



NEW YORK CITY AUDUBON
CELEBRATING 30 YEARS OF CONSERVATION

NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT: 2019 NESTING SURVEY REPORT

December 6, 2019

Prepared for:

New York City Audubon
Kathryn Heintz, Executive Director
71 W. 23rd Street, Suite 1523
New York, NY 10010
Tel. 212-691-7483
www.nycaudubon.org

Prepared by:

Tod Winston, Research Assistant
New York City Audubon
71 W. 23rd Street, Suite 1523
New York, NY 10010
Tel. 917-698-1892
twinston@nycaudubon.org

New York City Audubon's Conservation Programs are made possible by the leadership support of The Leon Levy Foundation.

Support for the Harbor Herons Nesting Surveys is provided by Elizabeth Woods and Charles Denholm, individual contributions from NYC Audubon's major donors, and the New York State Department of Environmental Conservation.

This report should be cited as:

Winston, T. 2019. New York City Audubon's Harbor Herons Project: 2019 Nesting Survey Report. New York City Audubon, New York, NY.

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 4 July, 2019. 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 seven of eighteen islands surveyed in New York Harbor as well as at several mainland sites. Surveyed wading bird species, hereafter collectively referred to as waders, included (in order of decreasing abundance) Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, and Cattle Egret. Overall, the total number of island wader nests declined 16% since the last comprehensive survey in 2016, from 1,420 to 1,186 pairs. (When mainland wader colonies, principally consisting of New York City and New Jersey colonies of Yellow-Crowned Night-Herons, are included in these totals, this decline is 13%, from 1,493 to 1,305 pairs.)

The most significant species population changes since 2016 included a decrease in the Great Egret population to 321 pairs (-21%) and Black-crowned Night-Heron population to 468 pairs (-13%), and an increase in the Snowy Egret population to 270 pairs (14%). Glossy Ibis numbers have fluctuated greatly over time, and decreased 50% to 112 pairs since 2016. The number of Yellow-Crowned Night-Heron pairs on the nesting islands has remained in the single digits since 2016. (Though our mainland surveys are not methodically conducted, the mainland population of Yellow-crowned Night-Herons appears to be slowly increasing; our harbor-wide estimate of nesting pairs increased 66% to 126 pairs over 2016.) Little Blue Herons continued to nest in low numbers. Tricolored Heron, which has nested in very low numbers in most of the past 20 years, was not observed in 2019—while one Cattle Egret, not observed on the islands since 2010, was observed on Hoffman Island in 2019, possibly representing one breeding pair. Great Blue Heron, observed nesting in small numbers on the harbor islands in past years and more recently on mainland Staten Island, was not confirmed as breeding in New York City in 2019. Green Heron, though believed by local observers to nest on Staten Island, was also not confirmed as breeding.

A total of 2,416 Double-crested Cormorant nests were observed on 6 of 18 islands surveyed for cormorant nesting activity in 2019, a 31% increase since 2016; this year's count continues an increasing trend across the harbor exhibited since 2005. Herring and Great Black-backed Gull nesting activity was observed on 11 of 15 islands surveyed for gull breeding; no nesting activity was observed on Isle of Meadows or on Shooters, Prall's, North Brother, or Huckleberry Islands. Canarsie Pol and Ruffle Bar were not surveyed for gull nesting activity. Incidental observations of Common Tern nesting activity were recorded at several sites including Little Egg Marsh and Governors Islands, both of which also hosted colonies in 2016.

Island and selected mainland colony summaries: Hoffman Island in the lower harbor was the largest colony in the survey area in 2019, as it has been since 2008, followed by South Brother Island in Long Island Sound and Subway Island in Jamaica Bay. These three colonies have held the largest breeding populations continuously since 2013, and together hosted 88% of the total island-nesting wader population in the harbor in 2019. When combined with the fourth largest

colony, Elders Point West Marsh Island in Jamaica Bay, these four largest colonies hosted 98% of island-nesting waders in 2019.

In the East River and Long Island Sound, South Brother Island is the only currently active wader colony; it exhibited an 11% decline, to 310 nesting pairs, since 2016. All other colonies in this area have either declined or remained abandoned since 2016: North Brother Island exhibited no signs of wader nesting activity in 2019, marking the 12th consecutive year it has been inactive. Nearby Mill Rock Island continues to exhibit little to no wader nesting activity since its abandonment in 2016, though it continues to host a small Double-crested Cormorant colony. In Long Island Sound, Huckleberry Island has shown little wader nesting activity since 2016, and its previously sizeable Double-crested Cormorant colony has demonstrated no nesting activity in the past three years. No wader nesting has been observed on Goose Island since its apparent predation and abandonment shortly before the 2013 survey. A small amount of wader nesting was observed on Governors Island for the fifth consecutive year; this year one pair of Yellow-crowned Night-Herons nested there.

In the lower harbor outside Jamaica Bay, Hoffman Island was the only productive wader colony in 2019. In addition to being the largest colony in the survey area, this island was also the most diverse in 2019, hosting seven wader species. This island's nesting populations exhibited a 23% decrease in total nests since 2016, however, and this year's count of 436 pairs was the lowest registered there since 2001. Double-crested Cormorant numbers continued to increase on this island, reaching a survey-period high of 1,124 pairs and exhibiting a 35% population increase since 2016. Nearby Swinburne Island's colony of Double-crested Cormorants increased 21%, to 436 pairs, since 2016. Isle of Meadows and Prall's Island, in the Arthur Kill, and Shooters Island, in the Kill Van Kull, the core of the harbor's breeding wader population in first 15 to 20 years of this survey, have shown no evidence of wading bird nesting since the early 2000s.

In Jamaica Bay, waders nested on three out of six islands surveyed: Subway, Elders Point West Marsh, and Little Egg Marsh Islands. Subway Island held the largest population in the Bay at 301 wader pairs, and its population has remained stable since 2016. Elders Point East Marsh Island, a growing colony from 2010 to 2015, declined since 2016 and exhibited no wader or cormorant nesting activity in 2019. Elders Point West Marsh Island, however, has rapidly grown since 2016, when 2 wading pairs were found there, to this year's count of 118 pairs. Its cormorant colony has grown even more quickly, to 290 nests in two years. Little Egg Marsh Island, which has hosted a small, fluctuating population of waders since 2013, exhibited a decline of 63%, to 18 pairs, since 2016. No breeding waders were detected on Canarsie Pol, which was first found abandoned in 2013 after more than a decade of nesting activity. Ruffle Bar, which as not hosted breeding waders during the survey period, remains inactive.

The mainland nesting colony of Yellow-crowned Night-Herons at Redfern Houses in Far Rockaway exhibited an increase of 20%, to 61 pairs, over 2016, while a second Yellow-crowned Night-Heron colony in nearby Rockaway Beach, discovered in 2018, increased by 14%, to 40 pairs. A few nests were reported from additional, very small mainland colonies in Queens and Staten Island. Stable numbers (15 pairs) of this same species were reported from the Harmon Cove colony in the New Jersey Meadowlands.

Introduction

New York City Audubon’s 2019 Harbor Herons Nesting Survey marks the 35th 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. The last comprehensive nesting survey previous to this year’s 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 2019 field season, between 17 May and 4 July. The objectives of the 2019 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 2019 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 17 May to 4 July 2019.

Islands fully surveyed in 2019 (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 Marsh, Elders Point West Marsh, Little Egg Marsh, and Subway Islands). North Brother Island in the East River/Long Island Sound and Canarsie Pol in Jamaica Bay, which have not hosted nesting waders since 2007 and 2012, respectively, and Ruffle Bar in Jamaica Bay, which has 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, and (2) Common Tern nesting on Governors Island and Little Egg Marsh Island. (Great Blue Heron and Green Heron, which have nested in the survey area in the past, were not confirmed as breeding in 2019.)

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 New York Harbor. Surveys of islands in the Kill Van Kull/Arthur Kill complex were conducted by Carla Garcia, Brady Simmons, and Alex Summers of NYCDPR. Surveys at Goose and Huckleberry islands were conducted with the support of 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 and Ray Duffy of Hackensack Riverkeeper 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 roof-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. Biodegradable flagging tape and spray paint were 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 ground counts 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/NYC Audubon, NYCDPR, Chris Nagy of Mianus River Gorge/Gotham Coyote Project, and Stan McGuigan.

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

Acknowledgements

We sincerely thank all volunteers (noted by name in the island accounts), organizations, and agencies that participated in the 2019 surveys.

NYC Audubon's Conservation Programs are made possible by the leadership support of the Leon Levy Foundation. Support for the Harbor Herons Nesting Surveys is provided by Elizabeth Woods and Charles Denholm, individual contributions from NYC Audubon's major donors, and the New York State Department of Environmental Conservation.

The author wishes to acknowledge the New York City Department of Parks & Recreation (NYCDPR) for its continuing support and partnership in the Harbor Herons Project (particularly Novem Auyeung, Marianne Anderson, Carla Garcia, Jennifer Greenfeld, Marit Larson, Ellen Pehek, Brady Simmons, and Alex Summers), and the National Park Service (NPS) for support within Gateway National Recreation Area (particularly Doug Adamo, Dana Filippini, George Frame, Kathy Garofalo, Patti Rafferty, and Dave Taft). Don Riepe of the American Littoral Society/Jamaica Bay Guardian/NYC Audubon has continued to provide critical information and assistance on Jamaica Bay populations, and Elizabeth Manclark and Lisa Schepke have provided important assistance. Chip Hamilton of the New York State Department of Environmental Conservation (NYSDEC) provided expertise and insight, which has aided NYC Audubon in coordinating the New York Harbor surveys within NYSDEC's Long Island Colonial Waterbird and Piping Plover Survey time frame. Thomas Desisto and colleagues from the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA/APHIS) have been helpful in providing us with expert field assistance during these surveys. Jeff Kolodzinski of the Port Authority of New York & New Jersey provided information on nesting gull populations at

Rikers Island. Rita McMahon and staff of the Wild Bird Fund have provided skilled assistance in our survey work. Hugh Carola and Ray Duffy of Hackensack Riverkeeper 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 2019, seven species of long-legged wading birds were confirmed as nesting on seven of eighteen islands surveyed in New York Harbor as well as at several mainland sites. (See Table 2.) These seven species, hereafter collectively referred to as waders, included (in order of decreasing abundance) Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, and Cattle Egret. 2019 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 2016—though both shorter- and longer-term trends are noted where deemed relevant. Overall, our count of total island wader nests declined 16% since the last comprehensive survey in 2016, from 1,420 to 1,186 pairs. (When mainland wader colonies are included in these totals, principally consisting of New York City and New Jersey mainland colonies of Yellow-Crowned Night-Herons, this decline is 13%, from 1,493 to 1,305 pairs). 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. A total of 2,416 Double-crested Cormorant nests were observed on six of eighteen islands surveyed for cormorant nesting activity in 2019, a 31% increase since 2016; this year's count continues an increasing trend across the harbor exhibited since 2005. Herring and Great Black-backed Gull nesting activity was observed on 11 of 15 islands surveyed for gull breeding. Incidental observations of Common Tern nesting activity were recorded at several sites including Little Egg Marsh and Governors Islands, both of which also hosted colonies in 2016.

The three most active wader nesting colonies in 2019, hosting the greatest number of nests and a good diversity of nesting species, were Hoffman Island in the lower harbor, South Brother Island in the East River/Long Island Sound, and Subway Island in Jamaica Bay. These three colonies have hosted the largest breeding populations in the harbor continuously since 2013, and together hosted 88% of the total island-nesting wader population in 2019. Seven 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. A mixed wader and cormorant colony on Elders Point West Marsh Island in Jamaica Bay has rapidly grown since 2016, and is the fourth largest colony in the Harbor. Together, these four largest colonies constitute 98% of island-nesting waders in the harbor. This concentration of nesting birds on four islands has coincided with the abandonment of recently productive Elders Point East Marsh Island in Jamaica Bay, and declines on Mill Rock and Huckleberry Islands in the East River/Long Island Sound. Goose Island, North Brother Island, and Canarsie Pol, which hosted colonies in the past two decades, and 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, continued to exhibit no nesting activity in 2019. Principal mainland wader colonies were made up of Yellow-crowned Night-Herons, which appear to be nesting in increasing numbers at mainland sites including continuing colonies in Far Rockaway and Rockaway Beach, in Queens, and Harmon Cove in the New Jersey Meadowlands.

Island Accounts:

Hutchinson River/Long Island Sound:

Huckleberry Island (10 acres)

16 May 2019, 8:50am-10:20am

By the author, Susan Elbin, Emilio Tobon (NYC Audubon); Ellen Pehek (NYCDPR)

For the third consecutive year since nesting waterbirds were first observed on this island in 1986, the Huckleberry Island nesting survey revealed no nesting wader or cormorant activity (see Table 2 and Figure 4). (A total of 17 adult cormorants, however, was observed perched on rocks offshore.) In 2016, very low numbers of recently active Black-crowned Night-Heron and Double-crested Cormorant nests were observed, but no adults were seen in the vicinity of these nests during the survey. This colony abandonment follows a 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. Continuing a decline over the past 20 years, no Herring Gull or Great Black-backed Gull nests have been observed since 2014, though for a second consecutive year, a Great Black-backed Gull pair was observed flying low over the island during the survey. Eleven American Oystercatcher adults were observed on the island, suggesting the presence of at least five nesting pairs, the highest count of this species noted for this island. Seven Spotted Sandpipers were sighted, possibly representing several nesting pairs. Eight Canada Goose nests were observed, most with eggs or attended by an adult; one nest was found with eggs that appeared to have been eaten by a predator. Several Mallards were observed in the water nearby. One Great Egret was observed foraging nearby. Other possible nesting bird species observed on or near the island included Fish Crow, Tree Swallow, Barn Swallow, American Robin, Gray Catbird, European Starling, Common Yellowthroat, Yellow Warbler, Song Sparrow, Red-winged Blackbird (one nest), Common Grackle, Northern Cardinal, and American Goldfinch. Wintering species Atlantic Brant and Common Loon were observed foraging nearby.

The wader and cormorant colonies on Huckleberry Island appear to have been abandoned due to the presence of predators (rats and raccoons); human activity on the island during breeding season may also play a role. No direct signs of raccoons or rats were encountered during this year's survey, though as noted above, it appeared that one Canada Goose nest had suffered predation. During the 2018 survey, an adult raccoon was found living in one of the island's buildings, and island management has been working to seal off potential living spaces and trap and remove raccoons. NYC Audubon and NYCDPR will continue to work closely with Huckleberry Indians, Inc. 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.

Goose Island (1 acre)

16 May 2019, 11:23pm-11:55pm

By the author, Susan Elbin, Emilio Tobon (NYC Audubon); Ellen Pehek (NYCDPR)

Goose Island, abandoned shortly before our 2013 survey was conducted, exhibited no active nesting wader activity for the sixth consecutive year. Four species of ground-nesting waterbirds

were found on the island this year, however, three of them confirmed as nesting: Seventeen active Canada Goose nests were found, most containing eggs and one containing five goslings. (A dead adult Canada Goose was found, but there was no evidence of predation.) A domestic (white) Mallard was observed brooding on a nest, and a Great Black-Backed Gull nest with two eggs was found, with an adult gull nearby. A female American Black Duck flushed from undergrowth during the survey and a male was observed offshore, but a nest could not be located. Other possible nesting species observed on or near the island in 2019 included Spotted Sandpiper, Great Horned Owl, Fish Crow (one nest), American Robin, Gray Catbird, Cedar Waxwing, European Starling, Song Sparrow, Common Grackle (one nest), and House Sparrow. Probable migrants observed included White-throated Sparrow.

The presence of successfully reproducing ground-nesting birds on Goose Island is encouraging, and may indicate that rats and raccoons, which were thought to be the cause of colony predation and abandonment in 2013, are not present. The proximity of Goose Island to the mainland makes it vulnerable to access by both predators and human visitors. Additional signage was posted on the shoreline in 2015 in an effort to reduce unwanted visitation, and this signage needs to be repaired and replaced. Outreach efforts to the local community to raise awareness may be helpful in enabling a healthy wader colony to reestablish itself here.

East River:

North Brother Island (19 acres):

17 May 2019, 11:45am-12:15pm

By Susan Elbin (NYC Audubon); Stan McGuigan (NYC Audubon volunteer); Mike Feller (NDCDPR); Chris Nagy (Mianus River Gorge/ Gotham Coyote Project)

North Brother Island has not exhibited signs of nesting wader activity since 2007, and no evidence of wader or cormorant nesting activity was observed in 2019. Black-crowned Night-Herons observed circling and perching on the Island were thought to be birds from the South Brother Island colony, as was a Great Egret that flushed during the survey. Gull-nesting has been observed on building roofs on the island in recent years, but no nesting was confirmed this year. Other bird species observed included Turkey Vulture, House Wren, and Song Sparrow. (Note: Osprey was observed to be nesting on North Brother Island, post-survey.) NYCDPR concluded habitat restoration activities on North Brother Island in 2016. Continued monitoring during full survey years will determine the effectiveness of this restoration in improving the island's habitat for nesting waders.

South Brother Island (12 acres)

17 May 2019, 9:30am-12:55pm

By the author, Susan Elbin, Kaitlyn Parkins (NYC Audubon); Stan McGuigan, Beryl Perrin-Feller (NYC Audubon volunteers); Georgina Cullman, Michael Feller, Carla Garcia, Ellen Pehek (NYCDPR); Chris Nagy (Mianus River Gorge/ Gotham Coyote Project)

The South Brother Island colony was the second largest wader colony in the NY/NJ Harbor in 2019. A total of 310 nests of four wader species was observed on 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 population decrease of 11% since 2016. Though the wader population has remained relatively stable over the past five years, a decline has been 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. At 113 pairs, our 2019 count of this species was the lowest registered on South Brother Island in the history of this survey, representing a 37% decline since 2016 and a continuation of a decline over the past 20 years. At 111 pairs, Snowy Egret numbers increased 29% since 2016. Great Egret numbers remained stable since 2016 at 80 pairs. Four Yellow-crowned Night-Heron pairs were estimated; this species has nested here in fluctuating small numbers for the past decade. For the eighth consecutive year, no evidence of Glossy Ibis nesting activity was observed; this species had maintained a small breeding population over the previous 10 years. Double-crested Cormorant nests increased 39% compared to 2016, to 466 nests, the highest count reported since 2005. Cormorant numbers have rebounded steadily in the last five years, marking a break in a declining trend observed on this island over the previous 20 years. Waders on South Brother Island primarily nested in box elder, mulberry sp., black cherry, multiflora rose, and oriental bittersweet; cormorants nested primarily in black locust, black cherry, mulberry, and box elder.

Gull counts on the island produced a total of 10 Great Black-backed Gull nests, however due to impending rain the gull count was not completed and cannot be compared with prior years. Other confirmed or possible nesting bird species observed included Canada Goose (6 nests), Mallard (1 probable nest), Osprey, Fish Crow (1 nest), Tree Swallow, Gray Catbird, Baltimore Oriole, and Boat-tailed Grackle.

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 300 Herring Gull nests and 5 Great Black-backed Gull nests on Rikers Island this year.

Mill Rock Island (3 acres)

30 May 2019, 8:10am-9:51am

By the author, Susan Elbin, Kaitlyn Parkins (NYC Audubon); Ellen Pehk (NYCDPR)

This colony, first established in 2004, reached a maximum of 203 wader pairs in 2012 but declined rapidly starting in 2015 and exhibited little or no activity in 2017. Though a slight recovery was observed last year, when a total of 17 nests was observed, this year no wader nests were observed, though two Black-crowned Night-Heron adults were observed during the survey. In 2019, 1 Herring Gull pair and 19 Great Black-backed Gull pairs were estimated, consistent with our 2016 count. Double-crested Cormorants begin nesting on Mill Rock Island in 2011; our 2019 count of 53 nests represents a 26% increase over the 2016 survey, but the number of cormorant nests has remained fairly stable over the past five years. Other confirmed or possible nesting bird species observed on the island included Canada Goose (5 nests), Mallard (1 nest), Spotted Sandpiper, Barn Swallow, European Starling, and Common Yellowthroat. Probable migrants observed included Eastern Wood Pewee, American Redstart, and Mourning Warbler.

Though human disturbance was not evident during the survey of Mill Rock Island this year, man-made structures including benches and tables have appeared over the last few years, and human visitation may be at least partially responsible for the decline of this wader colony. Future efforts to discourage 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)

30 May 2019, 10:15am-10:25am

By the author, Susan Elbin, Kaitlyn Parkins (NYC Audubon); Ellen Pehek (NYCDPR)

This island was surveyed by ground counts in 2019 for the fourth consecutive year. A total of 47 Double-crested Cormorant nests was observed on the collapsed metal arch sculpture, in trees, and on the ground. This total represents a stable cormorant population since 2016. A total of three Great Black-backed Gull nests was counted; this species has been found nesting here in the single digits in each of the last four surveys. No Herring Gull nests or individuals were observed. (In past surveys, observations of adult Herring Gulls on U Thant Island have been included in this report. These adult counts were taken from the mainland, and it is not clear whether Herring Gulls were nesting on the island.)

Upper New York Bay

Governors Island (172 acres)

One active Yellow-crowned Night-Heron nest was reported and photographed on Governors Island on 24 May 2019 by eBird reporter Cathy Weiner. One or two pairs of this species have been observed nesting here since 2015.

Since 2008, a colony of Common Terns has nested on three decommissioned piers on the southeast end of Governor's Island, extending into Buttermilk Channel. The entire colony was last officially surveyed in 2013. In 2014, survey access was allowed to only 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 hosted 24 nesting pairs, a slight decrease from 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, the section of Yankee Pier used by nesting terns collapsed into Buttermilk Channel. 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 in 2017, 18 pairs in 2018, and 67 pairs in 2019. Plans were made to have NYS DEC Region 2 survey the remaining, inaccessible pier (Tango) by drone, but the flight was grounded and the count was cancelled. At the end of the nesting season, a webcam was also installed overlooking Tango Pier. Only portions of the pier are visible, so the webcam will provide public outreach rather than survey information.

Note: Adult and nestling Herring and Great Black-backed Gulls were noted on rooftops on Governors Island after the survey period, in late June 2019. A formal survey of this entire island would be worthwhile in the future.

Staten Island – Arthur Kill and Kill Van Kull

Isle of Meadows (101 acres)

7 June 2019, 9:00am-1:30pm

By Carla Garcia, Brady Simmons (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 predators 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 possible nesting bird species observed on or near the island included Mourning Dove, Turkey Vulture, Downy Woodpecker, Carolina Wren, American Robin, Gray Catbird, Cedar Waxwing, Yellow Warbler, Northern Cardinal, Eastern Towhee, Song Sparrow, Grasshopper Sparrow, American Goldfinch, and Red-winged Blackbird. Probable migrants observed included Hooded Warbler.

Prall's Island (88 acres)

14 June 2019, 8:30am-10:25am

By Alex Summers (NYCDPR)

No evidence of wader nesting activity was observed on Prall's Island in 2019. Several large inactive nests of unidentified species were noted, possibly Red-tailed Hawk or Osprey. Herring Gull was observed, though no nesting activity was noted; Great Egret was observed foraging in nearby Merrill's Creek, where an active Osprey nest was also present. Other confirmed or possible nesting bird species observed on or near the island included Mourning Dove, Wild Turkey, American Woodcock, Red-tailed Hawk, Willow Flycatcher, House Wren, Marsh Wren, American Robin (nesting), Gray Catbird, European Starling, Yellow Warbler, Common Yellowthroat, Song Sparrow, American Goldfinch, Baltimore Oriole (nesting), Common Grackle, and Red-winged Blackbird.

Prall's Island, the site of the most recent Black- and Yellow-crowned Night-Heron nesting attempts in the Arthur Kill/Kill Van Kull complex, has continued to be inactive since 2005. Efforts to control an Asian Long-horned Beetle infestation on the island in March and April 2007 resulted in the removal of most suitable nesting trees (approximately 3,000 trees in total). While some restoration of native plant species and removal of invasive non-natives appears to have been successful (e.g., planting of blackjack oak and removal of glossy buckthorn), other native plantings have not been adequately protected or maintained, or appear to have been eliminated through subsequent herbicide application to control invasives. Four white-tailed deer were observed on the island during the survey, and established deer trails were evident. The current habitat does not seem optimal for nesting waders, and browsing by 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 coordinated restoration efforts combined with methods to control deer browsing and predator access to tree-nesting birds. Loss and degradation of saltmarsh (*Spartina alterniflora*) areas bordering this island was also noted during the survey. To read the full nesting survey report of Prall's Island, including a more detailed account of plant species observed, please see Appendix I.

Shooters Island (48 acres)

23 May 2019, 11:30am-1:30pm

By Carla Garcia, Brady Simmons (NYCDPR)

No evidence of wader nesting activity was observed on Shooters Island in 2019. With the exception of 2011, 2014, and 2017, this island has been surveyed every year since 1985; no wader nesting has been noted since 1999. No Double-crested Cormorant nesting activity was observed in 2019, the first time cormorant nesting has been absent since 1987, when this species was first observed nesting here. This cormorant colony has exhibited a continuous decline over the past 20 years; the wooden structures upon which the birds have nested continue to collapse, offering fewer nesting sites than in the past. Double-crested Cormorant, Canada Goose, Mallard, Herring Gull, and Laughing Gull were observed on or near the island, but no nesting activity was noted. Other possible nesting bird species observed on or near the island included Turkey Vulture, Osprey, Tree Swallow, House Wren, Gray Catbird, Cedar Waxwing, Yellow Warbler, Common Grackle, and American Goldfinch.

Lower NY Harbor

Hoffman Island (10 acres)

29 May 2019, 9:10am-12:45pm

By the author, Susan Elbin, Emilio Tobon (NYC Audubon); Monica Cuoco, Alicia Williams (NYC Audubon volunteers); Don Riepe (American Littoral Society); Ellen Pehek, Mike Feller (NYCDPR); Christopher Girgenti (Randall's Island Park Alliance)

Hoffman Island, where nesting waders were first detected in 1998, was the largest wader colony in the harbor in 2019, as it has been since 2009. It was also the most diverse colony this year, hosting seven wader species. A total of 436 nests was observed (in order of decreasing frequency, Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Little Blue Heron, Yellow-crowned Night-Heron, and Cattle Egret; see Table 2). This total constitutes a 23% decrease since 2016, and is the lowest count recorded here since 2001. Numbers have fluctuated in this range since the wader population reached an all-time high of 824 pairs in 2011, however, and the island's nesting wader population has been relatively stable over the past 15 years. Great Egret numbers declined 38% since 2016, to 125 pairs, while Snowy Egret numbers fell 11%, to 71 pairs (a total consistent with most counts over the past decade). Black-crowned Night-Heron numbers declined 11% to 204 pairs, while Glossy Ibis declined 50%, to 29 nests, since 2016. The population of this latter species, while fluctuating widely, appears to have suffered a decline over the past decade, since a high of 115 nests recorded in 2011. Three pairs of Little Blue Herons and two pairs of Yellow-crowned Night-Herons were estimated in 2019; both of these species have nested in low numbers over the past 20 years. One breeding-plumaged Cattle Egret was observed during the survey, possibly indicating one breeding pair. This species, which nested here in low numbers

from 2001 to 2005, has not been found here since that time. Waders primarily nested in mulberry sp., multiflora rose, box elder, black locust, hackberry, oriental bittersweet, wild grape and/or porcelain-berry, Virginia creeper, and on the ground (Glossy Ibis).

A total of 1,124 Double-crested Cormorant nests was observed on Hoffman Island in 2019, a 35% increase over 2016, marking the highest cormorant population noted since this island's cormorant colony first became established in 2002.

Totals of 100 Herring and 38 Great Black-backed Gull nests were counted during the survey. Nesting populations of both species are substantially below the peaks they achieved in past decades. American Oystercatcher, Canada Goose, and Mallard, which have nested here in the past, were not observed in 2019. Additional confirmed or possible nesting species observed included Fish Crow (3 nests), Gray Catbird, and Red-winged Blackbird.

Swinburne Island (4 acres)

20 May 2019, 8:45am-10:50am

By the author, Susan Elbin, Kaitlyn Parkins (NYC Audubon); Ellen Pehek (NYCDPR)

No waders were found nesting on Swinburne Island in 2019. (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 436 Double-crested Cormorant nests was observed this year, an increase of 21% over 2016 (though a slight decline from last year's count of 468 nests, the highest count recorded since this colony was first surveyed in 1998). Swinburne Island's cormorant populations has remained stable despite significant transformation of the habitat in 2012 by Hurricane Sandy, which removed topsoil and completely or partially felled all the standing buildings. Nests in 2019 were located on the remains of buildings, on the ground, and in several hackberry and black locust trees. Totals of 115 Herring Gull and 47 Great Black-backed Gull nests were consistent with survey results in 2016. Two American Oystercatcher adults were observed, indicating one likely nesting pair; adults or nests of this species have been observed on the island for the past four years. Nesting Canada Goose (3 nests) and American Black Duck (1 nest) were observed. Other possible nesting bird species observed included Red-winged Blackbird.

Jamaica Bay

Elders Point East Marsh Island (40 acres)

22 May 2019, 12:34am-12:55pm

By the author (NYC Audubon); Mike Feller and Opal Perrin-Feller (NYC Audubon volunteers); Don Riepe (American Littoral Society); Georgina Cullman, Ellen Pehek (NYCDPR); John Orgera (USDA/APHIS)

Restoration of Elders Point East Marsh Island was begun eleven years ago as part of a marsh restoration project undertaken in Jamaica Bay by the U.S. Army Corps of Engineers (USACE). During the intervening decade, a wader and cormorant colony was established on this low-lying island, becoming the most diverse in the harbor with five wader species—and in the last four years has declined and been abandoned by both waders and cormorants. In 2019, no nesting activity was

observed by these species for the first time since the colony was established; several Great and Snowy Egrets and one Black-crowned Night-Herons were observed foraging in the marsh adjacent to the island, but no nests were found. In recent years, most waders at this colony were nesting in a broad expanse of high-tide bush on the southern part of the island, at a height of two feet or less. The colony seemed particularly vulnerable to disturbance by recreational boating activity in Jamaica Bay, as well as to storms and seal-level rise. This vulnerability to flooding was evidenced during both the 2017 and 2018 surveys, when several dead Great Egret chicks were found, apparently drowned during recent high tides. Several mulberry and ailanthus trees on the northern part of the island, which had in recent years served as a substrate for cormorant nests, have died and deteriorated in the last few years. The wader colony decline on Elders Point East Marsh Island has coincided with population increases on nearby Subway Island, in 2017, and Elders Point West Marsh Island, in 2018 and 2019.

Despite the recent decline in breeding waders and cormorants on the island, the nesting gull population appears stable: totals of 206 Herring Gull adults and 9 Great Black-backed Gull adults are consistent with our 2016 counts. A total of 12 American Oystercatcher adults was observed on the island, indicating a continuing breeding presence of this species. Forster's Tern was observed foraging in the area; this species is known to nest in nearby Joco Marsh. Seven adult Canada Geese were observed off-shore. Other bird species observed that may nest on or near the island included Osprey, Fish Crow, Barn Swallow, and Red-winged Blackbird. Wintering species Atlantic Brant was also observed.

Elders Point West Marsh Island (40 acres)

22 May 2019, 1:09pm-1:44pm

By the author (NYC Audubon); Mike Feller and Opal Perrin-Feller (NYC Audubon volunteers); Don Riepe (American Littoral Society); Georgina Cullman, Ellen Pehek (NYCDPR); John Orgera (USDA/APHIS)

Elders Point West Marsh Island, like its eastern counterpart, was restored as part of a marsh restoration project undertaken in Jamaica Bay by USACE. This colony has expanded sharply in the last two years, after several Snowy Egret nests were observed here in 2016. (Low numbers of Great and Snowy Egret nests were also observed here from 2007 to 2009.) In 2019, 118 wader nests were estimated to be present on the island, nearly doubling the 2018 total, and including 63 Snowy Egret pairs, 26 Great Egret pairs, 26 Black-crowned Night-Heron pairs, and 2 Little Blue Heron pairs. The island's Double-crested Cormorant colony has expanded even more quickly, from 99 nests in 2018 to 290 nests in 2019. (A small cormorant colony was also found here from 2007 to 2009.) Waders on this island nested in high-tide bush, while cormorants nested primarily on the ground. This island appears to be slightly higher in elevation than Elders Point East Marsh Island, so may afford more protection from high tides.

Totals of 247 Herring Gulls and 9 Great Black-backed Gulls were observed in 2019, consistent with the gull count conducted here in 2016. Eight adult American Oystercatcher were observed, likely representing several nesting pairs. One occupied Osprey nest was observed. Additional possible nesting species observed included Barn Swallow and Red-winged Blackbird. Wintering and migrant species observed included Atlantic Brant, Semipalmated Sandpiper, and Western Sandpiper.

Subway Island (40 acres)

22 May 2019, 9:14am-10:50am

By the author (NYC Audubon); Mike Feller and Opal Perrin-Feller (NYC Audubon volunteers); Don Riepe (American Littoral Society); Georgina Cullman, Ellen Pehek (NYCDPR); John Orgera (USDA/APHIS)

The Subway Island colony was the third-largest nesting colony in NY/NJ Harbor in 2019. This year was the tenth 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 301 wader nests was observed, representing four species of waders (in order of decreasing frequency, Black-crowned Night-Heron, Great Egret, Glossy Ibis, and Snowy Egret). This total represents a stable population since 2016. The count of Great Egrets was stable compared to 2016 at 90 pairs, while counts of Black-crowned Night-Heron and Snowy Egret increased 62% and 32%, to 105 and 25 pairs, respectively. Glossy Ibis pairs declined by 40% since 2016 to 81 pairs, though this year's count represents a stable population over the past five years. Little Blue Heron and Yellow-crowned Night-Heron, recorded in small numbers in the past, were not observed in 2019. Great and Snowy Egrets nested primarily in Multiflora Rose and other low shrubs, while Black-crowned Night-Herons nested in somewhat taller shrubs and trees.

A total of 491 Herring Gull adults was observed, an increase over the 2016 count of 400 adults, while 46 Great Black-backed Gull adults were observed, an increase over the 2016 total of 30 adults. Laughing Gull was observed near the island; this species is known to nest in nearby Joco Marsh. A total of 61 American Oystercatcher adults was observed, the highest count yet observed on this island; it was not clear how many of these birds were nesting on the island. A total of 7 Willet adults was observed, likely representing several nesting pairs. Other possible nesting waterbirds observed included 18 Canada Geese, 3 Mallards, 1 Gadwall, and 1 Clapper Rail. Other possible nesting bird species observed on or near the island included Fish Crow, Barn Swallow, Northern Mockingbird, Gray Catbird, Yellow Warbler, Common Yellowthroat, Song Sparrow, Field Sparrow, Boat-tailed Grackle, and Red-winged Blackbird. Wintering and/or migrant species observed included Brant, Ruddy Turnstone, Sanderling, Semipalmated Sandpiper, and Least Sandpiper.

Little Egg Marsh Island

By the author (NYC Audubon); Mike Feller and Opal Perrin-Feller (NYC Audubon volunteers); Don Riepe (American Littoral Society); Georgina Cullman, Ellen Pehek (NYCDPR); John Orgera (USDA/APHIS)

The number of nesting waders observed in this small colony, first detected in 2013, has declined in the last two years, following a peak of 59 estimated nests in 2017. Black-crowned Night-Herons have made up the majority of this island's nesting wader population, and this year 18 nests of this species were estimated. While one Great Egret was observed in the area, no nests of this species were noted. Totals of 352 Herring Gull adults and 146 Great Black-backed Gull adults were observed, counts consistent with recent surveys. Laughing Gull was observed near the island; this species is known to nest in nearby Joco Marsh. A Common Tern colony has been observed on the island in three of the past four years; 30 nests were estimated in 2019. A total of 68 American

Oystercatchers was observed, the highest total recorded for this island; it was not clear how many of these birds were nesting on the island. Other confirmed or possible nesting waterbirds observed included 12 Willets (1 nest), 7 Canada Geese, and Gadwall. An unidentified duck nest was observed with predated eggs. Other possible nesting bird species observed included Osprey, Tree Swallow, Barn Swallow, Fish Crow, European Starling, Yellow Warbler, Song Sparrow, Red-winged Blackbird, and Boat-tailed Grackle. A female Bobolink was observed; according to eBird reports, this species was seen, though not confirmed as nesting, this summer in grassland areas on the northern edge of Jamaica Bay. Wintering and/or migrant species observed included Brant, Dunlin, and Semipalmated Sandpiper.

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. Research being conducted by multiple organizations should also be coordinated to minimize human visitation to the island.

Canarsie Pol (220 acres)

23 May 2019, 11:33am-12:20pm

By the author, Molly Adams (NYC Audubon); Don Riepe (American Littoral Society); Rita McMahon (Wild Bird Fund)

No nesting wader activity was evident on Canarsie Pol in 2019 during a partial survey by foot and additional observation by boat. The wader population on this once productive nesting island collapsed to very low levels in 2012, and no breeding has been observed since that time. It is unclear why these declines occurred, but the presence of mammals on the island, including raccoons, may have been a primary cause, as has occurred on other nesting islands in the harbor. From 2003 to 2010, this island was one of the largest and most diverse heron colonies within the New York Harbor system. During this year's survey, several Snowy and Great Egrets were observed foraging near the island. A foraging flock of Double-crested Cormorants was also seen.

Several adult Herring and Great Black-backed Gulls were observed circling over the island, indicating possible nesting. Laughing Gull and Forster's Tern were observed, but are not believed to nest here. A Canada Goose pair with goslings was observed on the island. Other possibly nesting waterbird species observed on or near the island included American Oystercatcher and Willet. Other bird species observed that may nest on or near the island included Osprey, Peregrine Falcon, Tree Swallow, Barn Swallow, Fish Crow, Northern Mockingbird, European Starling, Yellow Warbler, Song Sparrow, Eastern Towhee, and Red-winged Blackbird. Wintering and/or migrant species observed included Brant.

Ruffle Bar (143 acres)

23 May 2019, 10:30am-11:25am

By the author, Molly Adams (NYC Audubon); Don Riepe (American Littoral Society); Rita McMahon (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 2016. A partial survey by foot revealed no evidence of wader or cormorant nesting. A fly-over Great Egret and foraging

Snowy Egret were noted, as was a group of foraging Double-crested Cormorants. Gulls may be nesting on the island: three Herring Gulls and three Great Black-backed Gulls circled overhead during the survey, emitting alarm calls usually heard on their nesting grounds. Two Canada Goose pairs with goslings were observed. Laughing Gull, Common Tern, and Forster's Tern were observed foraging in the area, but are not believed to nest here. A raccoon was observed foraging on the shoreline during the survey.

Other possible nesting bird species observed included Osprey, Willow Flycatcher, Tree Swallow, Fish Crow, House Wren, Northern Mockingbird, Gray Catbird, Yellow Warbler, Common Yellowthroat, Song Sparrow, Eastern Towhee, Northern Cardinal, Red-winged Blackbird, and Boat-tailed Grackle. Wintering and/or migrant species observed included Brant and Semipalmated Sandpiper.

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. Joco Marsh, an extensive, tidally flooded saltmarsh adjacent to the runways of John F. Kennedy International Airport, hosts a large waterbird colony that in recent years has included Laughing Gull, Common Tern, and Forster's Tern, but this colony is not known to have included breeding waders or cormorants, and has not traditionally been surveyed as part of this study. Joco Marsh is surveyed periodically by a collaborative group of agencies and organizations including NPS, NYCDPR, the American Littoral Society, the Port Authority of New York & New Jersey, USDA/APHIS, and NYC Audubon.

Mainland and Aid to Navigation (ATON) 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, Great Blue Heron, and Green Heron. These mainland colonies are included here to the extent they are known, but are not included in report island totals or in accompanying figures, unless noted. Several mainland colonies of non-wader waterbirds are also noted below, though they are not surveyed as part of the Harbor Herons Project. Double-crested Cormorants are known to nest on aids to navigation (ATONs) in the harbor, but our ATON survey is not comprehensive. As mainland and ATON 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 these colonies are included in year-to-year analyses.

Mainland New York Accounts:

NYC Audubon has conducted regular surveys of the Yellow-crowned Night-Heron colony at Redfern Houses in Far Rockaway, Queens. A report on this colony and the survey of a newly discovered nearby colony are included below. 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; Throggs Neck, Bronx; and Brookville Park, Queens. An official survey of these colonies was not conducted in

2019 and no reports were received. However a small colony was reported for a third consecutive year in Lindenwood, Queens (2 nests), while one nest was reported at a newly detected site in Great Kills, Staten Island.

A pair of Great Blue Herons nested for a six consecutive year in Staten Island's Clove Lakes Park, from 2013 to 2018, but nesting was not confirmed at this site or elsewhere in New York City in 2019. Though several Green Heron pairs nested in recent years in Brooklyn's Prospect Park, no nesting activity was noted by local birders in 2019. This species is believed to nest at freshwater sites in the survey area, particularly on Staten Island, but no survey of this species' mainland nesting activity was conducted and no confirmed nesting was reported in 2019.

Redfern Houses, Far Rockaway

27 May 2019, 7:59am-9:45am

By the author (NYC Audubon); David Spawn (NYC Audubon volunteer)

A total of 61 Yellow-crowned Night-Heron nests was observed (Table 2), a 20% increase over our 2016 count. Nest count numbers have continued to recover since a sharp decline was documented in 2011, following possible predation by Red-tailed Hawks in 2010. This remarkable colony, located among the buildings of a New York City Housing Authority community, was first detected in 2006. Nests are located primarily in tall interior willow oak and honey locust trees, close to the community buildings. NYC Audubon was given the opportunity by NYC Parks to review construction and tree removal planned by the community for 2018 and 2019; it appears that the affected area and trees are not part of the principal nesting colony. Continued monitoring will clarify whether the planned work will have any negative repercussions.

Other waterbird species observed during the survey but not believed to nest on the Redfern grounds included Glossy Ibis, Double-crested Cormorant, Laughing Gull, Herring Gull, and Forster's Tern. Other possible nesting species observed included Rock Pigeon, Chimney Swift, Red-tailed Hawk, Fish Crow, Blue Jay, Cedar Waxwing, European Starling, Common Yellowthroat, Northern Cardinal, and House Sparrow. Migrant species observed included Blackpoll Warbler.

Local residents and workers have proven to be a good source of information on the behavior and location of these local, distinctly urban colonies. During the 2018 Redfern Houses survey, maintenance workers alerted the survey team to another nearby nesting colony, in the Hammel Houses community in Rockaway Beach, summarized below.

Hammel Houses, Rockaway Beach

27 May 2019, 11:18am-11:41am

By the author (NYC Audubon); David Spawn (NYC Audubon volunteer)

A total of 40 Yellow-crowned Night-Heron nests was observed in this colony in New York City House Authority's Hammel Houses community; 35 nests were found when the colony was first discovered in 2018. All nests were located in Willow Oak trees, also the preferred nesting tree species in the nearby Redfern Houses colony. Other waterbird species observed during the survey but not believed to nest on the Hammel Houses grounds included Laughing Gull, Herring Gull, and Great Black-backed Gull. Other possible nesting species observed included Chimney Swift,

Barn Swallow, Fish Crow, European Starling, Gray Catbird, Yellow Warbler, and Northern Cardinal. Migrant species observed included Blackpoll Warbler.

Other Mainland New York Non-Wader Waterbird Colonies

Several mainland waterbird colonies within the NJ/NJ harbor are not surveyed by NYC Audubon as part of the Harbor Herons project:

Beach Colonies: Colonies of several non-wader waterbird species including Common Tern, Least Tern, Black Skimmer, American Oystercatcher, and Piping Plover are known to exist, or to have recently existed, on New York City beaches including those on the Rockaway Peninsula. While NYC Audubon conducts research on nesting American Oystercatchers at some of these sites, these waterbird colonies are monitored primarily by NYCDPR.

Rooftop Colonies: Herring and Great-blacked Gulls are known to nest on mainland rooftops in New York City, but these colonies are not regularly surveyed by NYC Audubon. (For detail on the Rikers Island gull colony, see the account of South Brother Island.)

Mainland New Jersey Accounts:

Hugh Carola of Hackensack Riverkeeper and Nellie Tsipoura of New Jersey Audubon have 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. A survey was conducted of the Harmon Cove colony in 2019. A more methodical survey of local New Jersey colonies is being considered for future surveys.

Harmon Cove, Secaucus

4 July 2019, 10:26am-11:30am

By Ray Duffy (Hackensack Riverkeeper)

A total of 15 active nests were found at Harmon Cove, similar to numbers found there in recent years. Nest checks indicated a productive year; most nests contained young.

Aids to Navigation (ATONs):

During surveys conducted on June 24 and July 3, Hugh Carola (program director, Hackensack Riverkeeper) observed 50 nesting pairs of Double-crested Cormorants on aids to navigation in Newark Bay and in the Kill Van Kull adjacent to the Bayonne Bridge. This total is a slight increase over the 37 nests observed at these sites in 2016. Two active Great Black-backed Gull nests were also observed, on a bridge support and on an ATON, during the survey. Aids to navigation off the coast of Staten Island, including those located in the Arthur Kill, were not surveyed in 2019.

Species Accounts:

The species trends discussed below are based primarily on comparisons of nesting numbers between the comprehensive surveys conducted in 2016 and 2019, though shorter- and longer-term comparisons are made when considered relevant.

Black-crowned Night-Heron (468 pairs): Breeding Black-crowned Night-Herons were observed on six islands in 2019 (in order of decreasing colony size, Hoffman, South Brother, Subway, Elders Point West Marsh, Little Egg Marsh, and Mill Rock Islands; see Table 2) and were the numerically dominant species both harbor-wide and in several mixed-species colonies including Hoffman and South Brother Islands. Total observed island nesting activity decreased 13% compared to 2016. This decrease is in the context of a longer-term decline over 25 years that is evident in our data, from a survey-period high of 1,343 pairs in 1993 to 468 pairs in 2019. (See figure 5.)

Yellow-crowned Night-Heron (126 total pairs comprising 7 pairs on islands; 104 New York City mainland pairs; and 15 Secaucus, NJ, pairs): Yellow-crowned Night-Herons were observed in low numbers on three islands in 2019: South Brother Island (4 pairs), Hoffman Island (2 pairs), and Governors Island (1 pair). Numbers of island-nesting Yellow-crowned Night-Herons have increased and declined several times over the last thirty years. As the island population of this species has decreased over the past decade, numbers have increased at mainland colonies in Queens and Secaucus, NJ, resulting in a possible slow increase in the total surveyed nesting population. (See figure 6.) The largest colony in the survey area continued to be the mainland colony at Redfern Houses (61 nests), which exhibited a 20% increase since 2016. A new colony of 35 nests was discovered last year in the nearby Hammel Houses community in Rockaway Beach; this year that colony had grown to 40 nests. The colony located in the Harmon Cove 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. A small colony was found in Lindenwood, Queens for the third consecutive year (2 nests), while one pair was observed nesting in a newly detected site in Great Kills, Staten Island. One pair of Yellow-crowned Night-Herons nested on Governors Island, where one or two pairs have nested for the past five years. See the description of these colonies as well as the New York City mainland colonies above in the mainland accounts section.

Great Egret (444 pairs): Great Egrets were observed on four islands in NY/NJ Harbor (in order of decreasing colony size, Hoffman, Subway, South Brother, and Elders Point West Marsh Islands; see Table 2). This species' measured population declined 21% compared to 2016, continuing a slight decline over the past decade. This decline however is in the context of a longer-term increase in population over the entire survey period (see Figure 7). Over the past 35 years, Great Egrets have shifted their breeding locations around the harbor, and their current concentration on just four islands represents a loss of other breeding colonies: No nesting activity was observed this year on the previously productive Elders Point East Marsh, Mill Rock, Huckleberry, or Goose Islands, and no pairs were found on Little Egg Marsh Island, where this species has nested in low numbers in recent years. The Great Egret population declined sharply since 2016 on Hoffman island (38%), but remained stable compared to 2016 on Subway and South Brother Islands. The decline and colony abandonment on Elders Point East Marsh Island over the past three years was accompanied by a newly developed colony on nearby Elders Point West Marsh Island.

Snowy Egret (270 pairs): Snowy Egrets nested on four islands in NY/NJ Harbor in 2019 (in order of decreasing colony size, South Brother, Hoffman, Elders Point West Marsh, and Subway Islands; see Table 2). This year's count of 270 pairs represents a slight increase from the 2016 count of 236 pairs. Despite year-to-year fluctuations, the population of this species has remained fairly stable over the history of this survey. (See Figure 8.) The Snowy Egret, like the Great Egret, has continued to move its centers of nesting activity throughout the harbor, and has recently abandoned several nesting islands; formerly productive colonies (Huckleberry, Goose, and Mill Rock Islands) remained inactive in 2019, while the Elders Point East Marsh Island colony was first abandoned in 2019. The pair count on South Brother Island increased 29% over 2016, while the Hoffman Island population decreased 11% in this same period. In Jamaica Bay, the collapse of the Elders Point East Marsh Island colony over the past two years was accompanied by a 32% increase in the population on Subway Island and the establishment and rapid growth of a new colony on Elders Point West Marsh Island, now the third largest Snowy Egret colony in the harbor at 63 pairs. No Snowy Egret pairs were observed on Little Egg Marsh Island in 2019.

Little Blue Heron (4 pairs): Little Blue Herons were observed on Hoffman and Elders Point West Marsh Islands in 2019. The small Jamaica Bay population appears to have shifted from Subway Island to the Elders Point complex 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.

Cattle Egret (1 possible pair): One breeding-plumaged Cattle Egret was observed during the 2019 survey of Hoffman Island. This is the first time this species has been observed during the nesting survey since 2010, when one pair was estimated on Canarsie Pol. (Cattle Egrets previously bred in low numbers on Hoffman Island from 2001 to 2005.) The harbor-wide breeding Cattle Egret population declined to 0 in 2011 from a high of 266 nests on two islands (Prall's and Shooters islands) in 1985. A possible cause of this decline was closure of local landfills that were a foraging source.

Tricolored Heron: No Tricolored Herons were observed this year during the Jamaica Bay surveys; this species has been found consistently in very low numbers found in the 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).

Green Heron: No Green Heron nests were observed on the island colonies in 2019, the ninth consecutive year this species has been absent. While this species nested in Brooklyn's Prospect Park in both 2013 and 2014, nesting has not been confirmed there since. Green Heron is believed to nest at freshwater sites in the survey area, but no survey of this species' mainland nesting activity was conducted and no confirmed nesting was reported in 2019. 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: No Great Blue Heron nests were observed on the island colonies this year. A Great Blue Heron pair nested for a six consecutive year in Staten Island's Clove Lakes Park, from 2013 to 2018, but nesting was not confirmed at this site or elsewhere in New York City in 2019.

Glossy Ibis (112 pairs): Glossy Ibis nests were found on three islands in 2018 (in order of decreasing colony size, Subway, Hoffman, and Elders Point West Marsh Islands). The total of 128 nests represents a 50% decrease since 2016, due to observed declines on both Hoffman and Subway Islands. The population of this species has remained fairly consistent over the past decade despite some sharp fluctuations. In the past seven years this species has nested exclusively on Hoffman, Subway, Elders Point East Marsh, and Elders Point West Marsh Islands, 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 (2,416 pairs): Double-crested Cormorant nests were observed on six of eighteen islands surveyed for cormorant nesting activity in 2019 (in order of decreasing colony size, Hoffman, South Brother, Swinburne, Elders Point West Marsh, U Thant, and Mill Rock Islands; see Table 2). This year's count represents a 35% increase since 2016, continuing an increasing trend across the harbor exhibited since 2005. This increase has continued despite abandonment of longtime colonies Huckleberry Island in 2017, and Shooters Island in 2018. The decline and desertion of Elders Point East Marsh Island since 2016 was accompanied by rapid growth on Elders Point West Marsh Island, to 290 pairs in just two years. An additional 50 cormorant nests were observed on aids to navigation in Newark Bay and the Kill Van Kull in 2019, an increase over the 37 nests counted in 2016. Aids to navigation off the coast of Staten Island, which have hosted nesting colonies in recent years, were not surveyed in 2019.

As pertains to island cormorant colonies, this year's island-nesting total of 2,416 pairs is the highest count registered during the period of this survey. 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 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 stable number of Herring Gulls and a decrease in Great Black-backed Gulls (26%) harbor-wide since 2016. Our gull count of South Brother Island was incomplete, however, and likely underrepresented Great Black-backed Gulls in particular. Adult gull counts in Jamaica Bay yielded an increase in Herring Gulls (23%) and a slight decrease in Great Black-backed Gulls (-4%). (For detail on the Rikers Island gull colony, see the account of South Brother Island.)

Common Tern: Common Terns nested at three known island locations in 2019: Governors Island, Little Egg Marsh Island, and Joco Marsh in Jamaica Bay, in addition to 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. (NPS and NYCDPR conduct surveys of the colonies located at Joco Marsh and on the Rockaway Peninsula.) The colony on Little Egg Marsh Island was estimated at 30 pairs during the 2019

survey. This colony was not detected during the 2017 survey but consisted of 110 pairs in 2016, and is reported to have been established post-survey in 2015. (For details on the Governors Island colony, see the island accounts.) 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 the NY Harbor colonies.

Conclusions and Recommendations

In 2019, seven species of long-legged wading birds were confirmed as nesting on seven of eighteen islands surveyed in New York Harbor as well as at several mainland sites. (See Table 2.) These seven wader species included (in order of decreasing abundance) Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, and Cattle Egret. The results of this comprehensive survey demonstrate a decline of 16% in the harbor's island-nesting wader population since the last comprehensive survey in 2016, from 1,420 to 1,186 wader pairs. Compared to our 2016 survey, Great Egret and Black-crowned Night-Heron populations declined 21% and 13%, respectively, while the Snowy Egret population increased 14%. Glossy Ibis numbers have fluctuated greatly over the past decades, and decreased 50% since 2016. Yellow-crowned Night-Heron numbers appear to have increased harbor-wide, though this species has shifted its population from island to mainland colonies in recent years, and those mainland colonies are not methodically surveyed.

This year's total of 1,186 nesting wader pairs is the lowest survey count recorded since 1987, when years with substantial uncertainty in the data (1998, 2006, 2012) are excluded. While the total nesting wader population has ostensibly declined over the past few years and over the last decade, the apparent wader population decline over the last three decades may be attributable to a long-term decline in the population of Black-crowned Night Herons; other wader species populations appear to be stable or increasing in numbers over this time period. (See Figure 2.) A comprehensive trend analysis (1986-2017) suggests the harbor's wader population is stable over the entire survey period (Tobon unpublished report).

The preferred nesting locations of the majority of breeding waders have been stable since 2016, and indeed since 2013. The three largest wader nesting colonies in 2019—Hoffman Island in the lower harbor, South Brother Island in the East River/Long Island Sound, and Subway Island in Jamaica Bay, have held that position since 2013, and hosted 88% of the total island-nesting wader population in 2019. These three colonies plus the new Elders Point West Marsh Island in Jamaica Bay constitute 98% of island-nesting waders in the harbor. This concentration of nesting birds on four islands has coincided with the abandonment of recently productive Elders Point East Marsh Island in Jamaica Bay, and continued declines on Mill Rock and Huckleberry Islands in the East River/Long Island Sound. Goose Island, North Brother Island, and Canarsie Pol, which hosted colonies in the past two decades, and 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, continued to exhibit no nesting activity in 2019.

It is normal for waterbird colonies to move from island to island over time. 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 conducting 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. NYC Audubon has received a NPS permit for implementation of a grid system of directionally marked posts on Hoffman Island, and has been in discussion with NYC Parks to implement a similar system on South Brother Island. This system should 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 (e.g., 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.

An additional 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, Canarsie Pol, and Goose, South Brother, Huckleberry, and Mill Rock Islands. 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 the placement of 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 is included in the previously mentioned plans 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/NJ 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. NYC 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 NY/NJ Harbor. In recent years, color bands have been affixed to young-of-the-year Double-crested Cormorants, Great Egrets, Snowy Egrets, Glossy Ibis, and Herring Gulls. Wing tags (yellow) were used as a means of Great Egret identification in 2012-2015. USGS metal bands without color 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 NYC 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:

- Complete the analysis and summary of data from the New York City Audubon Harbor Herons Nesting 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 NY/NJ Harbor area.
- Provide guidance for continued tern habitat enhancement on Governors Island.

New York City Audubon's Harbor Herons Project has included additional programs in recent years (i.e., the Harbor Herons Foraging Study) 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.

Literature Cited

- Bernick, A. 2007. New York City Audubon's Harbor Herons Project: 2007 Nesting Survey. New York City Audubon, New York, NY.
- Elbin, S.B. and N.K. Tsipoura (Editors), Harbor Herons Subcommittee. 2010. Harbor Herons Conservation Plan- NY/NJ Harbor Region. NY-NJ Harbor Estuary Program.
- Kerlinger, P. 2004. New York City Audubon Society's Harbor Herons Project: 2004 Nesting Survey. New York City Audubon.
- Litwin, TS, Ducey-Ortiz, A, Lent, RA, and Liebelt, CE. 1993. 1990-1991 Long Island Colonial Waterbird and Piping Plover Survey. NYS Department of Environmental Conservation, Stony Brook, NY and the Seatuck Research Program, Islip, NY. p 436.
- McGowan KJ and Corwin K, eds. 2008. The atlas of breeding birds in New York State: 2000-2005. Ithaca, NY: Cornell University Press. p 688.
- U.S. Army Corps of Engineers and The Port Authority of New York & New Jersey. 2009. Draft Hudson-Raritan Estuary Comprehensive Restoration Plan.

TABLES, FIGURES, AND APPENDICES

Table 1. Survey schedule for principal wader, cormorant, and gull counts, 17 May-4 July 2019

Location Surveyed	Date	# of Observers	Ownership
<u>Long Island Sound</u>			
1) Goose Island	16 May	4	NYC DPR
2) Huckleberry Island	16 May	4	Huckleberry Indians, Inc.
<u>East River</u>			
3) North Brother Island	17 May	3	NYC DPR
4) South Brother Island	17 May	10	NYC DPR
5) Mill Rock	30 May	4	NYC DPR
6) U Thant	30 May	4	NYC DPR
<u>Arthur Kill/Kill Van Kull</u>			
7) Shooters Island	23 May	2	NYC DPR
8) Prall's Island	14 June	1	NYC DPR
9) Isle of Meadows	7 June	2	NYC DPR
<u>Lower New York Bay</u>			
10) Swinburne Island	20 May	4	NPS
11) Hoffman Island	29 May	9	NPS
<u>Jamaica Bay</u>			
12) Elders Point East Marsh Island	22 May	7	NPS
13) Elders Point West Marsh Island	22 May	7	NPS
14) Canarsie Pol	23 May	4	NPS
15) Subway Island	22 May	7	NPS
16) Little Egg Marsh Island	22 May	7	NPS
17) Ruffle Bar	23 May	4	NPS
<u>Mainland – Far Rockaway</u>			
18) Redfern Houses	27 May	2	NYC Housing Authority
19) Hammel Houses	27 May	2	NYC Housing Authority
<u>Mainland – New Jersey</u>			
20) Harmon Cove	4 July	1	Harmon Cove



Figure 1: Current and former island nest sites (●) and primary mainland nest colonies (●) surveyed in the NY/NJ Harbor for waders, cormorants, and gulls.

Table 2. Wader, cormorant, and gull nesting activity (number of nesting pairs, as estimated from nest and/or adult counts) on selected islands and mainland colonies in NY/NJ Harbor and surrounding waterways. 2019 species included Black-crowned Night-Heron (BCNH), Great Egret (GREG), Snowy Egret (SNEG), Glossy Ibis (GLIB), Yellow-crowned Night-Heron (YCNH), Little Blue Heron (LBHE), Cattle Egret (CAEG), Double-crested Cormorant (DCCO), Herring Gull (HERG), and Great Black-backed Gull (GBBG).

	Hoffman Island	North Brother Island	South Brother Island	Mill Rock Island	Goose Island	Huckleberry Island	Elders Point East Marsh Island	Elders Point West Marsh Island	Subway Island	Little Egg Marsh Island	Ruffie Bar	Canarsie Pol	Swinburne Island	Shooters Island	Prall's Island	Isle of Meadows	U Thant Island	Governors Island	Redfern Houses	Other Mainland Colonies	Total Islands	Total Islands and Mainland	
Waders																							
GREG	125		80					26	90													321	321
CAEG	1																					1	1
SNEG	71		111					63	25													270	270
BCNH	204		113	2				26	105	18												468	468
YCNH	2		4															1	61	58		7	126
LBHE	3							1														4	4
GLIB	29							2	81													112	112
GRHE																						0	0
TRHE																						0	0
GBHE																						0	0
Unidentified	1		2																			3	3
Total Active Wader Nests	436	0	310	2	0	0	0	118	301	18	0	0	0	0	0	0	0	1	61	58	1,186	1,305	
Cormorants																							
DCCO	1,124		466	53				290					436				47					2,416	
Gulls																							
HERG Nests	100			1			*	*	*	*	*	*	115					*				216	
HERG Adults	*	*	*	*	*	*	206	247	491	352	3	2	*	*	*	*	*	*	*			1301	
GBBG Nests	38		10	19	1		*	*	*	*	*	*	47				3	*				118	
GBBG Adults	*	*	*	*	*	*	9	9	46	146	3	3	*	*	*	*	*	*	*			216	

Note: Blank items represent counts of zero (0).
An asterisk (*) indicates that no data were collected.

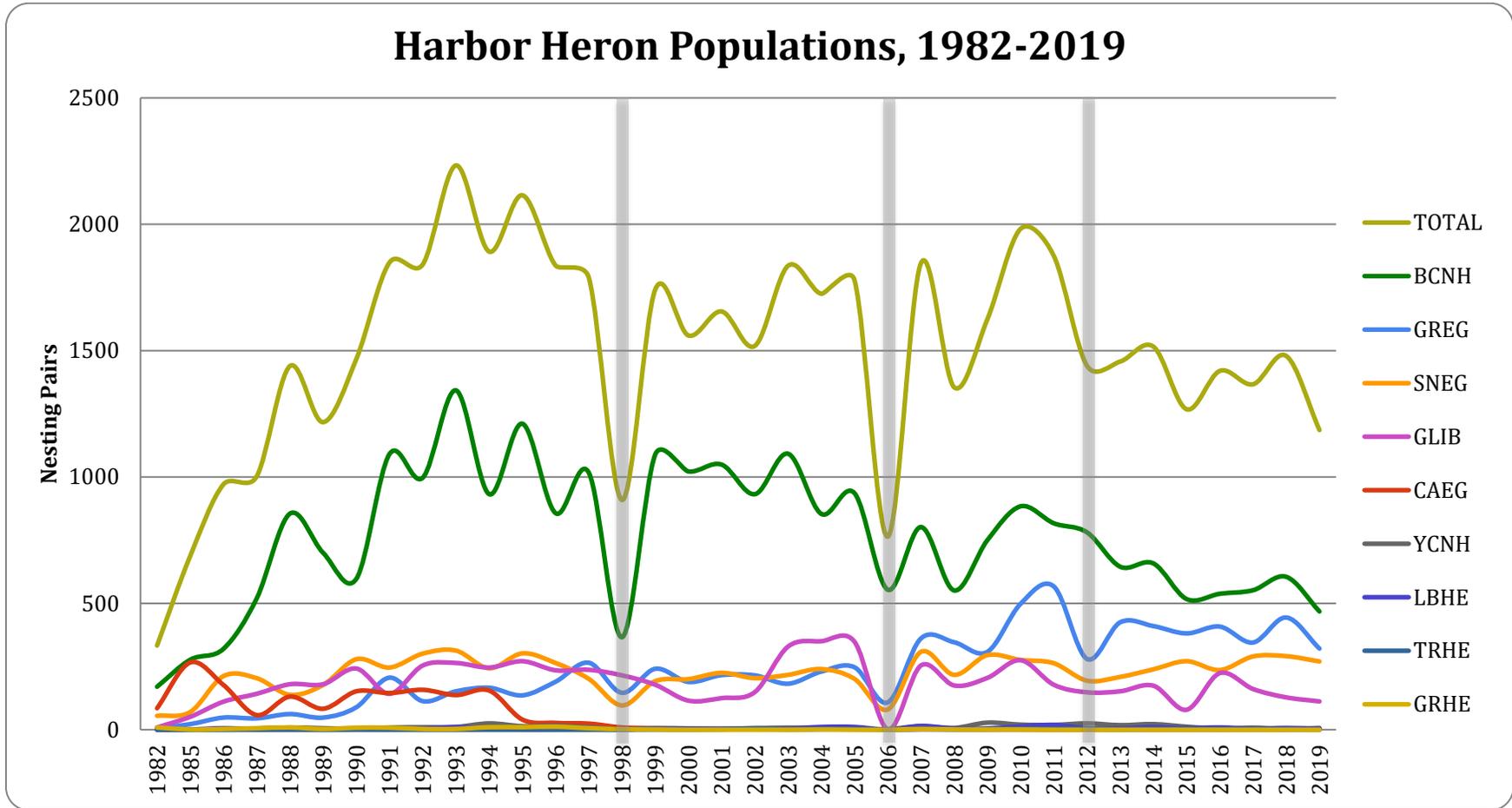


Figure 2: Total number of island-nesting pairs of wader species estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982 to 2019. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Key:

BCNH = Black-crowned Night-Heron; GREG = Great Egret; SNEG = Snowy Egret; GLIB = Glossy Ibis; CAEG = Cattle Egret; YCNH = Yellow-crowned Night-Heron; LBHE = Little Blue Heron; TRHE = Tricolored Heron; GRHE = Green Heron

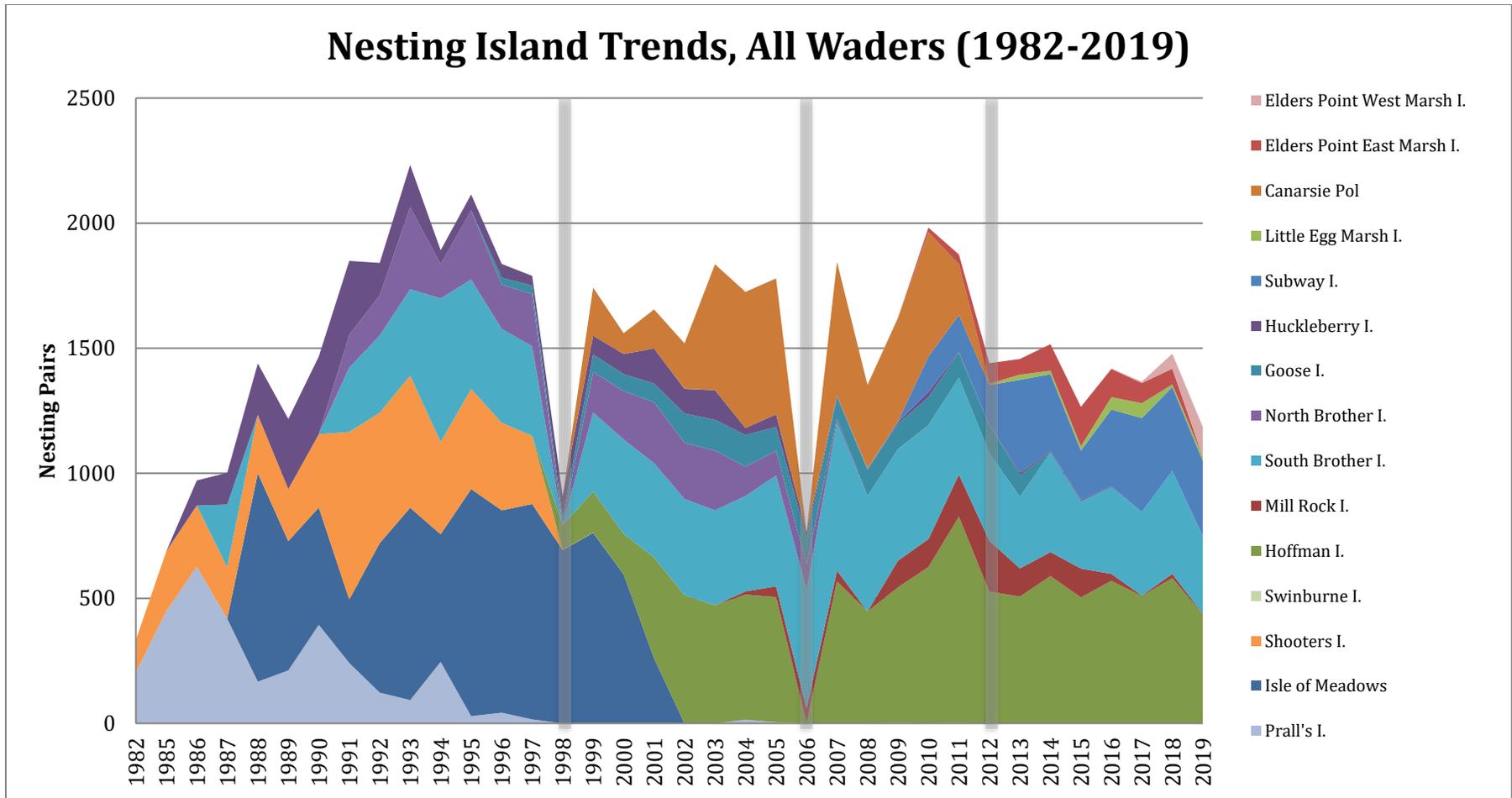


Figure 3: Total number of wader nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982 to 2019, by nesting Island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

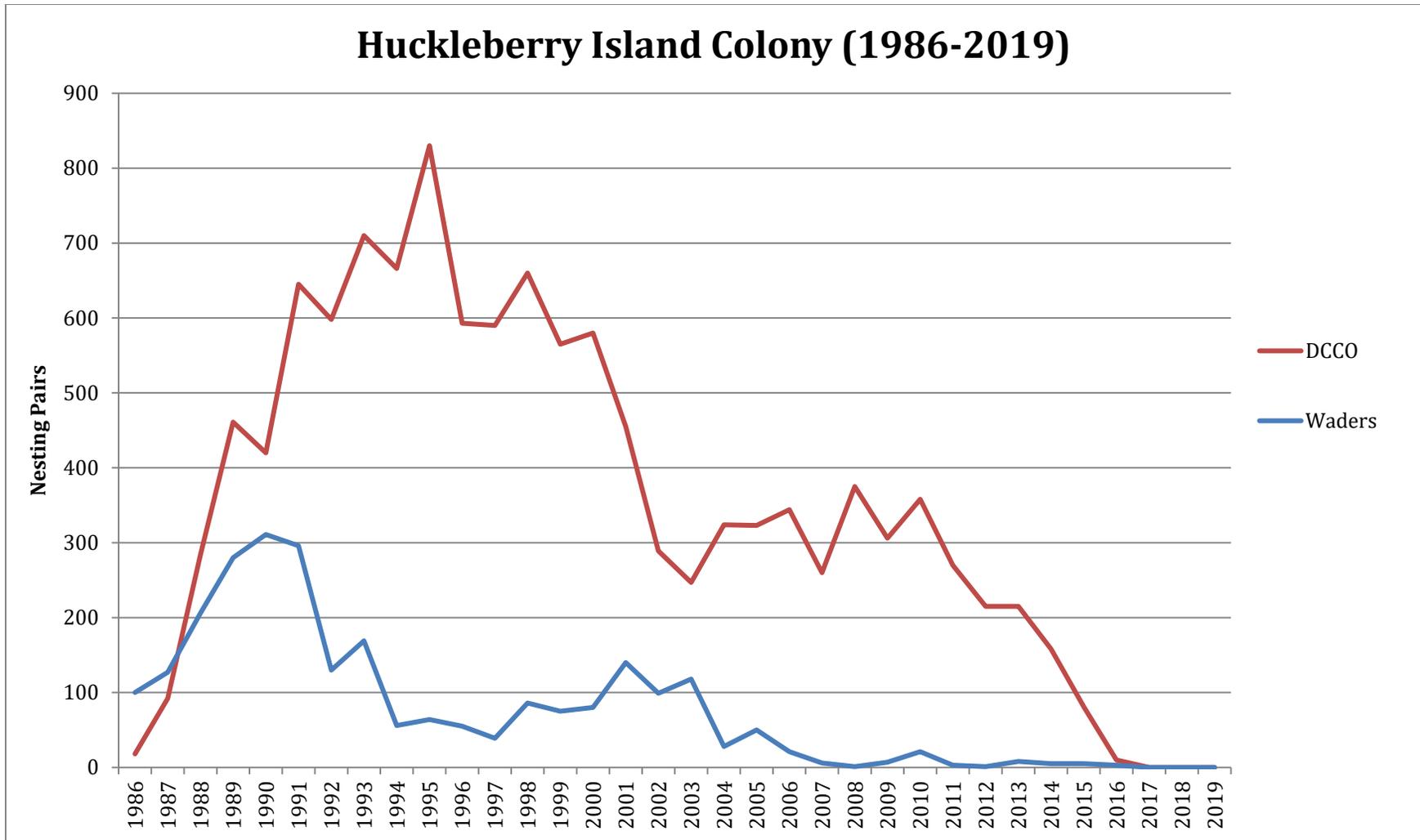


Figure 4: Total number of wader and Double-crested Cormorant (DCCO) nesting pairs estimated from nest and/or adult counts during surveys of Huckleberry Island, 1986-2019. (Note: Huckleberry Island was first surveyed as part of this project in 1986.)

Nesting Island Trends, Black-crowned Night-Herons (1982-2019)

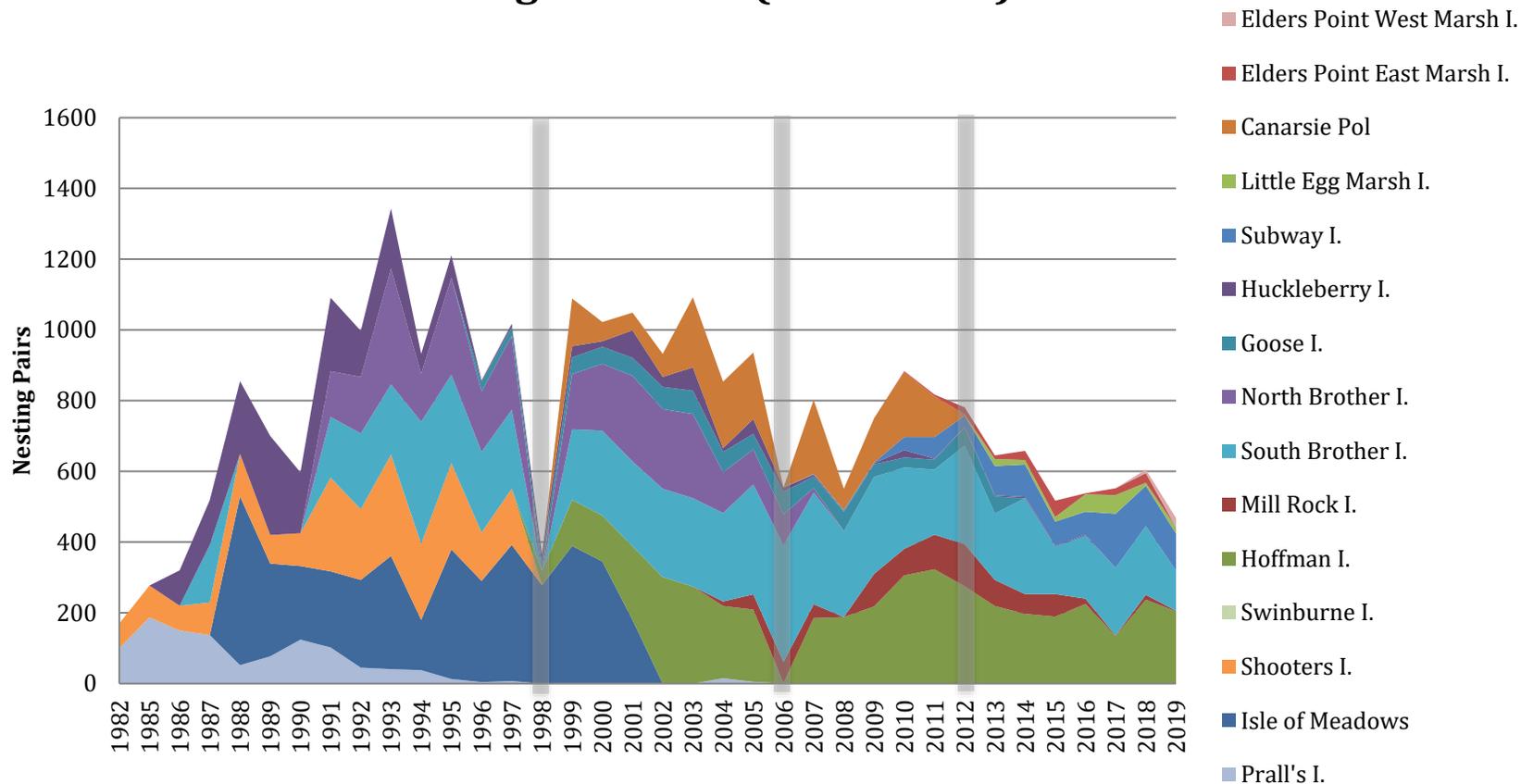


Figure 5: Total number of Black-crowned Night-Heron nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982-2019, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Nesting Trends, Yellow-crowned Night-Herons (1982-2019)

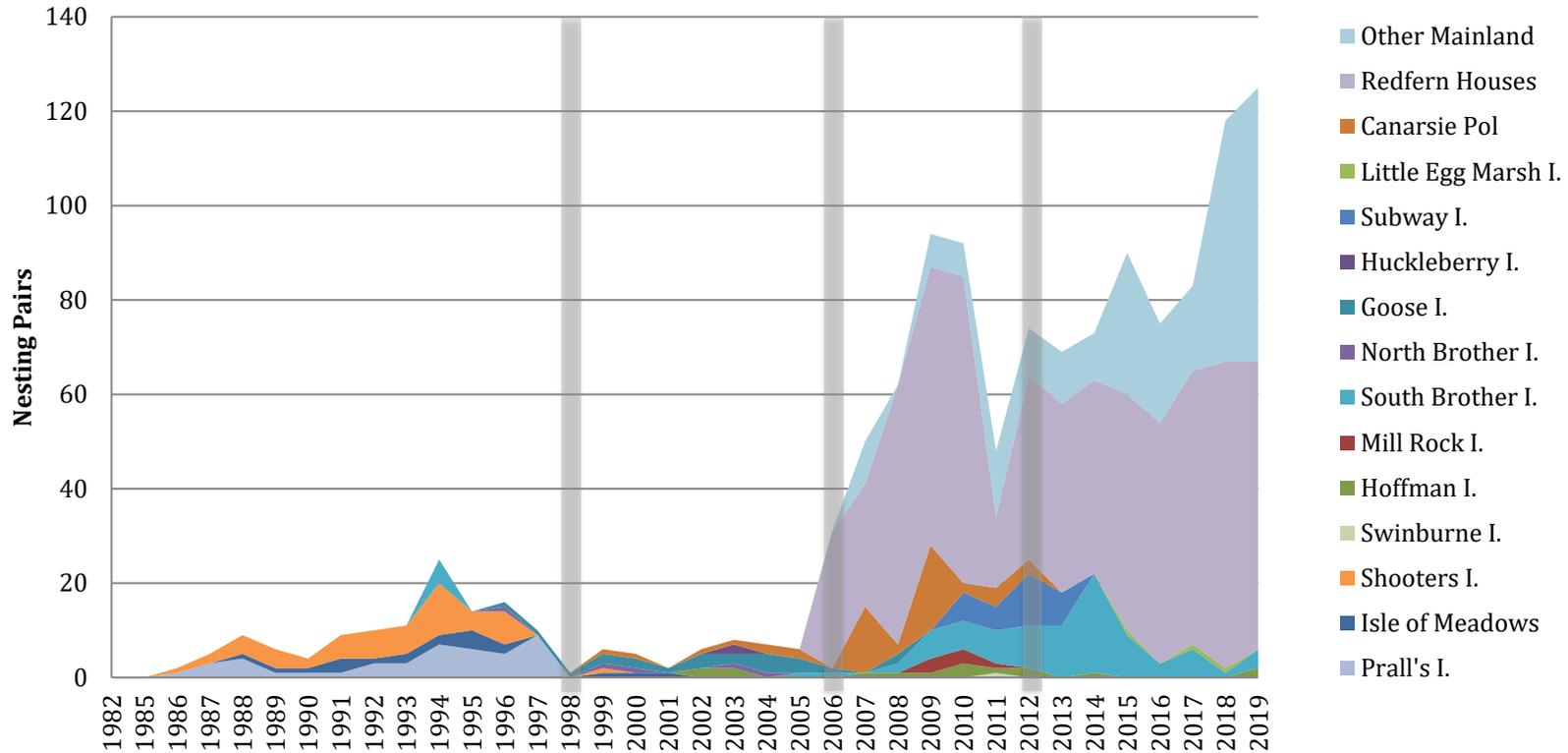


Figure 6: Total number of Yellow-crowned Night-Heron nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982 to 2019, by nesting island and regularly surveyed mainland colony. Years with substantial uncertainty in the island data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012). Note: Mainland colony data from the New York City and local New Jersey areas (“Other Mainland” and “Redfern Houses”) is included as available. It is unclear whether mainland nesting has actually increased since 2006, as it might appear above, or if the apparent increase is simply the result of a lack of earlier data and/or failure to detect earlier mainland colonies. A survey of historical records of mainland nesting prior to 2006 would be a worthwhile endeavor.

Nesting Island Trends, Great Egrets (1982-2019)

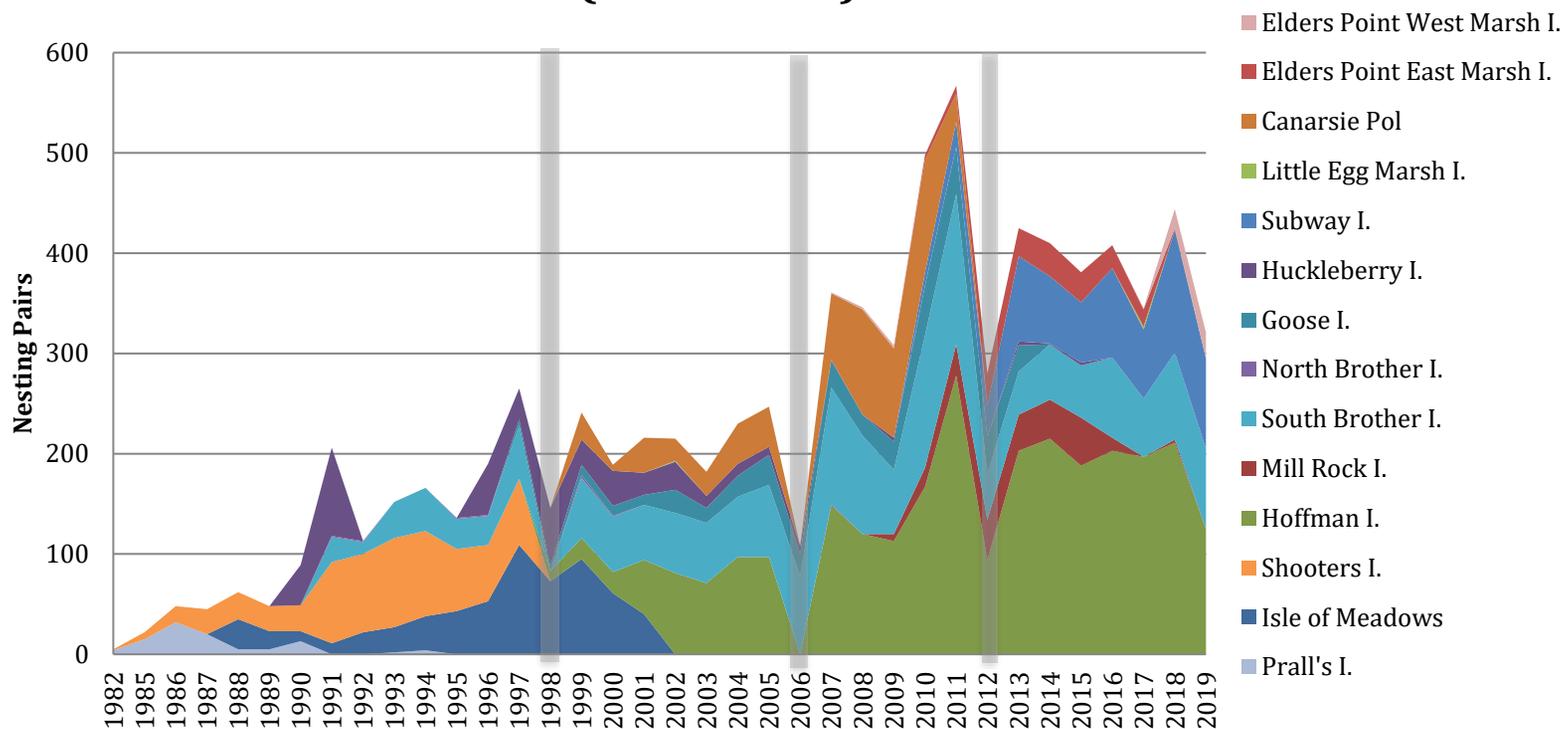


Figure 7: Total number of Great Egret nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982-2019, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Nesting Island Trends, Snowy Egrets (1982-2019)

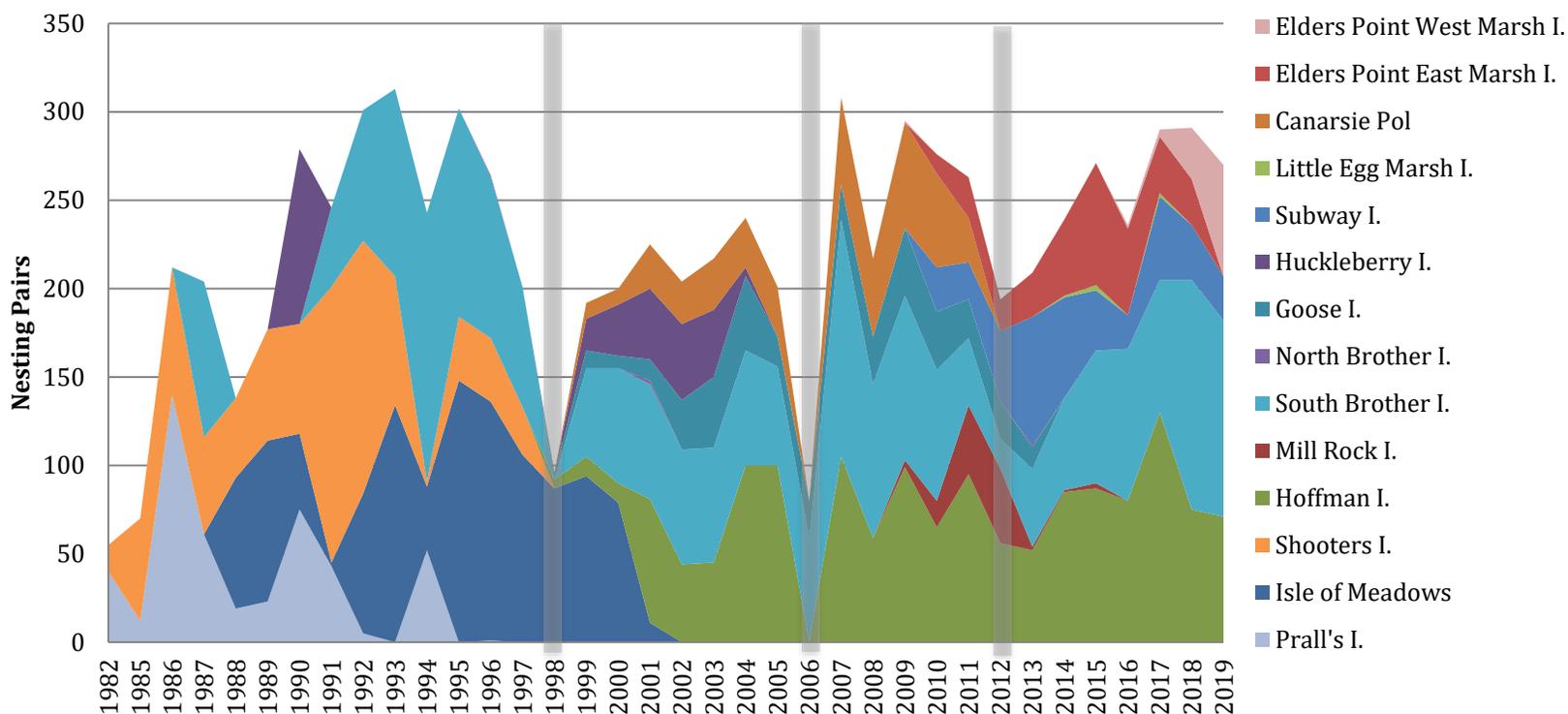


Figure 8: Total number of Snowy Egret nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982-2019, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Nesting Island Trends, Glossy Ibis (1982-2019)

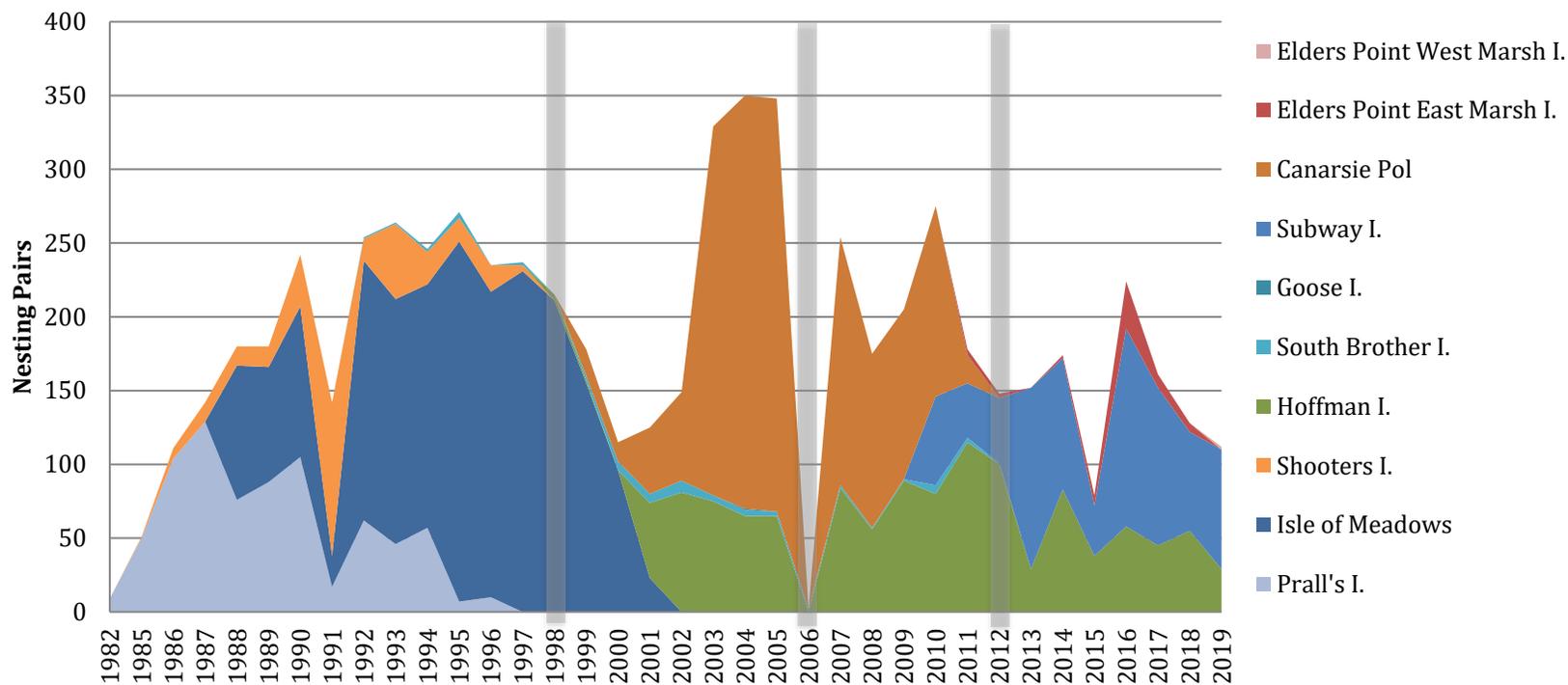


Figure 9: Total number of Glossy Ibis nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982-2019, by nesting island. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

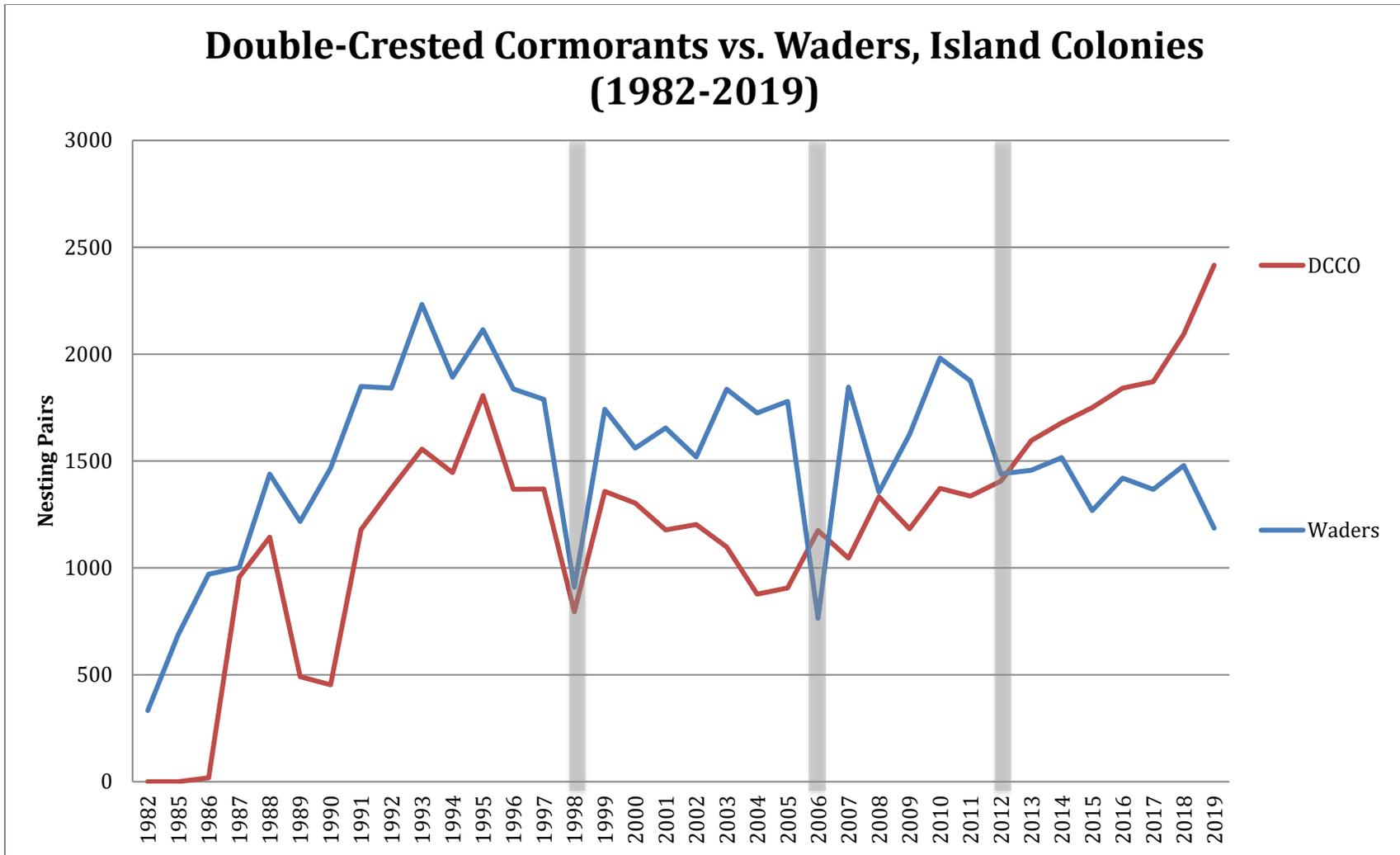


Figure 10: Total number of Double-crested Cormorant and wader nesting pairs estimated from nest and/or adult counts during the New York City Audubon Harbor Herons nesting surveys from 1982 to 2019. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars (1998, 2006, 2012).

Appendix I: 2019 Prall's Island Survey

14 June 2019

Prall's Island

8:30am-10:25am

Launch @Merrills Creek, No rain, Intermediate Clouds, High Winds, White Caps – landed on island 9:15am. Tide outgoing.

In Merrills Creek, 1 GREG foraging, 2 adult Osprey on nest with chicks feeding them fish.

Species observed on Prall's

Red-winged Blackbird	American Goldfinch
Song Sparrow	Red-tailed Hawk
Yellow Warbler	Grey Catbird
Turkey (2 females, no nests found)	House Wren
Common Yellowthroat	Mourning Dove
American Robin (nesting)	European Starling
Common Grackle	American Woodcock
Willow Flycatcher	Herring Gull (no nests)
Marsh Wren	
Baltimore Oriole (nesting)	

The scouring of creeks and shoreline peat loss is dramatically increasing (see photo 116023 and zoom in). Large areas of *Spartina alterniflora* continue to slump off.

Mile-a-minute (*Persicaria perfoliata*) has been able to establish a dramatic foothold and territory where it is most dense in the North areas of the island where foliar spraying and pre-emergent herbicide was used. I could not find any signs of the nearly 3000 trees that I planted which were sprayed with herbicide and pre-emergent herbicide. The deer fencing installed to protect plantings has been removed allowing deer full access, so it is not surprising to find no saplings left. A great deal of tree guards and other equipment remains littered across the North end of the island and requires cleanup. There is still a massive amount of debris throughout the island as a result from Sandy. DEP helped collect debris and tires in the past, perhaps there is a way to arrange for more help? There is a large amount of stacked tires on the North end and shoreline. The mile-a-minute has extended its territory to mid-island.

The grove of *Quercus marilandica* that Nate and I planted is doing really well and have reached heights of 10m! The shaded understory has less signs of invasive species.

Along with the mile-a-minute, the Glossy Buckthorn (*Rhamnus frangula*) is still prevalent of North end of the island with new saplings appearing. The good news is that the 1.5 acres on Northwest part of island that was hand pulled by myself and volunteers remains completely free of Buckthorn (for now).

The Black locust (*Robinia pseudoacacia*) grove has diminished and is failing rapidly. I'd be surprised to see any remaining in the next 2 years. I took a photo of the nest in the one tree which is not active and has remained there for the past 3 or four years now.

There is another suspicious nest that I had seen last year in a Black cherry (*Prunus serotina*) on the upper West side of the island that I expected to be a Red-tailed Hawks nest, or possibly Osprey, or remote possibility of a rogue Greg. I took pictures (104402/104354) of the nest which is also not active.

The *Sassafras albidum* grove on the west side is retreating rapidly with new saplings forming inland and older trees along the shoreline dying off.

I found 2 new burrows, I suspect groundhog, but did not locate tracks.

The poison ivy (*Toxicodendron radicans*) is so widespread throughout the island now. It continues to appear (to me) to target exotic species, so many Mulberry (*Morus alba*) are blanketed in poison ivy while native species have minimal or no signs.

I did not have time with the tides to walk to the extreme bottom of island. I did make observations from the Southern end just above the *Myrica pennsylvanica* patch. There are only two trees remaining on very southern end, with no nests.

I observed 4 deer on the island while there, and the deer trails are very established. I did not observe any signs of rabbit or rat. I feel pretty confident that Sandy did indeed wash out all the rabbits on the island. It raises questions for the voles that were there and whether they were able to survive.

There is an amazing patch of *Opuntia humifusa* growing on the Southern end of the island. The area down there is rapidly changing with massive expansion of the Mugwort (*Artemisia vulgaris*) displacing the populations of *Panicum virgatum* and *Schizachyrium scoparium*.

Alex Summers

Conservation Ecologist

T 718.390.2080

F 718.816.9194

E alexander.summers@parks.nyc.gov

NYC Parks

Staten Island Forestry

21 Slosson Avenue

Staten Island, NY 10314

nyc.gov/parks