Incidence of Waterbirds Along Comparative Points of the Gowanus Canal

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ABSTRACT

The Gowanus Canal is a heavily and historically polluted waterway located in Brooklyn, New York. In the last two decades, it has received attention from local government, real-estate developers, and the general public in regards to its health, cleanliness, and future development and was declared a superfund site in 2010, with upcoming plans for remediation. While water quality has been monitored, limited study and mostly anecdotal observation has been dedicated to recording the bird life of the Canal, which may or may not be increasing. This study aimed, through identifying various points along the Canal that differ in aspects of remediation, to observe and compare Canal birdlife as a means of establishing baseline data as well as to draw inferences about whether healthier areas of the Canal are seeing a greater number of bird species returning to or using the Canal and its shoreline habitats. Results drew on limited data and were not statistically significant in comparing bird abundance throughout the Canal. Nevertheless, waterbird and shorebird species were observed swimming in and hunting within the waters of the Canal, and are being added to a public database of bird sightings to help reinforce the Canal as an area of current, and hopefully future, bird habitat.

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INTRODUCTION

In 2010, the Gowanus Canal, a waterbody situated in Brooklyn, New York, was declared a superfund site, due to its high level of pollution and industrial contaminants (US Environmental Protection Agency, n.d.; US Environmental Protection Agency, 2016; Navarro, 2010). The modern-day Canal, developed between the mid- and late-1800s, supplanted the Gowanus Creek, part of a tidal, salt marsh ecosystem. Here, Native Americans foraged within

the Creek, harvesting clams and oysters. Later, colonial-era farms ran along the marshes while mills were built over the Creek for processing grain and flour (Hunter Research, Inc., Raber Associates, & Northern Ecological Associates, Inc., 2004).

Through a period of urban development and industrialization beginning in the late 1840s, the conditions and water quality within the Canal deteriorated. Sewers diverted public waste and storm overflow into the Canal. Canal-bank industries deposited industrial pollutants, further contaminating this waterway (Hunter Research, Inc. et. al., 2004; Gowanus Canal Conservancy, n.d.). Eventually, the Canal gained a reputation as one of the least-likeliest places any New Yorker would venture near, the "heart of darkest Brooklyn." (Held, 1999). Even recent water quality testing still indicates periodic levels of fecal coliform bacteria that warns against swimming or sustained contact with the water (New York State Department of Health, 2014). As to the presence of wildlife in the Gowanus Canal, it's likely most of the general public view the Canal as dead, with nothing being able to inhabit and survive there, based on recent tales like that of the whale that wandered into the Canal in 2007 and died (Von Ancken, 2016).

Nevertheless, the cleanliness of the Gowanus Canal attracted public and governmental attention well before, as well as after, Superfund status. A short-lived flushing tunnel, designed to improve conditions by pumping polluted water out into the surrounding harbor, was installed in 1911, only to fail until fully brought back online over one hundred years later (Musumeci, 2014). In the late 1990s and early 2000s, organizations such as the Gowanus Canal Conservancy and the Gowanus Dredgers Canoe Club brought increasing awareness of stewardship of the Canal. Large-scale retail businesses, such as Lowe's and Whole Foods have decided to place locations there, constructing pleasant walking paths where they border the Canal. A new apartment development even plans a waterfront park "on a clean and vital Gowanus Canal" ("365 Bond," n.d.). Other underway projects include SpongePark, a park and landscape system designed to absorb and filter contaminated surface and stormwater runoff (Drake & Yong Kim, 2011).

This study, however, is concerned with the wildlife within the Canal, specifically the birdlife along the Canal's waters. Despite the Canal's reputation, one can observe fish, and

wading and shore birds that feed within the Canal. Anecdotal sources list herons, egrets, and ducks, among other wildlife (Wills, 2014; Miller, 2015; Gowanus Dredgers Canoe Club, n.d.). Interest in the urban wildlife of the Canal exists—SpongePark's design even includes the additional goals of revitalizing habitat for birds and other species (Drake & Yong Kim, 2011). Yet, popular, local birding websites do not list the Gowanus (New York City Audubon, n.d.) as a site for birding and it is unclear if there is empirical data specifically about Canal birdlife.

To form a better view of Gowanus Canal birdlife, this study seeks, through recording on-site observations, to establish a baseline of data for Canal birdlife, focusing on wading birds, shorebirds, and other bird species making their life along the water's edge. It will also compare different points along the Canal—an area closest to the restored flushing tunnel (which now pumps in water from the harbor to help oxygenate the Canal and flush out waste) (Musumeci, 2014), an area near new landscaped walking paths (which feature new tree plantings), and a seemingly neglected area. This study will also seek to determine if restored areas show increased abundance among the species focused on. This study predicts that waterbird species surveyed in the Gowanus Canal will be more abundant near newer, restored pathways or areas closest to the more oxygenated water being pumped in, versus other non-restored areas. Prior studies of riparian and marsh wetlands have shown increases in the abundance of birdlife with restoration efforts (although they have varied in the specific attributes of restoration—f.g., planting selection, restored additions to existing habitat, etc. (Gardali & Holmes, 2011; Kloeppel Trathnigg & Phillips, 2015) along with an implication that increasing bird numbers indicate better health of an ecosystem (Kloeppel Trathnigg & Phillips, 2015). In a similar vein to the planned SpongePark (and the Gowanus Canal) in terms of waste treatment and remediating water quality through restored habitat, analysis of the man-made Wakodohatchee Wetlands of Florida showed that bird species and nesting communities increased in its initial years between 1997 and 1998 (Bays, Dernlan, Hadjimiry, Vaith, & Keller, 2000). Overall, the aim will be to investigate how recent improvements have affected Gowanus Canal birdlife with the implication that the acquired data could inform future study, development, and remediation.

MATERIALS AND METHODS

Investigating the incidence of certain bird species along different areas of the Canal first required identification of these different sites, owing to apparent comparative differences. It also required basic birding skills to scan for, observe, and identify bird species quickly.

The following sites along the Gowanus Canal were identified as observation points during the month of July, 2016:

- From Union St. Bridge just south from restored flushing tunnel (visual evidence of new water treatment with aim to oxygenate the water)

- Confluence of Canal and 3rd St. basin (view from Whole Foods landscaped walking path)

- 7th St. basin of Canal north of 9th St (view from a lot out onto seemingly unrestored area of the Canal (little to no evidence of recent development or water treatment)

Data collection consisted of making at least two visits to each data collection point, with visits split between one morning visit (ideally 7-8am) and one evening visit (ideally 6-7pm). Bird species and their number were recorded and basic hand-drawn maps or directional notes were made pinpointing the location or traveling direction of a species within the field of view of the data collection point. This data collection procedure was not based on any specific, prior study. Rather, this method is based in part on the prior experience of the study's author with human observation studies in informal science settings.

Standard birding practices and tools were put into effect. These included use of binoculars to scan shorelines and trees and to ID sighted birds, and use of naked eyesight and hearing to pick up birds. Methods of reporting data then included either use of a pad for taking immediate notes or recording notes to a cell phone voice recorder app so as not to take eyes off subject. Data entry into a spreadsheet was completed afterwards and birding field guides were occasionally used to confirm identification of a bird species and to note its scientific name.

The aim of this investigation was to focus on shorebirds and waterbirds who depend on the health and life of this water system (i.e. herons, geese, ducks, cormorants, blackbirds). As discussed further below in results and discussions, this study ruled out recording numbers for highly abundant urban-adaptive birds such as pigeons, sparrows, and European starlings, whose diets do not depend on the water system or associated habitat. Yet this study does not specifically rule out other species who may be invasive.

Recent, recorded observation data of bird species sighted at a nearby location (Columbia St. pier) was also obtained from the Cornell eBird public reporting website, to compare the results of this study with existing sightings and abundance of species.

RESULTS AND DISCUSSION

During the observations made during the study period, this study made 56 sightings of nine species. These species included *Mimus polyglottos* (northern mockingbird), *Corvus brachyrhynchos* (American crow), *Hirundo rustica* (barn swallow), *Chaetura pelagica* (chimney swift), *Phalacrocorax auritus* (double-crested cormorant), *Ardea alba* (great egret), *Charadrius vociferus* (killdeer), *Zenaida macroura* (mourning dove), and *Larus sp.* (unspecified gull species).

Both the identification of a species and the number of sightings of that particular species are considered important to this study to compare observation points along the Canal. In that regard, the top of Figure 1 below reveals the possibility of skewed data from the 7th St. basin location as evidenced by a sample variance of five to twenty times more than the other two locations. This variance can be explained by an evening feeding frenzy so to speak of more than twenty chimney swifts at the 7th St. basin. This study has previously indicated its decision to not count highly numerous and urban-adapted species such as pigeons, sparrows, and starlings. Along these lines, and given that chimney swift habitat is now commonly related to industrial sites (like the Gowanus) but not necessarily related to water or riparian sites, the results to follow will exclude chimney swift numbers (additionally, these birds are so fast in flight, that it is also possible that none of the observed numbers here are accurate, however fascinating the species is to observe).

	7th St. basin	**3rd St. basin**	**Union St. Bridge**
Total Sightings	28	8	20
Visit 1 (morning)	5	8	12
Visit 2 (evening)	23	0	8
Mean (*b/w each visit)	14.0	4.0	10.0
Median*	14.0	4.0	10.0
Sample Variance*	162.0	32.0	8.0

New Total Sightings	8	8	12
Visit 1 (morning)	5	8	5
Visit 2 (evening)	3	0	7
Mean (*b/w each visit)	4.0	4.0	6.0
Median*	4.0	4.0	6.0
Sample Variance*	2.0	32.0	2.0

FIG. 1

With the adjustment, the bottom of Figure 1 now seems to indicate a large sample variance difference at the 3rd St. site. However, although the evening visit to this site yielded no observations (possibly due to fog), mean and median indications across all sites are now comparable with the removal of chimney swifts from the data.

From the remaining data to analyze, and given the small overall data sample, total numbers and percentages appear most useful in comparing data across each observation point. While there were more total sightings at the point closest to the flushing tunnel (Union St. Bridge location) versus the other two points (12 sightings to 8 and 8), there was an overall greater number of water/shore bird sightings at the 7th St basin site (Figure 2).

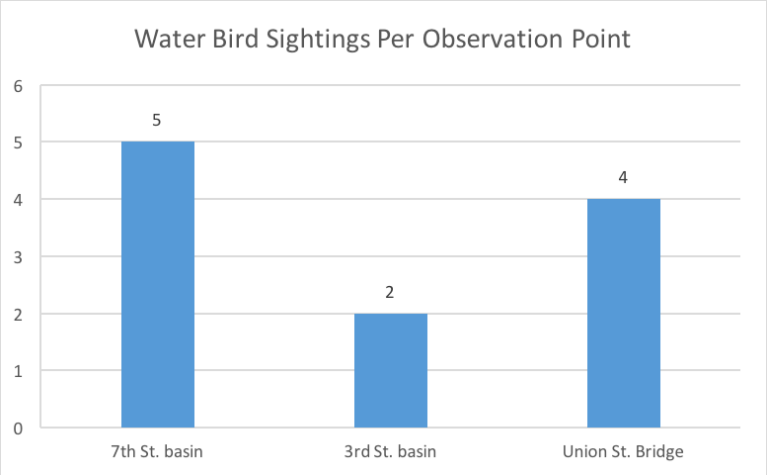

FIG. 2

Despite that edge in sightings, there were more incidences of bird-water interaction at the upper Canal. This included a great egret catching a fish while standing on a buoy rope near the incoming waters from the flushing tunnel, and a double-crested cormorant swimming and diving in the length of the Canal as could be observed from the observation point, starting from the northern end by the flushing tunnel and heading south.

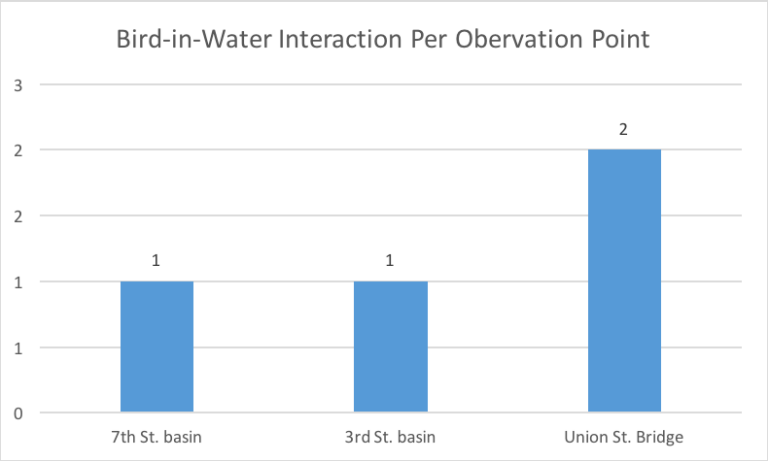

FIG. 3

Great Egret just before catching a fish near Union St. Bridge.

Overall, however, these results draw on limited data and makes it difficult to draw conclusions regarding incidence of waterbirds along comparative points of the Canal. Only six total, one-hour observations were made. Other things to consider might include the fact that, despite best intents, exact observation times also varied and may have required even earlier viewing times in the mornings to catch greater bird activity. Further drawbacks this study now considers is the need for a more exact method to compare the remediation levels of each observation point. Other questions that occurred during the course of the study regard whether other factors such as tree cover, perching areas, or wading spots influence water and shore bird incidence. And because seagulls contributed to the count of birds seen at the 7th St. basin, is that because they are simply heading out into the greater Bay.

Study data was also compared to recent historical data gleaned from Cornell's eBird public reporting website (http://ebird.org/content/ebird/). This data consists of both individual

reports of bird species as well as sightings from "hotspots," the program's notion for a shared location where viewing data is aggregated. Figure 4 shows that, while the listed number of species sighted at the Columbia St. Pier hotspot (a site nearby to this study, overlooking the Gowanus Bay, which the Gowanus Canal leads into) is greater than this study's, it's interesting that their list does not include the great egret and killdeer. When then compared to individual sightings submitted to eBird, great egrets and double-crested cormorants do appear, however, neither the hotspot or species submissions list sightings of a killdeer at the Canal. All these species, of course, have been sighted relatively nearby, but hopefully this paper's sighting of a killdeer at the Canal will add to the knowledge of bird species occurring at the Canal.

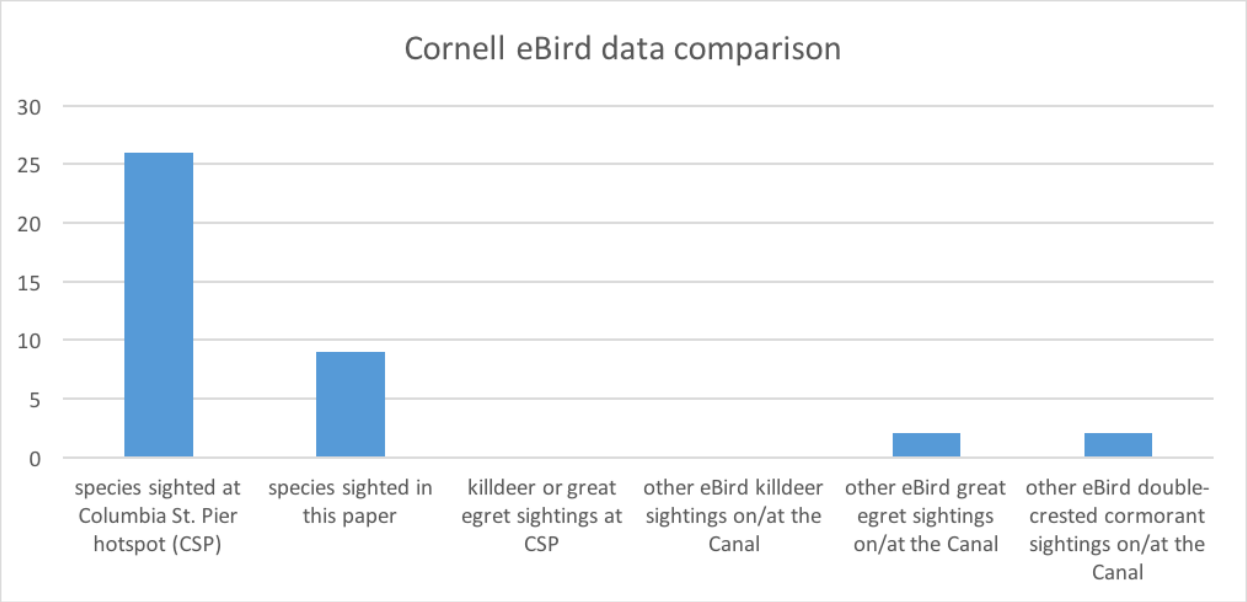

FIG. 4

CONCLUSION

Several bird species common in the surrounding area were observed along and adjacent to the Gowanus Canal. Two water bird species—*Phalacrocorax auritus* (double-crested cormorant) and *Ardea alba* (great egret)—were observed in direct contact of the water and eating/hunting from the water. Sightings were inconclusive regarding water/shore bird incidence per Canal location, yet observed feeding activity took place closer to Canal flushing waters. Nevertheless, this study attempted to enact a more formal data collection process for bird

sightings along the Canal and that data will now be added to Cornell eBird's submission site to contribute to a more complete baseline picture of birdlife in and among the Canal.

Interest exists in a healthier Gowanus Canal, one inclusive again of natural green space and inhabited by wildlife. Perhaps this study will serve as evidence of more formal birding possibilities and scientific inquiry regarding Canal wildlife. This could include organizing citizen science birding projects along the Gowanus Canal through local stewardship organizations (i.e., a Canal Dredgers birding boat tour or a Gowanus Canal Conservancy public program). Further scientific studies may also help establish the Gowanus as a remediation site where returning wildlife can be studied, investigating such things as re-development strategies or effects of native plantings.

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