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SPECIAL ISSUE: GLOSSY IBIS ECOLOGY & CONSERVATION

Glossy Ibis *Plegadis facinellus* Nesting in the New York City, New York, USA

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ABSTRACT

The urban landscape of New York City's harbor can provide important habitat for colonially nesting waterbirds, including Great Egret *Ardea alba*, Snowy Egret *Egretta thula*, Little Blue Heron *Egretta caerulea*, Western Cattle Egret *Bubulcus ibis*, Tricolored Heron *Egretta tricolor*, Green Heron *Butorides striatus*, Black-crowned Night-Heron *Nycticorax nycticorax*, Yellow-crowned Night-Heron *Nyctanassa violacea*, Glossy Ibis *Plegadis facinellus*, Double-crested Cormorants *Phalacrocorax auritus*, Herring Gull *Larus argentatus*, and Great Black-backed Gull *Larus marinus*. NYC Audubon, a non-profit conservation organization, has been conducting nesting surveys of these mixed-species colonies since 1985. The average number of pairs nesting on all islands each year (1985 – 2016) is 4,000. Following a northward range expansion in the 1990s, Glossy Ibis started nesting in these mixed-species colonies. The average number of nesting ibis, harbor-wide, since 1982 is 188 pairs (SD 84). The high count occurred in 2004 (N=350 pairs) and the low count was in 1985 (N=51 pairs). The total population size in 2018 was 5,319 pairs, with 128 nesting Glossy Ibis. We plan to continue our banding efforts and to collect feathers for a world-wide genetic analysis project.

Introduction

The Glossy Ibis *Plegadis falcinellus* is a cosmopolitan species (Davis and Kricher 2000). In North America, they occur along the east coast, ranging from New Brunswick, Canada, throughout Florida, and along the Gulf Coast of Louisiana. The current distribution reflects a well-documented northward range expansion in that occurred in the 1990s (Stewart 1957; Hailman 1959; Bull 1974; Miller and Burger 1977; McGowan and Corwin 2008). This paper discusses changes in colony sites and breeding population size within the New York Harbor, NY City, NY, USA, from 1982 through 2018.

After the range expansion, Post *et al.* (1970) published the first record of Glossy Ibis breeding in New York City. It was not until 1980 when nine pairs were seen breeding in a mixed-species colony on Pralls Island, between New York City, NY and New Jersey (NYCA website). New York City Audubon (NYCA) staff or consultants have been responsible for conducting the waterbird nesting surveys on an annual basis since 1985. NYCA is a non-profit conservation organization whose mission is to protect wild birds and their habitat in New York City. NYCA has been conducting annual colonial waterbird nesting surveys in the New York Harbor since 1985. The annual survey results are published on NYCA's website (www.nycaudubon.org).

Methods

17 of 19 undeveloped islands in the New York Harbor have been occupied at one time or another by colonially nesting waterbird species, and NYCA has been responsible for the island surveys every year since 1985, recording location, species identification, and number of nesting pairs on each island. Nest surveys continue through the present and are conducted using protocols established by Parsons (1986) and the New York State Department of Environmental Conservation's Long Island Colonial Waterbird and Piping Plover Survey (Litwin *et al.* 1993), summarized in Winston (2016). All counts are conducted between 0600 and 1600 hours, under clear conditions, low winds (<8 knots), and temperatures not exceeding 29°C. Counts are done in May, during the last two weeks of the month. The number of active nests is used as a proxy for the number of nesting pairs; the number of birds on a colony is greater than twice the number of nests (not all adults breed).

In New York, Glossy Ibis nest in mixed-species colonies on any one of seven of the 19 uninhabited islands in the harbor (Figure 1). Co-occurring species include: Great Egret *Ardea alba*, Snowy Egret *Egretta thula*, Little Blue Heron *Egretta caerulea*, Western Cattle Egret *Bubulcus ibis*, Tricolored Heron *Egretta tricolor*, Green Heron *Butorides virescens*, Black-crowned Night-Heron *Nycticorax nycticorax*, Yellow--crowned Night-Heron *Nyctanassa violacea*. Double-crested Cormorant *Phalacrocorax auritus*, Herring Gull *Larus argentatus*, and Great Black-backed Gull *Larus marinus* (Elbin and Tsipoura 2010; Winston 2017). Note: Local and regional conservation status for these species are listed in Table 1.

Figure 1. Uninhabited islands in the New York Harbor provide nesting habitat for colonial waterbirds. Red circles indicate islands that are or have been used by Glossy Ibis for nesting

Table 1. Conservation status for colonially nesting waterbirds of the New York Harbor. Nesting colonies are located in New York (NY). New Jersey (NJ) is a neighboring state within the harbor estuary. Mid-Atlantic Northeast Maritime (MANIM) is the region along the Atlantic Ocean, extending from Maine to Virginia. The US Fish and Wildlife Service Joint Ventures program for Bird Conservation Region 30 also extends from Maine to Virginia (BCR30), but includes coastal and upland bird species of 'highest' and 'high' conservation priority, as reflected in state wildlife conservation action plans. SCGN is 'species of greatest conservation concern' in New York; SC is 'species of concern' in New Jersey. NA is 'not at risk. "0" indicates that is it not listed

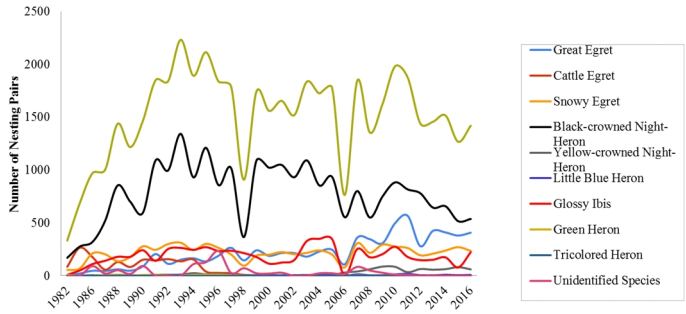
Common Name	Scientific Name	New York (Smith 2018)	New Jersey (NJ Fish and Wildlife 2018)	NAWCP (Kushlan et.al 2002)	BCR 30 (Steinkamp 2008)
Great Egret	*Ardea alba*	SGCN	0	NA	0
Snowy Egret	*Egretta thula*	SGCN	SC	High Concern	Moderate priority
Cattle Egret	*Bulbulcus ibis*	SGCN	SC	0	0
Little Blue Heron	*Egretta caerulea*	SGCN	SC	High Concern	Moderate priority
Tricolored Heron	*Egretta tricolor*	SGCN	SC	High Concern	Moderate priority
Green Heron	*Butorides virescens*	SGCN	SC	Low Concern	0
Black-crowned Night-Heron	*Nycticorax nycticorax*	SGCN	Threatened	Moderate Concern	Moderate priority
Yellow-crowned Night-Heron	*Nyctanassa violacea*	SGCN	SC	Moderate Concern	Moderate priority
Glossy Ibis	*Plegadis facinellus*	SGCN	SC	Low Concern	High
Double-crested Cormorant	*Phalacrocroax auritus*	0	0	NA	0
Herring Gull	*Larus argentatus*	0	0	0	0
Great Black-backed Gull	*Larus marinus*	0	0	0	0

Results

All species

The average number of colonial waterbirds nesting the harbor each year is approximately 4,000 pairs, with a high count of 5,900 pairs in 1993. We used linear regression analysis for long-term trends (Sauer, *et al.* 2004) to analyze the breeding population for long-legged wading birds only (excluding cormorants and gulls) and found the mixed-species, harbor-wide breeding population is stable, with a slow, positive trend (p=0.6, Figure 2) (Elbin and Tobón 2018). Two species, however, exhibited a decline: Western Cattle Egret and Green Heron. Western Cattle Egrets were present in very low numbers (less than 1,000 active nests in some sites) since late 1990s and disappeared from the harbor in 2010. Green Herons have always been present in low numbers, and the last island-breeding birds were seen in 2010.

Figure 2. Colonial waterbird nesting populations for the New York Harbor from 1982–2017. Species are represented by different colored lines as indicated in the key. The mustard-colored line represents all wading birds. Data have been extracted from New York City Audubon's annual Harbor Herons Nesting Surveys (Kerlinger 2004; Bernick 2007; Craig 2013; Winston 2017)



Glossy Ibis

The New York Harbor Glossy Ibis breeding population has remained stable over time (Winton 2017). A linear regression analysis (Sauer, *et al.* 2004) confirmed this result (p = 0.4, Figure 3) (Elbin and Tobón 2018). The average number of nesting ibis, harbor-wide, since 1982 is 188 pairs (s.d. 84). The high count occurred in 2004 (N=350 pairs) and the low count was in 1985 (N=51 pairs) (Figure 4). The population size in 2018 was 5,319 pairs (N=128 Glossy Ibis).

Figure 3. Glossy Ibis nesting population within the New York Harbor from 1982 -2016. Number of pairs is summed across all islands during a given survey year. In year 2006, weather prohibited the surveys for the two major nesting islands (Hoffman and Canarsie Pol). X axis: Survey year.

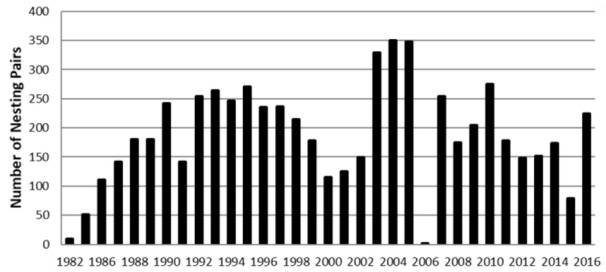
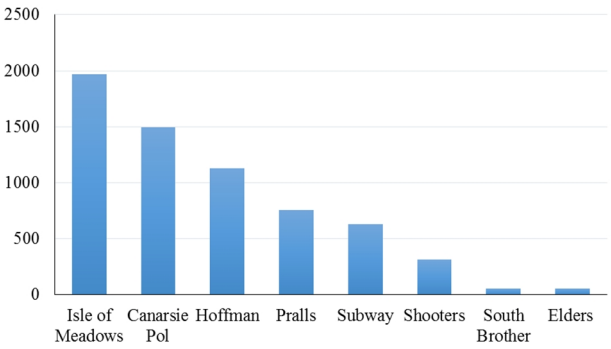


Figure 4. Glossy Ibis nest numbers as a function of Island in the New York Harbor. The number of nests represents all pairs of birds nesting in the Harbor from 1982 to through 2017. For island location, refer to the map in Figure 1. The Isle of Meadows and Canarsie Pol had the highest number of nesting ibis. Those two islands no longer support nesting wading birds, and Hoffman Island has become the location for the greatest number of nesting ibis. Pralls and Shooters are no longer active colonies. Subway has become the second most important site for ibis nesting in the Harbor. Elders refers to two closely situated islands: Elders East and Elders West. Y axis: Number of nesting pairs



Use of Specific Islands

A colony shift occurred in the harbor during 1999 and 2000. The three previously productive islands between NY and NJ (Pralls, Isle of Meadows, and Shooters) were gradually abandoned. In 1990 there was a 40,000 gallon oil spill from a nearby refinery that impacted foraging habitat for the birds nesting on those three islands (Burger 1994). Birds did not leave immediately, but by 1994, they shifted southward along the western shore of Staten Island. Four years later (1998) birds were colonizing Hoffman Island in the Lower Bay off the eastern shore of Staten Island.

Discussion

Species composition of colonies is most likely influenced by changes not only in island habitat but also perturbation to nearby foraging sites. NYCA is currently analyzing the nesting data with respect to environmental variables. For example, in the winter of 1990, 5.7 million l. of oil, including 2.1 million l of No. 2 fuel oil, leaked from cracked pipes and spills into the waters near Pralls Island (Figure 1) (Burger 1994). At the time, the islands in that waterway supported the large, productive colonies of mixed-species, long-legged wading birds. There was no apparent immediate effect on the size of the breeding colonies that formed that spring. An affect was seen in reproduction of two species: Snowy Egret and Glossy Ibis – two species that are tactile feeders and probe in mudflats for their food (Hancock et.al 1992; Parsons 1996). Glossy Ibis returned to breed for the next two to three years, but had low reproduction (Parsons 1996). Since that time, the nesting colonies shifted the location of their colonies from the islands in the affected waterway to those further north or east. Challenges continue for Glossy Ibis and their allies in the NY Harbor. Invasive species (Asian long-horned beetles), major storm events, sea level rise, human disturbance, and other identified insults continue to impact those islands.

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