



NEW YORK CITY AUDUBON  
CELEBRATING 30 YEARS OF CONSERVATION

# **NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT: 2015 NESTING SURVEY REPORT**

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## Abstract

New York City Audubon's Harbor Herons Project Nesting Survey of the New York/New Jersey Harbor and surrounding waterways was conducted between 17 May and 25 June, 2015. This report summarizes long-legged wading bird, cormorant, gull, and tern nesting activity observed on selected islands, aids to navigation, and mainland sites.

*Species summaries:* Seven species of long-legged wading birds nested on eight islands in New York Harbor and at several mainland sites, while two additional wading bird species nested exclusively at mainland sites. Surveyed wading bird species, hereafter collectively referred to as waders, included Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, Tricolored Heron, Great Blue Heron, and Green Heron. Overall, the total count of wader nests decreased 14% compared to last year's survey. The most significant decreases since 2014 included Black-crowned Night-Heron (-21%), the numerically dominant nesting species in most mixed-species colonies, and Glossy Ibis (-55%). A slight decrease was also observed in Great Egret nesting pairs (-7%), while Yellow-Crowned Night-Heron numbers increased (30%) as did Snowy Egret numbers (13%). Tricolored and Little Blue Herons continued to nest in low numbers. Cattle Egret, observed in small numbers in years previous to 2011, was again not observed nesting in New York Harbor in 2015. Great Blue Heron and Green Heron, observed nesting in small numbers on the harbor islands in past years, were not observed nesting on the islands in 2015, but were reported nesting in small numbers at mainland sites in New York City. A total of 1,750 Double-crested Cormorant nests were observed in 2015, a 4% increase since 2014, continuing an increasing trend exhibited since 2005. Gull nesting activity was observed on eight of thirteen surveyed islands; no nesting activity was observed on Isle of Meadows nor on Shooters, Prall's, Huckleberry, or Goose Islands. North Brother and Canarsie Pol were not surveyed for gull nesting activity. Common tern nesting activity was again observed on Governor's Island.

*Island summaries:* For the first time in the history of this survey, the greatest species diversity in 2015 was observed on Elders Point East Island (six wader species); this colony has grown rapidly since first established in 2010. Nesting activity in Jamaica Bay was concentrated on Subway Island and Elders Point East; wader populations experienced a substantial increase on Elders Point East (49%) but for the second year in a row decreased on Subway Island (-36%), while nesting activity on Canarsie Pol was entirely absent for the third consecutive year. As in recent years, Hoffman Island continued to host the greatest total number of nests, though this island exhibited a 14% decrease in total nests since 2014. Hoffman was the second most diverse colony in 2015, with five wader species. For the first time in this survey, wader nesting was observed on Governors Island, where two pairs of Yellow-crowned Night-Herons nested in 2015. After a substantial increase last year of 40% over 2013, South Brother Island exhibited a 32% decrease in nesting activity over 2014—primarily due to a 51% decrease in observed Black-Crowned Night-Heron nests—while nearby Mill Rock Island exhibited a 20% increase in nesting pairs. North Brother Island exhibited no signs of wader nesting activity in 2015, marking the eighth consecutive year it has been inactive. Goose Island, abandoned shortly before the 2013 survey likely due to a combination of human disturbance and nest predation, exhibited no nesting activity for the second year in a row. Wader nesting activity on Huckleberry Island continued at very low levels, and evidence of predators on the island continued. Isle of Meadows and Prall's

Island, in the Arthur Kill, and Shooters Island, in the Kill Van Kull, showed no evidence of wading bird nesting this year. The mainland nesting colony of Yellow-crowned Night-Herons at the Redfern Houses in Far Rockaway exhibited a slight increase this year (22%); this species has also established several new small colonies at other mainland sites in Brooklyn and the Bronx, in addition to Governors Island. Double-crested Cormorants continued to nest on eight islands in the harbor; cormorant numbers increased 4% over 2014, continuing a decade-long trend of slow population increase in the harbor.

## **Introduction**

New York City Audubon's 2015 Harbor Herons Nesting Survey marks the 31st consecutive year of this project. The primary objective of the surveys is to monitor the population status of wading birds (i.e., herons, egrets, and ibis) and other colonial waterbirds on select islands and mainland sites in New York/New Jersey (NY/NJ) Harbor and surrounding waterways, while also noting the presence of other nesting bird species and current nesting habitat.

In Fall 2004, NYC Audubon made a decision to shift the Harbor Herons Nesting Survey from an annual to a triennial schedule, and in intervening years to conduct interim surveys on islands where nesting occurred in the prior year. An interim nesting survey was conducted in 2015. (The next comprehensive survey will take place in 2016.)

The U.S. Army Corps of Engineers and The Port Authority of New York & New Jersey "Comprehensive Restoration Plan for the Hudson-Raritan Estuary" and the Harbor Herons Subcommittee of the Harbor Estuary Program's "Harbor Herons Conservation Plan" provide historical perspective on Harbor Herons and their breeding and foraging habitat, identify threats to the persistence of these species in the Harbor, and lay out a plan of action for protecting these birds in the future.

This report summarizes nesting activity of long-legged wading birds, cormorants, gulls, and terns observed on selected islands, aids to navigation, and at mainland colonies documented during the 2015 field season, between 17 May and 25 June. The objectives of the 2015 survey were to: (1) monitor the population status of long-legged wading birds (i.e., herons, egrets, and ibis), cormorants, and gulls on selected islands; (2) document nesting habitat used by long-legged wading birds and cormorants; and (3) record the presence of other important nesting or migratory bird species.

Monitoring long-term trends and short-term conditions in long-legged wading bird and other colonial waterbird nesting populations in NY/NJ Harbor provides both an estimate of the relative health and stability of local colonial waterbird populations, and a valuable indicator of the overall health of the region's natural resources.

## **Methods**

The 2015 survey followed field methods designed for previous Harbor Herons Project nesting surveys [Katherine Parsons (1986-1995), Paul Kerlinger (1996-2004)] and the standard protocol of the New York State Department of Environmental Conservation's Long Island Colonial Waterbird and Piping Plover Survey (Litwin et al. 1993). All counts were conducted between 6:00AM and 4:00PM, and under clear conditions without rainfall, high winds (>8 knots), or temperatures above 80°F. Counts were conducted from 17 May to 25 June, 2015.

Islands fully surveyed in 2015 (Table 1, Figure 1) using a combination of nest and adult counts included two in Lower New York Harbor (Hoffman and Swinburne islands); three in the Arthur Kill and Kill Van Kull complex; three in the East River/Western Long Island Sound area

(U Thant, Mill Rock, and South Brother islands); two in the Hutchinson River/Long Island Sound area (Goose and Huckleberry islands); and three in Jamaica Bay: Elders Point East, Little Egg Marsh, and Subway Island. North Brother Island in the East River/Long Island Sound and Canarsie Poll in Jamaica Bay, which have not hosted nesting waders since 2007 and 2012, respectively, were each scanned by boat for evidence of nesting waders. Also presented in this report are observations of (1) Yellow-crowned Night-Heron nesting at several mainland colonies and on Governors Island, (2) Green Heron and Great Blue Heron nesting in small numbers at mainland sites, and (3) Common Tern nesting on Governors Island.

Each island was surveyed by a research team consisting of the author, staff and volunteers from New York City Audubon and other organizations, and/or staff from New York City Department of Parks and Recreation (NYCDPR). Double-crested Cormorant counts were conducted as part of an ongoing study of cormorant population dynamics, habitat use, and foraging ecology in NY Harbor. Surveys of islands in the Kill Van Kull/Arthur Kill complex were conducted by Ellen Pehek and staff of NYCDPR. Surveys at Goose and Huckleberry islands were conducted jointly with David Künstler (NYCDPR, Van Cortlandt & Pelham Bay Parks Administrators' Office). Don Riepe of the American Littoral Society/Jamaica Bay Guardian/NYC Audubon provided additional information on colonial waterbird activity in Jamaica Bay.

Surveys were conducted by one or two teams of researchers, led by the author and trained volunteers. Groups quickly and systematically searched for nests on each island, initially focusing effort on areas occupied by nesting birds in previous years. Depending on the colony size, each team was composed of two counters (i.e., one person using a telescopic mirror pole to examine contents of nests up to five meters from the ground, and another to record data), and from one to three spotters, who moved slightly ahead to direct the counters to nests and keep multiple teams from re-sampling the same nests. A nest was deemed active if it contained eggs or young, if there was evidence of recent construction (e.g., fresh twigs or vegetation in nest) or use (e.g., a layer of fresh feces underneath a nest), or by direct observation of adults on or within one meter of a nest with the above characteristics. Whenever possible, nests were identified to species by the presence of young, eggs, and clearly discernible nest structure. Nests beyond the reach of the mirror pole were examined with binoculars. If nest contents could not be confirmed, but other evidence suggested recent activity (e.g., feces, new nest construction), nesting species was noted as 'unknown'. Old or unused nests were noted in the count as 'inactive,' but not included in the final tally of active nests. Nesting vegetation (i.e., tree, shrub, or vine species) was recorded for all species whenever possible by observers skilled in plant identification.

Double-crested Cormorant surveys were conducted by direct observation within colonies (as detailed above). After all the nests were counted in a given tree, the tree was tagged with forestry flagging tape. Boat counts were conducted on U Thant Island, where nests were counted with binoculars from a boat no more than 20 meters away from the colony.

Adult and/or nest counts of Great Black-backed Gulls and Herring Gulls were conducted at all surveyed colonies, and are presented in this report. When adults were counted in the vicinity of selected colonies, a nest was assumed present for each adult observed, as one-half of adults are assumed to be foraging away from the nesting colony during daytime (see Litwin et al. 1993; Kerlinger 2004).

## **Transportation and Permits**

Boat access to islands was provided by NYC Audubon and Don Riepe of the American Littoral Society/Jamaica Bay Guardian.

Permits were issued by the NYCDPR and the NPS to conduct surveys on protected islands under city and federal jurisdiction, and permission to access the privately-owned Huckleberry Island was offered by the Huckleberry Indians, Inc.

## **Acknowledgements**

We sincerely thank all volunteers (noted by name in the island profiles), organizations, and agencies that participated in the 2015 surveys.

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## Results

### Overview:

In 2015, seven species of long-legged wading birds were observed nesting on eight islands in NY Harbor and at several mainland colonies (Table 2); two additional species nested exclusively at mainland sites. These nine species, hereafter collectively referred to as waders, included Black-Crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-Crowned Night-Heron, Little Blue Heron, and Tricolored Heron; Great Blue Heron and Green Heron nested exclusively at mainland sites. The four most active nesting colonies, with the greatest number of nests and a good diversity of nesting species, were Hoffman, South Brother, Subway, and Elders Point East Islands. Elders Point East, while hosting the smallest total pairs of these four, was the most diverse colony in the harbor in 2015, with six species of nesting waders present. Five wader species nested on Hoffman Island, the largest colony in the harbor, while South Brother and Subway Islands each had four species of nesting waders. Canarsie Pol in Jamaica Bay has historically been the most diverse and one of the largest wader colonies in the New York Harbor, however in 2015 there was no nesting activity on this island for the third consecutive year. Norther Brother Island also continued to exhibit no nesting wader activity, having been abandoned in 2008 after several years of decline. Goose Island, largely abandoned before the 2013 survey, again exhibited no nesting activity in 2015; this island has been at least temporarily abandoned, likely due to a combination of human disturbance and nest predation. Huckleberry Island, which has declined over the last decade, continued to exhibit little nesting activity and signs of nest predation. None of the islands in the Arthur Kill/Kill Van Kull complex (Isle of Meadows, Prall's Island, and Shooters Island), which were the core of NY/NJ Harbor's breeding wader community from the 1970s until the late 1990s, showed evidence of nesting waders this year.

2015 was an interim survey year, and the majority of comparisons noted in this report are between this year's survey and the 2014 survey—though longer-term trends are noted where deemed relevant. 2015's survey revealed a decline in the nesting wader population of 14% over 2014, and marks the lowest nesting wader population recorded since 1989 (excluding the years of 1998, 2006, and 2012, when the survey was incomplete or limited). Figure 2 illustrates the nesting activity of wader species in the NY/NJ harbor over the history of these surveys, with years of uncertainty in the data indicated with gray bars. Figure 3 illustrates the shifting patterns of nesting island use over the same time period.



## **Island Accounts:**

### Hutchinson River/Long Island Sound:

#### Huckleberry Island (10 acres)

27 May 2015, 9:20am-11:05am

By the author, Susan Elbin (NYC Audubon); Susan Stanley (NYCDPR); John Burke (Huckleberry Indians, Inc.); Sarah Heintz (NYC Audubon volunteer)

The Huckleberry Island nesting survey revealed three Great Egret nests and two Black-crowned Night-Heron nests (see Table 2). Two of the Great Egret Nests were not accessible and though they appeared recently active, no adults were observed. Broken eggs were found beneath the third nest, indicating recent predation. The two Black-crowned Night-Heron nests were not accessible to check contents and appeared recently active, but no adult birds were seen in the vicinity of the nests. Several inactive snowy egret nests were found, most likely from prior years. Raccoon tracks were found on the island. It seems possible that waders had recently abandoned this island due at least in part to predators. This year marks a continued trend of low numbers of nesting waders on Huckleberry Island, since a 20-year high of 140 nests observed in 2001. Double-crested Cormorant numbers also continued a decline observed on the island since 2010, and the 81 nests observed represent a striking 49% decrease from 2014. Continuing a decline over the past 20 years, no Herring Gull or Great Black-backed Gull nests were observed; gulls have been found to be nesting in very low numbers or absent for the past five years. Eight American Oystercatchers were observed on the island, likely representing four nesting pairs. Spotted Sandpipers were also observed. Two adult Mallards and 15 adult Canada Geese (with 13 confirmed nests) were observed; it appeared several Canada Goose nests had been subject to predation. Other bird species observed on or near the island included Brant, Tree Swallow, American Robin, Yellow Warbler, Common Yellowthroat, Gray Catbird, Song Sparrow, Red-winged Blackbird, Common Grackle, and American Goldfinch.

Wader nesting activity on Huckleberry Island has continued to decline over the past decade and continued monitoring of this colony is imperative. The presence of predators (rats and raccoons) has been suspected as a cause of this decline; no signs of rats were encountered on this visit. New York City Audubon and NYCDPR will work closely with the Huckleberry Indians to insure necessary researcher access to this island, and to understand and address any potential factors contributing to the continued decline. Huckleberry Island has been a critical nesting site for both waders and cormorants in the New York City area. Nearby David's Island may also provide suitable nesting habitat for waders, and this island should be monitored for future nesting activity.

#### Goose Island (1 acre)

27 May 2015, 12:00pm-1pm

By the author, Susan Elbin (NYC Audubon); Susan Stanley (NYCDPR); Sarah Heintz (NYC Audubon volunteer)

Goose Island, abandoned shortly before our 2013 survey was conducted, exhibited no active nesting wader activity for the second consecutive year. Shortly before our 2013 survey the island

evidenced 87 active pairs of waders, but during the survey itself we found only eight active nests, three dead adult waders, multiple nests with broken eggs either in or beneath the nests, and four predated Canada Goose nests. Evidence of predators themselves was clear: Raccoon droppings were observed in predated nests and on the ground, and Norway Rat presence on the island was also reported. Evidence of human presence on the island was also noted. During the 2015 survey, though no evidence of active wader nesting was found for a second year, one adult Black-Crowned Night-Heron was flushed from trees on the island while two Great Egrets and two Snowy Egrets were seen foraging nearby. Six active Canada Goose nests were found, while 116 adults were counted around the island. Two adult Mallards were also observed nearby. No gull nests were observed on the island. Evidence of human disturbance was again noted in 2015. Other bird species observed on the island in 2015 included Northern Flicker, European Starling, and Common Grackle (two nests).

Additional signage has been posted on the shoreline of Goose Island in an effort to reduce unwanted visitation. Outreach efforts to the local community to raise awareness may be helpful in allowing a healthy wader colony to reestablish itself here.

#### East River:

##### North Brother Island (19 acres):

21 May 2015, 12:40pm-12:50pm

By the author, Susan Elbin, Elizabeth Craig (NYC Audubon); Jeff Kolodzinski (Port Authority of New York & New Jersey)

North Brother Island has not exhibited signs of nesting wader activity since 2007. Former nesting areas were scanned by boat in 2015 and no evidence of wader or gull nesting activity was observed. Waders seen perched in trees on the south side of North Brother during the South Brother survey were thought to be birds from the South Brother colony.

NYCDPR continues to conduct restoration activities on North Brother Island.

##### South Brother Island (12 acres)

21 May 2015, 8:50am-12:30pm.

By the author, Susan Elbin, Elizabeth Craig (NYC Audubon); Michael Feller (NYCDPR); Laura Francoeur, Jeff Kolodzinski (Port Authority of New York & New Jersey); Stefan Guelly, Melissa Murgittroyd (USDA/APHIS); Rita McMahon (NYC Audubon volunteer)

A total of 270 nests of four wader species (in order of decreasing frequency, Black-crowned Night-Heron, Snowy Egret, Great Egret, and Yellow-crowned Night-Heron; see Table 2) was observed throughout the island. This total represents a marked decrease since 2014 (-32%), in contrast to the 40% increase observed between 2013 and 2014. The majority of the decline since 2014 is attributable to a 51% reduction in observed Black-crowned Night-Heron nesting pairs. The smaller number of nesting Yellow-crowned Night-Herons also decreased from last year's high of 21 nesting pairs to 9 pairs (-57%), while Snowy Egret numbers increased by 44% to 75 pairs. The South Brother colony was the second largest wader colony in the New York Harbor in

2015, though not as diverse as some of the smaller colonies. For the fourth consecutive year, no evidence of Glossy Ibis nesting activity was observed on this island; Glossy Ibis had maintained a small breeding population over the previous 20 years. The number of Double-crested Cormorant nests increased compared to last year (300 nests, a 129% increase), the highest count since 2006 and marking a break in a declining trend over the past 20 years.

Waders on South Brother Island primarily nested in box elder, mulberry, sycamore maple, hackberry, black cherry, oriental bittersweet, multiflora rose, and wild grape. Nesting habitat for cormorants included a stand of locust trees in the center of the colony, where the majority of nests were located, as well as box elder, mulberry, pin oak, Norway maple, and hackberry. Cormorants therefore exhibit some nest-site preferences in common with wader species, and compete with waders for these nest-sites in some instances. There continued to be large areas of overlap between cormorant and wader nesting habitat, including the continuing presence of Yellow-crowned Night-Heron nests within the principal Double-crested Cormorant colony (first noted in 2014). The cormorants have been less centralized in their distribution during the past several years and are nesting throughout the colony.

Gull counts on the island produced a total of two Herring Gull nests (18 adults) and four Great Black-backed Gull nests (27 adults); there was no change in Herring Gull nests, but a sharp decline in Great Black-backed Gull nests (81%). Other bird species observed included Canada Goose (5 nests), Mallard (4 adults), Gadwall, Red-breasted Merganser, Spotted Sandpiper, Tree Swallow, Gray Catbird, Yellow Warbler (1 nest), American Redstart, and Song Sparrow. For the third consecutive year, no evidence of Great Horned Owl nesting activity was observed.

Note: Herring and Great Black-backed Gulls are nesting on roof tops on neighboring Rikers Island. The population is being controlled via egg addling, but the USDA/Aphis/Wildlife Services biologists counted 646 Herring Gull nests and 8 Great Black-backed Gull nests this year.

#### Mill Rock (3 acres)

21 May 2015, 1:35pm-2:30pm

By the author, Susan Elbin, Elizabeth Craig (NYC Audubon); Jeff Kolodzinski (Port Authority of New York & New Jersey)

A total of 115 wader nests was observed on Mill Rock Island, an increase of 20% compared to 2014. This reverses a declining trend observed in the last two years, but is still a reduction in size since the colony reach its largest documented population of 203 wader pairs in 2012. Three species of waders (in order of decreasing frequency, Black-crowned Night-Heron, Great Egret, and Snowy Egret) were observed nesting on this island; counts of all three species increased over 2014. Two Herring Gull nests (down from 29 nests in 2014) and 16 Great Black-backed Gull nests (consistent with our 2014 count) were confirmed. Our count of Double-crested Cormorants (49 nests) increased 96% over 2014; cormorant numbers have increased steadily since the species was first found nesting here in 2011. Other bird species observed on the island included Canada Goose (6 nests) and Mallard (2 nests).

Human disturbance continued to be evident on Mill Rock Island. Man-made structures including benches and tables have persisted over the last few years. There is evidence of visitation from kayaking clubs, which must be discouraged from disturbing this growing nesting colony. Future efforts to discourage human disturbance should include increased signage on the island, particularly at the north harbor. If possible, kayaking clubs known to visit Mill Rock Island and other Harbor Herons nesting islands should be contacted and educated about the importance of maintaining zero human disturbance during the critical nesting period.

U Thant (1/4 acre)

3 June 2015 (cormorants); 17-29 May 2015 (gulls)

By the author and NYC Audubon Ecocruise participants (NYC Audubon); Jim Matthews (NYC Audubon volunteer)

The U Thant double-crested cormorant colony was surveyed from a boat with binoculars, approximately 10 meters from shore. Forty Double-crested Cormorant nests were observed on the island both on the collapsed metal arch sculpture and in trees. Approximately the same number of nests has been observed annually on this island since the colony was first established in 2008. A mean of 25 Great Black-backed adults and less than 1 Herring Gull adult was observed on the island between 17 and 29 May.

*Staten Island – Arthur Kill and Kill Van Kull*

Isle of Meadows (101 acres)

11 June 2015, 10:00am-3:00pm

By Ellen Pehek, Leila Mougoui

This year no evidence of wader nesting activity was observed on Isle of Meadows, which has not been found to host breeding wading birds since 2001. No evidence of raccoons was noted on the island. Isle of Meadows contains habitat suitable for breeding wading birds and may be a good candidate for recolonization by colonial nesting birds in the future.

Prall's Island (88 acres)

4 June 2015, 10:00am-3:00pm

By Ellen Pehek, Leila Mougoui

No evidence of wader nesting activity was observed on Prall's Island in 2015. The site of the most recent Black-crowned and Yellow-crowned Night-Heron nesting attempts off western Staten Island, Prall's Island has continued to be inactive since 2005. Efforts to control an ALB infestation on the island in March-April 2007 resulted in the removal of most suitable nesting trees (approximately 3,000 trees in total), and the resulting habitat does not seem optimal for nesting wading bird, despite restoration efforts in the intervening years. Two raccoon carcasses were found on the island during the survey, and evident browsing by abundant white-tailed deer on the island may limit regeneration of trees and shrubs that could create a substrate suitable for wader nesting. This combination of variables may make recolonization of Prall's Island by waders unlikely in the absence of further restoration efforts combined with methods to control deer browsing and predator access to tree-nesting birds.

Shooters Island (48 acres)

25 June, 2015, 11:00am-2:30pm

By Ellen Pehek, Susan Stanley, Leila Mougoui

No evidence of wader nesting activity was observed on Shooters Island in 2015. With the exception of 2011 and 2014, this island has been surveyed every year since 1985. No nesting has been noted since 1999. Eight Double-crested Cormorant nests were observed on dry docks and other wreckage west of the island; this cormorant colony has exhibited a continuous decline over the past 20 years. The structures upon which the birds nest continue to collapse, offering fewer nesting sites.

Lower NY Harbor

Hoffman Island (10 acres)

22 May 2015, 9:50am-1:00pm; 28 May 2015, 9:45am-12:30pm

By the author, Susan Elbin, Andrew Maas, Kellye Rosenheim (NYC Audubon); Don Riepe (American Littoral Society); Ellen Pehek (NYCDPR); Melissa Malloy (USDA/APHIS); Melanie del Rosario, Elizabeth Dluhos (NYC Audubon volunteer)

A total of 504 nests of five wader species was observed (in order of decreasing frequency, Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, and Little Blue Heron; see Table 2). This total constitutes a 14% decrease since 2014; numbers have fluctuated in this range since the wader population reached an all-time high of 824 pairs in 2011. Nest counts of all species decreased slightly since 2014, with the exception of Snowy Egrets, which increased slightly. Glossy Ibis numbers suffered the most striking decline, decreasing from 83 to 38 pairs (-54%). Waders primarily nested in mulberry species, multiflora rose, box elder, black locust, hackberry, oriental bittersweet, wild grape, and Virginia creeper.

A total of 783 Double-crested Cormorant nests was observed on Hoffman Island in 2014, a 6% decrease since 2014, marking the first reduction in nesting pairs on Hoffman for this species since our 2010 survey.

Totals of 71 Herring and 44 Great Black-backed Gull nests were counted during the survey, marking a decrease in both species over 2014 (19% and 38%, respectively). Additional species observed included Canada Goose (7 nests), Fish Crow (1 nest), Common Yellowthroat, Song Sparrow, and Red-winged Blackbird.

Swinburne Island (4 acres)

28 May 2015, 1:05pm-2:20pm

By Susan Elbin, Kellye Rosenheim (NYC Audubon); Elizabeth dluhos (NYC Audubon volunteer).

A total of 281 Double-crested Cormorant nests was observed; an 11% decrease from 2014 and a 34% decrease since the study's highest count of 426 nesting pairs, recorded in 2012. Nests were located on the remains of buildings, on the ground, and in several hackberry and black locust trees. The habitat on Swinburne Island was significantly remodeled in October 2012 during

Hurricane Sandy, which removed the majority of topsoil for the island, completely or partially felled all the standing buildings, and exposed foundations that had historically not been exposed. The observed decline since 2012 may be a result of degraded nesting substrate. Three adult cormorants banded in previous years were observed breeding on Swinburne Island again this year; L23 was banded In 2007 and was breeding on Swinburne in 2014; M98 was banded in 2008 and was nesting on Swinburne in 2012; a third bird identified as most likely one of our previously banded birds had lost its field readable band. Totals of 94 Herring Gull nests and 23 Great Black-backed Gull nests were observed, a decrease since 2014 of 10% and 60%, respectively. Additional species observed included Red-winged Blackbird.

### Jamaica Bay

#### Elders Point East Marsh (21 acres)

18 May 2015, 11:00am-11:32am

By the author, Debra Kriensky (NYC Audubon); Don Riepe (American Littoral Society); Ellen Pehek (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey)

Elders Point East was recently restored as part of a marsh restoration project undertaken in Jamaica Bay by the U.S. Army Corps of Engineers (USACE). 2015 was the sixth year since the restoration in which colonial waterbirds had the opportunity to nest on Elders Point Marsh East, and the size and diversity of the breeding population has continued to increase. A total of 158 wader nests was observed on this island from six wader species in 2015 (in order of decreasing frequency, Snowy Egret, Black-crowned Night-Heron, Great Egret, Glossy Ibis, Little Blue Heron, and Tricolored Heron). This total represents a 49% increase from 2014. Counts increased for both Snowy Egret and Black-crowned Night-Heron, while Great Egret numbers remained stable. The Elders Point East colony has steadily grown in size since 2010, the first year nesting birds were recorded post-restoration, and is now the fourth largest colony in the harbor. The increasing nesting activity on this island has coincided with the concurrent decline and abandonment of nearby Canarsie Pol, as well as with a more modest decline in the past two years on Subway Island. Wading birds nested in low trees and shrubs, and on the ground. Double-crested Cormorants have moved into some nesting territory located in mulberry and ailanthus trees on the northern part of the island formerly occupied by waders. In 2015, the majority of waders at this colony were nesting in a broad expanse of high-tide bush on the southern part of the island. Because almost all of these nests are located within four feet of the ground, this colony may be particularly vulnerable to disturbance by recreational boating activity in Jamaica Bay, as well as to storms and seal-level rise.

A total of 208 Double-crested Cormorant nests was observed, a 16% increase over 2014. Many cormorants were nesting on the ground. Totals of 190 Herring Gull adults and 14 Great Black-backed Gull adults were observed during this year's survey. Other bird species observed on the island included Clapper Rail, three American Oystercatcher adults, Least Sandpiper, Laughing Gull, Fish Crow, and Red-winged Blackbird.

Subway Island (40 acres)

18 May 2015, 12:12am-1:10pm

By the author, Debra Kriensky (NYC Audubon); Don Riepe (American Littoral Society); Ellen Pehek (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey)

The Subway Island colony was the third largest nesting colony in New York Harbor in 2015. This year was the sixth consecutive year in the history of these nesting surveys in which a large group of waders was found nesting on this island. A total of 197 wader nests was observed, representing four species of waders (in order of decreasing frequency, Black-crowned Night-Heron, Great Egret, Snowy Egret, and Glossy Ibis). This total represents a reduction of 36% since 2014, and is the second consecutive year of decline. While counts of all wader species on Subway Island declined since 2014, nesting pairs of Glossy Ibis declined particularly (-62%). The influx of birds on Subway Island in the past six years coincided both with the abandonment of Canarsie Pol and with the temporary cessation of service on the subway line (A-train) that crosses the island, passing very close to the nesting colony. The A train was out of service after Hurricane Sandy, from 29 October 2012 through 30 May 2013 (post-survey), so it is possible that the decline observed in the last two survey years is a result of disturbance caused by renewed subway traffic. Totals of 331 Herring Gull adults and 33 Great Black-backed Gull adults were observed. Thirty American Oystercatcher adults, 8 Canada Goose adults, and 2 Mallard male adults (1 nest) were observed on the island. Other species present included Willet, Ruddy Turnstone, Forster's Tern, Fish Crow, Gray Catbird, Song Sparrow, Red-winged Blackbird, and Boat-tailed Grackle.

Little Egg Island

18 May 2015, 9:52am- 10:30am

By the author, Debra Kriensky (NYC Audubon); Don Riepe (American Littoral Society); Ellen Pehek (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey)

For the third consecutive year, a small colony of nesting waders was observed on Little Egg Island, following a ten-year period in which intermittent surveying did not find evidence of nesting activity. A total of 13 Black-crowned Night-Heron nests were observed, consistent with our 2014 survey; three Snowy Egret nests were observed, the second year this species has been found to nest on this island. One adult Yellow-Crowned Night-Heron was also observed. A total of 195 Herring Gull adults and 129 Great Black-backed Gull adults were observed. Other bird species observed included Brant, Canada Goose (8 adults), American Oystercatcher (39 adults), Willet, Ruddy Turnstone, Dunlin, Short-billed Dowitcher, Semipalmated Sandpiper, Laughing Gull, Forster's Tern, and European Starling.

Canarsie Pol (220 acres)

18 May 2015, 11:45am-11:55am

By the author, Debra Kriensky (NYC Audubon); Don Riepe (American Littoral Society); Ellen Pehek (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey)

For the third consecutive year, no nesting wader activity was evident on Canarsie Pol, and 2015 marks the fourth consecutive year of massive decline in nesting activity on this once productive nesting island. It is unclear why these declines have occurred, but the presence of mammals on

the island, including raccoons, may have caused these declines as it has done on other nesting islands in Jamaica Bay. Further investigation is highly recommended, as this island has historically been one of the largest and most diverse heron colonies within the New York Harbor system.

Birds observed in a partial survey of the island's shoreline revealed species including Canada Goose, Brant, American Oystercatcher, Spotted Sandpiper, Herring Gull, Great Black-backed Gull, Laughing Gull, Forster's Tern, Osprey, Northern Harrier, Fish Crow, European Starling, and Red-winged Blackbird.

#### Other Jamaica Bay islands

Other islands in Jamaica Bay, such as White Island and Ruffle Bar, were not found to host nesting waders in 2013, and as a result were not surveyed during this interim nesting survey year.

#### Upper New York Bay

##### Governors Island

Two pairs of Yellow-crowned Night-Herons nested on Governors Island in 2015. This colony should be officially surveyed in future years.

Since 2008, a colony of Common Terns has nested on three abandoned piers on the southeast end of Governor's Island. The entire colony was last officially surveyed in 2013. Survey access was restricted to one pier (Lima) due to structural instability in 2014. The nesting population on Lima Pier was found to have increased by 200% over 2013; this increase may be attributable to the addition of oyster shell nesting substrate to the pier by Elbin and Craig prior to the 2014 breeding season. In 2015, we were again only able to access Lima Pier, which had 24 nesting pairs, slightly lower than in 2014. No habitat enhancement was done in 2015. Birds were observed nesting on the other two piers, Tango and Yankee, but we were not able to get a reliable count.

#### **Aids to Navigation:**

Aids to navigation in the Kill Van Kull and Arthur Kill were not surveyed in 2015. Hugh Carola (program director, Hackensack Riverkeeper) observed 37 nesting pairs of Double-crested Cormorants on aids to navigation in Newark Bay.



## **Mainland Accounts:**

New York City Audubon's Harbor Herons Project has traditionally reported nesting activity on island colonies only. Three species of waders are known to have nested recently in mainland areas: Yellow-crowned Night-Heron, Green Heron, and Great Blue Heron. Newly founded Yellow-crowned Night-Heron colonies have been included in totals for nesting wading birds in this report. Small numbers of Green Herons and Great Blue Herons are noted here but not included in report totals at this point, as numbers for these colonies have not been included in recent years' data.

The nesting colony of Yellow-crowned Night-Herons located at the Redfern Houses in Far Rockaway was visited on 10 June 2015, 11:05am-12pm by the author and Debra Kriensky.

A total of 50 nests was observed (Table 2), a 22% increase over 2014. Nest count numbers have recovered since a decline was documented in 2011 following possible predation by red-tailed hawks in 2010. This is the eleventh year the Red Fern colony has been confirmed.

Several new mainland colonies of Yellow-crowned Night-Herons were reported in New York City in 2015. These included colonies at Bushwick Housing Project (~10 pairs), Sheepshead Bay (~6 pairs), and Throggs Neck (~4 pairs). Possible colonies on Staten Island have not been documented. Hugh Carola has presented information on Yellow-crowned Night-Heron nesting activity in the Meadowlands and northern New Jersey at Harbor Estuary Program Harbor Herons Subcommittee meetings. Known nesting sites for this species have included Laurel Hill County Park, Schmidt's Woods Park and Harmon Cove in Secaucus. This year there were ten nesting pairs at Harmon Cove, similar to numbers found there in recent years, and no report of nesting at Schmidt's Woods Park in Secaucus, where low numbers had nested in recent years.

Though several Green Heron pairs have nested in recent years in Brooklyn's Prospect Park, no nesting activity was documented by local birders in 2015. This species is also known to nest at various mainland sites on Staten Island. One pair of Great Blue Herons nested for a third consecutive year in Staten Island's Clove Lakes Park.

## **Species Accounts:**

The species trends discussed below are based primarily on comparisons of nesting numbers between 2014 and 2015; both surveys were interim surveys.

Black-crowned Night-Heron (517 pairs): Black-crowned Night-Herons were observed on seven islands in 2015 (in order of decreasing colony size, Hoffman, South Brother, Subway, Mill Rock, Elders Point East, Little Egg, and Huckleberry Islands; see Table 2) and were the numerically dominant species both harbor-wide and in several mixed-species colonies including South Brother Island, Mill Rock, and Subway Island. Total observed nesting activity decreased 21% compared to 2014. A particularly sharp decline of 51% was noted on South Brother Island between 2014 and 2015. Declines for this species in the survey area have been observed in four of the past five surveys. (See Figure 4.)

Yellow-crowned Night-Heron (82 pairs): Yellow-crowned Night-Herons were observed on three islands in 2014 (in order of decreasing colony size, South Brother and Little Egg Islands, as well as Governors Island, a new island location for nesting wading birds in the time of this survey). Numbers of nesting pairs on islands declined somewhat since 2014, particularly on South Brother Island, where 9 nesting pairs were counted, down from 21 pairs in 2014. (These nests were again placed within the principal Double-crested Cormorant Colony, a pattern first observed in 2014.) However, this species has increased its presence in several new small mainland colonies in Brooklyn and the Bronx, resulting in an overall 30% increase in the survey area over 2014. The largest colony continued to be the mainland colony at Redfern Houses (50 nests), which exhibited a 22% increase since 2014. An additional small colony was found at a local New Jersey site. See the description of these colonies as well as the New York City mainland colonies above in the mainland accounts section. (See Figure 5.)

Great Egret (381 pairs): Great Egrets were observed on six islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, Subway, South Brother, Mill Rock, Elders Point East, and Huckleberry Islands; see Table 2). This species continues to shift its centers of nesting activity throughout the harbor. Numbers continued to be low or nonexistent on Huckleberry and Goose Islands and declined slightly on other colonies (including Hoffman, South Brother, Subway, and Elders Point East Islands); the species exhibited an increase on Mill Rock Island. Overall, Great Egrets exhibited a 7% decrease since 2014. (See Figure 6.)

Snowy Egret (271 pairs): Snowy Egrets nested on six islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, South Brother, Elders Point East, Subway, Mill Rock, and Little Egg Islands; see Table 2). An overall increase of approximately 13% was observed harbor-wide, the third consecutive year that this species' population has increased. This species, like the Great Egret, appears to have moved its centers of nesting activity throughout the harbor; several colonies (Huckleberry and Goose Islands) remained abandoned; all other colonies (including Hoffman, Elders Point East, South Brother, Mill Rock, and Little Egg Islands) exhibited increases in 2014, with the exception of Subway Island, which exhibited a moderate decline. (See Figure 7.)

Little Blue Heron (6 pairs): Little Blue Herons were observed on Hoffman and Elders Point East Islands in 2015; the small Jamaica Bay population appears to have shifted from Subway Island to Elders Point East since 2014. This species approaches the northern extent of its range in the NY/NJ Harbor area, and it maintains a consistent, low-level presence in the NY/NJ Harbor breeding community.

Tricolored Heron (2 pairs): Two Tricolored Herons were observed for the second consecutive year on Elders Point East in Jamaica Bay. This is a species more typical of southern colonies, and no increasing trends in NY Harbor have been observed since the first nesting recorded during this study period, in 1999. The first record of Tricolored Herons nesting in NY/NJ Harbor occurred in 1955 on Ruler's Bar Hassock in Jamaica Bay, and nesting for this species has also been observed in colonies in Long Island's Great South Bay (McGowan and Corwin 2008).

Cattle Egret: Cattle Egrets were not observed during the 2015 survey, the fifth consecutive year this species has been absent from our survey. No nesting was observed on South Brother Island, the only site where nesting had been confirmed in recent years. The population has declined to zero from a high of 266 nests on two islands (Prall's and Shooters islands) in 1985.

Green Heron: No Green Heron nests were observed on the island colonies in 2015, the fifth consecutive year this species has been absent. Green herons often nest in mainland habitats, and unconfirmed reports were received of nesting activity at mainland sites on Staten Island. While this species nested in Brooklyn's Prospect Park in both 2013 and 2014, nesting was not confirmed there in 2015. It is likely that, as in other parts of its range, this species may be declining due to habitat development. An effort to assess the population in NY/NJ Harbor would be a worthwhile endeavor.

Great Blue Heron (1 pair): No Great Blue Heron nests were observed on the island colonies this year. One pair of Great Blue Herons nested for a third consecutive year at Clove Lakes Park in Staten Island.

Glossy Ibis (79 pairs): Glossy Ibis nests were found on three islands in 2015 (in order of decreasing colony size, Hoffman, Subway, and Elders Point East Islands). Numbers decreased sharply since 2014 (-55%). A 62% decline was seen on Subway Island, while a 54% decline was observed on Hoffman Island. The small nesting group on Elders Point East increased slightly. This total is the lowest tally recorded for this species since 1985 (not including our 2006 survey, in which data was incomplete due to poor survey weather conditions). This species could historically be found nesting on other islands in Jamaica Bay, as well as on South Brother and Goose Island in small numbers. (See Figure 8.)

Double-crested Cormorant (1,750 pairs): Double-crested Cormorant nests were observed on eight islands (in order of decreasing colony size, Hoffman, South Brother, Swinburne, Elders Point East, Huckleberry, Mill Rock, U Thant, and Shooters Islands; see Table 2). Aids to navigation in the harbor, which have hosted nesting colonies in recent years, were not surveyed in 2015. (An additional 37 nests were observed on aids to navigation in Newark Bay.) We observed a 4% increase in cormorant nests harbor-wide since 2014. Cormorant colonies must continue to be carefully monitored to determine the potential impact of cormorant nesting activity on wader nesting populations (See Figure 9). An analysis of Double-crested cormorant population trends in the NY/NJ Harbor and northeast region is pending.

Herring and Great Black-backed Gulls: This year, gulls were monitored using adult counts, nest counts, or both whenever possible. Excluding Jamaica Bay and Rikers Island nesting populations, surveys of gull nests found decreases in nesting pairs of Herring Gulls (24%) and Great Black-backed Gulls (49%) harbor-wide since 2014. Adult gull counts in Jamaica Bay also yielded decreases in both species: a 20% decline in Herring Gulls and a 60% decrease in Great Black-backed Gulls.

Common Tern: Common Terns nested at two island locations in 2015: Governor's Island and Joco Marsh in Jamaica Bay. Both of these locations have been active in recent years, but neither has been consistently or formally surveyed as a part of the Harbor Herons survey effort. The

Common Tern is a threatened species in New York State. NYC Audubon has submitted to the New York State Department of Environmental Conservation a plan for all tern species nesting in New York City, to either monitor nesting populations directly or coordinate with others who are monitoring. We recommend continued monitoring and habitat enhancement at Governors Island and increased conservation efforts to protect and improve these New York Harbor colonies.

## Conclusions and Recommendations

Our 2015 survey results demonstrate a decline in the total number of active wader nests since 2014, following two consecutive years of stable or slightly increasing numbers. These results contribute to a trend of decline since our 2010 survey, and are the lowest count of nesting waders in the harbor recorded since 1989 (excluding the years of 1998, 2006, and 2012, when the survey was incomplete or limited). While all wader species other than Snowy Egret and Yellow-crowned Night-Heron exhibited declines since 2014, the reduction was particularly notable in two species: Black-crowned Night-Heron and Glossy Ibis. As concerning as the overall decrease in nesting numbers is the decrease in potentially suitable nesting islands, illustrated by the abandonment of Canarsie Pol and Goose Island, and the drastic declines on Huckleberry Island, all likely connected to issues of human disturbance and/or predation. It is normal for waterbird colonies to move from island to island over time, and we have observed this phenomenon in recent years with newly established and growing populations on Mill Rock Island, Subway Island, and Elders Point East. However, it is imperative that a large number of suitable nesting islands remain available for these birds to continue to colonize and recolonize, and that when islands are abandoned, other suitable nesting islands continue to remain available.

Continued monitoring of wader populations through nesting surveys and banding is a necessary step to comprehend species status, population trends, and overall health and persistence of the system.

At least three areas of the Harbor Herons Project survey protocol need improvement:

1. A repeatable method to survey islands with dense vegetation is required. This somewhat intractable problem is faced by many researchers that survey islands heavily colonized by invasive species, and further efforts to design a reasonable survey technique will be explored. Implementing a grid system on larger islands with dense undergrowth would improve the quality of systematic surveys. This could be accomplished by blazing or tagging select trees and/or placing directionally marked posts along gridlines throughout the island. This system would improve the qualitative and quantitative data collected in these surveys by allowing surveyors to more accurately describe changes in the nesting community and vegetation of a specific colony segment from one year to the next. This would add a valuable spatial component to the dataset.
2. A method of quantifying productivity is necessary and should be implemented. Although some reproductive data were collected (i.e., nest counts and contents), these data represent only a snapshot of time. The correlation between nest number and number of fledglings is the true measure of productivity. The most effective technique would likely be to mark and monitor a subset of nests within selected colonies over the breeding season.
3. An improved habitat assessment protocol should be developed, including a rapid assessment technique, collaborating with additional botanists during breeding season vegetation surveys, and conducting a non-breeding season vegetation survey.

Another relevant conservation issue is the presence of mammalian predators, particularly raccoons, on current and former nesting islands. Mammalian predators can have severe impacts on nesting colonial waterbird populations, and evidence of predation on waders, gulls, and other

waterbirds has been observed on Ruffle Bar, Goose Island, South Brother Island, Huckleberry Island, and others. Efforts to quantify mammalian presence throughout the year using camera trapping should be conducted on all nesting islands, and methods to control the impacts on colonial waterbirds should be considered for island colonies found to support mammalian predators. For nesting islands at a considerable distance from the mainland, appropriate control methods could include live-capture and relocation of mammals. For islands that mammals can reach more readily, control methods such as exclosures around nesting trees may be more appropriate.

Human disturbance on island colonies is difficult to manage in a highly urban setting. As mentioned in Bernick (2007), articles and websites that document unauthorized visitation of colonial waterbird nesting island have appeared in recent years. While an increase in waterfront activities by the public is a positive sign of a growing interest in the urban environment, any unauthorized visitation of nesting colonies requires attention and thoughtful solutions.

The first step in addressing unauthorized visitation of islands is through clear signage. Additional signs must be posted on city-owned and federally-owned islands, clearly stating the restricted status of the islands and the protected status of colonial waterbirds. In addition to signage, managing agencies and stakeholders should establish a dialogue with law enforcement entities that patrol NY Harbor waters (US Park Police, New York City Police Department's Harbor Unit, and the US Coast Guard) and inform them of the security and safety threats that this type of activity poses, in addition to the ecological impacts.

Any communication concerning press coverage of NY/NJ Harbor islands should stress that these issues be thoughtfully considered and incorporated in the press coverage. This would reinforce to the public that these islands are unique, wild places that often support large bird populations, and that these birds are sensitive to human disturbance.

Not only does the conservation community need to effectively and publicly express the conservation issues that unauthorized visitation to nesting islands can create for bird populations; we also need to offer programs for the public to learn about, appreciate, and participate in the study of these interesting islands and their birds. New York City Audubon currently conducts ecocruises that offer views and narratives on these islands and their nesting wildlife. Additional collaborations with other community organizations will create opportunities for community and educational outreach through participation in observational wader studies and other conservation projects. Additionally, direct contact with individuals or organizations that have made unauthorized visits to nesting colonies may often be productive and the danger to colonies easily remedied, without resorting to regulatory enforcement.

The Harbor Herons Conservation Plan was published in 2010 (Elbin and Tsipoura, Eds. 2010). Efforts are underway to prioritize and implement recommended actions outlined in this plan. In particular, emphasis needs to be placed on the protection of important foraging areas in addition to nesting habitats.

The New York City Audubon Harbor Herons Project Nesting Surveys are complemented by a suite of research programs (outlined in Appendix A), many of which include banding initiatives

of multiple species at nesting islands throughout the New York Harbor. In recent years, color bands have been affixed to young-of-the-year Double-crested Cormorants, Great Egrets, Snowy Egrets, and Glossy Ibis. USFWS metal bands have been used on Herring Gulls, Great Black-backed Gulls, and Black-crowned Night-Herons. Color band sightings of any of these species should be communicated to the author ([twinston@nycaudubon.org](mailto:twinston@nycaudubon.org)) or to New York City Audubon ([bands@nycaudubon.org](mailto:bands@nycaudubon.org)), giving leg band code, color, location, date, and name of observed. All band sightings should be reported to the Bird Banding Laboratory by visiting [www.reportband.gov](http://www.reportband.gov) or calling 1-800-327-2263.

Additional recommendations and goals are as follows:

- Analyze and summarize data from the New York City Audubon Harbor Heron Surveys (1986-present)
- Continue dialogue with all agencies responsible for colonial waterbird surveys in New York, New Jersey, and Connecticut, in order to establish a working regional perspective on colonial wader and cormorant populations. Coordinating standardized methods to allow for regional comparisons and data analysis will be critical to the success of this effort.
- For privately owned Huckleberry Island, continued communication and collaboration with the current owners should be pursued by parties interested in the persistence of wader and cormorant populations.
- Encourage the development of wader and cormorant research projects in the NY/NJ Harbor area at high school, undergraduate, and graduate levels.
- Establish a list of research conducted each season on the Harbor Herons or their nesting colonies (see Appendix A).
- Examine relationships between or among metropolitan NY/NJ area colonies and colonies in southern New Jersey, Long Island, and Connecticut, including gene flow, post-fledging dispersal, and natal philopatry.
- Design a photographic guide of nests, eggs, and young to aid volunteers in identification during nesting surveys. A reference guide to identify nest trees, shrubs, and vines should also be developed. Guides should be available in PDF format for all volunteers.

NYC Audubon's Harbor Herons Project has included several additional programs in recent years (i.e., the Harbor Herons Foraging Study and ecocruises) that allow for greater public participation and awareness of the "Harbor Herons," and have strengthened NYC Audubon's role as an advocate for conserving NY/NJ Harbor's wader populations. New and vital collaborations between NYC Audubon and other organizations (i.e., New Jersey Audubon) have formed, and the open forum of NY/NJ Harbor Estuary Program's Harbor Herons Subcommittee has brought organizations and agencies from New York, New Jersey, and Connecticut to discuss issues of regional importance.

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## **TABLES, FIGURES, AND APPENDICES**

**Table 1.** Survey schedule for wader, cormorant, and gull counts, 17 May-25 June 2015

<b>Location Surveyed</b>	<b>Date</b>	<b># of Observers</b>	<b>Ownership</b>
<u>Long Island Sound</u>			
Goose Island	27 May	3	NYC DPR
Huckleberry Island	27 May	5	Huckleberry Indians, Inc.
<u>East River</u>			
North Brother Island	21 May	2	NYC DPR
South Brother Island	21 May	9	NYC DPR
Mill Rock	21 May	4	NYC DPR
U Thant	17-29 May, 3 June	1,1	NYC DPR
<u>Arthur Kill-Kill Van Kull</u>			
Shooters Island	25 June	3	NYC DPR
Prall's Island	4 June	2	NYC DPR
Isle of Meadows	11 June	2	NYC DPR
<u>Lower New York Bay</u>			
Swinburne Island	28 May	3	NPS
Hoffman Island	22 May	7	NPS
	28 May	3	
<u>Jamaica Bay</u>			
Elders Point East	18 May	5	NPS
Canarsie Pol	18 May	5	NPS
Subway Island	18 May	5	NPS
Little Egg Marsh	18 May	5	NPS
<u>Mainland – Far Rockaway</u>			
Redfern Houses	10 June	2	NYC Housing Authority

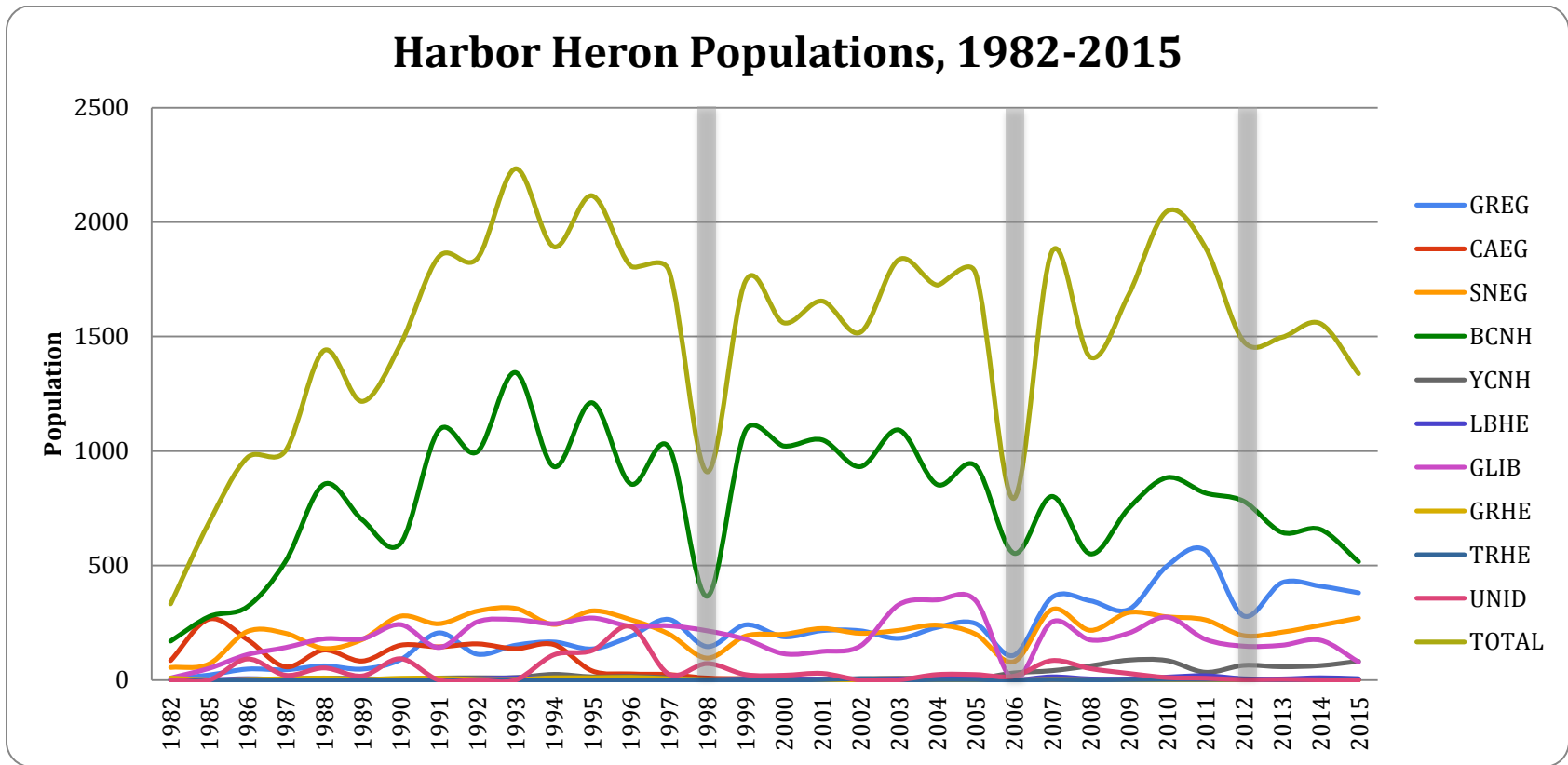


**Figure 1:** Current and former nest sites in NY/NJ Harbor for waders, cormorants, and gulls. Map modified by authors from OasisNYC

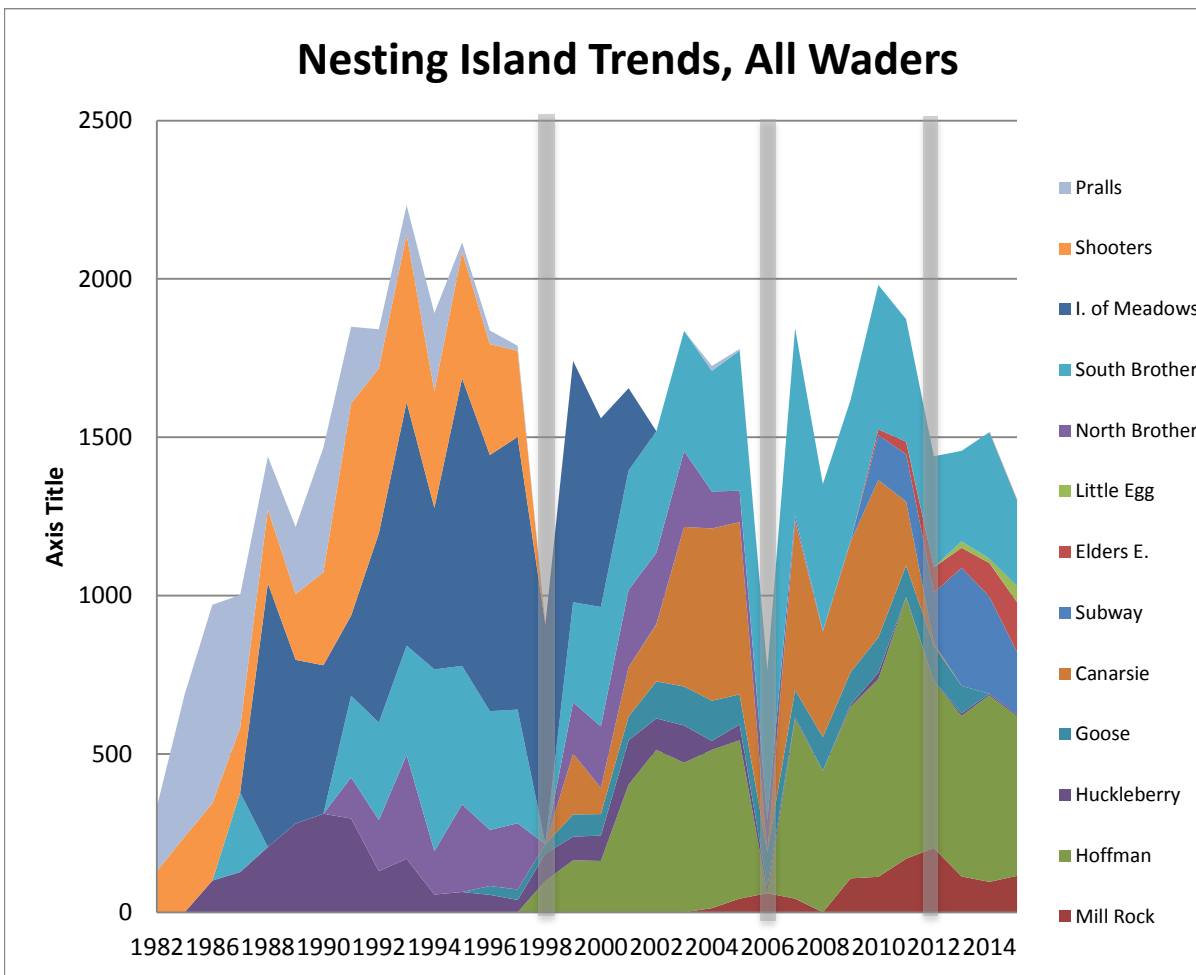
**Table 2.** Wader, cormorant, and gull nesting activity on selected islands and mainland colonies in NY/NJ Harbor and surrounding waterways. 2015 Species include Black-crowned Night-Heron (BCNH), Great Egret (GREG), Snowy Egret (SNEG), Glossy Ibis (GLIB), Little Blue Heron (LBHE), Yellow-crowned Night-Heron (YCNH), Tricolored Heron (TRHE), Double-crested Cormorant (DCCO), Herring Gull (HERG), and Great Black-backed Gull (GBBG).

	Hoffman Island	North Brother Island	South Brother Island	Canarsie Pol	Mill Rock	Goose Island	Huckleberry Island	Elders Point East	Subway Island	Little Egg Island	Swinburne Island	U Thant Island	Isle of Meadows	Prall's Island	Shooters Island	Governors Island	Red Fern	Other Mainland	Species Totals	
<b>Waders</b>																				
GREG	188	0	52	0	48	0	3	30	60	0	0	0	0	0	0	0	0	0	0	<b>381</b>
CAEG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
SNEG	87	0	75	0	3	0	0	69	34	3	0	0	0	0	0	0	0	0	0	<b>271</b>
BCNH	189	0	134	0	64	0	2	46	69	13	0	0	0	0	0	0	0	0	0	<b>517</b>
YCNH	0	0	9	0	0	0	0	0	0	1	0	0	0	0	0	2	50	20	0	<b>82</b>
LBHE	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	<b>6</b>
GLIB	38	0	0	0	0	0	0	7	34	0	0	0	0	0	0	0	0	0	0	<b>79</b>
GRHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
TRHE	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	<b>2</b>
GBHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	<b>1*</b>
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>Total Active Wader Nests</b>	<b>504</b>	<b>0</b>	<b>270</b>	<b>0</b>	<b>115</b>	<b>0</b>	<b>5</b>	<b>158</b>	<b>197</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>50</b>	<b>20</b>	<b>0</b>	<b>1338</b>
<b>Cormorants</b>																				
DCCO	783	0	300	0	49	0	81	208	0	0	281	40	0	0	8	0	0	0	0	<b>1750</b>
<b>Gulls</b>																				
HERG Nests	71	0	2	0	2	0	0	-	-	-	94	-	0	0	0	-	0	0	0	<b>169</b>
HERG adults	-	0	18	-	-	2	3	190	331	195	-	0	0	0	0	-	0	0	0	<b>739</b>
GBBG Nests	44	0	4	0	16	0		-	-	-	23	-	0	0	0	-	0	0	0	<b>87</b>
GBBG Adults	-	0	27	-	-	0	5	14	33	129	-	25	0	0	0	-	0	0	0	<b>208</b>

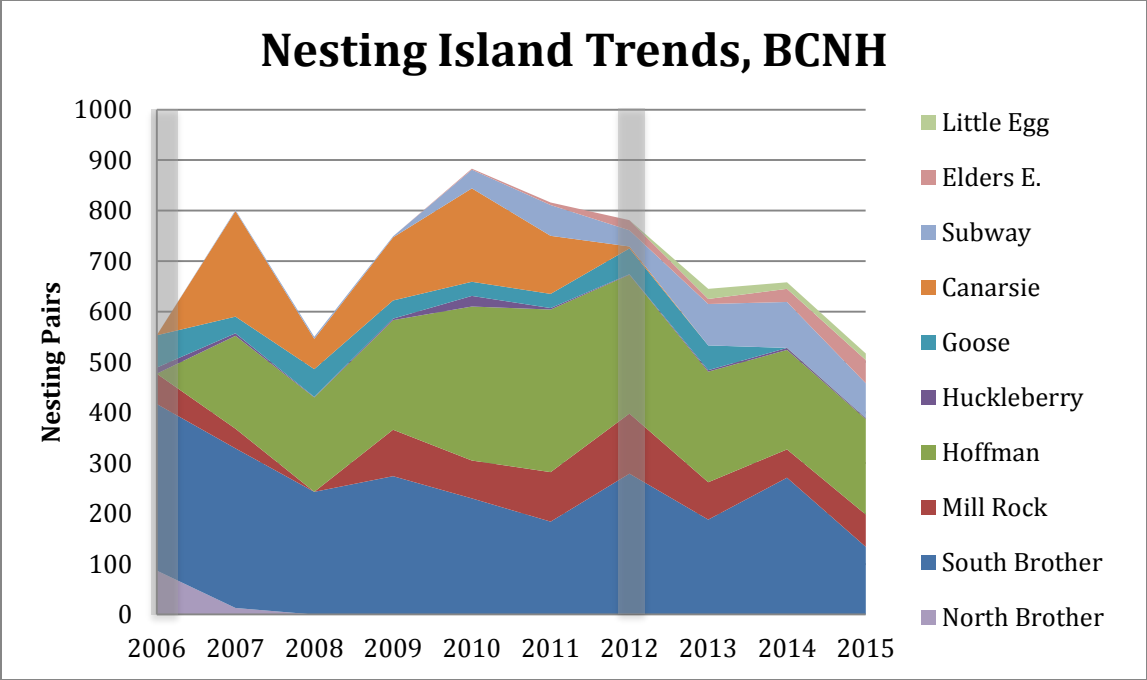
\* The Great Blue Heron total recorded here is not included in the gross wader nest total in the interest of comparability with prior years, as numbers of mainland-nesting Great Blue Herons have not yet been included in prior year data counts..



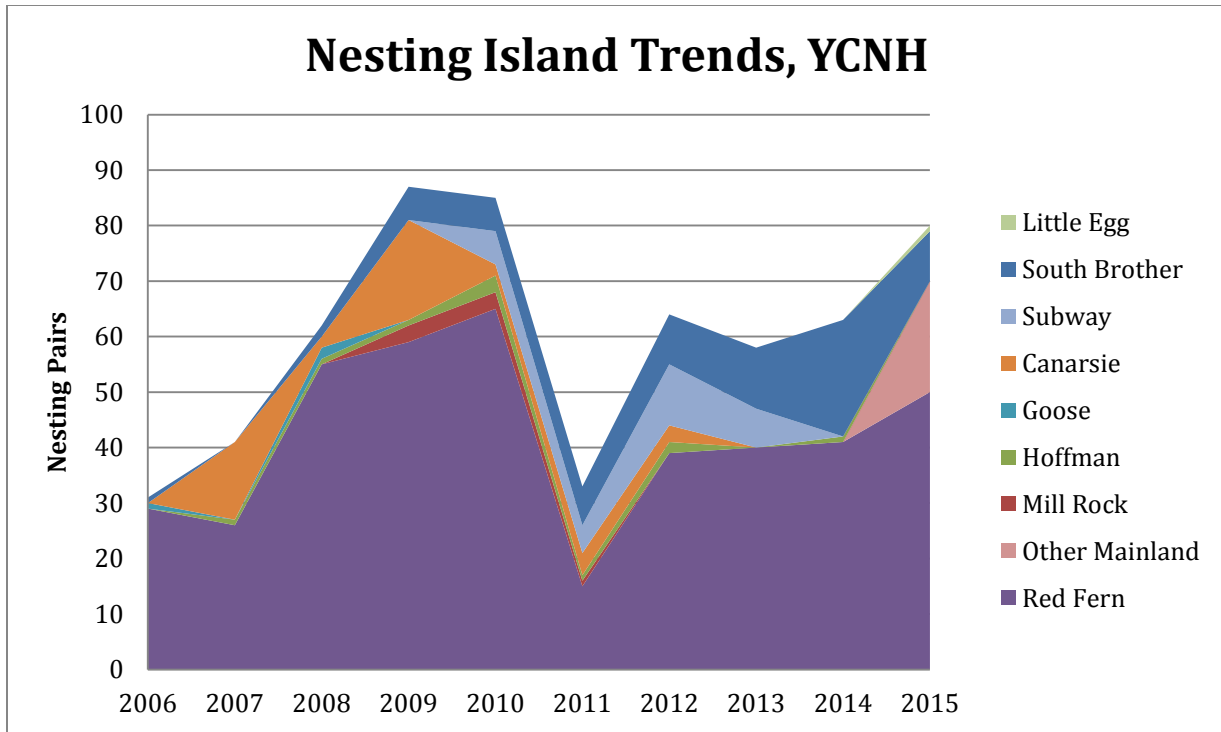
**Figure 2:** Total number of nesting pairs of wader species observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2015. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).



**Figure 3:** Total number of wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2015, by nesting Island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

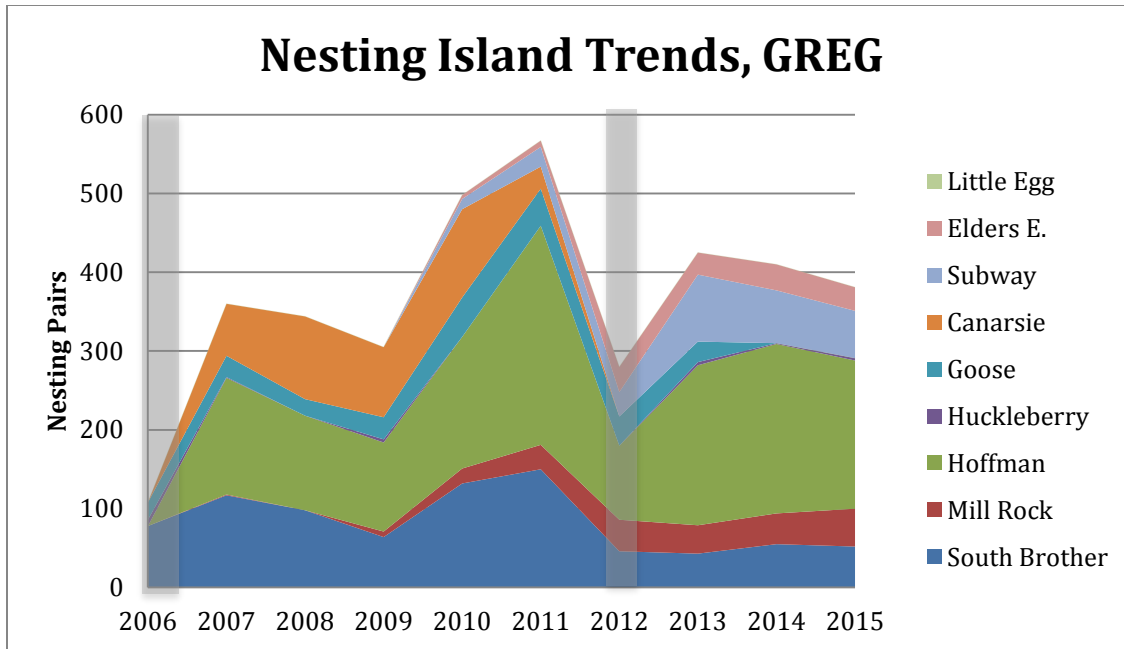


**Figure 4:** Total number of Black-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2006 to 2015, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2006, 2012).

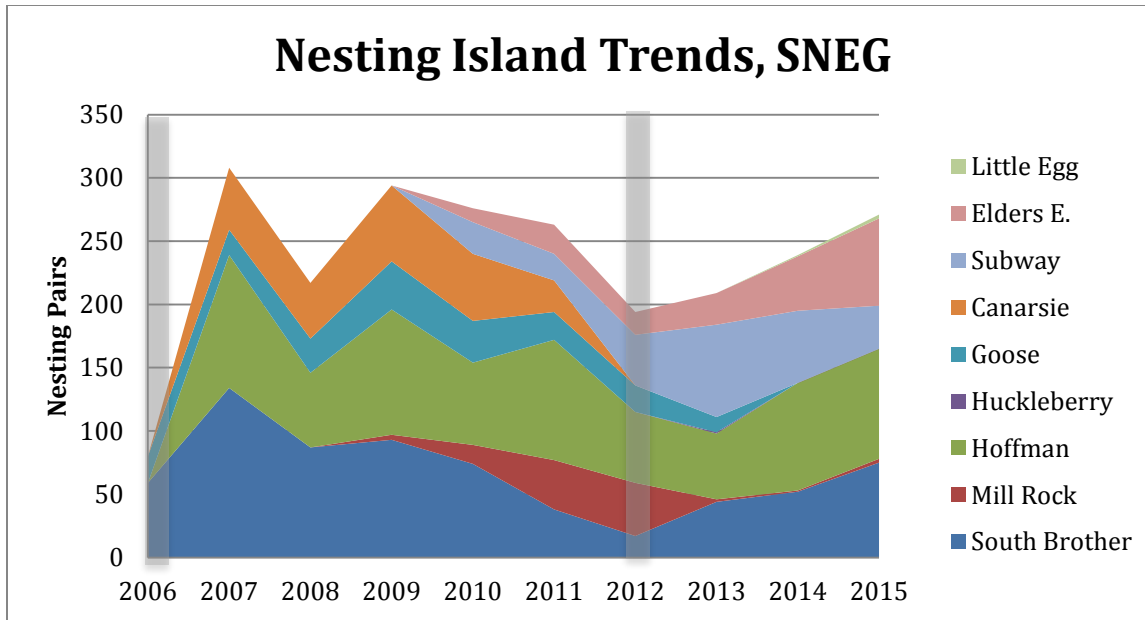


**Figure 5:** Total number of Yellow-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2006 to 2015, by nesting island and mainland colony. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2006, 2012).

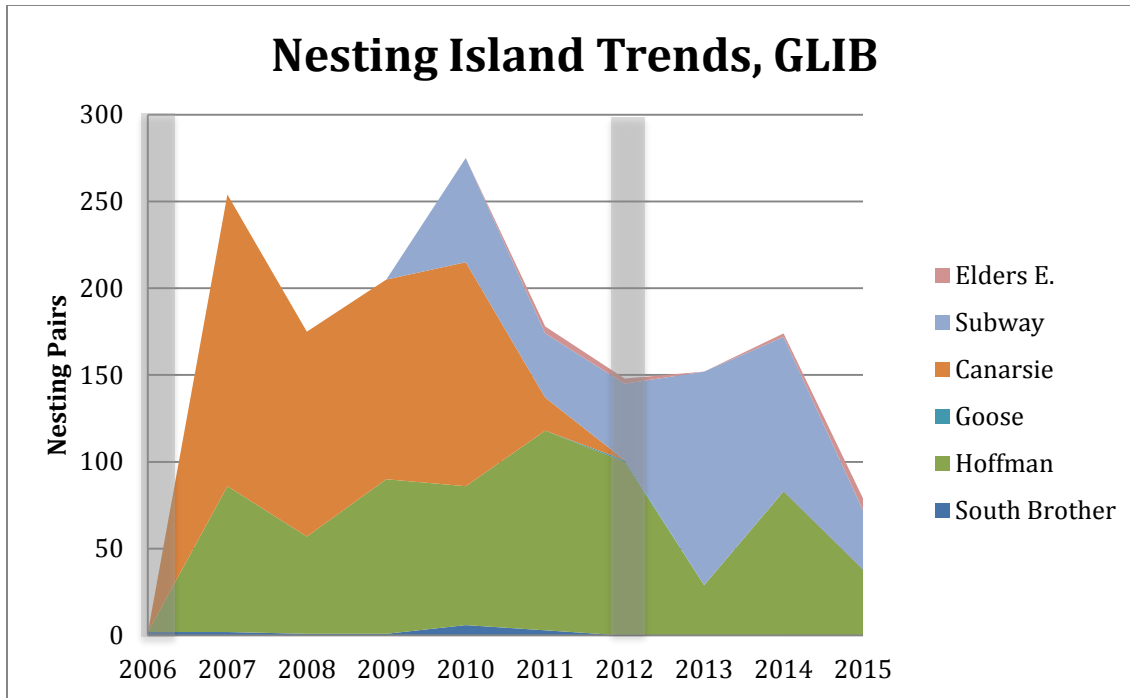




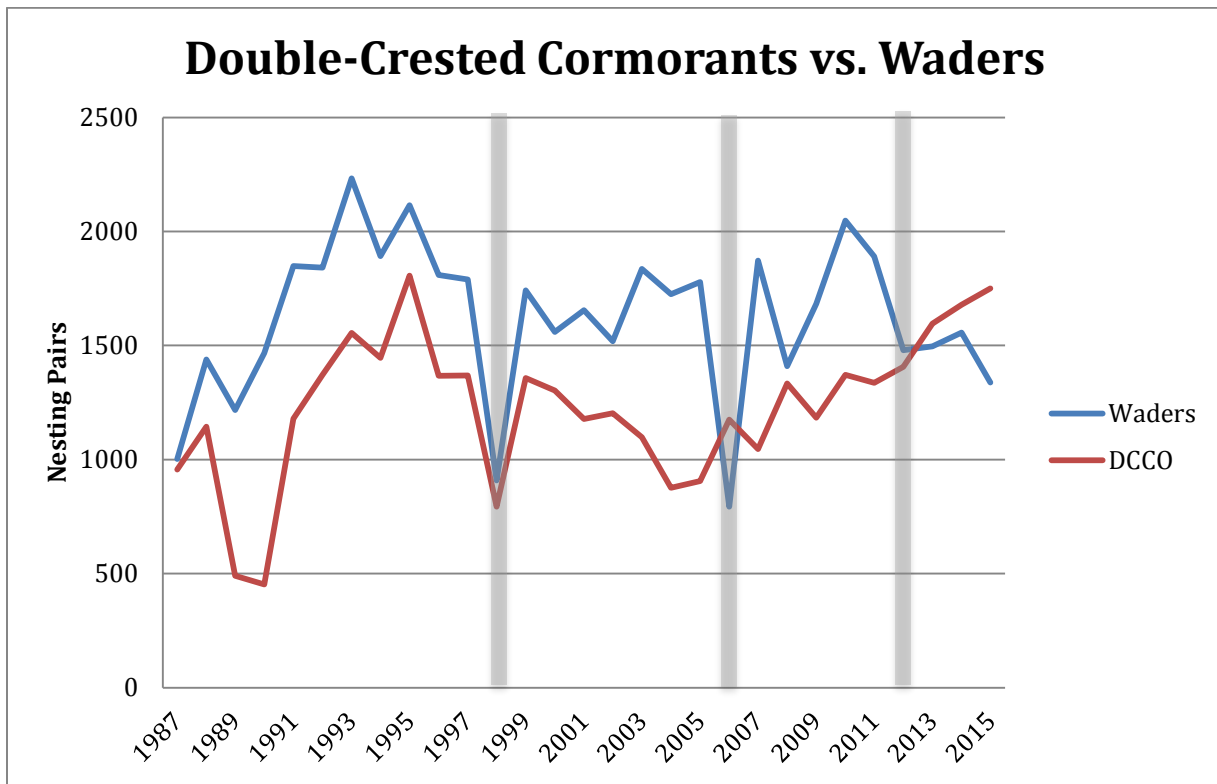
**Figure 6:** Total number of Great Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2006 to 2015, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2006, 2012).



**Figure 7:** Total number of Snowy Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2006 to 2015, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2006, 2012).



**Figure 8:** Total number of Glossy Ibis nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2006 to 2015, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2006, 2012).



**Figure 9:** Total number of Double-crested Cormorant and wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1985 to 2015. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

## **Appendix: Current Research on Wader and Cormorant Nesting Islands, NY/NJ Harbor**

Below is a list of other known projects conducted from 2008 to 2015 either directly or indirectly related to the Harbor Herons or the islands on which they nest. Please contact Tod Winston at [twinston@nycaudubon.org](mailto:twinston@nycaudubon.org) to report additional research projects.

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- Citizen science monitoring program of long-legged waders of NY and NJ, NYC/NJ Audubons. Ongoing. Contact: Susan Elbin, NYC Audubon and Nellie Tsipoura, NJ Audubon.
- Colonial waterbird foraging ecology study: stable isotope analyses of wading bird and seabird feathers from NY Harbor and Westchester County, NY. Ongoing. Contact: Elizabeth Craig, NYC Audubon/ Cornell University.
- Double-crested Cormorant diet study, CUNY-Queens College. Ongoing. Contact: Colin Grubel and John Waldman, CUNY-Queens College.
- Double-crested Cormorant population dynamics. Ongoing. Contact: Susan Elbin, NYC Audubon.
- Elders Point Marsh West Marsh Restoration Project, U.S. Army Corps of Engineers. Ongoing. Contact: Melissa D.A. Alvarez, U.S. Army Corps of Engineers
- Great Egret radiotelemetry study, John Brzorad, Lenoir Rhyne College, SC.
- Habitat Health, Ptilochronology and Waterbirds: A Tale of Two Estuaries. Completed. Contact: Charles Clarkson, University of Virginia.
- Habitat restoration on North Brother Island, NYC Department of Parks and Recreation, Ongoing. Contact: Kristy King, NYC Department of Parks and Recreation.
- Habitat restoration and final capping activity for the proposed Fresh Kills Park (in the vicinity of Isle of Meadows), NYC Department of Parks and Recreation/NYC Department of Sanitation. Contact: Cait Field, NYC Department of Parks and Recreation.