



Boston Harbor Islands National Recreation Area Coastal Breeding Bird Monitoring

2012 Field Season Summary

Natural Resource Technical Report NPS/NETN/NRTR—2013/737



ON THE COVER

Snowy Egret (*Egretta thula*) nest on Outer Brewster, 2012.

Photograph by: Carol Lynn Trocki

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Introduction

In 2002, Boston Harbor Islands National Recreation Area (BOHA) was designated as a Massachusetts Important Bird Area (IBA) because it provides habitat for a significant number of colonial-nesting waterbirds, including Least Terns (*Sterna antillarum*) and Common Terns (*Sterna hirundo*), which are both listed as Special Concern species in the State of Massachusetts (Massachusetts Natural Heritage and Endangered Species Program 2007). BOHA also provides habitat for breeding wading birds including Snowy Egrets (*Egretta thula*) and Black-crowned Night-Herons (*Nycticorax nycticorax*) which are, respectively, species of high and moderate continental conservation concern (Kushlan et al. 2002). American Oystercatchers (*Haematopus palliatus*) have expanded their range northward into Massachusetts and now have a substantial breeding population in the Boston Harbor Islands (Paton et al. 2005). The North American population of American Oystercatchers is listed as a high priority shorebird species with high conservation concern in the U.S. Shorebird Conservation Plan (U.S. Fish and Wildlife Service 2004). In addition, eiders, cormorants, several other wading and shorebird species, and gulls regularly nest on the islands.

Although much is known about the spatial distribution and abundance of breeding birds in Massachusetts (Veit and Petersen 1993), less has been published on the avifauna of the Boston Harbor Islands. Although not part of a consistent monitoring program until recently, periodic records of breeding waterbirds on the islands do exist (see Andrews 1990, Hatch 1984, Blodget and Livingston 1996, Parsons et al. 2001, Hatch 2001 and Nove 2001).

From 2001 to 2003, Paton et al. (2005) conducted an avian inventory of BOHA, which in part established the need for a long-term coastal breeding bird monitoring protocol in the park. When compared with previous studies, the Paton et al. (2005) inventory suggested that:

- Common Eiders (*Somateria mollissima*) have a small, but established colony of approximately 70 nests on islands in the Outer Harbor, primarily on Calf Island.
- Double-crested Cormorants (*Phalacrocorax auritus*) have redistributed themselves among the islands of the Outer Harbor, but have maintained fairly stable numbers since the 1980's (Andrews 1990, Hatch 1984).
- Wading birds have experienced a significant decline on Sarah Island where the population declined from 725 nests in 1994 (Parsons et al. 2001) to 112 nests in 2003. The number of nesting wading birds on Middle Brewster Island has varied from 124 nests in 1984-5 (Andrews 1990), to 207 nests in 1994 (Blodget and Livingston 1996), to only 14 pairs present in 2003. Wading birds are no longer present on Spectacle, Peddocks, or Gallops islands (Nove 2001).
- American Oystercatchers 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.
- 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 landfill and gull nesting site.

- Great Black-backed Gulls (*Larus marinus*) have maintained a stable population in BOHA (Andrews 1990), though regional data suggests they may be increasing (Rome and Ellis 2004).
- Least Terns have a small but relatively stable population (less than 100 pairs), usually on Rainsford or Lovell's islands (Hatch 2001, Nove 2001).
- Common Terns have declined from a peak of 100 pairs in 1993 (Hatch 2001) to approximately a dozen pairs on Snake Island in 2003.

Additional waterbird surveys were conducted in BOHA in 2005 and 2006 using similar techniques and providing generally similar results (Trocki et al. 2007). However, because waterbird populations can fluctuate widely, it was deemed necessary to establish a consistent and comprehensive long-term monitoring protocol in order to accurately measure population trends over time (Trocki et al. 2011). In 2007 and 2008, waterbird surveys were conducted in BOHA in support of the development of a long-term monitoring protocol (Trocki and Paton 2007, Trocki 2009), which was completed in 2010 and revised in 2011. Beginning in 2009, monitoring based on the protocol was implemented and annual summary reports are available (Trocki 2010, Trocki 2011, Trocki 2012, this report).

Since the establishment of the annual monitoring effort at BOHA, other state-wide and regional surveys have continued. These include a 2006-2007 state-wide survey for gulls, cormorants, and wading birds (Melvin 2010), 2011 surveys of American Oystercatchers (Melvin 2012) and 2011 and 2012 tern surveys (Mostello 2012, 2013). Melvin (2010) documents declines in most species, including Double-crested Cormorants, Herring Gulls, Great Black-backed Gulls, Black-crowned Night Herons, and Snowy Egrets. Laughing Gulls, Glossy Ibis, and Great Egret appear to be increasing. Tern surveys (Mostello 2012, 2013) indicate that tern numbers have stabilized in recent years.

The following objectives provide the basis for the coastal breeding bird monitoring protocol for Boston Harbor Islands National Recreation Area (Trocki et al. 2011):

- 1) Determine annual changes and long-term trends in 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*). If discovered in the park, these species would be a high priority for monitoring.
- 3) Determine long-term trends in species composition and abundance of priority coastal breeding bird species (eiders, cormorants, wading birds, shorebirds, and gulls).

In addition to these measurable objectives, we also seek to improve our understanding of breeding waterbird – habitat relationships in BOHA and the effects of habitat changes and management actions (such as invasive plant control, predator control, or visitor restrictions) on waterbird species composition and abundance. Waterbird monitoring data can be correlated with ancillary data on park management actions, rocky intertidal communities, water quality, climate, and other available data to assist park managers in their efforts to protect and, in some cases, encourage the recovery of coastal breeding birds in the park.

Volunteers assisted the lead scientist in conducting waterbird surveys in the park from 2007 to 2012. It is the intent of the Northeast Temperate Inventory and Monitoring Network (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 recommended in the protocol focus on obtaining information on the relative abundance of coastal breeding species by estimating or directly counting all nests, incubating adults, or territorial nesting pairs (methods vary by species, see Trocki et al. [2011] for details). These methods were selected based on their ability to:

- Accurately detect changes in species richness, relative abundance of nesting pairs, and nesting location for each high priority and priority species.
- Create minimal disturbance to nesting colonies and/or nesting pairs.
- Be implemented by trained volunteers working with a lead scientist and park staff.
- Be carried out with an annual budget of approximately \$16,000.

As described in the protocol, long-term monitoring surveys will be conducted annually for high priority species (terns and oystercatchers), while a complete survey that includes all priority and high priority species will be conducted within a 3-year rotation (Table 1). The first rotation began in 2008 (the 2007 pilot data did not match the final rotation), and the second rotation began in 2011. Surveillance surveys for new species and new colony sites are ongoing, in conjunction with all coastal breeding bird monitoring efforts, and there is a special focus on surveillance every 3rd year.

Table 1. Boston Harbor Islands National Recreation Area coastal breeding bird monitoring 3-year survey rotation schedule, based on annual effort and park priorities.

Survey Tasks ¹	Year 1: 2008 and 2011			Year 2: 2009 and 2012			Year 3: 2010 and 2013		
	May 15 – 31	June 1 – 15	Jun 15 – Jul 15	May 15 – 31	June 1 – 15	Jun 15 – Jul 15	May 15 – 31	June 1 – 15	Jun 15 – Jul 15
common eiders ²	x		x			x			x
cormorants & gulls	x								
wading birds				x	x				
large shorebirds	x	x	x	x	x	x	x	x	x
small shorebirds /surveillance							x	x	x
terns		x	x		x	x		x	x

¹ see Trocki et al. 2011 for complete information on methods and target dates established for this protocol.

² May survey (year 1) is a ground-based nest count, and June-July survey (all years) is a boat-based crèche count.

The priority and high priority species surveyed in this protocol are all highly visible and most nest in colonies, which makes them relatively easy to locate. Though coastal waterbirds nest in a variety of habitats, the specific requirements of each individual species are well understood and fairly predictable. Colonial-nesting waterbirds also exhibit a high degree of site fidelity, so colony locations are likely to remain similar from year-to-year. However, to accurately understand long-term trends, it is critical to have periodic and comprehensive surveys of all islands in the park to avoid a sampling bias for known locations. A regular surveillance program ensures that all nesting species are detected and that shifts in colony locations are not incorrectly recorded as losses. A comprehensive approach to sampling also allows for the detection of new colony sites or nesting by new species (such as Piping Plover [*Charadrius melodus*] or Roseate Tern [*Sterna dougallii*]).

A map of BOHA is provided for reference (Figure 1). Survey effort in 2012, which was ‘Year 2’ in the survey rotation, is summarized in Table 2. Unfortunately, spring weather limited our ability to gather information on nesting Common Eider or further refine gull and cormorant boat-based survey methods in 2011, so both of these activities became additional priorities in 2012, along with those regularly scheduled. Descriptions of the methods used to survey priority and high priority species in 2012 are given below.

Table 2. Boston Harbor Islands National Recreation Area coastal breeding bird monitoring survey effort in 2012. Note that ‘B’ indicates boat-based survey, while ‘G’ indicates ground-based survey. Surveys for eider ducklings included counts of attending females.

BOHA Island	May 14	May 17	May 18	May 30	May 31	Jun 12	Jun 29	Jul 12	Jul 26	2012 Species Focus
Calf	G		B		B	B	B	B	B	eider, gulls, cormorants, eider crèches, AMOY ¹
Little Calf			B		B	B	B	B	B	gulls, cormorants, eider crèches, AMOY
Green			B		B	B	B	B	B	gulls, cormorants, eider crèches, AMOY
Graves			B		B	B	B	B	B	gulls, cormorants, eider crèches, AMOY
Middle Brewster			GB		B	B		B	B	wading birds, eider, gulls, cormorants, eider crèches, AMOY
Outer Brewster		G	B		B	B		B	B	wading birds, eider, gulls, cormorants, eider crèches, AMOY
Shag Rocks			B		B	B			B	gulls, cormorants, eider crèches, AMOY
Little Brewster					B	B			B	gulls, cormorants, eider crèches, AMOY
Great Brewster					G			G		AMOY
Lovells	B				G	G	G			AMOY, terns
Georges						B				gulls
Gallops										AMOY gulls
Rainsford	B			G						AMOY, terns
Snake						G			B	AMOY, terns, Willets
Spectacle										AMOY
Peddocks				B						AMOY
Thompson										(AMOY surveyed by trained volunteer outside of scheduled group field work)
Sarah				B				B		AMOY, gulls, cormorants
Ragged				B				B		AMOY, gulls, cormorants
Langlee				B				B		AMOY, gulls, cormorants
Button				B				B		AMOY, gulls, cormorants
Slate				B				B		AMOY
Grape				B				B		AMOY
Bumpkin				B				B		AMOY
Sheep				B				B		AMOY, gulls, cormorants
Hangman				B				B		AMOY, gulls, cormorants
Spinnaker						B				terns

¹ AMOY = American Oystercatcher

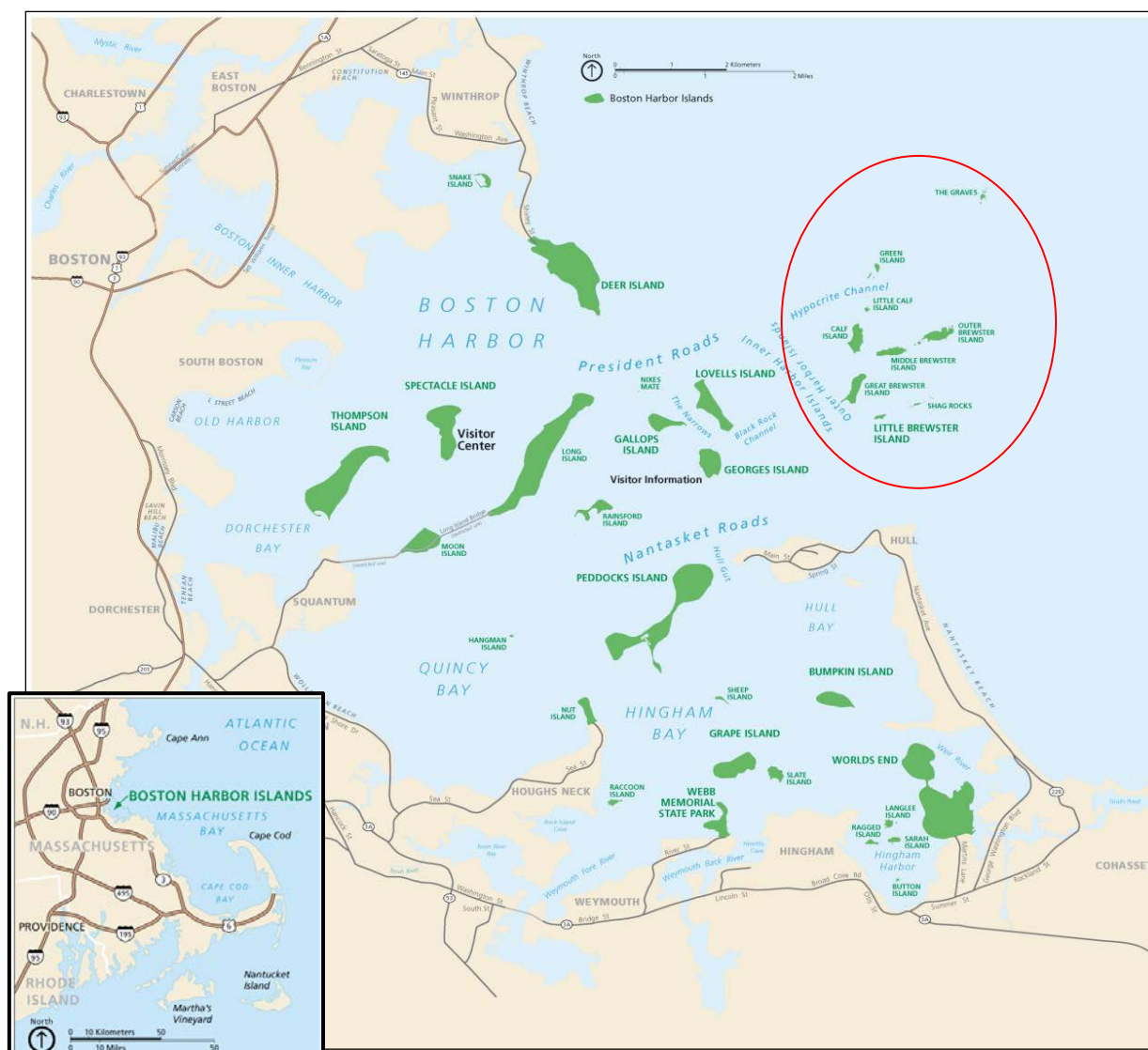


Figure 1. Boston Harbor Islands National Recreation Area (note the red circle enclosing the 'Outer Harbor Islands' which are frequently referred to collectively in the text).

Common Eiders

Common Eiders nest semi-colonially in BOHA and have generally been found nesting in tall grass or under overhanging vegetation, primarily staghorn sumac (*Rhus typhina*), on rocky islands in the Outer Harbor Islands. Common Eiders were surveyed with complete, ground-based nest counts in 2008 and it was planned that this effort would be repeated in 2011 but a strong storm system stalled offshore forcing the cancellation of trips scheduled for mid-May. Hence, ground-based nesting surveys for Common Eider became a priority for 2012.

In addition, on 14 May, we were joined on Calf Island by a group of federal and state biologists interested in obtaining blood samples from the Boston Harbor nesting colony to further their investigations of 'Wellfleet Bay Virus', the newly described virus that is thought to be responsible for recent large scale eider die-offs on Cape Cod. While researchers collected samples from nesting eider on the north end of Calf, we conducted a thorough search of the southern end of Calf Island, as documented by the GPS track recorded with handheld GPS units carried by observers (shown in Figure 2). Ground-based nest surveys were also conducted on Outer Brewster on 17 May, Middle Brewster on 18 May, Rainsford on 30 May, and Lovells and Great Brewster on 31 May. Note that the very eastern tip of Outer Brewster Island was not surveyed due to the timing of the tidal cycle which limited boat access to the island (Figure 3).

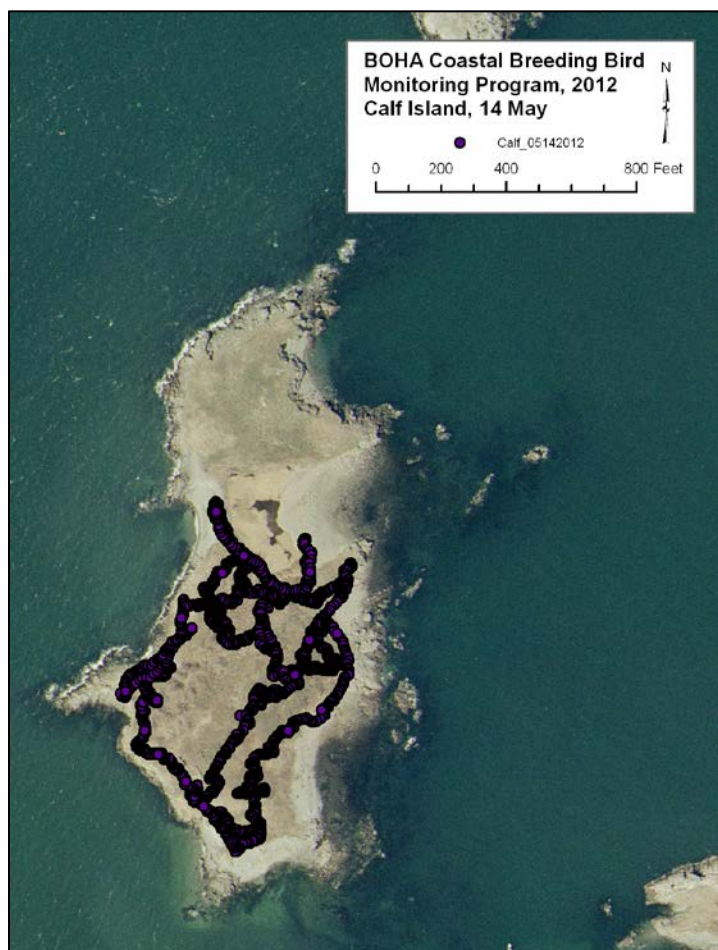


Figure 2. Common Eider ground-based survey track from Calf Island on 14 May 2012.

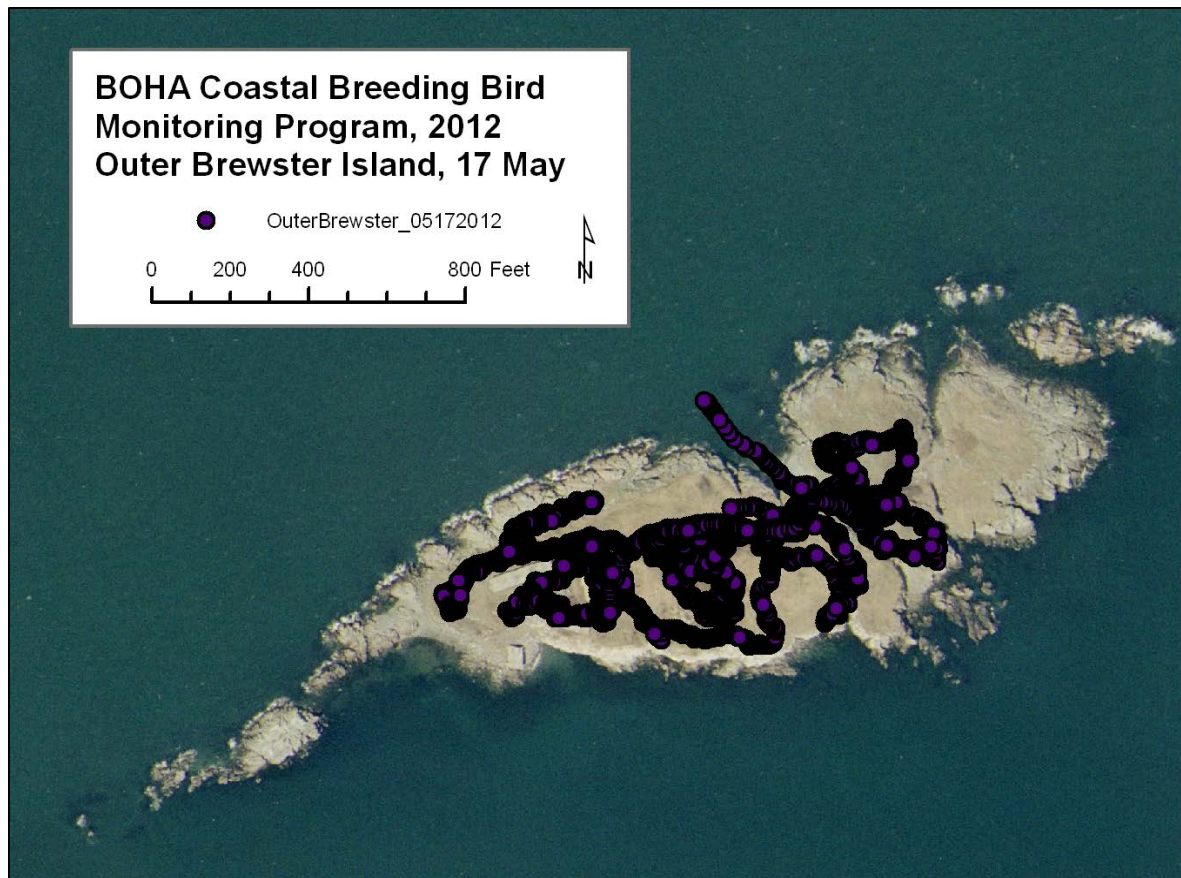


Figure 3. Common Eider and wading bird colony survey track from Outer Brewster Island on 17 May 2012.

Beginning approximately 2-3 weeks following peak incubation, Common Eider ducklings can be observed rafting in crèches offshore near nesting islands, protected by attending females. Ducklings cluster together in this way for protection from predators. The number of female Common Eiders and ducklings on the water were counted by surveyors circling the islands by boat at approximately 5 km per hour from a distance of approximately 9-46 m offshore (or as close as the boat captain felt safe boat operation was feasible). Preliminary boat-based crèche counts were conducted on 31 May and 12 June. An additional survey was attempted on 29 June, but was cut short due to inclement weather (Table 2). Figure 4 shows a sample track from a boat-based survey of the Outer Harbor Islands on 31 May.

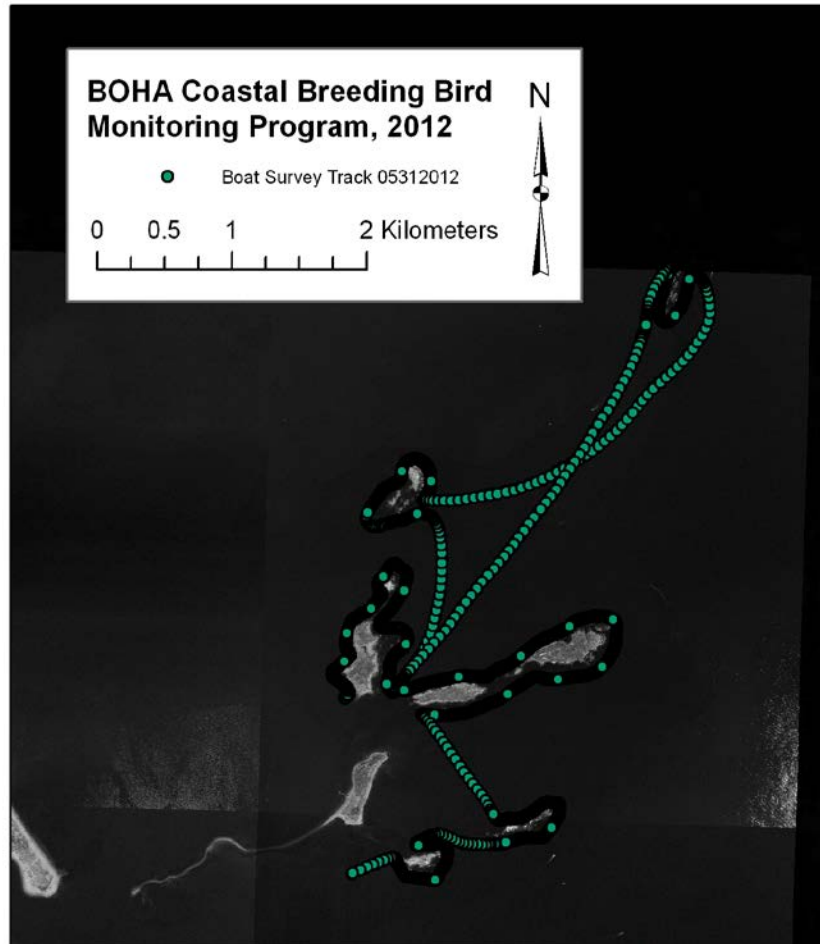


Figure 4. A sample GPS track from boat-based surveys for Common Eider crèches on 31 May during the 2012 monitoring season in Boston Harbor Islands National Recreation Area (BOHA).

Cormorants and Gulls

The majority of gulls and cormorants breeding in BOHA nest on islands in the Outer Harbor (Paton et al. 2005). Boat-based surveys of nesting Double-crested Cormorants (DCCO), Herring Gulls (HERG), and Great Black-backed Gulls (GBBG) were conducted on Calf, Little Calf, Green, Middle Brewster, Outer Brewster, and Little Brewster Islands, The Graves and Shag Rocks on 18 May 2012 (Table 2). The boat track was similar to that shown in Figure 4. Visible active nests, as evidenced by the presence of an incubating adult or visible chicks were counted by surveyors circling each island by boat at approximately 5 km per hour from a distance of approximately 9-46 m offshore (or as close as the boat captain felt safe boat operation was feasible). Two independent observers recorded observations of nesting adults simultaneously.

Beginning in 2009, we began exploring the feasibility of using a high-resolution digital camera to photograph nesting colonies from the boat so that numbers of nesting individuals of each species could be verified in the office following boat-based surveys. Efforts to refine photography techniques for this purpose were planned for mid-May in 2011 but were cancelled due to inclement weather. A photo survey was attempted during the boat-based survey on 18 May, but weather conditions were not conducive for high quality photos.

Wading Birds

Wading birds have previously been documented in five mixed-species wading bird colonies in BOHA on Calf, Middle Brewster, Outer Brewster, Sheep, and Sarah islands (Paton et al. 2005). A complete ground-based survey of each colony site was conducted during the peak of incubation in 2009. Wading birds were scheduled as a high priority for surveys in 2012 and a complete ground-based survey of each colony site was scheduled during the peak of incubation in mid to late May.

Survey methods targeted nesting Great Egrets (*Ardea alba*), Snowy Egrets (*Egretta thula*), Black-crowned Night-Herons (*Nycticorax nycticorax*), and Glossy Ibis (*Plegadis falcinellus*), all of which are known to nest in BOHA. During each colony visit, observers working in teams of two or three walked through the colony systematically, recording species, GPS location, and nest contents, whenever possible. For large, dense colonies (Sarah, Outer Brewster, and Sheep islands), an independent observer was stationed outside of the colony to identify and count the number of adults flushing from the colony site.

Calf Island and Middle Brewster were surveyed during comprehensive surveys for nesting eider on 14 May and 18 May, respectively. The large mixed species colony on Outer Brewster was comprehensively surveyed on 17 May. Sarah and Sheep Islands were scheduled to be surveyed on 22 May, but the trip was cancelled due to inclement weather. When Sarah and Sheep were visited on 30 May, it was determined that the advanced age of nestlings posed significant disturbance risks, and surveys were not conducted.

American Oystercatchers and Willets

Boat-based surveys were used to estimate the number of nesting pairs of adult American Oystercatchers on each island where complete ground-based surveys were not conducted. American Oystercatcher surveys of all islands were conducted simultaneously with cormorant and gull, Common Eider, or tern surveys throughout the breeding season in 2012 (Table 2). When American Oystercatcher nests were detected during ground-based surveys for other species, location (GPS coordinates) and nest contents were recorded. A complete nest search of all islands was not undertaken due to the effort and disturbance involved in finding individual oystercatcher nests. On islands where American Oystercatcher pairs were detected early in the season, repeated boat-based surveys were undertaken to try and gain additional observational information.

Willetts are conspicuously vocal when breeding and have only been detected nesting in BOHA on Snake Island (Paton et al. 2005). We estimated the total number of nesting pairs of Willets on Snake Island during a ground-based survey on 12 June.

Spotted Sandpipers

Spotted Sandpipers are presumed to be nesting on nine islands in the park (Paton et al. 2005, Trocki 2011), but were not comprehensively surveyed in 2012.

Terns

In recent years terns have nested on Lovells, Rainsford, and Snake Islands in BOHA (Paton et al. 2005). These three islands were visited periodically throughout the breeding season to observe

any evidence of tern colony formation. In addition, volunteers, rangers, and park staff regularly communicated and reported on tern nesting harbor-wide throughout the season, which greatly enhanced our ability to target survey activities.

Rainsford Island was surveyed on 14 May and 30 May. Snake Island was visited on 12 June and 26 July. Lovells Island was initially surveyed on 14 May, and again on 31 May, 12 June, and 29 June. A complete nest count was undertaken on 12 June, though the colony was greatly reduced by that time. Six volunteers lined up across the beach, dividing the area from the wrack line (the line of debris left on the upper beach by the last high tide) to the beginning of heavy vegetation, and worked as a team proceeding slowly through the colony locating and counting nests. Nest contents (eggs and chicks) were also recorded during this visit. On subsequent visits, observations were made from outside the colony to limit disturbance during chick-rearing.

Common Terns are also known to nest on a platform near Spinnaker Island. Although this nesting area is 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 2012.

Volunteer Training, Recruitment, & Coordination

Volunteers interested in participating in this project were recruited by park staff and asked to attend a training session led by the lead scientist. The training session, held on Thompson Island on 9 May 2012, focused on species identification, survey techniques, and safety protocols.

Park staff coordinated volunteers to participate in field surveys according to a schedule provided by the lead scientist in advance of the field season. Weather make-up days were assigned in advance to allow for some flexibility if inclement weather prevented surveys. The lead scientist trained and supervised participating volunteers while in the field. This program attracts volunteers with varying level of experience; field tasks are thus assigned based on individual skills, with less experienced volunteers assigned to supervised tasks accordingly.

Communication & Outreach

In 2012, efforts were continued to increase mid-season volunteer communication through regular e-mail updates and postings to the park website and NETN blog, which are publicly viewable (<http://northeastparkscience.wordpress.com/>). Massachusetts Department of Conservation and Recreation (DCR) park rangers, stationed on islands in BOHA, were also encouraged to participate in monitoring efforts. Data gathered during the 2012 field season was shared with the Massachusetts Division of Fishers and Wildlife's Natural Heritage and Endangered Species Program and the Southern New England Waterbird working group. The NETN Science Communication Specialist also highlights coastal breeding bird survey results through resource briefs and during annual public presentation visits to the park.

Data Management

In 2012, continuing efforts were undertaken to enhance the electronic data collection process for this project. A Cybertracker database that was developed by the NETN Data Manager in 2011 was refined prior to the start of the field season. GPS and Cybertracker data were downloaded

and error-checked after each field day. At the end of the field season, data were reviewed and processed and sent to the NETN Data Manager for archiving.

Results

Common Eiders

Ground-based surveys on five of the Outer Harbor Islands found a total of 112 Common eider nests (Table 3).

Table 3. Total number of Common Eider (COEI) nests detected during 2012 ground-based surveys in the Outer Harbor Islands of Boston Harbor Islands National Recreation Area.

Survey Date	Island Surveyed	Nests Detected
5/14/13	Calf (South only ¹)	26
5/17/13	Outer Brewster ¹	42
5/18/13	Middle Brewster	43
5/30/13	Rainsford	0
5/31/13	Lovells	0
5/31/13	Great Brewster	1

¹ Calf Island North was not surveyed and the very eastern tip of Outer Brewster was not surveyed; see Methods for a detailed explanation of effort.

In 2008, a total of 111 nests were detected on Calf Island; with eighteen detected on the south side of Calf and 93 on the north side (Trocki 2009). If we assume that the relative number and location of nests on Calf Island remained similar in 2012, we might reasonably estimate a total of 160 nests on Calf Island, extrapolating from the nests detected during surveys on the south side only.

This estimated figure would result in a total, unadjusted estimate of 246 nests on islands accessible for surveying in the Outer Harbor (note that Green Island may also have nesting eider, but is not accessible). If a detection rate of 72% is applied (see Trocki 2009), then the total estimated population of eider nests in the Outer Harbor is 342.

In addition to nest surveys, boat-based surveys of the Outer Harbor Islands were conducted twice during the latter half of the nesting season to search for adult female eiders tending ducklings. Results are given in Table 4; see Figure 4 for a sample boat-based survey track.

Table 4. Total number of adult female Common Eiders (COEI) and ducklings detected during 2012 boat-based crèche surveys in the Outer Harbor Islands of Boston Harbor Islands National Recreation Area.

Survey Date	Adult Female COEI Tending Ducklings	COEI Ducklings	Average Crèche Size	Total Number of Female COEI Observed ¹
5/31/2012	151	217	6.78	221
6/12/2012	25	16	2.29	299

¹ Indicates the total number of female Common Eiders detected near shore in the Outer Harbor Islands, both those attending ducklings and those without (presumably nesting females whose nests or ducklings were lost).

Cormorants and Gulls

Challenging weather conditions in May limited our ability to continue refining photograph methods for documenting nesting cormorants and gulls during boat-based counts. Mean total numbers of nests observed were 1,098 Double-crested Cormorant nests, 50 Great Black-backed Gull nests, and 196 Herring Gull nests (Table 5).

Table 5. Observed number of nesting cormorant and gull pairs surveyed during 18 May 2012 boat-based surveys in Boston Harbor Islands National Recreation Area.

Island	Species¹	Obs1	Obs2	Average	STDEV²	CV
Calf	DCCO ²	59	65	62	4	7
	GBBG	11	12	12	1	6
	HERG	47	60	54	9	17
Little Calf	DCCO	116	147	132	22	17
	GBBG	7	4	6	2	39
	HERG	3	2	3	1	28
Green	DCCO	184	175	180	6	4
	GBBG	27	15	21	8	40
	HERG	8	5	7	2	33
Middle Brewster	DCCO	520	612	566	65	11
	GBBG	1	2	2	1	47
	HERG	69	38	54	22	41
Outer Brewster	DCCO	73	64	69	6	9
	GBBG	7	12	10	4	37
	HERG	82	76	79	4	5
Shag Rocks	DCCO	93	118	106	18	17
	GBBG	1	1	1	0	0
	HERG	0	1	1	1	141
TOTAL	DCCO	1,041	1,155	1,098	81	7
TOTAL	GBBG	54	46	50	6	11
TOTAL	HERG	209	182	196	19	10

¹ DCCO = Double-crested Cormorant, GBBG = Great Black-backed Gull, HERG = Herring Gull

² STDEV = Standard Deviation, CV = Coefficient of Variation

Wading Birds

Wading birds were scheduled to be comprehensively surveyed in 2012, but not all colonies were visited during an appropriate survey window. Available data for the islands that were surveyed are presented in Table 6.

Table 6. Wading bird nests detected during 2012 surveys of Boston Harbor Islands National Recreation Area.

Survey Date	Colony Location	GREG¹	SNEG	BCNH	GLIB
5/14/2012	Calf	0	0	0	0
5/17/2012	Outer Brewster	0	21	41	3
5/18/2012	Middle Brewster	0	0	0	0

¹ GREG = Great Egret, SNEG = Snowy Egret, BCNH = Black-crowned Night Heron, GLIB = Glossy Ibis

In addition to active nest searching, during surveys on Outer Brewster, an observer was positioned above the colony to count the number of flushing adults which was significantly greater than the number of nests detected. One Great Egret, 27 Snowy Egrets, 135 Black-crowned Night Herons, and seven Glossy Ibis adults were observed attending the colony site on Outer Brewster.

Wading bird nesting activity was noted on Sarah Island and Sheep Island during boat-based surveys on 30 May, but comprehensive surveys were not conducted due to disturbance concerns given the advanced stage of development of chicks. Great Egrets, Snowy Egrets, Black-crowned Night Herons, and Glossy Ibis were all present at both sites.

American Oystercatchers and Willets

A combination of boat-based and ground-based surveys detected a total of 23 American Oystercatcher pairs on 13 islands in BOHA (Table 7 and Table 8, Figure 5). Although it was not possible to track productivity for all pairs, repeated surveys indicate that up to nine pairs may have been successful in fledging chicks.

Three pairs of territorial Willets were detected on Snake Island on 12 June, but no nests were located and only a limited survey effort was conducted due to disturbance concerns.

Table 7. Territorial pairs of American Oystercatchers observed during 2012 surveys of Boston Harbor Islands National Recreation Area.

Island	AMOY Pairs	Outcomes
Calf	3	No chicks observed after 5/14
Little Calf	0	Feeding only
Green	0	Feeding only
Graves	0	Feeding only
Middle	1	Nesting on landing beach; 1 adult still present 7/12; no chicks observed
Brewster		
Outer	1	Pair nesting on landing beach; Not observed after 5/18
Brewster		
Shag Rocks	0	
Little	0	
Brewster		
Great	2	1 pair still present 7/12; no chicks observed
Brewster		
Lovells	1	1 nest reported by park staff on 5/16; not observed during 5/31 visit
Georges	0	
Gallops	0	
Snake	5	5 pairs 6/12; 5 fledged chicks reported by E. Jedrey, S. Shulte and park staff on 6/27; observed 4 chicks, 3 of whom were too young to have been seen on June visit on 7/26; outcome = 8 fledged chicks?
Rainsford	2	1 pair with 2 chicks 5/30
Thompson	0	May have been one attempt early in season, unsuccessful.
Spectacle	0	No nesting reported from island volunteers.
Hangman	1	Productivity unknown
Peddocks	0	No nesting on south side beaches.
Sheep	3	3 pairs and 3 chicks observed 5/30; 9 adults with no juveniles on 7/12
Grape	1	Productivity unknown
Slate	0	1 adult - feeding only?
Bumpkin	1	Productivity unknown
Sarah	1	Productivity unknown
Langlee	0	
Ragged	0	
Button	1	Productivity unknown
Total	23	

Table 8. Summary of American Oystercatcher 2012 survey effort in Boston Harbor Islands National Recreation Area. B = boat-based survey, G = ground-based survey, A = adult, P = pair, C = chick.

Island	Survey Date								
	14 May	17 May	18 May	30 May	31 May	12 June	29 June	12 July	26 July
Calf	G, 2P, 1C		B, 3P		B, 3P	B, 1A	B, 1A	B, 1P, 2A	B, 2A
Little Calf			B		B	B	B	B	B, 1A
Green			B		B	B, 3A	B, 1A	B	B
Graves			B		B	B	B	B	B, 1A
Middle Brewster			B, G, 1P		B, 1A	B		B, 1A	B
Outer Brewster		G, 1P	B, 1P		B	B		B	B
Shag Rocks			B		B	B		B	B, 1A
Little Brewster			B		B	B		B	B
Great Brewster			B, 1P		G, 2P			G, 1P	B
Lovells	B				G, 2A	G	G		
Georges									
Gallops									
Snake						G, 5P			B, 7A, 4C
Rainsford	B			G, 2P, 2C					
Thompson									
Spectacle									
Hangman				B, 1P, 1A				B, 1P, 1A	
Peddocks				B					
Sheep				B, 3P, 3C				B, 4P, 1A	
Grape				B				B, 1P	
Slate				B, 1A				B	
Bumpkin				B, 1P				B	
Sarah				B				B, 1P	
Langlee				B				B	
Ragged				B				B	
Button				B, 1P				B, 1P	

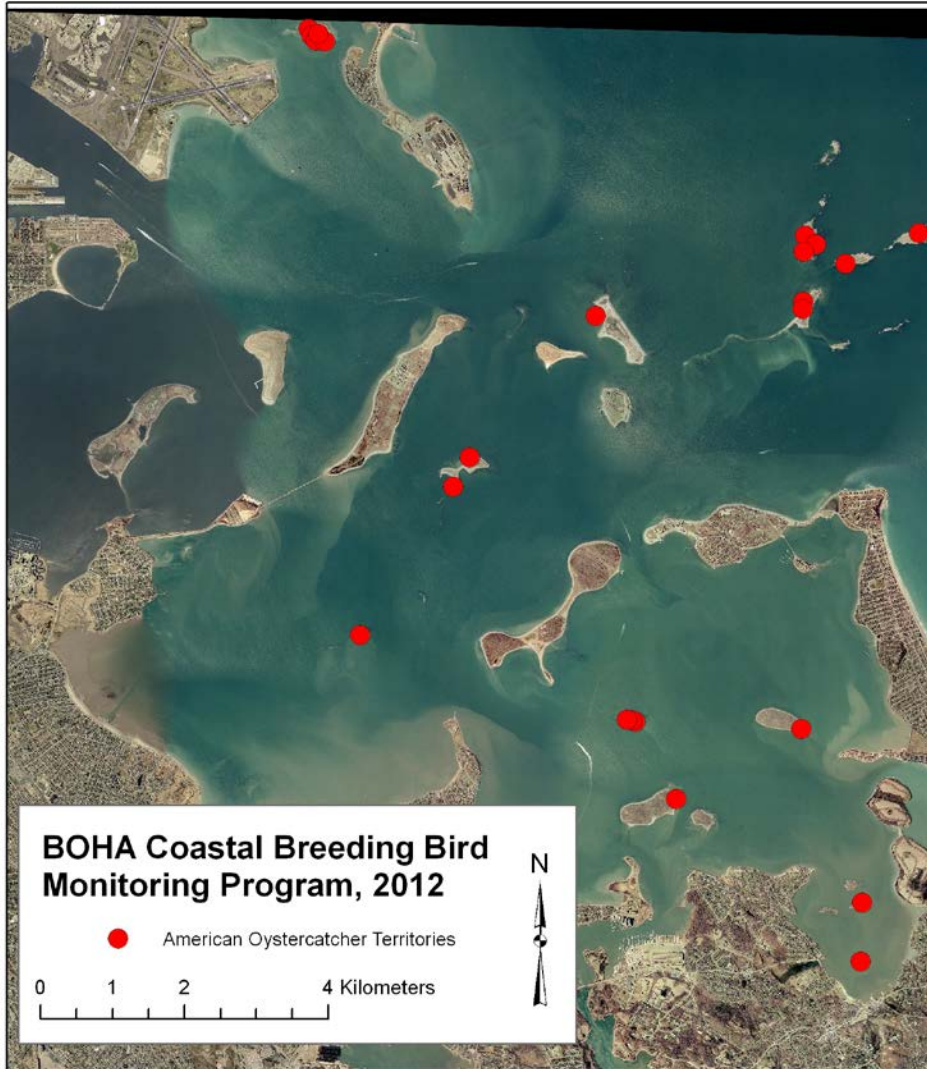


Figure 5. Location of American Oystercatcher pairs detected during 2012 surveys in Boston Harbor Islands National Recreation Area (BOHA).

Terns

In 2012, four Least Tern nests were detected on Lovells Island on 12 June (Figure 6). Based on early season reports from volunteers, it is believed that the colony had been significantly larger in size, but was overwashed in early June and that the 12 June observations were a re-nesting effort. Subsequently, the colony was abandoned, apparently due to a rat infestation as reported by island rangers and evidenced by extensive rat tracks. During a visit to the Spinnaker Island platform on 12 June, 163 adult Common Terns were observed attending the colony. No terns were detected nesting on Snake or Rainsford Islands in 2012 (see Table 2 for survey visit dates).



Figure 6. Location of Least Tern nesting colony on Lovells Island detected during 2012 surveys in Boston Harbor Islands National Recreation Area (BOHA). Google Earth image.

Spotted Sandpipers

Spotted Sandpipers were not surveyed in 2012.

Discussion

Common Eiders

A total of 112 nests were detected in the Outer Harbor Islands in 2012, which is similar to the 107 nests detected in the same survey areas in 2008. Our high count for eider ducklings was 217 observed on 31 May, while by mid-June numbers had declined precipitously. In previous years, high counts ranged from 155 in 2008 to 341 in 2010. The highest duckling counts have generally occurred in mid-June, but have varied from 3 June in 2009 to 28 June in 2011. In 2012, fewer eider crèche surveys were conducted due to an early-season focus in the survey schedule and weather limitations.

In general, Common Eider experience high annual adult survival rates (over 80% in several studies), but generally experience a highly variable degree of reproductive success in any given year and years of ‘near disaster’ are not uncommon (Goudie et al. 2000). In a stable population, low survival of young is compensated by their comparatively long average life span (5 to 6 years). The number of ducklings observed in 2012 was within the range generally observed in BOHA in recent years and does not necessarily suggest a particular concern for nesting eider productivity. More specific information about the productivity of the BOHA eider population would require tracking the fate of individual eider ducklings through their first season.

Cormorants and Gulls

Boat-based surveys of incubating cormorants and gulls are safe and efficient to conduct, but produce highly variable results due to differences in observers and survey conditions (Trocki 2011). Preliminary investigations into the use of high-resolution digital photography to document nesting were promising in 2010, but the methods require additional refinement, and weather conditions were not suitable for further testing in 2011 or 2012. Boat-based surveys are not possible for all islands in BOHA, such as Great Brewster, because boat navigation around these islands is prohibited by bathymetry and navigational hazards.

Ground-based nest surveys for gulls and cormorants are more precise but require considerably more effort and are not feasible for cliff-based colony sites. In addition, ground-based surveys cause much greater disturbance to nesting individuals. In the future, we will continue to survey gulls and cormorants using a mix of boat-based and ground-based techniques.

Wading Birds

While we were not able to comprehensively survey all wading bird colonies in 2012, we did successfully survey Outer Brewster, which is a large and challenging colony to survey due to boat landing restrictions, dense vegetation, and topography. Compared to numbers observed in 2009, it would appear that the Outer Brewster colony has grown; both the total number of nests detected and the adult flush count increased. No Black-crowned Night Herons were observed nesting on Calf Island or Middle Brewster Island where they have been documented in small numbers in the past, but there was no obvious change in habitat conditions accounting for this change. Without comparable numbers for all island colonies, it is difficult to draw any conclusions about the local wading bird population beyond acknowledging a general consistency in colony locations, relative size, and species composition.

American Oystercatchers and Willets

Boat-based surveys were successful in detecting territorial pairs of American Oystercatchers and Willets, but ground-based surveys of beach strand habitat 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 3-year rotation may be the best balance of effort. Regular surveillance of all islands will be undertaken. Many nest locations appear to be used repeatedly, which should increase search efficiency for known nesting locations in the future. Although we were not able to systematically track all individual nests, we did conduct repeated boat-based surveys on islands where American Oystercatchers pairs were observed, and thus have some incidental information about nest fate. These efforts should continue in the future.

Willets were once again observed defending territory on Snake Island in 2012, but have not been observed on any of the other islands in the park. Regular surveillance of all islands will be undertaken on a 3-year rotation and should be sufficient to detect new Willet territories elsewhere in the park, given their visible and vocal nature.

Terns

Although only a small number of Least Terns attempted nesting on Lovells Island in 2012, 75 were observed nesting there in 2011. A smaller colony was present in the same location in 2010, presumably as the result of a re-nesting effort following a predation event at nearby Winthrop Beach. Prior to this re-colonization, Least Terns had been absent in the park since a predation event on Lovells Island in 2007. It is believed that nesting in 2012 was disrupted by both an early season overwash event and by predation by rats later in the season.

Predator control efforts may be warranted if tern nesting is a desired outcome in the park. The variable history of nesting efforts also highlights the importance of continuing to manage for terns in the park, even in years when they may not be present. It is highly recommended that island managers continue to post informational signage and employ all other reasonable efforts to reduce human disturbance at previously known colony sites on Rainsford, Lovells, and Snake islands every season so that appropriate habitat remains available for future use.

Spotted Sandpipers

Spotted Sandpipers were not comprehensively surveyed in 2012.

Volunteer Training, Recruitment, & Coordination

In 2012, a highly skilled group of returning volunteers made short work of a very full waterbird monitoring season. A volunteer training session was conducted prior to the initiation of the field season to introduce safety protocols and review field survey methods and electronic data collection techniques. The full implementation of electronic data collection was generally well received by volunteers and several individuals in particular made significant contributions to improving the database over the course of the season.

A total of nine volunteers and three National Park Service staff members participated in waterbird surveys in BOHA in 2012. All nine were returning volunteers who had been involved

in monitoring in previous years. Volunteer scheduling and coordination was well orchestrated by park staff.

Continuing efforts to enhance communication and coordination among volunteers, staff and park managers during the field season generated much positive feedback and fruitful discussion. Regular surveillance and enhanced communication can improve the likelihood of detecting new species and nesting locations, as well as help to better inform management within the park and attract a consistent group of qualified observers to participate annually.

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