New Jersey Department of Environmental Protection
Baseline Studies

July – September 2008 Quarterly Report

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LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
^{o}C	Degree(s) Celsius
µW	Microwatt(s)
ADCP	Acoustic Doppler Current Profiler
BRP	Bioacoustics Research Program
CDOM	Colored Dissolved Organic Matter
cm^2	Square Centimeter(s)
CTD	Conductivity-Temperature-Depth
dB	Decibel(s)
ESA	Endangered Species Act
ft	Foot(Feet)
GMI	Geo-Marine, Inc.
hr	Hour
kHz	Kilohertz
km	Kilometer(s)
km^2	Square Kilometer(s)
lon-lat	Longitude-Latitude
m	Meter(s)
mbar	Millibar(s)
mg/L	Milligram(s) per Liter
min	Minute(s)
NJDEP	New Jersey Department of Environmental Protection
nm	Nanometer(s)
NM	Nautical Mile(s)
PAR	Photosynthetically Active Radiation
PSU	Practical Salinity Unit(s)
QAWP	Quality Assurance Work Plan
RUMFS	Rutgers University Marine Field Station
s	Second(s)
SMS	Surface Mapping System
SST	Sea Surface Temperature
TI-VPR	Thermal Imaging-Vertically Pointing Radar
XBAT	Extensible Bioacoustic Tool

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INTRODUCTION

This quarterly progress report provides an overview of avian, marine mammal, sea turtle, and pinniped studies conducted for the New Jersey Department of Environmental Protection (NJDEP) Baseline Studies Project from July through September 2008. Survey effort and a brief overview of survey results are presented for avian, marine mammals, sea turtles, and pinnipeds. We also discuss the acoustic monitoring task. Dates for the occurrence of each field task are presented in **Table 1.1**.

Table 1-1
Dates and Status of Tasks Conducted during this Reporting Period

Task	July	August	September
Ship Offshore Avian Survey	13-16	11-14	12-16
Ship Offshore Mammal Survey	13-16	11-14	12-16
Aerial Avian Survey	Not Scheduled	Not Scheduled	Not Scheduled
Aerial Mammal Survey	Not Conducted	Not Conducted	Not Conducted
Coastal Avian Survey	21/27	18	Scheduled for 9/30*
Radar Sites	Not scheduled	Not scheduled	Coastal Radar Site 1: 15- Offshore Barge Radar 30-
Thermal Sites	Not scheduled	Not scheduled	Coastal Radar Site 1: 15- Offshore Barge Radar 30-
Acoustic Surveys	Buoys collecting data	Buoys collecting data	15 – recovered one pop-up, 16 – recovered two pop-ups, 18 – recovered one pop-up; 17 – 22 refurbished 2 pop-up buoys & coordinated with BRP for 2 units and replacement of lost unit from June; redeployment shifted to October 1* (redeploy on 10/1 was successful)
Oceanographic Surveys	13-16	11-14	12-16

*Schedule change due to weather delay

1.0 QUALITY ASSURANCE WORK PLAN

The draft Quality Assurance Work Plan (QAWP) was submitted on October 24, 2007. NJDEP comments on the draft were addressed and a revised QAWP submitted on January 04, 2008 prior to the initiation of field work. Additional comments were addressed and a revised QAWP submitted on February 08, 2008 and then again on June 16, 2008 after secondary revisions. Changes and comments resulting from the additional funding received and the September 26th meeting with USFWS will be addressed and a revised QAWP will be submitted in the next quarter.

2.0 LITERATURE REVIEW

We pulled all of the literature within the Geo-Marine, Inc. (GMI) library that pertains to marine mammals, sea turtles, fisheries, habitats, oceanography and other marine resources for the northeast Atlantic and are currently evaluating all the literature for specific application to New Jersey (Refer to **Table 2.1** for literature totals as of September 30, 2008). Searches for additional relevant scientific literature and data will be conducted during the next quarter. As literature and data are identified, documents are obtained in hard or electronic format and reviewed, key-worded, and catalogued in EndNote. The compiled list of

literature reviewed to date can be found in **Appendix A**. This is an on going process and will continue throughout the project.

Table 2-1
New Jersey Literature Review (as of September 30, 2008)

Categories	Number of References	Appendix
Fishes	146	A-1
Marine Birds	35	A-2
Marine Mammals	133	A-3
Offshore Wind Farms	89	A-4
Sea Turtles	51	A-5
Total		

3.0 DIGITAL DATA COMPILATION

The Principal Investigator for this task has compiled a digital data list from GMI data banks and geospatial data from numerous sources presented in **Appendix B**. These data are currently under review for applicability for this project.

4.0 AVIAN PREDICTIVE/PROBABILITY MODEL

The following text provides an overview of temporal and spatial avian distribution modeling that will be conducted. Extensive work on developing the model and organizing the data for analysis and reporting has been ongoing throughout the past quarter.

Counts of birds sampled during shipboard strip-transect are used to determine seabird avian density within the survey area. First, we will maintain a geo-spatial database to visualize survey effort according to survey type sampled on a monthly basis (**Figure 4-1**) Secondly, for quality assurance and basic data management requirements (i.e. maintenance and updating data) we will examine expanding symbol plots of total seabird abundance (# per kilometer [km]) for inspection of data and calculating basic spatial and temporal descriptive statistics (**Figure 4-2 – 4-3**) Third, we will plot the most abundant species in relation to survey effort and month (**Figure 4-4 – 4-5**).

Densities (birds per square kilometer [km^2]) are calculated by dividing the number of birds observed by the amount of area surveyed. The area surveyed is calculated by multiplying the transect length by the survey width (300 meters [m]). Densities estimates are calculated using: $D = n / (l \times w)$, where D is density (birds per km^2), n of the number of birds observed, l is the transect length, and w is the width of the strip.

The objective of modeling at-sea bird density is essentially to determine the probability of being able to detect a specified change in bird numbers in relation to time (i.e. month) and spatial scale (e.g. 1 km x 1 km and 5 km x 5 km). All aspects of statistical modeling will pass through a rigorous series of tests and statistical power analyses. Furthermore, explicit consideration will be given to different species and how their densities vary accordingly to life history constraints. For example, species specific attributes such as timing of migration events and seasonal habitat requirements (e.g. affinity for shoals) will be considered during all aspects of statistical modeling procedures.

Modeling temporal variability of bird density is basically constrained to survey type (nearshore or offshore), effort (#/km), month and season. Temporal modeling will be conducted using a generalized linear model. To fit the model, a log-likelihood ratio is used along with a link function specified as a Poisson distribution to account for over-dispersion in the bird response variable (i.e. counts seabirds tend to be patchily distributed). Moreover, we will conduct a power analysis by using the observed data distribution to simulate a series of distributions with similar means and variances to the observed dataset and then calculate the proportion of times that the statistical tests are significant. The model output will be a tabulation of effects via contribution of explanatory variables for estimating and predicting bird density on a temporal basis.

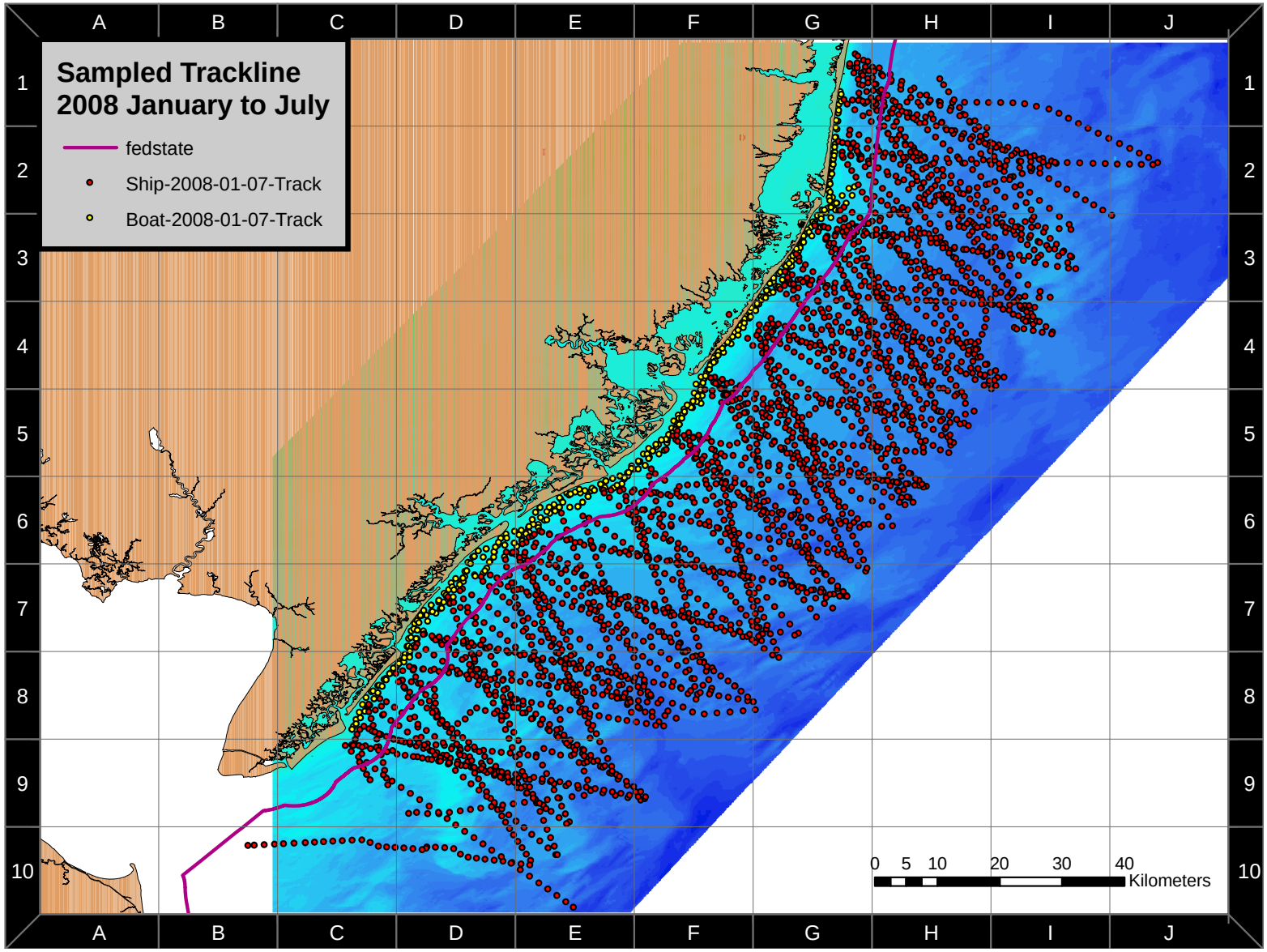

Figure 4-1. Total sampled trackline (km bins) during coastal (Boat survey effort ~478 km) and offshore (Ship survey effort ~3,051 km) surveys 2008 January-July.

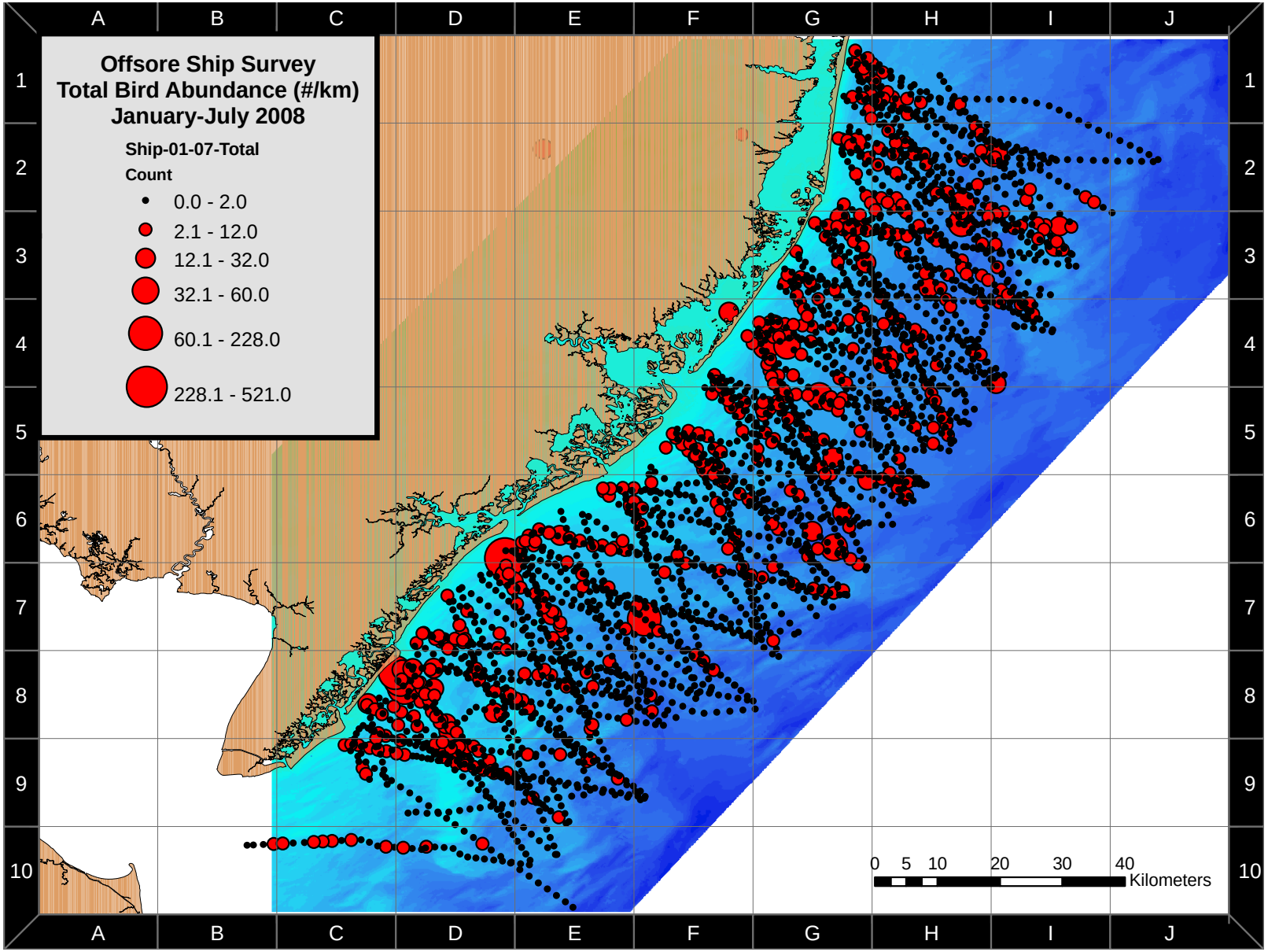

Figure 4-2. Total seabird abundance (#/km) during offshore ship surveys (effort ~3,051 km) January-July 2008.

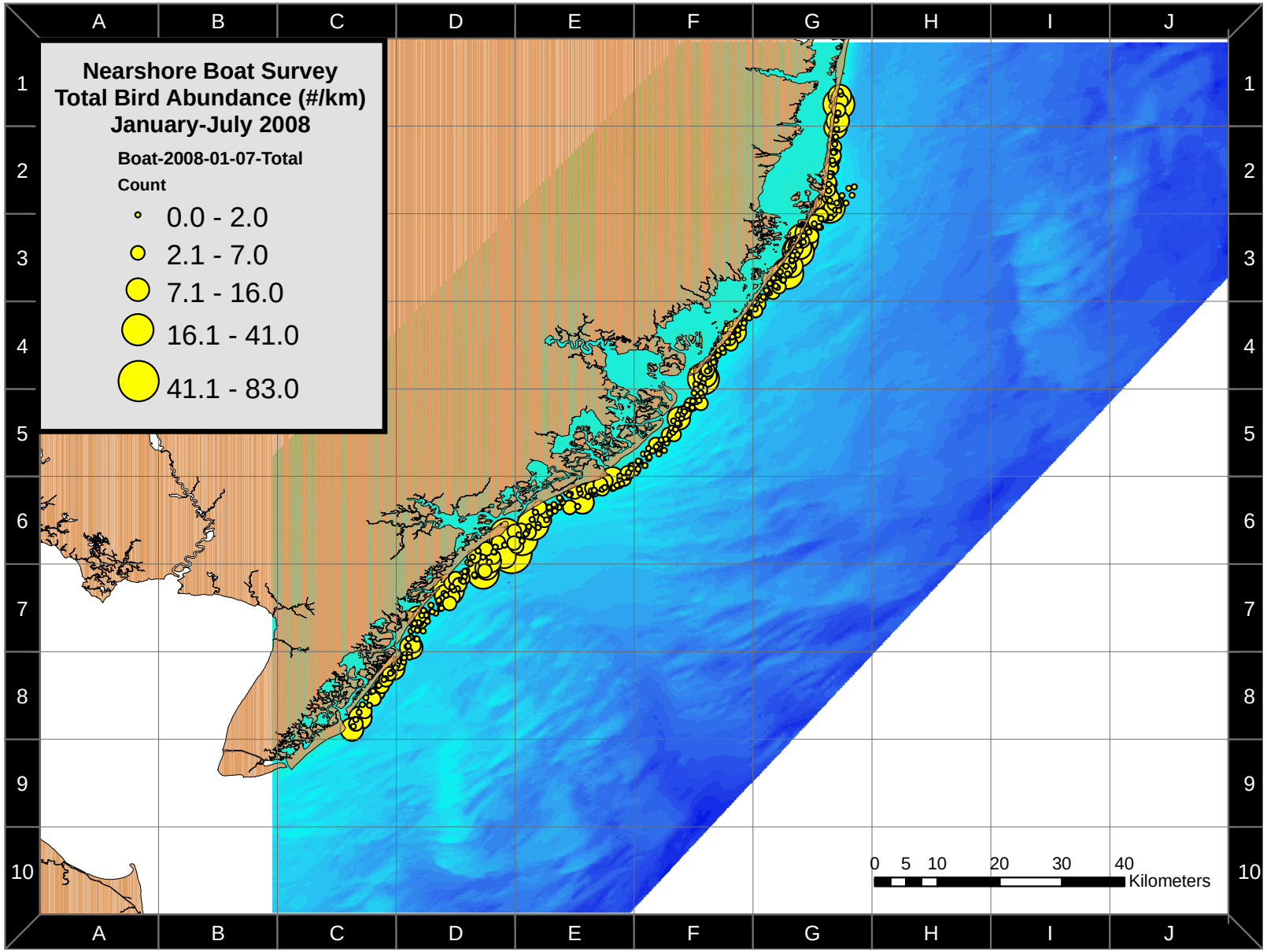

Figure 4-3. Total bird abundance (#/km) during nearshore boat surveys (effort ~478 km) January-July 2008.

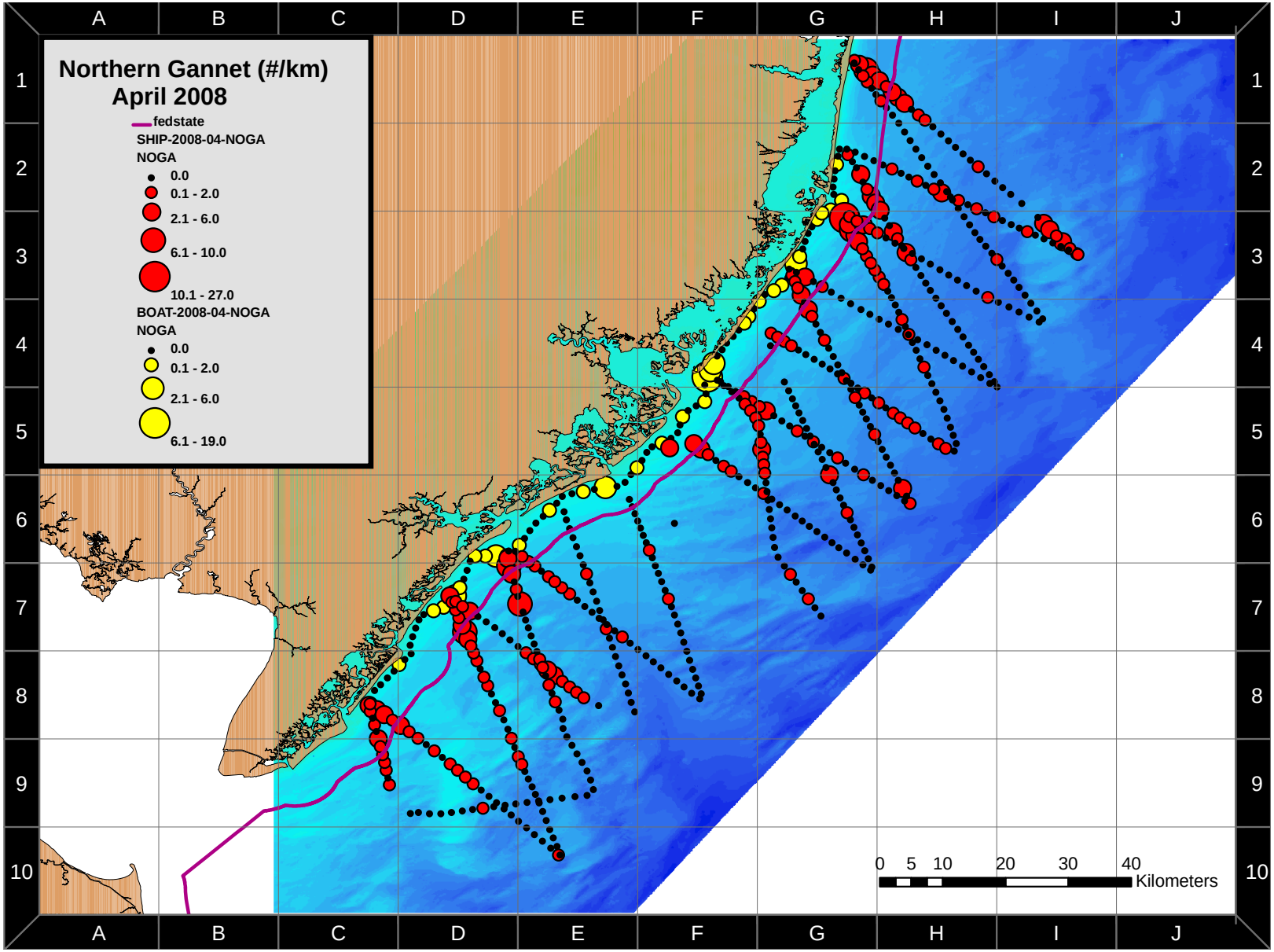

Figure 4-4. Example - Northern Gannet abundance (#/km) during nearshore and offshore surveys April 2008.

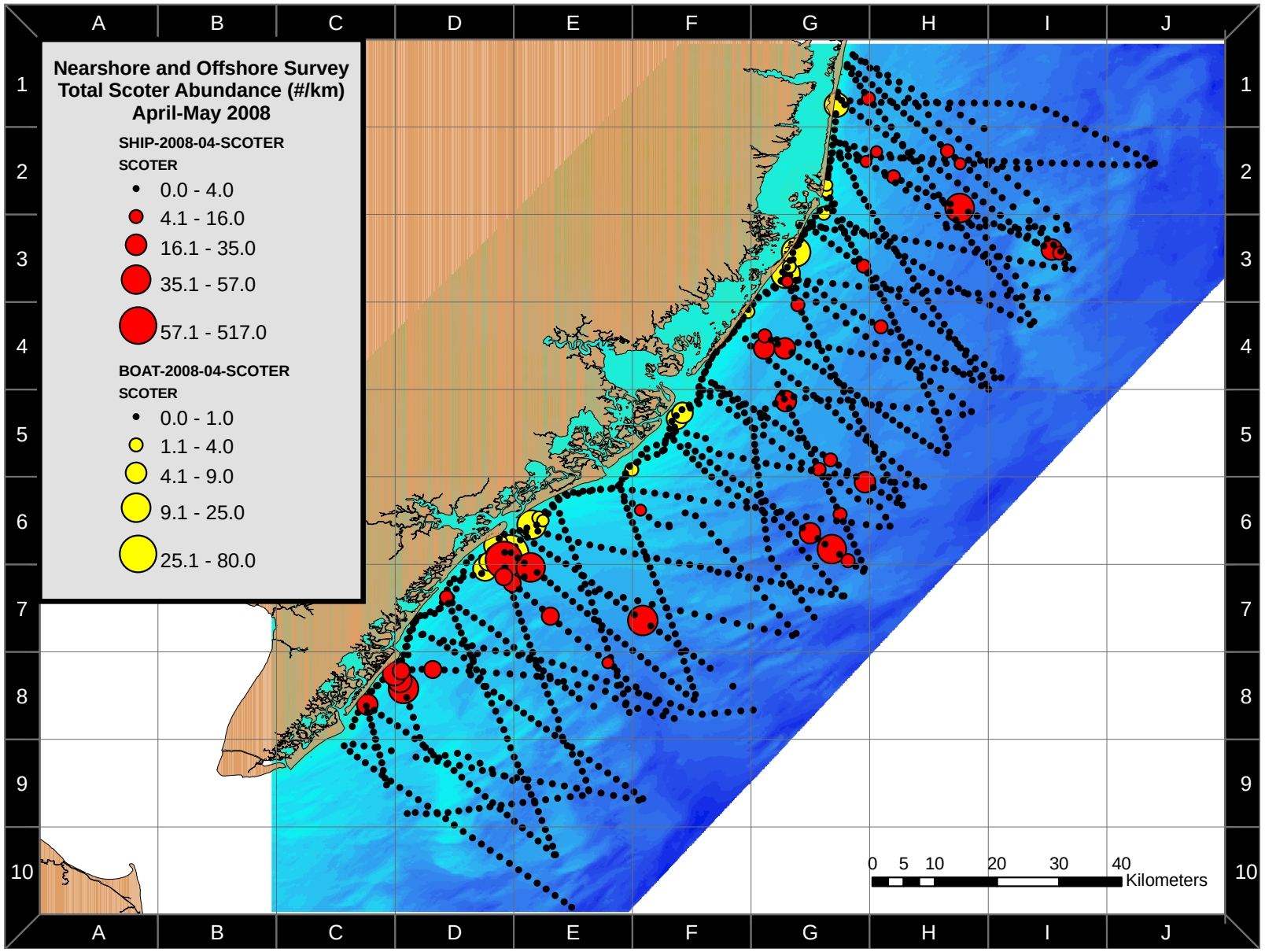

Figure 4-5. Example – Scoter species abundance (#/km) during nearshore and offshore surveys March-May 2008.

Modeling spatial variability of at-sea bird density requires explicit consideration of space and scale dependency. We will describe, estimate and predict seabird spatial variability using spatial autocorrelation (Moran's I), generalized linear models, spatial regression models and spatial interpolation (e.g. conditional simulation and kernel density methods). In addition, spatial covariates are used to aid in estimation and prediction of seabird spatial variability. Examples of spatial covariates include bathymetry (depth), distance to land, location and distance to shoals, and hydro-dynamic properties (e.g. sea-temperature).

The visual product of statistical spatial modeling is a density map that incorporates aspects of spatial structure (i.e. patchiness) and the variance or error in predicting spatial usage by seabirds. For example, counts of seabirds are used to generate spatial density maps using the kernel density spatial interpolation method. This method inputs measured attribute values (i.e., avian abundance) collected at sampled longitude-latitude locations to obtain estimates at un-sampled sites positioned on a regular longitude-latitude grid system. Kernel methods generally spread the mass of each observation around the observed value, with a relative weighting being inversely related to the separation distance between the un-sampled site and a neighboring sampled site. Attribute values generated at each sampled site are estimates rather than exact values, since interpolation is required. This method is relatively accurate for sampled data that are evenly spaced and exhibit smooth spatial gradients, but is less accurate for clustered data exhibiting sharp gradients or "spikes" (e.g., hot-spots). In addition, the presence of anomalies significantly skews the data, introducing inaccuracies in the interpolation process. The standard error in the estimates at a given un-sampled site generally varies directly with the magnitude of the spatial gradient (difference) in observed values in proximity to that site.

5.0 BASELINE SURVEYS

5.1 SHIPBOARD OFFSHORE SURVEYS

5.1.1 Avian

5.1.1.1 Survey Effort

Shipboard avian survey lines for the July, August, and September surveys were conducted along the same transect lines as the marine mammal/sea turtle lines but may differ due to varying sea state conditions/requirements.

5.1.1.1.1 July 2008

Ship avian surveys commenced on 13 July and were completed on 16 July. The ship transects covered 418.82 nautical miles (NM) (670.11 km; **Figure 5.1-1**). On-effort survey time totaled 42.71 hours (hrs).

5.1.1.1.2 August 2008

Ship avian surveys commenced on 11 August and were completed on 14 August. The ship transects covered 458.38 NM (733.41 km; **Figure 5.1-2**). On-effort survey time totaled 48.48 hrs.

5.1.1.1.3 September 2008

Ship avian surveys commenced on 12 September and were completed on 16 September. The ship transects covered 479.86 NM (767.78 km; **Figure 5.1-3**). On-effort survey time totaled 49.91 hrs.

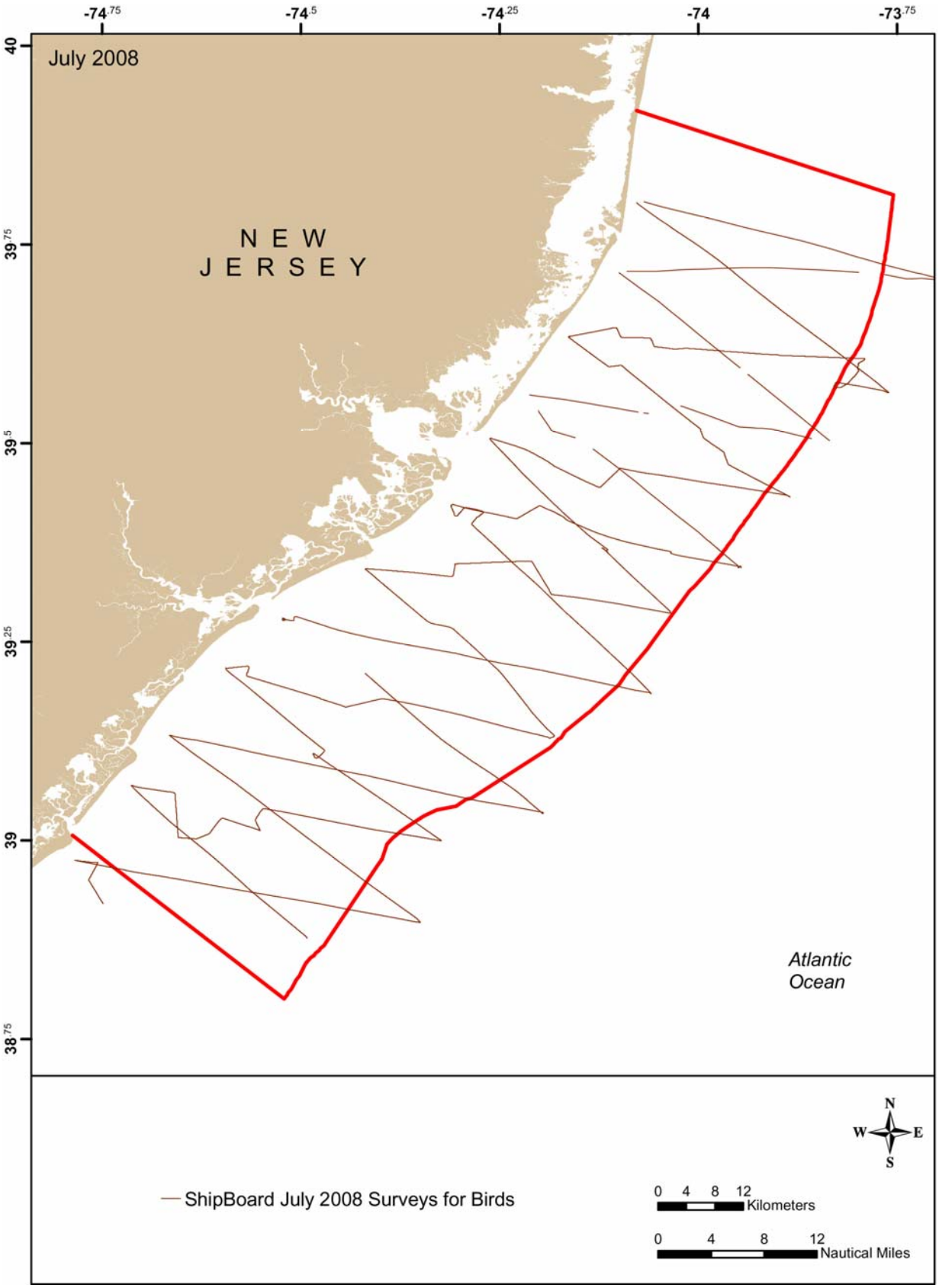

Figure 5.1-1. Shipboard Avian Survey Tracklines for July 2008.

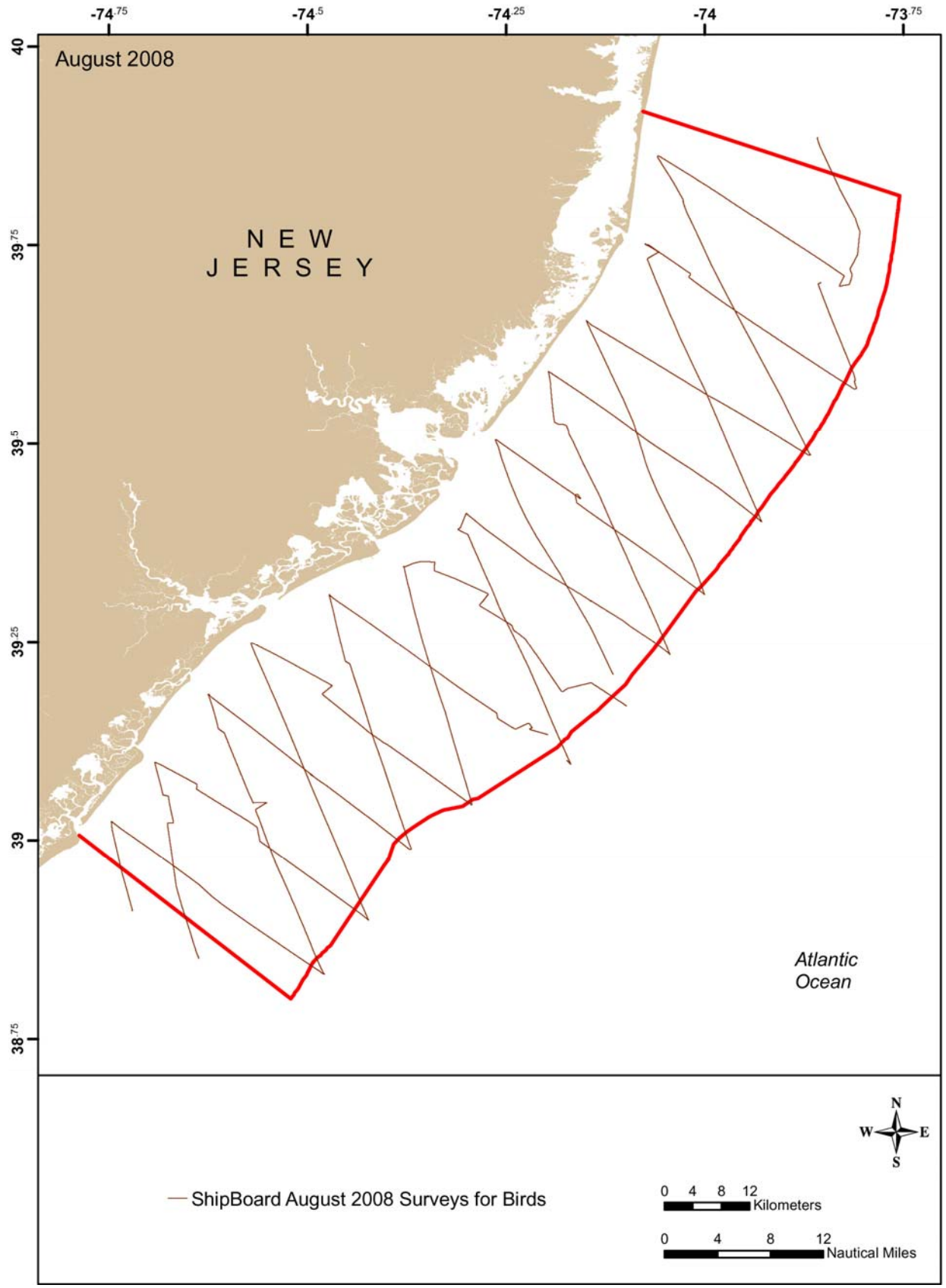

Figure 5.1-2. Shipboard Avian Survey Tracklines for August 2008.

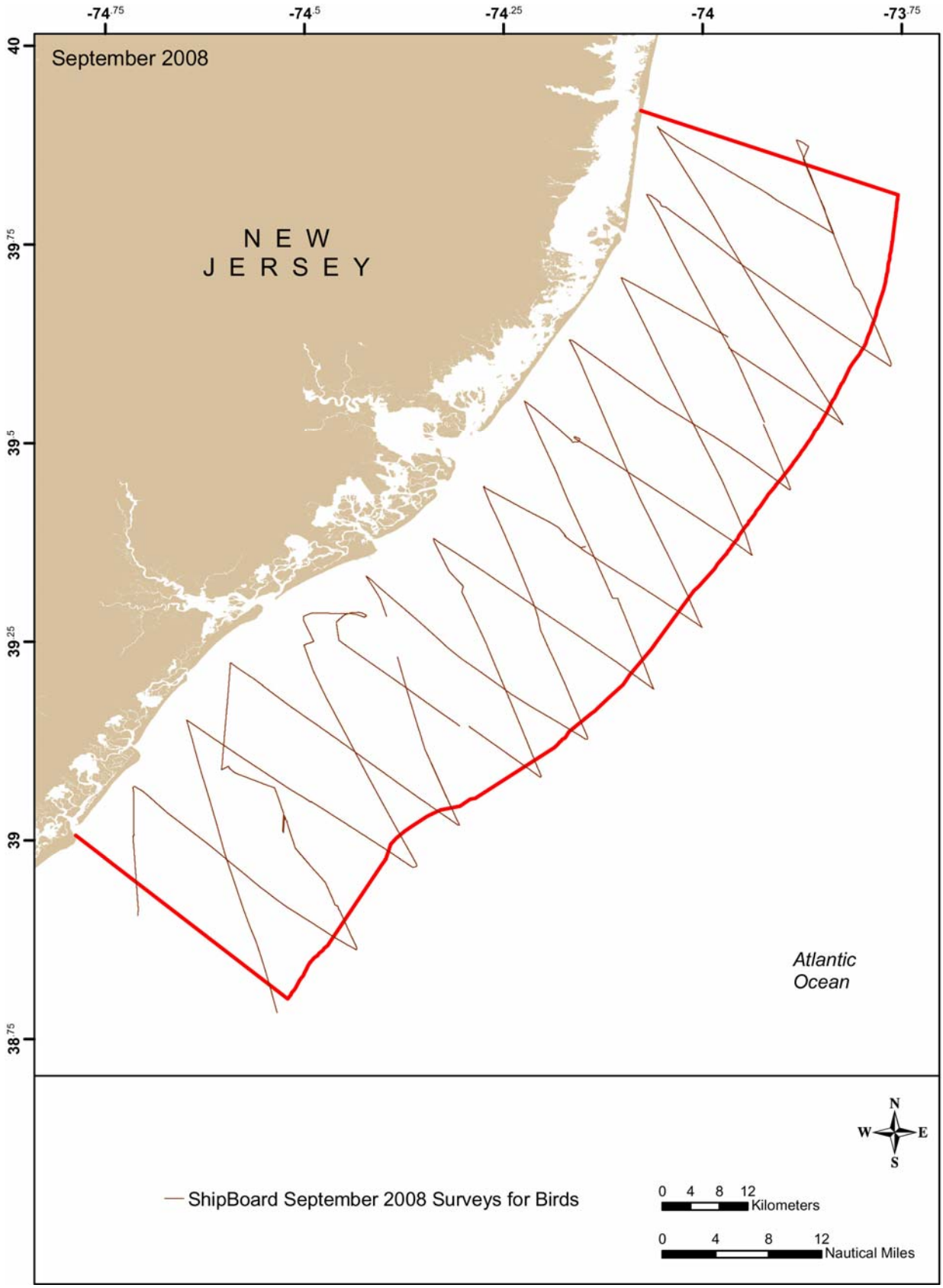

Figure 5.1-3. Shipboard Avian Survey Tracklines for September 2008.

5.1.1.2 Survey Results

5.1.1.2.1 Avian species occurrence

All survey data that were collected are presented in **Table 5.1-1**. Sixteen species were observed during July, 18 during August, and 27 during September. Birds that were not identifiable due to weather/sea state conditions, behavior, or distance were identified to the lowest identifiable form or taxon (genus, family, or unknown). Several species (e.g., Turkey Vulture) were only observed on or over land when the ship was nearshore. Three state-listed avian species (Black-crowned Night-heron, Yellow-crowned Night-heron, and Osprey) were observed during the surveys.

5.1.1.2.2 Avian abundance and composition

The total monthly number of individuals observed increased from July (1,592) to August (2,819) and decreased in September (1,606; **Table 5.1-2**). This increase in August was due to a large increase in the number of migrant Wilson's storm-petrels and smaller increases in the number of Laughing gulls and Common terns. The increase in laughing gulls and common tern abundance may due to the fledging of juvenile birds, post-breeding dispersal of adult birds, and/or arrival of early migrants from areas north of the project area.

The increase in number of avian species observed during September (27) indicates the beginning of fall migration, Migrants observed in September included ducks, cormorants, phalaropes, jaegers, gulls (i.e., Sabine's Gull), and passerines (e.g., flickers, wood warblers). Observations of migrant Wilson's Storm-Petrels decreased from August (44.40 percent [%]) to September (0.40%) indicating their departure from the area.

Laughing Gull was the most abundant species observed during July (30.90 percent [%] of the total species composition per month); over 44% of avian observations in August were Wilson's Storm-Petrel; Laughing Gull was the most numerous species in September (see **Table 5.1-2**). Gulls and terns made up 58.80% (935), 47.40% (1,335), and 84.30% (1,354) of the total birds counted during July, August, and September, respectively. Wilson's Storm Petrel, Common Tern, Cory's Shearwater, and Northern Gannet were the 2nd to 5th most abundant species during July. Laughing Gull, Common Tern, Great Black-backed Gull, and Northern Gannet were the 2nd to 5th most abundant species during August. Common Tern, Great Black-backed Gull, Double-crested Cormorant, and Herring Gull were the 2nd to 5th most abundant species during September (see **Table 5.1-2**).

Table 5.1-1
Avian Species* Observed during July through September 2008 Shipboard Surveys

Family Common Name, *Scientific name*	July	August	September
Gaviidae (loons)			
Common Loon, *Gavia immer*	X		X
Procellariidae (petrels and shearwaters)			
Cory's Shearwater, *Calonectris diomedea*	X	X	X
Manx Shearwater, *Puffinus puffinus*	X		
Audubon's Shearwater, *Puffinus Iherminieri*			X
Shearwater (black-and-white)			X
Hydrobatidae (storm-petrels)			
Wilson's Storm-Petrel, *Oceanites oceanicus*	X	X	X
Leach's Storm-petrel, *Oceanodroma leucorhoa*		X	
Phalacrocoracidae (cormorants)			
Double-crested Cormorant, *Phalacrocorax auritus*	X		X
Pelecanidae (pelicans)			
Brown Pelican, *Pelecanus erythrorhynchos*	X	X	
Sulidae (gannets)			
Northern Gannet, *Morus bassanus*	X	X	X
Ardeidae (bitterns, egrets, and herons)			
Great Blue Heron, *Ardea herodias*		X	
Black-crowned Night-heron, *Nycticorax nycticorax*	X		
Yellow-crowned Night-heron, *Nycticorax violaceus*		X	
Anatidae (geese, ducks)			
Canada Goose, *Branta canadensis*			X
Gadwall, *Anas strepera*			X
Green-winged Teal, *Anas crecca*			X
Accipitridae (harriers, eagles, kites, hawks, osprey)			
Osprey, *Pandion haliaetus*		X	
Merlin, *Falco columbarius*			X
Scolopacidae (sandpipers)			
Marbled Godwit, *Limosa fedoa*	X		
Sanderling, *Calidris alba*		X	
Least Sandpiper, *Calidris minutilla*	X	X	
Semipalmated Sandpiper, *Calidris pusilla*		X	
Red-necked Phalarope, *Phalaropus lobatus*			X
Red Phalarope, *Phalaropus fulicarius*			X
Laridae (gulls)			
Parasitic Jaeger, *Stercorarius parasiticus*			
Pomarine Jaeger, *Stercorarius pomarinus*			X
Laughing Gull, *Larus atricilla*	X	X	X
Herring Gull, *Larus argentatus*	X	X	X
Great Black-backed Gull, *Larus marinus*	X	X	X
Sabine's Gull, *Larus sabini*			X
Royal Tern, *Sterna maxima*	X	X	X
Common Tern, *Sterna hirundo*	X	X	X
Forster's Tern, *Sterna forsteri*	X	X	X
Black Tern, *Childonias niger*			X
Caspian Tern, *Hydroprogne caspia*			X
Picidae (woodpeckers)			
Northern Flicker (yellow-shafted), *Colaptes auratus*			X
Parulidae (wood-warblers)			
Common Yellowthroat, *Geothlpis trichas*			X
Palm Warbler, *Dendroica palmarum*			X
Troglodytidae (wrens)			
Marsh Wren, *Cistothorus palustris*			X

* All birds identified to species during shipboard surveys were included.

Table 5.1-2
Abundance and Percent Composition* of Avian Observations during July through September 2008 Shipboard Surveys

Family	July		August		September	
Common Name, *Scientific name*	Number	% Composition	Number	% Composition	Number	% Composition
Gaviidae (loons)						
Common Loon, *Gavia immer*	8	0.50%			1	0.10%
Procellariidae (petrels and shearwaters)						
Cory's Shearwater, *Calonectris diomedea*	117	7.30%	15	0.50%	10	0.60%
Manx Shearwater, *Puffinus puffinus*	1	0.10%				
Audubon's Shearwater, *Puffinus Iherminieri*					1	0.10%
Shearwater (black-and-white)					1	0.10%
Hydrobatidae (storm-petrels)						
Wilson's Storm-petrel, *Oceanites oceanicus*	446	28.00%	1251	44.40%	6	0.40%
Leach's Storm-petrel, *Oceanodroma leucorhoa*			1	0.00%		
Storm-petrel (unknown)	1	0.10%			2	0.10%
Phalacrocoracidae (cormorants)						
Double-crested Cormorant, *Phalacrocorax auritus*	1	0.10%			116	7.20%
Pelecanidae (pelicans)						
Brown Pelican, *Pelecanus erythrorhynchos*	5	0.30%	5	0.20%		
Sulidae (gannets)						
Northern Gannet, *Morus bassanus*	41	2.60%	47	1.70%	34	2.10%
Ardeidae (bitterns, egrets, herons)						
Great Blue Heron, *Ardea herodias*			2	0.10%		
Black-crowned Night-heron, *Nycticorax nycticorax*	1	0.10%				
Yellow-crowned Night-heron, *Nycticorax violaceus*			1	0.00%		
Anatidae (swans,geese, and ducks)						
Canada Goose, *Branta canadensis*					3	0.20%
Gadwall, *Anas strepera*					2	0.10%
Green-winged Teal, *Anas crecca*					14	0.90%
Duck (dabbling), *Anas spp.*					3	0.20%
Accipitridae (harriers, eagles, kites, hawks, osprey)						
Osprey, *Pandion haliaetus*			7	0.20%		
Merlin, *Falco columbarius*					1	0.10%
Scolopacidae (sandpipers)						
Marbled Godwit, *Limosa fedoa*	3	0.20%				
Sanderling, *Calidris alba*			4	0.10%		
Least Sandpiper, *Calidris minutilla*	12	0.80%	12	0.40%		
Semipalmated Sandpiper, *Calidris pusilla*			3	0.10%		

Table 5.1-2 (*continued*)
Abundance and Percent Composition* of Avian Observations during July through September 2008 Shipboard Surveys

Family	July		August		September	
Common Name, *Scientific name*	Number	% Composition	Number	% Composition	Number	% Composition
Scolopacidae (sandpipers) (*continued*)						
Peep (unknown), *Caladris* spp.			3	0.10%		
Red-necked Phalarope, *Phalaropus lobatus*					2	0.10%
Red Phalarope, *Phalaropus fulicarius*					1	0.10%
Phalarope (unknown), *Phalaropus* spp.					2	0.10%
Shorebird (small)	12	0.80%	1	0.00%		
Laridae (gulls, terns, jaegers, skimmers)						
Parasitic Jaeger, *Stercorarius parasiticus*					6	0.40%
Pomarine Jaeger, *Stercorarius pomarinus*					1	0.10%
Jaeger (unknown), *Stercorarius* spp.					1	0.10%
Laughing Gull, *Larus atricilla*	492	30.90%	611	21.70%	407	25.30%
Herring Gull, *Larus argentatus*	8	0.50%	2	0.10%	49	3.10%
Great Black-backed Gull, *Larus marinus*	30	1.90%	68	2.40%	256	15.90%
Sabine's Gull, *Larus sabini*					1	0.10%
Gull (large), *Larus spp.*			3	0.10%	28	1.70%
Royal Tern, *Sterna maxima*	19	1.20%	41	1.50%	19	1.20%
Common Tern, *Sterna hirundo*	314	19.70%	584	20.70%	378	23.50%
Forster's Tern, *Sterna forsteri*	1	0.10%	5	0.20%	3	0.20%
Black Tern, *Childonias niger*					4	0.20%
Caspian Tern, *Hydroprogne caspia*					1	0.10%
Tern (small), *Sterna spp.*	71	4.50%	21	0.70%	198	12.30%
Gull (small)/tern (unknown)					2	0.10%
Picidae (woodpeckers)						
Northern Flicker (yellow-shafted), *Colaptes auratus*					3	0.20%
Parulidae (wood-warblers)						
Common Yellowthroat, *Geothlpis trichas*					1	0.10%
Palm Warbler, *Dendroica palmarum*					1	0.10%
Warbler (unknown)					1	0.10%
Troglodytidae (wrens)						
Marsh Wren, *Cistothorus palustris*					1	0.10%
Other						
Passerine[2]	2	0.10%	83	2.90%	1	0.10%
Unknown	7	0.40%	49	1.70%	45	2.80%
TOTAL	*1592*	*100.00%*	*2819*	*100.00%*	*1606*	*100.00%*

* All avian data recorded during the offshore surveys was used to calculate percent composition.
[1] Represents passerine spp. recorded over land, on shore, offshore, and/or on the survey vessel.

5.1.2 Marine Mammals and Sea Turtles

5.1.2.1 Survey Effort

Shipboard marine mammal/sea turtle survey lines for the July, August, and September surveys differ from avian lines due to varying sea state conditions/observation requirements.

5.1.2.1.1 July 2008

Marine mammal/sea turtle shipboard surveys were initiated on 13 July and concluded on 16 July. There were no delays or suspension of effort during the survey. The survey covered 417.235 NM (772.721 km) of on-effort trackline (**Figure 5.1-4)**.

5.1.2.1.2 August 2008

Marine mammal/sea turtle shipboard surveys were initiated on 11 August and concluded on 14 August. There were no delays or suspension of effort during the survey. The survey covered 480.995 NM (890.804 km) of on-effort trackline (**Figure 5.1-5**).

5.1.2.1.3 September 2008

Marine mammal/sea turtle shipboard surveys were initiated on 12 September and concluded on 16 September. There were no delays or suspension of effort during the survey. The survey covered 440.688 NM (816.156 km) of on-effort trackline (**Figure 5.1-6**).

5.1.2.2 Survey Results

Six species were observed during the third quarter of the ship surveys along with unidentified cetaceans (unidentified dolphins and unidentified large whales), unidentified hardshell turtles, and unidentified turtles which could not be identified to species. All marine mammal and sea turtle species sighted during the third quarter are summarized in **Table 5.1.3**. Four of the six species are listed as threatened or endangered under the Endangered Species Act (ESA).

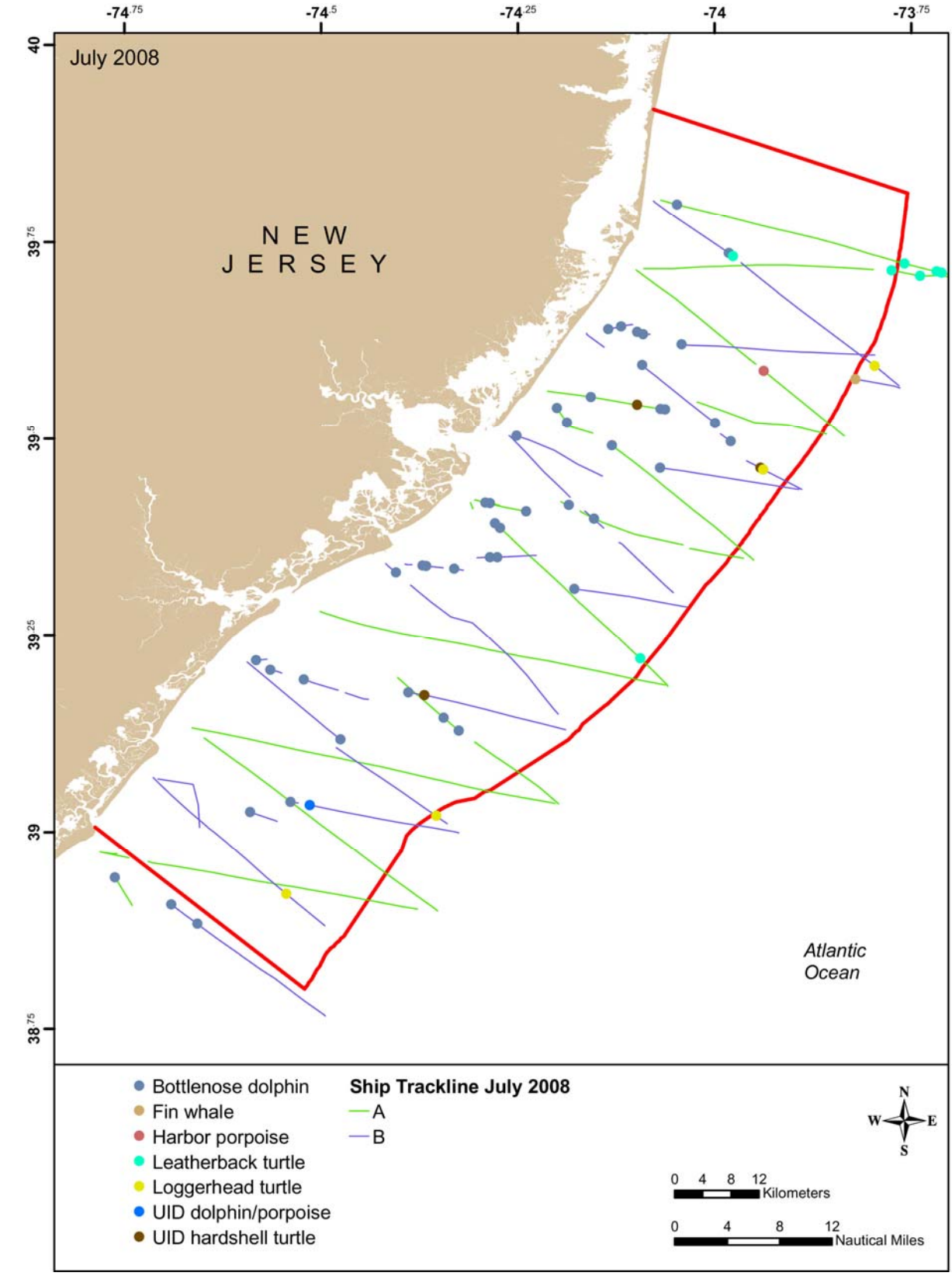

Figure 5.1-4. Shipboard Marine Mammal/Sea Turtle Survey for July 2008.

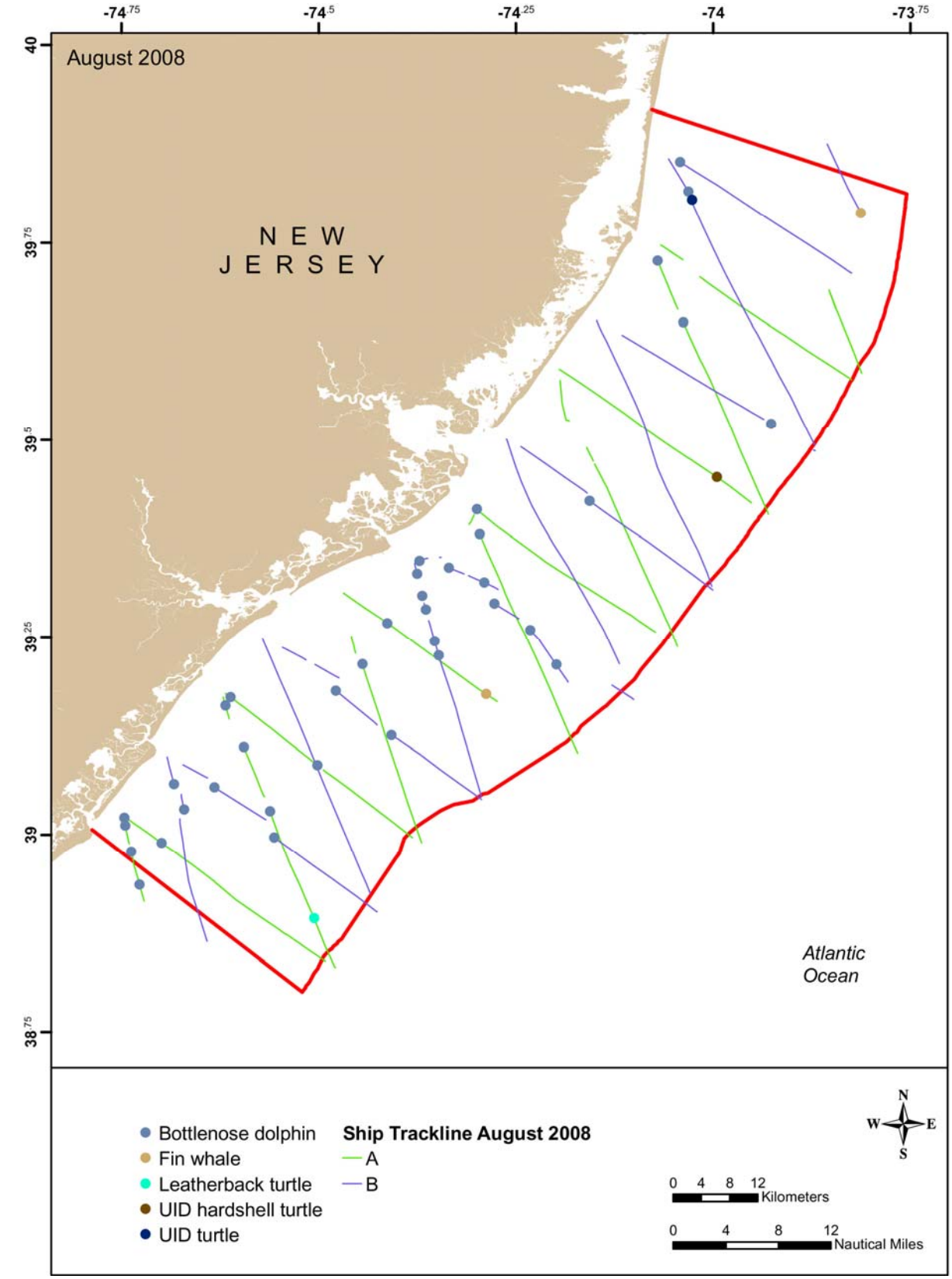

Figure 5.1-5. Shipboard Marine Mammal/Sea Turtle Survey for August 2008.

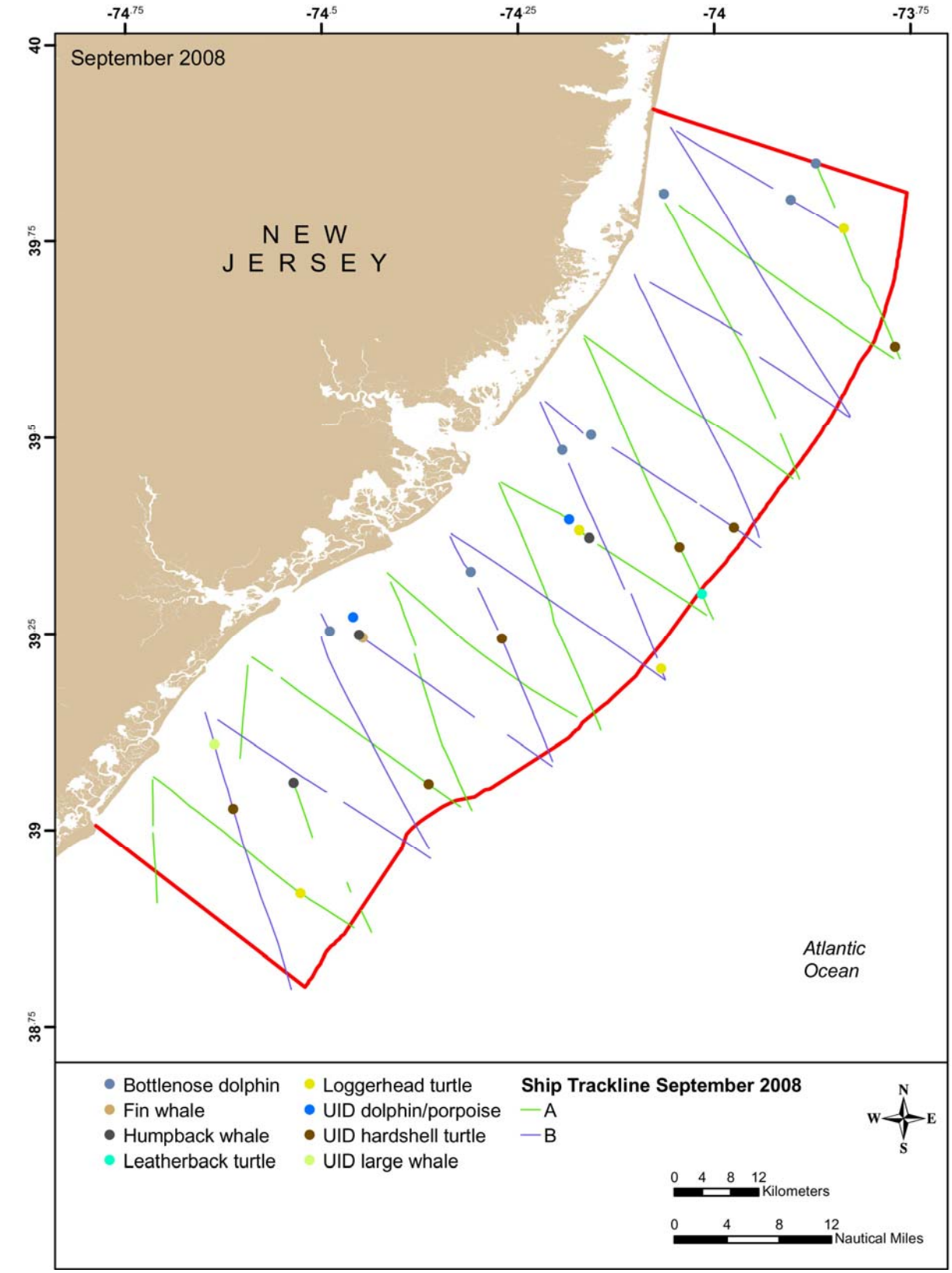

Figure 5.1-6. Shipboard Marine Mammal/Sea Turtle Survey for September 2008.

Table 5.1-3
Summary of Marine Mammal/Sea Turtle Sightings from the Shipboard Surveys from July through September 2008

Common Name, *Scientific Name*	Sightings by Month		
	July	August	September
Humpback whale, *Megaptera novaeangliae**			3
Fin whale, *Balaenoptera physalus**	1	2	1
Bottlenose dolphin, *Tursiops truncatus*	44	37	7
Harbor porpoise, *Phocoena phocoena*	1		
unidentified dolphin	1		2
unidentified large whale			1
Loggerhead turtle, *Caretta caretta**	3		4
Leatherback turtle, *Dermochelys coriacea**	8	1	1
unidentified hardshell turtle	3	1	6
unidentified turtle		1	

* ESA species
No weather delays this quarter.

5.2 AERIAL SURVEYS

5.2.1 Avian

Aerial avian surveys were not scheduled during the third quarter of 2008.

5.2.2 Marine Mammals and Sea Turtles

No marine mammal/sea turtle aerial surveys were conducted during the third quarter of 2008. Aerial surveys are scheduled to resume in October.

Aerial surveys are scheduled to resume in October.

5.3 SMALL BOAT COASTAL SURVEYS

5.3.1 Survey Effort

5.3.1.1 July 2008

The small boat coastal survey was conducted on 21 and 27 July. The small boat transects covered 50.10 NM (80.16 km; **Figure 5.3-1**). Survey effort was continuous; the total daily effort was 6.11 hrs.

5.3.1.2 August 2008

The small boat coastal survey was conducted on 18 August. The small boat transects covered 62.72 NM (100.35 km; **Figure 5.3-2**). Total survey effort was 6.16 hrs.

5.3.1.3 September 2008

The September small boat coastal survey is scheduled for late September. Results will be included in the next report.

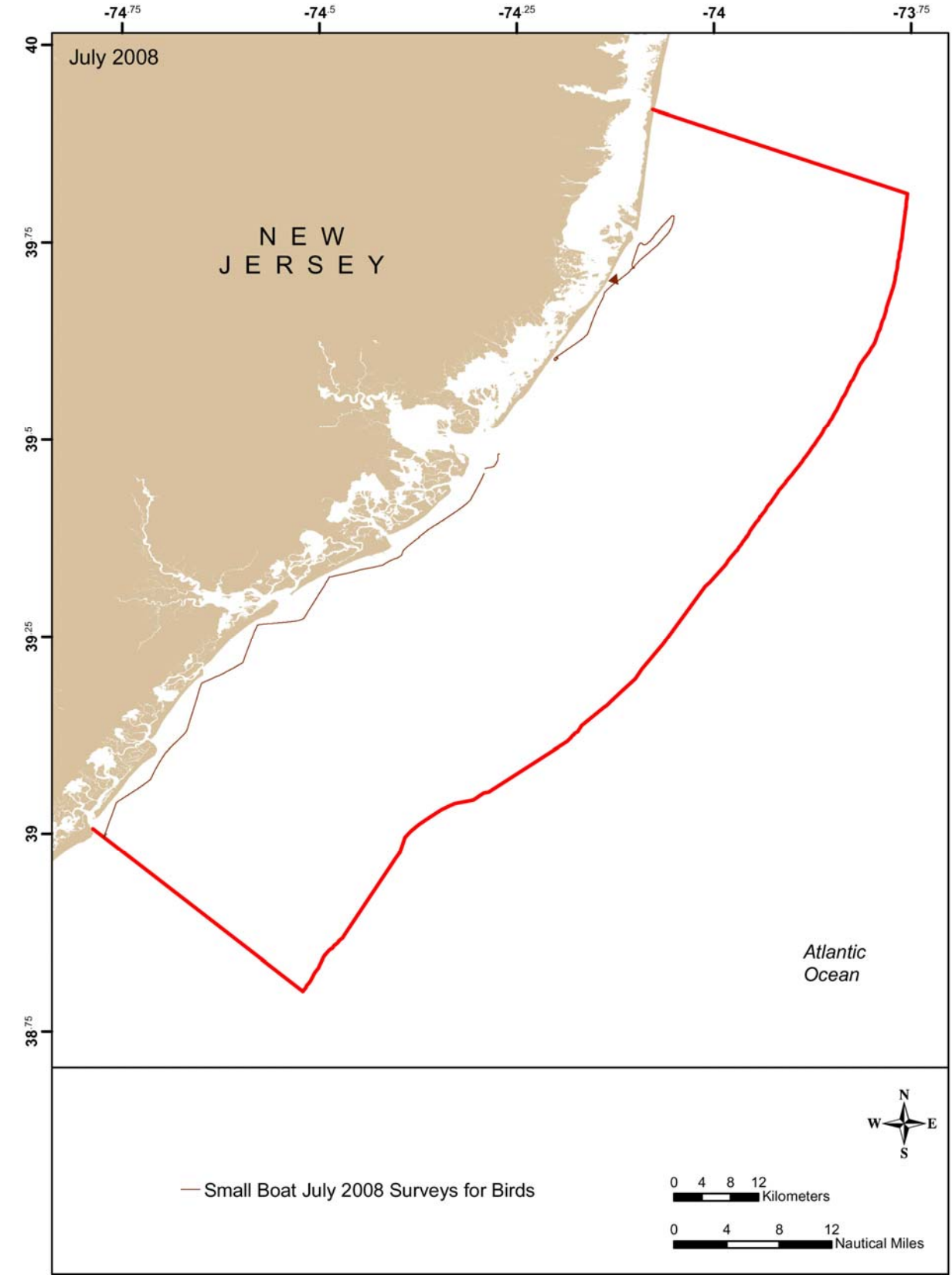

Figure 5.3-1. Small Boat Coastal Survey Tracklines for July 2008.

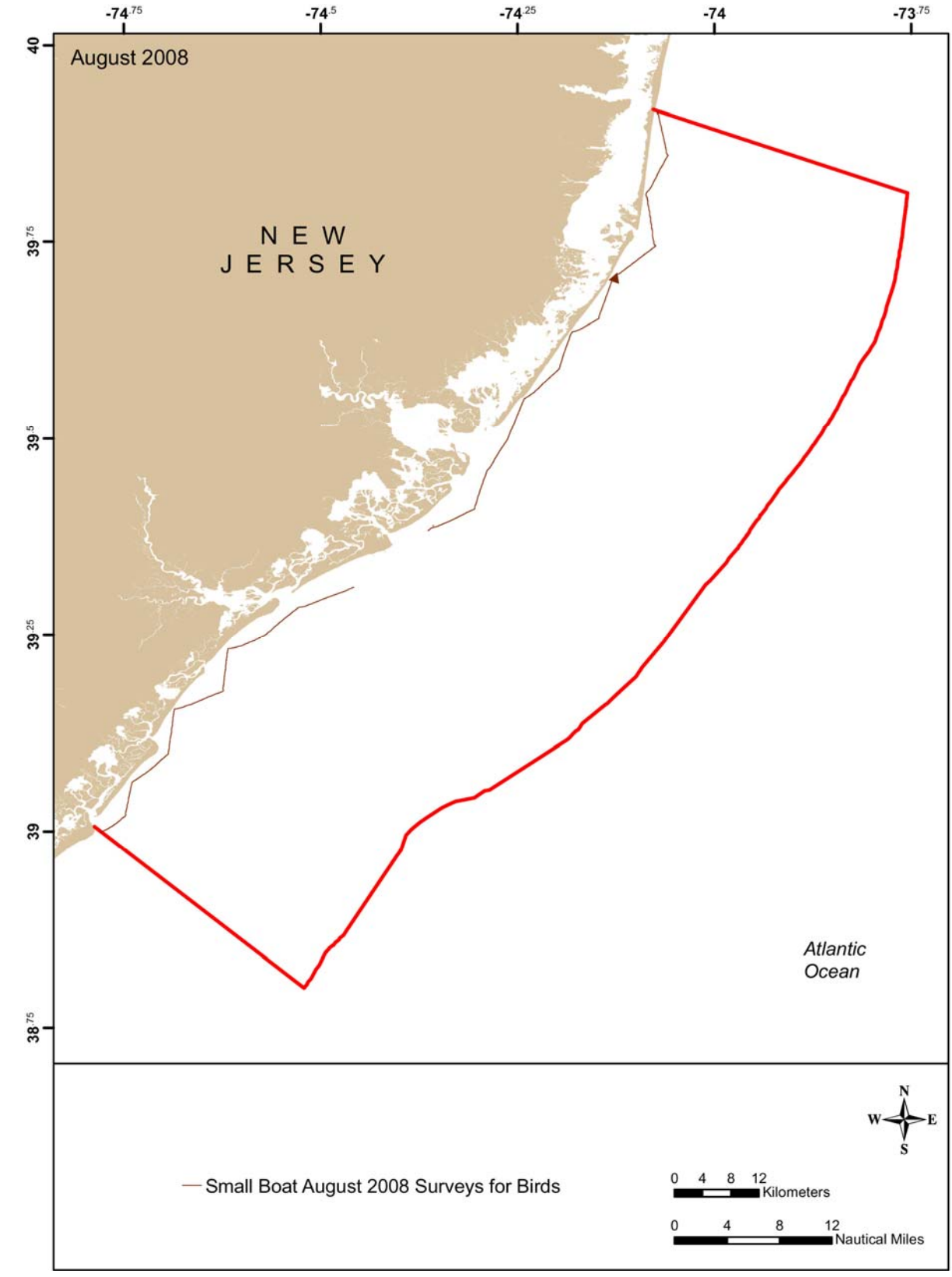

Figure 5.3-2. Small Boat Coastal Survey Tracklines for August 2008.

5.3.2 Survey Results

5.3.2.1 Avian Species Occurrence

A total of 11 species were sighted in July and 16 species in August (**Table 5.3-1**). Birds that were not identifiable due to weather/sea state conditions, behavior, or distance were identified to the lowest identifiable form or taxon (genus, family, or unknown). One state-listed avian species (Osprey) was observed during the surveys.

Table 5.3-1
Avian Species* Observed from July through September[1] 2008 Coastal Boat Surveys

Family Common Name, *Scientific name*	July	August	September
Phalacrocoracidae (cormorants)			
Double-crested Cormorant, *Phalacrocorax auritus*		X	
Pelecanidae (pelicans)			
Brown Pelican, *Pelecanus erythrorhynchos*	X	X	
Sulidae (gannets)			
Northern Gannet, *Morus bassanus*	X	X	
Accipitridae (harriers, eagles, kites, hawks, osprey)			
Osprey, *Pandion haliaetus*	X	X	
Scolopacidae (sandpipers)			
Sanderling, *Calidris alba*	X	X	
Semipalmated Sandpiper, *Calidris pusilla*		X	
Least Sandpiper, *Calidris minutilla*		X	
Semipalmated Plover, *Charadrius semipalmatus*		X	
Whimbrel, *Numenius phaeopus*	X		
Laridae (gulls)			
Laughing Gull, *Larus atricilla*	X	X	
Ring-billed Gull, *Larus delawarensis*		X	
Herring Gull, *Larus argentatus*	X	X	
Great Black-backed Gull, *Larus marinus*	X	X	
Royal Tern, *Sterna maxima*	X	X	
Common Tern, *Sterna hirundo*	X	X	
Forster's Tern, *Sterna forsteri*	X	X	
Sandwich Tern, *Sternasandvicensus*		X	

* All birds identified to species during shipboard surveys were included.
[1] The September 2008 small boat coastal avian survey is scheduled for late September.

5.3.2.2 Avian Abundance and Percent Composition

Laughing Gull, Common Tern, Whimbrel, Great Black-backed Gull, and Forster's Tern were the five most abundant species/identifiable groups during July; Laughing Gull, Common Tern, Great Black-backed Gull and Sanderling (tied for third), and Royal Tern were the five most abundant species during August (**Table 5.3-2**).

The total number of individuals increased from July (365) to August (1,436; **Table 5.3-2**). The number of individuals in June (598) was greater than in July (365). As discussed in **Section 5.1.1.2.2**, the numerical increase through the summer season is probably the result of increases in the number of Laughing gulls and Common terns. The increase in Laughing Gull and Common Tern abundance may due to the fledging of juvenile birds, post-breeding dispersal of adult birds, and/or arrival of early migrants from areas north of the project area.

Table 5.3-2
Abundance and Percent Composition* of Avian Observations during July through September[3]
2008 Small Boat Coastal Surveys

Family	July		August	
Common Name, *Scientific name*	**Number**	**% Composition**	**Number**	**% Composition**
Phalacrocoracidae (cormorants)				
Double-crested Cormorant, *Phalacrocorax auritus*			6	0.40%
Pelecanidae (pelicans)				
Brown Pelican, *Pelecanus occidentalis*	1	0.30%	6	0.40%
Sulidae (boobies, gannets)				
Northern Gannet, *Morus bassanus*	1	0.30%	18	1.30%
Accipitridae (eagles, hawks)				
Osprey, *Pandion haliaetus*	6	1.60%	10	0.70%
Scolopacidae (sandpipers)				
Sanderling, *Calidris alba*	14	3.80%	79	5.50%
Semipalmated Sandpiper, *Calidris pusilla*			3	0.20%
Least Sandpiper, *Calidris minutilla*			11	0.80%
Semipalmated Plover, *Charadrius semipalmatus*			5	0.30%
Whimbrel, *Numenius phaeopus*	49	13.40%		
Dowitcher (unknown), *Limnodromus spp.*			3	0.20%
Shorebird (small)			16	1.10%
Laridae (gulls)				
Laughing Gull, *Larus atricilla*	181	49.60%	738	51.40%
Ring-billed Gull, *Larus delawarensis*			4	0.30%
Herring Gull, *Larus argentatus*	9	2.50%	18	1.30%
Great Black-backed Gull, *Larus marinus*	20	5.50%	79	5.50%
Gull (large), *Larus spp.*	6	1.60%	46	3.20%
Royal Tern, *Sterna maxima*	4	1.10%	41	2.90%
Common Tern, *Sterna hirundo*	52	14.20%	214	14.90%
Forster's Tern, *Sterna forsteri*	17	4.70%	12	0.80%
Sandwich Tern, *Sternasandvicensus*			2	0.10%
Tern (large), *Sterna spp.*			2	0.10%
Tern (small), *Sterna spp.*	1	0.30%	83	5.80%
Other				
Non-passerine[1]	2	0.50%	1	0.10%
Passerine[2]	2	0.50%	35	2.40%
Unknown			4	0.30%
TOTAL	***365***	***100.00%***	***1436***	***100.00%***

* All avian data recorded during the coastal surveys was used to calculate percent composition.
[1] Represents vultures and other non-water bird, non-passerine spp.
[2] Represents passerine spp. recorded over land, on shore, offshore, and/or on the survey vessel.
[3] The September 2008 small boat coastal avian survey is scheduled for late September.

5.3.3 Discussion

Offshore bird abundance was greater than coastal bird abundance in July and August. This seems predictable given the far greater on-effort hours of each of the offshore surveys compared to the coastal surveys. When birds per on-effort hours is considered (**Table 5.3-3)**, the coastal small boat surveys had greater values than the offshore surveys for each month. Species composition/diversity varied between coastal and offshore survey areas.

During the July offshore shipboard survey, the average daily number of birds observed was 398; 365 birds were sighted on the one day coastal survey (**Table 5.3-4**).

During the August offshore shipboard survey, an average of 564 birds was sighted daily; 1,436 birds were recorded during the one day coastal survey (**Table 5.3-5**).

During the September offshore shipboard survey, an average of 321 birds was sighted daily (**Table 5.3-6**).

Table 5.3-3
Birds per On-effort Hours

	Coastal	Offshore
July	73.00	37.27
August	233.12	58.15
September[1]		32.18

[1] The September 2008 small boat coastal avian survey was completed on September 30. The data will be included in the next quarterly report.

Table 5.3-4
Abundance and Percent Composition of Avian Observations during July Coastal and Offshore Surveys

Family	Coastal		Offshore	
Common Name, *Scientific name*	**Number**	**% Composition**	**Number**	**% Composition**
Gaviidae (loons)				
Common Loon, *Gavia immer*			8	0.50%
Procellariidae (petrels and shearwaters)				
Cory's Shearwater, *Calonectris diomedea*			117	7.30%
Manx Shearwater, *Puffinus puffinus*			1	0.10%
Hydrobatidae (storm-petrels)				
Wilson's Storm-petrel, *Oceanites oceanicus*			446	28.00%
Storm-petrel (unknown)			1	0.10%
Phalacrocoracidae (cormorants)				
Double-crested Cormorant, *Phalacrocorax auritus*			1	0.10%
Pelecanidae (pelicans)				
Brown Pelican, *Pelecanus erythrorhynchos*	1	0.30%	5	0.30%
Sulidae (gannets)				
Northern Gannet, *Morus bassanus*			41	2.60%
Ardeidae (bitterns, egrets, herons)				
Black-crowned Night-heron, *Nycticorax nycticorax*			1	0.10%
Accipitridae (harriers, eagles, kites, hawks, osprey)				
Osprey, *Pandion haliaetus*	6	1.60%		
Scolopacidae (sandpipers)				
Marbled Godwit, *Limosa fedoa*			3	0.20%
Sanderling, *Calidris alba*	14	3.80%		
Least Sandpiper, *Calidris minutilla*			12	0.80%

Table 5.3-4 (*continued*)
Abundance and Percent Composition of Avian Observations during July Coastal and Offshore Surveys

Family	Coastal		Offshore	
Common Name, *Scientific name*	**Number**	**% Composition**	**Number**	**% Composition**
Scolopacidae (sandpipers) (*continued*)				
Whimbrel, *Numenius phaeopus*	49	13.40%		
Shorebird (small)			12	0.80%
Laridae (gulls, terns, jaegers, skimmers)				
Laughing Gull, *Larus atricilla*	181	49.60%	492	30.90%
Herring Gull, *Larus argentatus*	9	2.50%	8	0.50%
Great Black-backed Gull, *Larus marinus*	20	5.50%	30	1.90%
Gull (large), *Larus spp.*	6	1.60%		
Royal Tern, *Sterna maxima*	4	1.10%	19	1.20%
Common Tern, *Sterna hirundo*	52	14.20%	314	19.70%
Forster's Tern, *Sterna forsteri*	17	4.70%	1	0.10%
Tern (small), *Sterna spp.*	1	0.30%	71	4.50%
Other				
Non-passerine[1]	2	0.50%		
Passerine[2]	2	0.50%	2	0.10%
Unknown			7	0.40%
TOTAL	***365***	***100.00%***	***1592***	***100.00%***

* All avian data recorded during the coastal and offshore surveys was used to calculate percent composition.
[1] Represents vultures and other non-water bird, non-passerine spp.
[2] Represents passerine spp. recorded over land, on shore, offshore, and/or on the survey vessel.

Table 5.3-5
Abundance and Percent Composition of Avian Observations during August Coastal and Offshore Surveys

Family	Coastal		Offshore	
Common Name, *Scientific name*	**Number**	**% Composition**	**Number**	**% Composition**
Procellariidae (petrels and shearwaters)				
Cory's Shearwater, *Calonectris diomedea*			15	0.50%
Hydrobatidae (storm-petrels)				
Wilson's Storm-petrel, *Oceanites oceanicus*			1251	44.40%
Leach's Storm-petrel, *Oceanodroma leucorhoa*			1	0.00%
Phalacrocoracidae (cormorants)				
Double-crested Cormorant, *Phalacrocorax auritus*	6	0.40%		
Pelecanidae (pelicans)				
Brown Pelican, *Pelecanus erythrorhynchos*	6	0.40%	5	0.20%
Sulidae (gannets)				
Northern Gannet, *Morus bassanus*	18	1.30%	47	1.70%
Ardeidae (bitterns, egrets, herons)				
Great Blue Heron, *Ardea herodias*			2	0.10%
Yellow-crowned Night-heron, *Nycticorax violaceus*			1	0.00%
Accipitridae (harriers, eagles, kites, hawks, osprey)				
Osprey, *Pandion haliaetus*	10	0.70%	7	0.20%
Scolopacidae (sandpipers)				
Sanderling, *Calidris alba*	79	5.50%	4	0.10%
Least Sandpiper, *Calidris minutilla*	11	0.80%	12	0.40%
Semipalmated Sandpiper, *Calidris pusilla*	3	0.20%	3	0.10%
Semipalmated Plover, *Charadrius semipalmatus*	5	0.30%		
Peep (unknown), *Caladris* spp.			3	0.10%
Dowitcher (unknown), *Limnodromus spp.*	3	0.20%		
Shorebird (small)	16	1.10%	1	0.00%
Laridae (gulls, terns, jaegers, skimmers)				
Laughing Gull, *Larus atricilla*	738	51.40%	611	21.70%
Ring-billed Gull, *Larus delawarensis*	4	0.30%		
Herring Gull, *Larus argentatus*	18	1.30%	2	0.10%

Table 5.3-5 (*continued*)
Abundance and Percent Composition of Avian Observations during August Coastal and Offshore Surveys

Family	Coastal		Offshore	
Common Name, *Scientific name*	**Number**	**% Composition**	**Number**	**% Composition**
Laridae (gulls, terns, jaegers, skimmers) (*continued*)				
Great Black-backed Gull, *Larus marinus*	79	5.50%	68	2.40%
Gull (large), *Larus spp.*	46	3.20%	3	0.10%
Royal Tern, *Sterna maxima*	41	2.90%	41	1.50%
Common Tern, *Sterna hirundo*	214	14.90%	584	20.70%
Forster's Tern, *Sterna forsteri*	12	0.80%	5	0.20%
Sandwich Tern, *Sternasandvicensus*	2	0.10%		
Tern (large), *Sterna spp.*	2	0.10%		
Tern (small), *Sterna spp.*	83	5.80%	21	0.70%
Other				
Non-passerine[1]	1	0.10%		
Passerine[2]	35	2.40%	83	2.90%
Unknown	4	0.30%	49	1.70%
TOTAL	***1436***	***100.00%***	***2819***	***100.00%***

* All avian data recorded during the coastal and offshore surveys was used to calculate percent composition.
[1] Represents vultures and other non-water bird, non-passerine spp.
[2] Represents passerine spp. recorded over land, on shore, offshore, and/or on the survey vessel.

5.4 RADAR SURVEYS

5.4.1 Data Collection

No avian radar surveys were scheduled for July and August 2008.

Three land-based coastal avian radar sites were chosen based on location relative to the coastline, availability, and radar line of sight from the location. Based on these criteria, three sites were chosen (a northern, central, and southern site). The first site (northern most) is located in Island Beach State Park, NJ, the second was originally located behind an observation tower in North Brigantine Beach, NJ, but has since been moved to a more accessible area in front of the observation tower, the third place (southern most) was originally in Corson's Inlet State Park, NJ, but has since been moved to a more suitable area in the northern part of Sea Isle City, NJ. During the spring each site will be sampled for 10 days (30 days total) and in the fall each site will be sampled for a period of 20 days (60 days total).

Groundtruthing surveys of the land-based coastal avian radar were conducted at Site 1 on 15 and 17 September. Data will be collected at Site 1 from 15 September until 05 October. The radar will be moved to Site 2 on 05 October and after initial setup, a groundtruthing survey is scheduled.

The barge and avian radar system is scheduled to depart port at New York Harbor on 30 September (**Figure 5.4-1**). The barge-based offshore avian radar is scheduled for installation and data collection commencement on 30 September. A groundtruthing survey is scheduled on 03 October.

5.4.2 Data Analysis

The radar data collected during the fall 2008 radar study will be processed and analyzed at GMI's Plano, Texas, office.

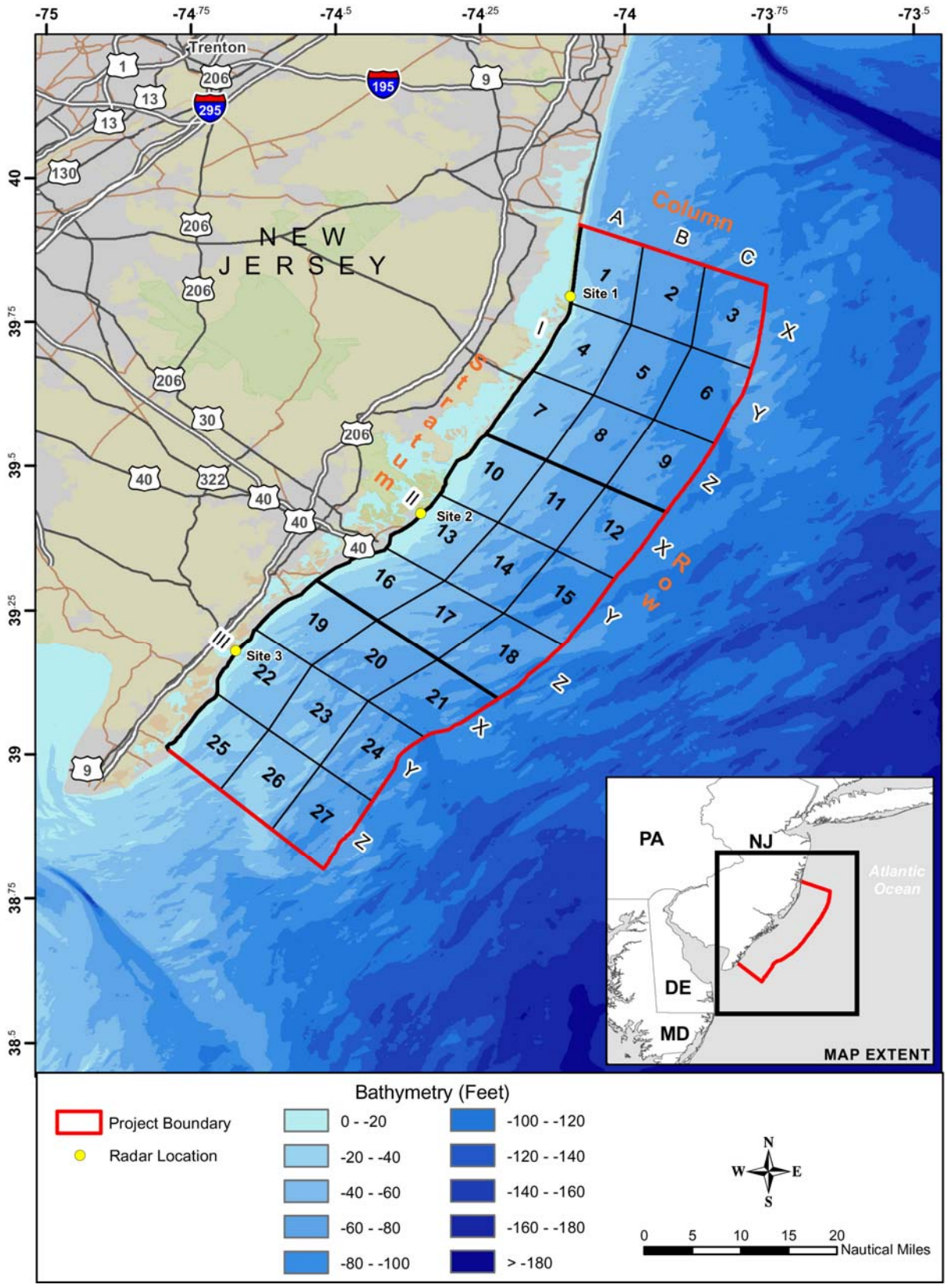

Figure 5.4-1. Radar Grid and Site Locations through September 2008.

5.5 THERMAL SURVEYS

No thermal imaging surveys were scheduled for July and August 2008.

The barge and avian radar/thermal imaging-vertically pointing radar (TI-VPR) system is scheduled to depart port at New York Harbor on 30 September (**Figure 5.4-1**).

Currently, there are no TI-VPR results to report at this time.

5.6 ACOUSTIC SURVEYS

The four Marine Autonomous Recording Units (e.g., pop-ups) that were deployed in June 2008 were recovered, refurbished, and redeployed in September 2008.

5.6.1 Recovery

Three of the four (PU063, PU086, PU134) deployed pop-ups were successfully recovered on September 16 (PU063, PU086) and September 18 (PU134). PU134 responded to the hello and burn acoustic signals, but did not surface, and required a second recovery attempt. The second recovery attempt for PU134 included a dive team (Roger Hoden and George Drayer, Dina Dee II, Barnegat, NJ): Hoden dove on PU134's GPS coordinates and cut the unit free from its anchor mooring. PU134's burn signal did activate, however the burn cable did not disconnect.

PU081 was recovered early by a fisherman (Anthony Tartaglia) from Brigantine, NJ; Dudzinski (GMI) retrieved PU081 on 15 September and refurbished and redeployed this unit with the other Pop-Ups between 17 and 23 September. The burn cable on PU081 had been twisted and 'ripped' from its anchor mooring. The consensus is that the early disconnect was due to some man-made interaction which remains undetermined.

5.6.2 Refurbishment

PU063, PU081, PU086, and PU134 were cleaned of bio-fouling and refurbishment begun on 17 and 18 September. PU063 and PU081 communicated accurately with computer software; however, PU086 would not communicate with the computer software. On-site trouble-shooting could not resolve the problems: PU086 was shipped to the Bioacoustics Research program (BRP) at Cornell for repair and refurbishment. PU134 showed no external indications as to why the burn cable did not disconnect (i.e., did not burn); the voltage reading on the burn cable was 17.10 volts (down from 28.5 volts). The unit was badly bio-fouled. BRP requested that Dudzinski return the unit to them for troubleshooting.

PU063 and PU081 were refurbished by Dudzinski (GMI) between September 17 and 23, 2008: their external hard hats and internal spheres were cleaned of marine growth; the internal power source components (i.e., batteries, hard drive) were replaced. Each unit's hydrophone o-rings were replaced and new burn units were also attached to each pop-up. On 18 September, BRP replaced the AWOL popup from the June 2008 recovery (PU039) with a new pop-up (PU202). On 19 September, BRP returned PU086 and replaced PU134 with a new pop-up (PU203).

Four hard drives were recovered during this September recovery from the June re-deployment. The pop-ups deployed at the southern- (S#1, PU063) and northern- (S#5, PU134) most points of our deployment configuration had a 2-kilohertz (kHz) sampling code reinstalled with continuous sampling during the ensuing 3-month deployment. The center-line pop-ups (S#4, PU086 and S#2, PU081) were loaded with a 31.25 kHz sampling code with 5 minutes (min) on and 25 min off sampling rates. The data on these hard drives will be extracted, compensated, and sound files created for analysis for the June to September 2008 quarter.

The September re-deployment includes a popup in each of the five stations in the cross-configuration along the NJ coastline. The southern-most station (S#1) is PU063; S#4 is PU086; S#3 is PU202; S#2 is

PU081; and the northern-most station (S#5) is PU203. PU063, PU202, and PU203 are loaded with a 2 kHz sample rate for continuous recording over the three-month deployment. PU081 and PU086 are loaded with a 31.25 kHz sample rate with a duty cycle of 5 min on/25 min off recording for the deployment duration.

All five refurbished or new pop-ups responded successfully to electronic/computer communication during refurbishment. Each pop-up responded well to all acoustic hello and burn tests (direct, time and auto). The five refurbished pop-ups will be turned on to record and synchronized on about 1 October 2008 and are planned to be redeployed on 1 or 2 October 2008. (Poor sea and weather conditions caused a delay from the originally planned redeployment date of 24 September 2008.)

5.6.3 Redeployment

The five refurbished pop-ups (PU063, PU081, PU086, PU202, and PU203) are planned to be redeployed in a cross-configuration on 1 or 2 October 2008. Details of their redeployment will be included in the next quarterly report.

5.6.4 Data Analyses/Processing

Data analysis details refer to data collected during the March 2008 deployment and include data collected from March 27 to June 17, 2008, unless otherwise noted. Data captured on three pop-ups (PU063, PU081, PU134) recorded continuously during the full deployment. Data from each hard drive were extracted, compensated (start and end times synchronized) and a three-channel AIFF file created for further analysis. PU086 stopped recording sounds for an undetermined reason on 30 May 2008; therefore, data from this unit could not be synchronized to the data files from the other three units. Data from PU086 were extracted and a single channel AIFF file was created for further analysis.

From mid-July through late September 2008, these sound data were examined for presence of fin and right whale calls using a preset data template detector in Extensible Bioacoustic Tool (XBAT) and BRP's ISRAT call detection, respectively. Results are presented below with respect to dates for which these two species of whale have been detected for the three-channel and single-channel files for the first deployment (March to June 2008). Analyses of these data are ongoing to investigate for the presence of other baleen whale species.

Three Channel Data – Fin whale pulses were detected in during each month of the March 2008 deployment within the study area and on varying pop-up units (**Table 5.6-1**). Fin whales were detected on two days in March, 12 days in April, 10 days in May, and on 13 days in June. Approximately half of the data from the March 2008 deployment (27 March to 5 May) have been examined for right whale up calls. The remaining data (6 May to 17 June) are being processed through the call detection software (ISRAT within XBAT on Matlab) for subsequent processing. Right whales were detected in on each day of deployment in March, early and late April and on two days in early May. A full presentation of right whale call detections for the March 2008 deployment will be included with the next quarterly report/first annual report.

Single Channel Data – Data on the single channel are from PU086 and range from 27 march to 30 May 2008. Fin whale pulses were detected during from March to May 2008 on this pop-up. Dates of detection vary slightly from those identified from the other three pop-up units (**Table 5.6-1**). Fin whales were detected on two days in March, five days in April, and six days in May, with the possibility of a 7^{th} day of detection for May. Right whale up call detections are pending for the data represented by this single channel set. A full presentation of right whale call detections for the March 2008 deployment will be included with the next quarterly report/first annual report.

Sample spectrograms of right whale up calls (**Figure 5.6-1**) and fin whale pulses (**Figure 5.6-2a,b**) are included with this report. Details are presented in each figure legend. Sample sound files (AIFF or mp3) are available on request.

Table 5.6-1

Fin whale pulses detected by date and location are presented in chronological order. Pop-up ID (PU###) and Station location (S#) within array configuration provided. P indicates a "pulse" (fin whale call) detection for the identified Pop-Up and date.

Date	PU081 (S#4)	PU063 (S#3)	PU134 (S#5)	PU086 (S#2)
3/29/08	P	P	P	P
3/30/08				P
4/1/08				P
4/4/08	P	P	P	
4/5/08				P
4/6/08	P			
4/7/08	P			P
4/8/08				P
4/9/08	P	P	P	
4/10/08	P			
4/12/08	P			
4/13/08			P	
4/15/08			P	P
4/27/08	P		P	
5/2/08			P	
5/4/08				P
5/5/08				P
5/9/08				P
5/18/08				P
5/19/08	P			P
5/20/08	P			
5/21/08	P			
5/22/08	P			P
5/23/08	P			?
6/2/08		P		No data
6/4/08	P	P		No data
6/6/08			P	No data
6/8/08			P	No data
6/9/08			P	No data
6/10/08	P		P	No data
6/11/08	P		P	No data
6/12/08			P	No data
6/13/08			P	No data
6/14/08			P	No data
6/15/08	P			No data
6/16/08	P		P	No data
6/17/08			P	No data

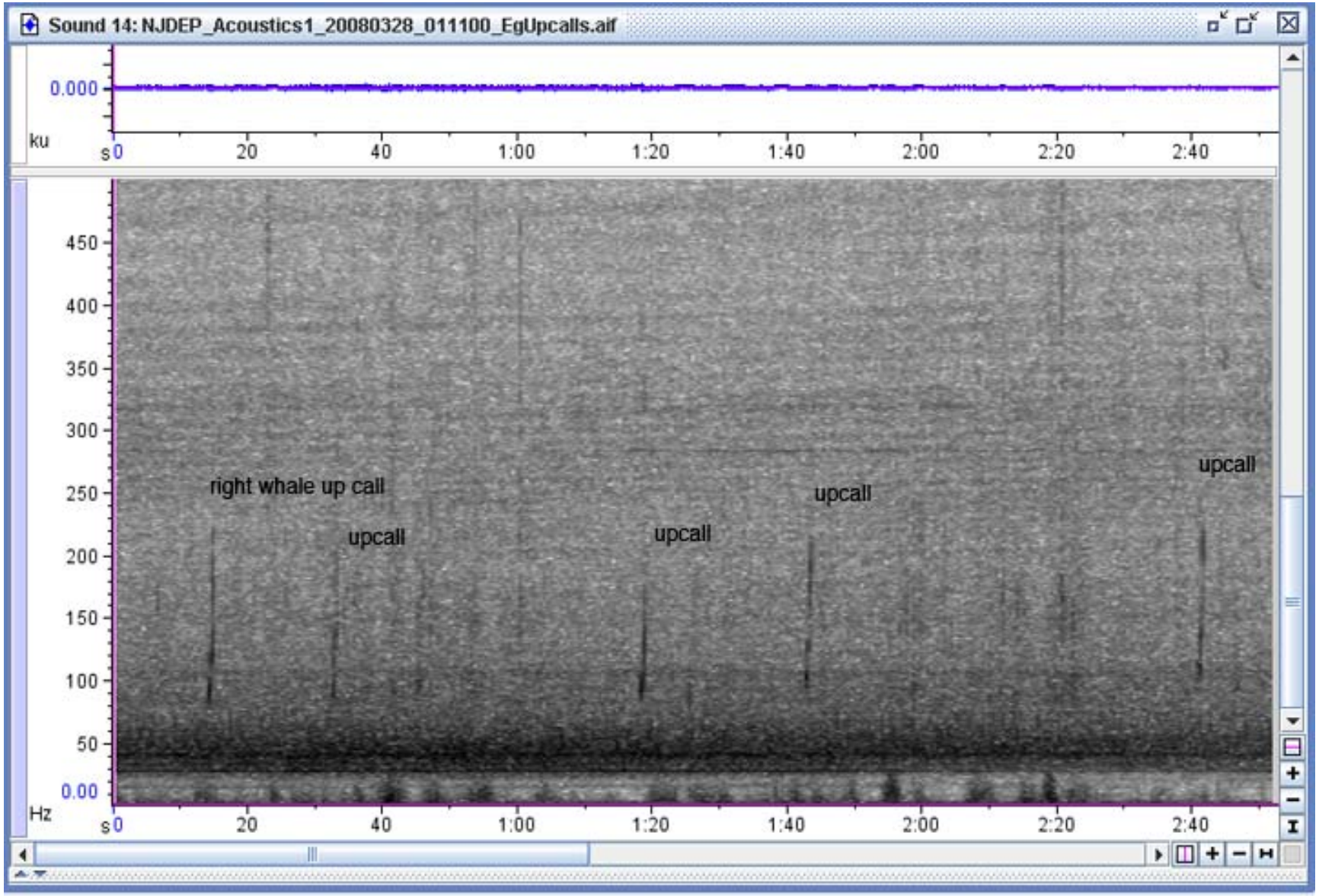

Figure 5.6-1. Five right whale calls are depicted in this spectrogram (visual representation of a sound). Up calls range from ~80 to 240 Hz in frequency and are typically about 20 seconds apart.

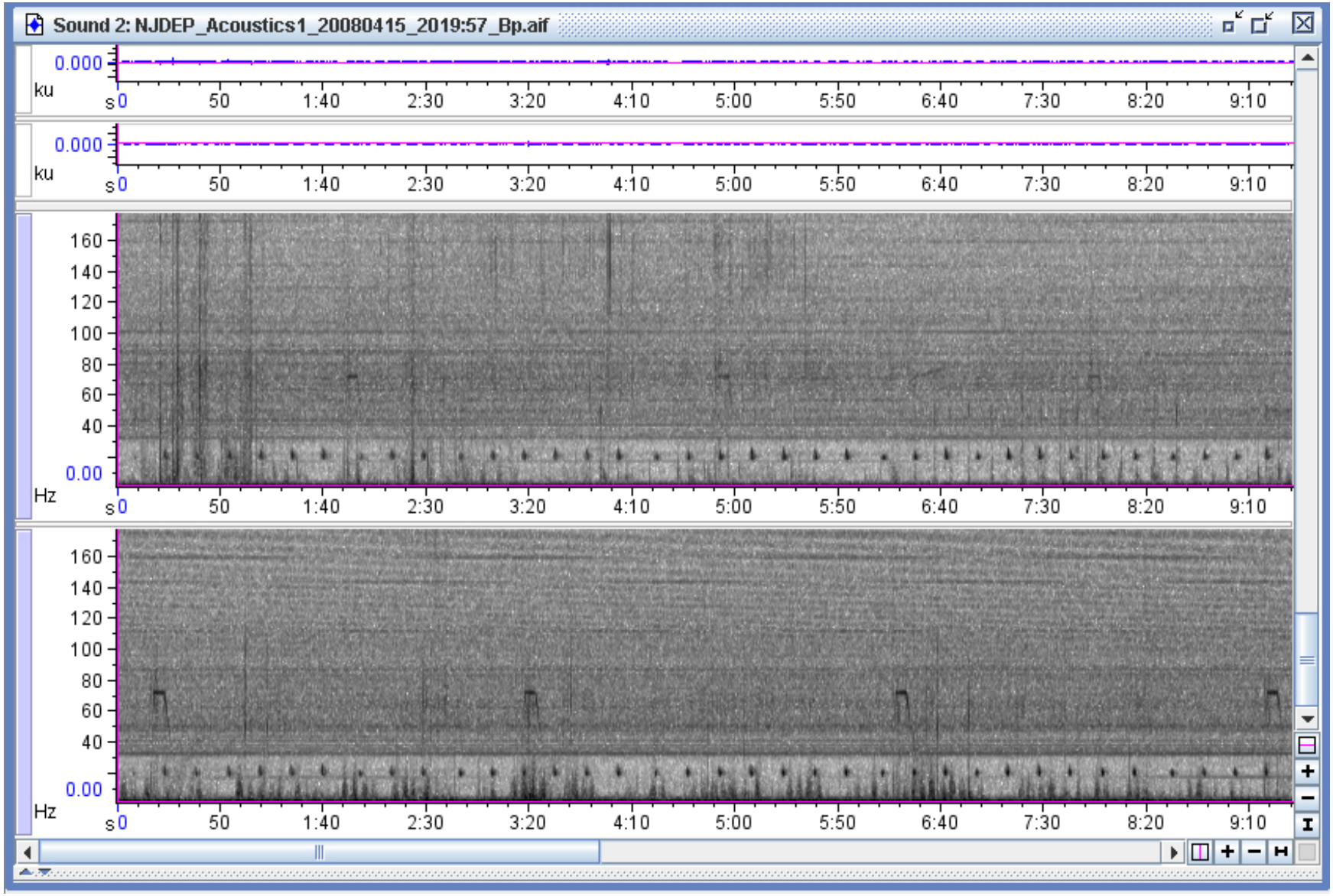

Figure 5.6-2a. Two channels of sound are shown in this figure depicting fin whale pulses (pulses at 20 Hz and about every 20 seconds) recorded by popups at Station #4 and Station #3 in the array configuration on April 15 in the evening.

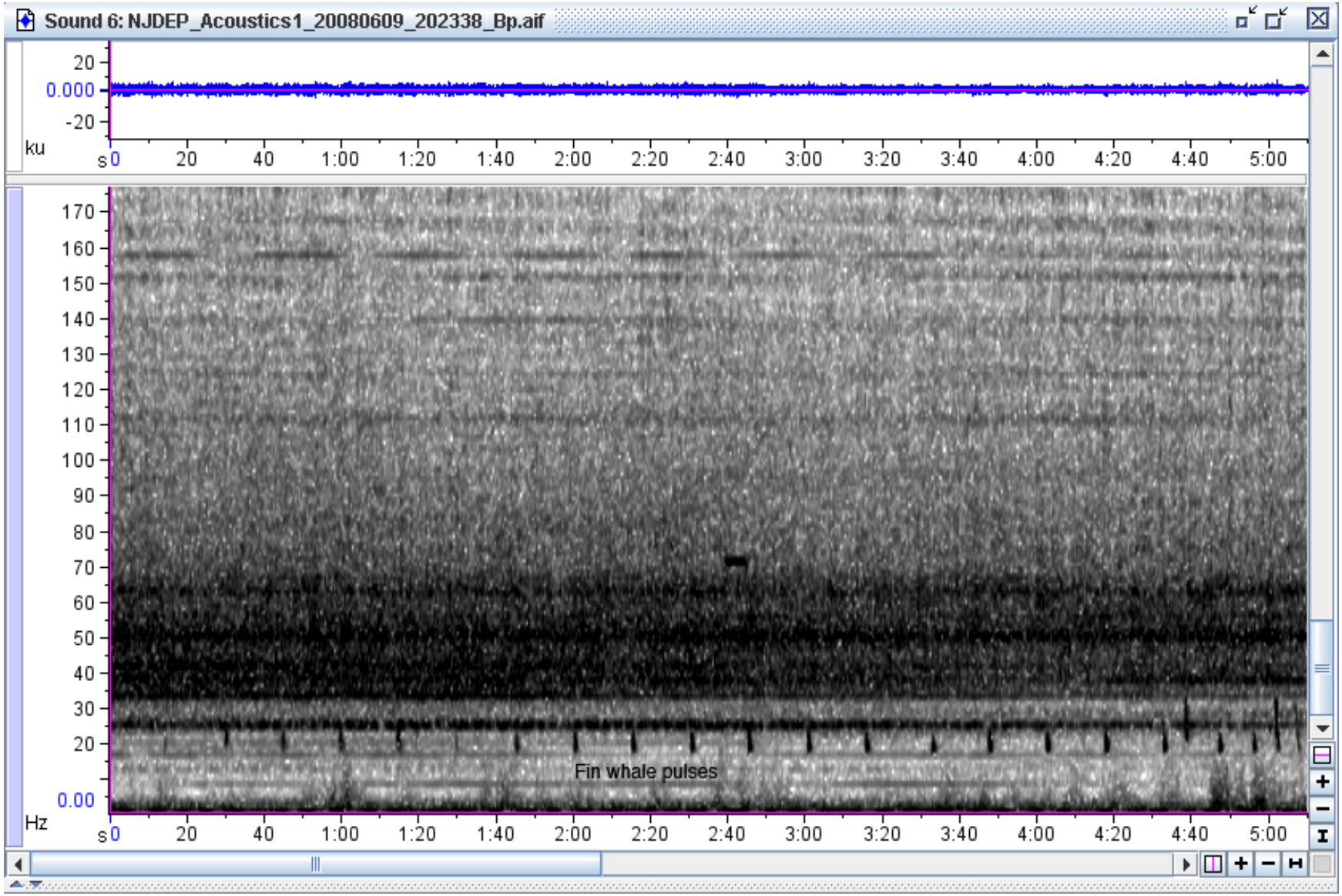

Figure 5.6-2b. A single channel of fin whale pulses with two fin whale downsweeps indicated at 4:40 and 5:00 on the time scale. These fin whale calls were recorded on June 9th at about 8 pm near our northern-most popup station.

5.6.5 RUMFS Open-House Participation

On 20 September, Saturday, the Rutgers University Marine Field Station (RUMFS) held their annual open house for members of the general public to learn about the science and research conducted from the field station. Because the September refurbishment was ongoing, Dudzinski was asked to participate in the program and share information about the pop-up units and some of the whale calls detected. More than 700 people attended the open house with maybe half that number listening to details about the RUMFS LEO-15 call detection system and other acoustic tracking and recording programs, as well as about the GMI acoustics data collection project. No details other than a brief overview of the pop-up equipment and the types of calls possible for detection were presented to listeners.

5.7 OCEANOGRAPHIC SURVEYS

Surface Mapping System (SMS), Conductivity-Temperature-Depth (CTD), and Acoustic Doppler Current Profiler (ADCP) measurements were conducted at point locations in the NJDEP Study Area off the coast of New Jersey during the third quarter (July-September) of 2008.

5.7.1 Surface Mapping System (SMS)

For the SMS, measured static parameters include the measurement date and time, water depth (feet [ft] or m), and longitude [lon]-latitude [lat] location. Measured climatic parameters include windspeed (knots), wind direction (deg), air temperature (degrees Celsius [^{o}C]), relative humidity (%), and atmospheric barometric pressure (millibar [mbar]). Measured dynamic oceanographic parameters include water temperature (sea surface temperature [SST], ^{o}C), salinity (practical salinity units [PSU]), fluorometric chlorophyll and colored dissolved organic matter (CDOM) (Turner raw), and photosynthetically active radiation (PAR) (quanta per second [s^{-1}]). Turner units are a spectral measurement of fluorescent material in the water at specific wavelengths. Chlorophyll has an absorption peak in the blue spectral region (440 nanometers [nm]) and a strong fluorescent peak at red wavelengths (670 nm), whereas CDOM absorbs strongly in the blue region (412 nm) and has a broad fluorescent peak at green-yellow wavelengths (530 nm). The PAR is measured with a PRR-600 light meter (spectral photometer) and is calculated from the spectral integration of light intensity measured at the following wavelengths: 443, 490, 510, 555, and 656 nm (spectral units: microwatts [µW] per square centimeter [cm^{-2}] per nm^{-1}).

These SMS measurements were conducted (**Figures 5.7-1 through 5.7-3**) and recorded every 10 s on the following dates:

- July 2008: 8:00 AM on 7-13 through 1:00 AM on 7-17.
- August 2008: 9:00 AM on 8-11 through 1:00 AM on 8-15.
- September 2008: 8:00 AM on 9-8 through midnight on 9-16.

Data values of these parameters for each 10-s interval were written to text files ("yymmddhh.txt"), and separate text files were generated for each hour ("hh") of data collection. For example, data collected during the 10th hour on September 8, 2008 were recorded to the text file "08090810.txt".

5.7.2 Conductivity-Temperature-Depth (CTD) Measurements

In addition to water surface properties, water depth profiles (extending from the surface down to a depth corresponding to 30 decibel [dB] pressure) were generated for water temperature (^{o}C), salinity (PSU), dissolved oxygen (milligrams per liter [mg/L]), and conductivity (voltage) using CTD instruments. Depth profiles of these four parameters were combined into a single plot for each set of measurements. Graphical plots of these depth profiles were saved as Excel files "CTDxxx.cnv" (where "xxx" = site number: "001", "002", *etc.*). Other CTD data files that were generated include BL files ("*.bl"), CON files ("*.con"), HDR files ("*.hdr"), HEX files ("*.hex"), ROS files ("*.ros"), and WMF Image files ("*.wmf"). The CON files contain the sensor calibrations: Voltage: 0 = fluorometer (Wetlabs ECO), 1=transmissometer, 2=oxygen (SEB 43), 3=free, 4=transmissometer (C-Star), 5=free, 6=altimeter, 7=free.

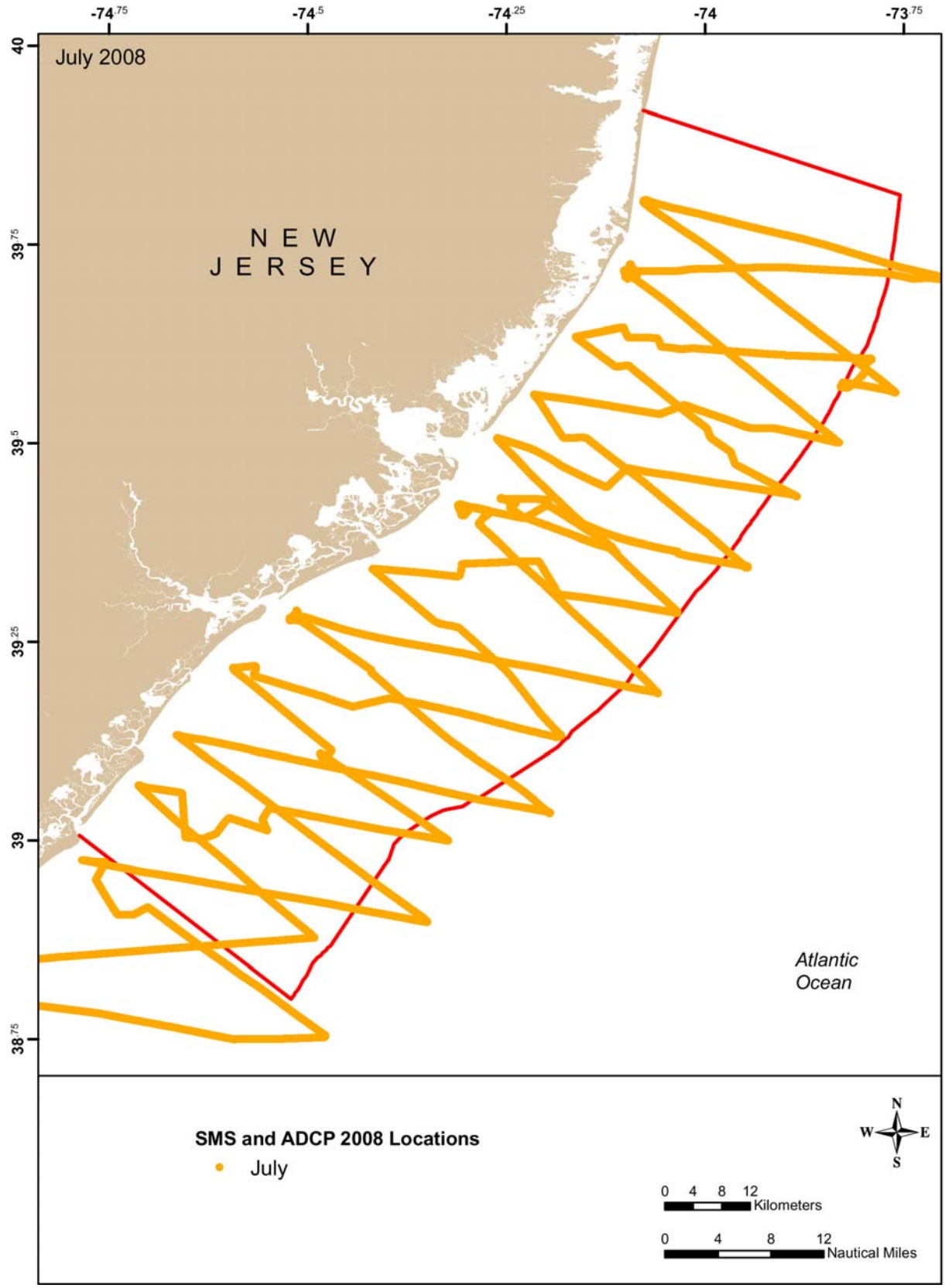

Figure 5.7-1. SMS and ADCP Measurements Conducted during Shipboard Surveys in the NJDEP Study Area off the Coast of New Jersey in July 2008.

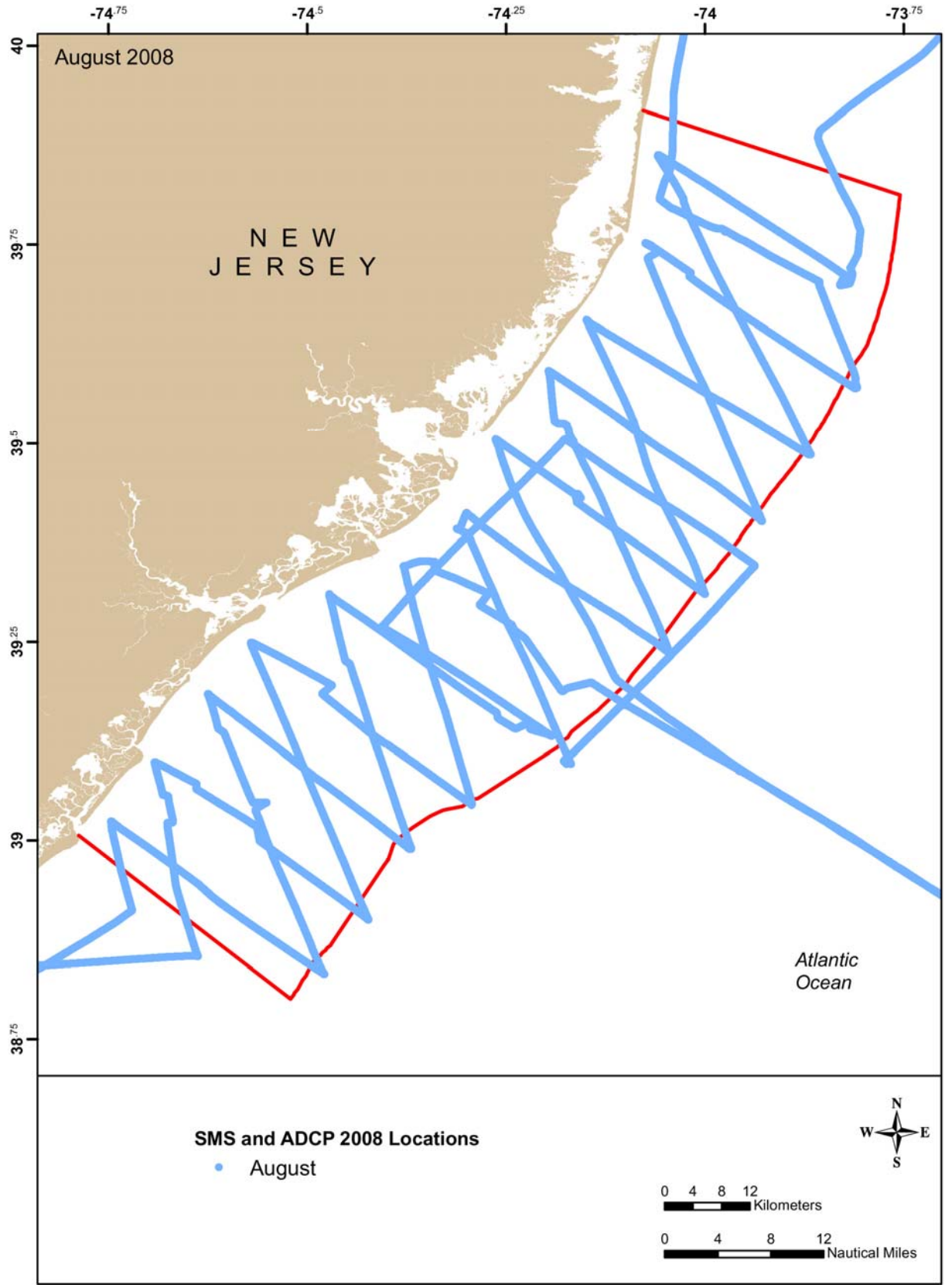

Figure 5.7-2. SMS and ADCP Measurements Conducted during Shipboard Surveys in the NJDEP Study Area off the Coast of New Jersey in August 2008.

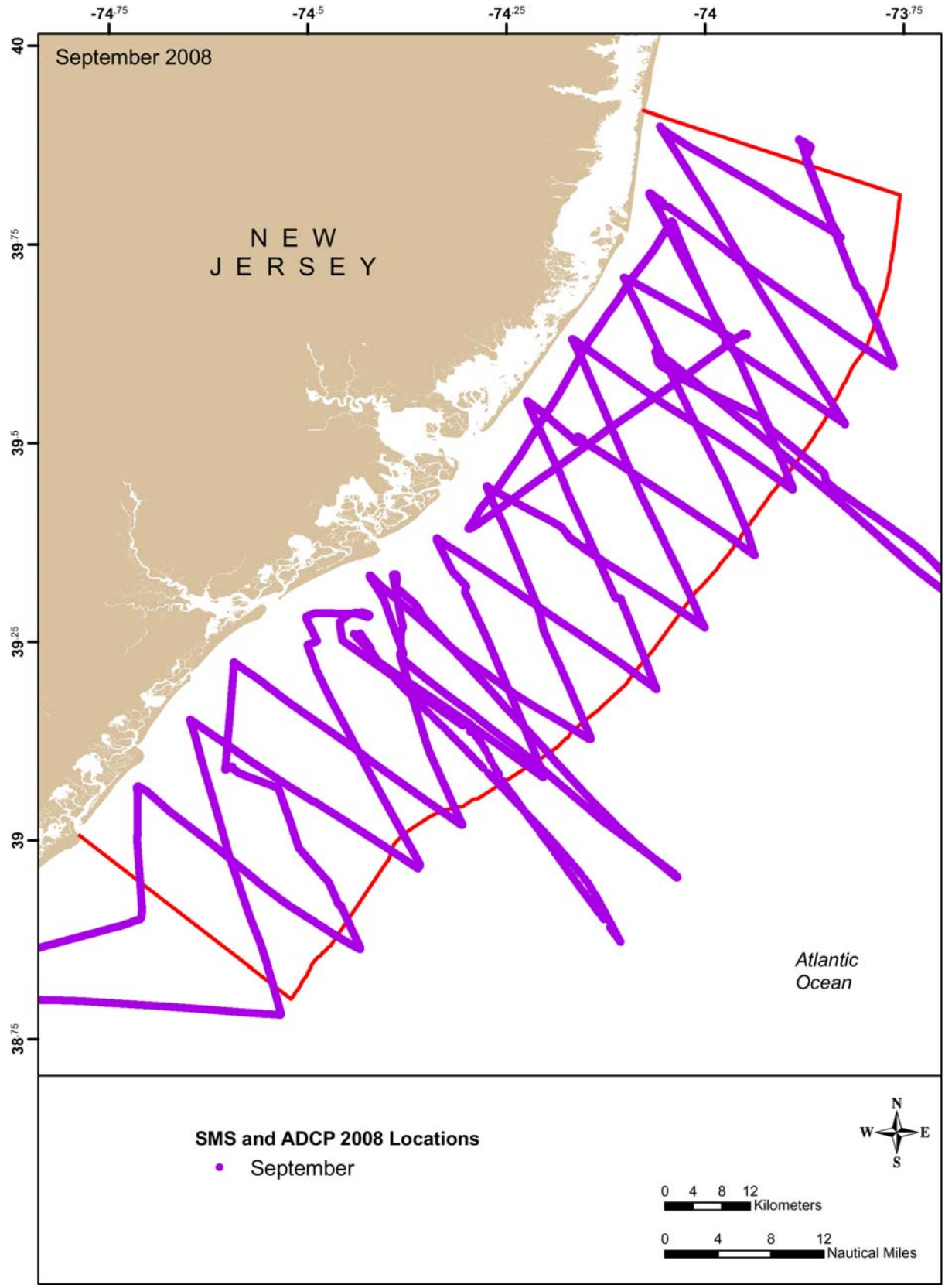

Figure 5.7-3. SMS and ADCP Measurements Conducted during Shipboard Surveys in the NJDEP Study Area off the Coast of New Jersey in September 2008.

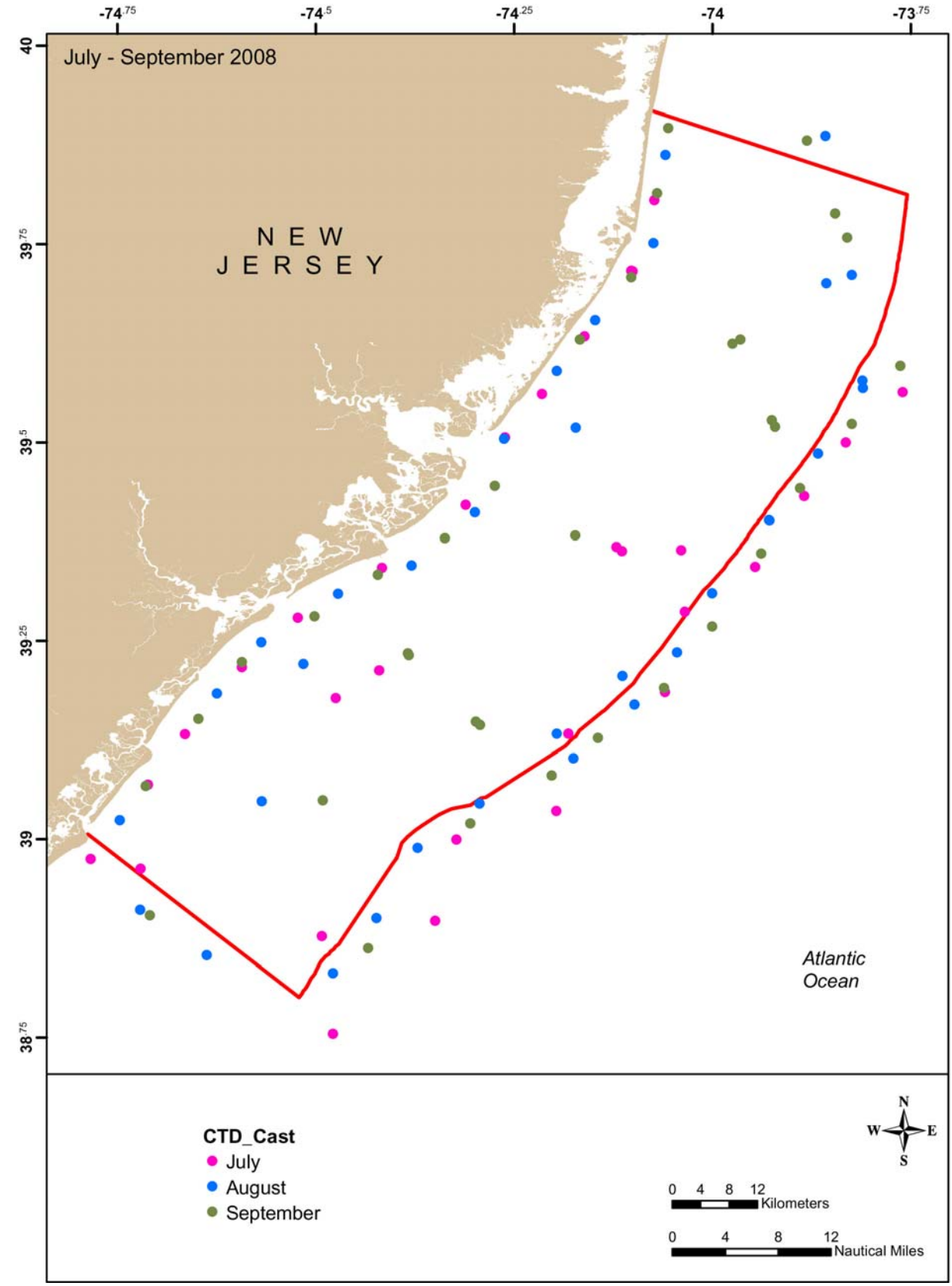

Figure 5.7-4. CTD Measurements Conducted at Point Locations in the NJDEP Study Area off the Coast of New Jersey from July through September 2008.

The CTD measurements were conducted at 32 sites in July, 35 sites in August, and 37 sites in September. The enclosed map shows the lon-lat locations of the sites of the CTD casts at which data collection occurred.

The CTD measurements were conducted on the following dates:

- July 2008 (32 sites): 7-13 through 7-16.
- August 2008 (35 sites): 8-11 through 8-14.
- September 2008 (37 sites): 9-12 through 9-16.

5.7.3 Acoustic Doppler Current Profiler (ADCP) Measurements

In addition to SMS and CTD, ADCP measurements were conducted at various site locations (**Figures 5.7-1 through 5.7-3**). The ADCP data were collected and processed using the VM-DAS or WIN-RIVER software programs. The raw ADCP data (generated in files "*.enr") were screened for RSSI and correlated by VM-DAS or WIN-RIVER (files "*.ens") and then bin-mapped and transformed to Earth coordinates. The single-ping ADCP data after this transformation are in the files "*.enx". The text files "*.vmo" contain the option settings for collecting the ADCP data. The general ADCP file format "*" = "ADCPxxx_eeeeee.", where "xxx" = sequence of data collection files (initially "001" at the beginning of the cruise, and then increases by 1 every time the system is turned on and off), and "eeeeee" = ensemble number. The additional labels "yyyymmdd" = date of ADCP pinging, and "hhmmss.ss" = time of ADCP pinging.

The ADCP measurements were conducted on the following dates and times:

July 2008:

- 7-13 (08:50:21 to 23:59:59)
- 7-14 (00:00:00 to 23:59:59)
- 7-15 (00:00:00 to 23:59:59)
- 7-16 (00:00:00 to 23:59:59)
- 7-17 (00:00:00 to 01:16:38)

August 2008:

- 8-11 (14:55:04 to 23:59:59)
- 8-12 (00:00:00 to 23:59:59)
- 8-13 (00:00:00 to 23:59:59)
- 8-14 (00:00:00 to 23:59:59)
- 8-15 (00:00:00 to 00:59:02)

September 2008:

- 9-12 (10:05:37 to 23:59:59)
- 9-13 (00:00:00 to 23:59:59)
- 9-14 (00:00:00 to 23:59:59)
- 9-15 (00:00:00 to 23:59:59)
- 9-16 (00:00:00 to 21:53:04)

6.0 INITIAL ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS FROM OFFSHORE WIND POWER FACILITIES

No activity was initiated on this task during this reporting period.

7.0 REPORTING

The final revised version of the second quarterly report was presented to NJDEP on June 30, 2008. This quarterly report was prepared during this period. Responses to comments on the draft QAWP were prepared. The Year 1 Interim Report is in preparation and will be submitted in January 2009.

APPENDIX A

REVIEWED LITERATURE

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APPENDIX A-1

FISHES

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APPENDIX A-4

OFFSHORE WIND FARMS

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APPENDIX A-5

SEA TURTLES

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APPENDIX B

DIGITAL DATA COMPILATION

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Table B-1
Digital Data Compilation from Multi-Source Data Banks

Agency	Data
NOAA National Geophysical Data Center	Bathymetry
New Jersey Department of Environmental Protection NJDEP	Earthquakes Epicentered In New Jersey
	New Jersey Tidal Benchmark Network
	Bedrock-Surface Topography of New Jersey (1:100,000-scale)
	Bedrock Outcrops of New Jersey
	Surficial Geology of New Jersey
NOAA ENC®	Electronic navigational chart
Environmental Protection Agency	Geospatial Data Download Relational Feature Class
Minerals Management Service	Baseline tangent lines and bay closing lines/points
	Preliminary Federal Outer Continental Shelf (OCS) Administrative Boundaries
	OCS block outlines
	Continental Shelf Boundary
	Submerged Lands Act boundary line
	Limit of '8(g) Zone'
	Marine Sanctuaries
	MMS Planning Area outlines
	Official Protraction Diagram
NOAA's Marine Protected Areas Center	MPA Inventory
National Pipeline Mapping System	Commercially Navigable Waterways
National Atlas	Hydrography
New Jersey Highlands Water Protection and Planning Council	Conservation Priority Areas
	Critical Habitat (Final Draft)
	Conservation Priority Areas (Final Draft)
	Critical Habitat Resource Area (Draft)
	Highlands Open Waters (Draft) - Water Bodies
	New Jersey Highlands Council Final Draft Land Use Capability
	Highlands Open Waters (Draft) - Wetlands
	New Jersey Highlands Water Protection and Planning Council
	Low Density Residential Land Use (Final Draft)
	Open Space
	Source Water Protection Area (Draft)
	Baseline Transportation & Transit (Final Draft)
NJDEP	2002 Landuse
	2002 Streams Update
	2003 Aerials
	Bald Eagle Foraging
	Beach
	Coastal Area Facilities Review Act Boundary
	Coastal Centers
	Coastal Flooding
	Counties
	Dedicated Open Space
	10-meter Digital Elevation Grid
	Emergent Wetland
	Forest
	Forested Wetland
	Grassland
	Habitat Delineation
	Historical Shorelines
	Known Contaminated Sites
	Lakes
	Landscape Project Endangered Species Habitat

Table 3-1 (*continued*)
Digital Data Compilation from Multi-Source Data Banks

Agency	Data
NJDEP	Natural Heritage Priority Sites
	Natural Heritage Program Priority Sites
	Hydrography
	NJPDES Ground Water Discharges
	NJPDES Surface Water Discharges
	Open Space
	Place Name Locations
	Roads
	Sewer Service Status
	Shellfish Classification 2007
	Shoreline Structures
	Shoreline Type
	Soil
	South Jersey Marsh
	STORET Water Quality Monitoring Stations
	Stormwater Rule Areas Affected by 300 Foot Buffers
	Streams
	Surface Water Quality Standards
	Tidelines
	Upper Wetlands Boundary
	Urban Peregrine
	USGS Quarter Quad Index
	Water Bodies
	Water Supply Planning Areas
	Watershed Management Areas
	Watersheds
	Wetlands
NJDOT	Roadway Network.
NOAA	National Geodetic Survey's Vector Shoreline
U.S. Fish and Wildlife Service, Region 5, National Wildlife Refuge System	E.B. Forsythe National Wildlife Refuge Boundary
	Great Swamp NWR
	Cape May
	Supawna Meadows
	Wallkill River NWR
Pinelands Management Areas	Pinelands Management Area Boundaries
NOAA Raster Navigational Chart	Raster Navigational Charts
U.S. Department of Agriculture, Natural Resources	Soil
USGS Coastal and Marine Geology Program	Coastal Vulnerability
	Erosion and Accretion Rates
	Geology
	Geomorphology
	Sediment Distribution