



NEW YORK CITY AUDUBON
CELEBRATING 30 YEARS OF CONSERVATION

NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT: 2017 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 16 May and 15 July, 2017. This report principally summarizes long-legged wading bird, cormorant, and gull 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 eight of thirteen 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, and Great Blue Heron, in order of decreasing frequency. (No island nesting was recorded for Green Heron, but this species is reported to nest at multiple sites in Staten Island.) Overall, the total number of island wader nests decreased slightly since the 2016 survey by 4%. (When the principal New York City and New Jersey mainland colonies of Yellow-Crowned Night-Herons are included, the percent decrease is 3%). The most significant changes since 2016 included a reduction in the Great Egret population (-15%) and an increase in the Snowy Egret population (23%). Glossy Ibis numbers have fluctuated greatly over the past several years, and showed a decrease of 28% over 2016, while Black-crowned Night-Heron numbers increased slightly (3%). Small numbers of Yellow-Crowned Night-Herons continued to nest on several harbor islands, and combined with a limited census of the mainland population, their numbers increased by 11% over 2016. Tricolored and Little Blue Herons continued to nest in low numbers in the lower harbor and in Jamaica Bay. Cattle Egret, observed in small numbers in years previous to 2011, was again not observed nesting in New York Harbor in 2017. 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 2017, but were reported nesting in small numbers at mainland sites in New York City. A total of 1,871 Double-crested Cormorant nests were observed in 2017, a very slight increase (2%) over 2016, continuing an increasing trend exhibited since 2005. Gull nesting activity was observed on nine of eleven islands surveyed for gull breeding; no nesting activity was observed on Goose or Huckleberry Islands, while Elders West and Governors Islands were not surveyed for gull nesting activity. Incidental observations of Common Tern nesting activity were recorded at several sites including Governors Island.

Island summaries: For the third year in a row, the greatest wader species diversity (six species) was observed on Elders Point East Island in Jamaica Bay. While this colony has expanded substantially since becoming established in 2010, it declined by almost a third (28%) for a second straight year. During our survey on 26 May, we encountered several dead Great Egret chicks in very low nests that had been drowned in a recent high tide. Nesting activity in Jamaica Bay continues to be concentrated on Subway Island and Elders Point East, though numbers and apparent productivity increased for a second consecutive year on Little Egg Island. Numbers also increased on Subway Island since 2016. A small population of waders was sighted for a second consecutive year on Elders Point West Island. In the lower harbor, as in recent years, Hoffman Island continued to be a productive colony. As has been the case in recent years, it hosted the greatest total number of nests of all the harbor islands in 2017. Numbers on Hoffman Island

exhibited an 11% decrease in total nests since 2016, continuing a fluctuating trend over the past half-decade. Hoffman was the second most diverse colony in 2016; five nesting wader species were present. For the third consecutive year, wader nesting was observed on Governors Island; this year one pair of Yellow-crowned Night-Herons nested. In the East River and Long Island Sound, several colonies have declined or been abandoned, while South Brother Island remains a productive colony. Breeding numbers on South Brother Island have fluctuated widely in recent years, but decreased by just 4% since 2016—while the wader colony on nearby Mill Rock Island was found to be all but abandoned in 2017, having declined from a total of 115 active nests in 2015 to 2 nests this year. North Brother Island exhibited no signs of wader nesting activity in 2016, marking the tenth 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 fourth year in a row, though Canada Geese appear to successfully nest on this island, indicating the possibility of reestablishment of this once productive colony. For the second consecutive year, no wader nesting activity was observed on Huckleberry Island, and for the first time since 1986, no Double-crested Cormorants were found nesting on the island, their numbers having declined sharply over the past five years. Isle of Meadows and Prall's Island, in the Arthur Kill, and Shooters Island, in the Kill Van Kull, were not surveyed for nesting waders during this 2017 interim survey, due to their lack of nesting activity in recent years. The mainland nesting colony of Yellow-crowned Night-Herons at the Redfern Houses in Far Rockaway exhibited an increase of 14% over 2016; this colony has grown steadily over the past six years. Double-crested Cormorants continued to nest on seven islands in the harbor; cormorant numbers increased 2% over 2016, continuing a decade-long trend of slow population increase in the survey area.

Introduction

New York City Audubon's 2017 Harbor Herons Nesting Survey marks the 33rd 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. An interim nesting survey was conducted in 2017.

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 2017 field season, between 16 May and 15 July. The objectives of the 2017 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 2017 survey followed field methods designed for previous Harbor Herons Project nesting surveys [Katherine Parsons (1986–1995), Paul Kerlinger (1996–2004), Andy Bernick (2004–2007), Liz Craig (2008–2013), Tod Winston (2014–current)] 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 16 May to 15 July, 2017.

Islands fully surveyed in 2017 (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 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, and Subway Islands). North Brother Island in the East River/Long Island Sound was partially surveyed by foot and scanned by boat for evidence of nesting waders, while Elders Point West was surveyed by boat for nesting waders. Structures on Shooters Island in the Kill Van Kull was surveyed by boat for cormorant nesting. The following islands, having not exhibited nesting activity in the last three years or more, were not surveyed for wader activity in 2017: Davids' Island in the Hutchinson River/Long Island Sound area; Isle of Meadows and Prall's and Shooters Islands in the Arthur Kill and Kill Van Kull; and Canarsie Poll and Ruffle Bar in Jamaica Bay. Also presented in this report are observations of Yellow-crowned Night-Heron nesting at on Governors Island and at several mainland colonies, Green Heron and Great Blue Heron nesting in small numbers at mainland sites, and Common Tern nesting at several sites including Governors Island.

Each island was surveyed by a research team consisting of the author and/or 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 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. Hugh Carola of the Hackensack Riverkeeper, Inc. and Nellie Tsipoura of New Jersey Audubon coordinated surveys of New Jersey mainland colonies, while Hugh Carola conducted waterbird counts in Newark Bay. Jeff Kolodzinski of the Port Authority of New York & New Jersey provided information on nesting gull populations at Rikers Island.

Surveys were conducted by one to three teams of researchers, led by the author, NYC Audubon staff, and/or 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 and spray paint 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 and structure could not be discerned, 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); biodegradable flagging tape was utilized to mark trees that had been surveyed for nests in larger colonies to avoid double counting.

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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We sincerely thank all volunteers (noted by name in the island profiles), organizations, and agencies that participated in the 2017 surveys.

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Jersey provided information provided information on nesting gull populations at Rikers Island. Hugh Carola of the Hackensack Riverkeeper, Inc. and Nellie Tsipoura of New Jersey Audubon provided valuable expertise in surveying New Jersey areas. 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 (Shoals Marine Laboratory) and Susan Elbin (NYC Audubon) for their expertise and guidance.

Results

Overview:

In 2017, seven species of long-legged wading birds were observed nesting on eight 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. Overall, the total number of island wader nests (1,367) decreased slightly since the 2016 survey, by 4%. 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 2017, 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. Small colonies on several other Jamaica Bay Islands continue to show gradual increases in breeding populations. Three recently productive islands in the East River and Long Island Sound continued to evidence sharp decline or abandonment by nesting waders: Mill Rock, Goose, and Huckleberry Islands all exhibited little or no nesting activity in 2017. A number of islands that were the core of NY/NJ Harbor's breeding wader community from the 1970s until the late 1990s were not surveyed in this interim year due to lack of recent breeding activity, including North Brother Island, the Arthur Kill/Kill Van Kull complex (Isle of Meadows, Prall's Island, and Shooters Island), and Canarsie Pol in Jamaica Bay. Double-crested Cormorants continued to nest on seven islands in the harbor; cormorant numbers increased 2% over 2016, continuing a decade-long trend of slow population increase in the survey area.

2017 was an interim survey year, and the majority of comparisons noted in this report are between the 2017 and 2016 surveys—though both shorter- and longer-term trends are noted when deemed relevant. Figure 2 illustrates the nesting activity of wader species on the NY/NJ harbor islands over the history of these surveys; years with lacking and/or uncertain data are 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)

17 May 2017, 9:06am-10:20am

By the author, Emilio Tobon (NYC Audubon); David Künstler (NYCDPR); John Burke (Huckleberry Indians, Inc.); Andrew Turk (NYC Audubon volunteer); Rita McMahon (Wild Bird Fund)

For the first time since the nesting colony was surveyed in 1986, the Huckleberry Island nesting survey revealed no nesting wader or cormorant activity (see Table 3 and Figure 4). This colony abandonment follows a continuing recent trend of low numbers of nesting waders on Huckleberry Island, since a 20-year high of 140 nests observed in 2001, and a survey-period maximum of 311 pairs in 1990. Double-crested Cormorants were absent, their numbers having fallen quickly from the 215 nests counted in 2013 (and more gradually from a survey-period maximum of 830 pairs observed in 1995). 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. Two American Oystercatcher pairs were observed on the island, consistent with low numbers over the past decade, while three Spotted Sandpipers were sighted, possibly representing one or two nesting pairs. Nine Canada Goose nests were observed. A Mallard pair was also observed in the water nearby. One Great Egret and one Great Blue Heron were observed foraging nearby. Other bird species observed on or near the island included Brant, Osprey, Fish Crow, Tree Swallow, Gray Catbird, European Starling (nesting), Yellow Warbler, Song Sparrow, Red-winged Blackbird, Common Grackle, American Goldfinch, House Finch, and House Sparrow.

The wader and cormorant colonies on Huckleberry Island appear to have been abandoned due to the presence of predators (rats and raccoons); no signs of rats were encountered on this visit, but raccoons had been recently sighted 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 colony abandonment. Huckleberry Island has been a critical nesting site for both waders and cormorants in the New York City area.

Dauids' Island (78 acres): not surveyed in 2017; no nesting activity observed in recent surveys

Goose Island (1 acre)

24 May 2017, 10:15am-10:45am

By the author (NYC Audubon); John Grayley, David Künstler (NYCDPR)

Goose Island, abandoned shortly before our 2013 survey was conducted, exhibited no active nesting wader activity for the fourth consecutive year. Nine active Canada Goose nests were found, several with eggs, while 12 adults were seen on or near the island. Other bird species

observed on or near the island in 2017 included Double-crested Cormorant, Mallard, Red-tailed Hawk, Barn Swallow, Warbling Vireo, American Robin, Cedar Waxwing, European Starling, Song Sparrow, Red-winged Blackbird, Baltimore Oriole, Common Grackle, and House Sparrow.

It is unclear whether predators such as rats or raccoons, which were thought to be the cause of colony predation and abandonment in 2013, are still present on Goose Island. Its proximity to the mainland makes this island vulnerable to access by both predators and human visitors. Additional signage was posted on the shoreline of Goose Island in an effort to reduce unwanted visitation in 2015, and this signage needs to be repaired and replaced. 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):

23 May 2017, 12:30pm-1:00pm

By Alex Summers (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey)

North Brother Island has not exhibited signs of nesting wader activity since 2007. No evidence of wader activity was observed in 2017, while one Great-blacked Back Gull nest was found. This island was not fully surveyed. Some additional gull nesting may have been occurring; gull-nesting has been observed on building roofs on the island in recent years, but no nesting was confirmed at those sites this year. Other bird species observed included Turkey Vulture.

NYCDPR concluded habitat restoration activities on North Brother Island last year. Continued monitoring will determine the effectiveness of this restoration in improving the island's habitat for nesting waders.

South Brother Island (12 acres)

23 May 2017, 8:58am-2:15pm.

By the author, Gabriel Willow (NYC Audubon); Michael Feller, Ellen Pehek, Alex Summers (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey); Melissa Zostant (USDA/APHIS)

A total of 334 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 a decrease of 4% since 2016, and 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, though this species exhibited an increase of 7% since last year. Since 2016, snowy Egret numbers decreased by 13% to 75 pairs, while Great Egret numbers decreased by 28% to 58 pairs. Both of these species' populations have remained stable, however, over the past several years. The South Brother colony was the second largest wader colony in the New York Harbor in 2017, though not as diverse as several smaller colonies. For the sixth 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

slightly compared to 2016 (344 nests, a 2% increase), the highest count reported since 2005. Cormorant numbers have rebounded slightly in the last three years, marking a break in a declining trend 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 3 Herring Gull nests and 26 Great Black-backed Gull nests. One American Oystercatcher was observed on the island shore. Other bird species observed included Canada Goose (2 nests), Mallard (2 nests), Downy Woodpecker, Eastern Wood-Pewee, Fish Crow, Yellow Warbler, Common Yellowthroat, Song Sparrow, and Baltimore Oriole.

Note: Herring and Great Black-backed Gulls are nesting on roof tops on neighboring Rikers Island. Because of its close proximity to a major New York City airport (LaGuardia), the population is being controlled via egg addling. USDA/Aphis/Wildlife Services biologists counted 426 Herring Gull nests and 5 Great Black-backed Gull nests this year.

Mill Rock (3 acres)

23 May 2017, 3:03pm-3:58pm

By the author, Gabriel Willow (NYC Audubon); Ellen Pehek, Alex Summers (NYCDPR)

This colony, first established in 2004, reached a maximum of 203 wader pairs in 2012, but has been abandoned in the past two years, falling to little or no activity in 2017 from a total of 115 nesting pairs observed in 2015. A total of two recently active wader nests, both Black-crowned Night-Heron, was observed on Mill Rock Island—but no adults were seen and it was not clear whether these nests were currently occupied. No Snowy or Great Egret nests or individuals were observed, though both of these species had sustained breeding populations here till two years ago. No Herring Gull nests were observed, (down from 3 nests in 2016), while 14 Great Black-backed Gull nests (down from 18 nests in 2016) were confirmed. Our count of Double-crested Cormorants (41 nests) was consistent with last year's survey. Cormorant nest counts have increased steadily since the species was first found nesting here in 2011. Cormorants continue to nest on the margin of the wader colony, but have not appeared to be competing with waders for nesting territory. In the past two years, the success of cormorant nesting on this island has been unclear. In 2016 few adults were seen despite signs of recent nesting activity; in 2017, adults were seen on and around nests, and some eggs and young were observed. Other bird species observed on the island included Canada Goose (2 nests), Spotted Sandpiper, Mourning Dove, Gray Catbird, European Starling, and Blackpoll Warbler.

Human disturbance continued to be evident on Mill Rock Island, and may be at least partially responsible for the abandonment of the wader colony. 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)

7 June 2017, 8:45am-9:15am

By Emilio Tobon (NYC Audubon); Willis Welkins (Newtown Creek Alliance)

This island was surveyed on foot in 2017 for the second consecutive year. A total of 47 Double-crested Cormorant nests was observed on the island, both on the collapsed metal arch sculpture and in trees, consistent with last year's survey and marking an increasing trend since the colony was founded in 2008. A total of 7 Great Black-backed Gull nests was counted. No Herring Gull nests or individuals were observed.

Staten Island – Arthur Kill and Kill Van Kull

Isle of Meadows (101 acres): not surveyed in 2017; no nesting activity observed in recent surveys

Prall's Island (88 acres): not surveyed in 2017; no nesting activity observed in recent surveys

Shooters Island (48 acres): while this island was not surveyed for wader nesting activity in 2017 due to lack of recent nesting activity, Hugh Carola (Hackensack Riverkeeper, Inc.) surveyed the Double-Crested Cormorant colony and found six nests. This cormorant colony has continued to decline as the wooden structures that serve as its nest substrate slowly collapse. The 2017 total is the lowest number recorded for this colony in 30 years.

Lower NY Harbor

Hoffman Island (10 acres)

16 May 2017, 9:55am-2:00pm

By the author, Emilio Tobon (NYC Audubon); Don Riepe (American Littoral Society); Willis Welkins (Newtown Creek Alliance); Carla Garcia, Ellen Pehek, Alex Summers (NYCDPR); Jeff Kolodzinski (Port Authority of New York & New Jersey); Thomas Heinemann, Melissa Malloy (USDA/APHIS)

A total of 509 nests of five wader species was observed (in order of decreasing frequency, Great Egret, Black-crowned Night-Heron, Snowy Egret, Glossy Ibis, and Little Blue Heron; see Table 2). This total constitutes an 11% decrease since 2016; 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. Great Egret numbers remained stable compared to 2016 at 197 pairs, while Snowy Egret numbers exhibited an increase of 63% over 2016 at 130 pairs, the highest number recorded on this island in the survey period. Both Black-crowned Night-Heron and Glossy Ibis numbers decreased since 2016, by 40% and 22%, respectively. Populations of both these species have declined on the island in recent years. Waders primarily nested in mulberry species, multiflora rose, box elder, black locust, hackberry, oriental bittersweet, wild grape, and Virginia creeper.

A total of 856 Double-crested Cormorant nests was observed on Hoffman Island in 2017, a 3% increase over 2016, marking the highest surveyed cormorant population since it first became established in 2002.

Totals of 84 Herring and 64 Great Black-backed Gull nests were counted during the survey, consistent with counts in 2016, though nesting populations of both species are substantially below the peaks they've achieved in past decades. One American Oystercatcher was observed. Additional species observed included Canada Goose (4 nests), Mallard (1 nest), Fish Crow (3 nests), Tree Swallow, Gray Catbird, Black-and-White Warbler, Common Yellowthroat, Swamp Sparrow, and Red-winged Blackbird.

Swinburne Island (4 acres)

19 May 2017, 8:50am-10:00am

By the author, Emilio Tobon (NYC Audubon); Ellen Pehek, Alex Summers (NYCDPR)

No waders were found nesting on Swinburne Island in 2017. (One Black-crowned Night-Heron adult was observed nesting in the cormorant colony in 2016, as well as in the period from 2006-2011.) A total of 360 Double-crested Cormorant nests was observed this year, consistent with last year's total, 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. A total of 69 Herring Gull nests were observed, a decrease from the 121 nests observed in 2016; a Great Black-backed Gull count of 50 nests was consistent with last year's survey. One American Oystercatcher nest with two eggs was observed (accompanied by one nesting pair). Additional species observed included Brant, Canada Goose (1 nest), Ruddy Turnstone, Spotted Sandpiper, Fish Crow, Common Yellowthroat, and Red-winged Blackbird.

Jamaica Bay

Elders Point East Marsh (40 acres)

26 May 2017, 11:00am-11:40am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Mike Feller, Opal Perron-Feller (NYC Audubon volunteers); Ariel Cordova-Rojas (Wild Bird Fund)

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). 2017 was the eighth year since the restoration in which colonial waterbirds had the opportunity to nest on this low-lying island, and while it continues to be the most diverse colony in the harbor, its total population has declined in the past two years. A total of 81 wader nests from six wader species was observed in 2017 (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 28% decrease from 2013, and a continued decline from a high count of 158 nests found in 2015. Counts decreased for Snowy and Great Egret since 2016 (35% and 26%, respectively), but increased sharply for Black-crowned Night-Heron (533%); the population of this species fell sharply last year after several years of growth. Glossy Ibis have been found nesting on the island in low single digits since 2011; nine nests were estimated in 2017. The growth of the Elders Point East colony since 2010 coincided with the decline and abandonment of nearby Canarsie Pol—but declines on Elders East in the past two years have likewise coincided with a population increase on nearby Subway Island.

Wading birds nested in very low shrubs, and on the ground. Double-crested Cormorant numbers have increased in nesting territory located in mulberry and ailanthus trees on the northern part of the island formerly occupied by waders. In 2017, 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 three 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 sea-level rise. This vulnerability to flooding was very clear during the survey, as several dead Great Egret chicks were found, apparently drowned during a recent, unusually high tide.

A total of 217 Double-crested Cormorant nests was observed, a 5% increase over 2016 and the highest number yet observed on this island. Many cormorants were nesting on the ground. Totals of 105 Herring Gull adults and 6 Great Black-backed Gull adults were observed during this year's survey, indicating a decline in both populations compared to 2016. A total of 7 American Oystercatcher adults was observed on the island. Other bird species observed on or near the island included Brant, Semipalmated Plover, Semipalmated Sandpiper, and Laughing Gull.

Elders Point West Marsh (40 acres)

15 July 2017, 3:00pm-3:15pm

By Don Riepe (American Littoral Society)

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 2017, four Snowy Egret pairs and one Great Egret pair were estimated to be nesting on this island from a

rapid boat survey; a full survey was not possible. This is the second consecutive year nesting waders have been observed here, not having been present since small numbers nested from 2007 to 2009. Nesting Herring and Great Black-backed Gulls were not surveyed in 2017 but are also likely to have nested here this year.

Subway Island (40 acres)

26 May 2017, 9:20am-10:30am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Mike Feller, Opal Perron-Feller (NYC Audubon volunteers); Ariel Cordova-Rojas (Wild Bird Fund)

The Subway Island colony was the second-largest nesting colony in New York Harbor in 2017. This year was the eighth 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 376 wader nests was observed, representing four species of waders (in order of decreasing frequency, Black-crowned Night-Heron, Glossy Ibis, Great Egret, and Snowy Egret). This total represents an increase of 22% since 2016, and is the highest count observed since this colony's establishment. Counts of Great Egrets and Glossy Ibis declined since 2016 (22% and 20%, respectively), while nesting pairs of Snowy Egret and Black-crowned Night-Heron increased substantially (147% and 135%, respectively). Totals of 407 Herring Gull adults and 44 Great Black-backed Gull adults were observed, both numbers representing increases over our 2016 counts. A total of 44 American Oystercatcher adults was observed, the highest count yet registered on this island. Ten Canada Goose adults were observed. Other species present included Mallard (3 nests), Gadwall, Spotted Sandpiper, Greater Yellowlegs, Semipalmated Sandpiper, Willet (1 nest), Laughing Gull, Willow Flycatcher, Fish Crow, Tree Swallow, Barn Swallow, Northern Mockingbird, Gray Catbird, Yellow Warbler, Common Yellowthroat, Song Sparrow, Common Grackle, Boat-tailed Grackle, and Red-winged Blackbird.

Little Egg Island

26 May 2017, 8:15am-9:00am

By the author (NYC Audubon); Don Riepe (American Littoral Society); Mike Feller, Opal Perron-Feller (NYC Audubon volunteers); Ariel Cordova-Rojas (Wild Bird Fund)

From 2013-2015, 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. This colony has continued to grow: In 2017, 59 nesting pairs were estimated, the majority Black-crowned Night-Heron (53 pairs) accompanied by very small numbers of Great Egret, Snowy Egret, and Yellow-crowned Night-Heron. A total of 258 Herring Gull adults and 228 Great Black-backed Gull adults were observed, indicating a 5% decrease and 39% increase, respectively, over 2016. A Common Tern colony was present on the island in the past two years; though no birds or nests were observed during the 2017 survey, it is possible that the colony began breeding later in the season, as occurred in 2015. A total of 35 American Oystercatcher adults was observed. Other bird species observed included Canada Goose (1 nest), Brant, Willet, Black-bellied Plover, Ruddy Turnstone, Red Knot, crow sp., Common Yellowthroat, Song Sparrow, and Red-winged Blackbird.

Recreational boaters have been observed walking on the island during the Jamaica Bay surveys; increased signage and increased Park Service presence would be helpful to prevent disturbance of nesting colonies during the breeding season.

Canarsie Pol (220 acres): not surveyed in 2017; no nesting activity observed in recent surveys

Ruffle Bar (143 acres): not surveyed in 2017; no nesting activity observed in recent surveys

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 2017; one or two pairs of this species have nested here since 2015.

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. In 2017 we enhanced the eastern end of Lima Pier by adding oyster shells, grasses, and gull excluders. A total of 35 successful nesting pairs were counted, as compared to zero in 2016.

Aids to Navigation:

Hugh Carola (program director, Hackensack Riverkeeper) observed 42 nesting pairs of Double-crested Cormorants on aids to navigation in Newark Bay and in the Kill van Kull adjacent to the Bayonne Bridge.

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 island totals or in accompanying figures, unless noted. 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 30 May 2017, 8:25am-9:10am by the author, Debra Kriensky, and Jose Ramirez-Garofalo.

A total of 58 nests was observed (Table 2), a 14% increase over 2016. Nest count numbers have continued to recover since a decline was documented in 2011, following possible predation by red-tailed hawks in 2010. This is the twelfth year the Red Fern colony has been confirmed.

Several other small mainland colonies of Yellow-crowned Night-Herons in New York City have been reported in recent years, including small colonies at Bushwick Housing Project, Brooklyn; Sheepshead Bay, Brooklyn; and Throggs Neck, Bronx, and Brookville Park, Queens. These colonies were not confirmed again in 2017, but an additional colony was confirmed this year in Lindenwood, Queens (3 nests). Thanks to the creation of an online map of nesting sites by American Littoral Society's Lisa Scheppke, we will be able to track the status of 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 of Hackensack Riverkeeper, Inc. 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 7 June by Hugh Carola, Nellie Tsipoura of New Jersey Audubon, and volunteer Ray Duffy, with assistance from Lynn Kramer. 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 noted by local birders in 2017. 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 fifth 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 2016 and 2017 surveys, though shorter- and longer-term comparisons are made where considered relevant.

Black-crowned Night-Heron (552 pairs): Black-crowned Night-Herons were observed on 6 islands in 2017 (in order of decreasing colony size, South Brother, Subway, Hoffman, Little Egg, Elders Point East, and Mill Rock; see Table 2) and were the numerically dominant species both harbor-wide and in several mixed-species colonies including South Brother, Subway, Little Egg, and Mill Rock Islands. This species has shifted somewhat in the harbor in recent years; its population has declined on Hoffman Island while rising on the Jamaica Bay islands of South Brother and Little Egg. Total observed nesting activity increased 3% compared to 2016. The harbor's Black-crowned Night-Heron population has remained stable for the past three years, but its numbers are substantially below populations recorded in previous decades. (See Figure 5.)

Yellow-crowned Night-Heron (84 total pairs comprising 8 pairs on islands; 61 New York City mainland pairs; and 15 Secaucus, NJ, pairs): Yellow-crowned Night-Herons were observed on three harbor islands in 2017: South Brother, Little Egg, and Governors Islands. Numbers of nesting pairs on islands have fluctuated in recent years and increased slightly over 2016; small numbers have continued to nest on South Brother Island, while this species has discontinued activity on Hoffman Island. One Yellow-crowned Night-Heron pair nested this year on each of Governors Island and Little Egg Island. As the island population of this species has decreased in recent years, numbers have increased at mainland colonies in Queens and Secaucus, NJ, resulting in a slow increase in the total surveyed nesting population. Though surveying of the smaller mainland colonies has not been consistent, harbor-wide the surveyed breeding population increased 11% over 2016. The largest colony in the survey area continued to be the mainland colony at Redfern Houses (58 nests), which exhibited a 14% increase since 2016, while the colony located in a housing development near Secaucus, NJ, remained stable at 15 pairs. Additional small colonies have been reported and not consistently surveyed in recent years in Brooklyn, the Bronx, and Queens. One colony of 3 nesting pairs was confirmed this year in Lindenwood, Queens. See the description of these colonies as well as the New York City mainland colonies above in the mainland accounts section. (See Figure 6.)

Great Egret (345 pairs): Great Egrets were observed on 6 islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, Subway, South Brother, Elders Point East, Little Egg, and Elders Point West Islands; see Table 2). This species' population declined 15% compared to 2016, 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 the previously productive Huckleberry, Goose, or Mill Rock Islands. Populations declined slightly over 2016 on Hoffman, Subway, South Brother, and Elders Point East Islands, while small new populations were present on Little Egg and Elders Point West Islands. (See Figure 7.)

Snowy Egret (290 pairs): Snowy Egrets nested on six islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, South Brother, Subway, Elders Point East, Elders Point West,

and Little Egg Islands; see Table 2). An overall increase of 23% was observed harbor-wide over 2016; despite year-to-year fluctuations, the population of this species has remained fairly stable over the history of this survey. The Snowy Egret, like the Great Egret, has continued to move its centers of nesting activity throughout the harbor; several formerly productive colonies (Huckleberry, Goose, and Mill Rock Islands) remained abandoned in 2017. The colony on Hoffman Island increased 63% over 2016, reaching the highest population of this species for this island in the survey period (130 pairs). The population on Subway Island also increased in size, while numbers declined somewhat on South Brother and Elders Point East Islands. Small numbers continue to nest on Little Egg Island, while a colony may be establishing itself on Elders Point West Island. (See Figure 8.)

Little Blue Heron (4 pairs): Little Blue Herons were observed on Hoffman and Elders Point East Islands in 2017. 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 while its populations is considerably below the higher numbers it has sometimes achieved (its highest count in the survey period being 19 pairs in 2011), it maintains a consistent, low-level presence in the NY/NJ Harbor breeding community.

Tricolored Heron (2 pairs): Two Tricolored Herons were 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 2017 survey, the seventh 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 served as foraging grounds.

Green Heron: No Green Heron nests were observed on the island colonies in 2017, the seventh 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 has not been confirmed there since. 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 fifth consecutive year at Clove Lakes Park in Staten Island.

Glossy Ibis (161 pairs): Glossy Ibis nests were found on three islands in 2017 (in order of decreasing colony size, Subway, Hoffman, and Elders Point East Islands). The total of 161 nests

represents a 28% decrease since 2016, primarily due to a declining population on Hoffman Island. The population of this species has remained fairly consistent over the past decade despite some sharp fluctuations. 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 9.)

Double-crested Cormorant (1,871 pairs): Double-crested Cormorant nests were observed on seven islands in 2017 (in order of decreasing colony size, Hoffman, Swinburne, South Brother, Elders Point East, U Thant, Mill Rock, and Shooters Islands; see Table 2). Notable in 2017 was a complete abandonment of the previously productive colony on Huckleberry Island, which has declined over the past three years, likely due to the continued presence of raccoons on the Island. An additional 42 cormorant nests were observed on aids to navigation in Newark Bay and in the Kill van Kull, consistent with counts in recent years. Other aids to navigation off the coast of Staten Island, which have hosted nesting colonies in recent years, were not surveyed in 2017. As pertains to island colonies, a 2% increase in cormorant nests has been observed since 2016. This year's island-nesting total of 1,871 pairs is the highest count registered during the period of this survey. Double-crested Cormorant colonies must be carefully monitored to determine the potential impact of cormorant nesting activity on wader nesting populations (See Figure 10). 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 a decrease in nesting pairs of Herring Gulls (28%) since 2016, while numbers of Great Black-backed Gulls increased slightly (2%). Adult gull counts in Jamaica Bay were incomplete and cannot be compared to 2016, as Elders Point West was not surveyed for nesting gulls this year. (For detail on the Rikers Island gull colony, see the account of South Brother Island.)

Common Tern: Common Terns nested at two known island locations in 2017, Governors Island and Joco Marsh in Jamaica Bay, as well as at several mainland sites on the Rockaway Peninsula. All of these locations have been active in recent years, but none has been consistently or formally surveyed as a part of the Harbor Herons survey effort. (National Park Service and New York City Parks conduct surveys of the colonies located at Joco Marsh and on the Rockaway Peninsula.) The colony on Little Egg Island was not found during the 2017 survey. This colony consisted of 110 pairs in 2016 and 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 2017 survey results demonstrate a stable population of nesting waders on the harbor islands and harbor-wide since 2016, and over the last six years. However, this year's island count of 1,367 pairs, and the 2015 count of 1,268 pairs, are 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 2016 survey, Snowy Egret numbers increased, while Great Egret and Glossy Ibis numbers declined slightly, and Black-crowned Night-Heron numbers remained stable. Yellow-crowned Night-Heron numbers also 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 continued lack of nesting activity on Canarsie Pol and Goose Island, and the recent sharp declines on Huckleberry and Mill Rock Islands, all trends 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, Elders Point West, 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. NYC Audubon is currently doing an in-depth nesting population trend analysis to determine statistical significance and environmental correlates of trends. 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. Many researchers face the somewhat intractable problem of surveying islands heavily colonized by invasive species and/or dense undergrowth. At the time of publication of this report, we are planning implementation of a grid system of directionally marked posts on the two larger islands that currently host breeding waders, Hoffman and South Brother Islands. Proposals have been submitted to the appropriate agencies with hopes of installation before the 2018 breeding season. 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, and 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), repeat visits to the colony by researchers has been discouraged. 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, Mill Rock, 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. (Additional signage will be included as part of previously mentioned proposals submitted for grid systems on Hoffman and South Brother Islands.) 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's programming and collaboration with community organizations create opportunities for community and educational outreach through participation in birding events as well as 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 under way 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, 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 re-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.
- 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, 16 May-15 July 2017

Location Surveyed	Date	# of Observers	Ownership
<u>Long Island Sound</u>			
Goose Island	24 May	3	NYC DPR
Huckleberry Island	17 May	6	Huckleberry Indians, Inc.
<u>East River</u>			
North Brother Island	23 May	2	NYC DPR
South Brother Island	23 May	7	NYC DPR
Mill Rock	23 May	4	NYC DPR
U Thant	7 June	2	NYC DPR
<u>Arthur Kill-Kill Van Kull</u>			
Shooters Island	27 May	1	NYC DPR
<u>Lower New York Bay</u>			
Swinburne Island	19 May	4	NPS
Hoffman Island	16 May	10	NPS
<u>Jamaica Bay</u>			
Elders Point East	26 May	5	NPS
Elders Point West	15 July	1	NPS
Subway Island	26 May	5	NPS
Little Egg Marsh	26 May	5	NPS
<u>Mainland – Far Rockaway</u>			
Redfern Houses	30 May	3	NYC Housing Authority
<u>Mainland – New Jersey</u>			
Harmon Cove	7 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. 2017 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).

	Hoffman Island	North Brother Island	South Brother Island	Mill Rock	Goose Island	Huckleberry Island	Elders Point Marsh East	Elders Point Marsh West	Subway Island	Little Egg Island	Swinburne Island	Shooter's Island	U Thant Island	Governors Island	Red Fern	Other Mainland Colonies	Total Islands	Total Islands and Mainland	
Survey Date																			
Waders																			
GREG	197	0	58	0	0	0	17	1	69	3	0	NA	0	0	0	0	345	345	
CAEG	0	0	0	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	0	
SNEG	130	0	75	0	0	0	32	4	47	2	0	NA	0	0	0	0	290	290	
BCNH	134	0	191	2	0	0	19	0	153	53	0	NA	0	0	0	0	552	552	
YCNH	0	0	6	0	0	0	0	0	0	1	0	NA	0	1	58	18	8	84	
LBHE	2	0	0	0	0	0	2	0	0	0	0	NA	0	0	0	0	4	4	
GLIB	45	0	0	0	0	0	9	0	107	0	0	NA	0	0	0	0	161	161	
GRHE	0	0	0	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	0	
TRHE	0	0	0	0	0	0	2	0	0	0	0	NA	0	0	0	0	2	2	
GBHE	0	0	0	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	1	
Unidentified	1	0	4	0	0	0	0	0	0	0	0	NA	0	0	0	0	5	5	
Total Active Wader Nests	509	0	334	2	0	0	81	5	376	59	0	NA	0	1	58	18	1367	1444	
Cormorants																			
DCCO	856		344	41			217	0			360	6	47					1871	
Gulls																			
HERG Nests	84		3								69	NA						156	
HERG Adults							105	NA	407	258								770	
GBBG Nests	64	1	26	14							50	NA	7					162	
GBBG Adults							6	NA	44	228								278	

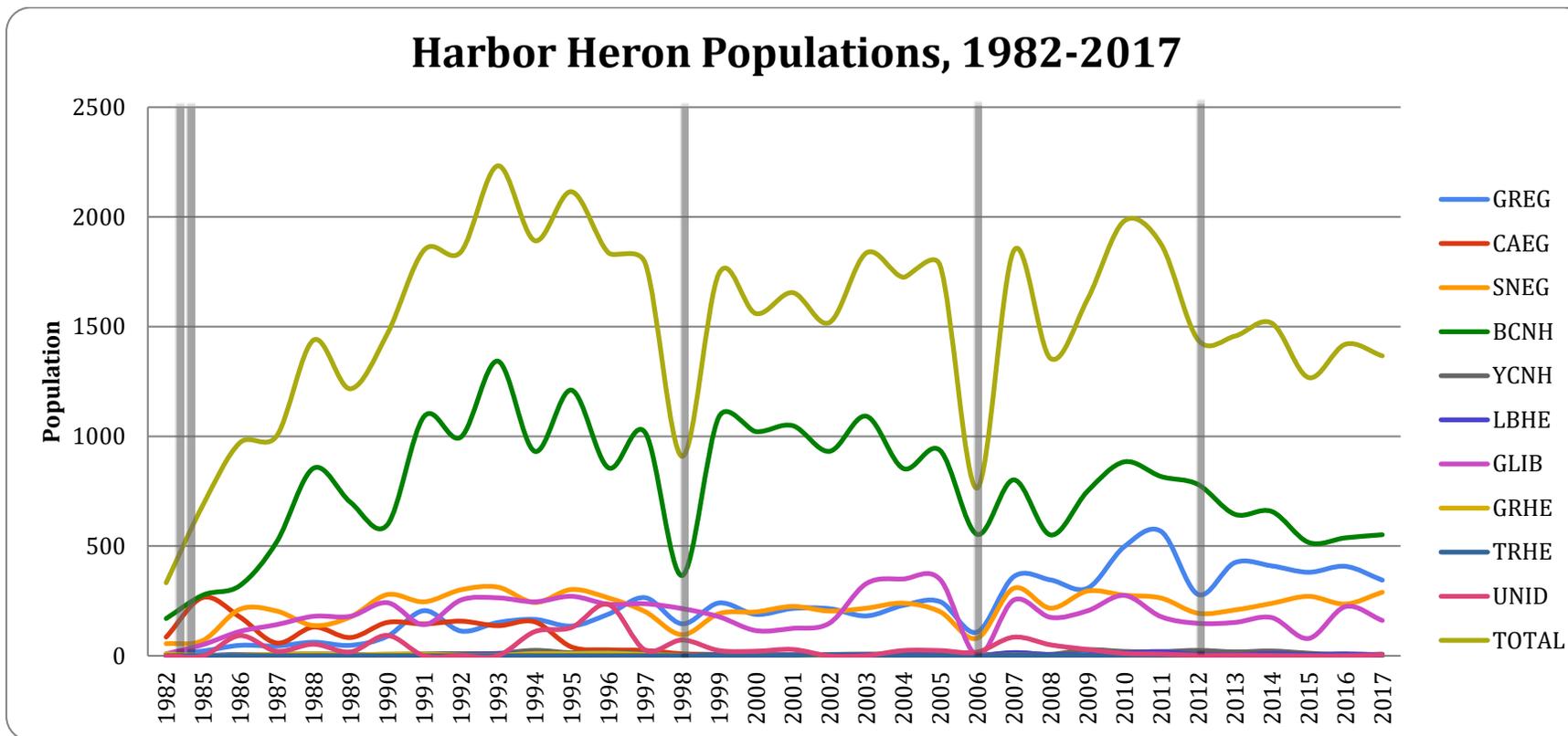


Figure 2: Total number of island-nesting pairs of wader species observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2017. Gray bars indicate years in which no data is available because no survey was conducted (1983, 1984) and years with substantial uncertainty in the data due to an incomplete survey of one or more of the major breeding colonies (1998, 2006, 2012).

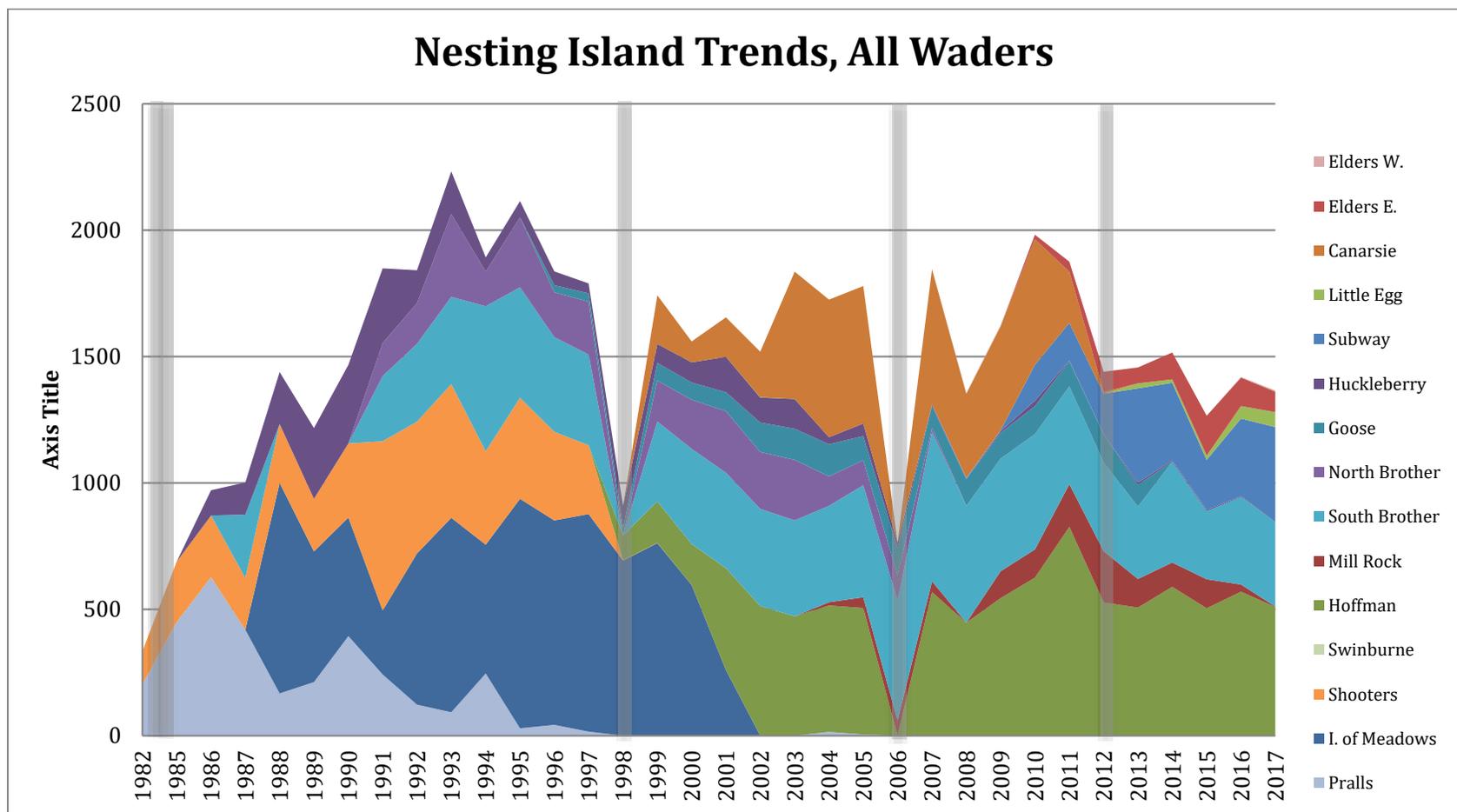


Figure 3: Total number of wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2017, by nesting Island. Gray bars indicate years in which no data is available because no survey was conducted (1983, 1984) and years with substantial uncertainty in the data due to an incomplete survey of one or more of the major breeding colonies (1998, 2006, 2012).

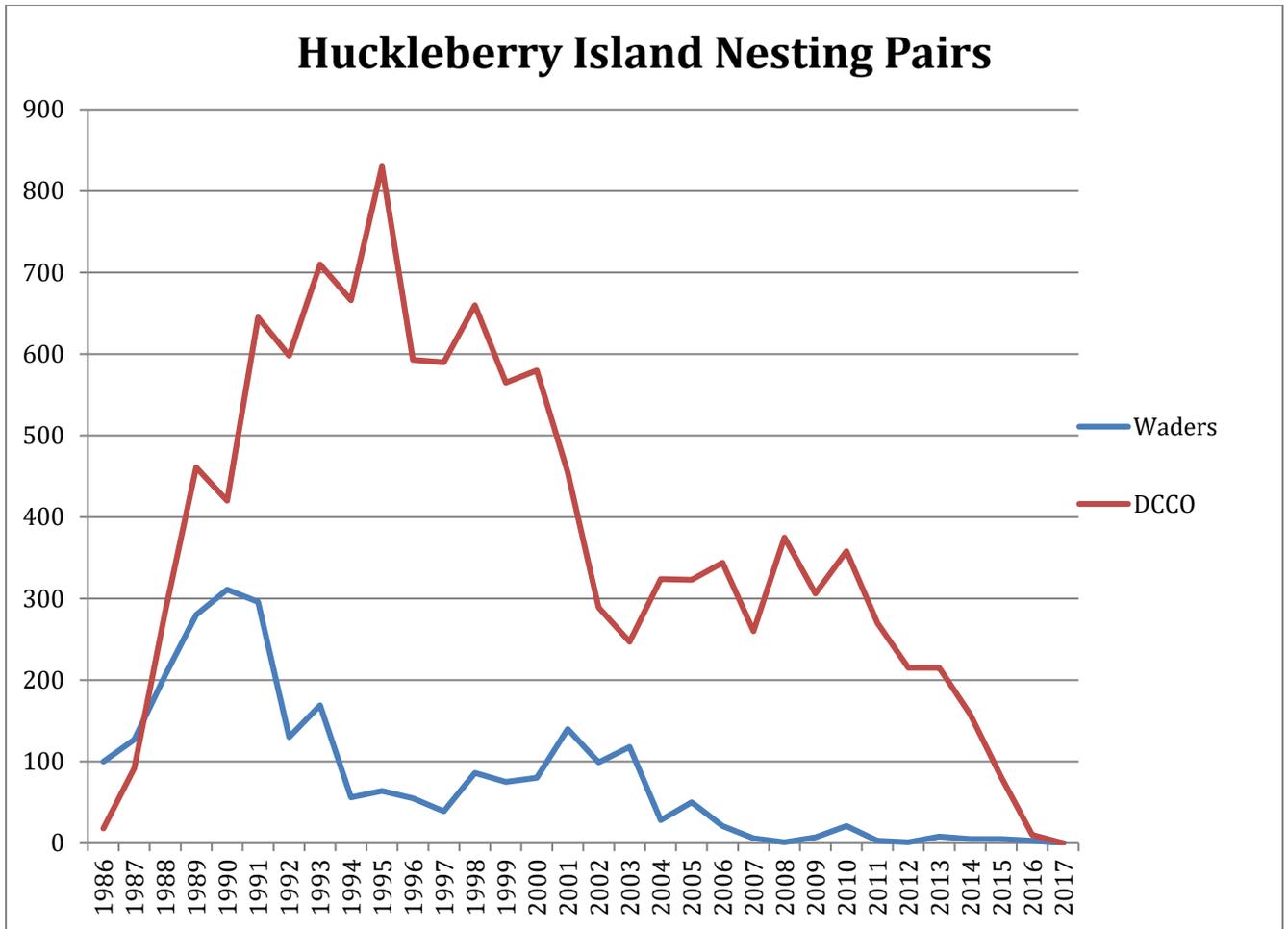


Figure 4: Total number of wader and Double-crested Cormorant (DCCO) nesting pairs observed on Huckleberry Island, 1986-2017. (Note: Huckleberry Island was first surveyed as part of this project in 1986.)

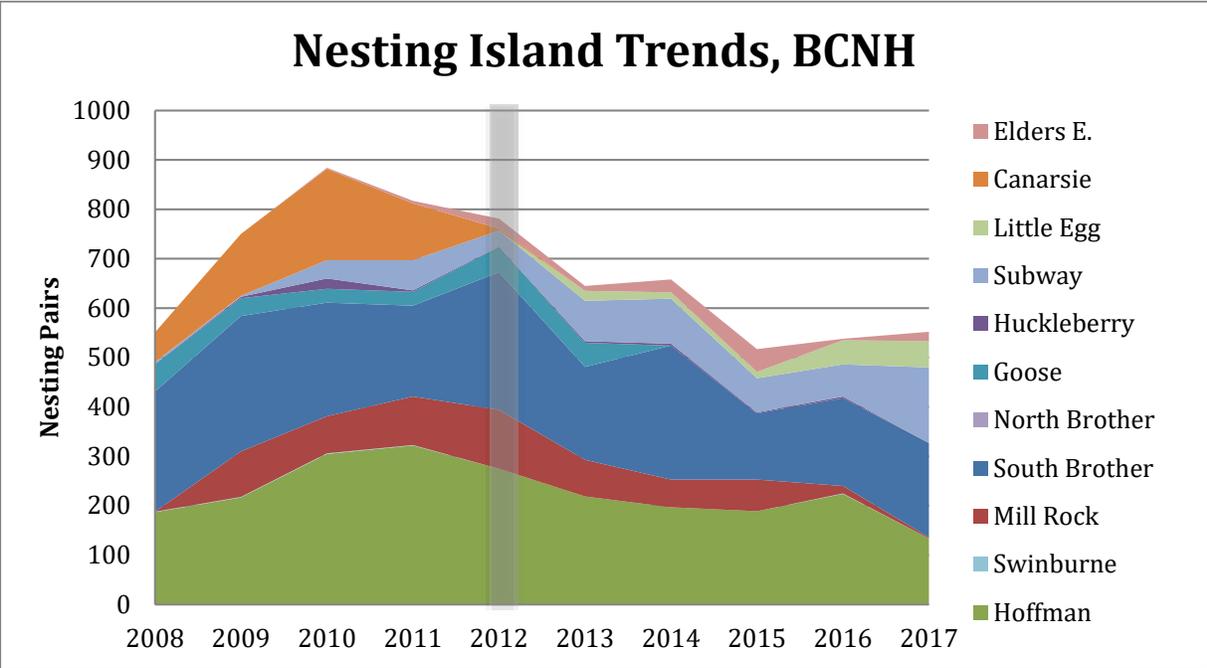


Figure 5: Total number of Black-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2008 to 2017, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

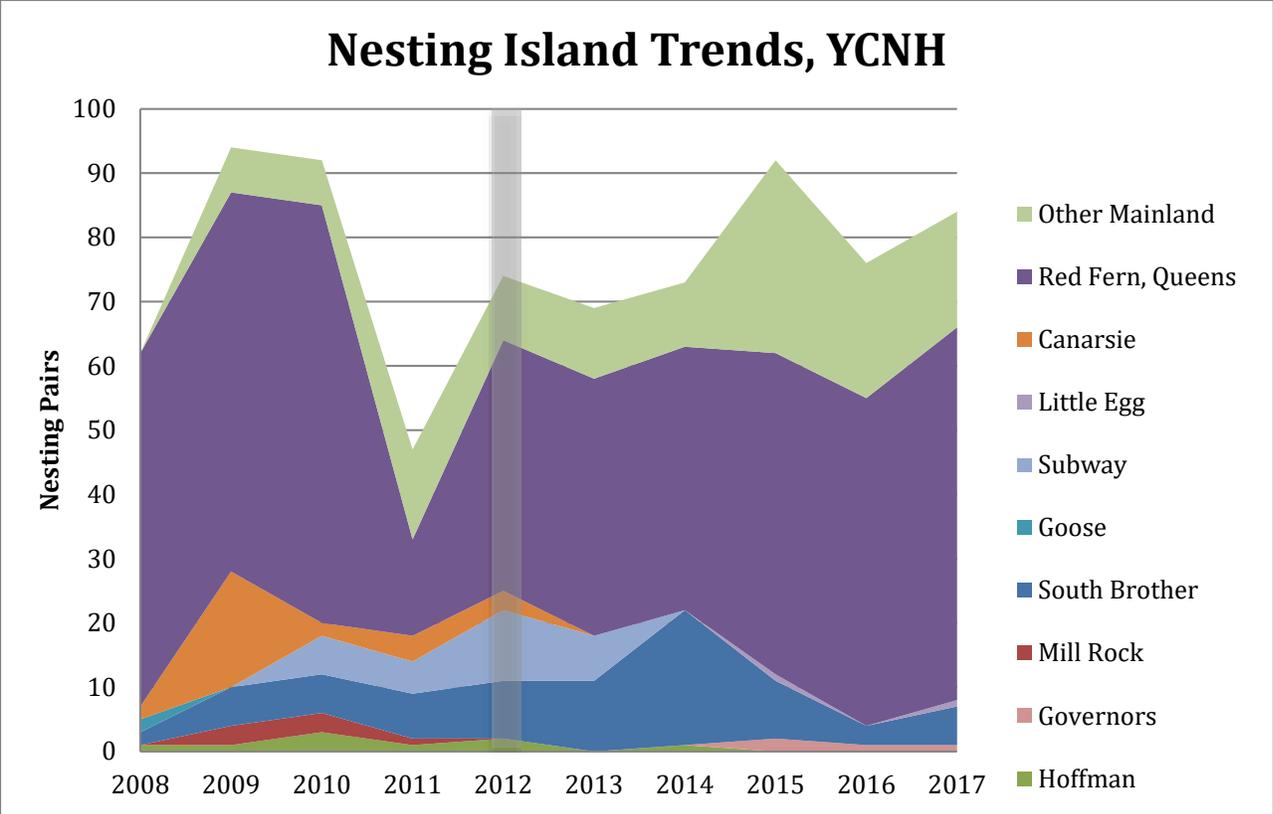


Figure 6: Total number of Yellow-crowned Night-Heron nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2008 to 2017, by nesting island and regularly surveyed mainland colony. Years with substantial uncertainty in the island survey data (survey years that did 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.

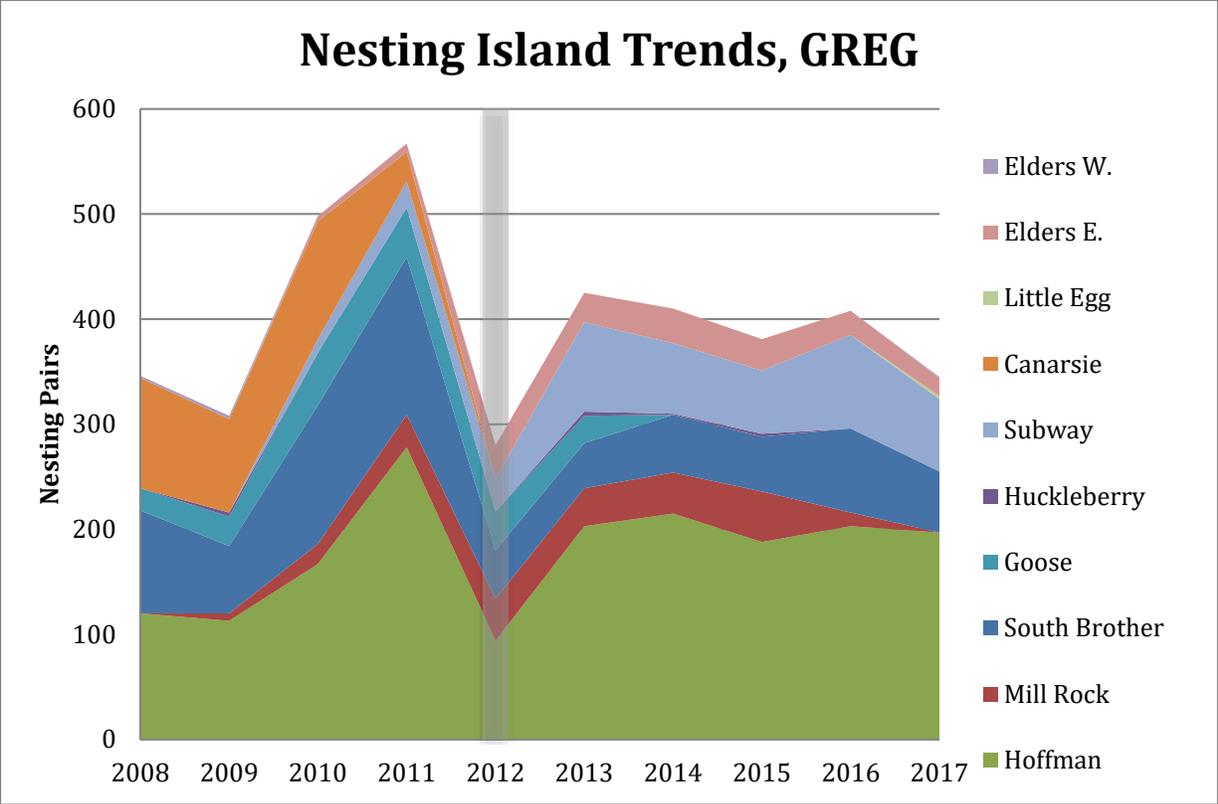


Figure 7: Total number of Great Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2008 to 2017, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

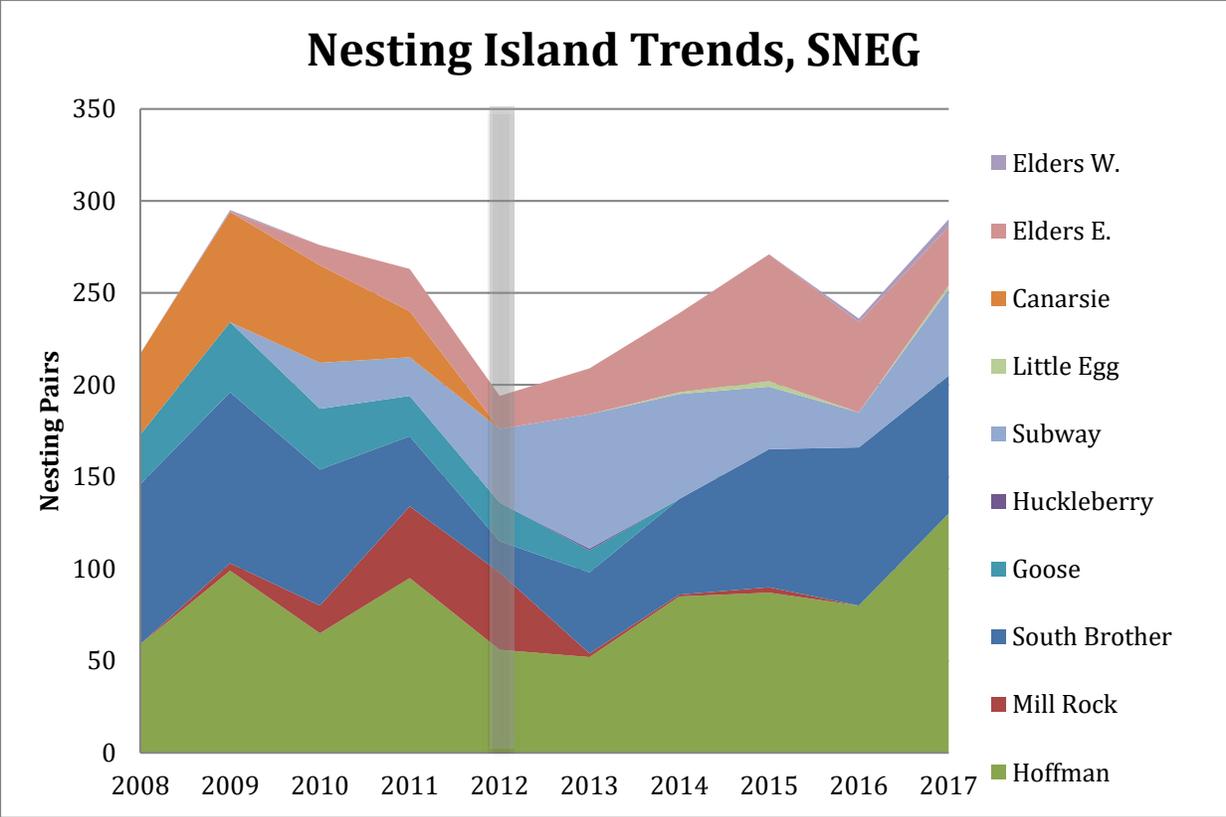


Figure 8: Total number of Snowy Egret nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2008 to 2017, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

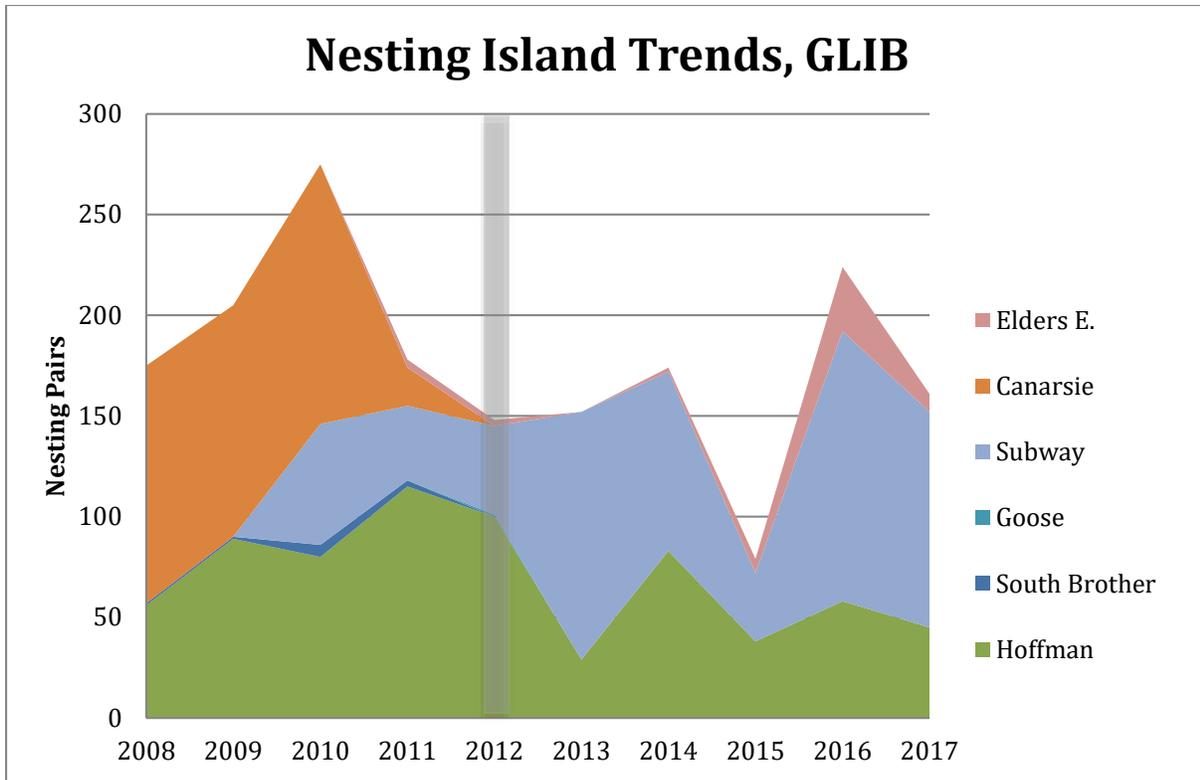


Figure 9: Total number of Glossy Ibis nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 2008 to 2017, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (2012).

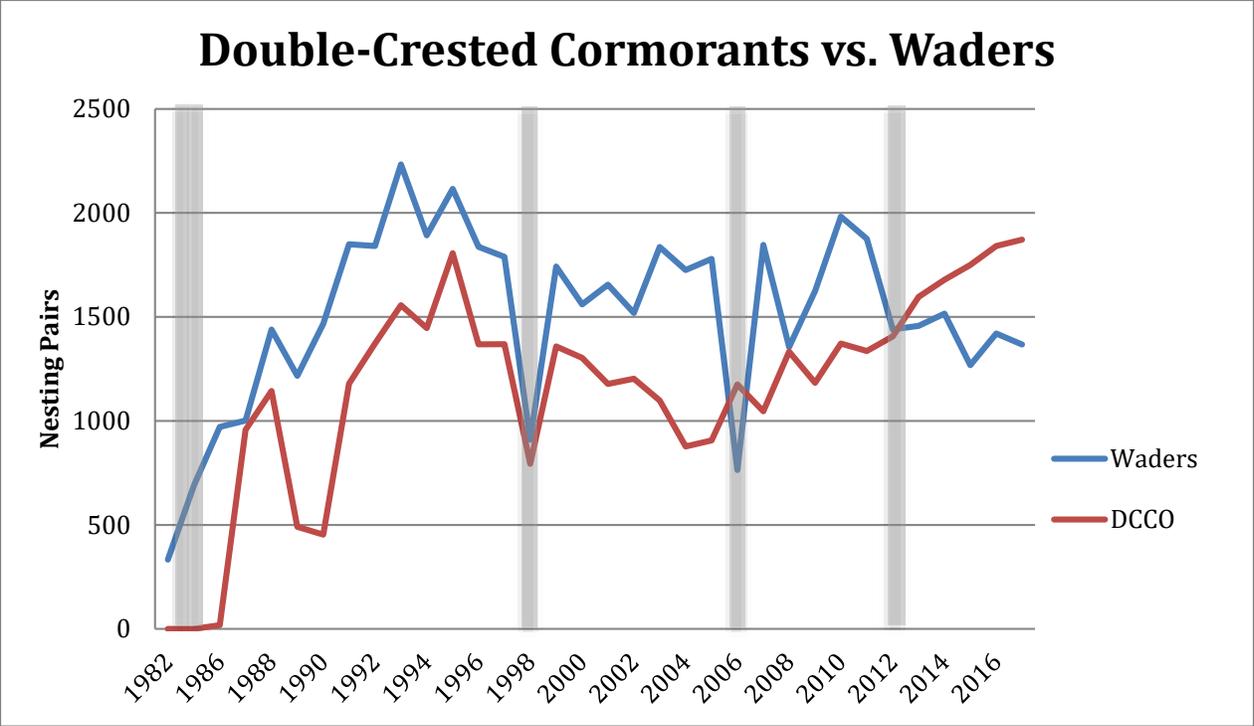


Figure 10: Total number of Double-crested Cormorant and wader nesting pairs observed through the New York City Audubon Harbor Herons nesting surveys from 1982 to 2017. Gray bars indicate years in which no data is available because no survey was conducted (1983, 1984) and years with substantial uncertainty in the data due to an incomplete survey of one or more of the major breeding colonies (1998, 2006, 2012).