



NEW YORK CITY AUDUBON
CELEBRATING 30 YEARS OF CONSERVATION

NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT: 2016 NESTING SURVEY REPORT

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Prepared for:

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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 17 June, 2016. This report principally summarizes long-legged wading bird, cormorant, gull, and tern nesting activity observed on selected harbor islands, and also includes surveys of aids to navigation and selected mainland sites.

Species summaries: Seven species of long-legged wading birds nested on ten of nineteen islands surveyed in New York Harbor as well as 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 number of island wader nests has remained fairly stable since the last comprehensive survey in 2013, having decreased by 3%. (When the principal New York City and New Jersey mainland colonies of Yellow-Crowned Night-Herons are included, this decrease is reduced to 1%). The most significant changes since 2013 included a decrease in the Black-crowned Night-Heron population (-17%), the numerically dominant nesting species in most mixed-species colonies, and an increase in the Snowy Egret population (13%). Glossy Ibis numbers have fluctuated greatly over the past several years, and showed an increase of 45% over 2013. A slight decrease was also observed in Great Egret nesting pairs (-4%). Yellow-Crowned Night-Heron numbers, while decreasing on the nesting islands, increased by 10% when their principal mainland colonies are included. 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 2016. Great Blue Heron and Green Heron, observed nesting in small numbers on the harbor islands in past years, were not observed nesting on the harbor islands in 2016, but were reported nesting in small numbers at mainland sites in New York City. A total of 1,841 Double-crested Cormorant nests were observed in 2016, a 15% increase since 2013, continuing an increasing trend exhibited since 2005. Gull nesting activity was observed on ten of fourteen islands surveyed for gull breeding; no nesting activity was observed on Isle of Meadows nor on Shooters, Prall's, Governors, or Huckleberry Islands. Davids' Island, North Brother Island, Canarsie Pol, and Ruffle Bar were not surveyed for gull nesting activity. Common tern nesting activity was again observed on Governors Island.

Island summaries: For the second year in a row, the greatest wader species diversity was observed on Elders Point East Island (six species) in Jamaica Bay; this colony has grown rapidly since it was first established in 2010. Nesting activity in Jamaica Bay continues to be concentrated on Subway Island and Elders Point East, though numbers and apparent productivity have increased markedly on Little Egg Island, and a few nesting pairs were discovered this year on Elders Point West Island. Since 2013, wader populations on Elders Point East have experienced a substantial increase of 79%, though numbers declined 28% since reaching their highest observed peak in 2015. In contrast numbers decreased 18% on Subway Island since 2013, while nesting activity on Canarsie Pol was entirely absent for the fourth consecutive year. In the lower harbor, as in recent years, Hoffman Island continued to be a productive colony. It hosts the greatest total number of nests of all the harbor islands, and exhibited a 12% increase in

total nests over 2013. Hoffman was the second most diverse colony in 2016; five wader species were present. For the second consecutive year, wader nesting was observed on Governors Island; this year one pair of Yellow-crowned Night-Herons nested there. In the East River and Long Island Sound, several colonies have declined, while South Brother Island remains a productive colony. Breeding numbers on South Brother Island have fluctuated widely in recent years, and exhibited a 21% increase in nesting activity over 2013—while the wader colony on nearby Mill Rock Island appears to have collapsed in 2016, exhibiting a 76% decline in recently active nests and apparent recent colony abandonment. North Brother Island exhibited no signs of wader nesting activity in 2016, marking the ninth 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 wader nesting activity for the third year in a row, though several active nests of other waterbird species indicated the possibility of reestablishment of this once productive colony. Wader nesting activity on Huckleberry Island has continued to decline to very low levels since 2013. During this year's survey, the island's Double-crested Cormorant colony appeared to have been recently abandoned; a raccoon was observed on the island during the survey. 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, continuing a trend of over a decade. The mainland nesting colony of Yellow-crowned Night-Herons at the Redfern Houses in Far Rockaway exhibited an increase of 28% over 2013, representing an apparent shift in this species' breeding from island to mainland colonies. Double-crested Cormorants continued to nest on eight islands in the harbor; cormorant numbers increased 15% over 2013, continuing a decade-long trend of slow population increase in the survey area.

Introduction

New York City Audubon's 2016 Harbor Herons Nesting Survey marks the 32nd 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 comprehensive 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. A comprehensive nesting survey was conducted 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 2016 field season, between 17 May and 17 June. The objectives of the 2016 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 2016 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 17 June, 2016.

Islands fully surveyed in 2016 (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 (Isle of Meadows and Prall's and Shooters Islands); 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 four in Jamaica Bay (Elders Point East, Elders Point West, Little Egg, and Subway Islands). 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, and Davids' Island in the Hutchinson River/Long Island Sound area and Ruffle Bar in Jamaica Bay, which have not been known to host nesting waders in the past, were each partially surveyed by foot and scanned by boat for evidence of nesting waders. Also presented in this report are observations of (1) Yellow-crowned Night-Heron nesting at on Governors Island and at several mainland colonies, (2) Green Heron and Great Blue Heron nesting in small numbers at mainland sites, and (3) Common Tern nesting on Governors Island and Little Egg 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, Alex Summers, and additional 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 to three teams of researchers, led by the author and trained volunteers. Groups quickly and systematically searched for nests and/or conducted adult counts 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. Flagging tape was utilized in larger colonies to ensure accurate counts. 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); flagging tape was utilized in larger colonies to ensure accurate counts.

Adult and/or nest counts of Great Black-backed Gulls and Herring Gulls were conducted at all fully 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, Don Riepe of the American Littoral Society/Jamaica Bay Guardian, Andrew Clapper of USDA/APHIS, and Willis Welkins of Newtown Creek Alliance.

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 provided by the Huckleberry Indians, Inc.

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Health Inspection Service (USDA/APHIS) have been helpful in providing us with expert field assistance during these surveys. The Palisades Interstate Park Commission provided access to Hazard's Boat Launch, Fort Lee, NJ. The New York Police Department Harbor Unit has generously supported this project through access to their facilities and expert staff. The author would like to particularly thank Elizabeth Craig (Cornell University) and Susan Elbin (NYC Audubon) for their expertise and guidance.

Results

Overview:

In 2016, seven species of long-legged wading birds were observed nesting on ten islands in New York 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 2016, 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 hosted 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 2016 there was no nesting activity on this island for the fourth consecutive year. Increased numbers were found this year on nearby Little Egg Island, however, and several nests were found on Elders Point West. In the East River, North 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 wader activity in 2016. Huckleberry Island, which has declined over the last decade, continued to exhibit little nesting activity and signs of nest predation, and Mill Rock Island, a productive colony for over 10 years, appeared to be recently abandoned at the time of the 2016 survey. 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.

2016 was a comprehensive survey year, and the majority of comparisons noted in this report are between this year's survey and the last comprehensive survey, conducted in 2013—though both shorter- and longer-term trends are noted where deemed relevant. 2016's survey revealed a fairly stable nesting wader population compared to 2013; the total nesting population decreased 3%. (When the principal New York City mainland colony of Yellow-Crowned Night-Herons is included, however, this decrease is reduced to 1%.) Figure 2 illustrates the nesting activity of wader species on the NY/NJ harbor islands 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)

18 May 2016, 9:25am-11:15am

By the author, Susan Elbin, Andrew Maas (NYC Audubon); David Künstler (NYCDPR); John Burke (Huckleberry Indians, Inc.); Andrew Turk (NYC Audubon volunteer)

The Huckleberry Island nesting survey revealed three Black-crowned Night-Heron nests (see Table 2). Though signs of recent activity were found, no adults were sighted, as has been the case in recent years. An adult raccoon was seen on the island. 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 appeared also to have collapsed in 2016, following a decline observed on the island since 2010. A total of 10 nests were observed, but no adults were observed in vicinity of the nests. This finding represent a striking 95% decrease over the 215 nests counted in 2013. 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 six years. One American Oystercatcher pair was observed on the island, a decrease from 2 pairs in 2013 (and 4 pairs in 2015), while six spotted sandpipers were sighted, possibly representing three nesting pairs. Eight Canada Goose nests were observed; it appeared several of these nests had been subject to predation. A Mallard pair was also observed in the water nearby. Other bird species observed on or near the island included Osprey, Tree Swallow, Gray Catbird, Northern Mockingbird, European Starling, Yellow Warbler, Northern Parula, Black-and-White Warbler, Black-throated Blue Warbler, American Redstart, Common Yellowthroat, Song Sparrow, Red-winged Blackbird, Common Grackle, and House Sparrow.

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, but an adult raccoon was found living in one of the island's buildings. 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.

Dauids' Island (78 acres)

18 May 2016, 11:35am-12:15pm

By the author, Susan Elbin, Andrew Maas (NYC Audubon); David Künstler (NYCDPR); John Burke (Huckleberry Indians, Inc.); Andrew Turk (NYC Audubon volunteer)

Dauids' Island was surveyed for the first time in 2016. The survey team landed on the island and did a partial survey on foot to search for possible wader activity, and then scanned the island by boat for evidence of wader presence. One adult Great Blue Heron was observed flying from the middle of the island as we approached, but no nest was found and no evidence of other activity was observed. This island seems to present a potential wader nesting habitat, although it was

reported to the author that raccoons trapped on the mainland are often moved to this island. This account may also explain the presence of raccoons on nearby Huckleberry Island. Other bird species observed on or near the island included Warbling Vireo, House Wren, American Robin, Gray Catbird, Yellow Warbler, Magnolia Warbler, Northern Parula, Blackburnian Warbler, American Redstart, Common Yellowthroat, Northern Cardinal, Song Sparrow, House Finch, American Goldfinch, and Red-winged Blackbird.

Goose Island (1 acre)

18 May 2016, 12:55pm-1:35pm

By the author, Susan Elbin, Andrew Maas (NYC Audubon); David Künstler (NYCDPR); Andrew Turk (NYC Audubon volunteer)

Goose Island, abandoned shortly before our 2013 survey was conducted, exhibited no active nesting wader activity for the third 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 2016 survey, though no evidence of active wader nesting was found for a third year, two adult Black-Crowned Night-Herons were flushed from trees on the island, while one Snowy Egret flew over the island during the survey. Ten active Canada Goose nests were found, several with eggs and live young, while 11 adults were counted on or around the island. Two adult Mute Swans were also observed nearby. One active Great Black-backed Gull nest with eggs was observed on the island. Other bird species observed on or near the island in 2016 included Rock Pigeon, Barn Swallow, American Robin, Northern Mockingbird, Yellow Warbler, European Starling, and Common Grackle (one nest).

Additional signage was posted on the shoreline of Goose Island in an effort to reduce unwanted visitation in 2015. Observed successful nesting of Canada Goose and Great Black-Backed Gull, as well as evident roosting by Black-crowned Night-Heron may be evidence that predators are not currently present on the island. 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):

17 May 2016, 11:26pm-12:30pm

By Susan Elbin, Debra Kriensky (NYC Audubon)

North Brother Island has not exhibited signs of nesting wader activity since 2007. No evidence of wader or gull nesting activity was observed in 2016. Over 40 Black-crowned Night-Herons observed circling and perching on the Island were thought to be birds from the South Brother Island colony. Two Canada Geese with one gosling were observed, as was one Great Black-backed Gull flying over the island. (Gull-nesting has been observed on building roofs on the island in recent years; no nesting was confirmed this year.) Other bird species observed included Northern Flicker, Fish Crow, Warbling Vireo, American Robin, Gray Catbird, European Starling, Yellow Warbler, Yellow-rumped Warbler, Black-and-White Warbler, Black-throated Blue Warbler, Black-throated Green Warbler, Chestnut-sided Warbler, Blackpoll Warbler, American Redstart, Blackburnian Warbler, Canada Warbler, Ovenbird, Common Yellowthroat, Northern Cardinal, and Song Sparrow.

NYCDPR continues to conduct restoration activities on North Brother Island.

South Brother Island (12 acres)

17 May 2016, 9:30am–1:45pm.

By the author, Susan Elbin, Debra Kriensky (NYC Audubon); Michael Feller, Christopher Girenti, Ellen Pehek, Susan Stanley (NYCDPR); Andrew Clapper, Victoria Olmstead (USDA/APHIS)

A total of 347 nests of four wader species was observed throughout the island (in order of decreasing frequency, Black-crowned Night-Heron, Snowy Egret, Great Egret, and Yellow-crowned Night-Heron; see Table 2). This total represents an increase of 21% over 2013, but continues a decline observed over the past 10 years. The majority of this longer-term decline is attributable to a reduction in observed Black-crowned Night-Heron nesting pairs. Since 2013, snowy Egret numbers increased by 95% to 86 pairs, while Great Egret numbers increased by 86% to 80 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 fifth 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 2013 (336 nests, a 71% increase), the highest count registered since 2005. This total along with last year's count mark a break in a declining trend in cormorant populations observed on this island 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 several 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 8 Herring Gull nests and 17 Great Black-backed Gull nests, both totals representing sharp increases from 2013 when 3 and 5 nests were found, respectively. Other bird species observed included Canada Goose (10 nests), Mourning Dove, Tree Swallow, Barn Swallow, Fish Crow, Blue Jay, Gray Catbird, Magnolia Warbler, Common Yellowthroat, and Song Sparrow. For the fourth 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 574 Herring Gull nests and 2 Great Black-backed Gull nests this year, both decreases from 646 and 8 active nests last year for each species, respectively.

Mill Rock (3 acres)

17 May 2016, 2:32pm-3:30pm

By the author, Susan Elbin, Debra Kriensky (NYC Audubon); Ellen Pehek (NYCDPR)

A total of 28 wader nests was observed on Mill Rock Island, a marked decrease of 75% compared to 2013's count of 113 nests. This colony appeared to have been recently abandoned at the time of our 2016 survey; while recent nest activity was evident, no adults were observed. One dead adult Black-crowned Night-Heron was found in the colony. Nests of two wader species were observed (in order of decreasing frequency, Black-crowned Night-Heron and Great Egret). No Snowy Egret nests were observed, a species that has nested in sharply declining numbers in recent years. Three Herring Gull nests (down from 18 nests in 2013) and 18 Great Black-backed Gull nests (down from 22 nests in 2013) were confirmed. Our count of Double-crested Cormorants (42 nests) increased 163% over 2013; cormorant numbers have increased steadily since the species was first found nesting here in 2011. Cormorants have continued to nest on the margin of the wader colony, however, and have not appeared to be competing for nesting territory—and on this survey few adult cormorants were observed near the nests, indicating that this species may also have abandoned its colony. Other bird species observed on the island included Canada Goose (8 nests), Fish Crow, Gray Catbird, Cedar Waxwing, and Common Yellowthroat.

Human disturbance continued to be evident on Mill Rock Island, and may be at least partially responsible for the apparent collapse of this colony in 2016. Man-made structures including benches and tables have persisted over the last few years. There is evidence of visitation from kayaking clubs. Future efforts to discourage human disturbance should include increased signage on the island, particularly at the north harbor. 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 2016, 8:30am-8:45am

By the author (NYC Audubon); Willis Welkins (Newtown Creek Alliance)

This island was surveyed on foot in 2016, following several years of survey by boat. A total of 48 Double-crested Cormorant nests was observed on the island, both on the collapsed metal arch

sculpture and in trees. This is the highest count of nests observed on this island since the colony was first established in 2008. This increase could reflect the additional accuracy of an on-island count, though it is consistent with an increasing trend since the colony was founded. A total of 5 Great Black-backed Gull nests were observed, while 12 adults were counted. No Herring Gulls were observed.

Staten Island – Arthur Kill and Kill Van Kull

Isle of Meadows (101 acres)

18 May 2016, 12:00pm-2:30pm

By Ellen Pehek, Leila Mougoui, Susan Stanley (NYCDPR)

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. Other bird species observed on or near the island included Osprey (2 nests), Red-tailed Hawk, Northern Flicker (nesting), Downy Woodpecker, Hairy Woodpecker, Yellow-billed Cuckoo, Fish Crow, Northern Rough-winged Swallow, Tree Swallow, House Wren, Marsh Wren, American Robin, Gray Catbird, European Starling, Yellow Warbler, Canada Warbler, Common Yellowthroat, Northern Cardinal, Eastern Towhee, Song Sparrow, American Goldfinch, Baltimore Oriole, Common Grackle, and Red-winged Blackbird.

Prall's Island (88 acres)

25 May 2016, 9:15am-11:30am

By Alex Summers (NYCDPR)

No evidence of wader nesting activity was observed on Prall's Island in 2016. Two Glossy Ibis were reported to have been observed in the middle of the island during the nesting season (pre-survey), but during the survey no evidence of nesting was found and no adults were observed. Two Wild Turkey nests were found on the island. Other bird species observed on or near the island included Red-tailed Hawk, Mourning Dove, Willow Flycatcher, Warbling Vireo, American Robin, Northern Mockingbird, European Starling, Cedar Waxwing, Yellow Warbler, American Redstart, Common Yellowthroat, Northern Cardinal, Song Sparrow, American Goldfinch, Baltimore Oriole, Boat-tailed Grackle, and Red-winged Blackbird.

The site of the most recent Black- 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 waders, despite restoration efforts in the intervening years. Unidentified mammal dens were found on the island during the 2016 survey, and evident browsing by abundant white-tailed deer 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)

19 May, 2016, 10:30am-12:00pm

By Alex Summers, Tim Wenskus (NYCDPR)

No evidence of wader nesting activity was observed on Shooters Island in 2016. With the exception of 2011 and 2014, this island has been surveyed every year since 1985; no wader nesting has been noted since 1999. Large metal structures were found to have been recently dumped on the island during this year's survey, and evidence was also found of possible camping or human habitation on the island. A total of 9 Double-crested Cormorant nests were observed on dry docks and other wreckage west of the island, consistent with a count of 8 nests in 2015. 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 than in the past. Other bird species observed on or near the island included Spotted Sandpiper, Gray Catbird, Yellow Warbler, Pine Warbler, American Redstart, Common Yellowthroat, Northern Cardinal, Song Sparrow, and American Goldfinch.

Lower NY Harbor

Hoffman Island (10 acres)

20 May 2016, 11:35am-2:25pm; 23 May 2015, 9:40am-1:05pm

By the author, Susan Elbin, Debra Kriensky (NYC Audubon); Don Riepe (American Littoral Society); Willis Welkins (Newtown Creek Alliance); Melanie del Rosario, Susan Stanley, Alex Summers (NYCDPR); Rita McMahon (Wild Bird Fund)

A total of 569 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 12% increase since 2013; numbers have fluctuated in this range since the wader population reached an all-time high of 824 pairs in 2011, and the island's nesting wader population has been stable over the past 15 years. Snowy Egret numbers exhibited an increase of 54% over 2013; this species' population has remained stable over the past 10 years. Both Glossy Ibis and Black-crowned Night-Heron numbers recovered substantially from low counts observed in 2015. Waders primarily nested in mulberry species, multiflora rose, box elder, black locust, hackberry, oriental bittersweet, wild grape, and Virginia creeper.

A total of 831 Double-crested Cormorant nests was observed on Hoffman Island in 2016, a 36% increase since 2013. The nesting population of this species rose continuously since first being established in 2001 till 2014, but has remained stable over the past 2 surveys.

Totals of 84 Herring and 68 Great Black-backed Gull nests were counted during the survey, marking an increase in both species over 2013 (110% and 21%, respectively), though nesting populations of both species are substantially below the peaks they've achieved in past decades. During the survey, over a dozen nestling gulls were found dead; dead gull nestlings in similar condition were also found on nearby Swinburne Island. No cause of death was apparent. Additional species observed included Mallard, Fish Crow (2 nests), Gray Catbird, Common Yellowthroat, Song Sparrow, and Red-winged Blackbird.

Swinburne Island (4 acres)

20 May 2016, 9:27am-11:05am

By the author, Susan Elbin (NYC Audubon); Alex Summers (NYCDPR), Willis Welkins (Newtown Creek Alliance)

One Black-crowned Night-Heron adult was observed nesting on Swinburne Island in 2016, in the cormorant colony; one nest had been found on the island from 2006-2011. A total of 359 Double-crested Cormorant nests was observed this year, a 7% increase over 2013, though below 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, though numbers are currently above those found in the years preceding Hurricane Sandy. Totals of 121 Herring Gull nests and 50 Great Black-backed Gull nests were observed, increases over 2013 of 59% and 11%, respectively. Over 10 nestling gulls were found dead during the survey, as were observed on nearby Hoffman Island; no cause of death was apparent. Additional species observed included Fish Crow, Common Yellowthroat, and Red-winged Blackbird.

Jamaica Bay

Elders Point East Marsh (40 acres)

25 May 2016, 10:45am-11:30am

By the author, Kellye Rosenheim (NYC Audubon); Don Riepe (American Littoral Society); Christopher Girgenti, Susan Stanley (NYCDPR); Stefan Guelly (USDA/APHIS)

Restoration of Elders Point East was begun ten years ago as part of a marsh restoration project undertaken in Jamaica Bay by the U.S. Army Corps of Engineers (USACE). 2016 was the seventh year since the restoration in which colonial waterbirds had the opportunity to nest on this low-lying island, and the size and diversity of the breeding population has continued to increase, with some fluctuation in the past two years. A total of 113 wader nests was observed on this island from six wader species in 2016 (in order of decreasing frequency, Snowy Egret, Glossy Ibis, Great Egret, Little Blue Heron, Black-crowned Night-Heron, and Tricolored Heron). This total represents a 79% increase from 2013, though a decline from a high count of 158 nests found in 2015. Counts increased for Snowy Egret since 2013, but decreased slightly for Great Egret and declined sharply for Black-crowned Night-Heron (70%); the population of this species had grown steadily till this year. Glossy Ibis have been found nesting on the island in low single digits since 2011; 32 nests were estimated in 2016. 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 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 2016, 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 206 Double-crested Cormorant nests was observed, a 14% increase over 2013. Many cormorants were nesting on the ground. Totals of 195 Herring Gull adults and 16 Great Black-backed Gull adults were observed during this year's survey, indicating stable populations compared to 2013. A total of 19 American Oystercatcher adults was observed on the island, more than triple the highest count in past years. Other bird species observed on or near the island included Brant, Gadwall, Laughing Gull, Osprey, and Fish Crow.

Elders Point West Marsh (40 acres)

26 May 2016, 10:10am-10:25am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Alex Summers (NYCDPR); Stefan Guelly (USDA/APHIS); Kate Faehling (Wild Bird Fund)

Elders Point West, like its eastern counterpart, was restored as part of a marsh restoration project undertaken in Jamaica Bay by the U.S. Army Corps of Engineers (USACE). In 2016, 2 Snowy Egret nests were found. Two adult Black-crowned Night-Herons were also observed, but no Night-Heron nests were located. This marks the first observed wader breeding on Elders Point West since 2007-2009, when small numbers of Great and Snowy Egrets were found nesting here. Nesting gulls were also found on the island in 2016: Totals of 183 Herring Gull and 16 Great Black-backed Gulls were observed. Previous to this survey, Herring Gulls were confirmed nesting on the island only once, in 2008; it is suspected however that nesting gulls on the island may have gone undetected in recent years. A total of 6 American Oystercatcher adults were observed; 2 nests were found. Other bird species observed on or near the island in 2016 included Double-crested Cormorant, Canada Goose, Brant, Semipalmated Sandpiper, Common Tern, Osprey, Fish Crow, and Red-winged Blackbird.

Subway Island (40 acres)

25 May 2016, 8:55am-10:30am

By the author, Kellye Rosenheim (NYC Audubon); Don Riepe (American Littoral Society); Christopher Girgenti, Susan Stanley (NYCDPR); Stefan Guelly (USDA/APHIS)

The Subway Island colony was the third largest nesting colony in New York Harbor in 2016. This year was the seventh 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 307 wader nests was observed, representing four species of waders (in order of decreasing frequency, Glossy Ibis, Great Egret, Black-crowned Night-Heron, and Snowy Egret). This total represents a reduction of 18% since 2013, when the highest count since its establishment was observed for this colony. Counts of Snowy Egrets and Black-crowned Night-Herons declined since 2013 (74% and 21%, respectively), while nesting pairs of Glossy Ibis and Great Egret increased slightly (9% and 5%, respectively). Glossy Ibis numbers have fluctuated greatly in recent years; this year's total represented a 294% increase over last year's count. Totals of 400 Herring Gull adults and 30 Great Black-backed Gull adults were observed, both numbers representing increases over our

2013 count. A total of 35 American Oystercatcher adults was observed, the highest count yet registered on this island. Eight Canada Goose adults were observed on the island. Other species present included Mallard, Willet, Dunlin, Laughing Gull, Willow Flycatcher, Fish Crow, Tree Swallow, Barn Swallow, Gray Catbird, European Starling, Yellow Warbler, Common Yellowthroat, Song Sparrow, Common Grackle, Boat-tailed Grackle, and Red-winged Blackbird.

Little Egg Island

25 May 2016, 11:45am-12:45am

By the author, Kellye Rosenheim (NYC Audubon); Don Riepe (American Littoral Society); Christopher Girgenti, Susan Stanley (NYCDPR); Stefan Guelly (USDA/APHIS)

For the past three years, a small colony of nesting waders was observed on Little Egg Island, but few eggs or young were found during these surveys. In contrast the 2016 survey team encountered a population of 49 Black-crowned Night-Heron nests, most with young or eggs; the total population increased 145% over 2013. No Snowy Egret nests were observed in 2016 however; low numbers of this species were observed in the previous two years. A total of 273 Herring Gull adults and 164 Great Black-backed Gull adults were observed, both counts representing decreases from 2013. A Common Tern colony has also established itself on Little Egg Island: 110 adults were observed in the vicinity of nests. Though this colony was not observed during the 2015 survey, nesting was confirmed by other observers later in the 2015 breeding season. A total of 37 American Oystercatcher adults was observed. One Mallard nest was found. Other bird species observed included Brant, Canada Goose, Gadwall, Willet, Ruddy Turnstone, Dunlin, Laughing Gull, Forster's Tern, Tree Swallow, Barn Swallow, Fish Crow, European Starling, Song Sparrow, Boat-tailed Grackle, and Red-winged Blackbird.

Several dangers are apparent for this island's growing waterbird colonies: Recreational boaters were observed walking on the island during one of the Jamaica Bay surveys; increased signage and increased Park Service presence would be helpful to prevent disturbance of nesting colonies during the breeding season. Several unidentified mammal dens were also found on the island, and several partially eaten gull carcasses were found. It has been suggested these dens may be muskrat dens, as muskrats are known scavengers.

Canarsie Pol (220 acres)

26 May 2016, 9:42am-10:01am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Alex Summers (NYCDPR); Stefan Guelly (USDA/APHIS); Kate Faehling (Wild Bird Fund)

For the fourth consecutive year, no nesting wader activity was evident on Canarsie Pol; the wader population on this once productive nesting island collapsed to very low levels in 2012. It is unclear why these declines occurred, but the presence of mammals on the island, including raccoons, may have caused the declines, as has occurred on other nesting islands in the harbor. This island has historically been one of the largest and most diverse heron colonies within the New York Harbor system. Several Snowy and Great Egrets were observed foraging near the island. Several Herring Gull pairs were observed on the island, indicating possible nesting. One Willet nest was found.

Other bird species observed in a partial foot survey and partial scan of the island's southern shoreline included Canada Goose, Brant, Mallard, Black-bellied Plover, Least Sandpiper, Laughing Gull, Forster's Tern, Osprey, Tree Swallow, Barn Swallow, Red-eyed Vireo, Fish Crow, House Wren, Northern Mockingbird, Gray Catbird, Brown Thrasher, European Starling, Yellow Warbler, Common Yellowthroat, Northern Cardinal, Eastern Towhee, Song Sparrow, Boat-tailed Grackle, and Red-winged Blackbird.

Ruffle Bar (143 acres)

26 May 2016, 10:45am-11:05am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Alex Summers (NYCDPR); Stefan Guelly (USDA/APHIS); Kate Faehling (Wild Bird Fund)

Ruffle bar is the second largest uninhabited island in Jamaica Bay, and has not been found to host nesting waders in the time period of this project. It was last surveyed in 2010. A partial survey by foot revealed no evidence of wader presence or nesting, and no evidence of nesting by other colonial waterbirds. One Willet nest was found. Other bird species observed on or near the island included Brant, Osprey (nesting), Tree Swallow, Gray Catbird, Yellow Warbler, Common Yellowthroat, Eastern Towhee, Song Sparrow, American Goldfinch, and Red-winged Blackbird.

Other Jamaica Bay islands

No evidence of nesting waders has been noted by Jamaica Bay Guardian Don Riepe on other islands in Jamaica Bay such as White Island, which have not been known to host nesting waders in the time period of this project.

Upper New York Bay

Governors Island (172 acres)

One pair of Yellow-crowned Night-Herons is reported to have nested on Governors Island in 2016.

Since 2008, a colony of Common Terns has nested on three decommissioned piers on the southeast end of Governor's Island. The entire colony was last officially surveyed in 2013. In 2014, survey access was restricted to one pier (Lima) due to structural instability of the other two piers. That year, the number of nesting pairs on Lima Pier was found to have increased by 200% over 2013; this increase may have been 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 or 2016. Birds were observed nesting on the other two piers, Tango and Yankee in 2014, 2015, and 2016, but we have not been able to get a reliable count due to lack of access. No terns nested on Lima in 2016.

Aids to Navigation:

Aids to navigation off the coast of Staten Island, including in the Kill Van Kull and Arthur Kill, were not surveyed in 2016. 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 in recent years in mainland areas: Yellow-crowned Night-Heron, Green Heron, and Great Blue Heron. These mainland colonies are noted here to the extent they are known, but are not included in report totals. As mainland nesting has not been consistently or comprehensively surveyed for the duration of the Harbor Herons Nesting Survey, valid comparisons between years cannot be made if mainland colonies are included.

The nesting colony of Yellow-crowned Night-Herons located at the Redfern Houses in Far Rockaway was visited on 19 May 2016, 11:21am-12:48pm by the author and Debra Kriensky.

A total of 51 nests was observed (Table 2), a 28% increase over 2013. 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 other mainland colonies of Yellow-crowned Night-Herons in New York City were reported in 2015, including small colonies at Bushwick Housing Project, Brooklyn; Sheepshead Bay, Brooklyn; and Throggs Neck, Bronx. These colonies were not confirmed again in 2016, but an additional colony was confirmed this year in Brookville Park, Queens (6 nests). Thanks to the creation of an online map of nesting sites by American Littoral Society's Lisa Schepke, we will be able to track these colonies more easily in the future. Possible small colonies of Yellow-crowned Night-Heron on Staten Island in recent years have not been documented.

Hugh Carola has regularly presented information on nesting activity of Yellow-crowned Night-Herons 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 the Harmon Cove colony was surveyed on 17 June by Nellie Tsipoura of New Jersey Audubon and volunteer Ray Duffy, with assistance by Alice and Bill Allured. A total of 15 nesting pairs were found at Harmon Cove, similar to numbers found there in recent years. No nesting was reported 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 2016. This species is also known to nest at various mainland sites on Staten Island, but no nesting has been recently documented. One pair of Great Blue Herons nested for a fourth 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 the comprehensive surveys conducted in 2016 and 2013, though shorter- and longer-term comparisons are made where considered relevant.

Black-crowned Night-Heron (538 pairs): Black-crowned Night-Herons were observed on 8 islands in 2016 (in order of decreasing colony size, Hoffman, South Brother, Subway, Little Egg, Mill Rock, Elders Point East, Huckleberry, and Swinburne Islands; see Table 2) and were the numerically dominant species both harbor-wide and in several mixed-species colonies including Hoffman, South Brother, Little Egg, Mill Rock, and Subway Islands. Total observed nesting activity decreased 17% compared to 2013. A decline of this species in the survey area has been observed over the past 6 years. (See Figure 4.)

Yellow-crowned Night-Heron (76 total pairs comprising 4 pairs on islands; 57 New York City mainland pairs; and 15 Secaucus, NJ, pairs): Yellow-crowned Night-Herons were observed on two harbor islands in 2016: South Brother and Governors Islands. Numbers of nesting pairs on islands declined by 78% since 2013; nesting pairs on South Brother Island declined from 11 to 3 pairs, while nesting pairs on Hoffman Island declined from 7 to 0 pairs. One Yellow-crowned Night-Heron pair nested this year on Governors Island; last year's 2 observed nesting pairs were the first recorded of any wader species for this island. As the island population of this species has decreased in recent years, however, numbers have increased at mainland colonies in Queens and Secaucus, NJ, resulting in a slight increase in the total surveyed nesting population since 2013. The largest colony in the survey area continued to be the mainland colony at Redfern Houses (51 nests), which exhibited a 28% increase since 2013, while the colony located in a housing development near Secaucus, NJ, increased from 10 to 15 pairs during the same period. Additional small colonies have been reported and not consistently surveyed in recent years in Brooklyn, the Bronx, and Queens. One colony of 6 nesting pairs was confirmed this year in Brookville Park, Queens. 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 (408 pairs): Great Egrets were observed on five islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, Subway, South Brother, Elders Point East, and Mill Rock Islands; see Table 2). This species' population harborwide declined slightly (4%) compared to 2013, but the trend in its population is positive over the time of the survey. Great Egrets continue to shift their centers of nesting activity throughout the harbor. No nesting activity was observed this year on Huckleberry and Goose Islands, while the colony on Mill Rock island declined sharply and may have been abandoned shortly before the survey in 2016. The South Brother Island colony increased 86% over 2013 (the 2013 count represented a low point over the past

decade), while populations on Hoffman and Subway remained stable and the Elders Point East Island colony declined by 18%. (See Figure 6.)

Snowy Egret (236 pairs): Snowy Egrets nested on five islands in NY/NJ Harbor (in order of decreasing colony size, South Brother, Hoffman, Elders Point East, Subway, and Elders Point West Islands; see Table 2). Though an overall increase of approximately 13% was observed harbor-wide over 2013, the population of this species has remained fairly stable over the history of this survey, despite year-to-year fluctuations. The Snowy Egret, like the Great Egret, has continued to move its centers of nesting activity throughout the harbor; several colonies (Huckleberry and Goose Islands) remained abandoned in 2016, while Mill Rock appears to have been possibly abandoned this year. Colonies on Hoffman, Elders Point East, and South Brother Islands grew in size since 2013, while the colony on Subway Island has declined during this same period. (See Figure 7.)

Little Blue Heron (9 pairs): Little Blue Herons were observed on Hoffman and Elders Point East Islands in 2016. 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 (1 pair): One Tricolored Heron was observed this year on Elders Point East in Jamaica Bay, consistent with very low numbers found in Jamaica Bay in recent years. This is a species more typical of southern colonies, and no increasing trends in NY Harbor have been observed since the first nesting recorded here 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 2016 survey, the sixth consecutive year this species has been absent from our survey since it was last 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. A possible cause of this decline is closure of local landfills that were a foraging source.

Green Heron: No Green Heron nests were observed on the island colonies in 2016, the sixth 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 or 2016. 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 fourth consecutive year at Clove Lakes Park in Staten Island.

Glossy Ibis (224 pairs): Glossy Ibis nests were found on three islands in 2016 (in order of decreasing colony size, Subway, Hoffman, and Elders Point East Islands). The total of 224 nests represents a 47% increase over 2013, but the population of this species has remained fairly consistent over the past decade despite some sharp fluctuations. The harbor Glossy Ibis population declined sharply between 2014 and 2015, but recovered this year by 184%, primarily due to an increase on Subway Island from 34 pairs to 134 pairs. In the past four years this species has nested exclusively on Hoffman, Subway, and Elders Point East Island, though it could historically be found nesting on other islands in Jamaica Bay, as well as on South Brother and Goose Islands in small numbers. (See Figure 8.)

Double-crested Cormorant (1,841 pairs): Double-crested Cormorant nests were observed on eight islands (in order of decreasing colony size, Hoffman, Swinburne, South Brother, Elders Point East, U Thant, Mill Rock, Huckleberry, and Shooters Islands; see Table 2). Notable in 2016 was a sharp decline in the previously productive colony on Huckleberry Island, which has decreased in size by 95% since 2013. The colony appeared recently abandoned in 2016, likely due to the confirmed presence of a raccoon on the Island. An additional 37 cormorant nests were observed on aids to navigation in Newark Bay, consistent with counts in recent years. Aids to navigation off the coast of Staten Island, which have hosted nesting colonies in recent years, were not surveyed in 2016. As pertains to island colonies, we observed a 15% increase in cormorant nests since 2013. This year's island-nesting total of 1,841 pairs is the highest count registered during the period of this survey, just slightly above the previous high count of 1,806 pairs observed in 1995. Double-crested 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, island surveys of gull nests found increases in nesting pairs of Herring Gulls (53%) and Great Black-backed Gulls (20%) harbor-wide since 2013. Adult gull counts in Jamaica Bay yielded an increase in Herring Gulls (14%) and a decrease in Great Black-backed Gulls (-20%). (For detail on the Rikers Island gull colony, see the account of South Brother Island.)

Common Tern: Common Terns nested at three island locations in 2016: Governor's Island, and Joco Marsh and Little Egg Island in Jamaica Bay. The first two 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 colony on Little Egg Island, consisting of 110 surveyed adults in 2016, is reported to have been established post-survey in 2015. 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 2016 survey results demonstrate a stable population of nesting waders in the harbor since the last comprehensive survey conducted in 2013. However, these two surveys (yielding total island wader pair counts of 1,457 and 1,420 for 2013 and 2016, respectively) have been among the lowest counts registered since the colony reached its peak of 2,233 pairs in 1993 (excluding the years of 1998, 2006, and 2012, when the survey was incomplete or limited). These findings may represent an overall declining trend across the last two and half decades. (See Figure 2.) Compared to our 2013 survey, Snowy Egret and Glossy Ibis numbers increased, while Great Egret numbers declined slightly, and Black-crowned Night-Heron numbers continued a decline apparent over the past 25 years; indeed the decline in wader numbers over recent years is primarily attributable to a decline in this species. Yellow-crowned Night-Heron numbers remained stable in the harbor, though this species has shifted its population somewhat from island to mainland colonies in recent years. As concerning as the overall decrease in nesting numbers across the harbor is the decrease in potentially suitable nesting islands, illustrated by the abandonment of Canarsie Pol and Goose Island, and the recent sharp declines on Huckleberry and Mill Rock Islands, 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 Subway, Elders Point East, and Little Egg Islands. 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 are 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, while colored wing tags have been affixed to Great Egrets. 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) or to New York City Audubon (bands@nycaudubon.org), giving leg band or wing tag code, color, location, date, and name of observed. All band sightings should be reported to the Bird Banding Laboratory by visiting 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.
- Outreach to the local birding community would be helpful to learn about the location of mainland wader colonies (principally Green Heron and Yellow-crowned Night-Heron) in the New York Harbor area.
- Provide guidance for continued tern habitat enhancement on Governors Island.

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-17 June 2016

Location Surveyed	Date	# of Observers	Ownership
<u>Long Island Sound</u>			
Goose Island	18 May	5	NYC DPR
Dauids' Island	18 May	6	City of New Rochelle
Huckleberry Island	18 May	6	Huckleberry Indians, Inc.
<u>East River</u>			
North Brother Island	17 May	2	NYC DPR
South Brother Island	17 May	9	NYC DPR
Mill Rock	17 May	4	NYC DPR
U Thant	3 June	2	NYC DPR
<u>Arthur Kill-Kill Van Kull</u>			
Shooters Island	19 May	2	NYC DPR
Prall's Island	25 May	1	NYC DPR
Isle of Meadows	18 May	3	NYC DPR
<u>Lower New York Bay</u>			
Swinburne Island	20 May	4	NPS
Hoffman Island	20 May	4	NPS
	23 May	7	
<u>Jamaica Bay</u>			
Elders Point East	25 May	6	NPS
Elders Point West	26 May	5	NPS
Canarsie Pol	26 May	5	NPS
Subway Island	25 May	6	NPS
Little Egg Marsh	25 May	6	NPS
Ruffle Bar	26 May	5	NPS
<u>Mainland – Far Rockaway</u>			
Redfern Houses	19 May	2	NYC Housing Authority
<u>Mainland – New Jersey</u>			
Harmon Cove	17 June	4	Harmon Cove



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. 2016 Species include Black-crowned Night-Heron (BCNH), Great Egret (GREG), Snowy Egret (SNEG), Glossy Ibis (GLIB), Yellow-crowned Night-Heron (YCNH), Little Blue Heron (LBHE), Tricolored Heron (TRHE), Double-crested Cormorant (DCCO), Herring Gull (HERG), and Great Black-backed Gull (GBBG).

	Hofman Island	North Brother Island	South Brother Island	Canarsie Pol	Mill Rock	Goose Island	David's Island	Huckleberry Island	Elders Point Marsh East	Elders Point Marsh West	Subway Island	Little Egg Island	Ruffe Bar	Swinburne Island	Shooter's Island	Prairie Island	Isle of Meadows	U Thant Island	Governors Island	Red Fern	Other Mainland Colonies	Total Islands	Total Islands and Mainland	
Survey Date																								
Waders																								
GREG	203	0	80	0	13	0	0	0	23	0	89	0	0	0	0	0	0	0	0	0	0	0	408	408
CAEG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SNEG	80	0	86	0	0	0	0	0	49	2	19	0	0	0	0	0	0	0	0	0	0	0	236	236
BCNH	224	0	178	0	15	0	0	3	3	0	65	49	0	1	0	0	0	0	0	0	0	0	538	538
YCNH	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	51	6	4	76	
LBHE	4	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9
GLIB	58	0	0	0	0	0	0	0	32	0	134	0	0	0	0	0	0	0	0	0	0	0	224	224
GRHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRHE	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
GBHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Active Wader Nests	569	0	347	0	28	0	0	3	113	2	307	49	0	1	0	0	0	0	1	51	6	1420	1493	
Cormorants																								
DCCO	831		336		42			10	206					359	9			48					1841	
Gulls																								
HERG Nests	84		8		3									121									216	
HERG Adults									195	183	400	273											1057	
GBBG Nests	68		17		18	1								50				5					159	
GBBG Adults								16	16	30	164							12					227	

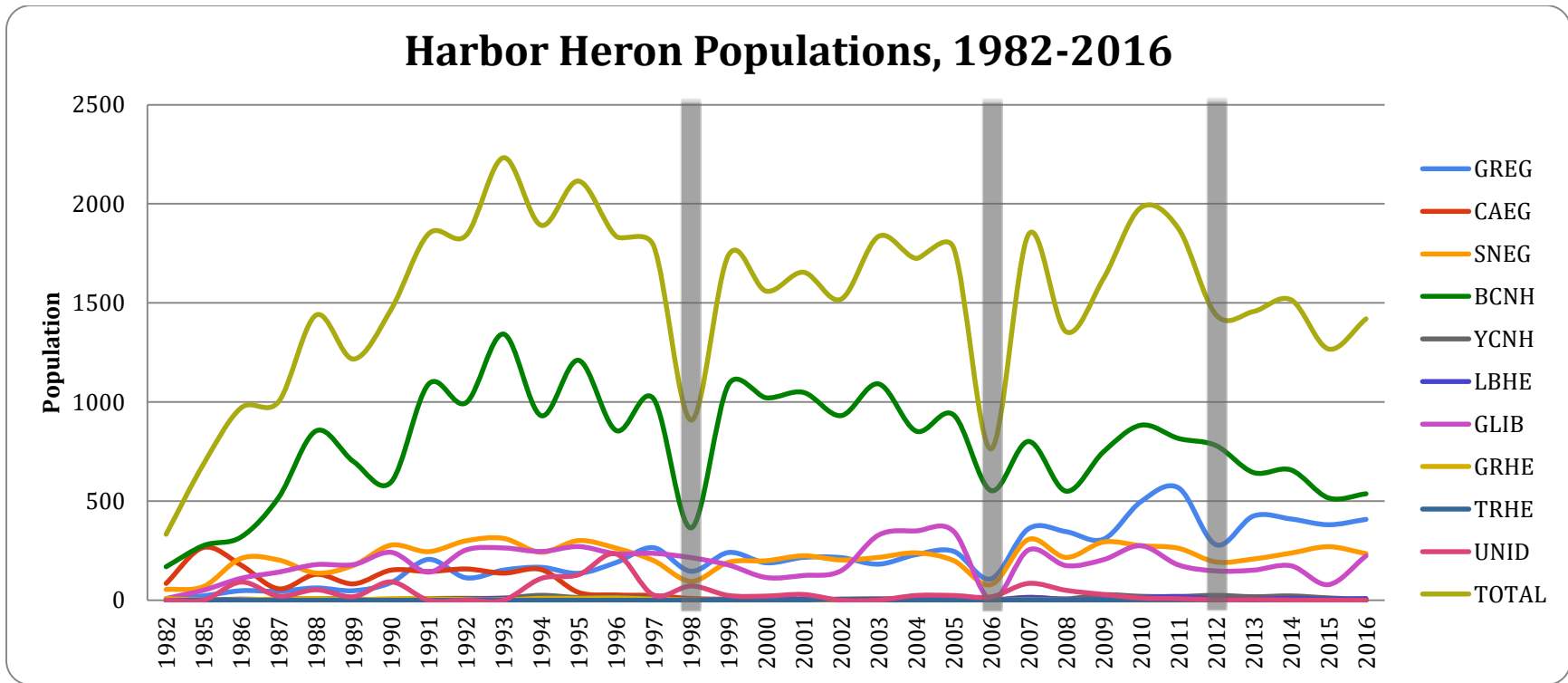


Figure 2: Total number of island-nesting pairs of wader species observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2016. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Nesting Island Trends, All Waders

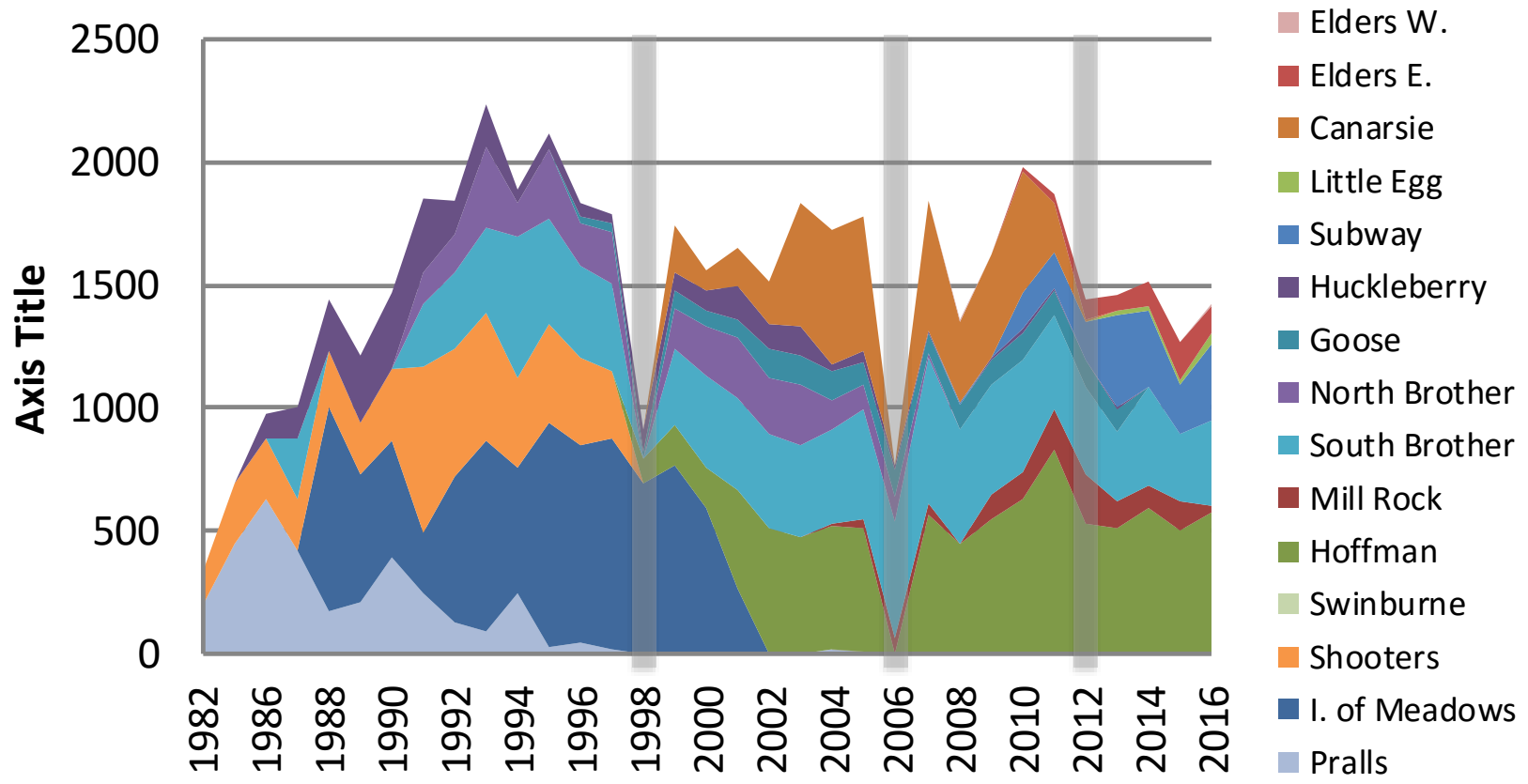


Figure 3: Total number of wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2016, by nesting Island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

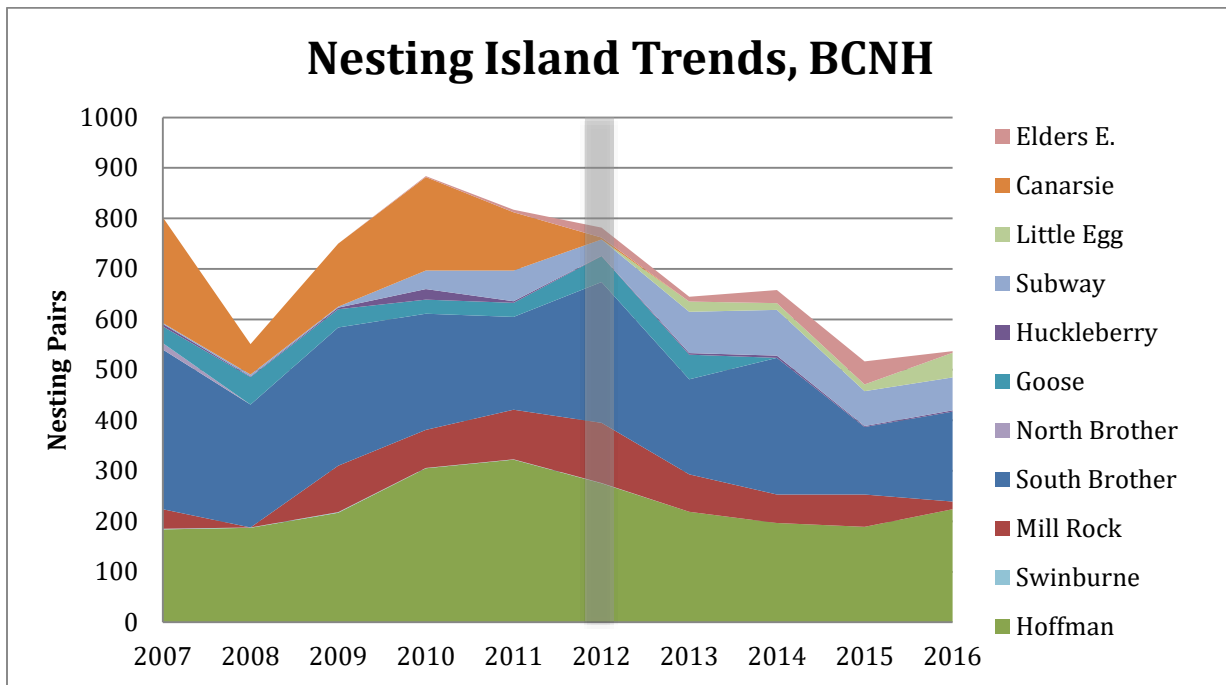


Figure 4: Total number of Black-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2007 to 2016, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

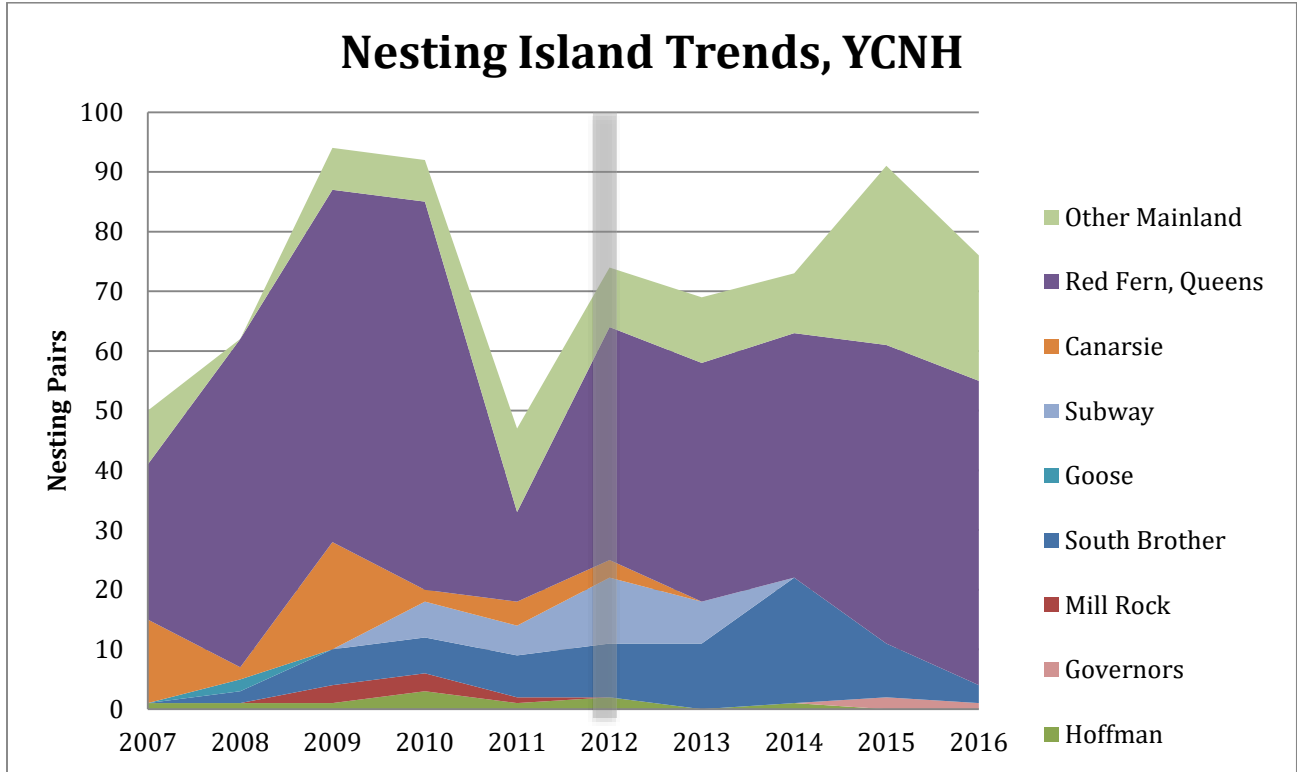


Figure 5: Total number of Yellow-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2007 to 2016, by nesting island and regularly surveyed mainland colony. Years with substantial uncertainty in the island survey data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012). “Other Mainland” colony data from the New York City and local New Jersey area is included as available.

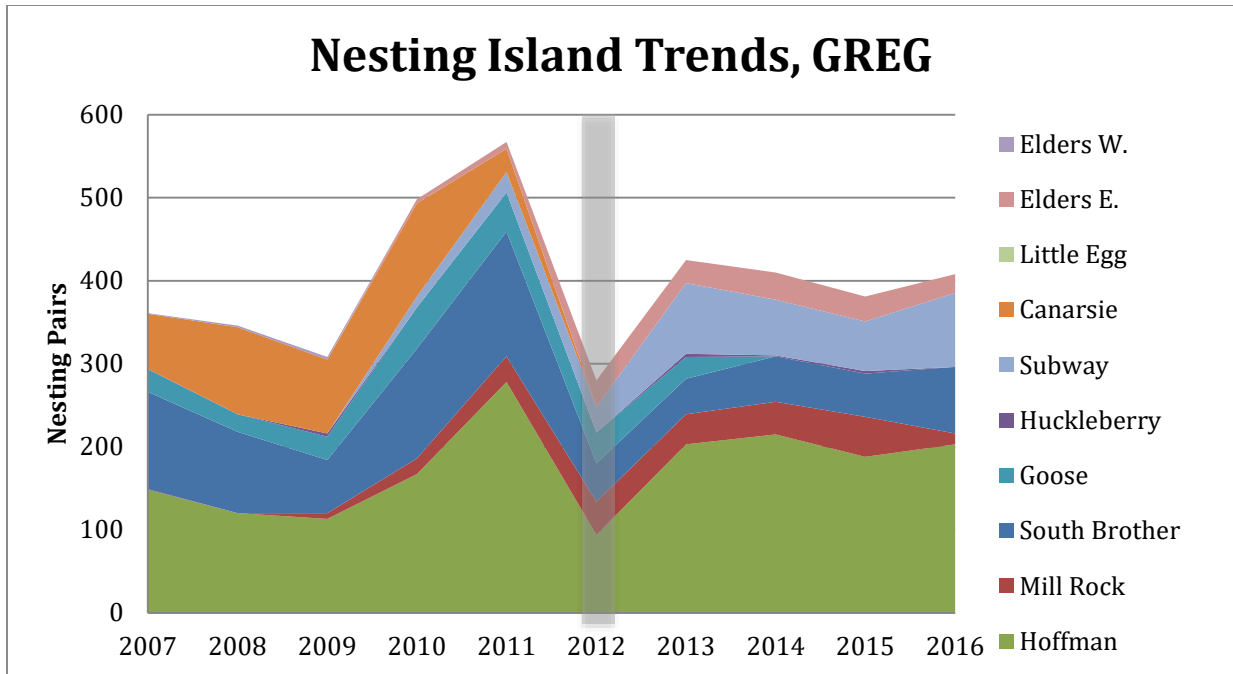


Figure 6: Total number of Great Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2007 to 2016, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

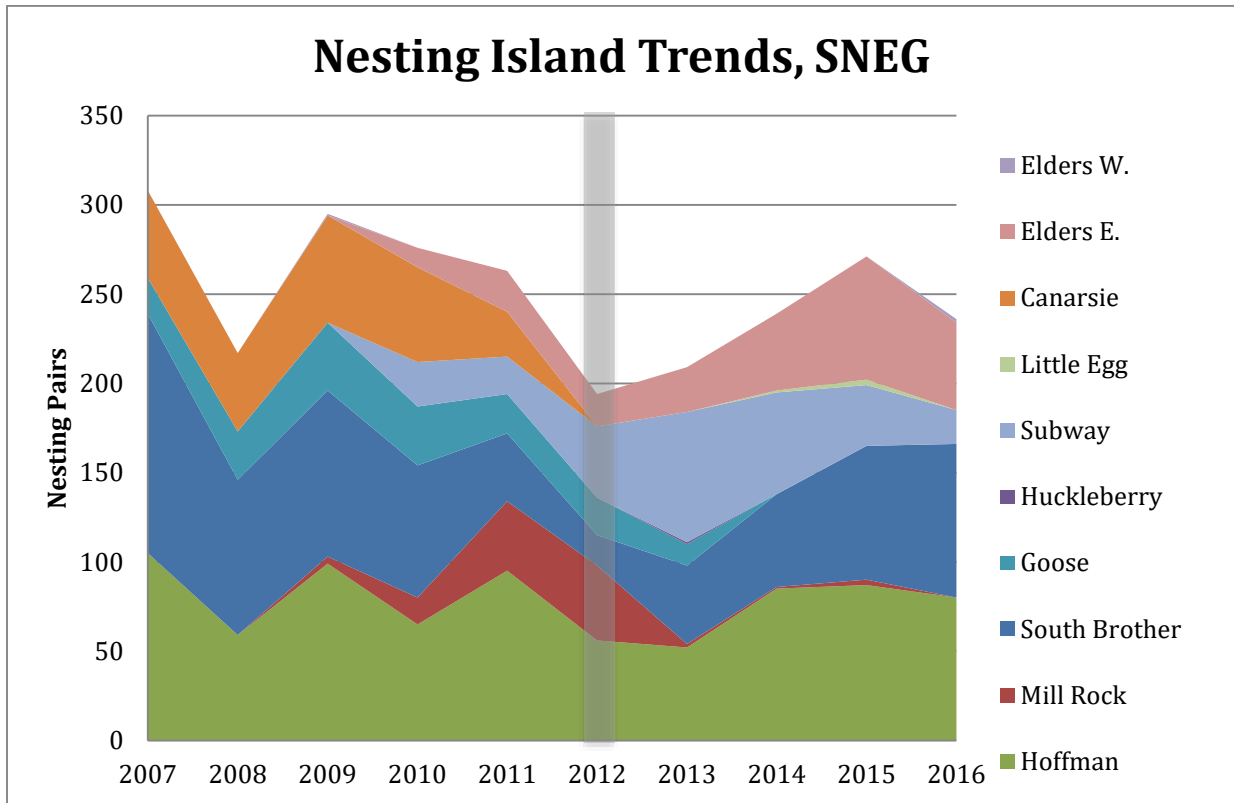


Figure 7: Total number of Snowy Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2007 to 2016, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

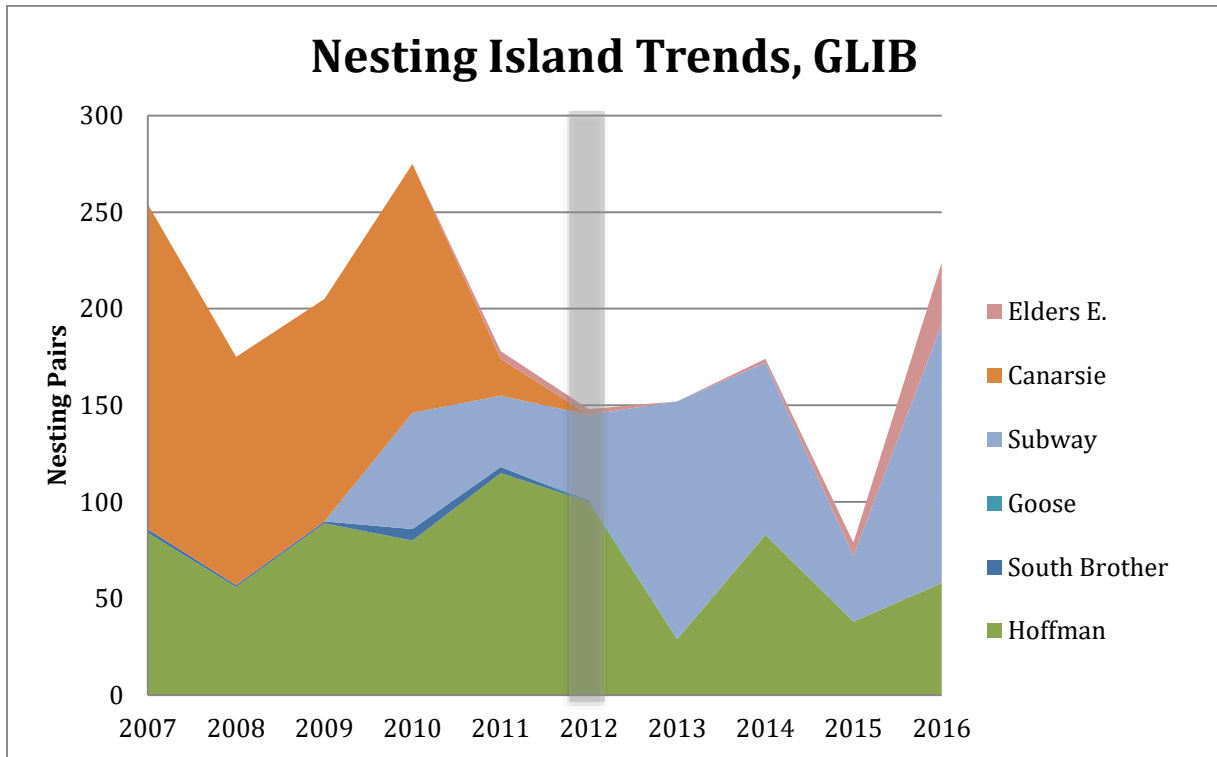


Figure 8: Total number of Glossy Ibis nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2007 to 2016, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

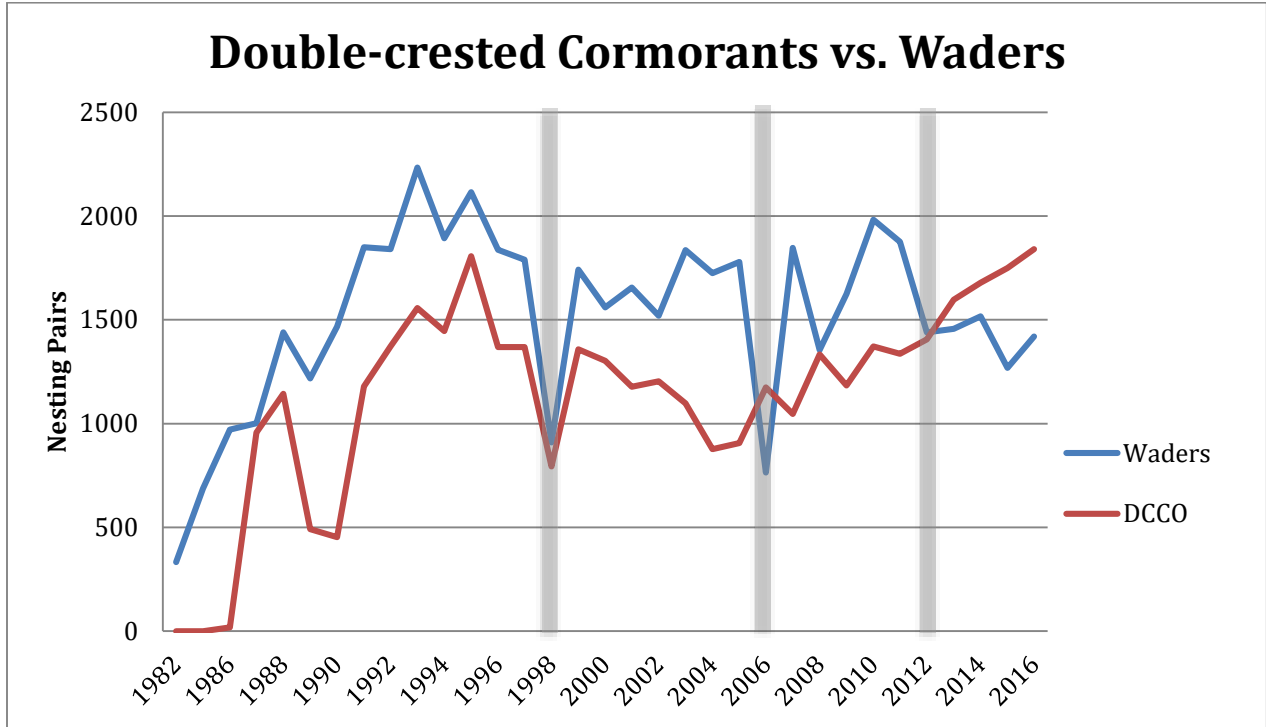


Figure 9: Total number of Double-crested Cormorant and wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2016. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated 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 2016 either directly or indirectly related to the Harbor Herons or the islands on which they nest. Please contact Tod Winston at twinston@nycaudubon.org to report additional research projects.

- 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.