CRUISE RESULTS
NOAA Fisheries Survey Vessel Pisces
Cruise No. PC 16-07
Northeast Shelf Ecosystem Monitoring
Summer Survey

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CRUISE PERIOD AND AREA

The cruise period was 08 to 19 August 2016. The cruise departed from Morehead City, North Carolina and disembarked in Davisville, Rhode Island. The NOAA FSV *Pisces* sampled at a total of 114 stations, 94 bongo tows and 20 hydrographic stations. Of the standard Ecosystem Monitoring (EcoMon) stations, 42 were located in the Mid-Atlantic Bight (MAB), 34 were in the Southern New England (SNE), 29 were located on Georges Bank (GB), and 7 were located in the Gulf of Maine (GOM) region.

OBJECTIVES

The principal objective of the of the survey was to assess the pelagic components of the Northeast U.S. Continental Shelf Ecosystem from water currents to plankton, pelagic fishes, marine mammals, sea turtles, and seabirds. The spatial distribution of the following parameters was quantified: water properties, phytoplankton, microzooplankton, mesozooplankton, pelagic fish and invertebrates. Both traditional and novel techniques and instruments were used to collect a variety of datasets. Other operational objectives included:

(1) Collect near-surface underway data and imagery from the entire cruise track using a TSG, fluorometer, SCS, EK-60 Scientific Sounder, ADCP and an Imaging FlowCytoBot unit.
(2) Collect samples for the Census of Marine Zooplankton (CMarZ) genetics studies.
(3) Collect samples for aging and genetic analyses of fish larvae and eggs.
(4) Collect sample to examine trends in ocean acidification and nutrient levels by collecting seawater samples at various depths with a rosette water sampler at predetermined fixed locations.
(5) Identifications and counts of marine sea birds and mammals along the cruise track by observer.

METHODS

The survey consisted of 114 stations at which the vessel stopped to lower instruments over the side (Table 1; Figure 1). Of the 94 61-cm bongo stations sampled (Table 1; Figure 1), 93 were at randomly stratified locations. One non-random GB station was sampled along the cruise track to replace a station originally located in shoal waters on the bank.

Plankton and hydrographic sampling was conducted with double oblique tows using the 61-cm bongo sampler and a Seabird CTD. The tows were extended to approximately 5 meters above the bottom, or to a maximum depth of 200 meters. All plankton tows were conducted at a ship speed of 1.5 – 2.0 knots. Plankton sampling gear consisted of a 61-centimeter diameter aluminum bongo frame with two 335-micron nylon mesh nets equipped with analog flowmeters that recorded number of revolutions during the tow. At randomly designated Census of Marine Zooplankton (CMarZ) stations a 20-cm diameter PVC bongo frame fitted with paired 165-

micron nylon mesh nets was put on the towing wire one half meter above the Seabird CTD with a wire stop and towed together with the large aluminum bongo frame. No flowmeters were used in the 20-cm bongos. A similar array, with 20 cm 335 micron mesh nets deployed above the 61 cm 335 micron mesh nets, was fished for larval fish and egg samples at most other stations. A 45-kilogram bell-shaped lead weight was attached by a 20-centimeter length of 3/8-inch diameter chain below the aluminum bongo frame to depress the sampler. The flat bottomed configuration of the depressor weight made for safer deployment and retrieval of the sampling gear when the boat was rolling in rough seas. The plankton sampling gear was deployed off the starboard side of the vessel using a A-frame and a conducting cable winch. Tow depth was monitored in real time with a Seabird CTD profiler. The Seabird CTD profiler was hard-wired to the conductive towing cable, providing simultaneous depth, temperature, and salinity for each plankton tow. A Power Data Interface Module (PDIM) signal booster was also used to allow the data transfer at high baud rate from the Seabird 19+ CTD profiler over the great length of wire (>1600 meters) on the *Pisces* oceanic winch. After retrieval, both the large and small bongo nets were washed down with seawater on a table set up on the deck of the sampling area to obtain the plankton samples. The 61-centimeter bongo plankton samples were preserved in a 5% solution of formalin in seawater. The CMarZ genetics samples and the genetics and otolith larval fish and egg samples from the 20-centimeter bongo nets were preserved in 95% ethanol, which was changed once, 24 hours after the initial preservation.

Twenty casts were made with the CTD 911/Niskin bottle rosette to collect sub-surface water samples. A Seabird 911+ CTD was deployed on a rosette frame with a carousel water sampling system (SBE32) and 11 10-liter Niskin bottles at all fixed stations. The package was deployed on vertical casts, collecting profiles of water temperature, salinity, chlorophyll-a and oxygen levels. Water samples were collected by the Niskin sampling bottles at multiple depths along the upcast to be processed ashore for nutrients, and carbonate chemistry.

Salinity, temperature and chlorophyll-a levels were monitored continuously from a depth of about 3 meters along the entire cruise track using a thermosalinograph, and a fluorometer hooked up to the ship's scientific flow-through seawater system. The Scientific Computer System (SCS) recorded the output from both the thermosalinograph, and fluorometer at 10-second intervals. Records were given a time-date stamp by the GPS unit. In addition, an ImagingFlowCytobot unit was plumbed into the flow-through seawater system in the lab. The device captured images of diatoms, dinoflagellates and marine ciliates on an independent computer provided by the Woods Hole Oceanographic Institution (WHOI).

RESULTS

The *Pisces* sailed at 0900 hours EDT on Monday, 08 August 2016 out Beaufort Inlet, North Carolina, and proceeded past the sea buoy to conduct a test tow. The ship proceeded north to the first survey station, arriving about midnight on 09 August. A summary of routine survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1. Canadian Wildlife Observer Holly Hunter conducted marine mammal and seabird observations from the bridge. A Seabird Survey Report by Carina Gjerdrum of the Canadian Wildlife Service, Environment Canada summarizes the seabird observations in Appendix A. The *Pisces* docked in Davisville, Rhode Island the afternoon of Friday, 19 August 2016.

DISPOSITION OF SAMPLES AND DATA

The plankton samples collected with the 61-cm bongo and data were delivered to the Ecosystem Monitoring Group of the NEFSC, Narragansett, Rhode Island for quality control processing. The plankton samples were subsequently sent to Zaklad Sortowania i Oznaczania Planktonu (ZSIOP) in Szczecin, Poland for sorting and identification.

The plankton samples collected with the 20-cm bongo were delivered to the various investigators. The Census of Marine Zooplankton samples (165-mesh) were delivered to the Woods Hole Oceanographic Institute. The fish egg and genetics samples (333-mesh) delivered to the Ecosystem Monitoring Group of the NEFSC, Narragansett, Rhode Island.

The Oceans and Climate Branch of the NEFSC, Woods Hole, retained the CTD data and original log sheets.

Nutrient samples collected for University of Maine researcher Dave Townsend were placed in a freezer NEFSC, Narragansett, Rhode Island for future deliver.

Water samples for carbonate chemistry were shipped to the AMOL Lab in Miami, Florida.

SCIENTIFIC PERSONNEL

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Table 1. Summary of routine sample activities conducted at 114 stations at which the *Pisces* stopped to lower instruments over the side during Cruise No. PC 16-07. Latitude and Longitude are shown in decimal degrees. BON/CTD = 61-cm bongo sampler and a Seabird CTD, CTD PROFILE 911+ WATER = CTD 911/Niskin bottle rosette.

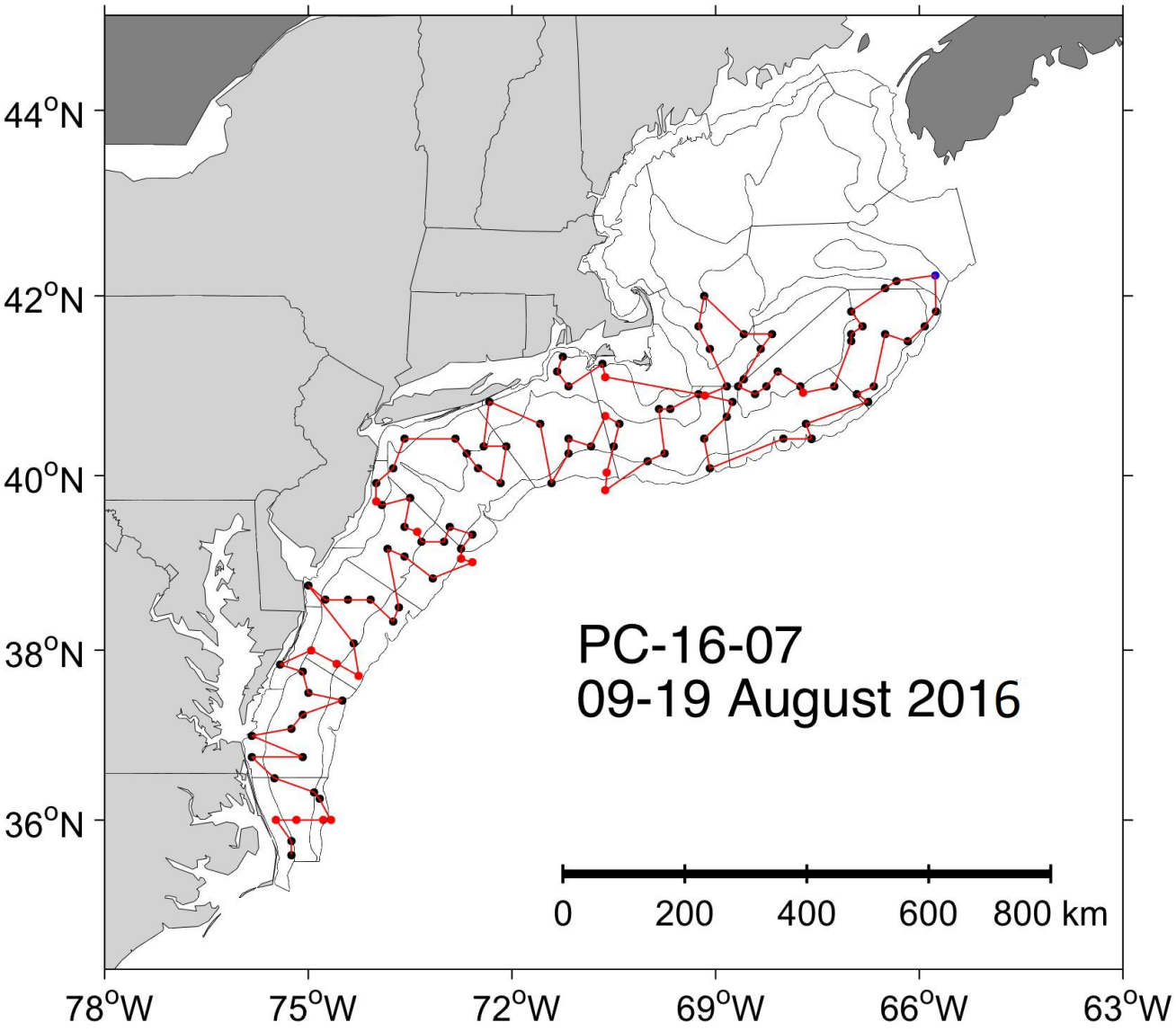
Station Name	Event Number	Date (GMT)	Latitude	Longitude	Depth (m)	Operation
3-MAB-2	1	8/9/16 4:22	35.5830	-75.2480	33	BON/CTD
3-MAB-1	2	8/9/16 5:31	35.7430	-75.2520	34	BON/CTD
Acid 6 MAB	3	8/9/16 7:39	35.9930	-75.4630	24	CTD PROFILE 911+ WATER
Acid 7 MAB	4	8/9/16 9:22	36.0000	-75.1780	37	CTD PROFILE 911+ WATER
Acid 8 MAB	5	8/9/16 11:49	36.0000	-74.7800	121	CTD PROFILE 911+ WATER
Acid 9 MAB	6	8/9/16 12:45	35.9980	-74.6830	1327	CTD PROFILE 911+ WATER
1-MAB-1	7	8/9/16 15:55	36.2470	-74.8200	99	BON/CTD
2-MAB-1	8	8/9/16 17:00	36.3320	-74.9100	49	BON/CTD
2-MAB-2	9	8/9/16 20:14	36.4970	-75.4980	29	BON/CTD
6-MAB-1	10	8/9/16 22:51	36.7470	-75.0850	30	BON/CTD
5-MAB-1	11	8/10/16 2:33	36.7500	-75.7930	18	BON/CTD
6-MAB-2	12	8/10/16 4:17	36.9950	-75.7880	16	BON/CTD
5-MAB-2	13	8/10/16 7:01	37.0800	-75.2500	35	BON/CTD
5-MAB-3	14	8/10/16 8:28	37.2470	-75.0800	36	BON/CTD
4-MAB-1	15	8/10/16 11:32	37.4180	-74.5070	130	BON/CTD
5-MAB-5	16	8/10/16 14:09	37.4970	-74.9930	29	BON/CTD
5-MAB-4	17	8/10/16 15:46	37.7470	-75.0830	30	BON/CTD
9-MAB-1	18	8/10/16 16:40	37.8130	-75.2120	25	BON/CTD
Acid 10 MAB	19	8/10/16 18:24	37.9980	-74.9550	25	CTD PROFILE 911+ WATER
Acid 11 MAB	20	8/10/16 20:30	37.8450	-74.5850	55	CTD PROFILE 911+ WATER
Acid 12 MAB	21	8/10/16 22:25	37.7000	-74.2670	106	CTD PROFILE 911+ WATER
8-MAB-1	22	8/11/16 1:03	38.0750	-74.3330	49	BON/CTD
12-MAB-1	23	8/11/16 6:37	38.7430	-74.9300	28	BON/CTD
8-MAB-2	24	8/11/16 8:17	38.5800	-74.7520	21	BON/CTD
8-MAB-4	25	8/11/16 10:03	38.5820	-74.4200	44	BON/CTD
8-MAB-3	26	8/11/16 11:43	38.5780	-74.0870	59	BON/CTD
7-MAB-1	27	8/11/16 13:54	38.3330	-73.7570	110	BON/CTD

7-MAB-2	28	8/11/16 15:33	38.4980	-73.6670	70	BON/CTD
11-MAB-1	29	8/11/16 19:39	39.1670	-73.8300	38	BON/CTD
11-MAB-3	30	8/11/16 21:32	39.0780	-73.5750	50	BON/CTD
10-MAB-1	31	8/11/16 23:57	38.8320	-73.1700	82	BON/CTD
Acid 16 MAB	32	8/12/16 3:05	39.0080	-72.5850	1288	CTD PROFILE 911+ WATER
Acid 15 MAB	33	8/12/16 4:30	39.0500	-72.7380	254	CTD PROFILE 911+ WATER
10-MAB-2	34	8/12/16 5:42	39.1600	-72.7530	129	BON/CTD
14-SNE-1	35	8/12/16 7:17	39.3250	-72.5850	132	BON/CTD
15-SNE-2	36	8/12/16 11:21	39.4200	-72.9150	68	BON/CTD
10-MAB-3	37	8/12/16 12:44	39.2500	-72.9970	76	BON/CTD
11-MAB-2	38	8/12/16 14:41	39.2170	-73.3550	56	BON/CTD
Acid 14 MAB	39	8/12/16 16:09	39.3600	-73.3880	50	CTD PROFILE 911+ WATER
11-MAB-4	40	8/12/16 17:26	39.4170	-73.5880	42	BON/CTD
16-SNE-3	41	8/12/16 19:34	39.7400	-73.5020	43	BON/CTD
13-MAB-1	42	8/12/16 21:57	39.6650	-73.9100	28	BON/CTD
Acid 13 MAB	43	8/12/16 22:38	39.7020	-73.9850	23	CTD PROFILE 911+ WATER
13-MAB-2	44	8/13/16 0:06	39.9100	-73.9950	21	BON/CTD
16-SNE-4	45	8/13/16 1:59	40.0680	-73.7630	31	BON/CTD
17-SNE-1	46	8/13/16 4:06	40.3670	-73.5830	26	BON/CTD
16-SNE-2	47	8/13/16 7:43	40.4000	-72.8400	48	BON/CTD
15-SNE-3	48	8/13/16 9:04	40.2480	-72.6730	58	BON/CTD
15-SNE-4	49	8/13/16 10:28	40.0800	-72.4970	63	BON/CTD
15-SNE-1	50	8/13/16 12:20	39.9150	-72.1770	84	BON/CTD
19-SNE-4	51	8/13/16 15:06	40.3220	-72.0850	64	BON/CTD
16-SNE-1	53	8/13/16 17:05	40.3330	-72.4130	55	BON/CTD
21-SNE-1	54	8/13/16 20:08	40.8230	-72.3330	30	BON/CTD
19-SNE-2	55	8/13/16 23:39	40.5800	-71.5900	77	BON/CTD
18-SNE-1	56	8/14/16 3:31	39.9180	-71.4180	373	BON/CTD
18-SNE-1	57	8/14/16 3:58	39.9050	-71.4130	416	CTD PROFILE 19/19+
19-SNE-5	58	8/14/16 6:53	40.2470	-71.1730	107	BON/CTD
19-SNE-3	59	8/14/16 8:10	40.4120	-71.1700	86	BON/CTD
19-SNE-1	60	8/14/16 9:58	40.3320	-70.8350	106	BON/CTD

Acid 18 SNE	61	8/14/16 12:23	40.6650	-70.6220	64	CTD PROFILE 911+ WATER
23-SNE-2	62	8/14/16 13:37	40.5800	-70.4270	65	BON/CTD
23-SNE-1	63	8/14/16 15:29	40.3270	-70.5020	98	BON/CTD
Acid 19 SNE	64	8/14/16 17:45	40.0030	-70.6050	238	CTD PROFILE 911+ WATER
Acid 20 SNE	65	8/14/16 19:10	39.8350	-70.6220	950	CTD PROFILE 911+ WATER
23-SNE-3	66	8/14/16 23:15	40.1620	-70.0070	112	BON/CTD
23-SNE-5	67	8/15/16 0:46	40.2400	-69.7580	88	BON/CTD
24-SNE-1	68	8/15/16 4:18	40.7420	-69.8320	45	BON/CTD
24-SNE-3	69	8/15/16 5:17	40.7450	-69.6750	46	BON/CTD
24-SNE-2	70	8/15/16 9:05	40.9150	-69.2300	65	BON/CTD
Great South Ch (Acid 28)	71	8/15/16 9:47	40.8970	-69.1630	69	CTD PROFILE 911+ WATER
27-GB-4	72	8/15/16 11:57	40.8350	-68.7670	67	BON/CTD
27-GB-3	73	8/15/16 13:20	40.6680	-68.8350	66	BON/CTD
23-SNE-4	74	8/15/16 15:36	40.4130	-69.1670	85	BON/CTD
22-SNE-1	75	8/15/16 17:33	40.0850	-69.0920	160	BON/CTD
26-GB-1	76	8/15/16 23:38	40.4170	-68.0130	147	BON/CTD
26-GB-2	77	8/16/16 2:05	40.4180	-67.6070	168	BON/CTD
27-GB-6	78	8/16/16 3:21	40.5720	-67.6650	106	BON/CTD
28-GB-2	79	8/16/16 8:01	40.8280	-66.7570	120	BON/CTD
29-GB-4	80	8/16/16 9:07	40.9150	-66.9230	91	BON/CTD
29-GB-8	81	8/16/16 10:55	40.9970	-66.6820	86	BON/CTD
29-GB-3	82	8/16/16 14:34	41.5820	-66.5150	84	BON/CTD
29-GB-2	83	8/16/16 16:16	41.5000	-66.1780	103	BON/CTD
29-GB-5	84	8/16/16 18:01	41.6620	-65.9230	119	BON/CTD
28-GB-1	85	8/16/16 19:36	41.8270	-65.7550	176	BON/CTD
NE Ch (Acid 2)	86	8/16/16 22:17	42.2320	-65.7700	231	BON/CTD
NE Ch (Acid 2)	87	8/16/16 22:54	42.2250	-65.7830	230	CTD PROFILE 911+ WATER
32-GB-1	88	8/17/16 1:31	42.1630	-66.3230	194	BON/CTD
32-GB-2	89	8/17/16 2:59	42.0780	-66.4880	83	BON/CTD
30-GB-4	90	8/17/16 5:52	41.8250	-66.9950	67	BON/CTD
29-GB-1	91	8/17/16 7:08	41.6620	-66.8400	64	BON/CTD
29-GB-6	92	8/17/16 8:03	41.5780	-66.9930	65	BON/CTD

29-GB-7	93	8/17/16 8:37	41.5020	-67.0020	67	BON/CTD
27-GB-2	94	8/17/16 11:46	40.9970	-67.2570	77	BON/CTD
GB Add	95	8/17/16 14:22	41.3280	-67.6620	43	BON/CTD
Acid 23 GB	96	8/17/16 17:03	40.9300	-67.7030	67	CTD PROFILE 911+ WATER
30-GB-1	97	8/17/16 18:21	40.9950	-67.7520	57	BON/CTD
30-GB-5	98	8/17/16 20:25	41.1570	-68.0830	51	BON/CTD
30-GB-6	99	8/17/16 21:50	40.9980	-68.2520	54	BON/CTD
30-GB-7	100	8/17/16 23:19	40.9150	-68.4180	49	BON/CTD
27-GB-5	101	8/18/16 0:48	40.9950	-68.6620	52	BON/CTD
31-GB-2	102	8/18/16 1:38	41.0800	-68.5930	58	BON/CTD
31-GB-3	103	8/18/16 3:44	41.4130	-68.3380	61	BON/CTD
31-GB-1	104	8/18/16 4:36	41.5330	-68.3320	41	BON/CTD
34-GOM-1	105	8/18/16 5:54	41.5780	-68.5830	132	BON/CTD
37-GOM-1	106	8/18/16 9:36	41.9950	-69.1650	217	BON/CTD
37-GOM-1	107	8/18/16 10:16	41.9730	-69.1600	208	BON/CTD
34-GOM-2	108	8/18/16 12:19	41.6670	-69.2470	187	BON/CTD
34-GOM-3	109	8/18/16 14:15	41.4170	-69.0870	159	BON/CTD
27-GB-1	110	8/18/16 17:02	40.9930	-68.8420	70	BON/CTD
Great South Ch (Acid 28)	111	8/18/16 18:45	40.9070	-69.1480	68	CTD PROFILE 911+ WATER
Acid 17 SNE	112	8/19/16 2:09	41.0970	-70.6130	45	CTD PROFILE 911+ WATER
25-SNE-1	113	8/19/16 3:27	41.2430	-70.6670	29	BON/CTD
20-SNE-1	114	8/19/16 6:23	40.9850	-71.1630	55	BON/CTD
20-SNE-2	115	8/19/16 8:05	41.1670	-71.3270	43	BON/CTD
20-SNE-3	116	8/19/16 9:18	41.3270	-71.2520	36	BON/CTD

Figure 1. Map of sample locations and cruise track made during Cruise No. PC 16-07. 61-cm bongo sampler and a Seabird CTD = Black dot (•), CTD 911/Niskin bottle rosette = Red dot (•), Both gears = Blue dot (•).



Appendix A

Seabird Survey Report
8-18 August, 2016
Canadian Wildlife Service, Environment and Climate Change Canada
45 Alderney Drive, Dartmouth, Nova Scotia, Canada
Carina Gjerdrum carina.gjerdrum@canada.ca
Seabird Observer: Holly Hogan

Background

The east coast of Canada supports millions of breeding marine birds as well as migrants from the southern hemisphere and northeastern Atlantic. In 1969, PIROP (*Programme intégré de recherches sur les oiseaux pélagiques*) was initiated based on a systematic survey technique and computer database (Brown *et al.* 1975; Brown 1986) to document the abundance and distribution of marine birds in Atlantic Canada and elsewhere. The program was operated by the Canadian Wildlife Service (CWS) of Environment Canada and supported by the large DFO (Department of Fisheries and Oceans) oceanographic fleet based in eastern Canada. Much of the data collected under PIROP are limited beyond the mid-1980s, therefore, CWS reinvigorated the pelagic seabird monitoring program in 2005 with the goal of identifying and minimizing the impacts of human activities on birds in the marine environment. Since 2005, a protocol for collecting data at sea (Gjerdrum *et al.* 2012) and a sophisticated geodatabase have been developed, relationships with industry and others to support offshore seabird observers have been established, and over 200,000 km of ocean track have been surveyed by CWS-trained observers. These data are now being used to identify and address threats to birds in their marine environment (Gjerdrum *et al.* 2008; Fifield *et al.* 2009; Lieske *et al.* 2014; Wong *et al.* 2014).

Objective

The objective of our seabird survey on board the PISCES in August 2016 was to collect data on the distribution and abundance of seabirds as part of our long term monitoring program for seabirds at sea in eastern Canada. We were particularly interested in surveying in the Gulf of Maine/Bay of Fundy region where we have identified a significant data gap.

Methods

Seabird surveys were conducted from the port side of the bridge of the PISCES during oceanographic surveys from 8-18 August, 2016. Surveys were conducted while the ship was moving at speeds greater than 4 knots, looking forward and scanning a 90° arc to one side of the ship. All birds observed on the water within a 300m-wide transect were recorded, and we used the snapshot approach for flying birds (intermittent sampling based on the speed of the ship) to avoid overestimating abundance of birds flying in and out of transect. Distance sampling methods were incorporated to address the variation in bird detectability (Buckland *et al.* 2001). Marine mammal, large fish, and turtle observations were also recorded, although surveys were not specifically designed to detect marine organisms other than birds. Details of the methods used can be found in the CWS standardized protocol for pelagic seabird surveys from moving platforms (Gjerdrum *et al.* 2012).

Results and discussion

Seabird sightings
We surveyed 1486 km of ocean track from 8-18 August, 2016 (Figure 1). A total of 1616 waterbirds from 4 families were observed during the surveys; 1101 of the birds sighted were counted in transect (Table 1). Overall, bird densities averaged 2.6 birds/km^2 (ranging from 0 – 241.2 birds/km^2). The highest densities of birds (>100 birds/km^2) were observed on both the eastern and western edges of Georges Bank (Figure 1). Interestingly, birds were far more abundant on the northern sections of the survey compared with the southern sections (Figure 1), and far less numerous than on an earlier survey of the same waters in May when many individuals were still migrating to breeding locations.

Great and Cory's shearwater were the most commonly observed species, accounting for a combined 77% of the observations (Table 1). Great shearwaters were only observed on Georges Bank (Figure 2a). This species breeds in the southern hemisphere but travels to the western North Atlantic during the non-breeding season. Cory's shearwaters were sighted throughout the study area, although in the highest densities were observed on the western edge of Georges Bank. Unlike the great shearwater, this species breeds in the eastern North Atlantic, so the individuals observed during this survey were likely non-breeders. Other shearwater species observed but in far lower numbers included Audubon's shearwater and sooty shearwater (Table 1).

Storm-petrels accounted for 15% of the sightings (Table 1) and were primarily Wilson's storm-petrels here from the southern-hemisphere (Figure 2b). Other species sighted during the surveys included phalaropes, gulls, and three black-capped petrels, a globally endangered species that is endemic to Haiti and the Dominican Republic.

Marine Mammal, turtle and fish sightings
Although the survey protocol (Gjerdrum et al. 2012) used for the seabird surveys was not designed for marine mammals, turtles or large fish, these observations were also recorded. A total of 771 marine organisms in addition to the birds were sighted and recorded, 87% of which were common dolphin (Table 2). Other dolphin species sighted included the striped, bottle-nosed and white-beaked (Figure 2c). Also observed were a number of whales and six Loggerhead Turtles (Table 2; Figure 2d).

Data Storage
All data collected on marine bird, mammal, fish and turtles from the Pisces have been imported into our main pelagic seabird survey database (MS Access), which is managed by Canadian Wildlife Service, Environment and Climate Change Canada in Dartmouth, Nova Scotia. The data are made publically available on OBIS (Ocean Biogeographic Information System), which is updated on a semi-annual basin.

Acknowledgements
The CWS monitoring program for seabirds at sea relies on the generous support of ships' crew and personnel; the surveys conducted from the Pisces would not have been possible without the kind support of Jerry Prezioso, NOAA, and we thank Jerry, the science staff, and ship's crew for giving us this valuable opportunity to accompany them on their mission.

Table 1: List of bird species sighted during seabird surveys on board the PISCES from 8-18 August, 2016.

Family	English	Latin	Number observed in transect	Total number observed
Procellariidae	Great Shearwater	*Ardenna gravis*	436	604
	Cory's Shearwater	*Calonectris diomedea*	407	559
	Audubon's Shearwater	*Puffinus lherminieri*	6	10
	Sooty Shearwater	*Ardenna griseus*	6	8
	Unidentified Shearwaters	Procellariidae	3	23
	Black-capped Petrel	*Perodroma hasitata*	0	3
Hydrobatidae	Wilson's Storm Petrel	*Oceanites oceanicus*	134	209
	Leach's Storm-Petrel	*Oceanodroma leucorhoa*	16	26
	Unidentified Storm-Petrels	Hydrobatidae	19	81
Scolopacidae	Unidentified Phalaropes	*Phalaropus*	51	51
Laridae	Great Black-backed Gull	*Larus marinus*	12	21
	Laughing Gull	*Larus atricilla*	5	5
	Herring Gull	*Larus argentatus*	4	7
	Forster's Tern	*Sterna forsteri*	0	1
	Unidentified Gull	Laridae	1	1
	Unidentified Tern	Sternidae	0	6
AVES	Unknown Bird	Aves	1	1
TOTAL			1101	1616

Table 2: List of marine wildlife (other than birds) sighted during seabird surveys on board the PISCES from 8-18 August, 2016.

English	Latin	Total number observed
Common Dolphin	*Delphinus delphis*	670
Bottle-nosed Dolphin	*Tursiops truncatus*	50
Striped Dolphin	*Stenella coeruleoalba*	3
White-beaked Dolphin	*Lagenorhynchus albirostris*	2
Unidentified Dolphins	Delphinidae	33
Fin Whale	*Balaenoptera physalus*	3
Humpback Whale	*Megaptera novaeangliae*	2
Minke Whale	*Balaenoptera acutorostrata*	1
Loggerhead Turtle	*Caretta caretta*	6
Unidentified Turtle	Chelonioidea	1
TOTAL		771

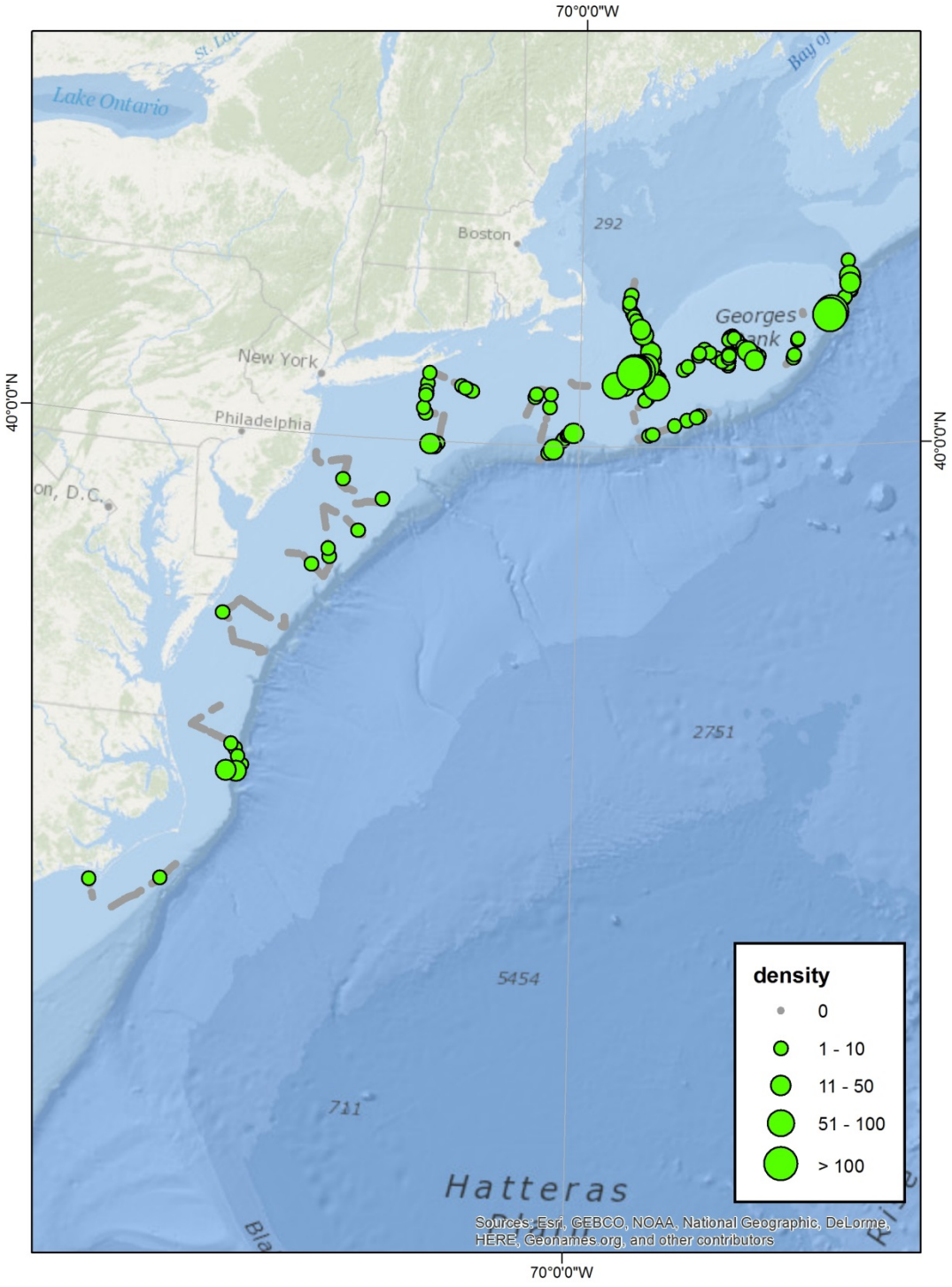


Figure 1. Density (count/km^2) of birds (all species combined) sighted during seabird surveys on board the PISCES during oceanographic surveys from 8-18 August, 2016.

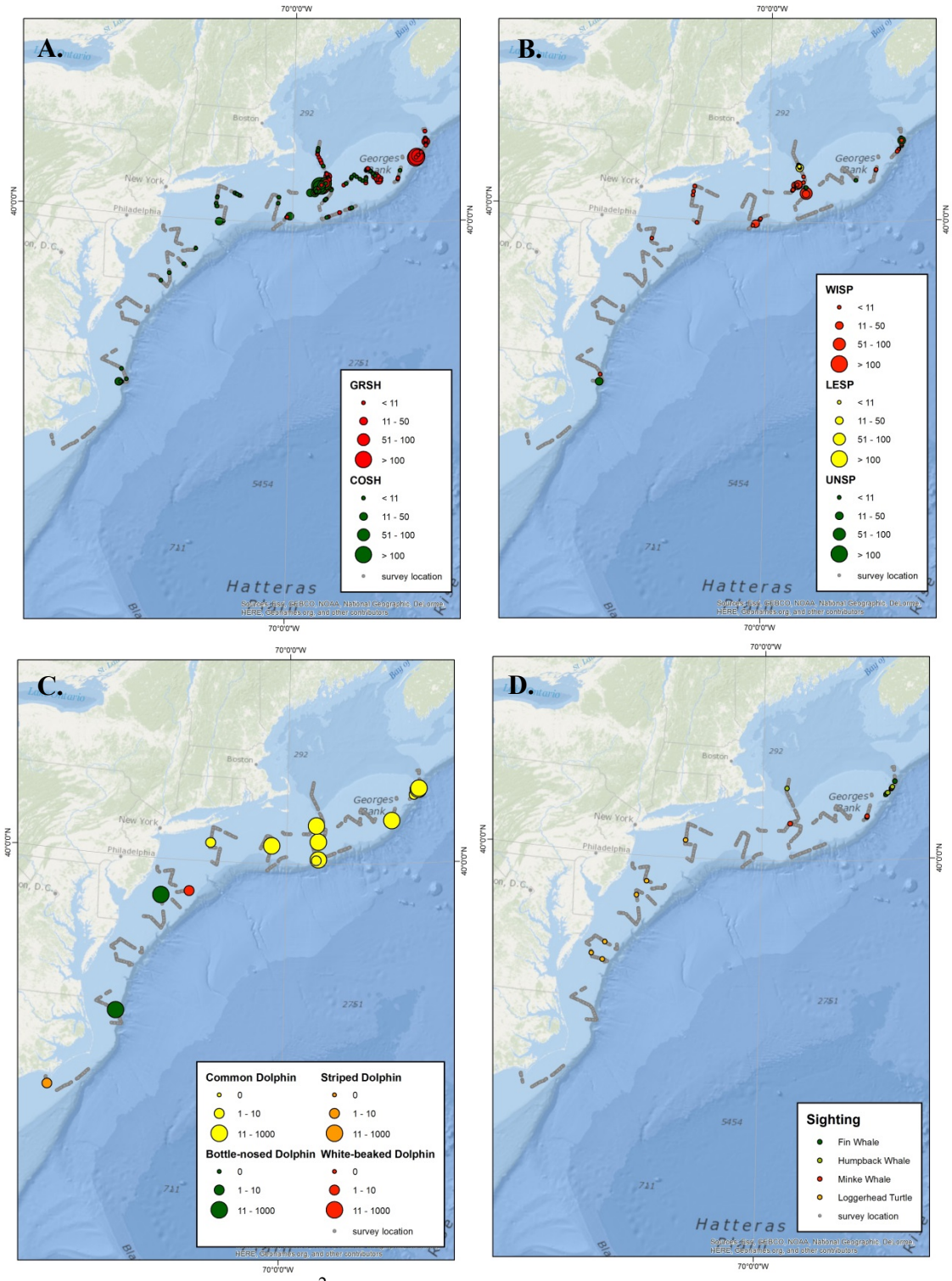


Figure 2. Density (count/km^2) of (A) shearwaters (GRSH = great shearwater; COSH = Cory's shearwater); (B) storm-petrels (LESP = Leach's storm-petrel; WISP = Wilson's storm-petrel; UNSP = unidentified storm-petrel); and counts of (C) dolphin; and (D) whales and turtles sighted during surveys from the PISCES from 8-18 August, 2016.

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