



NEW YORK CITY AUDUBON
CELEBRATING 30 YEARS OF CONSERVATION

NEW YORK CITY AUDUBON'S HARBOR HERONS PROJECT:

2013 NESTING SURVEY REPORT

23 December 2013

Prepared for:

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

Prepared by:

Elizabeth Craig, Research Associate
New York City Audubon
71 W. 23rd Street, Suite 1523
New York, NY 10010
Tel. 212-691-7483
ecraig@nycaudubon.org

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Abstract

New York City Audubon's Harbor Herons Project Nesting Survey of the New York/New Jersey Harbor and surrounding waterways was conducted between 20 and 31 May 2013. This report summarizes long-legged wading bird, cormorant, gull, and tern nesting activity observed on selected islands, aids to navigation and at one mainland colony.

Species summaries: Seven species of long-legged wading birds nested on seven islands in New York Harbor. These species, hereafter collectively referred to as waders, included Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, and Tricolored Heron. Overall, the total number of wader nests has decreased by 26% since the last comprehensive survey in 2010. This includes decreases in Black-crowned Night-Herons (-27%), the numerically dominant nesting species in most mixed-species colonies, Great Egrets (-15%), Snowy Egrets (-24%), and Glossy Ibis (-45%). The Tricolored and Little Blue herons continued to nest at low numbers. Great Blue Heron, Cattle Egret and Green Heron, observed in small numbers in previous years, were not observed nesting in New York Harbor in 2013. A total of 1,596 Double-crested Cormorant nests were observed, continuing the slow but steady population increase exhibited since 2004. Gull nesting activity was observed on all surveyed islands. Tern nesting activity was observed in Joco Marsh and on Governor's Island.

Island summaries: The greatest species diversity was observed in Jamaica Bay on Subway Island this year (six wader species) as opposed to Canarsie Pol as in previous years. The greatest total number of nests was observed on Hoffman Island as in recent years, although this island exhibited a 19% decline in total nests since 2010. Nesting activity in Jamaica Bay was concentrated on Subway Island and Elder's Point Marsh East, where wader populations experienced substantial increases (163% and 250% respectively), while nesting activity on Canarsie Pol was entirely absent for the first time in the fourteen years this island has been surveyed. South Brother Island exhibited substantial declines in nesting activity (-37%) since the last comprehensive survey in 2010. Goose Island exhibited substantial nesting activity during the 2013 breeding season, but had been recently abandoned, likely due to a combination of human disturbance and nest predation, one or two days prior to the survey. Wader nesting activity on Huckleberry Island continued at very low levels. Recently inactive islands, including the three islands in the Arthur Kill and Kill Van Kull (Shooters Island, Pralls Island, and Isle of Meadows) and North Brother Island, continued to exhibit no signs of wader nesting activity in 2013. Mainland nesting of Yellow-crowned Night-Herons has increased after reported predation pressure reduced the breeding colony at the Redfern Houses in Far Rockaway in 2010. Double-crested Cormorants nested on seven islands throughout the harbor. Additional cormorant nests were observed near Shooters Island and on aids to navigation in the Kill Van Kull, Arthur Kill and northwestern Raritan Bay.

Introduction

New York City Audubon's 2013 Harbor Herons nesting survey marks the 28th consecutive year of this project. The primary objective of the surveys is to monitor the population status of wading birds (i.e. herons, egrets, ibis) and other colonial waterbirds on select islands 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, New York City Audubon made a decision to shift the Harbor Herons Nesting Survey from an annual to a triennial schedule, and in intervening years to conduct interim surveys on islands where nesting occurred in the prior year. A comprehensive nesting survey was conducted in 2013.

The US 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 of 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 one mainland colony documented during the 2013 field season, between 20 and 31 May. The objectives of the 2013 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 2013 survey followed field methods designed for previous Harbor Herons Project nesting surveys [Katherine Parsons (1986-1995), Paul Kerlinger (1996-2004)] and the standard protocol of the New York State Department of Environmental Conservation's Long Island Colonial Waterbird and Piping Plover Survey (Litwin et al. 1993). All counts were conducted between 6:00AM and 4:00PM, and under clear conditions without rainfall, high winds (>8 knots), or temperatures above 80°F. Counts were conducted once from 20 through 31 May 2013.

Islands surveyed in 2013 (Table 1, Figure 1) included two in Lower New York Harbor (Hoffman and Swinburne islands); four in the East River/Western Long Island Sound area (U Thant, Mill Rock, and North and South Brother islands); and two in the Hutchinson River/Long Island

Sound area (Goose and Huckleberry islands). Colonial waterbird estimates were conducted using adult counts on four islands in Jamaica Bay: Canarsie Pol, Elders Point Marsh East, Little Egg Marsh, and Subway Island. Additionally, observations of (1) Double-crested Cormorant nests near Shooters Island and on aids to navigation (i.e., channel markers and beacons) in the Kill Van Kull, Arthur Kill and northwestern Raritan Bay, (2) Yellow-crowned Night-Heron nesting at a mainland colony, and (3) Common Terns nesting on Governor's Island, are also presented in this report.

Each island was surveyed by a research team consisting of the author, volunteers from New York City Audubon and other organizations, and staff from New York City Department of Parks and Recreation (NYCDPR). Double-crested Cormorant counts were conducted by the author with Susan Elbin and numerous volunteers (see island accounts for details) as part of an ongoing study of cormorant population dynamics, habitat use, and foraging ecology in NY Harbor. Surveys at Goose and Huckleberry islands were conducted jointly with David Künstler (Pelham Bay Parks Administrator's Office). Don Riepe of the American Littoral Society/Jamaica Bay Guardian/New York City Audubon provided additional information on colonial waterbird activity in Jamaica Bay.

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

Double-crested Cormorant surveys were conducted by direct observation within colonies (as detailed above). After all the nests were counted in a given tree, the tree was tagged with forestry flagging tape. Boat counts were conducted on Shooter's and U Thant islands, where nests were counted with binoculars from a boat no more than 20 meters away from the colony. In addition, observations of nesting activity on aids to navigation were made from distances of up to 20 meters.

Adult counts of Great Black-backed Gulls and Herring Gulls were conducted at all surveyed colonies. In addition, nest counts were made whenever possible. Both adult counts and nest counts 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 Don Riepe of the American Littoral Society/Jamaica Bay Guardian, and New York City Audubon.

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

Acknowledgements

We sincerely thank all volunteers (noted by name in the island profiles), organizations and agencies who participated in the 2013 surveys.

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 comes from the New York State Department of Environmental Conservation (DEC), New England Interstate Water Pollution Control Commission (NEIWPC), the Harbor Estuary Program, and support from New York City Audubon's major donors.

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Results

Overview:

In 2013, seven species of long-legged wading birds were observed nesting on seven islands (Table 2). These seven species, hereafter collectively referred to as waders, included Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, Yellow-crowned Night-Heron, Little Blue Heron, and Tricolored Heron. The three most active nesting colonies, with the greatest number of nests and diversity of nesting species, were Hoffman Island, South Brother Island, and Subway Island (also the most diverse colony in the harbor with six species of nesting waders present). Canarsie Pol in Jamaica Bay has historically been the most diverse and one of the largest wader colonies in the New York Harbor, however in 2013 there was no nesting activity on this island for the first time in the 14 years that it has been surveyed. Goose Island exhibited substantial nesting activity during the 2013 breeding season, but had been recently abandoned when the survey was conducted, likely due to a combination of human disturbance and nest predation. Islands with declining trends in recent years (i.e., Huckleberry Island and North Brother Island) continued to exhibit little to no nesting activity. The Arthur Kill/Kill van Kull complex (Isle of Meadows, Prall's Island, and Shooter's Island), which was the core of NY/NJ Harbor's breeding wader community from the 1970s until the late 1990s, continues to show no sign of wader nesting activity.

As 2013 was a comprehensive survey year, the majority of trends observed in this report are comparisons between this year's survey and the last comprehensive survey year in 2010. Although the total number of active nests in 2013 was substantially lower than in 2010, this year constituted an upswing from 2012, and is well within the range of nesting activity observed since the early 1990's. Figure 2 illustrates the overall nesting activity of waders in the NY/NJ harbor over the history of these surveys, with years of uncertainty in the data indicated with gray bars. Figure 3 illustrates the recent history of cormorants and the four most common waders (Black-crowned Night-Herons, Great Egrets, Snowy Egrets, and Glossy Ibis) over the last four comprehensive survey years (2004, 2007, 2010, and 2013).

Island Accounts:

Hutchinson River/Long Island Sound:

Huckleberry Island (13 acres)

28 May 2013, 9:50-11:45 AM.

By the author, Tod Winston (New York City Audubon), David Künstler (NYCDPR), Coby Klein (CUNY), Robert Blair (The Raptor Trust), and John Burke (Huckleberry Indians, Inc.).

The Huckleberry Island nesting survey revealed three Black-crowned Night-Heron adults, four Great Egret adults, and one Snowy Egret adult. These adult birds were assumed to each represent one nesting pair (Table 2). Several nests were identified, but none appeared active. This year marks a continued decline in the numbers of nesting waders on Huckleberry Island. Double-crested Cormorants (215 nests) exhibited a 40% decrease from 2010. Four Herring Gull and five Great Black-backed Gull nests were observed. Four adult American Oystercatchers were observed on the island, in addition to a flock of six birds flying past the island, likely indicating

that two nesting pairs were present. One Mallard nest and 29 adult Canada Geese (with at least 15 confirmed nests) were observed. Other bird species observed on the island included Common Raven, Fish Crow, Common Grackle, Yellow Warbler, Common Yellowthroat, Gray Catbird, Killdeer, Red-tailed Hawk, European Starling, and Common Tern.

Wader activity has been concentrated on the northern peninsula of the island in recent years. Apparently appropriate nesting habitat continues to be present on the peninsula and within the central and western sections of the island as well, so observed declines may be caused by the presence of nest predators (i.e., raccoon tracks were observed on the island) and/or human activity during the breeding season. Authorized use of the island by the property owners appears to be limited (J. Burke, Huckleberry Indians, personal communication), while unauthorized visitation remains a source of human disturbance that may escape detection. Double-crested Cormorants have expanded their nesting activity into the eastern section of the island, which was formerly populated by herons and egrets. Competition for nesting sites between waders and cormorants may be a factor in the observed wader declines.

Wader nesting activity on Huckleberry Island has continued to decline over the past decade and continued monitoring of this colony is imperative. New York City Audubon and NYCDPR will work closely with the Huckleberry Indians to insure necessary researcher access to this island, and to understand and address any potential factors contributing to the continued decline. Huckleberry Island has been a critical nesting site for both waders and cormorants in the New York City area. Nearby Davids Island may also provide suitable nesting habitat for waders, and this island should be monitored for future nesting activity.

Goose Island (1 acre)

30 May 2013, 9:45-10:45 AM.

By the author, Tod Winston, David Künstler, Alex Summers (NYCDPR), and Josué Garcia

Goose Island was a sad sight in 2013. While the island supported 87 active pairs of waders, a massive abandonment occurred shortly before the 2013 survey was conducted. During the survey, the only remaining active nests were two Snowy Egrets, five Black-crowned Night-Herons, and one Great Egret. Multiple nests were observed with broken eggs either in or beneath the nests. Before the nesting season, David Künstler and Grant Wheeler (Urban Park Ranger) found observed evidence of Norway rats on the island. Raccoon droppings were also observed in predated nests and on the ground. One adult Snowy Egret and two adult Black-crowned Night-Herons were found dead on the island (Figure 4). No gull nests were observed on the island this year. Five Canada Goose nests (four of which were abandoned or predated) were observed during the survey. Other bird species observed on the island included Common Grackle (at least 11 nests), and Cedar Waxwing. Künstler (2007) presented a detailed treatment of Goose Island bird populations and vegetation from 1996-2006.

Mammals have been noted on Goose Island in past seasons (Raccoon and Virginia Opossum), but this magnitude of predation and abandonment has never been observed. A Great Horned Owl feather was found on the island and could indicate another potential predator. As in previous years, evidence of human disturbance on Goose Island was present.

East River:

North Brother Island (19 acres):

22 May 2013, 2:10-3:00 PM.

By the author, Tod Winston, and Susan Elbin (New York City Audubon)

The areas of North Brother Island that had previously supported wader nests were searched during the 2013 survey. No evidence of wader or gull nesting activity was observed. Other species observed included America Robin, Swainson's Thrush, Veery, Gray Catbird, Northern Cardinal, Cedar Waxwing, House Sparrow, Warbling Vireo, Common Grackle, Boat-tailed Grackle, Barn Swallow, Magnolia Warbler, Blackpoll Warbler, Canada Warbler, Yellow Warbler, American Redstart, Common Yellowthroat, Mallard, and Canada Goose.

There continues to be evidence of human disturbance, beyond the activities of the NYCDPR, on North Brother Island. A dead snapping turtle with Mexican pesos placed on its body was found near the NW access point of the island (Figure 5).

South Brother Island (12 acres)

22 May 2013, 9:15AM - 1:30 PM.

By the author, Tod Winston, Susan Elbin, Michael Feller (NYCDPR), Alex Summers, Coby Klein (CUNY), Susan Stanley (NYCDPR), Tom Heinemann (USDA) and Erica Santana (USDA).

A total of 286 nests of four wader species (Black-crowned Night-Heron, Great Egret, Snowy Egret, and Yellow-crowned Night-Heron; see Table 2) was observed throughout the island. This represents a marked decrease (-37%) from 2010. No evidence of Glossy Ibis nesting activity was observed this year as in recent years. This colony was the third largest wader colony in the NY Harbor. Despite a decrease in Double-crested Cormorant nests (197 nests, -25% from 2010), nests were no longer concentrated in the black locust grove in the center of the island but appear to have spread throughout much of the island. There continued to be large areas of overlap between cormorant and wader nesting habitat, and dense tangles of vines and bushes still supported a substantial number of waders. However, many of the large groves of dead and dying trees covered with oriental bittersweet, which had historically been the center of Great Egret nesting activity, had fallen, likely during Hurricane Sandy in October 2012.

Waders primarily nested in box elder, mulberry, sycamore maple, black cherry, oriental bittersweet, multiflora rose, and wild grape. Nesting habitat for cormorants on South Brother Island included a stand of locust trees in the center of the colony, where the majority of nests were located, as well as box elder, mulberry, ailanthus, and black cherry. Cormorants therefore exhibit nest-site preferences in common with wader species, and compete with waders for these nest-sites in some instances.

Based on adults present, an estimated 25 Herring Gull pairs and 54 Great Black-backed Gull pairs nested on the Island. Other bird species observed included American Oystercatcher (1 nest

with 1 egg), Red-eyed Vireo, Song Sparrow, Canada Warbler, and Cedar Waxwing. In contrast to recent years, no evidence of Great Horned Owl nesting activity was observed in 2013.

The purchase of South Brother Island was coordinated in 2007 by Trust for Public Land, Wildlife Conservation Society, The Point Community Development Corporation, and Congressman Serrano (16th Congressional District, Bronx, NY). The island was officially transferred to NYCDPR in November 2007. New York City Audubon will continue to advocate for maintaining the island as a refuge for nesting colonial waterbirds.

A potential concern is that one of the prevalent tree species used by nesting waders, Box Elder, is also a host tree preferred by Asian Longhorned Beetles (ALBs). If ALBs were detected on South Brother, the current management plan calls for the complete removal of all potential ALB host trees within the area. This could have a devastating effect on the persistence of the colony; it is important to establish preventative measures to reduce the chance of this occurring (i.e., early detection surveys, training of Harbor Herons volunteer teams, chemical treatment) with USDA-APHIS and other organizations within the ALB Cooperative Eradication Team.

Mill Rock (3 acres)

22 May 2013, 3:15 PM - 4:00 PM

By the author, Tod Winston, and Susan Elbin.

A total of 113 wader nests was observed on Mill Rock Island; a very similar number to that observed in 2010, although a decline from the >200 pairs observed in the intervening years. Three species of waders (Black-crowned Night-Heron, Great Egret, and Snowy Egret) were observed nesting on this Island. Eighteen Herring Gull and 22 Great Black-backed Gull nests were confirmed. Double-crested Cormorants (16 nests) were observed nesting on Mill Rock Island for the third consecutive year. Other bird species observed on the island included Canada Goose (1 nest), Mallard (1 nest), and one nest presumably belonging to a Sharp-shinned Hawk.

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

U Thant (1/4 acre)

May 2013

By Jim Matthews and NYC Audubon Eco-cruise

U Thant was surveyed from an adjacent apartment building and from a boat with binoculars, approximately 10 meters from shore. Thirty-one Double-crested Cormorant nests were observed on the island both on the collapsed metal arch sculpture and in trees. Approximately the same number of nests has been observed annually on this island since the colony established in 2008. Based on adults present, an estimated 22 pairs of Great Black-backed Gulls nested on the island.

Staten Island – Arthur Kill and Kill Van Kull

Isle of Meadows (101 acres): not surveyed in 2013

Prall's Island (88 acres)

29 May 2013, 10:45 AM - 12:15 PM

By Susan Elbin and Alex Summers

Prall's Island, the site of the most recent Black-crowned and Yellow-crowned Night-Heron nesting attempts off western Staten Island, has continued to be inactive since 2005. Efforts to control an ALB infestation on the island in March-April 2007 resulted in the removal of most suitable nesting trees (approximately 3,000 trees in total). A long-term restoration strategy is being formulated in the interest of restoring native plant communities and bringing nesting waders back to the island.

Shooter's Island (48 acres): not surveyed in 2013

The Double-crested Cormorant colony situated on dry docks and other wreckage west of Shooter's Island decreased to 10 nests from the 17 active nests observed in 2012.

Lower NY Harbor

Hoffman Island (10 acres)

21 May 2013, 10:45 AM - 3:00 PM.

By the author, Tod Winston, Susan Elbin, and Alex Summers.

There were 507 nests of at least five wader species observed, including Black-crowned Night-Heron, Great Egret, Snowy Egret, Glossy Ibis, and Yellow-crowned Night-Heron. This constitutes a 19% decline from 2010. Large areas of shoreline vegetation that had historically protected the interior of the colony from view and from the elements were not present this year, likely due to damages from Hurricane Sandy in October 2012. Portions of the colony were visible from the shore, creating less than ideal conditions for nesting waterbirds. If vegetative cover continues to be thin along the shore, this will continue to reduce the quality and quantity of available nesting habitat on Hoffman Island. Waders primarily nested in mulberry species, multiflora rose, box elder, black locust, hackberry, oriental bittersweet, wild grape and Virginia creeper.

There were 611 Double-crested Cormorant nests observed on Hoffman Island in 2013; a 183% increase from 2010 and a 53% increase from 2012. From 2003 to 2006, Double-crested Cormorant nesting expanded across the southern end of the island, into areas formerly used by waders. In 2008, the first nests were noted on the north side of the island. Cormorant nests were in close proximity to wader nests in some locations, and wader nests appeared to be more

concentrated in the center of Hoffman Island than in previous years. In 2013 cormorant nests were found throughout much of the island, although remained concentrated in the southern half of the island, with smaller groups of nests on the Northern shore.

Forty Herring and 56 Great Black-backed gull nests were counted during the survey. Three Canada Goose nests were observed. Additional species observed included Mallard (with at least 6 ducklings), Brant, American Oystercatcher (2 adults), Fish Crow, Song sparrow, Red-winged Blackbird, Barns Swallow, Common Yellowthroat, and Gray Catbird. Evidence of deer (hoof prints) was observed on Hoffman Island for the first time this year.

Swinburne Island (4 acres)

20 May 2013, 11:00 AM - 12:45 PM

By the author, Susan Elbin, David Manry (New York City Audubon) and Peter Post (New York City Audubon volunteer).

A total of 336 cormorant nests was observed; a 5% increase from 2010 and a 20% decrease from 2012. Nests were located on the remains of buildings, and in several hackberry, black locust, and mulberry trees. The habitat on Swinburne Island was significantly remodeled during Hurricane Sandy, which removed the majority of topsoil from the island, completely or partially felled all the standing buildings, and exposed foundations that had historically not been exposed (Figure 6). In response, cormorants have transitioned from primarily tree nesting to ground nesting in several places. Adult cormorants banded in previous years were observed breeding on Swinburne Island again this year (Figure 7). Seventy-six Herring Gull nests and 45 Great Black-backed Gull nests were observed. Additional species observed included Purple Sandpiper and Brant. A nest was observed on the sea wall near several gull nests that remains unidentified, but most closely resembled a Glossy Ibis.

Jamaica Bay

Elder's Point Marsh (21 acres)

27 May 2013, 11:08-11:40 AM

By the author, Tod Winston, Don Riepe (American Littoral Society), Leslie Day (New York City Audubon volunteer), and Jenny Mastantuono (USDA)

Elder's Point Marsh East was recently restored as part of a marsh restoration project undertaken in Jamaica Bay by the U.S. Army Corps of Engineers (USACE). 2013 was the fourth year since the commencement of restoration activities in which colonial waterbirds had the opportunity to nest on Elder's Point Marsh East. A total of 63 wader nests were observed on this island from four wader species, including Black-crowned Night-Herons, Great Egrets, Snowy Egrets, and Tricolored Heron; a 250% increase from 2010. This increase coincides with the concurrent decline and recent abandonment of Canarsie Pol. Waders nested in trees, low branches, and on the ground. The majority of egrets at this colony were nesting in a broad expanse of high-tide bush (Figure 8).

One hundred and eighty Double-crested cormorant nests were observed; a nearly 45-fold increase from 2010 and 100% increase from 2012. Many cormorants were nesting on the ground. Two hundred and nineteen Herring Gull adults and 12 Great Black-backed Gull adults were observed. Other bird species observed on this island included Canada Goose (two nests), and four American Oystercatchers.

Elder's Point Marsh West is in the final stages of marsh restoration through the USACE. In December 2009 all of the vegetation and trees were removed from the island, and sand was deposited on the island as substrate for the future marsh. Colonial waterbird nesting activity was therefore discontinued on this island. Waders are unlikely to re-colonize this island due to the removal of potential nesting habitat. The restored marsh will hopefully provide productive foraging habitat for waders in the future. This island should be monitored for other colonial waterbird activity once restoration activities have been completed. Restoration is scheduled for completion in February or March 2010. USACE completed initial construction of a similar marsh island restoration project at Elders Point East in 2006-2007, which used dredged material from Rockaway Inlet. Projects aimed at restoring salt marsh acreage within the Bay are certainly justified by the substantial marsh island losses observed in recent decades.

Subway Island (40 acres)

27 May 2013, 12:00 – 1:00 PM

By the author, Tod Winston, Don Riepe, Leslie Day, and Jenny Mastantuono

The Subway Island colony was the second largest and the most diverse nesting colony in NY Harbor in 2013. This year was the fourth consecutive year in the history of these nesting surveys in which a large group of waders was found nesting on Subway Island. A total of 373 wader nests was observed representing six species of waders including Black-crowned Night-Herons, Great Egrets, Snowy Egrets, Glossy Ibis, Yellow-crowned Night-Heron, and Little Blue Heron. This represents an increase of two species and of 163% nesting activity since 2010. This influx of birds on Subway Island coincided both with the unprecedented declines observed on Canarsie Pol and with the cessation of the subway line (A-train) that crosses the island. The A train was out of service after Hurricane Sandy, from 29 October through 30 May (post-survey). In addition, 307 Herring Gull adults and eight Great Black-backed Gull adults were observed. Fourteen American Oystercatchers were observed on the island. Other species present included Mallard (1 nest), Gadwall, Least Tern, Willet, Dunlin, Semipalmated Sandpiper, Boat-tailed Grackle, Willow Flycatcher, Song Sparrow, American Crow, Fish Crow, Red-winged Blackbird, Gray Catbird, European Starling, Yellow Warbler, and Common Yellowthroat.

Little Egg Marsh

27 May 2013, 8:55 – 9:45 AM

By the author, Tod Winston, Don Riepe, Leslie Day, and Jenny Mastantuono

Little Egg Marsh was surveyed for the first time since 2010. Twenty Black-crowned Night-Heron nests were observed, although no evidence of other nesting waders was found. Three hundred and ninety-seven Herring Gull adults and 262 Great Black-backed Gull adults were observed. Other bird species observed included Fish Crow (one nest), American Oystercatchers (eight adults, one confirmed nest), Semipalmated Sandpiper, Dowitcher sp., Red Knot, Ruddy Turnstone, Willet (two adults), Dunlin, Common Tern, Forster's Tern, Brant, Canada Goose, and Snowy Egret.

Canarsie Pol (220 acres)

27 May 2013, 10:20 – 10:40 AM

By the author, Tod Winston, Don Riepe, Leslie Day, and Jenny Mastantuono

Canarsie Pol was largely deserted this year. 2013 marks the third consecutive year of massive decline in nesting activity on Canarsie Pol, as well as the first year with no wader nesting activity in the island's 14-year survey history. It is unclear why these declines have occurred, but presence of mammals on the island, including raccoons, may be causing these declines as they have done on other nesting islands in Jamaica Bay. Further investigation is highly recommended, as this island has historically been one of the largest and most diverse heron colonies within the New York Harbor system.

Wading birds (seven Snowy Egrets, one Great Egret, and one Yellow-crowned Night-Heron) appeared to be using the shores of Canarsie Pol as foraging grounds. Other birds observed on or near Canarsie Pol included Herring Gull (four adults, two empty nests), American Oystercatcher (12 adults), Laughing Gull, Brant, Forster's Tern, Chimney Swift, Yellow warbler, Tree Swallow, Barn Swallow, Red-winged Blackbird, Song Sparrow, Gray Catbird, Fish Crow (two nests, six adults), Canada Goose, Mallard, Brant and Willet.

Other Jamaica Bay islands

May-June 2013

By Don Riepe, Susan Elbin, and Tod Winston

No heron nesting activity was observed on other Jamaica Bay islands. On June 10th, during the annual Laughing Gull survey, Don Riepe, Susan Elbin and Tod Winston observed Common and Forster's Terns nesting in Joco Marsh. They observed 42 nests of Common and Forster's Terns combined. This marsh has not been formally monitored as part of these surveys, but the continued monitoring and protection of this colony should be a high priority, as the Common Tern is a threatened species in NY State.

Upper New York Bay

Governor's Island (172 acres)

31 May 2013, 8:30-10:30 AM

By the author, Susan Elbin, Tod Winston, James Reed (LiRo), and Marisa Dedominicis (Earth Matter)

Since 2008, a colony of Common Terns has nested on abandoned piers on the south end of Governor's Island. This year was the first year this colony has been formally surveyed, including ground nest counts. A total of 81 nests was observed on three piers: Yankee, Lima, and Tango. Fifty adults and 45 nests were observed on Yankee pier. Twenty-eight adults and 31 nests were observed on Tango pier. Five adults and five nests were observed on Lima pier. One Great Black-backed Gull and one Herring Gull nest were observed in total. During this nest survey, we posted signs at the entrance to each pier to discourage human disturbance, and set out plywood chick shelters to provide Common Tern chicks some protection from the elements (Figure 9). On June 29th, NYC Audubon staff returned to work with James Reed and Annie Barry (who has documented the numbers of adult Common Terns on Governor's Island since 2008) to conduct further monitoring and banding of Common Terns. In late July, a portion of Yankee pier collapsed. As the collapse occurred late in the season, we assume that the majority of nestlings

were mobile enough to survive the collapse, but do not have any data on the post-collapse population. While not necessarily threatening the reproductive efforts of terns this year, the collapse will reduce available nesting habitat in the future.

NYC Audubon hopes to partner with the governing and stakeholder organizations on Governor's Island to promote Common Tern nesting activity and conservation, including continued monitoring, habitat improvement and protection.

Aids to Navigation:

Susan Elbin observed 24 nesting pairs of Double-crested Cormorants on aids to navigation in the Kill Van Kull and Arthur Kill. Cormorants nested on markers near Shooter's Island as well as on the decaying dry docks off the shore of Shooter's Island (discussed in the Shooter's Island survey summary above). Observations were made at a distance of 10-20 meters from channel markers. Hugh Carola observed an additional 27 nesting pairs of DCCOs on aids to navigation in Newark Bay.

Mainland Accounts:

The New York City Audubon's Harbor Herons Project has traditionally reported nesting activity on island colonies only. Two species of waders are known to nest in mainland areas: Yellow-crowned Night-Heron and Green Heron.

The nesting colony of Yellow-crowned Night-Herons located at the Redfern Houses in Far Rockaway was visited on 24 May 2013 11:15 – 11:50 AM) by the author and Tod Winston.

A total of 40 nests was observed (Table 2) which marks an increase from the 15 nests observed in 2011 after the 2010 observations of predation by hawks. Predation was not observed from 2011 -2013. This is the 10th year the colony has been confirmed.

Several smaller incidences of Yellow-crowned Night-Heron nesting have been reported on Staten Island and several sites in Nassau County in recent years. Hugh Carola (program director, Hackensack Riverkeeper) has presented information on Yellow-crowned Night-Heron nesting activity in the Meadowlands and northern New Jersey at Harbor Estuary Program Harbor Herons Subcommittee meetings. Known nesting sites for this species have included: Laurel Hill County Park, Schmidt's Woods Park and Harmon Cove in Secaucus. This year there were 10 nesting pairs at Harmon Cove and one pair at Schmidt's Woods Park in Secaucus – confirmed by Ray Duffy and Lynn Kramer. This is similar to observations made in 2012.

Species Accounts:

The species trends discussed below are based on comparisons of nesting numbers between 2010 and 2013.

Black-crowned Night-Heron (645 pairs): Black-crowned Night-Herons were observed on eight islands in 2013 and were the numerically dominant species in larger, mixed-species colonies such as Hoffman Island, South Brother Island, and Mill Rock. Observed nesting activity decreased by approximately 27% harbor wide.

Yellow-crowned Night-Heron (58 pairs): Numbers of nesting pairs on islands remained relatively unchanged between 2010 and 2013. The largest colony, however, occurred on the mainland at Redfern Houses. See the description of this colony above in the mainland accounts.

Great Egret (425 pairs): Great Egrets were observed on seven islands in NY/NJ Harbor. This species appears to be moving its centers of nesting activity throughout the harbor, as some colonies (including South Brother Island) exhibited declines while others (including Mill Rock and islands in Jamaica Bay) exhibited increases. Harbor wide, Great Egrets exhibited a 15% decrease since 2010.

Snowy Egret (209 pairs): Snowy Egrets nested on seven islands in NY/NJ Harbor. An overall decrease of approximately 24% was observed harbor-wide. This species, like the Great Egret, appears to be moving its centers of nesting activity throughout the harbor, as some colonies (including South Brother Island) exhibited declines while others (including Mill Rock and islands in Jamaica Bay) exhibited increases.

Little Blue Heron (5 pairs): Little Blue Herons were observed on Hoffman and Subway Island in 2013. This species approaches the northern extent of its range in the NY/NJ Harbor area, and it maintains a consistent, low-level presence in the NY/NJ Harbor breeding community.

Tricolored Heron (1 pair): One Tricolored Heron was observed on Elder's Point Marsh in Jamaica Bay in 2013. This is a species more typical of southern colonies, and no increasing trends in NY Harbor have been observed. The first record of Tricolored Herons nesting in NY/NJ Harbor occurred in 1955 on Ruler's Bar Hassock in Jamaica Bay, and nesting for this species has also been observed in colonies in Long Island's Great South Bay (McGowan and Corwin 2008).

Cattle Egret: Cattle Egrets were not observed during the 2013 survey. No nesting was observed on South Brother Island, the only other site where nesting had been confirmed in recent years. The population has declined to zero from a high of 266 nests on two islands (Prall's and Shooter's islands) in 1985.

Green Heron: No Green Heron nests were observed this year. This species often nests in mainland habitats, and it is therefore not well represented by the Harbor Herons Project. 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.

Glossy Ibis (152 pairs): Glossy Ibis nests were found on only two islands (Subway and Hoffman islands) and decreased by 45% harbor wide since 2010. This species could historically be found

nesting on other islands in Jamaica Bay, as well as on South Brother Island, Huckleberry Island and Goose Island (adult observed but nest not confirmed) in small numbers.

Double-crested Cormorant (1596 pairs): A total of 1,596 Double-crested Cormorant nests was observed on eight islands (Huckleberry, South Brother, U Thant, Hoffman, Swinburne, Mill Rock, Shooter's islands, and Elder's Point Marsh East; Table 2). An additional 51 nests were observed on aids to navigation. We observed a 14% increase in cormorant nests harbor-wide since last year. Figure 10 shows cormorant population change in size and location since 2005, when comprehensive annual cormorant counts began. Cormorant colonies must continue to be carefully monitored to determine the potential impact of cormorant nesting activity on wader nesting populations. An analysis of Double-crested Cormorant population trends in NY/NJ Harbor 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, moderate declines in nesting pairs (~30%) were observed Harbor-wide for both species since 2010. Jamaica Bay was not included in this figure because Brian Washburn of the USDA coordinated a comprehensive Jamaica Bay gull survey this year and will be reporting on these populations separately.

Common Tern: Common Terns nested at two locations in 2013: Governor's Island and Joco Marsh. Both of these locations have been active in recent years, but neither has been consistently or formally surveyed as a part of the Harbor Herons survey effort. The Common Tern is a threatened species in New York State and we recommend continued monitoring and increased conservation efforts to protect and improve these New York Harbor colonies.

Conclusions and Recommendations

Although the total number of active nests in 2013 was substantially lower than in the last comprehensive survey, this year constituted an upswing from 2012, and is well within the range of nesting activity observed since the early 1990's. More concerning than the decrease in nesting numbers, however, is the decrease in potentially suitable nesting islands, illustrated by the abandonment of Canarsie Pol, the drastic declines on Huckleberry Island, and the failure of the majority of the colony on Goose Island this year, all likely connected to issues of human disturbance and/or predation. It is normal for waterbird colonies to move from island to island over time, and this is a phenomenon we have observed in recent years with newly established and growing populations on Mill Rock Island, Subway Island and Elder's Point Marsh East. However, it is imperative that a large number of suitable nesting islands remain available for these birds to continue to colonize and recolonize, and that when islands are abandoned, other suitable nesting islands continue to remain available.

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

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

1. A repeatable method to survey islands with dense vegetation is required. This somewhat intractable problem is faced by many researchers that survey islands heavily colonized by invasive species, and further efforts to design a reasonable survey technique will be explored. Implementing a grid system on larger islands with dense undergrowth would improve the quality of systematic surveys. This could be accomplished by blazing or tagging select trees along gridlines throughout the island. This system would improve the qualitative and quantitative data collected in these surveys by allowing surveyors to more accurately describe changes in the nesting community and vegetation of a specific colony segment from one year to the next. This would add a valuable spatial component to the dataset.
2. A method of quantifying productivity is necessary and should be implemented. Although some productivity data were collected (i.e., nest counts and contents), the most effective technique would likely be to mark and monitor a subset of nests within selected colonies over the breeding season; both the method and funding necessary to carry out productivity studies will be explored for the 2010 nesting survey.
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.

Several major conservation challenges have been observed in recent years. The discovery of ALBs on Prall's Island in 2007 and subsequent tree removal eliminated valuable nesting habitat for colonial waterbirds. Further, observations in the 2008 season confirmed that Prall's Island had been heavily colonized by invasive woody plant species (i.e., Glossy Buckthorn, Callery Pear). Current and future habitat restoration at Prall's will need to take the vigorous growth of invasive species into account. Further, management of ALBs detected on island colonies may cause a similar degradation in native plant communities, which could have detrimental effects on biodiversity, as well as suitable habitat for birds and other wildlife. Tree removal and treatment is the standard ALB management approach, where all potential ALB host trees are cut within a 0.5 mile area surrounding infested trees. A clear conservation concern of this management protocol is the potential for loss of colonial waterbird nesting habitat in NY Harbor. Waders require trees for nest-building and nest material; unfortunately, the list of preferred nesting trees overlaps widely with preferred ALB host trees (USDA-APHIS 2005). For instance, gray birch has been an important tree species for nesting waders on Prall's Island and other colonies, and their removal greatly reduces the chance that waders will nest there in the near future. If ALBs are discovered on other nesting islands, the present management strategy could have serious impacts on wader breeding populations in NY Harbor.

Various organizations, including the NY/NJ Harbor Estuary Program's Harbor Herons Subcommittee, are working closely with the management team to develop workable plans for habitat restoration and preventative management strategies to reduce impacts on nesting waders at island-colonies where ALB has not been identified. In February 2008, Joan Mahoney and Ed Bressel of the NYS Department of Agriculture and Markets provided training on recognizing ALB presence (i.e., oviposition sites, exit holes) at the National Park Service's Fort Wadsworth. Several Harbor Herons Project volunteers and field workers from several governmental agencies were in attendance.

Another 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 and gulls has been observed on Ruffle Bar, Goose Island, South Brother Island and others. Efforts to quantify mammalian presence throughout the year 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 might 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 to addressing unauthorized visitation of islands is through clear signage. Additional signs must be posted on city-owned and federally-owned islands, clearly stating the restricted status of the islands and the protected status of colonial waterbirds. In addition to signage, managing agencies and stakeholders should establish a dialogue with law enforcement entities that patrol NY Harbor waters (US Park Police, New York City Police Department's Harbor Unit, and the US Coast Guard) and inform them of the security and safety threats that this type of activity poses, in addition to the ecological impacts.

Any communication concerning press coverage of NY/NJ Harbor islands should stress that these issues be thoughtfully considered and incorporated in the press coverage. This would reinforce to the public that these islands are unique, lively 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, publicly express the conservation issues that unauthorized visitation to nesting islands can create for bird populations; we also need to offer programs for the public to learn about, appreciate and participate in the study of these interesting islands and their birds. New York City Audubon currently runs eco-tours that offer views and narratives on islands and nesting wildlife. Additional collaborations with ACTION, Rocking the Boat and other community organizations will create opportunities for community and educational outreach through participate in observational wader studies and other conservation projects. Additionally, direct contact with individuals or organizations that have made unauthorized visits to nesting colonies may often be productive and easily remedied, without resorting to regulatory enforcement.

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

The New York City Audubon Harbor Herons Project Nesting Surveys are complemented by a suite of research programs (outlined in Appendix A), many of which include banding initiatives of multiple species at nesting islands throughout the NY Harbor. In recent years, color bands have been affixed to young of the year Double-crested Cormorants, Herring Gulls, Great Black-backed Gulls, Great Egrets, Glossy Ibis, and Black-crowned Night-Herons. Color band sightings of any of these species should be communicated to the author or to New York City Audubon (bands@nycaudubon.org) giving leg band code, color, location, date, and name of observed. All band sightings should be reported to the Bird Banding Laboratory.

Additional recommendations and goals are as follows:

- Analyze and summarize data from the New York City Audubon Harbor Heron Surveys (1986-present) as presented by Andrew Bernick at the 2009 American Ornithologist's Union Annual Meeting in Philadelphia, PA and by the author at the 2009 Colonial Waterbirds Meeting in Cape May, NJ; a summary report will be produced from these data.
- 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.
- A report on Double-crested Cormorant population trends in the NY/NJ Harbor area (1986-2013) is pending from New York City Audubon.
- 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 at NY/NJ universities, at high school, undergraduate, and graduate levels.
- Establish a list of research conducted each season on the Harbor Herons or their nesting colonies (see Appendix A).
- Examine relationships between or among metropolitan NY/NJ area colonies with 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.

New York City Audubon's Harbor Herons Project has included several additional programs in recent years (i.e. Harbor Herons Monitoring Program and Eco-tours) that allow for greater public

participation and awareness of the ‘Harbor Herons’, and have strengthened New York City Audubon’s role as an advocate for conserving NY/NJ Harbor’s wader populations. New and vital collaborations between New York City Audubon and other organizations (i.e. NJ Audubon) have formed, and the open forum of NY/NJ Harbor Estuary Program’s Harbor Herons Subcommittee has brought organizations and agencies from New York, New Jersey, and Connecticut to discuss issues of regional importance.

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TABLES, FIGURES, AND APPENDICES

Table 1. Survey schedule for wader, cormorant and gull counts, 20-31 May 2013

Location Surveyed	Date	# of Observers	Ownership
<u>Long Island Sound</u>			
Goose Island	30 May	5	NYC DPR
Huckleberry Island	28 May	6	Huckleberry Indians, Inc.
<u>East River</u>			
North Brother Island	22 May	3	NYC DPR
South Brother Island	22 May	9	NYC DPR
Mill Rock	22 May	3	NYC DPR
U Thant	May	1	NYC DPR
<u>Arthur Kill-Kill Van Kull</u>			
Shooter's Island	Not surveyed		NYC DPR
Prall's Island		2	NYC DPR
Isle of Meadows	Not surveyed		NYC DPR
<u>Lower New York Bay</u>			
Swinburne Island	20 May	4	NPS
Hoffman Island	21 May	4	NPS
<u>Upper New York Bay</u>			
Governor's Island	31 May	4	NY State, NPS
<u>Jamaica Bay</u>			
Elders Point Marsh	27 May	5	NPS
Canarsie Pol	27 May	5	NPS
Subway Island	27 May	5	NPS
Little Egg Marsh	27 May	5	NPS
<u>Mainland – Far Rockaway</u>			
Redfern Houses	24 May	2	NYC Housing Authority

Table 2. Wader, cormorant, and gull nesting activity on selected islands in NY/NJ Harbor and surrounding waterways, 2013 Species include Black-crowned Night-Heron (BCNH), Great Egret (GREG), Snowy Egret (SNEG), Glossy Ibis (GLIB), Little Blue Heron (LBHE), Yellow-crowned Night-Heron (YCNH), Green Heron (GRHE), Tricolored Heron (TRHE), Cattle Egret (CAEG), Great Blue Heron (GBHE), Double-crested Cormorant (DCCO), Herring Gull (HERG), and Great Black-backed Gull (GBBG).

	Hoffman Island	North Brother Island	South Brother Island	Canarsie Pol	Mill Rock	Goose Island	Huckleberry Island	Elders Point Marsh East	Subway Island	Little Egg Marsh	Swinburne Island	U Thant Island	Redfern
Waders													
BCNH	219	0	188	0	74	49	3	10	82	20	0	0	0
GREG	203	0	43	0	36	26	4	28	85	0	0	0	0
SNEG	52	0	44	0	2	12	1	25	73	0	0	0	0
GLIB	29	0	0	0	0	0	0	0	123	0	0	0	0
LBHE	2	0	0	0	0	0	0	0	3	0	0	0	0
YCNH	0	0	11	0	0	0	0	0	7	0	0	0	40
GRHE	0	0	0	0	0	0	0	0	0	0	0	0	0
TRHE	0	0	0	0	0	0	0	1	0	0	0	0	0
CAEG	0	0	0	0	0	0	0	0	0	0	0	0	0
GBHE	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	2	0	0	0	1	0	0	0	0	0	0	0	0
Total Active Wader Nests	507	0	286	0	113	87	8	64	373	20	0	0	40
Cormorants													
DCCO	611	0	197	0	16	0	215	180	0	0	336	31	0
Gulls													
HERG	40 nests	none	3 nests, 25 adults	2 nests, 4 adults	18 nests	none	4 nests, no adults	88 nests, 219 adults	52 nests, 307 adults	397 adults	76 nests	none	none
GBBG	56 nests	none	5 nests, 54 adults	none	22 nests	none	4 nests, 4 adults	14 nests, 12 adults	no nests, 8 adults	262 adults	45 nests	22 adults	none

Table 3. Summary of recent Herring Gull and Great Black-backed Gull nesting activity on selected islands of the New York Harbor from 2010 to 2013. Numbers presented are total adults observed on each island. Numbers in parentheses are total nests observed on each island, when available.

	Herring Gull				Great Black-backed Gull			
	# nesting pairs				# nesting pairs			
	2010	2011	2012	2013	2010	2011	2012	2013
Huckleberry Island	39 (2)	0	11 (0)	0 (4)	28 (4)	0	17 (3)	4 (4)
S. Brother Island	14	6 (1)	13 (2)	25 (3)	82 (9)	37 (10)	37 (3)	54 (5)
U Thant Island	7	2	1	0	22	14	18	22
Hoffman Island	67 (36)	(33)	(40)	(40)	146 (101)	(40)	(67)	(56)
Swinburne Island	75 (117)	(47)	(89)	(76)	62 (33)	(44)	(23)	(45)



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

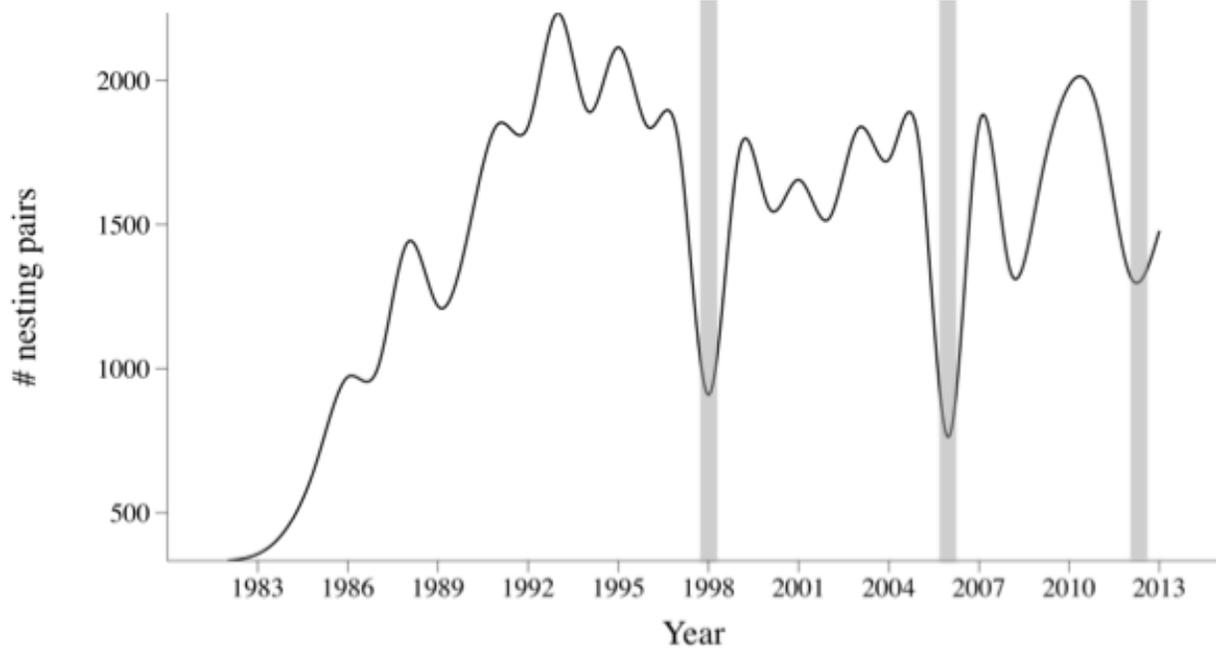


Figure 2: Total number of nesting pairs of waders observed through the New York City Audubon Harbor Herons nesting surveys from 1986 to 2013. Years with substantial uncertainty in the data (survey years that did not capture one or more of the major breeding colonies) are indicated with gray bars.

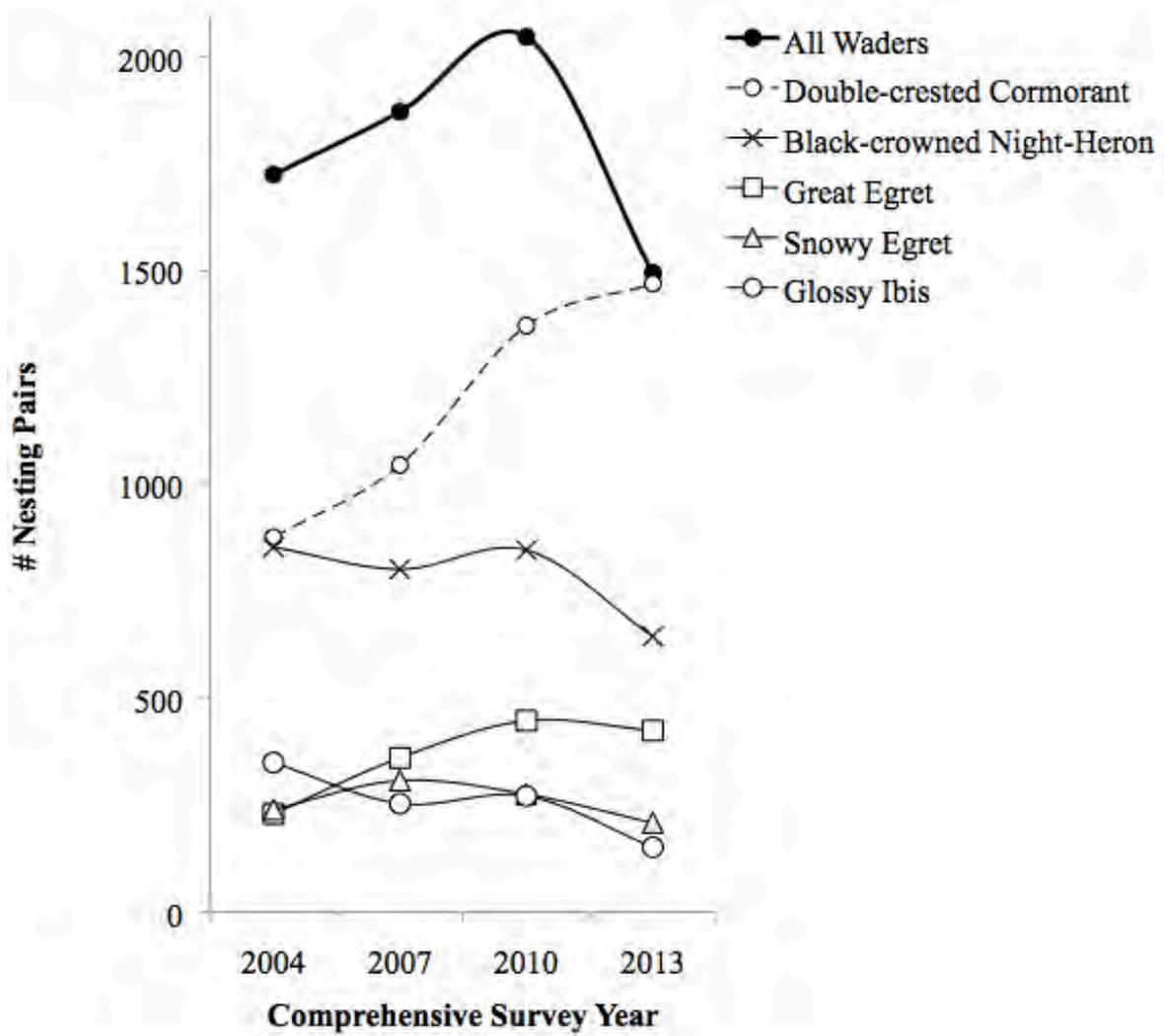


Figure 3: Total number of nesting pairs of cormorants and waders (highlighting the four most common wader species) observed over the last four comprehensive survey years.



Figure 4: Evidence of adult mortality (Black-crowned Night-Heron on left and Snowy Egret on right) on Goose Island. Photo © E. Craig.



Figure 5: Evidence of human presence on North Brother Island: a dead snapping turtle with Mexican pesos placed on the shell. Photo © E. Craig.



Figure 6: Habitat on Swinburne Island was largely remodeled by Hurricane Sandy in October 2012. Substrate was washed away revealing previously buried structures and foundations. The standing buildings on the island were partially, and in some cases completely demolished. Photo © E. Craig.



Figure 7: Adult cormorants that were banded as young on Swinburne Island return in 2013 to breed. Photo © Peter Post.



Figure 8: Egrets on Elder's Point Marsh East nested in trees (upper left), low bushes (bottom), and on the ground (upper right). Photos © Elizabeth Craig.



Figure 9: Common Tern monitoring and conservation activities on Governor’s Island included displaying signs to discourage disturbance (above with James Reed, LiRo), and setting out chick shelters to help protect young birds from predation and the elements (below). Photos © Annie Barry.

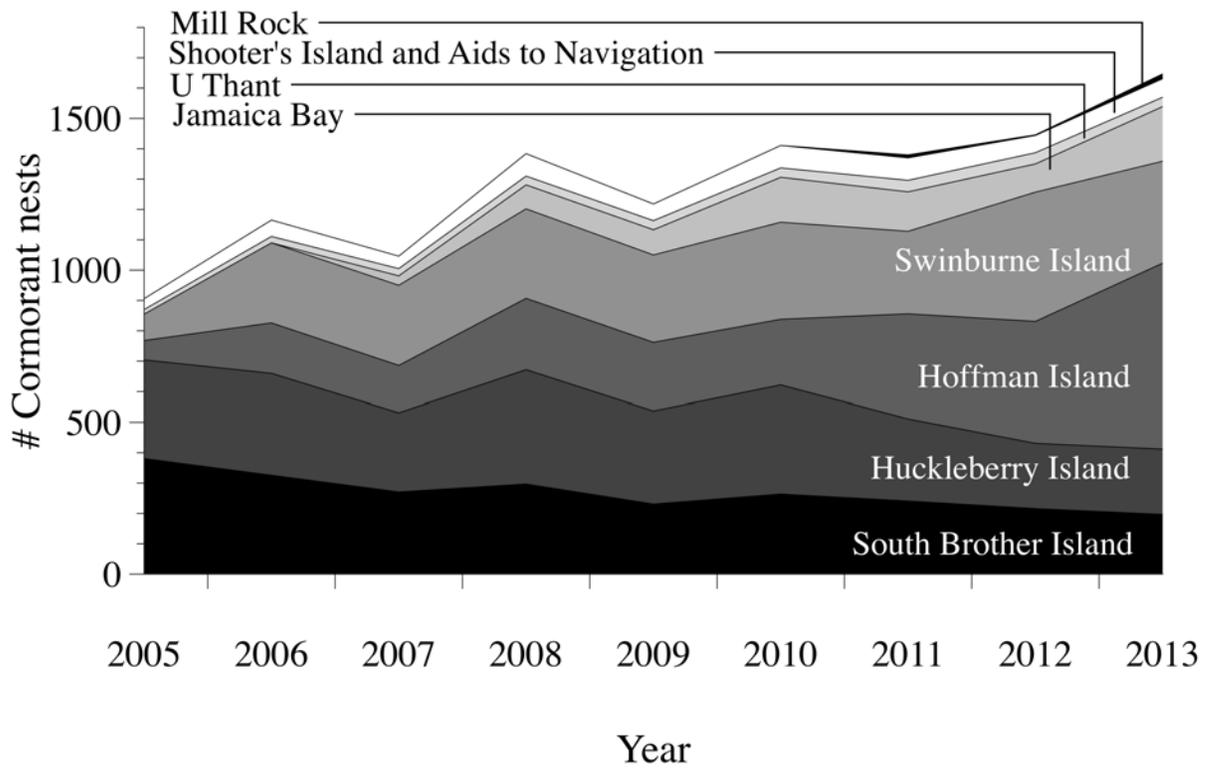


Figure 10. Double-crested Cormorants nesting in the New York/New Jersey Harbor from 2005-2013.

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

Below is a list of other known projects conducted from 2008 to 2013 either directly or indirectly related to the Harbor Herons or the islands on which they nest. Please contact ecraig@nycaudubon.org to report additional research projects.

- Asian Longhorned Beetle identification training for NYC-area researchers, Fort Wadsworth, Staten Island, NY. 2008. Contact: Joan Mahoney, NYS Department of Ag. and Markets.
- Arthur Kill Wildlife Refuge Concept, Sweetbay Magnolia Conservancy. Contact: Richard Lynch, Sweetbay Magnolia Conservancy.
- Citizen science monitoring program of long-legged waders of NY and NJ, NYC/NJ Audubons. Ongoing. Contact: Susan Elbin, New York City Audubon and Nellie Tsipoura, NJ Audubon.
- Colonial waterbird foraging ecology study: stable isotope analyses of wading bird and seabird feathers from NY Harbor and Westchester County, NY. Ongoing. Contact: Elizabeth Craig, New York City Audubon/ Cornell University.
- Double-crested Cormorant diet study, CUNY-Queens College. Ongoing. Contact: Colin Grubel and John Waldman, CUNY-Queens College.
- Double-crested Cormorant population dynamics. Ongoing. Contact: Susan Elbin, New York City Audubon.
- Elders Point Marsh West Marsh Restoration Project, U.S. Army Corps of Engineers. Ongoing. Contact: Melissa D.A. Alvarez, U.S. Army Corps of Engineers
- Great Egret radiotelemetry study, New York City Audubon/NJ Audubon. June-August 2008-2010. Contact: Susan Elbin, New York City Audubon
- Habitat Health, Ptilochronology and Waterbirds: A Tale of Two Estuaries. Completed. Contact: Charles Clarkson, University of Virginia.
- Habitat restoration on North Brother Island, NYC Department of Parks and Recreation, Ongoing. Contact: Tim Wenskus, NYC Department of Parks and Recreation.
- Habitat restoration and final capping activity for the proposed Fresh Kills Park (in the vicinity of Isle of Meadows), NYC Department of Parks and Recreation/NYC Department of Sanitation. Contact: Michael Feller, NYC Department of Parks and Recreation – Natural Resources Group.
- HeronCam project on Goose Island, New York City Audubon and NYC Department of Parks and Recreation. Completed. Currently out of order. Contact: Glenn Phillips, New York City Audubon.
- White Island Habitat Restoration Project, NYC Department of Parks and Recreation. Contact: Michael Feller, NYC Department of Parks and Recreation – Natural Resources Group.
- Prall's Island Heron Rookery Restoration and Harbor Herons Studies. Ongoing. Contact: Michael Feller, NYC Department of Parks and Recreation; Susan Elbin, New York City Audubon