National Park Service
U.S. Department of the Interior

Northeast Region
Boston, Massachusetts

Boston Harbor Islands Coastal Breeding Bird Monitoring 2007 Field Season Summary

Natural Resources Report NPS/NER/NRR--2007/16

ON THE COVER
Black-crowned Night-Heron (*Nycticorax nycticorax)* chick and egg in outer island colony
Photograph by: Carol Lynn Trocki

Boston Harbor Islands Coastal Breeding Bird Monitoring 2007 Field Season Summary

Natural Resources Report NPS/NER/NRR--2007/16

Carol Lynn Trocki and Peter W. C. Paton

Department of Natural Resources Science
University of Rhode Island
Kingston, RI 02881

October 2007

U.S. Department of the Interior
National Park Service
Northeast Region
Boston, MA

The Northeast Region of the National Park Service (NPS) comprises national parks and related areas in 13 New England and Mid-Atlantic states. The diversity of parks and their resources are reflected in their designations as national parks, seashores, historic sites, recreation areas, military parks, memorials, and rivers and trails. Biological, physical, and social science research results, natural resource inventory and monitoring data, scientific literature reviews, bibliographies, and proceedings of technical workshops and conferences related to these park units are disseminated through the NPS/NER Technical Report (NRTR) and Natural Resources Report (NRR) series. The reports are a continuation of series with previous acronyms of NPS/PHSO, NPS/MAR, NPS/BOS-RNR, and NPS/NERBOST. Individual parks may also disseminate information through their own report series.

Natural Resources Reports are the designated medium for information on technologies and resource management methods; "how to" resource management papers; proceedings of resource management workshops or conferences; and natural resource program descriptions and resource action plans.

Technical Reports are the designated medium for initially disseminating data and results of biological, physical, and social science research that addresses natural resource management issues; natural resource inventories and monitoring activities; scientific literature reviews; bibliographies; and peer-reviewed proceedings of technical workshops, conferences, or symposia.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the National Park Service.

This report was accomplished under Cooperative Agreement 4520-99-007, Task Agreement Number J4506060629 with assistance from the NPS. The statements, findings, conclusions, recommendations, and data in this report are solely those of the author(s), and do not necessarily reflect the views of the U.S. Department of the Interior, National Park Service.

Reports in these series are produced in limited quantities and, as long as the supply lasts, may be obtained by sending a request to the address on the back cover. When original quantities are exhausted, copies may be requested from the NPS Technical Information Center (TIC), Denver Service Center, PO Box 25287, Denver, CO 80225-0287. A copy charge may be involved. To order from TIC, refer to document D-21.

This report may also be available as a downloadable portable document format file from the Internet at http://www.nps.gov/nero/science/.

Please cite this publication as:

Trocki, C. L., P. W. C. Paton. October 2007. Boston Harbor Islands Coastal Breeding Bird Monitoring: 2007 Field Season Summary. Natural Resources Report NPS/NER/NRR--2007/16. National Park Service. Boston, MA.

NPS D-21 October 2007

Table of Contents

Tables v

Figures vii

Acknowledgements ix

Introduction 1

Methods 3

Results 9

Discussion 19

Literature Cited 23

Tables

Table 1a. Inter-observer variation in numbers of nesting cormorants and gulls surveyed from boats on the Outer Islands. 10

Table 1b. Inter-observer variation in numbers of nesting cormorant and gull pairs surveyed on other islands in BOHA. 11

Table 2. Total number of cormorant and gull nests detected on islands surveyed using complete ground-based counts. 11

Table 3. Total number of COEI nests detected during complete ground-based surveys. 13

Table 4. Total number of wading bird nests on each island. 14

Table 5. Territorial pairs of American Oystercatchers that were presumed to be nesting. 15

Figures

Figure 1. Map of Boston Harbor Islands national park area. 4

Figure 2. Common Eider nest locations during 2007 monitoring. 13

Figure 3. Wading Bird colony sites detected during 2007 coastal bird monitoring. 14

Figure 4. Location of American Oystercatcher pairs detected during 2007 surveys..... 15

Figure 5. Least and Common Tern colony site locations detected during surveys in 2007. 17

Acknowledgements

Thanks to the incredible volunteers – Katie Banks, Susanna Corona, Carl Johnson, Bob Kelley, Colin Millar, Brian Mitchell, Theresa Moore, Jack Renfrew, Polly Stevens, and Bob Stymeist - who helped gather this year's data AND made the work so much fun!

Thank you also to park staff Marc Albert, Sheila Colwell, and Mary Raczko for their support and help with data collection, and to Mary Raczko for her tremendous efforts recruiting and coordinating volunteers.

We greatly appreciate Russ Bowles and his capable and professional staff at UMASS Boston Marine Operations for providing transportation on the water. Thanks also to Maureen McConnell from the Boston Museum of Science for providing meeting space for volunteer training and access to the Museum's avian exhibits. This project was supported and funded by the Northeast Temperate Network Inventory & Monitoring Program. Thanks to Brian Mitchell, Theresa Moore, and Fred Dieffenbach for their helpful input.

Introduction

In 2002, the Boston Harbor Islands were designated as a Massachusetts Important Bird Area (IBA) because they provide habitat for a significant number of colonial-nesting waterbirds, including Common Terns (*Sterna hirundo*) and Least Terns (*Sterna antillarum*), which are both listed as species of special concern in the State of Massachusetts (Massachusetts Natural Heritage and Endangered Species Program 2007). The Boston Harbor Islands also provide habitat for breeding American Oystercatchers, a species of high continental conservation concern with a high level of regional responsibility (Dettmers and Rosenberg 2000), and several species of wading birds including Black-crowned Night-Heron (*Nycticorax nycticorax*) and Snowy Egret (*Egretta thula*), which are, respectively, species of moderate and high continental conservation concern (Kushlan et al. 2002). In addition, cormorants, gulls, eider, oystercatchers and several other wading and shorebird species regularly nest on the islands.

Although not part of a consistent monitoring program, periodic records of breeding waterbirds exist for the islands (see Andrews 1990, Hatch 1984, Blodget and Livingston 1996, Parsons et al. 2001). In 2001-2003, Paton et al. (2005) conducted an inventory of waterbirds and landbirds breeding in the Boston Harbor Islands National Park Area (BOHA), which in part established the need for a long-term coastal breeding bird protocol in the park. When compared with previous studies, the Paton et al. (2005) waterbird inventory suggested that:

- Least Terns have a small but relatively stable population (<100 pairs), usually on Rainsford or Lovell's Islands (Hatch 2001, Nove 2001).
- Common Terns have declined from a peak of over 100 pairs in 1993 (Hatch 2001) to approximately a dozen pairs on Snake Island in 2003.
- American Oystercatchers (*Haematopus palliates*) have increased from only several pairs in the early 1990s (Veit and Petersen 1993; Nove 2001) to approximately 16 pairs on 14 islands in 2003.
- Wading birds have experienced a significant, ten-fold decline on Sarah Island from 725 nests in 1994 (Parsons et al. 2001) to 228 in 2003, and Middle Brewster Island from 124 nests in 1984-5 (Andrews 1990; 207 nests in 1994, Blodget and Livingston 1996) to 10 in 2003, and are no longer present on Spectacle, Peddocks, or Gallops (Nove 2001).
- Common Eiders have a small, but established colony of approximately 70 nests on islands in the Outer Harbor, primarily Calf Island.
- Herring Gulls (*Larus argentatus*) have declined in BOHA (Andrews 1990), as they have regionally (Rome and Ellis 2004), which may be due in part to the restoration of Spectacle Island, a former land fill where gulls used to nest.
- Great Black-backed Gulls (*Larus marinus*) have maintained a stable population in BOHA (Andrews 1990), though regional trends suggest they may be increasing (Rome and Ellis 2004).
- Double-crested Cormorants have redistributed themselves among the islands of the Outer Harbor, but have maintained fairly stable numbers since the 1980s (Andrews 1990, Hatch 1981).

Additional waterbird surveys conducted in BOHA in 2005 and 2006 (Trocki et al. 2007) used similar techniques and obtained generally similar results. However, it is necessary to establish a consistent and comprehensive long-term monitoring protocol in order to accurately measure population trends over time. In 2007, waterbird surveys were conducted in BOHA as part of the development of a long-term monitoring protocol for coastal breeding birds in the park.

The objectives of this protocol are to:

1. Quantify annual variation in the long-term abundance of high priority coastal breeding bird species (Least Terns, Common Terns, and American Oystercatchers).
2. Conduct an annual surveillance program within the park to identify future use by threatened or endangered coastal breeding bird species, such as Piping Plover (*Charadrius melodus*) or Roseate Tern (*Sterna dougallii*). Neither of these species currently nest in the park, but could in the future. Thus, management agencies should be vigilant, as both species are listed on the federal endangered species list.
3. Determine long-term trends in species composition and relative abundance of priority coastal breeding bird species: Double-crested Cormorant, gulls, wading birds, Common Eider (*Somateria mollissima)*, Spotted Sandpiper (*Actitis macularia)*, and Willet (*Catoptrophorus semipalmatus*).
4. Provide information that can be used to improve our understanding of the relationship between coastal breeding birds, their habitat, and management actions.

Volunteers assisted cooperating researchers in conducting waterbird surveys in the park in 2007. It is the intent of the NETN and the park to use volunteers to implement this protocol in the future, both to enhance community involvement with park islands and to provide a cost-effective implementation method for long-term monitoring.

Methods

The survey methods used during protocol development focused on obtaining information on the relative abundance of coastal breeding species by estimating or directly counting all nests, incubating adults, or territorial nesting pairs. These methods were selected based on their ability to meet the following criteria:

- accurately detect changes in species richness, relative abundance of nesting pairs, and nesting location for each focal species.
- minimize disturbance to nesting colonies and/or nesting pairs.
- be implemented by a team including trained volunteers.
- be carried out with an annual budget of approximately $15,000.

Surveys were conducted on all islands within BOHA where waterbirds have been known to nest in the past (Paton et al. 2005; see Figure 1 for map of BOHA). The final long-term monitoring protocol will incorporate periodic surveillance for new nesting locations.

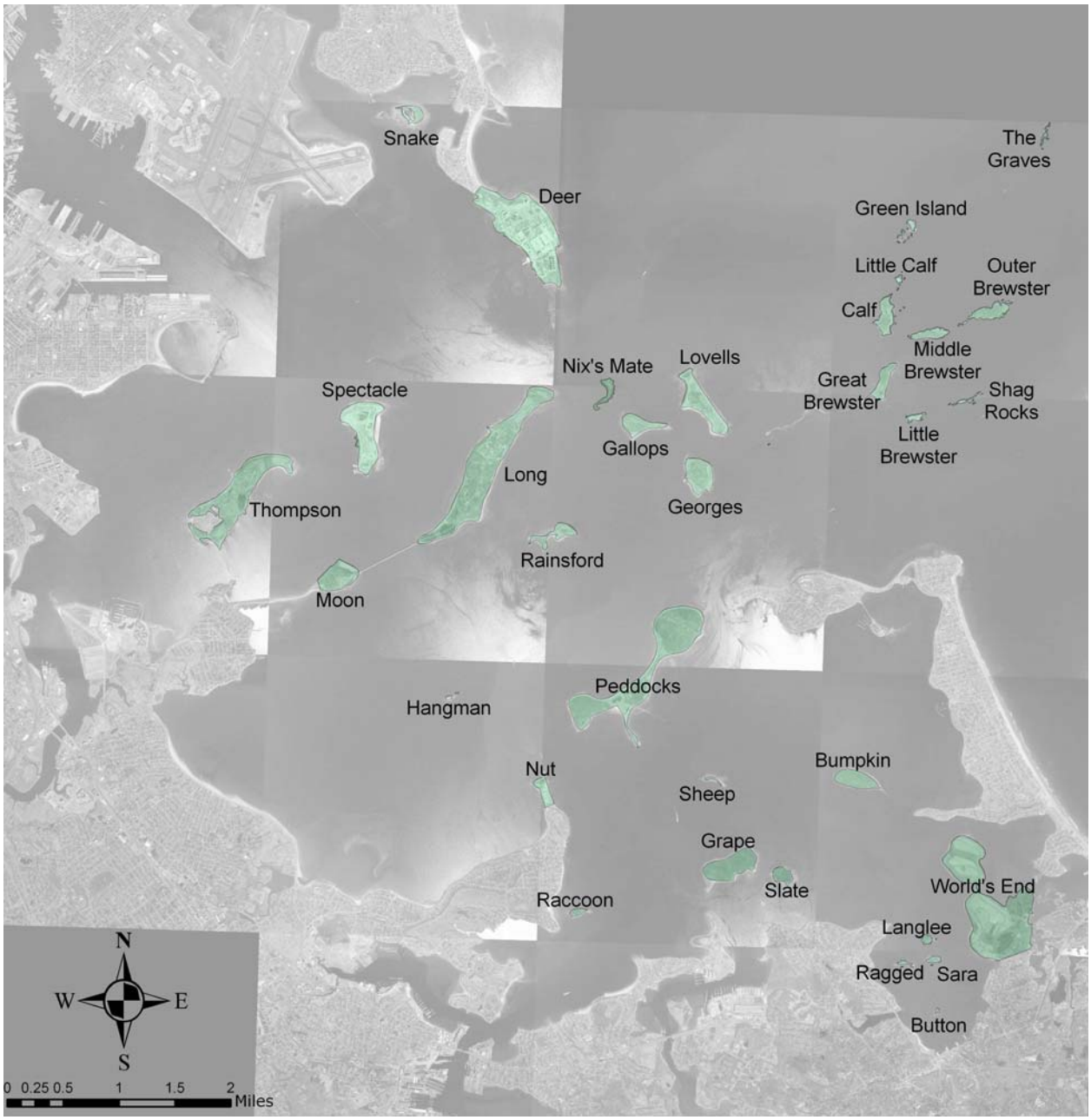

Figure 1. Map of Boston Harbor Islands national park area.

Cormorants and Gulls

Boat-based surveys of nesting Double-crested Cormorants (DCCO), Herring Gulls (HERG), and Great Black-backed Gulls (GBBG) on Calf, Little Calf, Green, Middle Brewster, and Outer Brewster Islands were conducted on three occasions (15 May, 16 May, and 23 May). Visible active nests, as evidenced by the presence of an incubating adult or visible chicks, were counted by surveyors circling the island by boat at approximately 5 km per hour from a distance of approximately 10-45 m offshore (or as close as the boat captain felt safe boat operation was feasible). Nesting Double-crested Cormorants on Shag Rocks were included in surveys on May 15 only. Boat-based surveys for nesting gulls and cormorants were also conducted on Langlee, Ragged, Button, Sarah, Slate, Grape and Hangman Islands on 25 May; on Gallops, Georges, Lovells, and Peddocks on 29 May; and on Spectacle Island on 30 May.

A complete ground-based count of nesting gulls was conducted on Great Brewster Island on 23 of May because rocks and shallow waters around Great Brewster Island make it difficult to circle the island in a boat. Also, the State of Massachusetts was particularly interested in obtaining a complete nest count from Great Brewster in order to fill a gap in their data from surveys conducted in 2006. Complete ground-based counts of nesting gulls and cormorants were also conducted on Sheep Island on 5 June while surveying for wading birds and American Oystercatchers.

Common Eiders

Common Eiders (COEI) were surveyed with complete, ground-based nest counts on Calf (16 May), Great Brewster (23 May), Middle Brewster (29 May), and Outer Brewster (30 May) Islands. It was not possible to safely land on Little Calf or Green Islands. Common Eider nest semi-colonially in BOHA and have generally been found nesting under overhanging vegetation, primarily sumac. During surveys, four to five observers spread out in a line (approximately 3-4 m apart) and proceeded through vegetation, flushing incubating females and locating nests. Ground-based nest counts were targeted for the peak incubation period.

Approximately 2-3 weeks following peak incubation, Common Eider chicks can be observed rafting in crèches offshore near nesting islands. Water-based counts of chicks from 15 June to 30 June may be able to provide supplementary data on reproductive success for the year. On 21 June, boat-based surveys of the Outer Islands were conducted to count adult female Common Eiders and chicks on the water.

Wading Birds

There are currently 5 mixed-species wading bird colonies in BOHA. Surveys of these known sites were targeted to take place during peak incubation. Black-crowned Night-Herons (BCNH) are the most common and widely distributed nesting species, but Snowy Egrets (SNEG), Glossy Ibis (GLIB), and Great Egrets (GREG) regularly nest in the park as well. Active wading bird nests were directly counted on Calf (16 May), Sarah (25 May), Middle Brewster (29 May, Outer Brewster (30 May), and Sheep Islands (5 June). On Outer Brewster and Sheep Islands, dense vegetation made it impossible to conduct a complete nest count without unreasonably disturbing

the colony. In these instances, estimates of nesting effort were made based on the number of attending adults that flushed from the colony on our approach.

American Oystercatchers and Willets

Boat-based surveys were used to estimate the number of nesting pairs of adult American Oystercatchers (AMOY) on each island where complete ground-based surveys were not conducted. American Oystercatcher surveys were conducted simultaneously with cormorant and gull, Common eider, or tern surveys from 15 May to 12 June. American Oystercatcher nests were documented when found but a complete nest search was not undertaken due to the effort and disturbance involved in finding individual nests.

Willets (WILL) are conspicuously vocal when breeding and have only been detected nesting on Snake Island in BOHA (Paton et al. 2005). We estimated the total number of nesting pairs of Willets on Snake Island during a visit on 12 June, and were able to successfully document a Willet nest.

Terns

In recent years terns have nested on Lovells, Rainsford, and Snake Islands in BOHA. These three islands were surveyed with complete, ground-based nest counts targeting peak incubation (2-3 eggs in most nests). Least Terns (LETE) are known to be especially asynchronous, thus Least Tern colony counts were conducted on several occasions during the month of June. In addition, Common Terns (COTE) are known to nest on a platform near Spinnaker Island, outside of park boundaries. These terns undoubtedly rely on BOHA for foraging habitat. Nesting was confirmed on the Spinnaker platform and the number of adults attending the colony was estimated on 12 June.

Spotted Sandpipers

Spotted Sandpipers (SPSA) have been previously documented nesting on nine islands in the park (Paton et al. 2005). During tern and oystercatcher surveys, any indication of nesting Spotted Sandpipers (such as flushing an adult from grassy habitat) was recorded. A complete ground-based survey of potential Spotted Sandpiper nesting habitat was not conducted in 2007.

Volunteer Training, Recruitment, & Coordination

Volunteers interested in participating in this project were recruited by park staff and asked to attend a training session lead by cooperating researchers. The training session, held at the Boston Museum of Science on 2 May, focused on species identification and techniques for estimating large numbers of birds.

Park staff coordinated volunteers to participate in field surveys according to a schedule provided by cooperating researchers in advance of the field season. Weather make-up days were assigned in advance to allow for some flexibility if weather prevented surveys. Park staff facilitated

volunteer communication and took the lead role in coordinating volunteer participation. Cooperating researchers trained and supervised participating volunteers while in the field.

Data Management

Data from field data sheets were entered into a MS Excel spreadsheet by cooperating researchers involved in the data collection effort. Data was reviewed for discrepancies and passed to the NETN Data Manager for uploading into an MS Access database for this project. Dated copies of the MS Access database will reside in multiple locations for archival and security purposes.

Results

Cormorants and Gulls

Boat-based surveys of nesting cormorants and gulls on the Outer Islands produced highly variable results (Table 1a and 1b). Estimates differed markedly among observers, but also varied greatly among days, presumably due to changes in visibility or changes in the actual number of individuals attending the colony at any given time. Overall mean Coefficients of Variation (CV; SD/Mean X 100) for the three primary species we monitored were: DCCO = 26.5, GBBG = 41.2, and HERG = 40.1, thus there was more variation in counts of nesting gulls than cormorants, with the most variation in numbers of nesting GBBGs (Table 1a). Boat-based surveys estimate only nesting activity that is visible from the water, and may drastically underestimate the total number of nests.

Ground-based counts, where conducted, are expected to provide more reliable results, though the effort required for this method is substantially greater (Table 2).

Table 1a. Inter-observer variation in numbers of nesting cormorants and gulls surveyed from boats on the Outer Islands.

	5/15/2007 - wind, drizzle						5/16/2007 - calm, clear						5/23/07 - calm, clear						
	CLT	**SC**	**ShC/PS**	**Mean**	**SD**	**CV**	**CLT**	**RS/CJ**	**RK/MR**	**Mean**	**SD**	**CV**	**CLT**	**CM**	**KB**	**SC/RS**	**Mean**	**SD**	**CV**
Calf																			
DCCO	61	na	0	30.5	43.1	141.4	68	52	46	55.3	11.4	20.6	39	34	45	52	42.50	7.77	18.28
GBBG	11	na	26	18.5	10.6	57.3	29	21	18	22.7	5.7	25.1	20	21	28	24	23.25	3.59	15.46
HERG	13	na	52	32.5	27.6	84.9	58	59	33	50.0	14.7	29.5	58	47	35	59	49.75	11.24	22.59
Little Calf																			
DCCO	94	99	190	127.7	54.0	42.3	163	87	149	133.0	40.4	30.4	183	173	181	170	176.75	6.24	3.53
GBBG	7	16	34	19.0	13.7	72.4	4	6	7	5.7	1.5	27.0	24	23	27	22	24.00	2.16	9.00
HERG	36	64	3	34.3	30.5	88.9	6	6	6	6.0	0.0	0.0	9	21	11	15	14.00	5.29	37.80
Green																			
DCCO	123	145	126	131.3	11.9	9.1	131	149	151	143.7	11.0	7.7	146	134	183	117	145.00	27.99	19.30
GBBG	19	12	22	17.7	5.1	29.0	14	11	12	12.3	1.5	12.4	13	6	23	16	14.50	7.05	48.60
HERG	6	13	19	12.7	6.5	51.4	20	3	14	12.3	8.6	69.9	21	25	34	29	27.25	5.56	20.40
Middle Brewster																			
DCCO	436	na	415	425.5	14.8	3.5	530	559	372	487.0	100.6	20.7							
GBBG	20	na	53	36.5	23.3	63.9	52	11	9	24.0	24.3	101.1							
HERG	44	na	88	66.0	31.1	47.1	38	27	25	30.0	7.0	23.3							
Outer Brewster																			
DCCO	63	75	55	64.3	10.1	15.6	60	100	59	73.0	23.4	32.0							
GBBG	27	18	21	22.0	4.6	20.8	10	14	4	9.3	5.0	53.9							
HERG	127	140	106	124.3	17.2	13.8	101	85	52	79.3	25.0	31.5							
Shag Rocks																			
DCCO	123	107	115	115	8	7.0													
GBBG	0	0	0	0	0														
HERG	0	0	0	0	0														

CLT= Carol Trocki, SC = Susanna Corona, ShC = Sheila Colwell, PS = Polly Stevens, RS = Robert Stymeist, CJ = Carol Johnson , RK = Robert Kelly, MR = Mary Raczko, CM = Colin Millar, KB = Katie Banks.

Table 1b. Inter-observer variation in numbers of nesting cormorant and gull pairs surveyed on other islands in BOHA.

Hingham Harbor Islands				
	5/25/07 - calm, clear			
	CLT	**PP**	**RS**	**PS/RK**
Langlee				
HERG	1	1	1	1
Button				
HERG	4	4	4	4
Sarah				
DCCO	69	73	63	64
GBBG	11	12	27	13
HERG	77	70	103	93
Hangman				
GBBG	34			

Gallops Island		
	5/29/07 - moderate wind, clear	
	CLT	**RS/KB**
GBBG	24	18
HERG	21	35

Table 2. Total number of cormorant and gull nests detected on islands surveyed using complete ground-based counts.

		Species	
Island	**DCCO**	**GBBG**	**HERG**
Great Brewster	0	16	165
Sheep	13	13	141

Common Eiders

A total of 196 Common Eider nests were detected on Outer Harbor Islands (Table 3 and Figure 2). Significantly more nests were detected on Outer Brewster than in previous years (Paton et al. 2005), likely due to an increased search effort. Contents were recorded for 174 (89%) of the nests detected. Clutch size averaged 3.8 ± 1.9 eggs (1SD) per nest.

Boat-based surveys of the Outer Islands conducted in late June detected a total of 226 adult female eiders near shore, but only 21 chicks. Given an average of 4 eggs per nest, we could have expected to see almost 800 chicks on the water, thus there must be some factor affecting juvenile survivorship. Given the number of Great Black-backed Gulls in the area, we suspect gulls might be the primary mortality factor of eider chicks in outer Boston Harbor (see Discussion).

Wading Birds

We detected four species of wading birds nesting on five islands in BOHA in 7 separate colony sites (2 colony locations were detected on Middle Brewster and Outer Brewster Islands; Table 4, Figure 3).

American Oystercatchers and Willets

A combination of boat-based and ground-based surveys detected a total of 17 American Oystercatcher nests on nine islands in BOHA (Table 5, Figure 4). On four islands, specific nest locations were documented based on the observation of incubating adults. No nesting American Oystercatchers were detected during boat-based surveys of Grape, Sarah, Langlee, Ragged, Button, Green, Hangman, Georges, or Gallops Islands.

Three pairs of territorial Willets were detected on Snake Island, where one nest, with three eggs, was located in a *Phragmites* marsh.

Table 3. Total number of COEI nests detected during complete ground-based surveys.

Island	COEI
Calf	72
Great Brewster	8
Middle Brewster	35
Outer Brewster	81
Grand Total	196

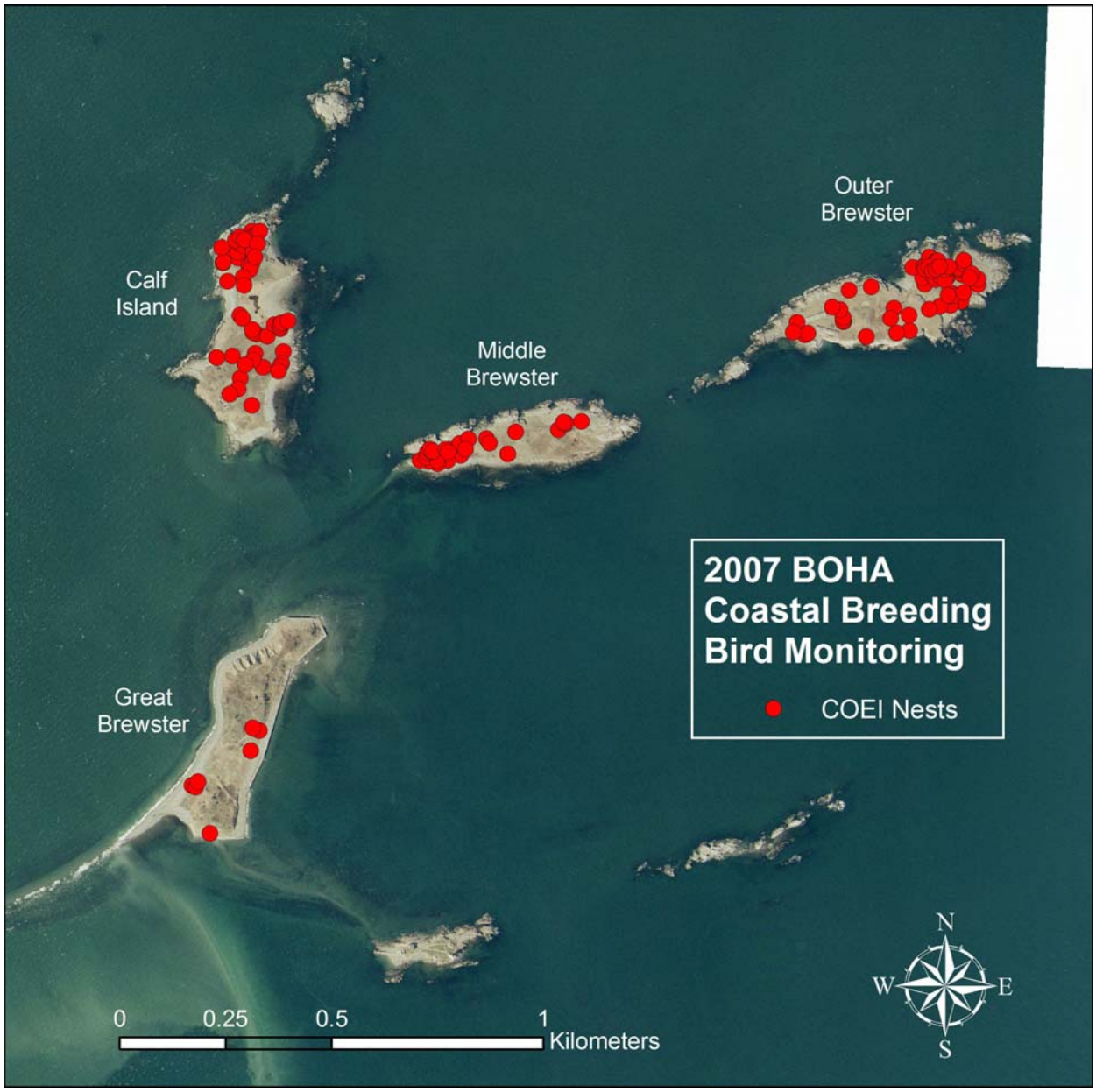

Figure 2. Common Eider nest locations during 2007 monitoring.

Table 4. Total number of wading bird nests on each island.

Island	BCNH	GLIB	GREG	SNEG
Calf	17	0	0	0
Middle Brewster	10	0	0	0
Outer Brewster*	13	17	0	7
Sarah	169	0	33	26
Sheep*	2	7	0	2
Grand Total	211	24	33	35

* Estimates based on maximum number of attending adults that flushed from the colony on our approach.

Figure 3. Wading Bird colony sites detected during 2007 coastal bird monitoring.

Table 5. Territorial pairs of American Oystercatchers that were presumed to be nesting.

Island	AMOY
Calf*	1
Great Brewster*	1
Middle Brewster	1
Peddocks	3
Rainsford	2
Sheep*	2
Slate	1
Snake*	5
Spectacle	1
Grand Total	17

* Nest locations were documented on these islands.

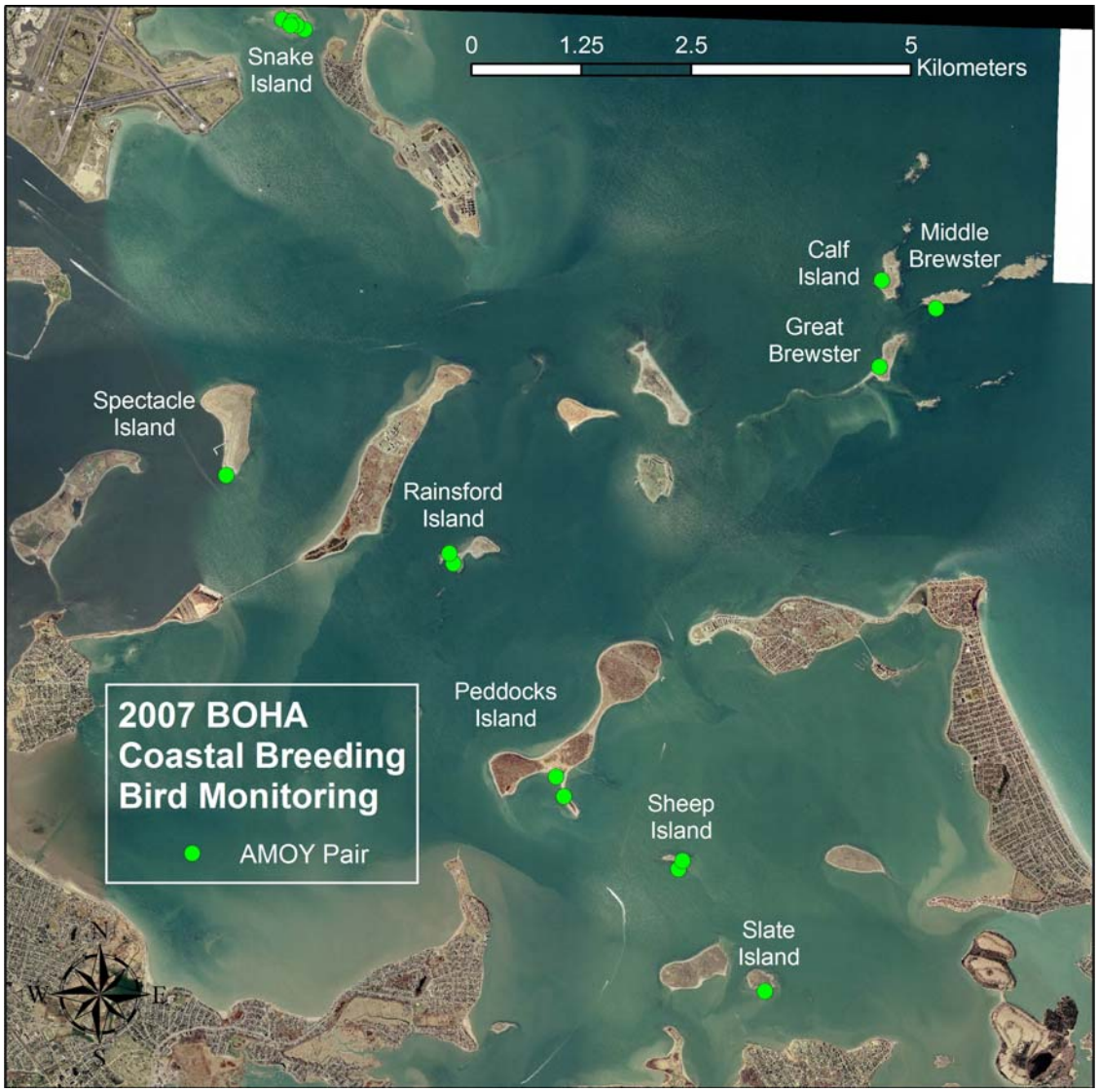

Figure 4. Location of American Oystercatcher pairs detected during 2007 surveys.

Terns

In 2007, no Least Terns were detected on Rainsford Island, although we did survey the island, and a Least Tern colony was established on Lovells (Figure 5). A complete nest count on 5 June resulted in 154 LETE nests, the majority of which (72%) contained 2 eggs. A week later, on 12 June, a similar count was conducted and only 124 nests were detected. Of the 124 nests detected, the majority (66%) again contained 2 eggs. Raccoon tracks were also observed in the sand outside the colony on 12 June. On 16 June, a ranger on Lovells Island reported that the colony had been destroyed sometime between 14 and 15 June. Environmental Police determined that the colony was decimated by raccoons. During a visit to Lovells on 21 June several adult LETEs were observed in the area, but no nests were detected.

Eleven adult Common Terns were observed on Snake Island during surveys on 12 June; 5 nests were located there (Figure 5). The nesting platform on Spinnaker Island was also visited on 12 June, and 220 COTEs were observed (Figure 5). A quick view of the surface of the nesting platform documented evidence of nesting, but a complete count was not undertaken.

Figure 5. Least and Common Tern colony site locations detected during surveys in 2007.

Spotted Sandpipers

While undertaking ground-based surveys for other species, incidental observations detected 8 Spotted Sandpiper potential nest sites on Rainsford Island, based on the flushing behavior of birds. A single Spotted Sandpiper was also flushed from a likely nest on Peddocks during surveys there. Comprehensive surveys to determine specific nest sites for Spotted Sandpipers were not undertaken in 2007.

Volunteer Training, Recruitment, & Coordination

A total of 13 volunteers participated in waterbird surveys in BOHA in 2007. Volunteer scheduling and coordination was well orchestrated by park staff. Volunteers varied in their levels of experience, but all demonstrated an eagerness to participate and willingness to learn.

Discussion

Cormorants and Gulls

Boat-based surveys of incubating cormorants and gulls are safe and efficient to conduct, but produced variable results. Much of this variation was due to volunteer observers not initially understanding what they were supposed to be counting. For, example, during initial boat-based surveys, some observers did not realize that all species were supposed to be surveyed. Thus, there was initial confusion, which was cleared up and subsequent surveys were much smoother. In the future, we suggest that boat-based counts should be conducted in only clear and calm conditions, and that all islands with nesting cormorants and gulls be surveyed once per week for three consecutive weeks during the peak of incubation (mid May to early June) to reduce interannual variation in results.

We expect that ground-based gull and cormorant surveys produce more reliable results; however they require tremendous time and effort to conduct and pose unacceptable safety risks to volunteers in some locations. Since the species targeted by these methods are all abundant in the region and their populations do not appear to be experiencing either great growth or decline in the park, we believe that boat-based surveys (as suggested above) are adequate to track changes in the relative abundance and spatial distribution of Double-crested Cormorants, Herring Gulls, and Great Black-backed Gulls in the Boston Harbor Islands.

Common Eiders

Teams of 6-8 volunteers were used to conduct comprehensive surveys of the Outer Islands for nesting eider, and we believe these methods were effective. The number of nesting eider detected on Outer Brewster was significantly higher than in past years, likely due to an increase in search effort.

Late season counts of female eider and chicks on the water near nesting islands produced disturbing results. Female eiders generally tend chicks in communal crèches on the water when hatched, and remain in the area for most of the summer. The number of female eiders (226) that were observed around the Outer Islands is similar to the number of nests detected in May (196), however only 19 chicks were observed with females. While conducting these counts, we watched an aggressive Great Black-backed Gull attack two chicks that were closely guarded by 7 female eiders. Though anecdotal, this observation suggests that Black-backed Gull predation may be negatively affecting Common Eider productivity after hatching. The documentation of nesting effort in May, but lack of chicks observed on the water in late June raises questions about the reproductive success of this population that may warrant further study.

Wading Birds

With the exception of Sarah Island, wading bird colony surveys produced similar results to those conducted by others in recent years. Sarah is the largest colony site in the park, and therefore the

most difficult to survey. Because methods, observers, and observer effort has varied among recent years, it is difficult to interpret data for this colony.

Although we felt confident about the number of nests we detected this year, we propose using a fewer number of trained individuals working in a more systematic fashion to survey this colony in the future. We also recommend that nests be lightly marked with a non-toxic, water soluble spray paint or other minimally invasive marker in the future to allow for the estimation of detection probabilities. This would require greater effort and more time spent in the colony, but would allow for a more rigorous analysis of population change for these species.

American Oystercatchers and Willets

Boat-based surveys were successful in detecting territorial pairs; however, ground-based surveys of beach strand habitat would undoubtedly provide more reliable results by reducing the chance of missing pairs. A combination of annual boat-based surveys and periodic walking surveys that cover all islands on a three-year rotation may be the best balance of effort. Regular surveillance of all islands should be undertaken, however, many nest locations appear to be fixed between years which should increase search efficiency for known nesting locations in the future.

Willets were successfully determined to be nesting on Snake Island. They have not been sighted on any of the other islands in the park, but can be regularly watched for during survey efforts for other species.

Although monitoring productivity is beyond the scope of this project, additional late season boat-based surveys of known nesting islands could provide some very basic information on reproductive success for these species with little additional effort.

Terns

We feel that the tern colony surveys we conducted were effective at comprehensively detecting this season's nesting effort. Tern colonies on islands in the park are small (max of 154 nests); therefore, complete nest counts are reasonable with a group of 4-6 volunteers.

Although monitoring productivity is beyond the scope of this project, information gathered by repeated nest counts, especially for Least Terns, may be useful to managers. The Least Tern colony on Lovells Island was destroyed, presumably by raccoons, in mid June. Predator management (either control or fencing) could protect the colony site on Lovells in the future.

Volunteer reports from later in the season suggest that a small number of Least Terns may have re-nested on Snake Island in late June or early July. A late season survey (July) of known nesting locations could provide some very basic, but very useful, information on reproductive success for these species with little additional effort.

Spotted Sandpipers

Comprehensive surveys for nesting Spotted Sandpipers were not undertaken in 2007. Future methods to survey this species may be problematic due to their asynchronous nesting cycle.

Volunteer Training, Recruitment, & Coordination

We conducted a mandatory two-hour training session prior to the initiation of the field season for all volunteers. During this session, we talked about field identification and natural history of all the species likely to be encountered and also gave a quiz at the end of the session. All potential volunteers did well (exceeded 90% correct answers), thus all volunteers were familiar with target species prior to the start of the field season. The content of future volunteer training sessions will, in part, depend on the number of seasoned volunteers that return in subsequent years. Park staff and cooperating researchers agreed that it would be helpful to increase the evaluation component of the volunteer experience in the future.

Literature Cited

Andrews, R. (Compiler). 1990. Coastal waterbird Colonies: Maine to Virginia 1984-85. US Fish and Wildlife Service, Newton Corner, MA. 429 pp.

Blodget, B. G., and J. E. Livingston. 1996. Coastal colony-nesting waterbirds: the Massachusetts status report 1994-1995. Massachusetts Wildlife 4:10-20.

Dettmers, R. and K. V. Rosenberg. 2000. Partners in Flight Landbird Conservation Plan: Physiographic Area 9: Southern New England. Version 1.0. Cornell Lab of Ornithology, Ithaca, NY.

Hatch, J. J. 1984. Rapid increase of Double-crested Cormorants nesting in southern New England. American Birds 1984:984-988.

Hatch, J. J. 2001. Tern nesting in Boston Harbor: the importance of artificial sites. Bird Observer 29: 187-193.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Kapp, M. Acosta Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, D.C.

Nove, J. 2001. Birding the Boston Harbor Islands. Bird Observer 29:173-186.

Parsons, K. C., S. R. Schmidt, and A. C. Matz. 2001. Regional patterns of wading bird productivity in Northeastern US estuaries. Waterbirds 24:323-330.

Paton, P. W. C, R. J. Harris, and C. L. Trocki. 2005. Distribution and abundance of breeding birds in Boston Harbor. Northeastern Naturalist 12:145-168.

Rome, M. S. and J. C. Ellis. 2004. Foraging ecology and interactions between Herring Gulls and Great Black-backed Gulls in New England. Waterbirds 27:200-210.

Trocki, C. L. N. W. Talancy, P. W. C. Paton. August 2007. An Inventory of Amphibians, Reptiles, Nonvolant Mammals, and Select Bird Species on Islands in Boston Harbor. Technical Report NPS/NER/NRTR-2007/094. National Park Service. Boston, MA.

Veit, R. R., and W. R. Petersen. 1993. Birds of Masssachusetts. Natural History of New England Series. Massachusetts Audubon Society. 514 pp.

As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-21 October 2007

National Park Service
U.S. Department of the Interior

Northeast Region
Natural Resource Stewardship and Science
15 State Street
Boston, Massachusetts 02109

http://www.nps.gov/nero/science/

EXPERIENCE YOUR AMERICA ™