	22:32:05	spring	bottlenose dolphin	11	38.46937	-74.9834
2	2	6/26/2015	22:34:50	spring	bottlenose dolphin	4	38.47098	-74.8807
2	2	6/26/2015	22:34:50	spring	bottlenose dolphin	5	38.47098	-74.8807
2	1	6/26/2015	22:34:52	spring	bottlenose dolphin	5	38.47098	-74.8819
2	2	6/26/2015	22:34:58	spring	bottlenose dolphin	2	38.47100	-74.8758
2	1	6/26/2015	22:35:02	spring	bottlenose dolphin	2	38.47100	-74.8758
2	2	6/26/2015	22:42:32	spring	unidentified dolphin	1	38.47105	-74.5908
1	3	6/26/2015	23:00:37	spring	bottlenose dolphin	2	38.50060	-74.8875
1	2	6/26/2015	23:00:49	spring	bottlenose dolphin	1	38.50058	-74.8951
1	1	6/26/2015	23:01:56	spring	bottlenose dolphin	3	38.50055	-74.9355
1	1	6/26/2015	23:02:33	spring	bottlenose dolphin	2	38.50068	-74.9591
1	2	6/26/2015	23:04:33	spring	bottlenose dolphin	4	38.50066	-75.0374

Most of the 453 delphinid sightings were bottlenose dolphins (N=417; 92%) and group sizes ranged from one to 230 with a mean of seven and a median of three. Number of sightings, number of animals and group size differed by season with number of sightings highest in spring and number of animals and group size highest in summer (Table 4). Bottlenose dolphins tended to be sighted west of the wind energy area in spring, summer and fall and were fairly evenly distributed throughout the survey area in winter (Figure 6).

There were also 24 common dolphin sightings representing 199 animals with a mean group size of eight and a median of 3.5. There were no common dolphins sighted in summer. Common dolphin group size ranged from one to 75. Number of sightings was highest in winter but number of animals and group size were highest in spring (Table 4; Figure 6). Two common dolphin sightings in winter were in the WEA and all other sightings were east of the WEA. There was one sighting of 45 spotted dolphins in summer east of the WEA.

Table 4: Seasonal sightings, number of animals and group size for delphinids in the survey area.

Delphinid species	Winter (Jan-Mar)		Spring (Apr-Jun)		Summer (Jul-Sep)		Fall (Oct-Dec)		Total Delphinids	
	Sightings/ Animals	Group size	Sightings/ Animals	Group size	Sightings/ Animals	Group size	Sightings/ Animals	Group size	Sightings/ Animals	Group size
bottlenose dolphin	25/84	3.4	217/1342	6.2	150/1492	9.9	25/60	2.4	417/2978	7.1
common dolphin	14/41	2.9	7/148	21.1	0	NA	3/10	3.3	24/199	8.3
spotted dolphin	0	NA	0	NA	1/45	45.0	0	NA	1/45	45.0
unidentified dolphin	3/10	3.3	7/7	1.0	1/1	1.0	0	NA	11/18	1.6
Totals	42/135	3.2	231/1497	6.5	0	55.9	28/70	2.5	453/3240	7.2

Delphinid species in the mid-Atlantic are protected under the U.S. Marine Mammal Protection Act but are not considered endangered or threatened under the Endangered Species Act. The population structure of bottlenose dolphins is complex with an offshore stock located near the continental shelf edge and multiple migratory and resident coastal stocks close to shore and in estuarine waters (Waring *et al.* 2013). The bottlenose dolphin (*Tursiops truncatus*) is the most common marine mammal in coastal mid-Atlantic waters. Coastal bottlenose dolphins are consistently seen in Virginia waters from May through October (Barco *et al.* 1999), and it is likely that they occur at similar times off the coast of Maryland. Coastal bottlenose dolphins north of North Carolina are considered migratory and may belong to either the southern or northern coastal migratory stock. Bottlenose dolphins sighted east of the 200m isobath are, by definition, offshore bottlenose dolphins. Coastal bottlenose dolphins are generally found within 30km of shore (Torres *et al.* 2003).

The common dolphin (in the western north Atlantic also called the short-beaked common dolphin) is one of the most widely distributed species worldwide, and they typically occur over the continental shelf in waters 100-2,000 m deep. In the mid-Atlantic, they are often associated with the Gulf Stream (Waring *et al.* 2013). Common dolphins are regularly seen north of Cape Hatteras North Carolina. From January through April, some of the population can be found in the mid-Atlantic.

There are two species of spotted dolphin in the North Atlantic and although both species have stranded in the mid-Atlantic, the more common species off Maryland is the Atlantic spotted dolphin (*Stenella frontalis*). There are two ecotypes of Atlantic spotted dolphin that could be distinct sub-species (Waring *et al.* 2013). A larger heavily spotted ecotype is usually found inside or near the 200m isobath and the smaller, less spotted form that is found east of the continental shelf. The two ecotypes are difficult to distinguish and abundance is reported for both forms combined. The abundance estimate for Atlantic spotted dolphins from central Virginia to the Bay of Fundy was 26,798 (CV=0.66) from surveys conducted in the summer of 2011 (Waring *et al.* 2013). There are no data on spotted dolphin population trends.

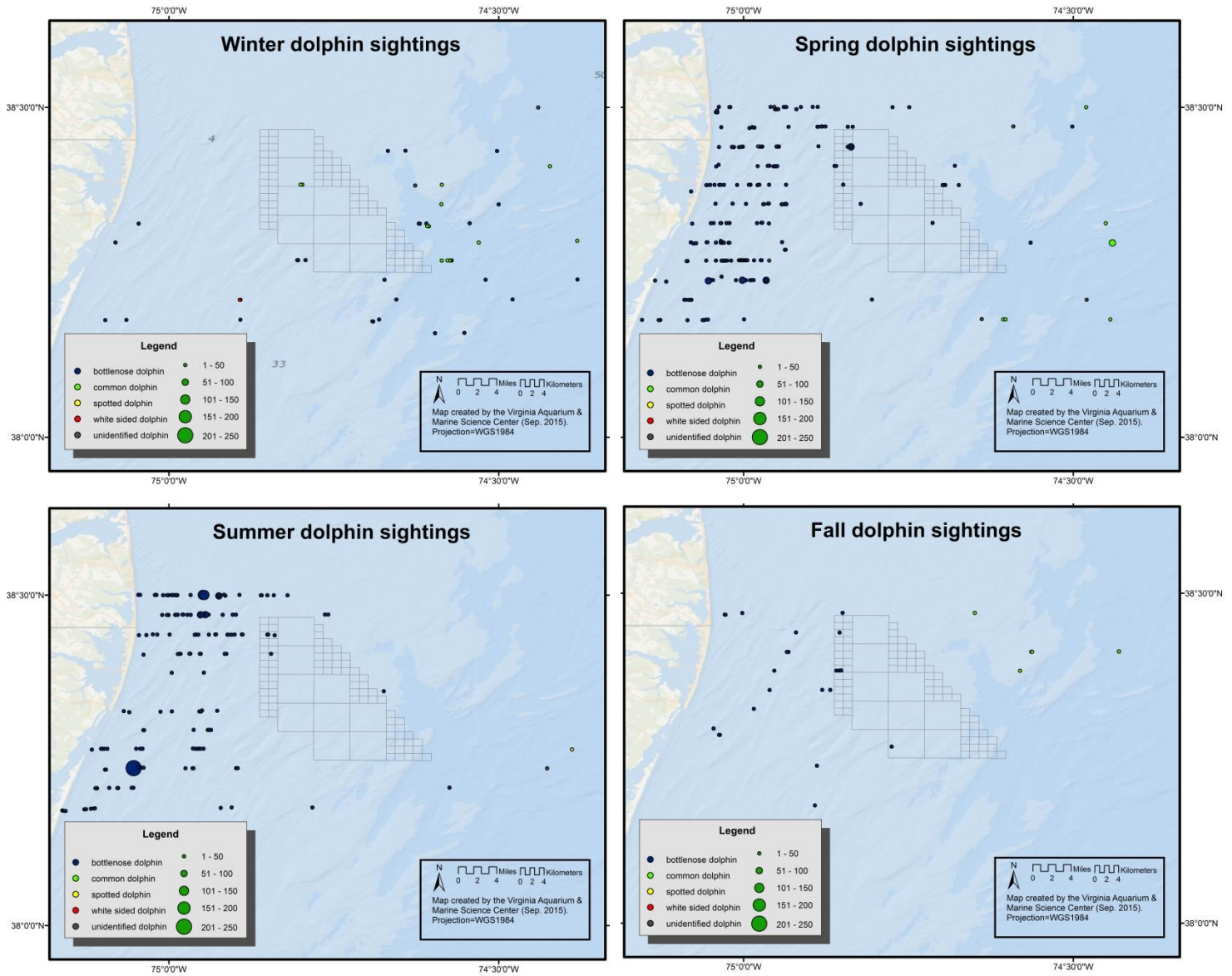


Figure 6: Seasonal delphinid sightings from July 2103 to June 2015.

Sea Turtles

Sea turtles generally have two distinct life stages, a pelagic (offshore) stage which includes hatchlings to small juveniles, and a neritic (inshore to the continental shelf break) stage which includes larger juveniles and adults. Only adult females leave the water for nesting. Sea turtles in the mid-Atlantic are migratory, spending the warm weather months feeding in temperate waters and moving south of Cape Hatteras, NC in the cooler months. The most common species, the loggerhead, appears in the spring when surface water temperatures approach 20 °C, usually mid-May. They tend to leave the area when water temperatures fall below 18 °C, usually in October (Mansfield 2009). Abundance of sea turtles has traditionally been estimated using counts of nests or nesting females, but this information provides little detail on relative abundance in foraging areas.

Genetic analyses suggests that loggerhead turtles from all nesting areas in the northwest Atlantic mix on the foraging grounds, but the majority of the loggerheads in the mid-Atlantic region are from the Northern Recovery Unit of the Northwest Atlantic Distinct Population Unit which nests north of the Georgia/Florida border (Conant *et al.* 2009). Kemp’s ridley, green and leatherback sea turtles in the mid-Atlantic are from a single stock of animals in the region. All sea turtles in the northwest Atlantic are protected under the U.S. Endangered Species Act.

Sea turtles represented the greatest number of sightings of all animal groups. There are five sea turtle species found in the waters of the U.S. mid-Atlantic, and four of those species were sighted during the survey, loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*) and Kemp’s ridley sea turtles (*Lepidochelys kempii*; Table 5). Nearly all of the turtle sightings were of a single animal (N=933 of 954; 98%), but groups of up to three animals were sighted. Of the 893 turtles identified to species, 93% (N=833) were loggerheads. Of the other species, there were 45 greens, 14 leatherbacks and one Kemp’s ridley sighted. In 83 sightings of 84 turtles, unidentified hard-shelled turtles were sighted, but the species was not identified. Because of the number of turtle sightings and the need to complete every track line, the observers did not break from the track line to identify every turtle observed.

Table 5: Sea turtle sightings from July 2013 through June 2015. Sightings are ordered by date and time of the observation.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	1	7/30/2013	14:38:05	summer	loggerhead turtle	1	38.4999	-74.9708
1	1	7/30/2013	14:52:03	summer	loggerhead turtle	1	38.5003	-74.5821
2	2	7/30/2013	14:58:13	summer	loggerhead turtle	1	38.4697	-74.4226
2	2	7/30/2013	15:03:02	summer	loggerhead turtle	1	38.4703	-74.5966
2	2	7/30/2013	15:10:21	summer	loggerhead turtle	1	38.4704	-74.8656
2	1	7/30/2013	15:11:49	summer	loggerhead turtle	1	38.4701	-74.9248
2	1	7/30/2013	15:12:06	summer	loggerhead turtle	1	38.4703	-74.9348
2	1	7/30/2013	15:14:08	summer	loggerhead turtle	1	38.4702	-75.0105
2	2	7/30/2013	15:14:40	summer	loggerhead turtle	1	38.4700	-75.0280
3	2	7/30/2013	15:20:08	summer	green turtle	1	38.4405	-74.9713
3	1	7/30/2013	15:21:58	summer	loggerhead turtle	1	38.4403	-74.9003
3	2	7/30/2013	15:21:59	summer	loggerhead turtle	1	38.4402	-74.9040
4	2	7/30/2013	15:39:14	summer	loggerhead turtle	1	38.4110	-74.4561
4	2	7/30/2013	15:39:17	summer	loggerhead turtle	1	38.4110	-74.4573
4	1	7/30/2013	15:45:17	summer	loggerhead turtle	1	38.4113	-74.5637
4	1	7/30/2013	15:48:12	summer	loggerhead turtle	1	38.4114	-74.6720
4	1	7/30/2013	15:55:45	summer	unidentified turtle	1	38.4112	-74.9482
4	2	7/30/2013	15:55:51	summer	loggerhead turtle	1	38.4112	-74.9482
4	2	7/30/2013	15:56:03	summer	loggerhead turtle	1	38.4111	-74.9555
4	2	7/30/2013	15:56:19	summer	loggerhead turtle	1	38.4113	-74.9652

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
12	1	7/31/2013	20:49:34	summer	unidentified turtle	1	38.1784	-74.8034
12	1	7/31/2013	20:50:04	summer	loggerhead turtle	1	38.1787	-74.7857
12	3	7/31/2013	20:52:06	summer	loggerhead turtle	1	38.1788	-74.7145
12	1	7/31/2013	20:56:10	summer	loggerhead turtle	1	38.1788	-74.5682
12	1	7/31/2013	20:56:42	summer	loggerhead turtle	1	38.1788	-74.5491
12	1	7/31/2013	20:56:50	summer	loggerhead turtle	1	38.1788	-74.5444
12	2	7/31/2013	20:56:50	summer	loggerhead turtle	1	38.1788	-74.5444
12	2	7/31/2013	20:56:51	summer	loggerhead turtle	1	38.1788	-74.5444
12	3	7/31/2013	20:56:58	summer	loggerhead turtle	1	38.1787	-74.5396
12	2	7/31/2013	20:56:59	summer	loggerhead turtle	1	38.1787	-74.5396
12	1	7/31/2013	20:58:16	summer	loggerhead turtle	1	38.1785	-74.4929
12	1	7/31/2013	20:58:20	summer	loggerhead turtle	1	38.1785	-74.4905
12	2	7/31/2013	20:58:21	summer	loggerhead turtle	1	38.1785	-74.4893
12	2	7/31/2013	20:58:22	summer	loggerhead turtle	1	38.1785	-74.4893
12	1	7/31/2013	21:00:12	summer	loggerhead turtle	1	38.1783	-74.4232
12	1	7/31/2013	21:00:30	summer	loggerhead turtle	1	38.1783	-74.4124
12	3	7/31/2013	21:01:08	summer	loggerhead turtle	1	38.1782	-74.3897
11	2	7/31/2013	21:04:55	summer	loggerhead turtle	1	38.2079	-74.4412
11	2	7/31/2013	21:04:56	summer	loggerhead turtle	1	38.2079	-74.4424
11	2	7/31/2013	21:04:57	summer	loggerhead turtle	1	38.2079	-74.4424
11	1	7/31/2013	21:04:58	summer	loggerhead turtle	1	38.2079	-74.4436
11	2	7/31/2013	21:06:15	summer	loggerhead turtle	1	38.2079	-74.4893
11	1	7/31/2013	21:07:38	summer	green turtle	1	38.2079	-74.5391
11	1	7/31/2013	21:10:33	summer	loggerhead turtle	1	38.2080	-74.6452
11	1	7/31/2013	21:12:26	summer	loggerhead turtle	1	38.2083	-74.7137
11	1	7/31/2013	21:15:24	summer	loggerhead turtle	1	38.2083	-74.8192
11	1	7/31/2013	21:17:44	summer	loggerhead turtle	1	38.2083	-74.9021
10	2	7/31/2013	21:27:07	summer	loggerhead turtle	1	38.2367	-75.1069
10	2	7/31/2013	21:39:33	summer	loggerhead turtle	1	38.2381	-74.6577
10	3	7/31/2013	21:39:38	summer	green turtle	1	38.2381	-74.6541
10	3	7/31/2013	21:41:39	summer	loggerhead turtle	1	38.2380	-74.5819
10	1	7/31/2013	21:41:55	summer	unidentified turtle	1	38.2380	-74.5723
10	3	7/31/2013	21:45:42	summer	loggerhead turtle	1	38.2376	-74.4350
10	1	7/31/2013	21:45:58	summer	loggerhead turtle	1	38.2376	-74.4253
10	2	7/31/2013	21:46:00	summer	loggerhead turtle	2	38.2376	-74.4241
10	2	7/31/2013	21:46:00	summer	loggerhead turtle	1	38.2376	-74.4241
10	1	7/31/2013	21:46:23	summer	loggerhead turtle	1	38.2377	-74.4109
10	1	7/31/2013	21:47:06	summer	unidentified turtle	1	38.2381	-74.3845
9	1	7/31/2013	21:48:54	summer	loggerhead turtle	1	38.2660	-74.3856
9	2	7/31/2013	21:49:34	summer	green turtle	1	38.2672	-74.4094
9	2	7/31/2013	21:51:00	summer	loggerhead turtle	1	38.2676	-74.4602

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	1	7/31/2013	21:51:02	summer	loggerhead turtle	1	38.2676	-74.4614
9	1	7/31/2013	21:53:28	summer	green turtle	1	38.2678	-74.5475
9	1	7/31/2013	21:56:44	summer	loggerhead turtle	1	38.2679	-74.6628
9	2	7/31/2013	21:56:49	summer	loggerhead turtle	1	38.2679	-74.6652
9	2	7/31/2013	22:04:13	summer	green turtle	1	38.2679	-74.9339
9	2	7/31/2013	22:08:38	summer	loggerhead turtle	1	38.2675	-75.0923
8	1	7/31/2013	22:13:45	summer	loggerhead turtle	1	38.2947	-75.0083
8	1	7/31/2013	22:14:09	summer	unidentified turtle	1	38.2946	-74.9938
8	2	7/31/2013	22:14:10	summer	loggerhead turtle	1	38.2946	-74.9926
8	2	7/31/2013	22:15:32	summer	unidentified turtle	1	38.2947	-74.9437
8	2	7/31/2013	22:16:17	summer	unidentified turtle	1	38.2948	-74.9176
8	1	7/31/2013	22:16:29	summer	loggerhead turtle	1	38.2948	-74.9106
8	2	7/31/2013	22:16:31	summer	loggerhead turtle	1	38.2948	-74.9094
8	1	7/31/2013	22:23:44	summer	unidentified turtle	1	38.2953	-74.6476
8	3	7/31/2013	22:27:00	summer	green turtle	1	38.2947	-74.5297
8	2	7/31/2013	22:27:47	summer	loggerhead turtle	1	38.2946	-74.5026
8	1	7/31/2013	22:27:53	summer	loggerhead turtle	1	38.2946	-74.4990
8	1	7/31/2013	22:27:54	summer	loggerhead turtle	1	38.2946	-74.4979
8	2	7/31/2013	22:28:01	summer	loggerhead turtle	1	38.2946	-74.4943
7	3	7/31/2013	22:34:49	summer	loggerhead turtle	1	38.3241	-74.4665
7	2	7/31/2013	22:34:49	summer	loggerhead turtle	1	38.3241	-74.4653
7	1	7/31/2013	22:50:02	summer	loggerhead turtle	1	38.3247	-75.0262
6	1	7/31/2013	23:01:06	summer	green turtle	1	38.3532	-74.7865
6	1	7/31/2013	23:01:34	summer	green turtle	1	38.3532	-74.7692
6	1	7/31/2013	23:05:36	summer	unidentified turtle	1	38.3530	-74.6205
6	1	7/31/2013	23:06:15	summer	green turtle	1	38.3530	-74.5961
6	2	7/31/2013	23:07:36	summer	loggerhead turtle	1	38.3529	-74.5474
5	3	7/31/2013	23:15:17	summer	loggerhead turtle	1	38.3824	-74.5150
5	2	7/31/2013	23:15:19	summer	loggerhead turtle	1	38.3824	-74.5162
5	1	7/31/2013	23:16:54	summer	green turtle	1	38.3824	-74.5786
5	1	7/31/2013	23:16:55	summer	loggerhead turtle	1	38.3824	-74.5761
5	2	7/31/2013	23:17:29	summer	unidentified turtle	1	38.3824	-74.5972
5	1	7/31/2013	23:21:44	summer	green turtle	1	38.3826	-74.7539
5	2	7/31/2013	23:23:11	summer	loggerhead turtle	1	38.3826	-74.8063
5	1	7/31/2013	23:26:06	summer	loggerhead turtle	1	38.3826	-74.9157
5	2	7/31/2013	23:26:43	summer	loggerhead turtle	1	38.3826	-74.9383
5	2	7/31/2013	23:26:43	summer	loggerhead turtle	1	38.3826	-74.9383
5	2	7/31/2013	23:26:47	summer	loggerhead turtle	1	38.3826	-74.9408
1	2	8/1/2013	14:59:20	summer	loggerhead turtle	1	38.5005	-74.8530
1	2	8/1/2013	15:01:38	summer	loggerhead turtle	1	38.5005	-74.7703

Table5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	1	8/1/2013	15:01:41	summer	green turtle	1	38.5005	-74.7691
2	2	8/1/2013	15:14:47	summer	loggerhead turtle	2	38.4697	-74.5077
2	2	8/1/2013	15:14:48	summer	loggerhead turtle	2	38.4698	-74.5091
2	1	8/1/2013	15:20:06	summer	loggerhead turtle	1	38.4701	-74.7068
4	2	8/1/2013	15:59:24	summer	loggerhead turtle	1	38.4108	-74.7604
4	1	8/1/2013	16:03:31	summer	green turtle	1	38.4107	-74.9088
4	1	8/1/2013	16:05:01	summer	loggerhead turtle	1	38.4106	-74.9624
5	1	8/1/2013	16:25:34	summer	loggerhead turtle	1	38.3824	-74.4620
5	2	8/1/2013	16:25:34	summer	loggerhead turtle	1	38.3824	-74.4620
6	1	8/1/2013	16:37:59	summer	loggerhead turtle	1	38.3527	-74.7685
8	2	8/1/2013	17:15:39	summer	loggerhead turtle	1	38.2944	-74.4998
8	2	8/1/2013	17:17:43	summer	loggerhead turtle	1	38.2945	-74.5748
9	2	8/1/2013	17:50:47	summer	loggerhead turtle	2	38.2678	-74.4990
9	2	8/1/2013	17:50:50	summer	loggerhead turtle	NA	38.2678	-74.4966
10	1	8/1/2013	17:57:12	summer	loggerhead turtle	1	38.2378	-74.5914
11	2	8/1/2013	18:16:34	summer	loggerhead turtle	1	38.2082	-75.1064
11	1	8/1/2013	18:16:36	summer	loggerhead turtle	1	38.2083	-75.1052
12	2	8/1/2013	18:30:15	summer	leatherback turtle	1	38.1780	-74.9259
2	2	9/29/2013	14:28:05	summer	loggerhead turtle	1	38.4708	-74.7320
4	2	9/29/2013	14:57:41	summer	loggerhead turtle	1	38.4086	-74.4248
4	1	9/29/2013	15:04:51	summer	loggerhead turtle	1	38.4117	-74.6924
6	1	9/29/2013	15:39:44	summer	loggerhead turtle	1	38.3535	-74.5591
6	2	9/29/2013	15:40:52	summer	loggerhead turtle	1	38.3535	-74.6023
6	1	9/29/2013	15:45:10	summer	loggerhead turtle	1	38.3536	-74.7680
7	1	9/29/2013	16:11:22	summer	loggerhead turtle	1	38.3243	-74.5081
8	2	9/29/2013	16:15:26	summer	loggerhead turtle	NA	38.3148	-74.4046
8	1	9/29/2013	16:19:14	summer	loggerhead turtle	1	38.2956	-74.5664
12	2	9/29/2013	17:59:36	summer	loggerhead turtle	1	38.1784	-74.9129
12	2	9/29/2013	18:11:16	summer	loggerhead turtle	1	38.1781	-74.4843
12	1	9/29/2013	18:13:27	summer	loggerhead turtle	1	38.1778	-74.4048
12	2	9/29/2013	18:13:33	summer	loggerhead turtle	1	38.1778	-74.4012
12	1	9/29/2013	18:13:34	summer	loggerhead turtle	1	38.1778	-74.4012
12	2	9/29/2013	18:13:36	summer	loggerhead turtle	1	38.1778	-74.4000
11	2	9/29/2013	18:16:21	summer	loggerhead turtle	1	38.2045	-74.4024
11	2	9/29/2013	18:18:55	summer	loggerhead turtle	1	38.2083	-74.4994
10	2	9/29/2013	18:44:04	summer	green turtle	1	38.2387	-74.8799
10	2	9/29/2013	18:55:34	summer	loggerhead turtle	1	38.2383	-74.4528
10	2	9/29/2013	18:56:35	summer	loggerhead turtle	1	38.2383	-74.4149
10	2	9/29/2013	18:56:36	summer	loggerhead turtle	1	38.2383	-74.4149
9	2	9/29/2013	19:00:55	summer	loggerhead turtle	1	38.2673	-74.4480
9	2	9/29/2013	19:03:07	summer	loggerhead turtle	1	38.2674	-74.5332

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	2	9/29/2013	19:03:09	summer	loggerhead turtle	1	38.2674	-74.5345
9	2	9/29/2013	19:03:39	summer	loggerhead turtle	1	38.2676	-74.5542
12	2	10/19/2013	15:54:13	fall	unidentified turtle	1	38.1786	-74.6887
12	2	10/19/2013	16:01:35	fall	loggerhead turtle	1	38.1781	-74.4212
11	2	10/19/2013	16:11:26	fall	loggerhead turtle	1	38.2087	-74.6566
11	2	10/19/2013	16:11:44	fall	loggerhead turtle	1	38.2087	-74.6674
11	3	10/19/2013	16:20:26	fall	loggerhead turtle	1	38.2083	-74.9865
11	2	10/19/2013	16:22:46	fall	loggerhead turtle	1	38.2081	-75.0729
11	2	10/19/2013	16:22:51	fall	unidentified turtle	1	38.2081	-75.0754
10	1	10/19/2013	16:47:10	fall	loggerhead turtle	1	38.2379	-74.4019
10	1	10/19/2013	16:47:13	fall	loggerhead turtle	1	38.2379	-74.4008
8	1	10/19/2013	17:11:29	fall	loggerhead turtle	1	38.2852	-75.0359
8	1	10/19/2013	17:12:13	fall	green turtle	1	38.2849	-75.0086
8	1	10/19/2013	17:16:56	fall	green turtle	1	38.3000	-74.8329
8	1	10/19/2013	17:21:17	fall	green turtle	1	38.3039	-74.6757
8	2	10/19/2013	17:22:19	fall	loggerhead turtle	1	38.2987	-74.6385
8	2	10/19/2013	17:24:56	fall	loggerhead turtle	1	38.2978	-74.5393
8	1	10/19/2013	17:25:35	fall	loggerhead turtle	1	38.2980	-74.5158
8	2	10/19/2013	17:25:40	fall	loggerhead turtle	1	38.2981	-74.5121
6	3	10/19/2013	18:04:46	fall	loggerhead turtle	1	38.3533	-74.5832
4	1	10/19/2013	18:43:15	fall	loggerhead turtle	1	38.4110	-74.4729
2	3	10/19/2013	20:24:30	fall	loggerhead turtle	1	38.4671	-74.8751
2	1	10/19/2013	20:25:25	fall	loggerhead turtle	1	38.4673	-74.8412
2	2	10/19/2013	20:33:53	fall	loggerhead turtle	1	38.4670	-74.5306
1	1	10/19/2013	20:43:20	fall	loggerhead turtle	1	38.5004	-74.6097
1	1	10/19/2013	20:43:32	fall	loggerhead turtle	1	38.5004	-74.6172
1	1	10/19/2013	20:47:21	fall	unidentified turtle	1	38.5005	-74.7585
5	1	11/26/2013	16:01:59	fall	loggerhead turtle	1	38.3820	-74.9923
6	1	12/26/2013	17:13:48	fall	loggerhead turtle	1	38.3538	-74.7803
11	2	2/22/2014	15:13:30	winter	loggerhead turtle	1	38.2091	-74.9240
10	2	2/22/2014	15:36:06	winter	loggerhead turtle	1	38.2380	-74.5686
9	2	6/12/2014	14:30:33	spring	loggerhead turtle	1	38.2678	-74.6011
9	1	6/12/2014	14:30:47	spring	unidentified turtle	1	38.2678	-74.5911
9	2	6/12/2014	14:31:17	spring	loggerhead turtle	1	38.2677	-74.5736
9	2	6/12/2014	14:31:41	spring	loggerhead turtle	1	38.2677	-74.5586
9	1	6/12/2014	14:32:05	spring	unidentified turtle	1	38.2677	-74.5424
9	2	6/12/2014	14:32:10	spring	loggerhead turtle	1	38.2676	-74.5399
9	1	6/12/2014	14:32:41	spring	loggerhead turtle	1	38.2676	-74.5199
9	2	6/12/2014	14:32:42	spring	loggerhead turtle	1	38.2676	-74.5199
9	1	6/12/2014	14:32:46	spring	loggerhead turtle	1	38.2676	-74.5162
9	1	6/12/2014	14:33:24	spring	unidentified turtle	1	38.2675	-74.4925

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	3	6/12/2014	14:33:27	spring	loggerhead turtle	1	38.2675	-74.4912
10	2	6/12/2014	14:40:21	spring	loggerhead turtle	1	38.2393	-74.4893
10	3	6/12/2014	14:41:04	spring	loggerhead turtle	1	38.2395	-74.5185
10	1	6/12/2014	14:41:39	spring	green turtle	1	38.2394	-74.5434
10	1	6/12/2014	14:43:01	spring	green turtle	1	38.2396	-74.5960
10	2	6/12/2014	14:43:02	spring	loggerhead turtle	1	38.2396	-74.5960
10	2	6/12/2014	14:43:03	spring	loggerhead turtle	1	38.2396	-74.5960
11	2	6/12/2014	15:09:24	spring	loggerhead turtle	2	38.2088	-74.7374
11	2	6/12/2014	15:14:14	spring	loggerhead turtle	1	38.2087	-74.5564
11	2	6/12/2014	15:14:53	spring	loggerhead turtle	1	38.2086	-74.5325
11	2	6/12/2014	15:14:53	spring	loggerhead turtle	1	38.2086	-74.5325
11	2	6/12/2014	15:15:00	spring	loggerhead turtle	NA	38.2086	-74.5274
11	1	6/12/2014	15:15:12	spring	unidentified turtle	1	38.2086	-74.5199
11	3	6/12/2014	15:17:13	spring	loggerhead turtle	1	38.2084	-74.4429
11	2	6/12/2014	15:17:17	spring	loggerhead turtle	1	38.2084	-74.4417
11	1	6/12/2014	15:18:22	spring	loggerhead turtle	1	38.2083	-74.3989
12	1	6/12/2014	15:27:01	spring	loggerhead turtle	1	38.1801	-74.5133
12	1	6/12/2014	15:28:16	spring	unidentified turtle	1	38.1800	-74.5642
12	2	6/12/2014	15:30:57	spring	loggerhead turtle	1	38.1781	-74.6700
12	1	6/12/2014	15:31:30	spring	loggerhead turtle	1	38.1783	-74.6948
12	2	6/12/2014	15:31:41	spring	loggerhead turtle	1	38.1783	-74.7003
12	2	6/12/2014	15:31:55	spring	loggerhead turtle	1	38.1782	-74.7099
12	1	6/12/2014	15:32:47	spring	loggerhead turtle	1	38.1783	-74.7461
12	3	6/12/2014	15:32:47	spring	loggerhead turtle	1	38.1783	-74.7461
12	2	6/12/2014	15:32:49	spring	loggerhead turtle	1	38.1783	-74.7461
12	3	6/12/2014	15:33:03	spring	loggerhead turtle	1	38.1782	-74.7564
12	1	6/12/2014	15:34:47	spring	unidentified turtle	1	38.1781	-74.8212
12	2	6/12/2014	15:39:39	spring	loggerhead turtle	1	38.1779	-75.0125
8	2	6/12/2014	16:00:29	spring	unidentified turtle	NA	38.2959	-74.6422
8	1	6/12/2014	16:00:50	spring	unidentified turtle	1	38.2959	-74.6273
8	1	6/12/2014	16:02:14	spring	loggerhead turtle	1	38.2958	-74.5765
8	1	6/12/2014	16:05:05	spring	unidentified turtle	1	38.2956	-74.4693
7	2	6/12/2014	16:10:12	spring	loggerhead turtle	1	38.3238	-74.4540
7	1	6/12/2014	16:10:44	spring	green turtle	1	38.3240	-74.4757
7	2	6/12/2014	16:10:44	spring	loggerhead turtle	1	38.3240	-74.4757
7	2	6/12/2014	16:10:46	spring	loggerhead turtle	NA	38.3240	-74.4770
7	2	6/12/2014	16:11:05	spring	loggerhead turtle	1	38.3239	-74.4892
7	2	6/12/2014	16:12:04	spring	loggerhead turtle	1	38.3239	-74.5292
7	1	6/12/2014	16:12:15	spring	loggerhead turtle	1	38.3240	-74.5371
7	2	6/12/2014	16:14:39	spring	loggerhead turtle	1	38.3241	-74.6300
7	1	6/12/2014	16:17:13	spring	loggerhead turtle	1	38.3243	-74.7317

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
7	1	6/12/2014	16:19:24	spring	unidentified turtle	1	38.3243	-74.8185
6	2	6/12/2014	17:34:53	spring	loggerhead turtle	NA	38.3541	-75.0314
6	2	6/12/2014	17:34:53	spring	loggerhead turtle	1	38.3541	-75.0314
6	1	6/12/2014	17:37:28	spring	unidentified turtle	1	38.3537	-74.9329
6	2	6/12/2014	17:39:46	spring	loggerhead turtle	1	38.3537	-74.8478
6	2	6/12/2014	17:42:35	spring	loggerhead turtle	1	38.3537	-74.7416
6	3	6/12/2014	17:45:28	spring	loggerhead turtle	1	38.3536	-74.6319
6	3	6/12/2014	17:45:38	spring	loggerhead turtle	1	38.3536	-74.6256
6	2	6/12/2014	17:46:44	spring	loggerhead turtle	1	38.3536	-74.5855
6	2	6/12/2014	17:47:56	spring	loggerhead turtle	1	38.3535	-74.5404
6	2	6/12/2014	17:48:41	spring	loggerhead turtle	1	38.3534	-74.5117
6	2	6/12/2014	17:48:42	spring	loggerhead turtle	1	38.3534	-74.5117
6	2	6/12/2014	17:49:56	spring	loggerhead turtle	NA	38.3533	-74.4646
6	2	6/12/2014	17:49:58	spring	loggerhead turtle	1	38.3533	-74.4646
6	1	6/12/2014	17:50:03	spring	loggerhead turtle	1	38.3533	-74.4596
6	2	6/12/2014	17:50:05	spring	loggerhead turtle	1	38.3533	-74.4596
6	3	6/12/2014	17:50:37	spring	unidentified turtle	1	38.3534	-74.4384
6	2	6/12/2014	17:50:38	spring	loggerhead turtle	1	38.3534	-74.4396
6	1	6/12/2014	17:51:00	spring	loggerhead turtle	1	38.3535	-74.4246
6	1	6/12/2014	17:51:05	spring	loggerhead turtle	1	38.3535	-74.4221
5	3	6/12/2014	17:53:26	spring	loggerhead turtle	1	38.3816	-74.4692
5	1	6/12/2014	17:54:04	spring	unidentified turtle	1	38.3824	-74.4953
5	3	6/12/2014	17:54:34	spring	loggerhead turtle	1	38.3821	-74.5149
5	1	6/12/2014	17:54:38	spring	green turtle	1	38.3821	-74.5176
5	2	6/12/2014	17:54:59	spring	loggerhead turtle	1	38.3822	-74.5311
5	2	6/12/2014	17:54:59	spring	loggerhead turtle	1	38.3822	-74.5311
5	1	6/12/2014	17:56:32	spring	loggerhead turtle	1	38.3823	-74.5947
5	2	6/12/2014	17:56:33	spring	loggerhead turtle	1	38.3823	-74.5947
5	2	6/12/2014	17:56:34	spring	loggerhead turtle	1	38.3823	-74.5947
5	1	6/12/2014	17:57:40	spring	loggerhead turtle	1	38.3822	-74.6389
5	3	6/12/2014	17:57:40	spring	loggerhead turtle	1	38.3822	-74.6389
5	2	6/12/2014	17:57:42	spring	loggerhead turtle	1	38.3822	-74.6389
5	2	6/12/2014	17:58:45	spring	loggerhead turtle	1	38.3822	-74.6800
5	2	6/12/2014	18:01:59	spring	loggerhead turtle	1	38.3822	-74.8035
5	2	6/12/2014	18:06:50	spring	loggerhead turtle	1	38.3820	-74.9890
4	3	6/12/2014	18:15:55	spring	loggerhead turtle	1	38.4116	-74.8497
4	1	6/12/2014	18:20:36	spring	loggerhead turtle	1	38.4117	-74.6737
4	2	6/12/2014	18:20:38	spring	loggerhead turtle	1	38.4117	-74.6737
4	1	6/12/2014	18:21:53	spring	loggerhead turtle	1	38.4117	-74.6247
4	2	6/12/2014	18:22:25	spring	loggerhead turtle	1	38.4117	-74.6059
4	1	6/12/2014	18:24:07	spring	loggerhead turtle	1	38.4115	-74.5415

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
4	2	6/12/2014	18:24:07	spring	loggerhead turtle	1	38.4115	-74.5415
4	2	6/12/2014	18:24:08	spring	loggerhead turtle	1	38.4115	-74.5415
4	3	6/12/2014	18:24:40	spring	loggerhead turtle	1	38.4115	-74.5201
4	2	6/12/2014	18:24:43	spring	unidentified turtle	1	38.4115	-74.5189
4	1	6/12/2014	18:25:26	spring	loggerhead turtle	1	38.4114	-74.4912
4	2	6/12/2014	18:25:30	spring	loggerhead turtle	1	38.4114	-74.4899
3	1	6/12/2014	18:30:01	spring	loggerhead turtle	2	38.4398	-74.4855
3	2	6/12/2014	18:30:01	spring	loggerhead turtle	2	38.4398	-74.4842
3	1	6/12/2014	18:30:45	spring	green turtle	1	38.4399	-74.5129
3	1	6/12/2014	18:31:31	spring	unidentified turtle	1	38.4401	-74.5440
3	1	6/12/2014	18:35:20	spring	loggerhead turtle	1	38.4401	-74.6909
3	2	6/12/2014	18:35:23	spring	loggerhead turtle	1	38.4401	-74.6922
3	2	6/12/2014	18:35:24	spring	loggerhead turtle	1	38.4401	-74.6922
3	2	6/12/2014	18:36:00	spring	unidentified turtle	1	38.4401	-74.7153
3	1	6/12/2014	18:38:11	spring	loggerhead turtle	1	38.4402	-74.8019
3	2	6/12/2014	18:38:11	spring	loggerhead turtle	1	38.4402	-74.8006
3	2	6/12/2014	18:52:48	spring	loggerhead turtle	1	38.4397	-74.9801
2	2	6/12/2014	19:05:00	spring	loggerhead turtle	NA	38.4707	-74.7219
2	2	6/12/2014	19:05:01	spring	loggerhead turtle	1	38.4707	-74.7206
2	2	6/12/2014	19:06:42	spring	loggerhead turtle	1	38.4706	-74.6576
2	3	6/12/2014	19:09:03	spring	loggerhead turtle	1	38.4706	-74.5684
2	2	6/12/2014	19:09:11	spring	loggerhead turtle	NA	38.4706	-74.5634
2	1	6/12/2014	19:11:03	spring	loggerhead turtle	1	38.4704	-74.4919
2	1	6/12/2014	19:12:07	spring	unidentified turtle	1	38.4704	-74.4510
1	1	6/12/2014	19:14:44	spring	unidentified turtle	1	38.5019	-74.4519
1	1	6/12/2014	19:14:50	spring	loggerhead turtle	1	38.5020	-74.4556
1	1	6/12/2014	19:14:51	spring	loggerhead turtle	1	38.5020	-74.4556
1	2	6/12/2014	19:15:02	spring	loggerhead turtle	NA	38.5020	-74.4619
1	2	6/12/2014	19:15:10	spring	loggerhead turtle	2	38.5020	-74.4669
1	1	6/12/2014	19:16:45	spring	unidentified turtle	1	38.5005	-74.5278
1	3	6/12/2014	19:17:03	spring	loggerhead turtle	1	38.5001	-74.5389
1	2	6/12/2014	19:17:31	spring	loggerhead turtle	1	38.5002	-74.5552
1	3	6/12/2014	19:18:40	spring	loggerhead turtle	1	38.5002	-74.5994
1	3	6/12/2014	19:19:09	spring	loggerhead turtle	1	38.5003	-74.6174
1	2	6/12/2014	19:19:11	spring	loggerhead turtle	NA	38.5003	-74.6186
1	2	6/12/2014	19:23:41	spring	loggerhead turtle	1	38.5003	-74.7945
1	1	6/19/2014	13:24:40	spring	green turtle	1	38.4995	-74.4251
1	1	6/19/2014	13:24:44	spring	unidentified turtle	1	38.4997	-74.4275
1	1	6/19/2014	13:25:08	spring	loggerhead turtle	1	38.5005	-74.4419
1	1	6/19/2014	13:28:50	spring	loggerhead turtle	1	38.5002	-74.5747
1	1	6/19/2014	13:30:05	spring	loggerhead turtle	1	38.5002	-74.6199

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	2	6/19/2014	13:30:07	spring	loggerhead turtle	1	38.5002	-74.6211
1	2	6/19/2014	13:30:07	spring	loggerhead turtle	NA	38.5002	-74.6211
1	1	6/19/2014	13:30:16	spring	loggerhead turtle	1	38.5002	-74.6272
1	1	6/19/2014	13:31:58	spring	loggerhead turtle	1	38.5002	-74.6886
1	1	6/19/2014	13:32:04	spring	loggerhead turtle	1	38.5002	-74.6922
1	2	6/19/2014	13:32:06	spring	loggerhead turtle	1	38.5002	-74.6922
1	2	6/19/2014	13:32:07	spring	loggerhead turtle	1	38.5002	-74.6934
1	1	6/19/2014	13:32:51	spring	loggerhead turtle	1	38.5002	-74.7209
1	1	6/19/2014	13:32:52	spring	loggerhead turtle	1	38.5002	-74.7209
1	2	6/19/2014	13:32:53	spring	loggerhead turtle	1	38.5002	-74.7209
1	2	6/19/2014	13:32:54	spring	loggerhead turtle	1	38.5002	-74.7209
1	1	6/19/2014	13:39:13	spring	loggerhead turtle	1	38.5003	-74.8497
1	2	6/19/2014	13:39:15	spring	loggerhead turtle	NA	38.5003	-74.8510
1	2	6/19/2014	13:39:16	spring	loggerhead turtle	1	38.5003	-74.8510
1	1	6/19/2014	13:40:35	spring	loggerhead turtle	1	38.5004	-74.9008
1	2	6/19/2014	13:40:37	spring	loggerhead turtle	1	38.5005	-74.9020
1	2	6/19/2014	13:40:37	spring	loggerhead turtle	1	38.5005	-74.9020
2	2	6/19/2014	13:47:00	spring	loggerhead turtle	1	38.4706	-75.0193
2	1	6/19/2014	13:48:47	spring	loggerhead turtle	1	38.4703	-74.9518
2	2	6/19/2014	13:48:49	spring	loggerhead turtle	1	38.4703	-74.9505
2	1	6/19/2014	13:48:57	spring	loggerhead turtle	1	38.4703	-74.9455
2	1	6/19/2014	13:53:49	spring	loggerhead turtle	1	38.4705	-74.7688
2	2	6/19/2014	13:53:50	spring	green turtle	1	38.4705	-74.7688
2	1	6/19/2014	13:54:19	spring	loggerhead turtle	1	38.4705	-74.7509
2	1	6/19/2014	13:55:27	spring	loggerhead turtle	1	38.4705	-74.7091
2	2	6/19/2014	13:58:25	spring	loggerhead turtle	1	38.4705	-74.6024
2	2	6/19/2014	13:58:26	spring	loggerhead turtle	1	38.4705	-74.6024
2	1	6/19/2014	14:01:33	spring	loggerhead turtle	1	38.4704	-74.4873
2	2	6/19/2014	14:01:48	spring	loggerhead turtle	1	38.4704	-74.4789
2	2	6/19/2014	14:01:49	spring	loggerhead turtle	1	38.4704	-74.4777
2	1	6/19/2014	14:02:21	spring	loggerhead turtle	1	38.4705	-74.4585
2	2	6/19/2014	14:02:28	spring	unidentified turtle	1	38.4705	-74.4549
2	2	6/19/2014	14:03:04	spring	loggerhead turtle	1	38.4705	-74.4331
2	1	6/19/2014	14:03:06	spring	unidentified turtle	1	38.4705	-74.4307
2	2	6/19/2014	14:03:09	spring	loggerhead turtle	1	38.4705	-74.4295
3	1	6/19/2014	14:06:34	spring	loggerhead turtle	1	38.4407	-74.4676
3	1	6/19/2014	14:06:38	spring	loggerhead turtle	1	38.4406	-74.4700
3	1	6/19/2014	14:06:46	spring	loggerhead turtle	1	38.4405	-74.4749
3	2	6/19/2014	14:07:03	spring	loggerhead turtle	1	38.4404	-74.4846
3	1	6/19/2014	14:07:07	spring	loggerhead turtle	1	38.4404	-74.4870
3	3	6/19/2014	14:07:20	spring	loggerhead turtle	1	38.4405	-74.4954

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
3	1	6/19/2014	14:07:44	spring	loggerhead turtle	1	38.4406	-74.5097
3	2	6/19/2014	14:07:47	spring	loggerhead turtle	1	38.4406	-74.5109
3	1	6/19/2014	14:07:53	spring	loggerhead turtle	1	38.4407	-74.5156
3	3	6/19/2014	14:09:17	spring	loggerhead turtle	1	38.4407	-74.5648
3	1	6/19/2014	14:11:59	spring	loggerhead turtle	1	38.4407	-74.6644
3	3	6/19/2014	14:19:24	spring	loggerhead turtle	1	38.4405	-74.9368
4	2	6/19/2014	14:31:15	spring	loggerhead turtle	1	38.4103	-74.9715
4	1	6/19/2014	14:34:27	spring	loggerhead turtle	1	38.4111	-74.8522
4	2	6/19/2014	14:36:34	spring	loggerhead turtle	1	38.4114	-74.7763
4	2	6/19/2014	14:36:52	spring	loggerhead turtle	1	38.4113	-74.7655
4	1	6/19/2014	14:37:25	spring	loggerhead turtle	1	38.4114	-74.7450
4	2	6/19/2014	14:37:32	spring	loggerhead turtle	1	38.4114	-74.7414
4	1	6/19/2014	14:38:59	spring	loggerhead turtle	1	38.4113	-74.6881
4	2	6/19/2014	14:39:04	spring	loggerhead turtle	1	38.4114	-74.6856
4	1	6/19/2014	14:39:05	spring	green turtle	1	38.4114	-74.6844
4	2	6/19/2014	14:39:10	spring	unidentified turtle	1	38.4114	-74.6820
4	2	6/19/2014	14:39:11	spring	loggerhead turtle	1	38.4114	-74.6807
4	2	6/19/2014	14:39:36	spring	loggerhead turtle	1	38.4151	-74.6700
4	1	6/19/2014	14:45:19	spring	loggerhead turtle	1	38.4115	-74.6446
4	1	6/19/2014	14:48:56	spring	loggerhead turtle	1	38.4113	-74.5093
4	1	6/19/2014	14:51:11	spring	loggerhead turtle	1	38.4112	-74.4267
4	1	6/19/2014	14:51:19	spring	loggerhead turtle	1	38.4113	-74.4217
5	1	6/19/2014	14:53:32	spring	loggerhead turtle	1	38.3811	-74.4396
5	1	6/19/2014	14:55:10	spring	loggerhead turtle	1	38.3825	-74.4994
5	1	6/19/2014	14:57:21	spring	loggerhead turtle	1	38.3827	-74.5753
5	2	6/19/2014	14:57:21	spring	loggerhead turtle	1	38.3827	-74.5753
5	1	6/19/2014	14:59:17	spring	loggerhead turtle	1	38.3828	-74.6457
5	2	6/19/2014	14:59:19	spring	green turtle	1	38.3828	-74.6469
5	2	6/19/2014	14:59:21	spring	loggerhead turtle	1	38.3828	-74.6469
5	1	6/19/2014	15:04:00	spring	loggerhead turtle	1	38.3827	-74.8216
7	1	6/19/2014	15:36:06	spring	unidentified turtle	1	38.3231	-74.4274
7	1	6/19/2014	15:37:09	spring	loggerhead turtle	1	38.3247	-74.4672
7	1	6/19/2014	15:37:16	spring	loggerhead turtle	1	38.3246	-74.4709
7	1	6/19/2014	15:38:25	spring	loggerhead turtle	1	38.3248	-74.5129
7	1	6/19/2014	15:39:06	spring	loggerhead turtle	1	38.3245	-74.5387
7	2	6/19/2014	15:39:07	spring	loggerhead turtle	1	38.3245	-74.5387
7	1	6/19/2014	15:43:10	spring	loggerhead turtle	1	38.3247	-74.6908
7	1	6/19/2014	15:48:56	spring	loggerhead turtle	1	38.3244	-74.9078
8	2	6/19/2014	16:05:47	spring	loggerhead turtle	1	38.2953	-74.9053
8	3	6/19/2014	16:14:37	spring	loggerhead turtle	1	38.2955	-74.5827
8	1	6/19/2014	16:14:56	spring	loggerhead turtle	1	38.2955	-74.5702

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
8	1	6/19/2014	16:18:49	spring	loggerhead turtle	1	38.2950	-74.4246
9	1	6/19/2014	16:21:45	spring	loggerhead turtle	1	38.2659	-74.3794
9	1	6/19/2014	16:23:56	spring	loggerhead turtle	1	38.2675	-74.4619
9	2	6/19/2014	16:24:03	spring	loggerhead turtle	1	38.2675	-74.4656
9	1	6/19/2014	16:24:07	spring	loggerhead turtle	1	38.2675	-74.4681
9	1	6/19/2014	16:24:57	spring	loggerhead turtle	1	38.2674	-74.4989
9	3	6/19/2014	16:25:18	spring	loggerhead turtle	1	38.2674	-74.5125
9	1	6/19/2014	16:25:47	spring	loggerhead turtle	1	38.2676	-74.5299
9	2	6/19/2014	16:25:51	spring	green turtle	1	38.2676	-74.5323
9	2	6/19/2014	16:25:57	spring	loggerhead turtle	1	38.2676	-74.5361
9	1	6/19/2014	16:25:59	spring	loggerhead turtle	1	38.2676	-74.5373
9	1	6/19/2014	16:26:37	spring	green turtle	1	38.2675	-74.5607
9	1	6/19/2014	16:28:57	spring	loggerhead turtle	1	38.2678	-74.6455
9	2	6/19/2014	16:28:59	spring	loggerhead turtle	1	38.2678	-74.6467
9	3	6/19/2014	16:31:06	spring	loggerhead turtle	1	38.2678	-74.7249
9	2	6/19/2014	16:32:46	spring	loggerhead turtle	1	38.2677	-74.7850
9	3	6/19/2014	16:35:41	spring	loggerhead turtle	1	38.2677	-74.8937
9	2	6/19/2014	16:36:05	spring	loggerhead turtle	1	38.2677	-74.9087
9	1	6/19/2014	16:36:07	spring	green turtle	1	38.2677	-74.9100
9	1	6/19/2014	16:36:14	spring	loggerhead turtle	1	38.2677	-74.9150
10	1	6/19/2014	18:13:02	spring	loggerhead turtle	1	38.2386	-75.0072
10	1	6/19/2014	18:14:32	spring	loggerhead turtle	1	38.2388	-74.9538
10	1	6/19/2014	18:23:54	spring	loggerhead turtle	1	38.2388	-74.6016
10	1	6/19/2014	18:24:18	spring	loggerhead turtle	1	38.2388	-74.5866
10	2	6/19/2014	18:27:17	spring	loggerhead turtle	1	38.2385	-74.4762
10	1	6/19/2014	18:27:49	spring	unidentified turtle	1	38.2384	-74.4551
10	2	6/19/2014	18:29:06	spring	loggerhead turtle	1	38.2383	-74.4074
11	1	6/19/2014	18:32:48	spring	loggerhead turtle	1	38.2052	-74.4197
11	2	6/19/2014	18:35:18	spring	loggerhead turtle	1	38.2076	-74.5120
11	1	6/19/2014	18:35:48	spring	loggerhead turtle	1	38.2078	-74.5313
11	2	6/19/2014	18:35:50	spring	loggerhead turtle	1	38.2078	-74.5313
11	2	6/19/2014	18:36:52	spring	loggerhead turtle	1	38.2081	-74.5731
11	1	6/19/2014	18:42:02	spring	unidentified turtle	1	38.2084	-74.7800
12	3	6/19/2014	18:57:57	spring	loggerhead turtle	1	38.1787	-74.9567
12	3	6/19/2014	18:58:29	spring	loggerhead turtle	1	38.1787	-74.9365
12	1	6/19/2014	19:00:01	spring	loggerhead turtle	1	38.1788	-74.8788
12	1	6/19/2014	19:01:19	spring	loggerhead turtle	1	38.1789	-74.8294
12	2	6/19/2014	19:01:20	spring	loggerhead turtle	1	38.1789	-74.8294
12	2	6/19/2014	19:02:25	spring	unidentified turtle	1	38.1789	-74.7881
12	2	6/19/2014	19:07:57	spring	green turtle	1	38.1787	-74.5720
12	2	6/19/2014	19:09:26	spring	unidentified turtle	1	38.1785	-74.5126

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
12	2	6/19/2014	19:09:27	spring	unidentified turtle	1	38.1785	-74.5126
1	1	7/17/2014	13:38:08	summer	loggerhead turtle	1	38.4998	-74.5504
2	1	7/17/2014	14:02:29	summer	unidentified turtle	1	38.4709	-74.8861
2	1	7/17/2014	14:12:55	summer	loggerhead turtle	1	38.4718	-74.5053
3	2	7/17/2014	14:18:38	summer	loggerhead turtle	1	38.4393	-74.4862
3	1	7/17/2014	14:18:58	summer	loggerhead turtle	1	38.4395	-74.4965
3	1	7/17/2014	14:19:24	summer	loggerhead turtle	1	38.4395	-74.5117
3	2	7/17/2014	14:24:06	summer	loggerhead turtle	1	38.4400	-74.6809
4	1	7/17/2014	14:36:57	summer	green turtle	1	38.4107	-75.0156
5	1	7/17/2014	15:10:08	summer	loggerhead turtle	1	38.3820	-74.7765
5	1	7/17/2014	15:14:20	summer	loggerhead turtle	1	38.3816	-74.9235
5	2	7/17/2014	15:14:39	summer	loggerhead turtle	1	38.3815	-74.9366
5	1	7/17/2014	15:14:43	summer	loggerhead turtle	1	38.3815	-74.9366
5	1	7/17/2014	15:15:15	summer	loggerhead turtle	1	38.3814	-74.9559
7	1	7/17/2014	15:52:29	summer	green turtle	1	38.3239	-74.8325
7	3	7/17/2014	15:52:42	summer	green turtle	1	38.3238	-74.8409
7	1	7/17/2014	15:59:24	summer	loggerhead turtle	1	38.3246	-74.9199
7	2	7/17/2014	15:59:54	summer	loggerhead turtle	1	38.3241	-74.9393
7	1	7/17/2014	15:59:54	summer	unidentified turtle	1	38.3242	-74.9381
7	1	7/17/2014	15:59:58	summer	loggerhead turtle	1	38.3241	-74.9405
8	1	7/17/2014	17:33:51	summer	loggerhead turtle	1	38.2957	-74.9089
8	1	7/17/2014	17:34:00	summer	loggerhead turtle	1	38.2957	-74.9029
8	3	7/17/2014	17:34:12	summer	loggerhead turtle	1	38.2956	-74.8944
8	1	7/17/2014	17:34:21	summer	loggerhead turtle	1	38.2956	-74.8908
8	2	7/17/2014	17:35:00	summer	loggerhead turtle	1	38.2956	-74.8654
8	1	7/17/2014	17:35:05	summer	green turtle	1	38.2956	-74.8642
8	2	7/17/2014	17:36:39	summer	loggerhead turtle	1	38.2957	-74.8069
8	1	7/17/2014	17:37:01	summer	loggerhead turtle	1	38.2957	-74.7936
8	1	7/17/2014	17:41:12	summer	green turtle	1	38.2958	-74.6410
8	2	7/17/2014	17:45:47	summer	loggerhead turtle	1	38.2954	-74.4683
9	2	7/17/2014	18:14:52	summer	loggerhead turtle	2	38.2675	-74.9683
9	1	7/17/2014	18:14:54	summer	loggerhead turtle	2	38.2675	-74.9683
10	2	7/17/2014	18:29:33	summer	loggerhead turtle	1	38.2382	-75.0350
10	1	7/17/2014	18:29:40	summer	loggerhead turtle	1	38.2382	-75.0315
10	1	7/17/2014	18:31:07	summer	loggerhead turtle	1	38.2383	-74.9800
10	1	7/17/2014	18:33:34	summer	loggerhead turtle	1	38.2384	-74.8888
10	1	7/17/2014	18:41:05	summer	loggerhead turtle	1	38.2385	-74.7238
10	1	7/17/2014	18:46:47	summer	unidentified turtle	1	38.2384	-74.5009
10	1	7/17/2014	18:49:30	summer	unidentified turtle	1	38.2379	-74.3952
10	1	7/17/2014	18:49:32	summer	loggerhead turtle	1	38.2379	-74.3938
11	1	7/17/2014	18:58:46	summer	loggerhead turtle	1	38.2087	-74.6443

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
11	1	7/17/2014	18:59:57	summer	unidentified turtle	1	38.2088	-74.6883
11	1	7/17/2014	19:01:34	summer	loggerhead turtle	1	38.2091	-74.7504
11	1	7/17/2014	19:02:15	summer	loggerhead turtle	1	38.2086	-74.7757
11	1	7/17/2014	19:03:14	summer	green turtle	1	38.2086	-74.8129
11	1	7/17/2014	19:07:01	summer	unidentified turtle	1	38.2083	-74.9523
11	1	7/17/2014	19:07:05	summer	loggerhead turtle	1	38.2083	-74.9548
11	1	7/17/2014	19:11:27	summer	loggerhead turtle	1	38.2078	-75.1141
12	1	7/17/2014	19:17:24	summer	unidentified turtle	1	38.1783	-75.0421
12	1	7/17/2014	19:17:32	summer	unidentified turtle	2	38.1783	-75.0370
12	1	7/17/2014	19:19:36	summer	loggerhead turtle	1	38.1784	-74.9589
12	1	7/17/2014	19:20:45	summer	green turtle	1	38.1784	-74.9176
12	1	7/17/2014	19:26:29	summer	loggerhead turtle	1	38.1783	-74.7095
12	3	7/17/2014	19:27:18	summer	loggerhead turtle	1	38.1782	-74.6781
12	1	7/17/2014	19:29:53	summer	loggerhead turtle	1	38.1782	-74.5808
12	1	7/17/2014	19:30:17	summer	loggerhead turtle	1	38.1782	-74.5656
12	2	7/17/2014	19:31:04	summer	loggerhead turtle	1	38.1781	-74.5338
1	1	8/1/2014	13:37:17	summer	loggerhead turtle	1	38.5001	-74.4400
1	2	8/1/2014	13:37:27	summer	loggerhead turtle	1	38.5000	-74.4490
1	1	8/1/2014	13:37:27	summer	loggerhead turtle	1	38.5000	-74.4465
1	1	8/1/2014	13:37:28	summer	loggerhead turtle	1	38.5000	-74.4478
1	2	8/1/2014	13:38:50	summer	loggerhead turtle	1	38.4999	-74.5016
1	1	8/1/2014	13:38:51	summer	loggerhead turtle	1	38.4999	-74.5004
1	2	8/1/2014	13:42:49	summer	loggerhead turtle	1	38.5001	-74.6444
1	1	8/1/2014	13:42:50	summer	loggerhead turtle	1	38.5001	-74.6432
1	2	8/1/2014	13:44:46	summer	loggerhead turtle	1	38.5000	-74.7127
1	1	8/1/2014	13:44:48	summer	loggerhead turtle	1	38.5000	-74.7127
1	1	8/1/2014	13:45:40	summer	loggerhead turtle	1	38.5000	-74.7434
1	1	8/1/2014	13:45:49	summer	loggerhead turtle	1	38.5000	-74.7481
2	2	8/1/2014	14:06:55	summer	unidentified turtle	1	38.4704	-74.8397
2	1	8/1/2014	14:06:56	summer	loggerhead turtle	1	38.4704	-74.8385
2	3	8/1/2014	14:10:04	summer	loggerhead turtle	1	38.4703	-74.7282
2	1	8/1/2014	14:11:52	summer	loggerhead turtle	1	38.4702	-74.6652
2	2	8/1/2014	14:14:48	summer	loggerhead turtle	1	38.4700	-74.5619
2	1	8/1/2014	14:14:51	summer	loggerhead turtle	1	38.4700	-74.5606
2	2	8/1/2014	14:16:26	summer	loggerhead turtle	1	38.4700	-74.5017
2	1	8/1/2014	14:18:15	summer	loggerhead turtle	1	38.4699	-74.4391
2	3	8/1/2014	14:18:19	summer	loggerhead turtle	1	38.4699	-74.4367
2	1	8/1/2014	14:18:31	summer	loggerhead turtle	1	38.4699	-74.4295
3	2	8/1/2014	14:20:47	summer	loggerhead turtle	1	38.4398	-74.4449
3	1	8/1/2014	14:20:47	summer	loggerhead turtle	1	38.4397	-74.4425
3	1	8/1/2014	14:25:07	summer	loggerhead turtle	1	38.4403	-74.5996

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
3	1	8/1/2014	14:25:55	summer	loggerhead turtle	1	38.4404	-74.6283
3	1	8/1/2014	14:27:32	summer	loggerhead turtle	1	38.4405	-74.6874
4	1	8/1/2014	14:50:55	summer	unidentified turtle	1	38.4113	-74.6473
4	2	8/1/2014	14:51:07	summer	loggerhead turtle	1	38.4112	-74.6403
4	1	8/1/2014	14:51:09	summer	loggerhead turtle	1	38.4112	-74.6391
4	1	8/1/2014	14:54:15	summer	loggerhead turtle	1	38.4110	-74.5302
4	1	8/1/2014	14:54:34	summer	loggerhead turtle	1	38.4112	-74.5187
5	1	8/1/2014	14:59:33	summer	loggerhead turtle	1	38.3819	-74.4451
5	1	8/1/2014	15:03:35	summer	loggerhead turtle	1	38.3821	-74.5902
5	3	8/1/2014	15:03:35	summer	loggerhead turtle	1	38.3821	-74.5902
5	2	8/1/2014	15:03:41	summer	loggerhead turtle	1	38.3821	-74.5962
5	1	8/1/2014	15:03:50	summer	loggerhead turtle	1	38.3821	-74.5998
5	2	8/1/2014	15:04:16	summer	green turtle	1	38.3821	-74.6175
5	1	8/1/2014	15:04:16	summer	loggerhead turtle	1	38.3821	-74.6151
5	1	8/1/2014	15:04:34	summer	loggerhead turtle	1	38.3822	-74.6257
5	1	8/1/2014	15:10:16	summer	loggerhead turtle	1	38.3821	-74.8289
5	2	8/1/2014	15:11:19	summer	loggerhead turtle	1	38.3821	-74.8676
5	3	8/1/2014	15:13:10	summer	loggerhead turtle	1	38.3820	-74.9331
6	3	8/1/2014	15:25:51	summer	loggerhead turtle	1	38.3533	-74.8184
6	1	8/1/2014	15:26:20	summer	loggerhead turtle	1	38.3533	-74.8006
6	3	8/1/2014	15:29:07	summer	loggerhead turtle	1	38.3533	-74.7024
6	1	8/1/2014	15:32:11	summer	loggerhead turtle	1	38.3532	-74.5943
6	2	8/1/2014	15:33:45	summer	loggerhead turtle	1	38.3530	-74.5363
6	1	8/1/2014	15:33:45	summer	loggerhead turtle	1	38.3530	-74.5386
6	3	8/1/2014	15:36:47	summer	loggerhead turtle	1	38.3528	-74.4307
7	2	8/1/2014	15:39:41	summer	loggerhead turtle	1	38.3243	-74.4562
7	2	8/1/2014	15:42:06	summer	loggerhead turtle	1	38.3239	-74.5438
7	2	8/1/2014	15:42:47	summer	loggerhead turtle	1	38.3241	-74.5679
7	1	8/1/2014	15:42:47	summer	loggerhead turtle	1	38.3241	-74.5655
7	3	8/1/2014	15:43:21	summer	loggerhead turtle	1	38.3241	-74.5860
7	2	8/1/2014	15:53:23	summer	green turtle	1	38.3239	-74.9466
7	1	8/1/2014	15:53:27	summer	loggerhead turtle	1	38.3239	-74.9466
8	2	8/1/2014	16:08:58	summer	loggerhead turtle	1	38.2956	-74.6308
8	1	8/1/2014	16:08:58	summer	loggerhead turtle	1	38.2956	-74.6332
8	2	8/1/2014	16:09:14	summer	loggerhead turtle	1	38.2956	-74.6224
8	1	8/1/2014	16:09:16	summer	loggerhead turtle	1	38.2956	-74.6224
8	2	8/1/2014	16:10:42	summer	loggerhead turtle	1	38.2956	-74.5695
8	1	8/1/2014	16:10:42	summer	loggerhead turtle	1	38.2956	-74.5707
8	2	8/1/2014	16:11:38	summer	loggerhead turtle	1	38.2957	-74.5360
8	1	8/1/2014	16:11:40	summer	loggerhead turtle	1	38.2957	-74.5360
9	2	8/1/2014	16:18:08	summer	loggerhead turtle	1	38.2669	-74.3985

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	1	8/1/2014	16:18:11	summer	loggerhead turtle	1	38.2669	-74.3973
9	2	8/1/2014	16:18:28	summer	unidentified turtle	1	38.2671	-74.4094
9	1	8/1/2014	16:18:30	summer	loggerhead turtle	1	38.2671	-74.4082
9	2	8/1/2014	16:18:34	summer	loggerhead turtle	1	38.2672	-74.4142
9	1	8/1/2014	16:23:31	summer	loggerhead turtle	1	38.2677	-74.5889
9	1	8/1/2014	16:38:02	summer	loggerhead turtle	1	38.2666	-75.1122
9	2	8/1/2014	16:38:06	summer	leatherback turtle	1	38.2665	-75.1159
12	1	8/1/2014	17:53:03	summer	loggerhead turtle	1	38.1792	-75.1386
12	2	8/1/2014	17:53:35	summer	loggerhead turtle	1	38.1793	-75.1200
12	1	8/1/2014	17:53:35	summer	loggerhead turtle	1	38.1793	-75.1201
12	3	8/1/2014	17:55:53	summer	loggerhead turtle	1	38.1780	-75.0400
12	1	8/1/2014	17:57:54	summer	loggerhead turtle	1	38.1784	-74.9703
12	1	8/1/2014	18:08:48	summer	loggerhead turtle	1	38.1783	-74.5793
12	1	8/1/2014	18:09:14	summer	loggerhead turtle	1	38.1782	-74.5636
12	1	8/1/2014	18:09:16	summer	loggerhead turtle	1	38.1782	-74.5624
12	1	8/1/2014	18:09:45	summer	loggerhead turtle	1	38.1781	-74.5443
12	2	8/1/2014	18:11:12	summer	loggerhead turtle	1	38.1781	-74.4921
12	1	8/1/2014	18:11:27	summer	loggerhead turtle	1	38.1780	-74.4838
12	2	8/1/2014	18:13:44	summer	loggerhead turtle	1	38.1778	-74.4040
12	1	8/1/2014	18:13:44	summer	loggerhead turtle	1	38.1778	-74.4040
11	1	8/1/2014	18:19:33	summer	loggerhead turtle	1	38.2064	-74.3851
11	1	8/1/2014	18:19:44	summer	loggerhead turtle	1	38.2068	-74.3931
11	1	8/1/2014	18:20:02	summer	unidentified turtle	1	38.2077	-74.4045
11	1	8/1/2014	18:20:49	summer	loggerhead turtle	1	38.2085	-74.4341
11	2	8/1/2014	18:22:54	summer	loggerhead turtle	1	38.2087	-74.5099
11	1	8/1/2014	18:24:08	summer	loggerhead turtle	1	38.2084	-74.5555
11	3	8/1/2014	18:24:59	summer	loggerhead turtle	1	38.2082	-74.5858
11	3	8/1/2014	18:37:27	summer	loggerhead turtle	1	38.2085	-75.0416
10	1	8/1/2014	19:03:04	summer	loggerhead turtle	1	38.2380	-74.9630
10	1	8/1/2014	19:04:12	summer	loggerhead turtle	1	38.2381	-74.9220
10	2	8/1/2014	19:07:04	summer	loggerhead turtle	1	38.2384	-74.8165
10	1	8/1/2014	19:07:38	summer	loggerhead turtle	1	38.2384	-74.7973
10	1	8/1/2014	19:13:47	summer	loggerhead turtle	1	38.2381	-74.5734
10	1	8/1/2014	19:20:24	summer	loggerhead turtle	1	38.2368	-74.4192
1	1	8/30/2014	13:09:30	summer	loggerhead turtle	1	38.4998	-74.4620
1	1	8/30/2014	13:09:31	summer	loggerhead turtle	1	38.4997	-74.4632
1	2	8/30/2014	13:09:35	summer	loggerhead turtle	1	38.4996	-74.4645
1	2	8/30/2014	13:09:36	summer	loggerhead turtle	1	38.4996	-74.4657
1	2	8/30/2014	13:09:36	summer	loggerhead turtle	1	38.4996	-74.4657
1	3	8/30/2014	13:10:59	summer	leatherback turtle	1	38.4997	-74.5185
1	2	8/30/2014	13:11:01	summer	leatherback turtle	1	38.4997	-74.5173

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	1	8/30/2014	13:14:50	summer	loggerhead turtle	1	38.4942	-74.6492
1	2	8/30/2014	13:15:06	summer	loggerhead turtle	1	38.4971	-74.6581
1	2	8/30/2014	13:24:29	summer	loggerhead turtle	1	38.4996	-74.9942
2	1	8/30/2014	13:37:06	summer	loggerhead turtle	1	38.4709	-74.7163
2	1	8/30/2014	13:37:17	summer	loggerhead turtle	1	38.4710	-74.7116
2	1	8/30/2014	13:39:01	summer	loggerhead turtle	1	38.4713	-74.6499
2	1	8/30/2014	13:40:18	summer	loggerhead turtle	1	38.4735	-74.6005
2	2	8/30/2014	13:42:07	summer	loggerhead turtle	1	38.4710	-74.5389
2	2	8/30/2014	13:42:11	summer	loggerhead turtle	1	38.4708	-74.5364
2	1	8/30/2014	13:43:04	summer	leatherback turtle	1	38.4707	-74.5036
2	1	8/30/2014	13:43:13	summer	loggerhead turtle	1	38.4713	-74.4975
2	1	8/30/2014	13:47:34	summer	loggerhead turtle	1	38.4703	-74.4291
2	1	8/30/2014	13:47:53	summer	loggerhead turtle	1	38.4700	-74.4178
3	1	8/30/2014	13:49:53	summer	loggerhead turtle	1	38.4399	-74.4298
3	1	8/30/2014	13:49:56	summer	loggerhead turtle	1	38.4399	-74.4321
3	2	8/30/2014	13:50:03	summer	loggerhead turtle	1	38.4399	-74.4345
3	2	8/30/2014	13:50:08	summer	loggerhead turtle	1	38.4399	-74.4380
3	1	8/30/2014	13:50:09	summer	loggerhead turtle	1	38.4399	-74.4392
3	3	8/30/2014	13:50:45	summer	loggerhead turtle	2	38.4400	-74.4607
3	3	8/30/2014	14:00:53	summer	loggerhead turtle	1	38.4405	-74.4803
3	3	8/30/2014	14:01:01	summer	loggerhead turtle	1	38.4404	-74.4852
3	2	8/30/2014	14:01:06	summer	loggerhead turtle	1	38.4402	-74.4877
3	3	8/30/2014	14:01:47	summer	loggerhead turtle	1	38.4395	-74.5138
3	1	8/30/2014	14:02:27	summer	loggerhead turtle	1	38.4400	-74.5384
3	2	8/30/2014	14:02:31	summer	Kemp's ridley turtle	1	38.4400	-74.5397
3	2	8/30/2014	14:02:32	summer	loggerhead turtle	1	38.4400	-74.5409
3	3	8/30/2014	14:03:01	summer	loggerhead turtle	1	38.4399	-74.5592
3	3	8/30/2014	14:05:50	summer	leatherback turtle	1	38.4400	-74.6628
3	3	8/30/2014	14:09:21	summer	loggerhead turtle	1	38.4409	-74.7109
3	3	8/30/2014	14:09:22	summer	loggerhead turtle	1	38.4409	-74.7109
3	3	8/30/2014	14:09:43	summer	loggerhead turtle	1	38.4411	-74.7241
4	1	8/30/2014	14:29:08	summer	loggerhead turtle	1	38.4116	-74.7514
4	1	8/30/2014	14:30:28	summer	loggerhead turtle	1	38.4121	-74.7057
4	2	8/30/2014	14:31:48	summer	loggerhead turtle	1	38.4119	-74.6589
4	1	8/30/2014	14:37:44	summer	loggerhead turtle	1	38.4111	-74.4478
5	1	8/30/2014	14:40:14	summer	loggerhead turtle	1	38.3825	-74.4303
5	3	8/30/2014	14:40:19	summer	leatherback turtle	1	38.3825	-74.4342
5	1	8/30/2014	14:45:58	summer	loggerhead turtle	1	38.3820	-74.6470
5	1	8/30/2014	14:47:30	summer	loggerhead turtle	1	38.3820	-74.7026
5	1	8/30/2014	14:47:30	summer	loggerhead turtle	1	38.3820	-74.7026
5	2	8/30/2014	14:47:35	summer	loggerhead turtle	1	38.3820	-74.7050

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
5	2	8/30/2014	14:47:37	summer	loggerhead turtle	1	38.3820	-74.7063
5	1	8/30/2014	14:56:30	summer	loggerhead turtle	1	38.3818	-75.0316
6	1	8/30/2014	15:21:44	summer	loggerhead turtle	1	38.3542	-74.6478
6	3	8/30/2014	15:22:48	summer	loggerhead turtle	1	38.3533	-74.6101
7	2	8/30/2014	15:31:21	summer	loggerhead turtle	1	38.3219	-74.4651
7	3	8/30/2014	15:31:28	summer	loggerhead turtle	1	38.3223	-74.4713
7	2	8/30/2014	15:35:48	summer	loggerhead turtle	1	38.3245	-74.6252
7	3	8/30/2014	15:35:52	summer	loggerhead turtle	1	38.3245	-74.6288
7	1	8/30/2014	15:36:06	summer	loggerhead turtle	1	38.3244	-74.6372
7	3	8/30/2014	15:36:24	summer	loggerhead turtle	1	38.3242	-74.6479
7	1	8/30/2014	15:36:35	summer	loggerhead turtle	1	38.3242	-74.6539
7	1	8/30/2014	15:38:23	summer	loggerhead turtle	1	38.3240	-74.7173
12	1	8/30/2014	17:27:47	summer	loggerhead turtle	1	38.1785	-74.9904
12	1	8/30/2014	17:28:44	summer	loggerhead turtle	1	38.1786	-74.9554
12	2	8/30/2014	17:30:37	summer	loggerhead turtle	1	38.1786	-74.8898
12	1	8/30/2014	17:34:32	summer	loggerhead turtle	1	38.1785	-74.7522
12	2	8/30/2014	17:35:36	summer	loggerhead turtle	1	38.1787	-74.7162
12	1	8/30/2014	17:36:07	summer	loggerhead turtle	1	38.1787	-74.6975
12	3	8/30/2014	17:39:31	summer	loggerhead turtle	1	38.1787	-74.5775
12	1	8/30/2014	17:39:57	summer	loggerhead turtle	1	38.1786	-74.5620
12	1	8/30/2014	17:40:13	summer	loggerhead turtle	1	38.1785	-74.5526
12	3	8/30/2014	17:40:42	summer	loggerhead turtle	1	38.1787	-74.5348
12	3	8/30/2014	17:41:03	summer	loggerhead turtle	1	38.1785	-74.5230
12	3	8/30/2014	17:41:46	summer	loggerhead turtle	1	38.1785	-74.4968
12	3	8/30/2014	17:42:38	summer	loggerhead turtle	1	38.1784	-74.4657
12	1	8/30/2014	17:42:46	summer	loggerhead turtle	1	38.1784	-74.4609
12	3	8/30/2014	17:43:22	summer	loggerhead turtle	1	38.1782	-74.4393
12	1	8/30/2014	17:44:12	summer	loggerhead turtle	1	38.1782	-74.4096
12	3	8/30/2014	17:44:21	summer	loggerhead turtle	1	38.1782	-74.4048
12	2	8/30/2014	17:44:46	summer	loggerhead turtle	1	38.1782	-74.3906
11	1	8/30/2014	17:47:13	summer	loggerhead turtle	1	38.2082	-74.3871
11	3	8/30/2014	17:47:16	summer	loggerhead turtle	1	38.2081	-74.3896
11	3	8/30/2014	17:47:32	summer	loggerhead turtle	1	38.2075	-74.3995
11	1	8/30/2014	17:47:46	summer	loggerhead turtle	1	38.2074	-74.4081
11	3	8/30/2014	17:48:23	summer	loggerhead turtle	1	38.2085	-74.4304
11	3	8/30/2014	17:49:19	summer	loggerhead turtle	1	38.2068	-74.4648
11	3	8/30/2014	17:50:32	summer	loggerhead turtle	1	38.2082	-74.5103
11	1	8/30/2014	17:50:51	summer	loggerhead turtle	1	38.2080	-74.5216
11	3	8/30/2014	17:50:52	summer	loggerhead turtle	1	38.2080	-74.5228
11	2	8/30/2014	17:50:57	summer	loggerhead turtle	1	38.2080	-74.5241
11	3	8/30/2014	17:51:08	summer	loggerhead turtle	1	38.2081	-74.5329

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
11	1	8/30/2014	17:51:32	summer	loggerhead turtle	1	38.2088	-74.5481
11	1	8/30/2014	17:51:34	summer	loggerhead turtle	1	38.2088	-74.5494
11	3	8/30/2014	17:52:31	summer	loggerhead turtle	1	38.2087	-74.5842
11	2	8/30/2014	17:52:47	summer	loggerhead turtle	1	38.2085	-74.5928
11	3	8/30/2014	17:53:03	summer	loggerhead turtle	1	38.2088	-74.6039
11	3	8/30/2014	17:53:51	summer	leatherback turtle	1	38.2089	-74.6332
11	2	8/30/2014	18:02:48	summer	loggerhead turtle	1	38.2085	-74.8581
10	1	8/30/2014	18:23:21	summer	unidentified turtle	1	38.2388	-74.7626
10	1	8/30/2014	18:23:33	summer	loggerhead turtle	1	38.2389	-74.7557
10	3	8/30/2014	18:23:35	summer	loggerhead turtle	1	38.2389	-74.7546
10	3	8/30/2014	18:24:13	summer	unidentified turtle	1	38.2390	-74.7325
10	3	8/30/2014	18:29:50	summer	loggerhead turtle	1	38.2387	-74.5354
10	1	8/30/2014	18:29:59	summer	loggerhead turtle	1	38.2387	-74.5307
10	1	8/30/2014	18:31:26	summer	loggerhead turtle	1	38.2381	-74.4788
10	1	8/30/2014	18:31:35	summer	unidentified turtle	1	38.2381	-74.4741
10	3	8/30/2014	18:32:10	summer	loggerhead turtle	1	38.2382	-74.4528
10	2	8/30/2014	18:37:26	summer	loggerhead turtle	1	38.2381	-74.4222
10	3	8/30/2014	18:38:31	summer	loggerhead turtle	1	38.2382	-74.3844
9	1	8/30/2014	18:40:14	summer	loggerhead turtle	1	38.2662	-74.3816
9	3	8/30/2014	18:40:17	summer	loggerhead turtle	1	38.2663	-74.3829
9	2	8/30/2014	18:40:24	summer	loggerhead turtle	1	38.2665	-74.3866
9	2	8/30/2014	18:40:24	summer	loggerhead turtle	1	38.2665	-74.3866
9	3	8/30/2014	18:41:00	summer	loggerhead turtle	1	38.2668	-74.4097
9	2	8/30/2014	18:42:23	summer	loggerhead turtle	1	38.2669	-74.4555
9	3	8/30/2014	18:42:46	summer	loggerhead turtle	1	38.2675	-74.4704
9	3	8/30/2014	18:46:44	summer	leatherback turtle	1	38.2672	-74.6127
9	2	8/30/2014	18:46:52	summer	loggerhead turtle	1	38.2673	-74.6163
9	2	8/30/2014	18:49:10	summer	loggerhead turtle	1	38.2680	-74.6443
9	2	8/30/2014	18:49:27	summer	leatherback turtle	1	38.2676	-74.6538
9	2	8/30/2014	18:53:19	summer	unidentified turtle	1	38.2677	-74.7930
8	1	8/30/2014	19:11:48	summer	loggerhead turtle	1	38.2957	-74.8311
8	2	8/30/2014	19:11:53	summer	loggerhead turtle	1	38.2957	-74.8299
8	1	8/30/2014	19:17:15	summer	loggerhead turtle	1	38.2960	-74.6385
8	2	8/30/2014	19:17:19	summer	loggerhead turtle	2	38.2960	-74.6385
8	1	8/30/2014	19:19:01	summer	unidentified turtle	1	38.2954	-74.5765
8	1	8/30/2014	19:19:43	summer	loggerhead turtle	1	38.2953	-74.5530
8	1	8/30/2014	19:19:49	summer	loggerhead turtle	1	38.2952	-74.5483
8	3	8/30/2014	19:20:47	summer	loggerhead turtle	1	38.2954	-74.5151
8	3	8/30/2014	19:21:08	summer	leatherback turtle	1	38.2954	-74.5021
12	2	11/5/2014	16:05:03	fall	loggerhead turtle	1	38.1784	-74.4033
11	1	11/5/2014	16:45:03	fall	green turtle	1	38.2087	-74.4896

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
4	1	11/5/2014	20:06:55	fall	leatherback turtle	1	38.4109	-74.5547
8	1	12/15/2014	15:46:55	fall	loggerhead turtle	1	38.2955	-74.7226
4	2	12/15/2014	17:21:44	fall	leatherback turtle	1	38.4114	-74.8871
2	1	12/15/2014	19:20:00	fall	unidentified turtle	1	38.4701	-74.4588
2	1	12/15/2014	19:28:57	fall	unidentified turtle	1	38.4706	-74.7862
2	1	12/15/2014	19:29:40	fall	unidentified turtle	1	38.4705	-74.8126
10	2	4/25/2015	18:01:19	spring	loggerhead turtle	1	38.2384	-74.5211
10	1	4/25/2015	18:01:26	spring	loggerhead turtle	1	38.2384	-74.5164
1	3	5/21/2015	13:44:26	spring	loggerhead turtle	1	38.5004	-74.9664
3	1	5/21/2015	14:17:28	spring	loggerhead turtle	1	38.4404	-74.8087
3	1	5/21/2015	14:21:32	spring	loggerhead turtle	1	38.4405	-74.9594
3	3	5/21/2015	14:21:49	spring	unidentified turtle	1	38.4404	-74.9704
4	2	5/21/2015	14:28:11	spring	loggerhead turtle	1	38.4113	-74.9600
4	1	5/21/2015	14:33:06	spring	loggerhead turtle	1	38.4113	-74.7845
4	1	5/21/2015	14:42:21	spring	loggerhead turtle	1	38.4121	-74.4487
6	3	5/21/2015	15:16:03	spring	unidentified turtle	1	38.3531	-74.6342
6	3	5/21/2015	15:17:40	spring	loggerhead turtle	1	38.3531	-74.5764
7	3	5/21/2015	15:30:14	spring	unidentified turtle	1	38.3246	-74.6817
7	1	5/21/2015	15:35:59	spring	loggerhead turtle	1	38.3245	-74.8945
8	1	5/21/2015	16:56:35	spring	unidentified turtle	1	38.2949	-74.4252
9	1	5/21/2015	17:02:47	spring	unidentified turtle	1	38.2675	-74.5042
9	2	5/21/2015	17:02:50	spring	loggerhead turtle	1	38.2675	-74.5054
9	2	5/21/2015	17:07:42	spring	loggerhead turtle	1	38.2676	-74.6910
10	2	5/21/2015	17:14:28	spring	unidentified turtle	1	38.2381	-74.5435
10	2	5/21/2015	17:18:19	spring	unidentified turtle	1	38.2383	-74.4027
11	2	5/21/2015	17:20:39	spring	loggerhead turtle	1	38.2052	-74.3810
11	1	5/21/2015	17:20:47	spring	unidentified turtle	1	38.2056	-74.3866
11	2	5/21/2015	17:20:49	spring	unidentified turtle	1	38.2058	-74.3880
11	1	5/21/2015	17:20:51	spring	loggerhead turtle	1	38.2060	-74.3893
12	2	5/21/2015	17:49:57	spring	loggerhead turtle	1	38.1782	-74.8680
12	1	5/21/2015	17:53:55	spring	loggerhead turtle	1	38.1781	-74.7241
12	1	5/21/2015	17:55:53	spring	loggerhead turtle	1	38.1780	-74.6528
1	1	6/25/2015	18:34:42	spring	loggerhead turtle	2	38.4971	-74.9415
1	2	6/25/2015	18:35:39	spring	unidentified turtle	1	38.4975	-74.9070
1	1	6/25/2015	18:36:23	spring	loggerhead turtle	1	38.4977	-74.8812
1	1	6/25/2015	18:37:11	spring	loggerhead turtle	1	38.4981	-74.8532
1	3	6/25/2015	18:37:11	spring	loggerhead turtle	1	38.4981	-74.8532
1	3	6/25/2015	18:37:15	spring	loggerhead turtle	1	38.4981	-74.8508
1	3	6/25/2015	18:37:29	spring	loggerhead turtle	1	38.4984	-74.8425
1	1	6/25/2015	18:38:01	spring	loggerhead turtle	1	38.4984	-74.8233
1	2	6/25/2015	18:38:45	spring	loggerhead turtle	1	38.4988	-74.7972

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	1	6/25/2015	18:39:37	spring	unidentified turtle	1	38.4988	-74.7661
1	2	6/25/2015	18:39:38	spring	loggerhead turtle	1	38.4988	-74.7661
1	3	6/25/2015	18:40:11	spring	loggerhead turtle	1	38.4992	-74.7453
1	2	6/25/2015	18:43:09	spring	loggerhead turtle	1	38.4997	-74.6434
1	1	6/25/2015	18:43:11	spring	loggerhead turtle	1	38.4997	-74.6423
1	1	6/25/2015	18:43:59	spring	loggerhead turtle	1	38.5000	-74.6153
1	1	6/25/2015	18:44:21	spring	loggerhead turtle	2	38.4998	-74.6031
1	2	6/25/2015	18:45:02	spring	loggerhead turtle	3	38.4995	-74.5787
1	1	6/25/2015	18:46:04	spring	loggerhead turtle	1	38.4998	-74.5433
1	2	6/25/2015	18:46:08	spring	loggerhead turtle	1	38.4998	-74.5410
1	1	6/25/2015	18:46:08	spring	loggerhead turtle	1	38.4998	-74.5410
1	2	6/25/2015	18:49:21	spring	loggerhead turtle	1	38.5005	-74.4281
2	1	6/25/2015	18:52:01	spring	loggerhead turtle	1	38.4710	-74.4526
2	1	6/25/2015	18:53:28	spring	loggerhead turtle	1	38.4708	-74.5037
2	2	6/25/2015	18:55:58	spring	loggerhead turtle	1	38.4696	-74.5935
2	2	6/25/2015	18:58:25	spring	loggerhead turtle	1	38.4696	-74.6811
2	3	6/25/2015	18:59:26	spring	loggerhead turtle	1	38.4697	-74.7168
2	2	6/25/2015	19:00:54	spring	unidentified turtle	1	38.4697	-74.7694
2	1	6/25/2015	19:05:21	spring	loggerhead turtle	1	38.4696	-74.9314
2	2	6/25/2015	19:05:33	spring	loggerhead turtle	1	38.4696	-74.9387
3	2	6/25/2015	19:11:45	spring	unidentified turtle	1	38.4404	-75.0042
3	1	6/25/2015	19:13:36	spring	loggerhead turtle	1	38.4409	-74.9424
3	1	6/25/2015	19:14:43	spring	loggerhead turtle	2	38.4409	-74.9035
3	2	6/25/2015	19:16:55	spring	loggerhead turtle	1	38.4410	-74.8277
3	1	6/25/2015	19:18:35	spring	loggerhead turtle	1	38.4411	-74.7695
3	2	6/25/2015	19:19:36	spring	unidentified turtle	1	38.4411	-74.7350
3	1	6/25/2015	19:19:37	spring	loggerhead turtle	1	38.4411	-74.7339
3	1	6/25/2015	19:25:37	spring	loggerhead turtle	1	38.4408	-74.5262
3	2	6/25/2015	19:25:37	spring	unidentified turtle	1	38.4408	-74.5262
3	2	6/25/2015	19:25:41	spring	green turtle	1	38.4408	-74.5238
3	1	6/25/2015	19:26:07	spring	unidentified turtle	1	38.4409	-74.5088
3	1	6/25/2015	19:26:30	spring	loggerhead turtle	1	38.4409	-74.4961
3	2	6/25/2015	19:26:32	spring	loggerhead turtle	1	38.4409	-74.4949
3	2	6/25/2015	19:28:09	spring	loggerhead turtle	1	38.4407	-74.4384
4	2	6/25/2015	19:33:21	spring	loggerhead turtle	1	38.4105	-74.5452
4	2	6/25/2015	19:33:31	spring	loggerhead turtle	1	38.4105	-74.5510
4	2	6/25/2015	19:36:20	spring	loggerhead turtle	1	38.4107	-74.6470
4	1	6/25/2015	19:37:55	spring	loggerhead turtle	1	38.4108	-74.7026
4	2	6/25/2015	19:38:20	spring	loggerhead turtle	1	38.4108	-74.7167
5	1	6/25/2015	19:50:41	spring	loggerhead turtle	1	38.3835	-75.0249
5	2	6/25/2015	19:53:52	spring	loggerhead turtle	1	38.3830	-74.9172

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
5	1	6/25/2015	19:55:24	spring	loggerhead turtle	1	38.3831	-74.8629
5	2	6/25/2015	19:56:16	spring	loggerhead turtle	1	38.3831	-74.8328
5	1	6/25/2015	20:03:43	spring	loggerhead turtle	1	38.3831	-74.5721
5	2	6/25/2015	20:03:45	spring	loggerhead turtle	1	38.3831	-74.5710
6	1	6/25/2015	20:14:13	spring	loggerhead turtle	1	38.3526	-74.5973
6	2	6/25/2015	20:14:14	spring	loggerhead turtle	1	38.3526	-74.5973
6	1	6/25/2015	20:16:03	spring	loggerhead turtle	1	38.3527	-74.6618
6	2	6/25/2015	20:16:07	spring	loggerhead turtle	1	38.3527	-74.6641
6	2	6/25/2015	20:16:29	spring	loggerhead turtle	1	38.3527	-74.6769
6	1	6/25/2015	20:20:46	spring	loggerhead turtle	1	38.3527	-74.8252
7	2	6/25/2015	20:31:18	spring	loggerhead turtle	1	38.3252	-75.0291
7	3	6/25/2015	20:31:52	spring	leatherback turtle	1	38.3250	-75.0091
7	3	6/25/2015	20:33:33	spring	loggerhead turtle	1	38.3251	-74.9496
7	2	6/25/2015	20:34:33	spring	loggerhead turtle	1	38.3251	-74.9148
7	2	6/25/2015	20:41:57	spring	loggerhead turtle	1	38.3252	-74.6528
7	1	6/25/2015	20:42:06	spring	loggerhead turtle	1	38.3252	-74.6480
7	2	6/25/2015	20:42:07	spring	loggerhead turtle	1	38.3252	-74.6468
7	1	6/25/2015	20:42:12	spring	loggerhead turtle	1	38.3251	-74.6444
7	2	6/25/2015	20:42:12	spring	unidentified turtle	1	38.3251	-74.6444
7	2	6/25/2015	20:43:24	spring	loggerhead turtle	1	38.3251	-74.6016
7	2	6/25/2015	20:43:32	spring	loggerhead turtle	1	38.3252	-74.5968
7	2	6/25/2015	20:43:36	spring	loggerhead turtle	1	38.3251	-74.5944
7	2	6/25/2015	20:44:27	spring	loggerhead turtle	1	38.3251	-74.5632
7	2	6/25/2015	20:45:39	spring	loggerhead turtle	1	38.3250	-74.5200
7	1	6/25/2015	20:45:40	spring	loggerhead turtle	1	38.3250	-74.5200
7	1	6/25/2015	20:45:40	spring	loggerhead turtle	1	38.3250	-74.5200
7	2	6/25/2015	20:46:09	spring	green turtle	1	38.3250	-74.5020
7	2	6/25/2015	20:46:45	spring	loggerhead turtle	1	38.3250	-74.4806
7	3	6/25/2015	20:47:41	spring	loggerhead turtle	1	38.3250	-74.4473
7	1	6/25/2015	20:48:22	spring	loggerhead turtle	1	38.3248	-74.4235
7	2	6/25/2015	20:48:23	spring	loggerhead turtle	1	38.3247	-74.4223
7	2	6/25/2015	20:48:37	spring	loggerhead turtle	1	38.3237	-74.4143
7	2	6/25/2015	20:48:48	spring	loggerhead turtle	1	38.3225	-74.4089
8	1	6/25/2015	20:54:37	spring	loggerhead turtle	1	38.2926	-74.5232
8	1	6/25/2015	21:02:25	spring	loggerhead turtle	1	38.2889	-74.7997
8	2	6/25/2015	21:02:29	spring	loggerhead turtle	1	38.2888	-74.8021
9	2	6/25/2015	21:15:08	spring	loggerhead turtle	1	38.2681	-75.0292
9	1	6/25/2015	21:16:07	spring	loggerhead turtle	1	38.2681	-74.9944
9	2	6/25/2015	21:29:44	spring	loggerhead turtle	2	38.2681	-74.5190
9	1	6/25/2015	21:29:47	spring	green turtle	1	38.2681	-74.5167
9	2	6/25/2015	21:31:56	spring	loggerhead turtle	1	38.2679	-74.4421

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
9	2	6/25/2015	21:32:25	spring	loggerhead turtle	1	38.2679	-74.4245
10	1	6/25/2015	21:38:37	spring	loggerhead turtle	1	38.2376	-74.5022
10	1	6/25/2015	21:40:03	spring	loggerhead turtle	1	38.2377	-74.5524
10	2	6/25/2015	21:40:05	spring	loggerhead turtle	1	38.2377	-74.5536
10	3	6/25/2015	21:40:49	spring	loggerhead turtle	1	38.2378	-74.5791
10	1	6/25/2015	21:40:50	spring	loggerhead turtle	1	38.2378	-74.5791
10	2	6/25/2015	21:40:51	spring	loggerhead turtle	1	38.2378	-74.5803
11	3	6/25/2015	22:15:22	spring	loggerhead turtle	1	38.2094	-74.8338
11	2	6/25/2015	22:23:21	spring	loggerhead turtle	1	38.2092	-74.5470
11	1	6/25/2015	22:25:13	spring	loggerhead turtle	1	38.2090	-74.4806
11	2	6/25/2015	22:25:14	spring	loggerhead turtle	1	38.2090	-74.4806
12	3	6/25/2015	22:30:54	spring	loggerhead turtle	1	38.1776	-74.4296
12	2	6/25/2015	22:33:16	spring	loggerhead turtle	1	38.1777	-74.5153
12	3	6/25/2015	22:33:42	spring	loggerhead turtle	1	38.1777	-74.5310
12	2	6/25/2015	22:33:51	spring	loggerhead turtle	1	38.1777	-74.5371
12	2	6/25/2015	22:34:12	spring	loggerhead turtle	1	38.1777	-74.5491
12	2	6/25/2015	22:34:15	spring	loggerhead turtle	1	38.1777	-74.5515
12	3	6/25/2015	22:34:19	spring	loggerhead turtle	1	38.1777	-74.5539
12	1	6/25/2015	22:34:25	spring	loggerhead turtle	1	38.1777	-74.5575
12	2	6/25/2015	22:34:27	spring	loggerhead turtle	1	38.1777	-74.5587
12	2	6/25/2015	22:34:27	spring	loggerhead turtle	1	38.1777	-74.5587
12	2	6/25/2015	23:00:51	spring	loggerhead turtle	1	38.1789	-74.8526
12	2	6/25/2015	23:04:05	spring	loggerhead turtle	1	38.1790	-74.7379
12	3	6/25/2015	23:05:17	spring	loggerhead turtle	1	38.1791	-74.6948
12	2	6/25/2015	23:05:41	spring	loggerhead turtle	1	38.1791	-74.6804
12	1	6/25/2015	23:08:18	spring	loggerhead turtle	1	38.1790	-74.5869
12	2	6/25/2015	23:08:19	spring	loggerhead turtle	3	38.1790	-74.5857
12	1	6/25/2015	23:08:21	spring	loggerhead turtle	1	38.1790	-74.5845
12	1	6/25/2015	23:08:25	spring	loggerhead turtle	1	38.1790	-74.5821
12	2	6/25/2015	23:08:36	spring	loggerhead turtle	1	38.1789	-74.5761
12	2	6/25/2015	23:09:07	spring	loggerhead turtle	1	38.1790	-74.5566
12	3	6/25/2015	23:09:27	spring	loggerhead turtle	1	38.1790	-74.5444
11	3	6/25/2015	23:16:05	spring	loggerhead turtle	1	38.2069	-74.4059
11	2	6/25/2015	23:17:17	spring	loggerhead turtle	1	38.2075	-74.4475
11	2	6/25/2015	23:17:40	spring	loggerhead turtle	1	38.2074	-74.4608
11	2	6/25/2015	23:19:45	spring	loggerhead turtle	1	38.2082	-74.5336
11	1	6/25/2015	23:20:07	spring	loggerhead turtle	1	38.2085	-74.5457
11	2	6/25/2015	23:20:12	spring	loggerhead turtle	1	38.2085	-74.5480
11	1	6/25/2015	23:24:52	spring	loggerhead turtle	1	38.2095	-74.7088
11	2	6/25/2015	23:27:13	spring	green turtle	1	38.2085	-74.7894
10	1	6/26/2015	19:51:27	spring	loggerhead turtle	1	38.2388	-75.0452

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
10	3	6/26/2015	20:03:09	spring	loggerhead turtle	1	38.2393	-74.6212
10	1	6/26/2015	20:04:43	spring	loggerhead turtle	1	38.2393	-74.5669
10	2	6/26/2015	20:07:59	spring	loggerhead turtle	1	38.2389	-74.4486
9	3	6/26/2015	20:16:03	spring	loggerhead turtle	1	38.2665	-74.5402
9	1	6/26/2015	20:21:28	spring	unidentified turtle	1	38.2668	-74.7308
8	2	6/26/2015	20:36:59	spring	loggerhead turtle	1	38.2871	-74.9934
8	1	6/26/2015	20:41:39	spring	loggerhead turtle	1	38.2900	-74.8237
8	2	6/26/2015	20:43:05	spring	loggerhead turtle	1	38.2909	-74.7674
8	1	6/26/2015	20:43:09	spring	loggerhead turtle	1	38.2909	-74.7674
8	1	6/26/2015	20:44:55	spring	unidentified turtle	1	38.2917	-74.7012
8	3	6/26/2015	20:50:27	spring	loggerhead turtle	1	38.2943	-74.4962
8	2	6/26/2015	20:51:06	spring	loggerhead turtle	1	38.2948	-74.4719
8	2	6/26/2015	20:52:13	spring	loggerhead turtle	1	38.2951	-74.4310
8	3	6/26/2015	20:52:24	spring	loggerhead turtle	1	38.2952	-74.4250
8	2	6/26/2015	20:52:41	spring	loggerhead turtle	1	38.2952	-74.4154
7	1	6/26/2015	20:57:05	spring	loggerhead turtle	1	38.3240	-74.4822
7	1	6/26/2015	20:58:19	spring	loggerhead turtle	1	38.3236	-74.5274
7	2	6/26/2015	20:58:43	spring	loggerhead turtle	1	38.3235	-74.5443
7	1	6/26/2015	21:00:58	spring	loggerhead turtle	1	38.3238	-74.6242
7	1	6/26/2015	21:01:57	spring	loggerhead turtle	1	38.3237	-74.6613
7	2	6/26/2015	21:09:00	spring	loggerhead turtle	1	38.3236	-74.9266
7	2	6/26/2015	21:09:04	spring	loggerhead turtle	1	38.3237	-74.9291
6	3	6/26/2015	21:23:29	spring	loggerhead turtle	1	38.3542	-74.7666
6	1	6/26/2015	21:27:16	spring	loggerhead turtle	1	38.3541	-74.6354
6	3	6/26/2015	21:28:22	spring	loggerhead turtle	1	38.3541	-74.5937
6	1	6/26/2015	21:29:36	spring	loggerhead turtle	1	38.3540	-74.5530
6	3	6/26/2015	21:29:42	spring	loggerhead turtle	1	38.3539	-74.5471
6	2	6/26/2015	21:29:50	spring	loggerhead turtle	1	38.3540	-74.5448
6	1	6/26/2015	21:30:06	spring	loggerhead turtle	1	38.3540	-74.5354
6	1	6/26/2015	21:30:31	spring	unidentified turtle	1	38.3540	-74.5199
6	1	6/26/2015	21:30:43	spring	loggerhead turtle	1	38.3541	-74.5127
6	1	6/26/2015	21:30:54	spring	loggerhead turtle	1	38.3541	-74.5068
6	3	6/26/2015	21:31:40	spring	loggerhead turtle	1	38.3538	-74.4771
6	2	6/26/2015	21:32:20	spring	loggerhead turtle	1	38.3538	-74.4534
6	1	6/26/2015	21:32:21	spring	loggerhead turtle	1	38.3538	-74.4546
5	1	6/26/2015	21:38:42	spring	loggerhead turtle	1	38.3815	-74.5622
5	2	6/26/2015	21:41:35	spring	unidentified turtle	1	38.3816	-74.6724
5	1	6/26/2015	21:47:01	spring	loggerhead turtle	1	38.3816	-74.8746
5	2	6/26/2015	21:48:37	spring	loggerhead turtle	1	38.3815	-74.9346
5	1	6/26/2015	21:49:51	spring	loggerhead turtle	1	38.3815	-74.9788
4	2	6/26/2015	21:57:08	spring	loggerhead turtle	1	38.4119	-74.9234

Table 5: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
4	3	6/26/2015	21:58:10	spring	loggerhead turtle	1	38.4120	-74.8877
4	1	6/26/2015	22:02:25	spring	loggerhead turtle	1	38.4123	-74.7265
4	2	6/26/2015	22:03:51	spring	loggerhead turtle	1	38.4122	-74.6712
4	3	6/26/2015	22:04:35	spring	loggerhead turtle	1	38.4120	-74.6452
4	2	6/26/2015	22:07:35	spring	loggerhead turtle	1	38.4119	-74.5333
4	2	6/26/2015	22:07:36	spring	loggerhead turtle	1	38.4119	-74.5333
4	1	6/26/2015	22:07:40	spring	loggerhead turtle	1	38.4119	-74.5308
4	1	6/26/2015	22:08:05	spring	loggerhead turtle	1	38.4118	-74.5145
4	1	6/26/2015	22:08:28	spring	loggerhead turtle	1	38.4118	-74.5006
3	1	6/26/2015	22:18:45	spring	loggerhead turtle	1	38.4397	-74.6739
3	2	6/26/2015	22:19:10	spring	loggerhead turtle	1	38.4398	-74.6912
3	2	6/26/2015	22:19:16	spring	loggerhead turtle	1	38.4398	-74.6950
3	2	6/26/2015	22:21:52	spring	loggerhead turtle	1	38.4395	-74.7894
2	1	6/26/2015	22:35:21	spring	loggerhead turtle	1	38.4710	-74.8635
2	3	6/26/2015	22:36:29	spring	loggerhead turtle	1	38.4710	-74.8209
2	2	6/26/2015	22:38:03	spring	loggerhead turtle	1	38.4712	-74.7607
2	3	6/26/2015	22:44:35	spring	loggerhead turtle	1	38.4709	-74.5137
2	3	6/26/2015	22:44:51	spring	loggerhead turtle	2	38.4709	-74.5036
2	2	6/26/2015	22:44:58	spring	loggerhead turtle	1	38.4709	-74.4985
2	1	6/26/2015	22:46:11	spring	unidentified turtle	1	38.4708	-74.4534
2	1	6/26/2015	22:46:33	spring	unidentified turtle	1	38.4707	-74.4392
1	2	6/26/2015	22:51:16	spring	loggerhead turtle	1	38.4995	-74.5336
1	1	6/26/2015	22:51:17	spring	loggerhead turtle	1	38.4995	-74.5348
1	3	6/26/2015	22:52:23	spring	loggerhead turtle	1	38.4999	-74.5774
1	1	6/26/2015	22:52:24	spring	loggerhead turtle	1	38.4999	-74.5749
1	2	6/26/2015	22:56:08	spring	loggerhead turtle	1	38.5002	-74.7173
1	1	6/26/2015	22:56:11	spring	loggerhead turtle	1	38.5002	-74.7173
1	1	6/26/2015	22:56:39	spring	loggerhead turtle	1	38.5001	-74.7348
1	3	6/26/2015	22:56:44	spring	loggerhead turtle	1	38.5001	-74.7398
1	1	6/26/2015	22:58:37	spring	loggerhead turtle	1	38.5004	-74.8104

Most of the turtles were sighted in the spring when loggerheads are migrating into the northern waters of the mid-Atlantic (Figure 7). Loggerheads also spend more time at the surface in the spring due to cooler water temperature, so the difference in number of sightings between spring and summer may be due to turtle behavior, not number of animals (Mansfield 2006). Sea turtles were sighted within the WEA in all three seasons, but a greater number of turtles were sighted east of the WEA in spring and summer. There were relatively few turtles sighted in the fall and no sea turtles were sighted January-April. Green sea turtles had a similar distribution to loggerheads and were also sighted in all three seasons.

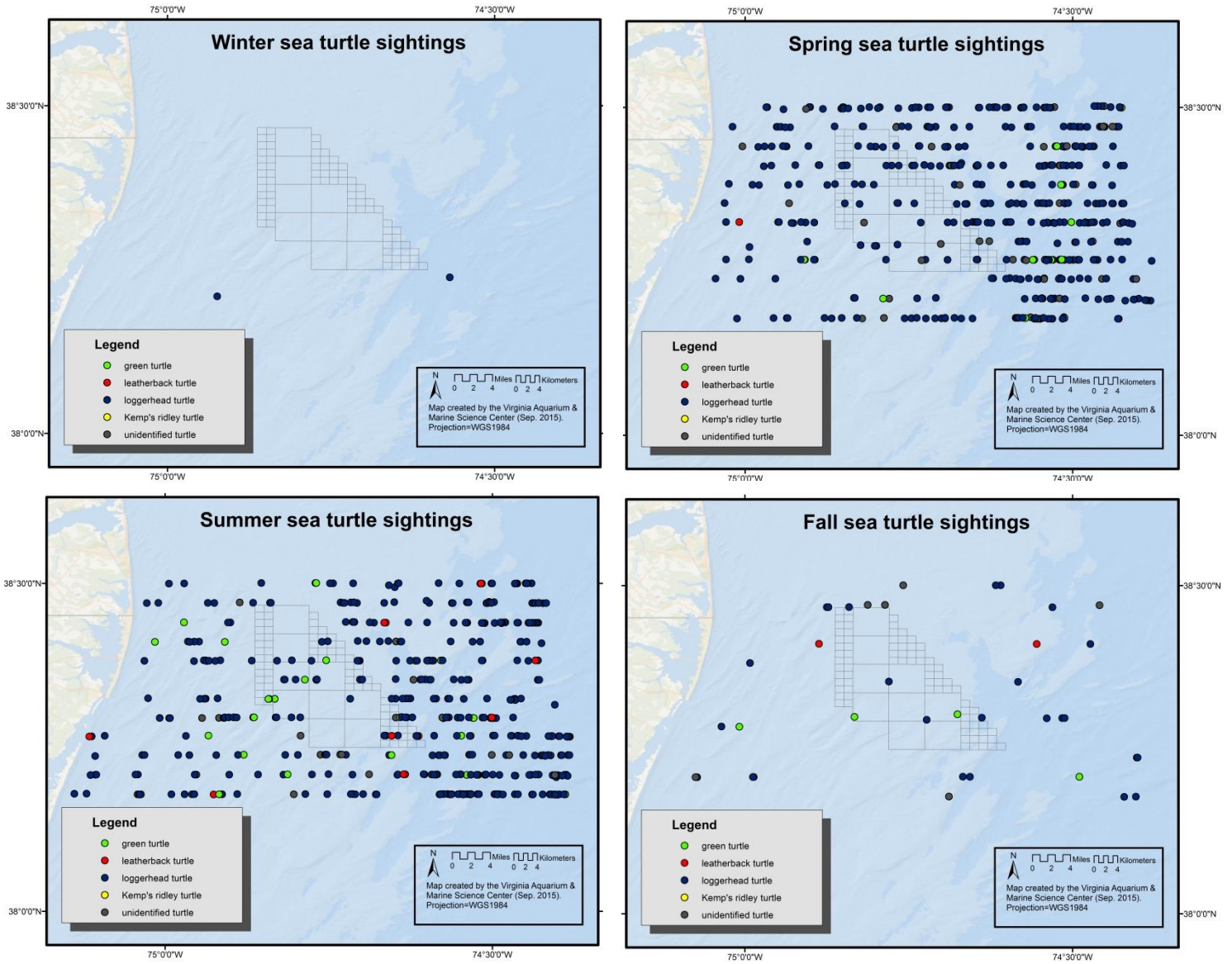


Figure 7: Seasonal sea turtle sightings from July 2013 through June 2015. There were sea turtles in the Wind Energy Area in spring, summer and fall.

Other sightings

The observers recorded sightings of other large vertebrates such as sharks, rays, and large fish. Many were not identified to species but observers did identify ocean sunfish (*Mola mola*), basking shark (*Cetorhinus maximus*) and manta ray (*Manta birostris*). Most of the sightings were of a single animal, but one sighting included eleven unidentified sharks (Table 5).

Table 6: Sightings of other species from July 2013 through June 2015. Sightings are ordered by date and time of observation.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
2	1	7/30/2013	15:08:47	summer	unidentified ray	1	38.4703	-74.8105
2	1	7/30/2013	15:09:26	summer	unidentified shark	1	38.4705	-74.8342
2	1	7/30/2013	15:10:01	summer	unidentified shark	1	38.4703	-74.8568
2	2	7/30/2013	15:11:02	summer	unidentified shark	1	38.4702	-74.8921
4	2	7/30/2013	15:54:31	summer	cownose ray	25	38.4114	-74.8995
4	3	7/30/2013	15:55:19	summer	manta ray	1	38.4114	-74.9323
4	1	7/30/2013	15:57:51	summer	unidentified shark	1	38.4110	-75.0255
12	3	7/31/2013	20:47:24	summer	unidentified shark	1	38.1780	-74.8806
12	2	7/31/2013	20:48:03	summer	unidentified shark	1	38.1779	-74.8579
12	2	7/31/2013	20:49:18	summer	unidentified shark	2	38.1781	-74.8129
12	1	7/31/2013	20:49:24	summer	unidentified shark	1	38.1782	-74.8093
12	2	7/31/2013	20:52:19	summer	unidentified shark	1	38.1788	-74.7074
12	2	7/31/2013	20:53:11	summer	unidentified shark	1	38.1789	-74.6752
12	2	7/31/2013	20:53:12	summer	unidentified shark	1	38.1789	-74.6752
12	2	7/31/2013	20:53:52	summer	unidentified shark	1	38.1789	-74.6511
12	2	7/31/2013	20:53:56	summer	unidentified shark	1	38.1789	-74.6487
12	2	7/31/2013	20:53:57	summer	unidentified shark	1	38.1789	-74.6487
12	3	7/31/2013	20:55:02	summer	unidentified shark	1	38.1789	-74.6089
12	2	7/31/2013	20:55:24	summer	unidentified shark	1	38.1789	-74.5957
12	2	7/31/2013	20:55:24	summer	unidentified shark	1	38.1789	-74.5957
12	2	7/31/2013	20:56:09	summer	unidentified shark	1	38.1788	-74.5694
12	2	7/31/2013	20:57:53	summer	unidentified shark	1	38.1785	-74.5073
10	2	7/31/2013	21:36:55	summer	unidentified shark	1	38.2381	-74.7514
10	2	7/31/2013	21:46:23	summer	unidentified shark	1	38.2377	-74.4109
9	2	7/31/2013	22:01:04	summer	unidentified shark	1	38.2680	-74.8209
8	2	7/31/2013	22:18:38	summer	unidentified shark	1	38.2951	-74.8342
8	1	7/31/2013	22:19:29	summer	unidentified shark	1	38.2952	-74.8029
8	1	7/31/2013	22:20:18	summer	unidentified shark	1	38.2953	-74.7737
7	2	7/31/2013	22:44:10	summer	unidentified shark	1	38.3250	-74.8153
7	2	7/31/2013	22:46:25	summer	unidentified shark	1	38.3250	-74.8958
6	1	7/31/2013	22:56:53	summer	unidentified shark	5	38.3528	-74.9420
6	2	7/31/2013	22:57:30	summer	unidentified shark	2	38.3530	-74.9186
6	2	7/31/2013	22:58:02	summer	unidentified shark	1	38.3530	-74.8991
6	2	7/31/2013	23:00:41	summer	unidentified shark	2	38.3531	-74.8025
6	1	7/31/2013	23:10:45	summer	unidentified ray	5	38.3529	-74.4334
5	2	7/31/2013	23:19:54	summer	unidentified shark	2	38.3826	-74.6867
5	2	7/31/2013	23:26:16	summer	unidentified shark	NA	38.3826	-74.9220
5	2	7/31/2013	23:26:35	summer	unidentified shark	1	38.3826	-74.9346

Table 6: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
5	2	7/31/2013	23:26:40	summer	unidentified shark	1	38.3826	-74.9371
5	1	7/31/2013	23:26:53	summer	unidentified shark	11	38.3826	-74.9446
6	3	10/19/2013	17:55:56	fall	ocean sunfish	1	38.3535	-74.9142
5	1	10/19/2013	18:15:40	fall	ocean sunfish	1	38.3826	-74.6230
4	1	10/19/2013	18:44:28	fall	ocean sunfish	1	38.4112	-74.4273
3	1	11/26/2013	15:45:44	fall	unidentified animal	2	38.4399	-74.5964
12	1	2/22/2014	14:39:49	winter	unidentified shark	1	38.1778	-74.2894
12	1	6/12/2014	15:37:30	spring	ocean sunfish	1	38.1782	-74.9300
7	1	6/12/2014	16:13:31	spring	ocean sunfish	1	38.3241	-74.5869
4	1	6/12/2014	18:11:23	spring	ocean sunfish	1	38.4115	-75.0239
4	1	6/12/2014	18:26:44	spring	ocean sunfish	1	38.4116	-74.4420
4	2	6/12/2014	18:26:49	spring	ocean sunfish	1	38.4116	-74.4395
2	1	6/12/2014	19:09:18	spring	ocean sunfish	2	38.4706	-74.5583
2	2	6/12/2014	19:09:20	spring	ocean sunfish	2	38.4706	-74.5583
2	1	6/12/2014	19:12:44	spring	unidentified shark	4	38.4707	-74.4268
1	1	6/12/2014	19:25:54	spring	ocean sunfish	1	38.5002	-74.8816
1	1	6/19/2014	13:25:17	spring	unidentified shark	1	38.5007	-74.4467
1	3	6/19/2014	13:31:22	spring	unidentified shark	3	38.5003	-74.6669
1	3	6/19/2014	13:31:39	spring	unidentified shark	1	38.5002	-74.6765
1	1	6/19/2014	13:38:15	spring	unidentified shark	1	38.5006	-74.8148
2	1	6/19/2014	14:01:11	spring	ocean sunfish	1	38.4705	-74.5005
3	2	6/19/2014	14:07:12	spring	hammerhead shark	1	38.4404	-74.4894
3	1	6/19/2014	14:17:45	spring	cownose ray	1	38.4406	-74.8762
5	1	6/19/2014	14:57:39	spring	unidentified shark	1	38.3827	-74.5862
7	1	6/19/2014	15:47:40	spring	unidentified shark	1	38.3245	-74.8595
7	1	6/19/2014	15:47:51	spring	unidentified shark	1	38.3245	-74.8659
7	1	6/19/2014	15:49:51	spring	unidentified shark	1	38.3245	-74.9403
1	2	7/17/2014	13:42:19	summer	cownose ray	1	38.4999	-74.7032
1	2	7/17/2014	13:45:32	summer	cownose ray	1	38.4998	-74.8190
1	1	7/17/2014	13:53:47	summer	unidentified shark	1	38.4998	-74.9602
1	2	7/17/2014	13:54:31	summer	cownose ray	1	38.5000	-74.9875
3	1	7/17/2014	14:31:00	summer	unidentified shark	1	38.4396	-74.9296
5	2	7/17/2014	15:07:27	summer	eagle ray	1	38.3821	-74.6797
5	1	7/17/2014	15:15:05	summer	unidentified shark	1	38.3814	-74.9499
6	1	7/17/2014	15:23:51	summer	manta ray	1	38.3539	-74.9815
6	1	7/17/2014	15:30:45	summer	manta ray	2	38.3541	-74.7343
12	1	7/17/2014	19:34:03	summer	hammerhead shark	1	38.1780	-74.4226
12	2	7/17/2014	19:34:13	summer	unidentified shark	1	38.1780	-74.4139
1	1	8/1/2014	13:40:47	summer	hammerhead shark	1	38.4999	-74.5690
1	1	8/1/2014	13:42:10	summer	hammerhead shark	1	38.5000	-74.6193
1	1	8/1/2014	13:49:39	summer	unidentified shark	1	38.5000	-74.8845

Table 6: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
3	1	8/1/2014	14:20:54	summer	ocean sunfish	2	38.4399	-74.4473
3	2	8/1/2014	14:29:57	summer	ocean sunfish	2	38.4406	-74.7767
4	1	8/1/2014	14:49:53	summer	hammerhead shark	1	38.4112	-74.6835
6	1	8/1/2014	15:31:59	summer	hammerhead shark	1	38.3532	-74.6014
8	1	8/1/2014	16:08:13	summer	manta ray	1	38.2958	-74.6608
9	1	8/1/2014	16:31:33	summer	ocean sunfish	1	38.2675	-74.8764
12	1	8/1/2014	18:06:27	summer	manta ray	2	38.1786	-74.6634
1	2	8/30/2014	13:18:39	summer	unidentified shark	1	38.4998	-74.7834
4	1	8/30/2014	14:34:33	summer	manta ray	1	38.4112	-74.5612
5	1	8/30/2014	14:56:30	summer	unidentified shark	1	38.3818	-75.0304
7	2	8/30/2014	15:45:27	summer	unidentified ray	1	38.3247	-74.9635
11	1	8/30/2014	17:52:47	summer	manta ray	1	38.2085	-74.5940
11	2	8/30/2014	17:52:54	summer	manta ray	1	38.2086	-74.5977
11	2	8/30/2014	17:58:06	summer	manta ray	1	38.2085	-74.6899
11	2	8/30/2014	18:05:37	summer	cownose ray	100	38.2084	-74.9593
11	2	8/30/2014	18:05:58	summer	cownose ray	40	38.2083	-74.9725
11	2	8/30/2014	18:06:31	summer	cownose ray	75	38.2082	-74.9915
11	2	8/30/2014	18:08:56	summer	cownose ray	50	38.2081	-75.0786
11	2	8/30/2014	18:09:18	summer	cownose ray	25	38.2079	-75.0915
11	2	8/30/2014	18:10:06	summer	cownose ray	10	38.2074	-75.1199
11	2	8/30/2014	18:10:32	summer	cownose ray	3	38.2077	-75.1348
10	2	8/30/2014	18:17:52	summer	cownose ray	100	38.2395	-74.9526
10	2	8/30/2014	18:26:33	summer	hammerhead shark	1	38.2378	-74.6524
10	1	8/30/2014	18:37:16	summer	hammerhead shark	NA	38.2389	-74.4266
10	1	8/30/2014	18:38:14	summer	manta ray	1	38.2389	-74.3931
10	2	8/30/2014	18:38:30	summer	manta ray	1	38.2383	-74.3855
9	2	8/30/2014	19:00:29	summer	cownose ray	15	38.2669	-75.0553
9	2	8/30/2014	19:00:47	summer	cownose ray	10	38.2670	-75.0660
8	2	8/30/2014	19:06:01	summer	cownose ray	5	38.2959	-75.0303
8	2	8/30/2014	19:06:31	summer	cownose ray	2	38.2958	-75.0137
8	1	8/30/2014	19:22:05	summer	unidentified ray	1	38.2952	-74.4687
8	2	8/30/2014	19:23:28	summer	cownose ray	1	38.2948	-74.4210
11	2	11/5/2014	16:38:56	fall	ocean sunfish	1	38.2090	-74.7195
2	2	12/15/2014	19:22:33	fall	unidentified animal	1	38.4702	-74.5509
7	1	4/25/2015	15:45:09	spring	unidentified animal	1	38.3248	-74.7501
10	1	4/25/2015	17:37:10	spring	unidentified shark	1	38.2388	-75.1078
11	3	5/21/2015	17:20:54	spring	ocean sunfish	1	38.2061	-74.3907
11	2	5/21/2015	17:27:28	spring	ocean sunfish	1	38.2086	-74.6418
11	2	5/21/2015	17:29:48	spring	ocean sunfish	1	38.2087	-74.7327
12	2	5/21/2015	18:00:37	spring	ocean sunfish	1	38.1779	-74.4806
1	2	6/25/2015	18:43:28	spring	hammerhead shark	1	38.4999	-74.6332

Table 6: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
1	3	6/25/2015	18:46:00	spring	unidentified shark	1	38.4997	-74.5457
1	2	6/25/2015	18:46:20	spring	unidentified shark	1	38.5001	-74.5339
1	1	6/25/2015	18:46:26	spring	unidentified shark	1	38.5003	-74.5303
1	1	6/25/2015	18:46:43	spring	unidentified shark	1	38.5006	-74.5197
1	1	6/25/2015	18:49:02	spring	hammerhead shark	1	38.5002	-74.4397
1	2	6/25/2015	18:49:06	spring	hammerhead shark	1	38.5003	-74.4374
2	2	6/25/2015	18:53:15	spring	unidentified ray	1	38.4710	-74.4966
2	2	6/25/2015	18:54:10	spring	unidentified shark	1	38.4708	-74.5294
2	2	6/25/2015	18:54:25	spring	unidentified shark	1	38.4705	-74.5390
2	2	6/25/2015	18:55:39	spring	unidentified shark	1	38.4696	-74.5829
3	2	6/25/2015	19:24:15	spring	manta ray	1	38.4409	-74.5736
3	2	6/25/2015	19:24:54	spring	unidentified shark	1	38.4409	-74.5516
3	2	6/25/2015	19:26:00	spring	unidentified shark	1	38.4408	-74.5134
3	3	6/25/2015	19:26:52	spring	manta ray	2	38.4409	-74.4833
5	3	6/25/2015	20:05:05	spring	unidentified shark	1	38.3830	-74.5233
5	1	6/25/2015	20:06:09	spring	manta ray	3	38.3830	-74.4861
6	1	6/25/2015	20:12:19	spring	cownose ray	200	38.3526	-74.5309
6	1	6/25/2015	20:20:03	spring	hammerhead shark	1	38.3527	-74.8009
7	1	6/25/2015	20:44:23	spring	unidentified shark	1	38.3251	-74.5656
8	2	6/25/2015	21:01:41	spring	unidentified shark	1	38.2892	-74.7739
8	1	6/25/2015	21:03:37	spring	unidentified shark	1	38.2882	-74.8415
9	1	6/25/2015	21:22:36	spring	hammerhead shark	1	38.2684	-74.7699
9	2	6/25/2015	21:25:27	spring	unidentified shark	1	38.2683	-74.6686
9	2	6/25/2015	21:31:48	spring	unidentified shark	1	38.2679	-74.4468
10	2	6/25/2015	21:40:55	spring	unidentified shark	1	38.2378	-74.5826
10	2	6/25/2015	21:40:59	spring	ocean sunfish	1	38.2378	-74.5849
11	1	6/25/2015	22:18:25	spring	unidentified shark	1	38.2094	-74.7242
11	2	6/25/2015	22:19:33	spring	manta ray	1	38.2094	-74.6822
11	1	6/25/2015	22:19:33	spring	manta ray	1	38.2094	-74.6834
11	2	6/25/2015	22:21:35	spring	ocean sunfish	1	38.2093	-74.6096
11	2	6/25/2015	22:22:17	spring	unidentified shark	1	38.2092	-74.5847
11	2	6/25/2015	22:24:21	spring	unidentified shark	4	38.2091	-74.5115
11	2	6/25/2015	22:25:12	spring	hammerhead shark	1	38.2090	-74.4818
11	1	6/25/2015	22:25:13	spring	unidentified shark	1	38.2090	-74.4806
12	2	6/25/2015	22:37:14	spring	manta ray	1	38.1778	-74.6581
12	2	6/25/2015	22:39:25	spring	hammerhead shark	1	38.1779	-74.7373
12	1	6/25/2015	22:54:45	spring	unidentified shark	1	38.1775	-75.0762
12	2	6/25/2015	23:05:21	spring	manta ray	1	38.1791	-74.6924
12	2	6/25/2015	23:06:33	spring	manta ray	1	38.1790	-74.6494
12	1	6/25/2015	23:06:52	spring	unidentified shark	1	38.1790	-74.6387
12	2	6/25/2015	23:11:34	spring	ocean sunfish	1	38.1789	-74.4679

Table 6: cont.

Line	Team	Date	Time (UTC)	Season	Species	Number	Latitude	Longitude
12	1	6/25/2015	23:13:22	spring	hammerhead shark	1	38.1788	-74.4018
12	2	6/25/2015	23:13:23	spring	hammerhead shark	1	38.1788	-74.4006
11	2	6/25/2015	23:18:15	spring	hammerhead shark	1	38.2074	-74.4820
11	2	6/25/2015	23:18:58	spring	manta ray	1	38.2079	-74.5062
11	2	6/25/2015	23:19:18	spring	manta ray	1	38.2081	-74.5178
11	2	6/25/2015	23:22:00	spring	manta ray	1	38.2097	-74.6106
11	2	6/25/2015	23:24:04	spring	manta ray	1	38.2087	-74.6811
10	1	6/26/2015	19:56:23	spring	hammerhead shark	1	38.2393	-74.8706
10	2	6/26/2015	20:04:53	spring	unidentified ray	1	38.2393	-74.5597
7	1	6/26/2015	20:57:45	spring	ocean sunfish	1	38.3239	-74.5071
7	1	6/26/2015	21:05:46	spring	ocean sunfish	1	38.3238	-74.8023
6	2	6/26/2015	21:21:49	spring	hammerhead shark	1	38.3541	-74.8275
6	1	6/26/2015	21:29:59	spring	ocean sunfish	1	38.3540	-74.5390
4	1	6/26/2015	22:06:25	spring	hammerhead shark	1	38.4120	-74.5769
4	2	6/26/2015	22:07:05	spring	hammerhead shark	1	38.4120	-74.5520
3	2	6/26/2015	22:18:25	spring	unidentified shark	1	38.4397	-74.6629
2	3	6/26/2015	22:38:22	spring	hammerhead shark	1	38.4712	-74.7484
2	1	6/26/2015	22:41:36	spring	unidentified shark	1	38.4710	-74.6287
2	2	6/26/2015	22:43:37	spring	hammerhead shark	1	38.4709	-74.5492
1	1	6/26/2015	22:50:36	spring	ocean sunfish	1	38.4984	-74.5089
1	1	6/26/2015	22:54:54	spring	manta ray	1	38.5002	-74.6683

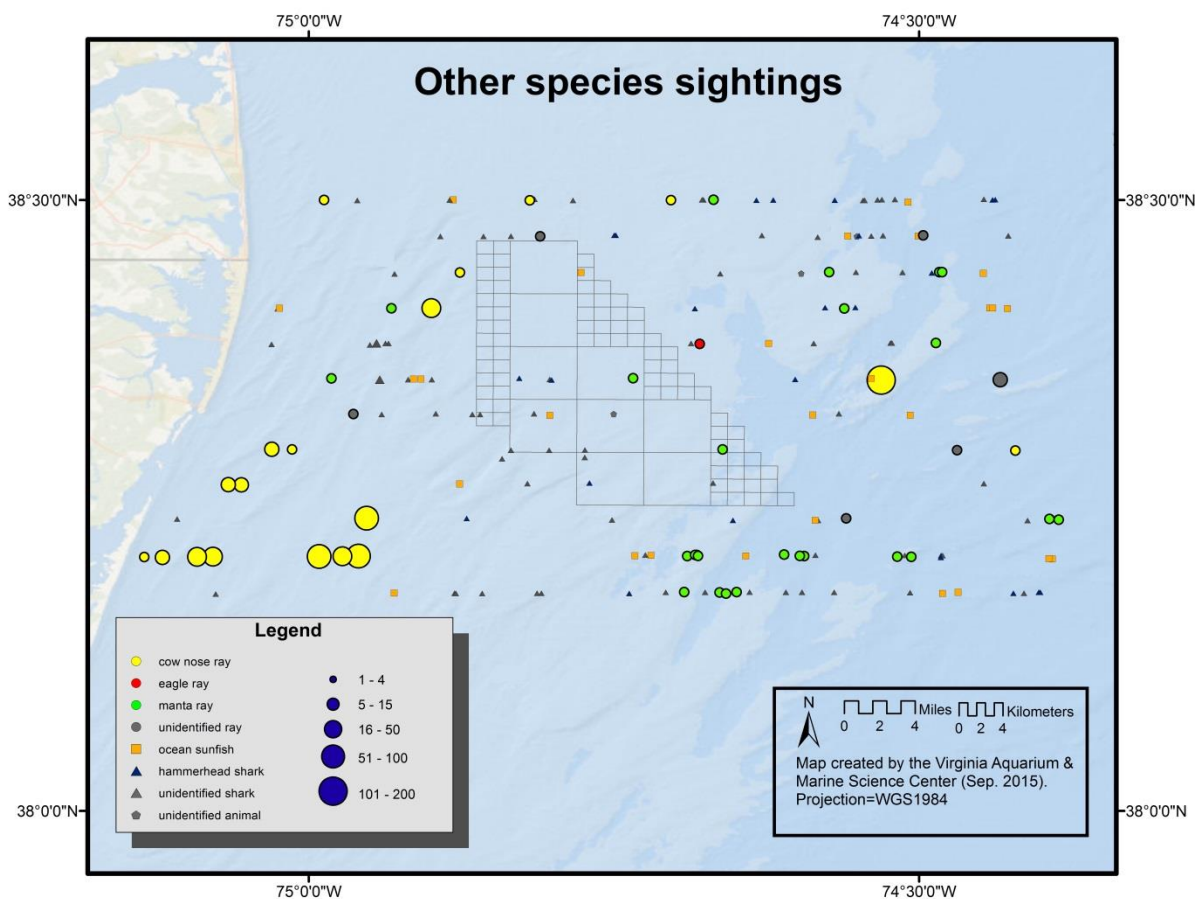


Figure 6: Sightings of species other than marine mammals and sea turtles from July 2013 through June 2015.

Sightings of other species were distributed throughout the study area (Figure 6). The highest number of sightings was for unidentified sharks (of all species except hammerhead) but the highest number of animals was cownose ray (*Rhinoptera bonasus*) with group sizes up to 200. There were similar numbers of sightings in spring (n=89) and summer (n=86) and few sightings in fall (N=6) and winter (N=1). Most of the cownose ray sightings were in summer and most of the ocean sunfish and hammerhead shark sightings were in spring. Cownose rays tended to be west of the WEA and manta rays tended to be east of the WEA.

Abundance estimates

Detailed descriptions of survey data analysis for abundance estimates are described in Appendix 1. The observer protocol used mark-recapture distance sampling (MRDS) methods so that the probability of detection by the observers, or perception bias, could be estimated. However, estimates developed by St. Andrews do not take into account that some animals may be unavailable for detection from the survey aircraft because of their diving behavior. Therefore, estimates from St. Andrews (Appendix 1) are for

available animals only (e.g. animals at or near the surface) rather than for all animals and will be referred to as uncorrected abundance. We did not investigate surface time for any species as part of this project and surface times are expected to vary somewhat based on location, behavior, group size and season (especially for sea turtles). Where available, we have applied surface times to the St. Andrews uncorrected abundance estimates to correct for availability and offer corrected abundance estimates, but these corrections may not all be accurate for Maryland waters.

The majority of detections were recorded during the months May to October and the most frequently detected species were loggerhead turtles followed by bottlenose dolphins. There were too few detections in some months to estimate detection probability separately for each survey, so detections from all surveys were pooled to estimate an overall detection probability for each species or species group.

The probability of detection by at least one team on the trackline was estimated to be 0.47 (CV=0.13) and the average probability of detection was 0.35 (CV=0.14) for loggerhead turtle groups. The maximum perpendicular distance that a loggerhead turtle group was detected was 638 m from the trackline. However, to avoid a long tail in the detection function, groups were truncated at a distance of 220 m leaving 738 groups (excluding 9% of detections). Loggerhead turtles were detected during 18 (of 24) surveys and, for these surveys, uncorrected abundance estimates ranged from 15 animals (CV=1.01) in November 2014 (survey 17) to 1,825 animals (CV=0.23) in June 2014 (survey 11). The highest seasonal uncorrected abundance of loggerhead turtles was 1,119 (CV=0.19; Table 7). For sea turtles in Virginia, surface time varies for sea turtles with season, and turtles spend more time at the surface in spring than summer and in summer than fall (Mansfield 2006, Barco *et al.* 2014). We do not have surface time estimates for sea turtles in winter because they rarely appear north of North Carolina in winter. Corrected seasonal estimates for spring summer and fall ranged from 4,605 in summer to 557 in fall (Table 7).

For bottlenose dolphin groups, the probability of detection by at least one team on the trackline was estimated to be 0.49 (CV=0.17) and the average probability of detection was 0.37 (CV=0.17). The maximum distance that a group of bottlenose dolphins was detected was 685 m from the trackline, but distances were truncated at a 220 m, leaving 380 groups (excluding 9% of detections). For the surveys where bottlenose dolphins were detected, uncorrected abundance estimates ranged from 24 dolphins (CV=1.05) for January 2015 (survey 19) to 8,351 dolphins (CV=0.45) for July 2013 (survey 1). The latter estimate of bottlenose dolphins was due to a high encounter rate and an estimated mean group size of nearly 10 animals (CV=0.25) although estimated mean group size was higher in August 2014 (survey 14) due to a group of 230 animals being observed. The highest uncorrected seasonal abundance of bottlenose dolphins was 2,769 (CV=0.30) in the spring, with slightly fewer animals in summer (N=2,555; Table 7). Surface time for groups of animals may be strongly affected by number of animals in a group. While an individual may only spend 20% of its time at the surface, at least one member of a large group may be visible 90% of the time. Thus, as group size increases, availability increases (Buckland *et al.* 2001). For this reason it is difficult to determine surface time for delphinids which were sighted in groups from one to 230 individuals. Estimates for surface time for cetaceans in the Western North Atlantic are being developed by the National Marine Fisheries Service and estimates for bottlenose dolphins with a mean group size of 8.8 is 0.75 (CV= \sim 0.3) for all seasons (D. Palka, *pers. comm.*). The corrected abundance estimates therefore ranged from 3,692 (CV= \sim 0.42) in spring to 263 (CV= \sim 0.46) in fall (Table 7).

Abundance estimates were obtained for common, spotted and unidentified dolphins as a group and are referred to as ‘other dolphins’. The probability of detection by at least one team on the trackline was estimated to be 0.47 (CV=0.16) and the average probability of detection was 0.40 (CV=0.17). A detection function was fitted to detections of all dolphins (including bottlenose) and then combined with the encounter rate of ‘other dolphins’. Estimates of uncorrected abundance for ‘other dolphins’ ranged from 15 dolphins in June 2015 (survey 23) (CV=1.03) to 2,828 dolphins (CV=0.97) in April 2014 (survey 10). The highest seasonal uncorrected abundance of other dolphins (mostly common dolphins) was 462 (CV=0.86) in spring and lowest in fall (N=36; Table 7). Estimates for surface time for cetaceans in the Western North Atlantic are being developed by the National Marine Fisheries Service and estimates for common dolphins with a mean group size of 23 was 0.90 (CV=~0.3) (D. Palka, *pers. comm.*). Applying the surface time correction results in corrected abundance of 513 (CV=~0.91) in spring to 40 (CV=~0.69) in fall (Table 7).

Abundance was estimated for all whales as a group (which included fin, minke, humpback, northern right, unidentified baleen and unidentified whales). Whales were detected out to 1.3 km but distances were truncated at 510 m leaving 15 groups. The probability of detection by at least one team was estimated to be 0.94 (CV=0.07) and the average probability of detection was 0.66 (CV=0.23). Whales were detected on seven surveys and abundance ranged from 4 whales on three of these surveys to 44 whales (CV=0.75) in January 2015 (survey 20). The highest seasonal uncorrected abundance of baleen whales was 14 (CV=0.53) in winter and the lowest was 1 in spring. There were not enough sightings of baleen whales in fall to develop an abundance estimate. Humpback whales on breeding grounds in Brazil were estimated to spend 67% (± 0.15 SD) of their time at the surface (Andriolo *et al.* 2006). Estimates for surface time for cetaceans in the Western North Atlantic are being developed by the National Marine Fisheries Service and estimates for humpback, fin and minke whales are 0.6, 0.3-0.5, and 0.3 respectively (D. Palka, *pers. comm.*). The mean of the western North Atlantic surface times is 0.433 which we applied to the uncorrected abundance estimates with an approximate CV of 0.2. The seasonal corrected abundances for baleen whales were 32 (CV=~0.57), 2 (CV=~0.78) and 9 (CV=~0.67) for winter, spring and summer respectively.

Table 7: Abundance and density by species/group and season. Uncorrected values are corrected for perception bias but not for availability bias and corrected values include availability bias estimates (Taken from Appendix 1; **mean of surface time for humpback, fin and minke whales in the western North Atlantic (D. Palka, pers. comm.).*

Loggerhead sea turtle	Uncorrected abundance*	CV*	Surface time	CV	Corrected abundance	CV	Uncorrected density	CV	Corrected density	CV
Winter (Jan-Mar)	8	0.72	NA	NA	NA	NA	0.004	0.72	NA	NA
Spring (Apr-Jun)	850	0.17	0.385	0.70	2,208	0.72	0.445	0.17	1.156	0.72
Summer (Jul-Sep)	1,119	0.19	0.243	0.96	4,605	0.98	0.585	0.19	2.407	0.98
Fall (Oct-Dec)	123	0.45	0.221	1.35	557	1.42	0.064	0.45	0.290	1.42

Table 7: cont.

Bottlenose dolphin	Uncorrected abundance*	CV*	Surface time	CV	Corrected abundance	CV	Uncorrected density	CV	Corrected density	CV
Winter (Jan-Mar)	275	0.59	0.75	~0.30	367	~0.66	0.144	0.59	0.192	~0.66
Spring (Apr-Jun)	2,769	0.30	0.75	~0.30	3,692	~0.42	1.449	0.30	1.932	~0.42
Summer (Jul-Sep)	2,555	0.33	0.75	~0.30	3,407	~0.45	1.337	0.33	1.783	~0.45
Fall (Oct-Dec)	197	0.35	0.75	~0.30	263	~0.46	0.103	0.35	0.137	~0.46
Other dolphins	Uncorrected abundance*	CV*	Surface time	CV	Corrected abundance	CV	Uncorrected density	CV	Corrected density	CV
Winter (Jan-Mar)	181	0.60	0.9	~0.30	201	~0.67	0.095	0.60	0.106	~0.67
Spring (Apr-Jun)	462	0.86	0.9	~0.30	513	~0.91	0.242	0.86	0.269	~0.91
Summer (Jul-Sep)	70	0.95	0.9	~0.30	78	~1.00	0.037	0.95	0.041	~1.00
Fall (Oct-Dec)	36	0.62	0.9	~0.30	40	~0.69	0.019	0.62	0.021	~0.69
Baleen whales	Uncorrected abundance*	CV*	Surface time**	CV	Corrected abundance	CV	Uncorrected density	CV	Corrected density	CV
Winter (Jan-Mar)	14	0.53	0.433	~0.20	32	~0.57	0.007	0.53	0.017	~0.57
Spring (Apr-Jun)	1	0.75	0.433	~0.20	2	~0.78	0.001	0.75	0.001	~0.78
Summer (Jul-Sep)	4	0.64	0.433	~0.20	9	~0.67	0.002	0.64	0.004	~0.67
Fall (Oct-Dec)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Summary

This two year aerial survey project resulted in 1,609 sightings of 5,103 animals off the coast of Maryland. Observers documented four baleen whale species, three of which are endangered, one critically endangered, four sea turtle species, two of which are endangered and two of which are threatened, three dolphin species and five or more species of shark, ray and large fish. Seasonal distribution maps for species groups indicate that large whales were most common in winter, sea turtles in spring and summer and dolphins in summer. Abundance estimates were developed for two species, loggerhead turtles and bottlenose dolphins and two species groups, other dolphins and baleen whales. All species groups appeared in the wind energy area (WEA) during at least three out of four seasons. Between baleen whales and sea turtles, endangered species were observed in the WEA in all seasons, although baleen whales were not sighted in the WEA in fall and sea turtles were not sighted in winter. Thirteen critically endangered right whales all sighted on one survey on January 17, 2015, but were not seen on a Maryland WEA survey five days earlier, and one right whale was seen on a WEA survey in Virginia three days later (VAQF *unpublished data*), suggesting that right whales may move sporadically through the area. Right whales were also sighted in the vicinity of the Virginia WEA in February and April of 2014 (Malette *et al.* 2014), but Maryland surveys during that time yielded no sightings. Despite the fact that right whales move from northern feeding areas to southern breeding areas in the fall, no right whales were sighted in the fall during this survey, nor were they sighted in the fall months in Virginia surveys (Malette *et al.* 2014, 2015). Analysis of the survey data suggest that the best time to conduct

activities that may be harmful to cetaceans is during the fall months (Oct-Dec). There are however, numerous endangered sea turtles in the WEA in October (see Table 5).

Although the coefficient of variation for several of the seasonal estimates were high, these data added to other regional survey efforts will provide a much clearer picture of seasonal distribution and abundance of sea turtles and marine mammals in the mid-Atlantic region. Efforts are currently underway to conduct such analyses in the northeast and mid-Atlantic regions and follow up efforts will allow for additional data such as these to be added to the analyses. Although aerial surveys are an expensive undertaking, consistent multi-year, fine scale survey efforts such as this project are imperative for collecting baseline data on marine mammal and sea turtle distribution and abundance in the region.

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Appendix 1: Aerial surveys off Maryland:

Analysis of surveys conducted from July 2013 to June 2015

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SUMMARY

As part of a study to investigate the seasonal densities and abundances of marine animals off the coast of Maryland, U.S., 24 aerial surveys were conducted from July 2013 to June 2015, inclusive. Here, we report on the analysis of the data collected during the surveys and provide abundance estimates for loggerhead turtles, bottlenose dolphins and for other dolphin species (as a combined group) and whales. These results update interim estimates.

The observer protocol used mark-recapture distance sampling (MRDS) methods so that the probability of detection by the observers, or perception bias, could be estimated. However, estimates do not take into account that some animals may be unavailable for detection from the survey aircraft because of their diving behaviour. Therefore, estimates are for available animals only rather than for all animals.

The majority of detections were recorded during the months May to October and the most frequently detected species were loggerhead turtles followed by bottlenose dolphins. There were too few detections in some months to estimate detection probability separately for each survey and so detections from all surveys were pooled to estimate an overall detection probability for each species or species group. The probability of detection on the trackline was estimated to be 0.47 (CV=0.13) for loggerhead turtle groups and 0.49 (CV=0.17) for bottlenose dolphin groups. Loggerhead turtles were detected during 18 surveys and, for these surveys, abundance estimates ranged from 15 animals (CV=1.01) in survey 17 to 1,825 animals (CV=0.23) in survey 11. For the surveys where bottlenose dolphins were detected, abundance estimates ranged from 24 dolphins (CV=1.05) for survey 19 to 8,351 dolphins (CV=0.45) for survey 1. The latter estimate of bottlenose dolphins was due to a high encounter rate and an estimated mean group size of nearly 10 animals (CV=0.25) although estimated mean group size was higher in survey 14 due to a group of 230 animals being observed.

Abundance estimates were obtained for common, spotted and unidentified dolphins as a group and are referred to as 'other dolphins'. A detection function was fitted to detections of all dolphins (including bottlenose) and then combined with the encounter rate of 'other dolphins'. Estimates of abundance for 'other dolphins' ranged from 15 dolphins on survey 23 (CV=1.03) to 2,828 dolphins (CV=0.97) on survey 10. Abundances were estimated for all whales as a group (which included fin, minke, humpback, northern right, unidentified baleen and unidentified whales) using simple models. Whales were detected on seven surveys and abundance ranged from 4 whales on three of these surveys to 44 whales (CV=0.75) on survey 20.

INTRODUCTION

A region off the coast of Maryland and Delaware, United States, has been proposed as a suitable site for harnessing wind energy. To assess any likely impact of such developments, 24 surveys of the marine animals have been conducted, approximately every month from July 2013 to June 2015, inclusive. This report describes the analysis and results of data collected during all 24 surveys.

The aim of the surveys was to collect data with which to estimate animal density and abundance, and line transect distance sampling methods (Buckland *et al.* 2011) were used. Transects, or tracklines, were laid down in the region of interest at random (or with some random component) and observers travelled along the lines (in a light aircraft) collecting information about any detected animals. In conventional distance sampling surveys, detection of animals on the trackline is assumed to be certain (Buckland *et al.* 2011) but this may not always be a valid assumption because observers may miss available animals (perception bias) or the animals may be under water and not available to be seen (availability bias). The observer configuration and protocol employed in the plane allowed mark-recapture

distance sampling analysis methods (Laake and Borchers 2004) to estimate perception bias. Thus, the resulting abundance estimates account for perception bias but do not make any correction for availability bias. Availability bias may be considerable in aerial surveys when the plane is moving so fast that animals do not have time to appear at the surface before the plane has passed. However, estimating availability bias requires additional data on the availability of animals which we did not have for this analysis and so the estimates presented here are the abundance of available animals (rather than the abundance of all animals).

Of primary interest were estimates of abundance for loggerhead turtles and bottlenose dolphins and there were sufficient numbers of detections to estimate the probability of detection for these species. Of additional interest were estimates of abundance for other species of dolphins (combined as a group) and whales (as a group). Common, spotted and unidentified dolphins were combined as a group and are referred to as 'other dolphins'. Detection functions were fitted to detections of all dolphins (including bottlenose dolphins and 'other dolphins') and then the resulting detection probabilities were applied to detections of 'other dolphins' to estimate abundance for 'other dolphins'. All species of whale were combined to estimate abundances for whales. It has been assumed that species which have been combined into a group have similar detection probabilities.

SURVEY METHODS

The region of interest is off the coast of Maryland and Delaware, U.S., and covered an area of 1,911 km². Twelve transects crossing the region east-west were laid down approximately 3.3 km apart (Figure 1). The total length of the designed transects was 718 km. Each of the surveys were conducted over one or two days and followed these transects, weather permitting. The plane flew at a height of 183m, except for the survey 8 (February 2014) when the plane had to fly at 305m for part of the survey.

In the plane, four observers were divided into two teams and the teams searched independently of each other. Team 1, sitting in front of Team 2, looked through bubble windows; one observer on the left side of the plane and one on the right. Team 2 consisted of an observer looking through a belly window and an observer looking out of a bubble window on the right side of the plane. Each team had a data recorder. On sighting an animal, the observers reported the angle of declination to the sighting when abeam, species, number of animals and other sighting information. Environmental conditions were also recorded. Perpendicular distance of the animal to the transect line was calculated from the angle and the height of the plane.

Since the observer teams were searching independently, an animal could be detected by one or both of the teams. Animals detected by both teams (called duplicate detections) were identified after the survey on the basis of timing, position and other recorded information.

STATISTICAL METHODS

Estimating density and abundance

Within each survey, group density (D_s) and group abundance (N_s) of animals available for detection were estimated from

$$\hat{D}_s = \frac{1}{2wL} \sum_{j=1}^n \frac{1}{\hat{p}_j} \quad \text{and} \quad \hat{N}_s = A\hat{D}_s$$

where A is the area of the survey region, w is the perpendicular truncation distance, L is the total effort achieved during the survey, n is the total number of detections recorded during the survey (within w) and \hat{p}_j is the estimated probability of detecting group j (see below). Individual animal density (D) and abundance (N) were estimated from

$$\hat{D} = \frac{1}{2wL} \sum_{j=1}^n \frac{s_j}{\hat{p}_j} \quad \text{and} \quad \hat{N} = A\hat{D}$$

where s_j is the recorded group size for group j . The expected group size ($E[s]$) in each survey was given by

$$E[s] = \frac{\hat{N}}{\hat{N}_s}$$

The variance of the encounter rate (n/L) was estimated using the method developed by Innes *et al.* (2002) using the R2 form of the estimator as in Fewster *et al.* (2009) - the default estimator in Distance (Thomas *et al.* 2010).

Estimation of detection probabilities

Having two teams of observers allowed a mark-recapture distance sampling approach to be used to estimate the probability of detection (Laake and Borchers 2004). The observing teams acted independently and since there was unlikely to have been responsive movement between detection by one team and the other team, the model used to analyse the data assumed an independent observer (IO) configuration with point independence (detections are assumed to be independent between the two teams only at the point where perpendicular distance is zero i.e. on the trackline). To fit an IO point independence model, two subsidiary models are required: a distance sampling (DS) model and a mark-recapture (MR) model. The DS model is fitted to all unique sightings assuming that the intercept at perpendicular distance zero was one (denoted as $g(0)=1$). The MR detection function model estimates the probability of detection by at least one team at distance zero. This probability is then used to adjust the intercept of the DS detection function to obtain an overall probability of detection.

For the DS model, both a hazard-rate ($1-\exp(-x/\sigma)^b$) and a half-normal form ($\exp(-x^2/2\sigma^2)$) were considered as suitable forms for the detection function (where σ is a scale parameter, x is perpendicular distance and b is a shape parameter) (Buckland *et al.* 2001). The effects of covariates, other than perpendicular distance, were incorporated into the detection function model by setting the scale parameter in the model to be an exponential function of the covariates (Marques and Buckland 2004). Thus, the covariates could affect the rate at which detection probability decreases as a function of distance, but not the shape of the detection function. The factor covariates considered for inclusion were water turbidity (clear, moderately clear or turbid), glare severity (none, slight, moderate and excessive) and year of survey (2013, 2014 and 2015). The non-factor covariates considered for inclusion were Beaufort sea state (BF) and percentage of cloud cover (CC). A factor representing season with two levels, summer (May to October) and winter (November to April), was also considered for dolphins; there were too few detections of turtles in winter to include it for loggerhead turtles. Group size was also considered for dolphins in two forms; as recorded group size and as a factor variable with 6 levels representing groups of size 1, 2, 3, 4-5, 6-10 and >10 animals. Akaike's Information Criterion (AIC) and goodness of fit statistics were used to select the final model using forward model selection and all model selection was performed using the mrds R library (Laake *et al.* 2015; version 2.1.12).

The MR detection function defines the probability that an animal at given perpendicular distance, and covariates z , was detected by team q ($q=1$ or 2) given that it was seen by the other team, and is denoted by $p_{q|3-q}(x, z)$, for $q=1,2$. Where there were sufficient numbers of detections and duplicates it was modelled using the logistic form:

$$p_{1|2}(x, z) = p_{2|1}(x, z) = \frac{\exp\left\{\beta_0 + \beta_1 x + \sum_{k=1}^K \beta_{k+1} z_k\right\}}{1 + \exp\left\{\beta_0 + \beta_1 x + \sum_{k=1}^K \beta_{k+1} z_k\right\}}$$

where $\beta_0, \beta_1, \dots, \beta_{K+1}$ represent the parameters to be estimated and K is the number of covariates other than distance. The same variables considered for inclusion in the DS model were also considered as explanatory variables for the MR model, in addition to observer team and observer position (left, right and centre). AIC was used for model selection. Note that if team is included then $p_{1|2}(0, z)$ will not equal $p_{2|1}(0, z)$. Where the number of detections was small, then team was included as the only explanatory variable; this variant of the MR model is equivalent to the Peterson MR estimator (Petersen 1896) which uses the ratio of duplicates to detections to estimate the probability of detection for an observer as follows:

$$p_{1|2} = \frac{m}{n_2} \text{ and } p_{2|1} = \frac{m}{n_1} \quad (1)$$

where n_i is the number of detection for observer i and m is the number of duplicate detections. In this case, the probability of detection on the trackline by at least one observer is simply given by $p_{1\cup 2} = p_{1|2} + p_{2|1} - p_{1|2}p_{2|1}$. The estimate of $p_{1\cup 2}$ provided the intercept for the DS model.

Missing values in the survey data were dealt with in a number of ways. Missing values of group size for detections of bottlenose dolphins were assigned a group size of 3, which was the median group size for bottlenose dolphin groups; all other species were assigned a group size of one. Where environmental values were missing (e.g. Beaufort sea state, turbidity), values recorded along the same transect and same date were used. For some duplicate detections, the teams had recorded different values for group size and declination angle (and hence perpendicular distance); for perpendicular distances, the average values for the duplicate pair were used and for group size, the larger group size was used (see Appendix C).

Left truncation

The form of the DS models used here assume that the probability of detection on, or close to, the trackline is at a maximum. The perpendicular distance distributions for the observers looking through a side window indicated that there were fewer detections within 20 m of the trackline than beyond 20 m (Appendix C). One solution is to offset the trackline (Buckland *et al.* 2001) to where detection is at a maximum and so the analyses described above were repeated on left truncated data (i.e. all detections within 20 m of the trackline were excluded and 20 m were subtracted from remaining detections).

RESULTS

Search effort and numbers of detections

During 24 surveys, 16,580 km of search effort were flown. All transects were covered during each survey except survey 5 when only 8 transects were covered and survey 18 when 11 transects were covered (Table 1). The most frequently detected species was loggerhead turtles (809 groups) followed by bottlenose dolphins (417 groups) and then green sea turtles (45 groups). The majority of detections of all species occurred in the months May to October (Table 1). Details of all detections recorded on each survey are given in Appendix A. Generally, detections of bottlenose dolphin groups occurred towards the coast during the summer months and further offshore during the winter months. Loggerhead turtles were detected at all distances from the coast but there was a tendency for detections to occur further offshore. Locations of all detected groups are shown in Figure 2.

The majority (98%) of detections of loggerhead turtles were of single animals. There were two detections of loggerhead turtles in groups of three. Nearly 73% of bottlenose dolphin groups were of five animals or less, however, there were groups of bottlenose dolphins that contained 100 animals (2 groups on survey 11), 120 animals (one group on survey 1) and 230 animals (one group on survey 14). Large groups of cow nose rays were also detected; a group of 75 rays and two groups of 100 rays were detected on survey 15 and a group of 200 rays was detected on survey 23.

There were 220 duplicate detections in total over all species, of which 119 were of loggerhead turtles and 67 were bottlenose dolphins. There were several duplicate detections where the teams had recorded different group sizes for bottlenose dolphins and for one detection of a loggerhead turtle; the majority of differences for bottlenose dolphins were less than 5 animals; the largest difference between Team 1 and Team 2 was a difference of 29 animals. All differences are listed in Appendix B. There may be a suggestion that for longer perpendicular distances (>200m) Team 2 recorded greater distances than Team 1 but the number of detections at these distances is too small to draw any conclusions (Appendix B).

Detection functions

Detection functions were estimated for loggerhead turtles, bottlenose dolphins, all dolphins (which included bottlenose, common, spotted and unidentified dolphins) and all whales (fin, humpback, minke, northern right, unidentified baleen and unidentified whales). There was only one detection classified as 'unidentified whale' and because the number of detections of baleen whales was small it was included in the whale species group. The distributions of perpendicular distances by team for each group considered are shown in Appendix D.

The maximum perpendicular distance that a loggerhead turtle group was detected was 638 m. However, to avoid a long tail in the detection function, groups were truncated at a distance of 220 m leaving 738 groups (excluding 9% of detections). The selected DS model had a hazard rate form and the scale parameter included terms for glare severity, Beaufort and year (Table 3; Figure 3). The MR model included terms for distance, team, observer position, year and an interaction between distance and team (Table 3; Figure 4). The probability of detection on the trackline by at least one team was estimated to be 0.47 (CV=0.13) (Table 4).

The maximum distance that a group of bottlenose dolphins was detected was 685 m but distances were truncated at a 220 m, leaving 380 groups (excluding 9% of detections). A half normal form of the DS detection function was selected and the scale parameter included glare severity and Beaufort sea state (Figure 3). Turbidity and size were initially included as potential covariates for the DS model but the model coefficients for these terms were not estimated reliably and so were excluded in the final model selection. The MR model included terms for distance, team, observer position, Beaufort, season and an interaction between distance and team (Figure 4). Although this model had the smallest AIC, tests indicated that there was a lack of fit. The resulting probability of detection on the trackline by at least one team was 0.49 (CV=0.17) (Table 4).

There were 36 detections of common, spotted and unidentified dolphins, of which 70% were of common dolphins (Appendix A). These were combined with the detections of bottlenose dolphins to estimate a detection function for all dolphins. Using a truncation distance of 220 m left 414 groups and 68 duplicates. A hazard rate form of the DS model was chosen with glare, Beaufort and turbidity in the scale parameter. The MR model was the same as that for bottlenose dolphins and the estimated probability of detection on the trackline by at least one team was 0.47 (CV=0.16). Again there was a lack of fit for the MR model.

Whales were detected out to 1.3 km but distances were truncated at 510 m leaving 15 groups. Due to the small number of detections, a simple DS model was fitted with no covariates and a Petersen estimator was used to estimate the probability of detection on the trackline. A half-normal form of the DS model was chosen (Figure 3); the estimates of detection probability for each team are shown in Table 4 (and Figure 4). The probability of detection by at least one team was estimated to be 0.94 (CV=0.07).

Density and abundance estimates

Estimates of density and abundance for each survey are given in Table 5 and displayed as a times series in Figure 5. With the exception of the six surveys where no loggerhead turtles were detected (and hence the estimated abundance is zero), the abundance estimates ranged from 15 loggerhead turtles (CV=1.01) for survey 17 to 1,825 turtles (CV=0.2s) for survey 11.

Bottlenose dolphins were not detected on survey 18 and the smallest estimated abundance (excluding zero) was 24 animals (CV=1.05) on survey 19. The highest estimated abundance of bottlenose dolphins was on survey 1 with an estimated abundance of 8,351 animals (CV=0.45). This was substantially larger than estimates for subsequent surveys due to survey 1 having the highest encounter rate of bottlenose dolphins and an estimated mean group size of nearly 10 animals (CV=0.26), the second largest estimated mean group size. The largest estimated mean group size was 21 animals (CV=0.53) due to the large group sizes observed during this survey (survey 14).

Common, spotted and unidentified dolphins were not recorded until survey 8. The largest estimated abundance for these 'other dolphins' was 2,828 dolphins (CV=0.97) on survey 10. This was due in part to an estimated mean group size of 26 animals (CV=0.73); a group of 75 common dolphins had been detected on this survey. Other large mean

group sizes were also estimated for other surveys because of the small number of detections and large recorded group sizes, for example on survey 13 the only detection of 'other dolphins' was a group of 45 spotted dolphins. Where only one group was detected on a survey, the estimate of the uncertainty associated with the estimated mean group size is likely to be underestimated.

Whales were detected on seven of the 24 surveys. When they were detected, estimates for three surveys were of 4 animals up to 44 animals (CV=0.75) for survey 20. The largest abundance estimate corresponded to three detections of northern right whales (1 group of 3 animals and 2 groups of 4).

Estimates by season are provided in Appendix F.

Left truncation

The analysis methods described above were performed on the left truncated loggerhead turtle and bottlenose dolphin data (Appendix E). The detections were truncated at 200 m (after rescaling) leaving 664 loggerhead turtle groups and 336 bottlenose dolphin groups. The selected models were similar to those selected using the original distances (Table E1), however, there was still a lack of fit evident for the MR model fitted to the bottlenose dolphin data (Figure E1b). The detection probabilities were lower than previously for loggerhead turtles (Table E2), hence the estimated abundances were higher overall, but not substantially so; all estimates were within the 95% confidence intervals of the original estimates (Table E3). The detection probabilities for bottlenose dolphins (Table E2) were larger than the original estimates and so the abundance estimates overall were smaller; again not substantially so.

DISCUSSION

Data from 24 surveys have been analysed and sixteen different species and seven unidentified species groups were detected. The majority of animals were detected during the months May to October, inclusive. There were enough groups detected to estimate density and abundance for loggerhead turtles and bottlenose dolphins. Detection function models were also fitted to detections of all dolphins and to all whales to estimate abundances for other dolphin species and whales. The abundance estimates obtained were for animals available to be detected – the availability of animals has not been taken into account. The overall probability of detection was 0.35 (CV=0.14) for loggerhead turtles and 0.37 (CV=0.17) for bottlenose dolphins. The probability of detection on the trackline was greater for Team 2 than Team 1 for both species; this is perhaps not surprising since the belly window observer in Team 2 had a clear view of the trackline. This can clearly be seen in the different distributions of perpendicular distances for each team; even with bubble windows, the observers tended to see more groups further away from the trackline than close to it.

Due to the lack of detections close to the trackline for the observers looking through side windows, left truncation was considered. From the distribution of distances for each observer (Appendix C) it appears that detection frequency declined close to zero distance. This may be the case since in aerial surveys visibility under the plane can be obscured. However, if this effect is not too pronounced using a monotonically declining form for the DS function should, to a large degree, compensate for the decline in detection frequency close to the trackline. With a left truncation distance of 20 m, the abundance estimates using the original distances and the left truncated distances were not substantially different. It may be that the left truncation distance should be increased but this comes at the cost of excluding a substantial number of detections made by the belly window observer in team 2. This observer could clearly see the trackline.

The conditional detection functions (MR models) for team 1 (Figure 4) are unusual and somewhat counter-intuitive because the proportion of duplicates increases with distance rather than decreasing as for team 2. Close to the trackline, the small number of duplicates compared to the number of team 2 detections may be because team 2 was generally focusing on the trackline and team 1 may not have had such a clear view, resulting in fewer detections for team 1 and, hence, fewer duplicates. Only one observer in team 2 was searching further away from the trackline and

so it is not surprising that there were fewer detections for team 2 at greater distances but potentially at greater distances team 2 may have been only detecting highly detectable animal groups, and these groups will also have been seen by team 1. The increase in duplicate proportions further away from the trackline appears to be due to unmodelled heterogeneity (i.e. both teams are detecting the same animals because of some unmeasured covariate) and possibly to a flat (unconditional) detection probability for Team 1; the detection frequencies for Team 1 decline after about 200m (Appendix D).

Detection functions were fitted to detections of all dolphins and to all whales. This assumes that detection probability was similar for all species in these species group. All detections of whales, except one, were of baleen whales and the detection of an unidentified whale was included because the sample size was small. Dolphins recorded as unidentified may possibly include some bottlenose dolphins which, if included in the bottlenose dolphin analysis would increase the abundance estimates for bottlenose dolphins. However, given the small number of detections recorded as unidentified dolphins, this increase is likely to be small. The majority of detections of these other dolphins can be attributed to common dolphins.

The availability of animals has not been taken into account in the abundance estimates provided here. It is likely that availability could change seasonally and so small abundances could be a result of animals being less available to be detected at certain times of the year rather than not being present.

CONCLUSIONS

Abundances have been estimated for each survey for loggerhead turtles, bottlenose dolphins, 'other dolphins' and whales taking into account perception bias. The estimated number of animals changed seasonally, ranging from estimates of thousands of animals in summer months to no animals in the winter months. Taking the availability of animals into account would increase these estimates.

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Table 1 Summary of the number of transects flown (k), total search effort (L) and number of unique groups detected for the most frequently detected species and species groups (no truncation). Blank cells indicate that no groups were detected.

Year	Survey	Month	k	L (km)	Loggerhead turtles	Other turtles ¹	Bottlenose dolphins	Other dolphins ²	Rays ³	Whales ⁴	Sharks ⁵
2013	1	July	12	722.1	77	22	90		4		36
	2	August	12	632.1	17	3	10				
	3	September	12	718.5	24	1	5				
	4	October	12	702.1	19	6	4				
	5	November	8	360.6	1		1				
	6	December	12	661.5	1		2				
2014	7	January	12	696.3			12			2	
	8	February	12	735.5	2		7	3		8	1
	9	March	12	707.9			1	1			
	10	April	12	705.9			2	6			
	11	June	12	721.6	105	23	50			1	1
	12	June	12	716.8	111	18	35	2	1		9
	13	July	12	723.3	41	15	23	1	6		5
	14	August	12	712.1	93	7	19	1	2	1	5
	15	August	12	714.2	113	15	3		21	3	4
	16	October	12	720.6	1	2	16				
	17	November	12	722.3	1	4	2	2		1	
	18	December	11	605.6				2			
2015	19	January	12	786.8			1				
	20	January	12	713.8			4	13		3	
	21	April	12	721.8	2		60	1			1
	22	May	12	645.5	17	7	13	1		1	
	23	June	12	712.5	100	12	36	1	8		27
	24	June	12	719.5	84	7	21	2	8		13
Total				16578.9	809	142	417	36	50	20	102

¹Includes detections of green sea, leatherback, Ridley's and unidentified turtles

²Includes common, spotted and unidentified dolphins

³Includes fin, humpback, minke, northern right, unidentified baleen and unidentified whales

⁴Includes cow nose, manta, eagle rays and unidentified rays

⁵Includes hammerhead and unidentified sharks

Table 2 Frequency of group sizes by species (after taking the maximum recorded group size for duplicate detections).

Group size	Loggerhead turtles	Bottlenose dolphins
1	789	124
2	18	73
3	2	54
4 - 5		53
6-10		54
>10		59
Total	809	417

Table 3 Summary of the fitted models; truncation distance, number of unique detections (n) and duplicates (m) after truncation and the explanatory variables selected in the scale term for the DS model and in the MR model. The form of the detection function was chosen was either hazard rate (HZ) or half normal (HN).

Species	Right truncation (m)	n	m	DS model	MR model
Loggerhead turtles	220	738	114	HZ: Glare + BF + year	Distance + team + position + year + distance*team
Bottlenose dolphins	220	380	65	HN: Glare + BF	Distance + team + position + BF + season + distance*team
Dolphins	220	414	68	HZ: Glare + BF + turbidity	Distance + team + position + BF + season + distance*team
Whales	510	15	7	HN: none	Team

Table 4 Probability of detection on the trackline by team q given (|) detection by the other team, $3-q$ ($q=1, 2$), probability of detection on the trackline by at least one team (\hat{p}_{1U2}) and the average probability of detection. CVs are given in parentheses.

Species	$\hat{p}_{1 2}$	$\hat{p}_{2 1}$	\hat{p}_{1U2}	Average probability of detection
Loggerhead turtles	0.17 (0.19)	0.37 (0.15)	0.47 (0.13)	0.35 (0.14)
Bottlenose dolphins	0.19 (0.24)	0.39 (0.19)	0.49 (0.17)	0.37 (0.17)
Dolphins	0.18 (0.24)	0.37 (0.19)	0.47 (0.16)	0.40 (0.17)
Whales	0.88 (0.13)	0.50 (0.27)	0.94 (0.07)	0.66 (0.23)

Table 5 Number of groups detected after truncation (n), encounter rate (n/L ; groups/km), group abundance (N_s), animal abundance (N), animal density (D ; animals/km²) and expected group size estimates ($E[s]$). Coefficients of variation are given in parentheses. Blank cells indicate the estimate was zero.

a) Loggerhead turtles

Year	Survey	n	n/L	N_s	N	D	$E[s]$
2013	1	64	0.089 (0.20)	1716 (0.35)	1739 (0.35)	0.910 (0.35)	1.01 (0.01)
	2	17	0.027 (0.20)	713 (0.38)	828 (0.40)	0.433 (0.40)	1.16 (0.09)
	3	21	0.029 (0.26)	563 (0.40)	563 (0.40)	0.294 (0.40)	1.00 (0.00)
	4	16	0.023 (0.32)	586 (0.43)	586 (0.43)	0.307 (0.43)	1.00 (0.00)
	5	1	0.003 (0.98)	43 (1.02)	43 (1.02)	0.022 (1.02)	1.00 (0.00)
	6	1	0.002 (1.00)	19 (1.04)	19 (1.04)	0.010 (1.04)	1.00 (0.00)
2014	7	0					
	8	2	0.003 (0.66)	38 (0.69)	38 (0.69)	0.020 (0.69)	1.00 (0.00)
	9	0					
	10	0					
	11	94	0.130 (0.18)	1790 (0.23)	1825 (0.23)	0.955 (0.23)	1.02 (0.01)
	12	100	0.140 (0.21)	1328 (0.26)	1328 (0.26)	0.695 (0.26)	1.00 (0.00)
	13	39	0.054 (0.22)	532 (0.26)	558 (0.24)	0.292 (0.24)	1.05 (0.05)
	14	92	0.129 (0.10)	1587 (0.17)	1587 (0.17)	0.830 (0.17)	1.00 (0.00)
	15	98	0.137 (0.16)	1379 (0.20)	1411 (0.20)	0.738 (0.20)	1.02 (0.01)
	16	1	0.001 (0.99)	17 (1.00)	17 (1.00)	0.009 (1.00)	1.00 (0.00)
	17	1	0.001 (1.00)	15 (1.01)	15 (1.01)	0.008 (1.01)	1.00 (0.00)
18	0						
2015	19	0					
	20	0					
	21	2	0.003 (0.99)	21 (1.00)	21 (1.00)	0.011 (1.00)	1.00 (0.00)
	22	17	0.026 (0.25)	287 (0.32)	287 (0.32)	0.150 (0.32)	1.00 (0.00)
	23	97	0.136 (0.21)	1291 (0.26)	1371 (0.27)	0.718 (0.27)	1.06 (0.03)
	24	75	0.104 (0.15)	1002 (0.22)	1051 (0.22)	0.550 (0.22)	1.05 (0.03)

b) Bottlenose dolphins

Year	Survey	n	n/L	N_s	N	D	$E[s]$
2013	1	76	0.105 (0.27)	839 (0.31)	8351 (0.45)	4.37 (0.45)	9.95 (0.26)
	2	10	0.016 (0.69)	481 (0.86)	1625 (0.93)	0.85 (0.93)	3.38 (0.10)
	3	5	0.007 (0.55)	91 (0.63)	475 (0.68)	0.25 (0.68)	5.18 (0.17)
	4	4	0.006 (0.68)	69 (0.70)	243 (0.70)	0.13 (0.70)	3.55 (0.06)
	5	1	0.003 (0.98)	33 (1.02)	98 (1.02)	0.05 (1.02)	3.00 (0.00)
	6	2	0.003 (0.67)	52 (0.88)	98 (0.75)	0.05 (0.75)	1.91 (0.56)
2014	7	11	0.016 (0.39)	209 (0.58)	815 (0.83)	0.43 (0.83)	3.89 (0.46)
	8	5	0.007 (0.58)	91 (0.63)	435 (0.82)	0.23 (0.82)	4.80 (0.37)
	9	1	0.001 (0.99)	20 (1.06)	40 (1.06)	0.02 (1.06)	2.00 (0.00)
	10	2	0.003 (0.67)	72 (0.81)	221 (0.97)	0.12 (0.97)	3.08 (0.49)
	11	46	0.064 (0.23)	1086 (0.32)	5213 (0.59)	2.73 (0.59)	4.80 (0.40)
	12	30	0.042 (0.34)	272 (0.37)	1595 (0.37)	0.83 (0.37)	5.86 (0.27)
	13	19	0.026 (0.62)	234 (0.68)	963 (0.60)	0.50 (0.60)	4.11 (0.17)
	14	19	0.027 (0.30)	174 (0.35)	3633 (0.57)	1.90 (0.57)	20.86 (0.53)
	15	3	0.004 (0.51)	41 (0.59)	149 (0.82)	0.08 (0.82)	3.63 (0.50)
	16	15	0.021 (0.30)	312 (0.38)	447 (0.35)	0.23 (0.35)	1.43 (0.14)
	17	2	0.003 (1.01)	42 (1.05)	209 (1.05)	0.11 (1.05)	5.00 (0.00)
	18	0					
2015	19	1	0.001 (1.02)	24 (1.05)	24 (1.05)	0.01 (1.05)	1.00 (0.00)
	20	4	0.006 (0.54)	54 (0.59)	91 (0.67)	0.05 (0.67)	1.67 (0.36)
	21	55	0.076 (0.28)	829 (0.41)	5030 (0.59)	2.63 (0.59)	6.06 (0.50)
	22	12	0.019 (0.47)	217 (0.50)	569 (0.55)	0.30 (0.55)	2.61 (0.37)
	23	36	0.051 (0.46)	772 (0.58)	5387 (0.46)	2.82 (0.46)	6.98 (0.30)
	24	21	0.029 (0.55)	370 (0.52)	1099 (0.60)	0.58 (0.60)	2.97 (0.13)

c) Common, spotted and unidentified dolphins

Year	Survey	n	n/L	N_s	N	D	$E[s]$
2013	1	0					
	2	0					
	3	0					
	4	0					
	5	0					
	6	0					
2014	7	0					
	8	3	0.004 (0.73)	55 (0.77)	145 (0.82)	0.08 (0.82)	2.64 (0.13)
	9	1	0.001 (0.99)	10 (1.01)	19 (1.01)	0.01 (1.01)	2.00 (0.00)
	10	6	0.008 (0.46)	110 (0.54)	2828 (0.97)	1.48 (0.97)	25.82 (0.73)
	11	0	0				
	12	2	0.003 (0.66)	22 (0.72)	152 (0.97)	0.08 (0.97)	6.95 (0.43)
	13	1	0.001 (0.99)	9 (1.00)	386 (1.00)	0.20 (1.00)	45.00 (0.00)
	14	1	0.001 (0.99)	24 (1.03)	24 (1.03)	0.01 (1.03)	1.00 (0.00)
	15	0	0				
	16	0	0				
	17	2	0.003 (0.68)	42 (0.75)	139 (0.77)	0.07 (0.77)	3.32 (0.33)
18	2	0.003 (0.67)	23 (0.70)	57 (0.72)	0.03 (0.72)	2.52 (0.15)	
2015	19	0	0				
	20	11	0.015 (0.51)	220 (0.58)	756 (0.65)	0.40 (0.65)	3.43 (0.28)
	21	1	0.001 (0.99)	9 (1.00)	182 (1.00)	0.10 (1.00)	20.00 (0.00)
	22	1	0.002 (0.98)	17 (1.01)	17 (1.01)	0.01 (1.01)	1.00 (0.00)
	23	1	0.001 (1.01)	15 (1.03)	15 (1.03)	0.01 (1.03)	1.00 (0.00)
	24	2	0.003 (0.67)	37 (0.70)	37 (0.70)	0.02 (0.70)	1.00 (0.00)

d) Whales

Year	Survey	n	n/L	N_s	N	D	$E[s]$
2013	1	0					
	2	0					
	3	0					
	4	0					
	5	0					
	6	0					
2014	7	2	0.003 (0.64)	8 (0.68)	8 (0.68)	0.004 (0.68)	1.00 (0.00)
	8	4	0.005 (0.58)	16 (0.62)	19 (0.68)	0.010 (0.68)	1.25 (0.13)
	9	0					
	10	0					
	11	1	0.001 (1.01)	4 (1.03)	4 (1.03)	0.002 (1.03)	1.00 (0.00)
	12	0					
	13	0					
	14	1	0.001 (0.99)	4 (1.01)	4 (1.01)	0.002 (1.01)	1.00 (0.00)
	15	3	0.004 (0.71)	12 (0.75)	16 (0.71)	0.008 (0.71)	1.33 (0.25)
	16	0					
	17	0					
18	0						
2015	19	0					
	20	3	0.004 (0.73)	12 (0.77)	44 (0.75)	0.023 (0.75)	3.67 (0.04)
	21	0					
	22	1	0.002 (1.04)	4 (1.07)	4 (1.07)	0.002 (1.07)	1.00 (0.00)
	23	0					
	24	0					

Figure 1 Location of the survey region and designed transects.

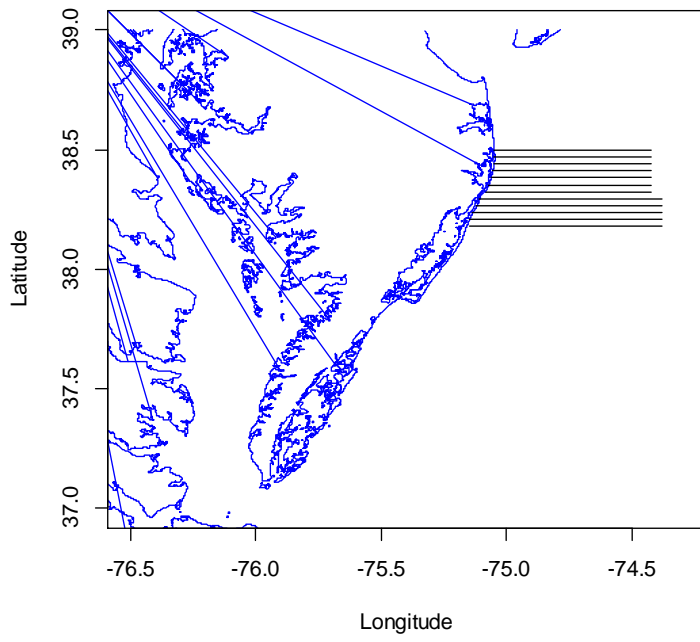
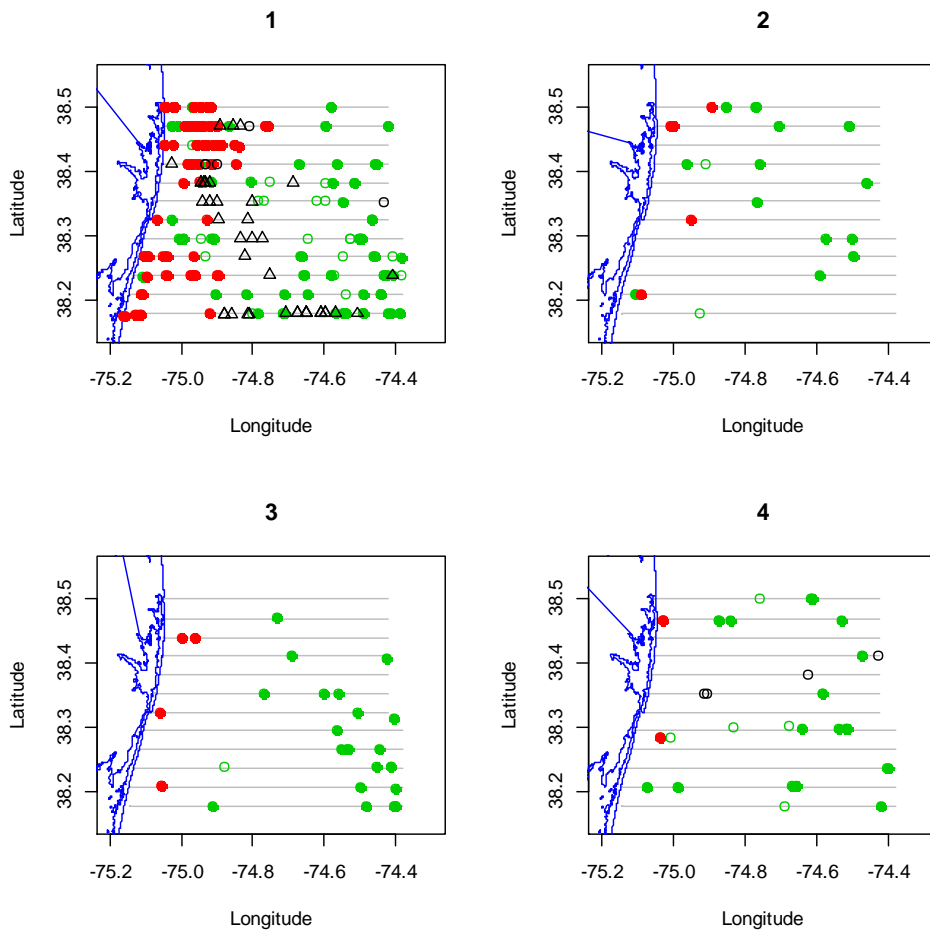
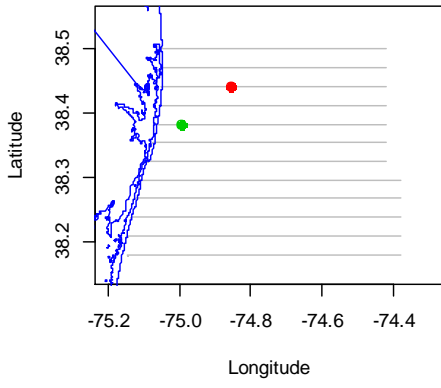


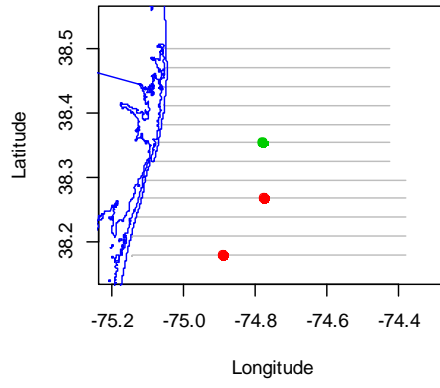
Figure 2 Location of detected groups for each survey; bottlenose dolphins (red dots); other dolphin species (open red circles); loggerhead turtles (green dots); other turtle species (open green circles); whales (open magenta circles), sharks (black triangles) and rays and sunfish (open black dots). Grey lines are the designed transects.



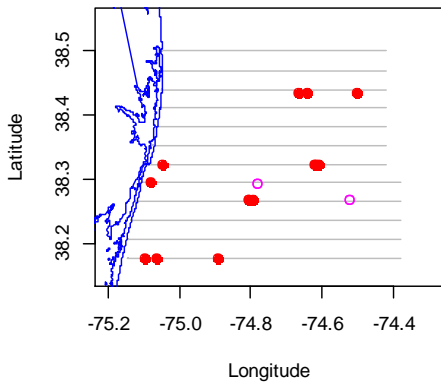
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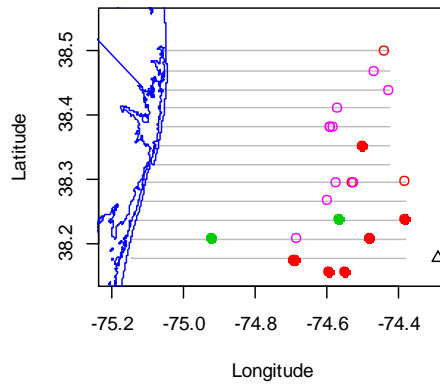
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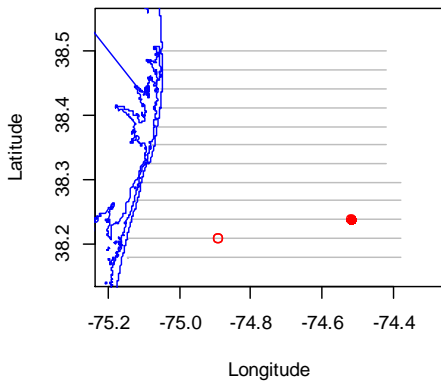
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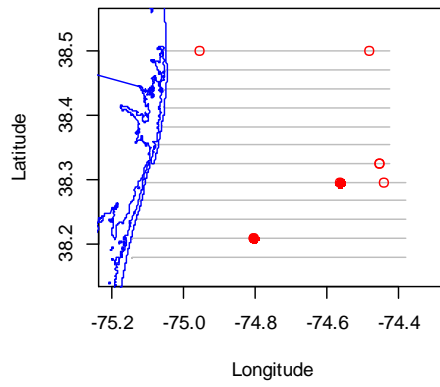
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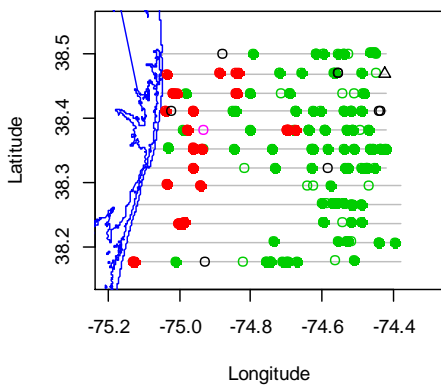
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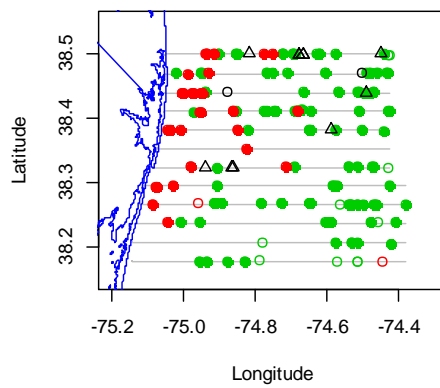
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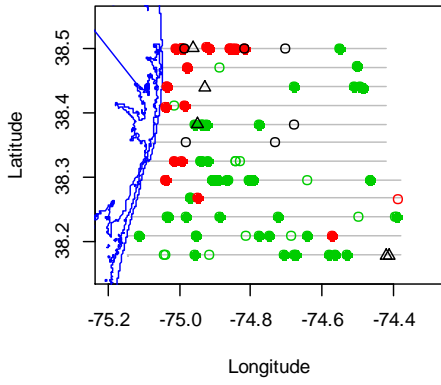
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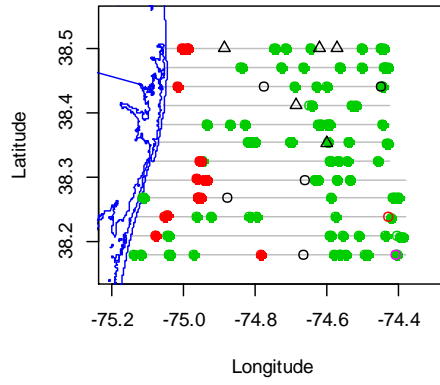
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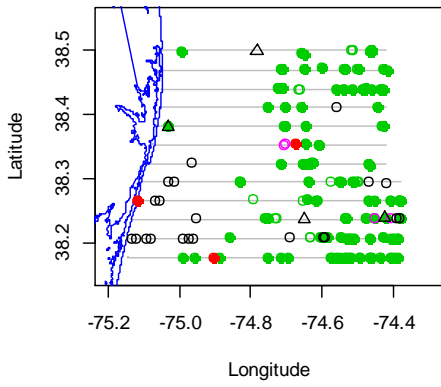
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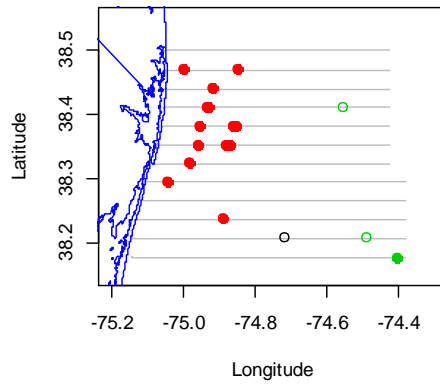
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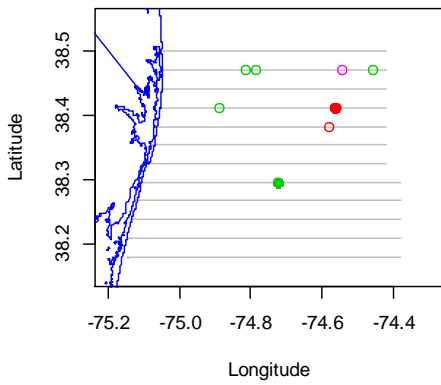
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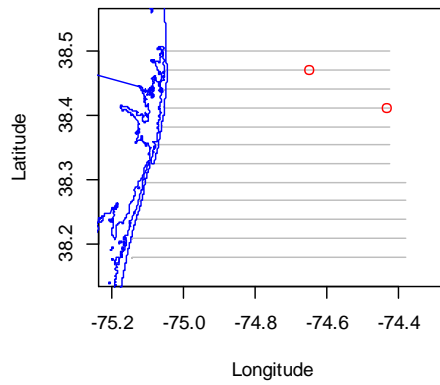
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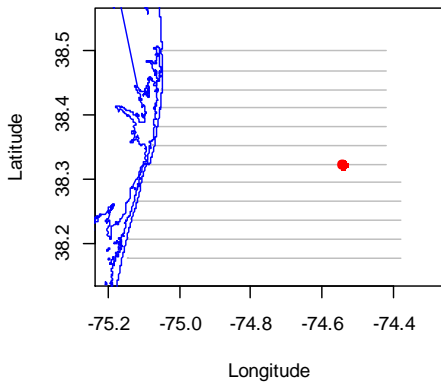
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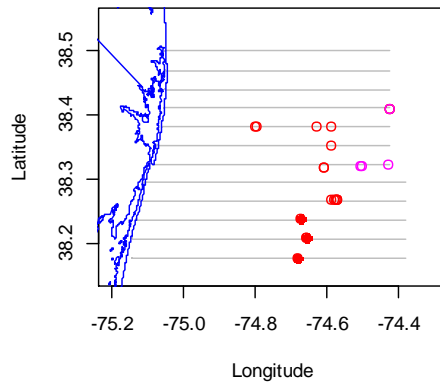
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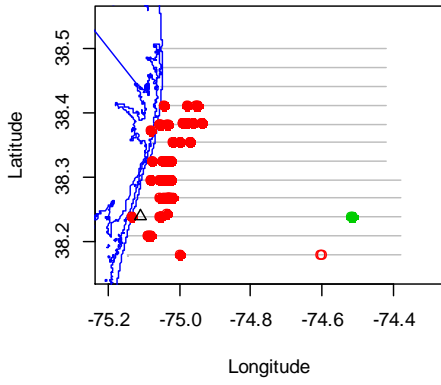
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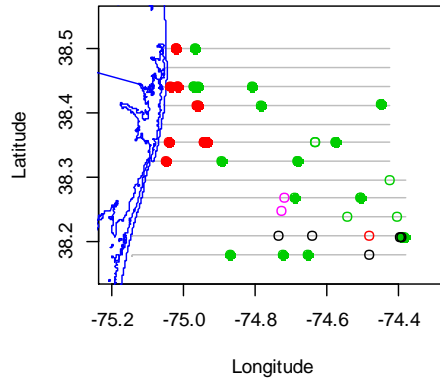
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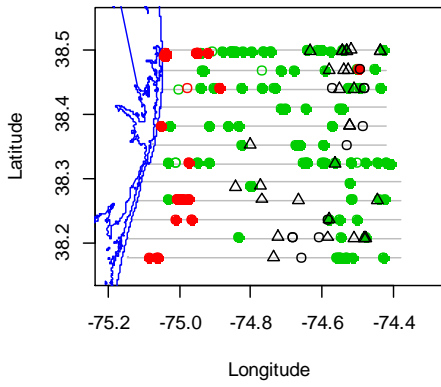
21



22



23



24

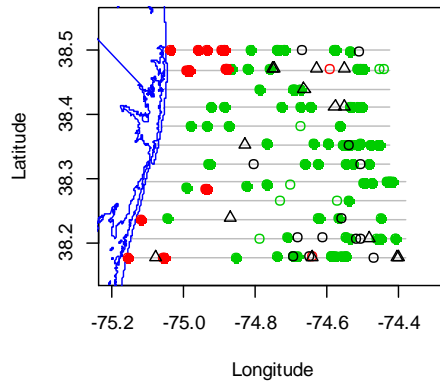


Figure 3 DS models overlaid onto the scaled distribution of perpendicular distances (m) from both teams combined. The lines indicate the average predicted detection probability and the points represent the predicted values for individual detections.

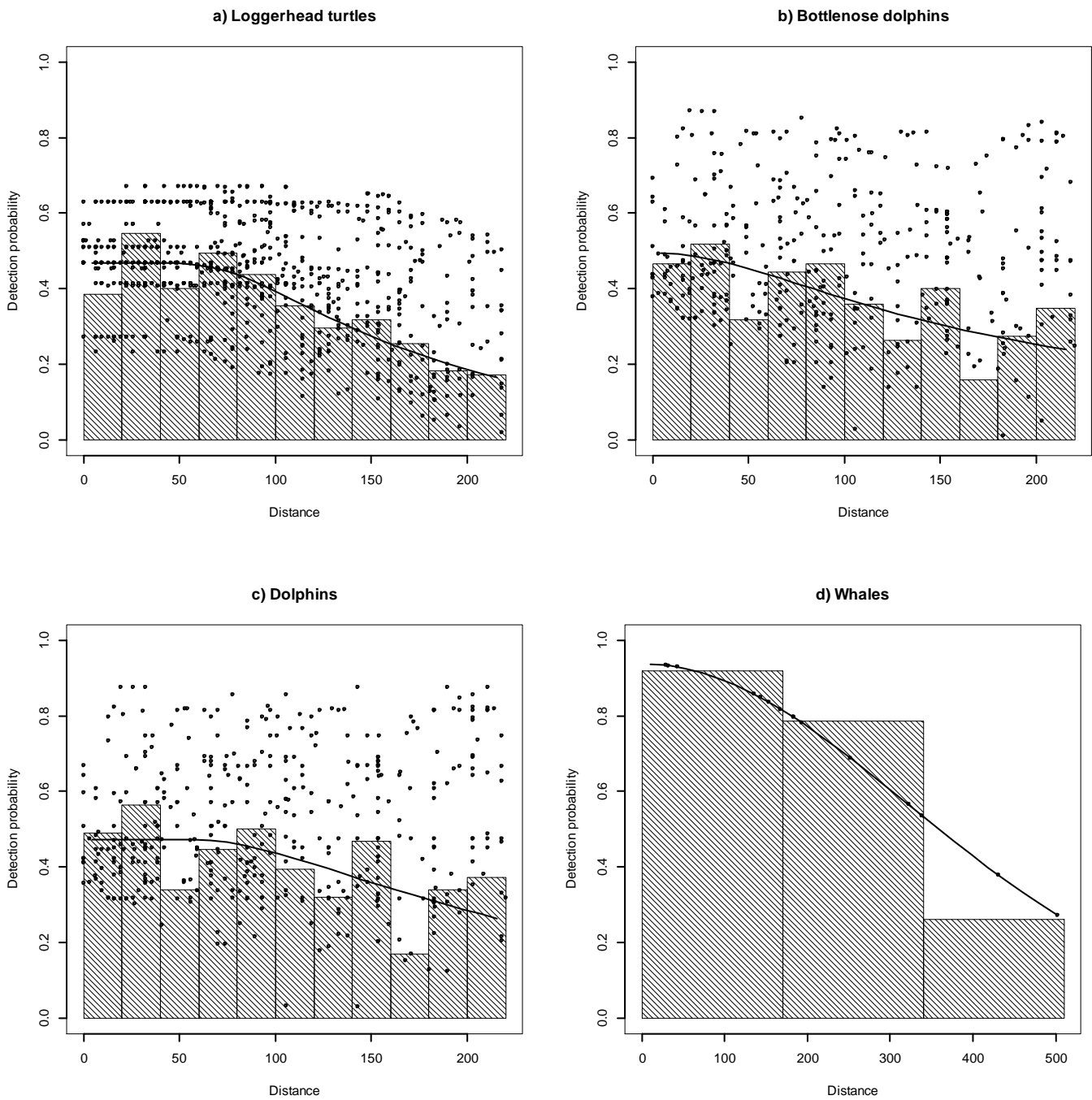
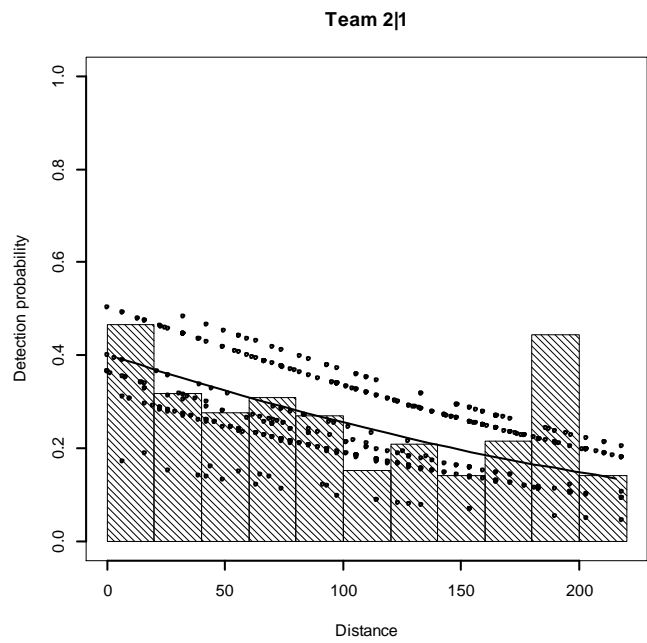
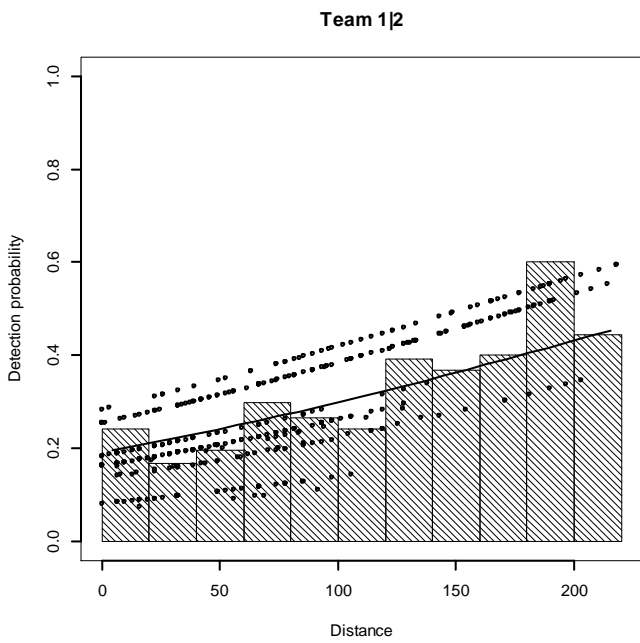
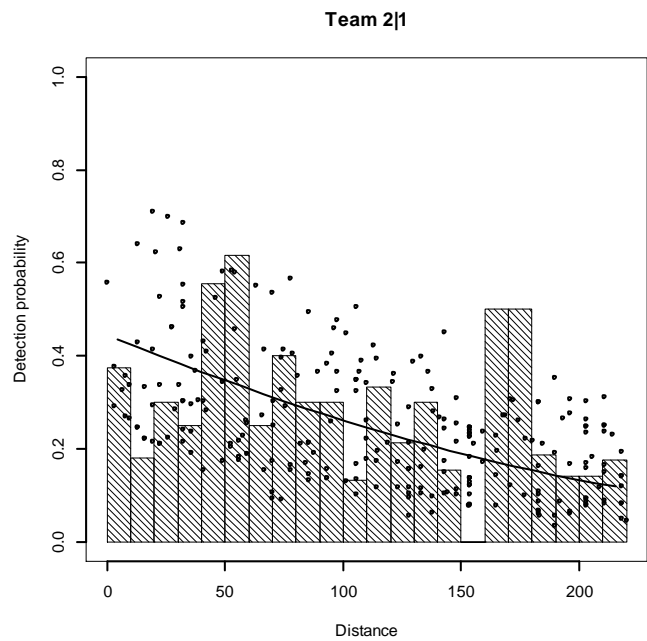
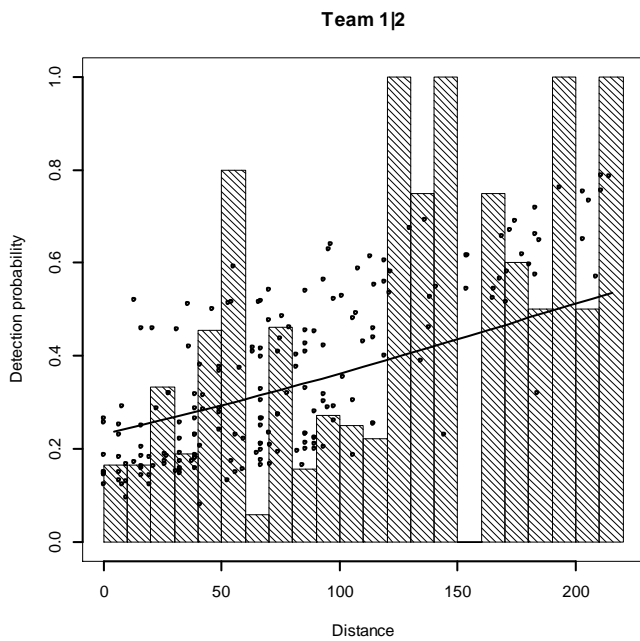


Figure 4 MR models fitted to duplicate detections overlaid onto the histogram of detections seen by Team 1 (left) or Team 2 (right) given detection by the other team. The lines indicate the average predicted detection probability and the points represent the predicted values for individual detections. Distances are in metres.

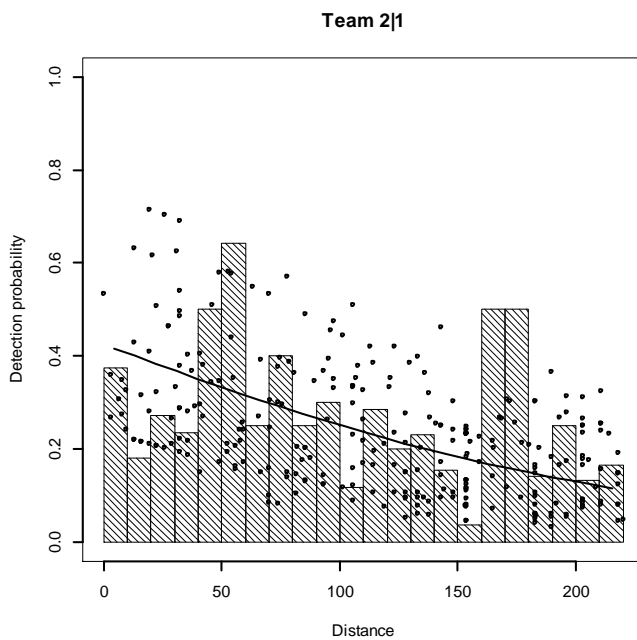
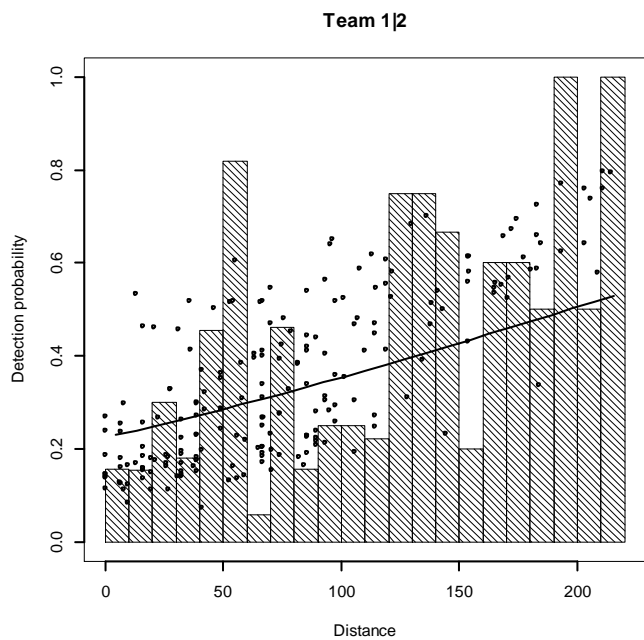
a) Loggerhead turtles



b) Bottlenose dolphins



c) Dolphins



d) Whales

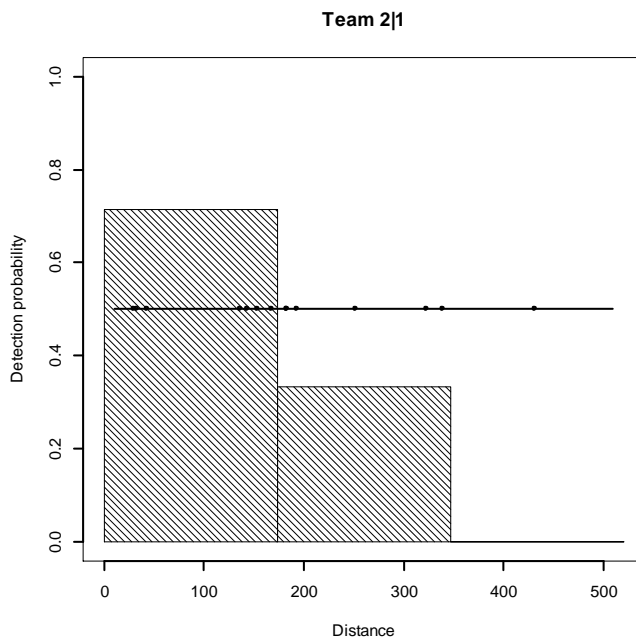
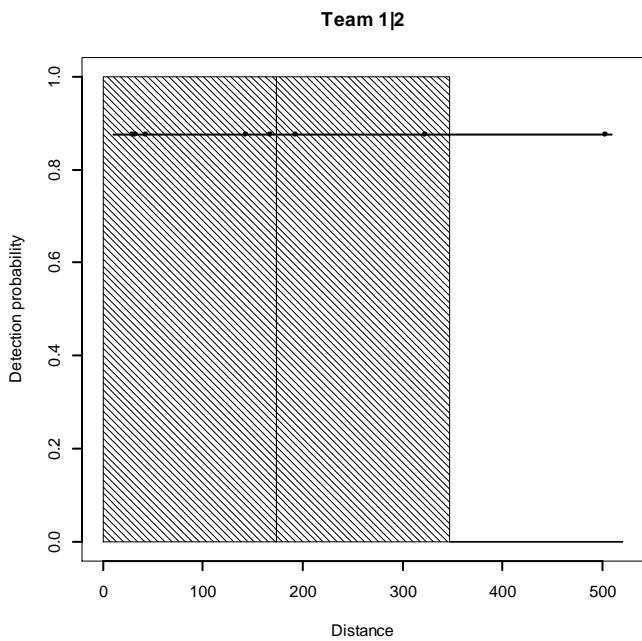
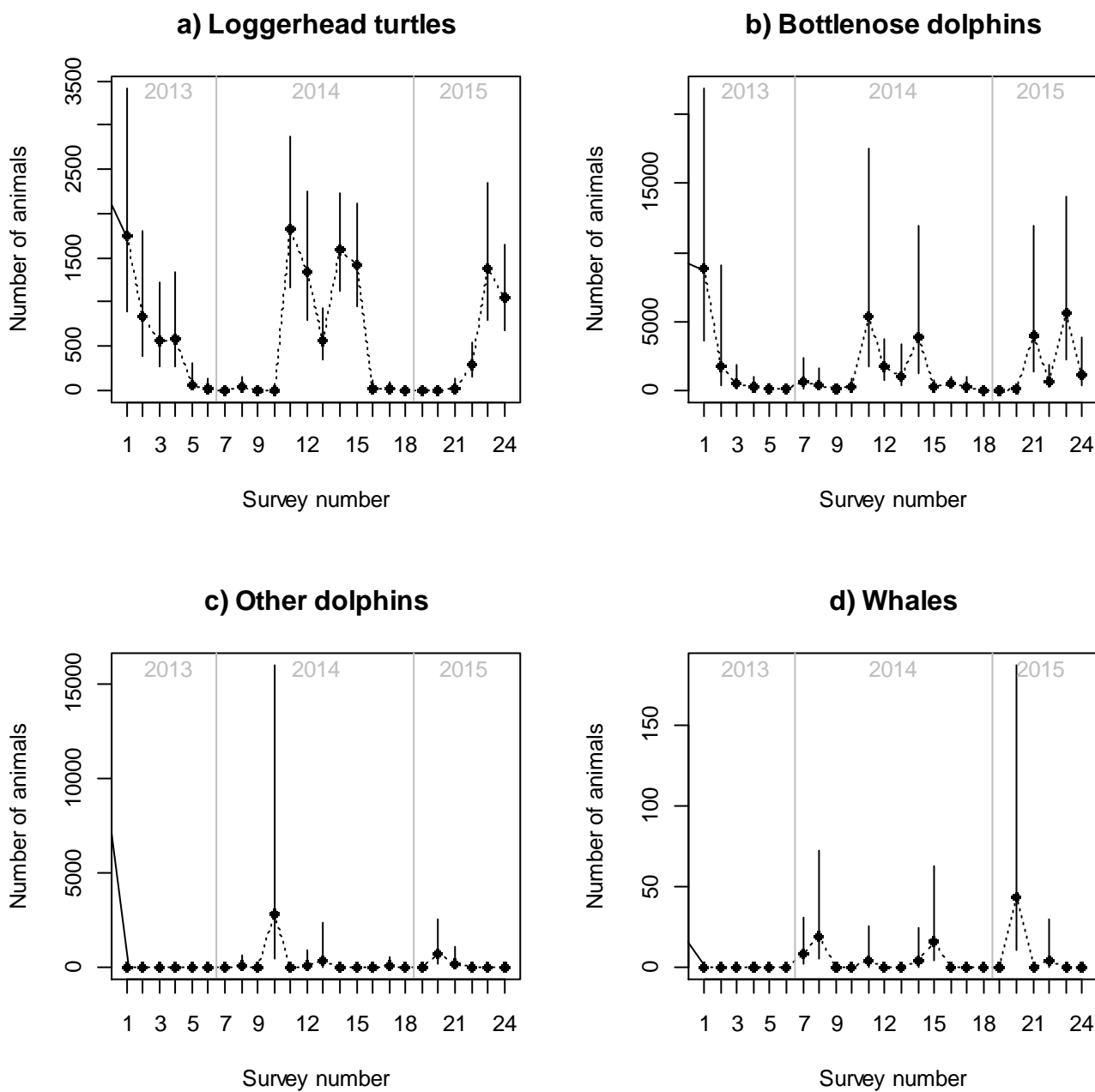


Figure 5 Abundances estimates by survey number. The black dots indicate the abundance estimate and the 95% confidence limits are indicated by the black vertical lines.



Appendix A The number of groups by each species detected by team 1 (n_1) and team 2 (n_2) and of those groups, the numbers detected by both teams (m). A blank cell indicates that no groups were detected.

a) Turtles

Year	Survey	Loggerhead			Green sea			Leatherback			Ridley's			Unidentified		
		n_1	n_2	m	n_1	n_2	m	n_1	n_2	m	n_1	n_2	m	n_1	n_2	m
2013	1	40	44	7	9	5	2							7	3	
	2	6	11		2				1							
	3	7	17			1										
	4	11	11	3	3									1	2	
	5	1														
	6	1														
2014	7															
	8		2													
	9															
	10															
	11	41	81	17	5									15	3	
	12	69	51	9	4	4								5	5	
	13	31	12	2	7	1	1							8		
	14	68	36	11		2				1				2	2	
	15	83	66	36					7	8	6		1	4	2	1
	16		1		1				1							
17	1								1				3			
18																
2015	19															
	20															
	21	1	1													
	22	12	9	4										4	4	1
	23	50	62	12	1	2			1	1	1			2	6	
	24	51	51	18		1								5	1	
Total		473	455	119	32	16	3	9	12	7		1	56	28	2	

b) Dolphins

Year	Survey	Bottlenose			Common			Spotted			Unidentified		
		n_1	n_2	m	n_1	n_2	m	n_1	n_2	m	n_1	n_2	m
2013	1	72	35	17									
	2	3	7										
	3	3	2										
	4	2	3	1									
	5		1										
	6	2											
2014	7	9	5	2									
	8	5	2		2							1	
	9	1			1	1*	1						
	10	2			3	1						2	
	11	24	33	7									
	12	25	21	11	1							1	
	13	21	5	3					1				
	14	16	7	4								1	
	15	3	1	1									
	16	10	9	3									
17		2		2									
18				2									
2015	19		1										
	20	1	3		10	4	2					1	
	21	41	28	9	1	1	1						
	22	8	8	3								1	
	23	21	19	4									1
	24	10	13	2									2
Total		279	205	67	22	7	4	1			3	7	

*Species recorded as white-sided dolphin by team 2

c) Whales ('Unidentified' includes unidentified baleen whales and unidentified whales)

Year	Survey	Fin			Humpback			Minke			Northern Right			Unidentified		
		<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>
2013	1															
	2															
	3															
	4															
	5															
	6															
2014	7										1	1	1	1	1	1
	8	4			1			1	1	1	1	1	1			
	9															
	10															
	11				1											
	12															
	13															
	14	1														
	15	2	2	1												
	16															
	17													1		
	18															
2015	19															
	20										3	1	1			
	21															
	22	1	1	1												
	23															
	24															
Total		8	3	2	2			1	1	1	5	3	3	3	1	1

d) Rays

Year	Survey	Cow nose ray			Manta ray			Eagle ray			Unidentified ray		
		<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>
2013	1		1		1	1	1				2		
	2												
	3												
	4												
	5												
	6												
2014	7												
	8												
	9												
	10												
	11												
	12	1											
	13		3		2				1				
	14				2								
	15		13		3	3					1	1	
	16												
	17												
	18												
2015	19												
	20												
	21												
	22												
	23	1			3	4	1						1
	24				1	6							1
Total		2	17		12	14	2		1		3	3	

e) Other species

Year	Survey	Ocean sunfish			Hammerhead shark			Unidentified shark			Unidentified animal		
		<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>	<i>n</i> ₁	<i>n</i> ₂	<i>m</i>
2013	1							10	28	2			
	2												
	3												
	4	3	1	1									
	5											1	
	6												
2014	7												
	8							1					
	9												
	10												
	11	6	2					1					
	12	1				1		8	2	2			
	13				1			3	1				
	14	2	1		4			1					
	15				1	1		1	1				
	16		1										
17											1		
18													
2015	19												
	20												
	21							1			1		
	22	1	4	1									
	23		2		3	4		8	14	2			
	24	4	1		4	6	1	3	1				
Total		17	12	2	13	12	1	37	47	6	2	1	

Appendix B Differences in duplicate detections

Differences between duplicate detections are summarised below. Where there were differences in group size the larger group size for the pair of detections was used (Table B1); for differences in perpendicular distance the mean perpendicular distances (Figure B2) were used. There were a few duplicate detections where the teams had recorded different species (Table B2); in these cases, the identified (rather than unidentified) species code was used.

Table B1 Differences in group size.

Year	Survey	Line	Species	Group size		
				Team 1	Team 2	Difference
2013	1	2	Bottlenose dolphin	15	7	8
		12	Bottlenose dolphin	10	7	3
		12	Bottlenose dolphin	4	5	1
		12	Bottlenose dolphin	13	12	1
	4	2	Bottlenose dolphin	4	7	3
2014	7	7	Bottlenose dolphin	3	1	2
	11	12	Bottlenose dolphin	4	3	1
		5	Bottlenose dolphin	8	2	6
		4	Bottlenose dolphin	1	2	1
	12	3	Bottlenose dolphin	3	1	2
		3	Bottlenose dolphin	2	4	2
		4	Bottlenose dolphin	5	12	7
		4	Bottlenose dolphin	3	1	2
		5	Bottlenose dolphin	13	8	5
		7	Bottlenose dolphin	35	7	28
		13	1	Bottlenose dolphin	8	9
	2		Bottlenose dolphin	9	2	7
	14	8	Bottlenose dolphin	20	16	4
	15	11	Loggerhead turtle	1	2	1
2015	20	7	Right whale	3	1	2
		9	Common dolphin	6	3	3
	23	1	Bottlenose dolphin	35	12	23
		9	Bottlenose dolphin	2	4	2
		10	Bottlenose dolphin	50	79	29

Table B2 Differences in species codes.

Year	Survey	Line	Species		
			Team 1	Team 2	Code used
2013	1	12	Loggerhead	Green sea	Loggerhead
2014	9	11	Common dolphin	White-sided dolphin	Common dolphin
	11	6	Unidentified turtle	Loggerhead	Loggerhead
		4	Loggerhead	Unidentified turtle	Loggerhead
2015	22	3	Loggerhead	Unidentified turtle	Loggerhead
		7	Loggerhead	Unidentified turtle	Loggerhead
		9	Fin whale	Unidentified whale	Fin whale
	23	12	Unidentified turtle	Loggerhead	Loggerhead
	24	9	Loggerhead	Unidentified turtle	Loggerhead

Figure B1 Declination angles (degrees) recorded by Team 1 against angles recorded by Team 2 for detections seen by both teams. Colour indicates different species groups; dolphins (red), turtles (green), whales (blue) and other (black). The dashed line is the line of equality.

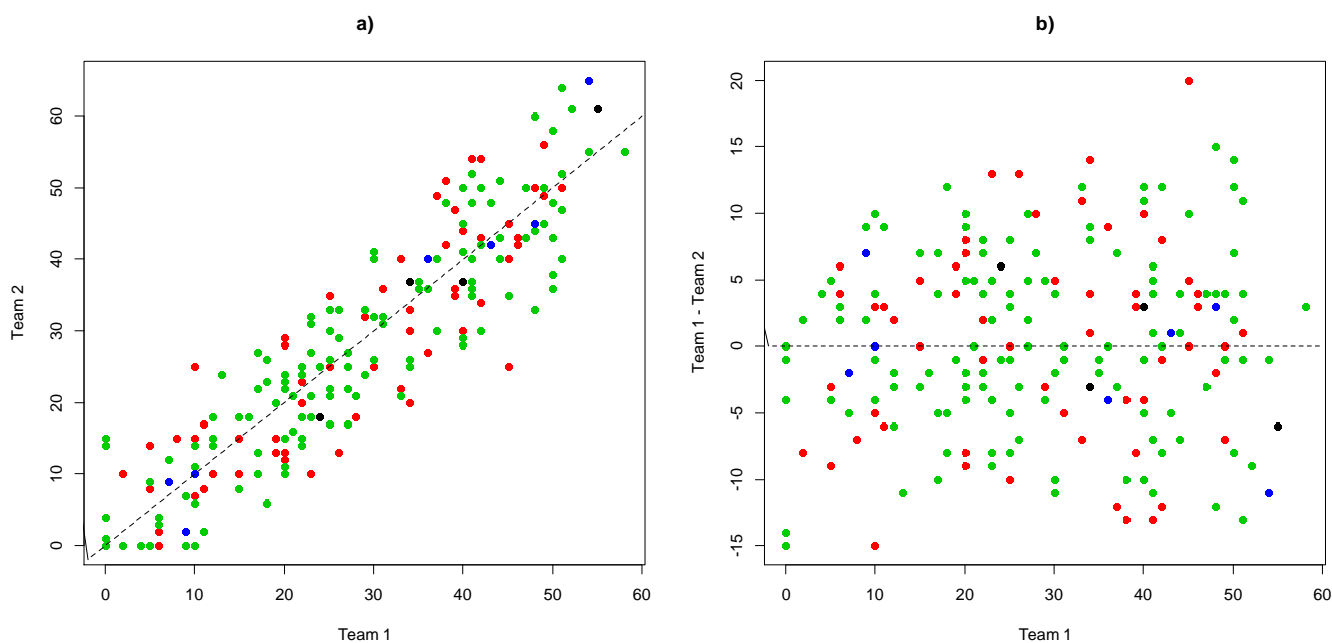
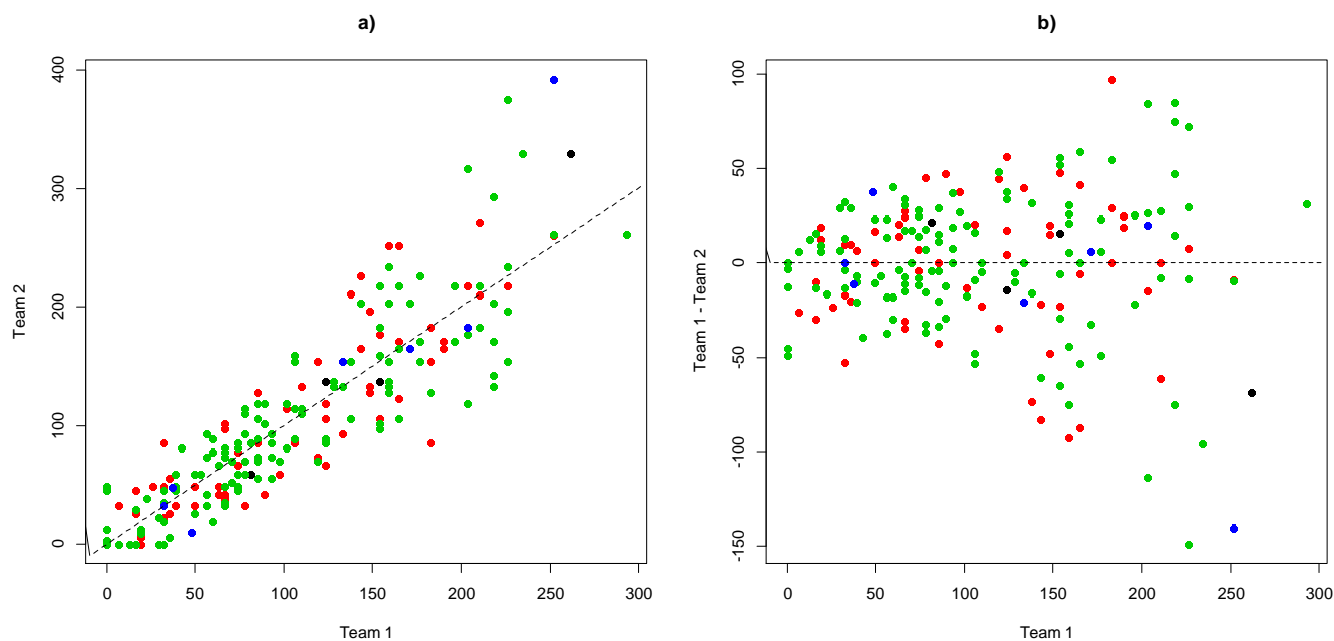
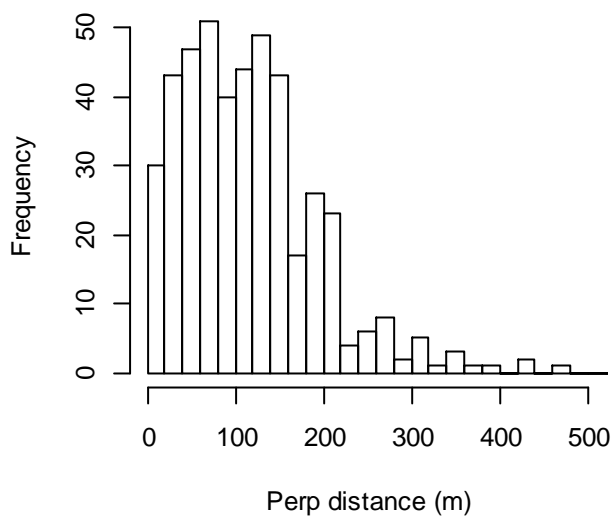


Figure B2 Perpendicular distances (m) recorded by Team 1 against distances recorded by Team 2 for detections seen by both teams. Colour indicates different species groups; dolphins (red), turtles (green), whales (blue) and other (black). The dashed line is the line of equality.

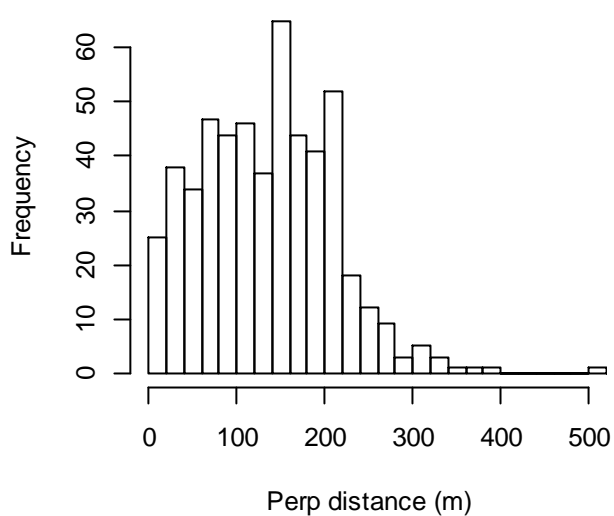


Appendix C Histograms of perpendicular distances for all detections by team and side of plane (Left, Right and Centre). Distances have been truncated at 500 m which has excluded 13 detections (of which 6 were of whales, 2 were of dolphins and 2 were of turtles).

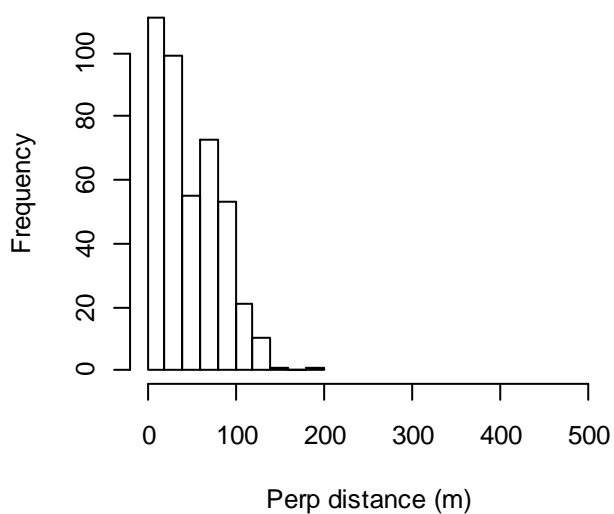
Team 1 - L



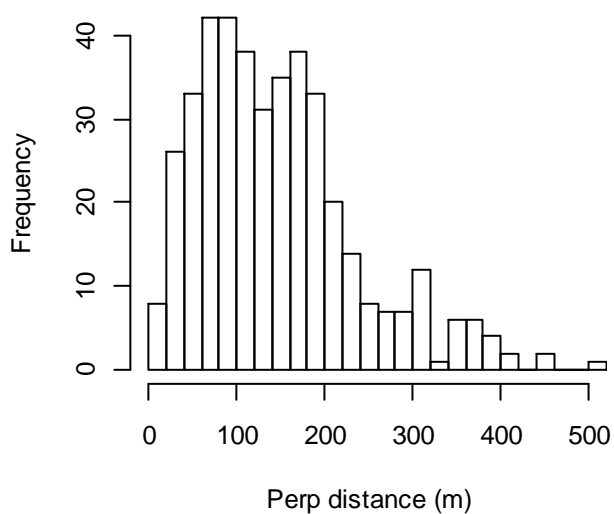
Team 1 - R



Team 2 - C

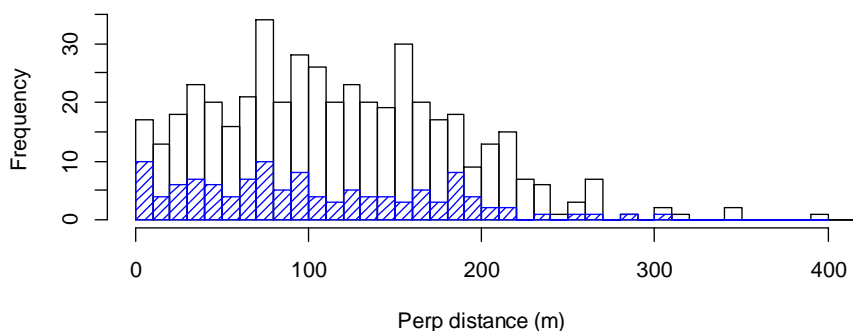


Team 2 - R

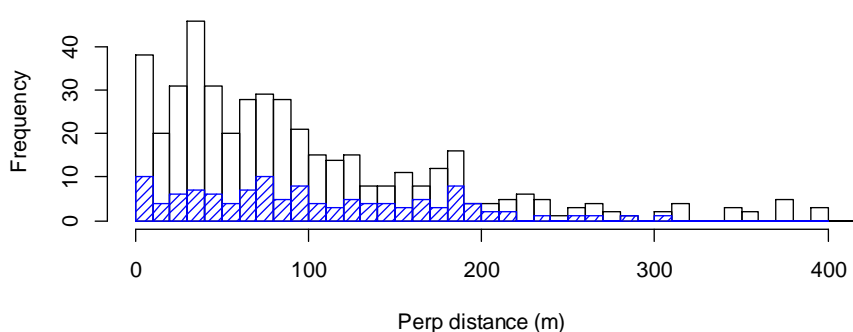


Appendix D Distributions of perpendicular distances for a) loggerhead turtles, b) bottlenose dolphins, c) all dolphins and d) all whales for each team. The shaded regions indicate duplicate detections. Distances have been truncated at 400 m for all groups except whales.

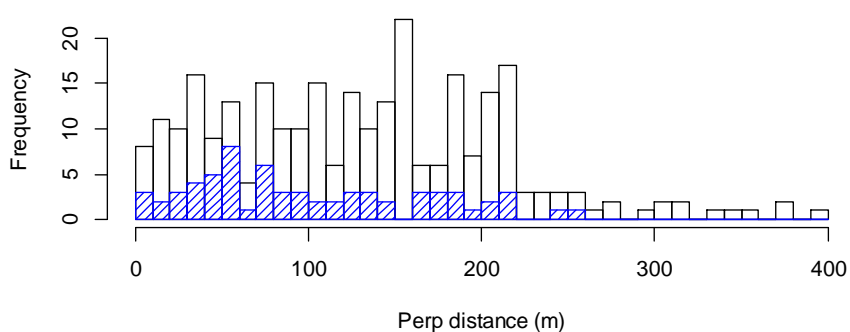
Team 1 - loggerhead



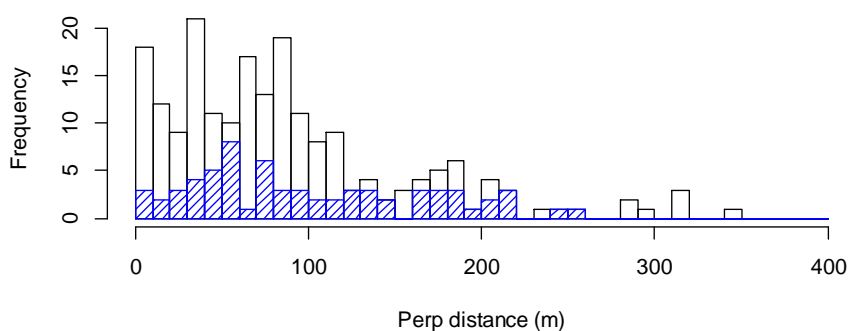
Team 2 - loggerhead



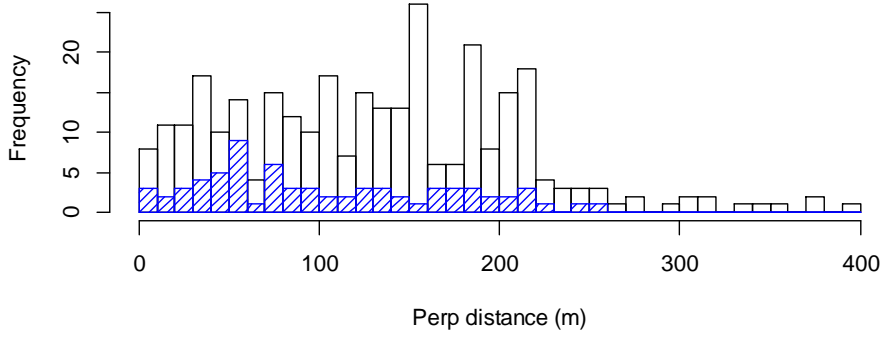
Team 1 - bottlenose



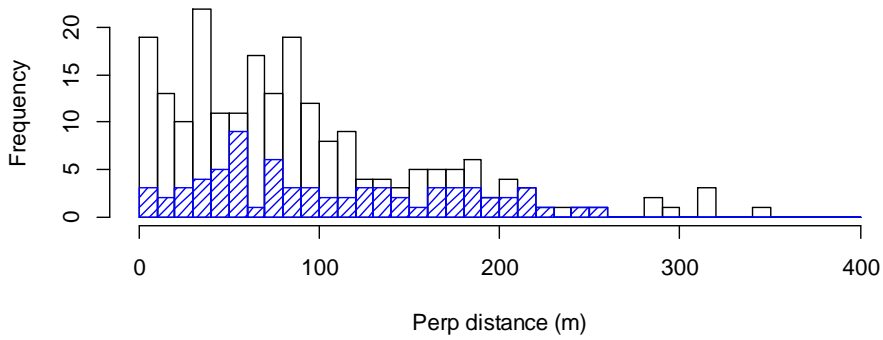
Team 2 - bottlenose



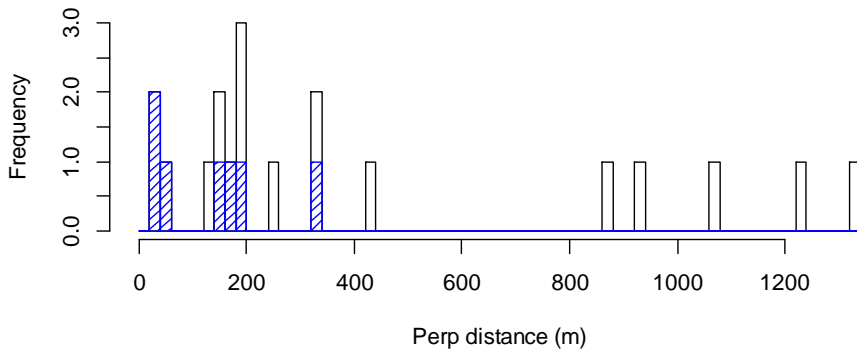
Team 1 - dolphins



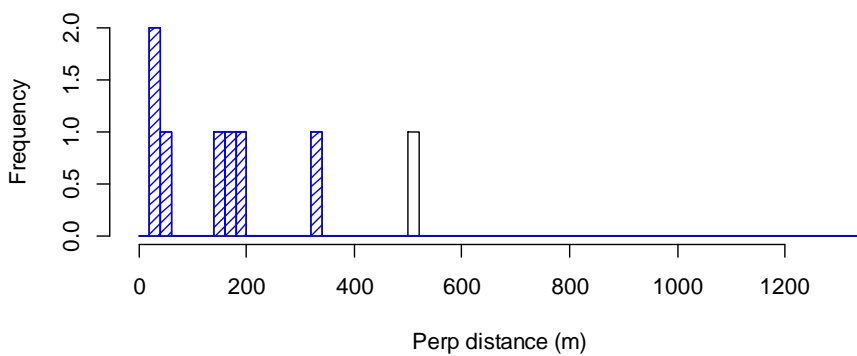
Team 2 - dolphins



Team 1 - whales



Team 2 - whales



Appendix E Left truncation

For the observers sitting on the left and right sides of the plane, there were fewer detections within 20 m of the trackline than beyond it which could indicate that the probability of detection on, or close to, the trackline was not at a maximum. Therefore, the data were left truncated - the detections within 20 m were discarded and 20 m subtracted from the remaining detections – and the analyses was repeated. Table E1 and Figure E1 show the selected models for loggerhead turtles and bottlenose dolphins and Table E2 shows the probabilities of detection. Abundance estimates are given in Table E3.

Table E1 Summary of the fitted models; truncation distances, number of unique detections (n) and duplicates (m) after truncation and the explanatory variables selected in the scale term for the DS model and in the MR model. The form of the detection function was chosen was half normal.

Species	Left (m)	Right ¹ (m)	n	m	DS model	MR model
Loggerhead turtles	20	200	664	100	HN: Glare	Distance + team + position + year + distance*team
Bottlenose dolphins	20	200	336	60	HN: Glare + BF	Distance + team + position + BF + season + distance*team

¹ after rescaling

Table E2 Probability of detection on the trackline by team q given (|) detection by the other team, $3-q$ ($q=1, 2$), probability of detection on the trackline by at least one team (\hat{p}_{1U2}) and the average probability of detection. CVs are given in parentheses.

Species	$\hat{p}_{1 2}$	$\hat{p}_{2 1}$	\hat{p}_{1U2}	Average probability of detection
Loggerhead turtles	0.16 (0.20)	0.29 (0.17)	0.40 (0.15)	0.28 (0.15)
Bottlenose dolphins	0.22 (0.24)	0.39 (0.19)	0.51 (0.16)	0.39 (0.18)

Table E3 Number of groups detected (n), encounter rate (n/L ; groups/km), animal abundance (N) and animal density (D ; animals/km²) by survey. Coefficients of variation are given in parentheses.

a) Loggerhead turtles

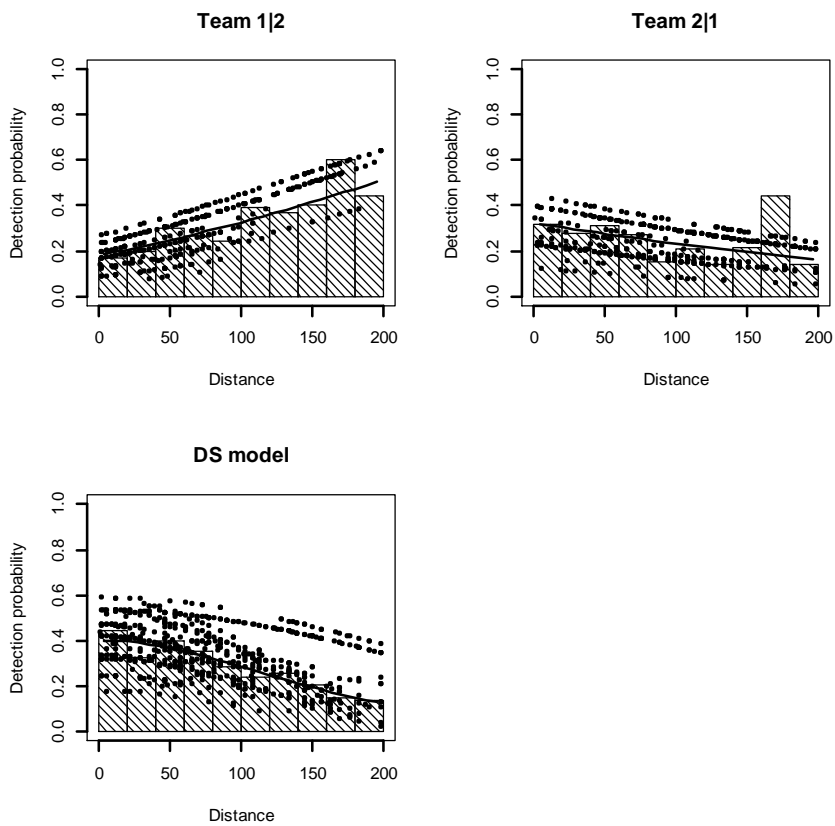
Year	Survey	n	n/L	N	D
2013	1	58	0.080 (0.17)	2137 (0.35)	1.118 (0.35)
	2	16	0.025 (0.20)	840 (0.41)	0.439 (0.41)
	3	21	0.029 (0.26)	659 (0.40)	0.345 (0.40)
	4	11	0.016 (0.31)	499 (0.44)	0.261 (0.44)
	5	1	0.003 (0.98)	64 (1.02)	0.034 (1.02)
	6	1	0.002 (1.00)	25 (1.05)	0.013 (1.05)
2014	7	0	0		
	8	2	0.003 (0.66)	51 (0.69)	0.026 (0.69)
	9	0	0		
	10	0	0		
	11	77	0.107 (0.18)	1904 (0.23)	0.996 (0.23)
	12	92	0.128 (0.20)	1779 (0.28)	0.931 (0.28)
	13	37	0.051 (0.22)	759 (0.27)	0.397 (0.27)
	14	84	0.118 (0.10)	2191 (0.19)	1.147 (0.19)
	15	89	0.125 (0.15)	1778 (0.21)	0.930 (0.21)
	16	1	0.001 (0.99)	20 (1.00)	0.011 (1.00)
	17	1	0.001 (1.00)	20 (1.01)	0.011 (1.01)
2015	18	0	0		
	19	0	0		
	20	0	0		
	21	2	0.003 (0.99)	36 (1.00)	0.020 (1.00)
	22	16	0.025 (0.24)	463 (0.33)	0.240 (0.33)
	23	87	0.122 (0.21)	1721 (0.28)	0.900 (0.28)
	24	68	0.095 (0.16)	1406 (0.24)	0.736 (0.24)
Total		664	0.040 (0.09)	16352 (0.17)	0.357 (0.17)

b) Bottlenose dolphins

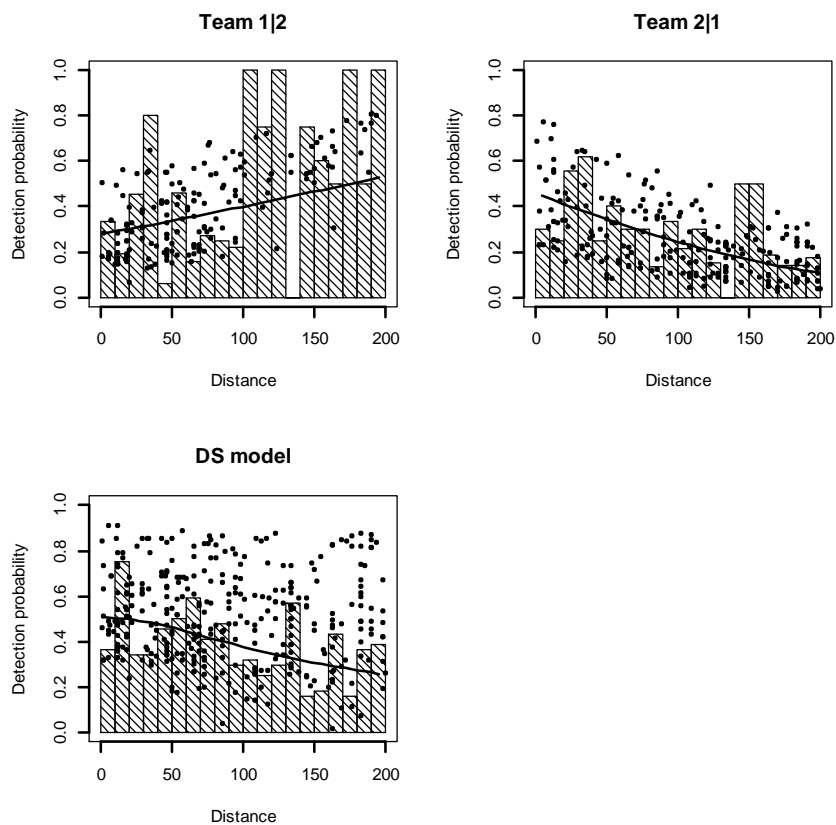
Year	Survey	n	n/L	N	D
2013	1	69	0.095 (0.25)	8740 (0.45)	4.57 (0.45)
	2	6	0.009 (0.68)	929 (0.87)	0.49 (0.87)
	3	5	0.007 (0.55)	572 (0.69)	0.30 (0.69)
	4	3	0.004 (0.72)	156 (0.85)	0.08 (0.85)
	5	1	0.003 (0.98)	99 (1.03)	0.05 (1.03)
	6	2	0.003 (0.67)	115 (0.75)	0.06 (0.75)
2014	7	11	0.016 (0.39)	1078 (0.87)	0.56 (0.87)
	8	4	0.005 (0.73)	434 (0.88)	0.23 (0.88)
	9	1	0.001 (0.99)	45 (1.07)	0.02 (1.07)
	10	2	0.003 (0.67)	286 (0.97)	0.15 (0.97)
	11	36	0.050 (0.22)	3651 (0.47)	1.91 (0.47)
	12	30	0.042 (0.34)	1665 (0.37)	0.87 (0.37)
	13	17	0.024 (0.58)	1006 (0.60)	0.53 (0.60)
	14	14	0.020 (0.29)	3291 (0.63)	1.72 (0.63)
	15	3	0.004 (0.51)	171 (0.83)	0.09 (0.83)
	16	14	0.019 (0.29)	464 (0.36)	0.24 (0.36)
	17	2	0.003 (1.01)	224 (1.05)	0.11 (1.05)
2015	18	0	0		
	19	1	0.001 (1.02)	25 (1.06)	0.01 (1.06)
	20	3	0.004 (0.50)	83 (0.76)	0.04 (0.76)
	21	49	0.068 (0.27)	4904 (0.62)	2.57 (0.62)
	22	10	0.015 (0.48)	558 (0.58)	0.29 (0.58)
	23	34	0.048 (0.46)	5817 (0.45)	3.04 (0.45)
	24	19	0.026 (0.56)	1019 (0.59)	0.53 (0.59)
Total		336	0.020 (0.12)	35334 (0.23)	0.77 (0.23)

Figure E1 MR models (top) and DS models for a) loggerhead turtles and b) bottlenose dolphins. The line indicates the average probability of detection and the dots indicate the individual detections. Distances are in metres.

a) Loggerhead turtles



b) Bottlenose dolphins



Appendix F Average seasonal estimates

Seasons have been defined as winter (January to March), spring (April to June), summer (July to September) and autumn (October to December). Surveys have been allocated to a season according to the month when the survey was conducted (Table 1; Table F1). Seasonal estimates have been obtained by calculating the average estimate for each season, weighting by survey effort (Table F2).

Table F1 Number of surveys and total effort (L ; km) conducted in each season.

Season	Number of surveys	L
Winter	5	3640.3
Spring	7	4943.6
Summer	6	4222.3
Autumn	6	3772.7
Total	24	16578.9

Table F2 Number of groups detected after truncation (n), encounter rate (n/L ; groups/km), group abundance (N_s), animal abundance (N), animal density (D ; animals/km²) and expected group size ($E[s]$) estimates by season. Coefficients of variation are given in parentheses. Blank cells indicate the estimate was zero.

a) Loggerhead turtles

Season	n	n/L	N_s	N	D	$E[s]$
Winter	2	0.001 (0.70)	8 (0.72)	8 (0.72)	0.004 (0.72)	1.00 (0.00)
Spring	385	0.078 (0.12)	826 (0.17)	850 (0.17)	0.445 (0.17)	1.03 (0.01)
Summer	331	0.078 (0.10)	1088 (0.19)	1119 (0.19)	0.585 (0.19)	1.03 (0.01)
Autumn	20	0.005 (0.33)	123 (0.45)	123 (0.45)	0.064 (0.45)	1.00 (0.00)

b) Bottlenose dolphins

Season	n	n/L	N_s	N	D	$E[s]$
Winter	22	0.006 (0.28)	78 (0.43)	275 (0.59)	0.144 (0.59)	3.5 (0.30)
Spring	202	0.041 (0.16)	523 (0.25)	2769 (0.30)	1.449 (0.30)	5.3 (0.18)
Summer	132	0.031 (0.23)	307 (0.31)	2555 (0.33)	1.337 (0.33)	8.3 (0.23)
Autumn	24	0.006 (0.27)	93 (0.35)	197 (0.35)	0.103 (0.35)	2.1 (0.19)

c) Common, spotted and unidentified dolphins

Season	n	n/L	N_s	N	D	$E[s]$
Winter	15	0.0041 (0.43)	56 (0.53)	181 (0.60)	0.095 (0.60)	3.2 (0.23)
Spring	13	0.0026 (0.30)	30 (0.37)	462 (0.86)	0.242 (0.86)	15.4 (0.69)
Summer	2	0.0005 (0.70)	6 (0.81)	70 (0.95)	0.037 (0.95)	12.6 (0.98)
Autumn	4	0.0011 (0.49)	12 (0.58)	36 (0.62)	0.019 (0.62)	3.1 (0.24)

d) Whales

Season	n	n/L	N_s	N	D	$E[s]$
Winter	9	0.0025 (0.38)	7 (0.45)	14 (0.53)	0.0074 (0.53)	2.0 (0.24)
Spring	2	0.0004 (0.71)	1 (0.31)	1 (0.75)	0.0006 (0.75)	1.0 (0.00)
Summer	4	0.0009 (0.60)	3 (0.65)	4 (0.64)	0.0018 (0.64)	1.3 (0.19)
Autumn	0					