

## Double-crested Cormorants and VHF Telemetry on Lake Ontario, 2001

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A recent New York State Department of Environmental Conservation (NYSDEC) study (Lantry et al. 1999) revealed a highly significant relationship between age 3 to 6 relative mortality of smallmouth bass (*Micropterus dolomieu*) and numbers of nesting pairs of double-crested cormorants (*Phalacrocorax auritus*) on Little Galloo Island. These findings prompted the NYSDEC to design a five year experimental plan for the management of cormorants and fish populations in the eastern basin of Lake Ontario. Since 1999, management activities have included reducing cormorant reproduction on Little Galloo Island (LGI) by egg oiling and continuing to evaluate the diet composition of cormorants by collecting regurgitated pellets at three breeding colonies (both US and Canadian). In addition, the NYSDEC has contracted the United States Department of Agriculture (USDA) to conduct a hazing project on Oneida Lake to minimize predation on walleye (*Stizostedion vitreum vitreum*) and yellow perch (*Perca flavescens*) by cormorants during the fall migration period. This management action was taken in response to a recommendation by the Double-crested Cormorant Citizens Task Group in 1995 (Gotcsik 1995).

In order to assess cormorant behavior and foraging patterns, the NYSDEC initiated a two year VHF telemetry study in May, 2000. During the initial year, 48 birds from two Canadian Islands were tagged with VHF transmitters in order to determine foraging locations of these birds with respect to US and Canadian waters, nest site fidelity within the breeding season and movement of birds between Lake Ontario, the St. Lawrence River, Oneida Lake and nearby waters.

In 2001, birds were again tagged at Pigeon and Snake Islands, as well as LGI. The objectives of the study were expanded to include assessing cormorant response to ongoing management practices and

capture techniques. The work for both years was conducted under permit from the Ontario Ministry of Natural Resources for the Canadian islands and in collaboration with the USDA and Canadian Wildlife Services. This report addresses the preliminary results of the second year of the VHF study.

### Study Areas

The three island study sites are all located in the eastern Basin of Lake Ontario.

#### *Little Galloo Island*

Little Galloo Island (LGI) is located approximately 14 km (9 mi) from Henderson Harbor, New York (Figure 1). This 17 hectare island is owned by New York State and managed by the NYSDEC. In 2001, the maximum number of cormorant nests counted on LGI was 5,440 on 15 May.

#### *Pigeon Island*

Pigeon Island is located approximately 18 km (11 mi) south-southwest of Kingston, Ontario (Figure 1). Owned by the Province of Ontario, Canada, this island is approximately 6 km (4 mi) from US waters and is roughly one hectare in size. Cormorant nests numbered 1,180 on Pigeon Island in 2001.

#### *Snake Island*

Also located in Canadian waters, Snake Island is approximately 3 km (2 mi) southwest of Kingston, Ontario (Figure 1). This island is privately owned and is less than one hectare in size. In 2001, 1,160 cormorant nests were counted on Snake Island.

### Methods

In May 2001, cormorants were captured on all three islands using modified leg hold traps set on or near active nests (King et al. 1998, 2000). Twenty-five birds each on LGI and Pigeon Island and 23 birds on

Snake Island were fitted with VHF transmitters using a backpack harness design (adapted from Dunstan 1972; King et al., 2000). Seventy-two transmitters made by John Kenty (Bureau of Operations, NYSDEC) and one transmitter made by Advanced Telemetry Systems (ATS) were used in 2001. The NYSDEC transmitters were in the 170 and 171 MHz frequency ranges and the one ATS transmitter was in the 173 MHz frequency range. NYSDEC and ATS transmitters weighed approximately 27 and 28 gms, respectively. The expected battery life of all transmitters was approximately one year. Birds were also marked with United States Fish and Wildlife Service (USFWS) aluminum bands and colored plastic leg bands. Orange leg bands with a black alpha-numeric code were used for birds trapped on LGI and white leg bands with a black alpha-numeric code were used for birds trapped on Pigeon and Snake Islands.

The following measurements were taken on all tagged bird: mass (0.1 kg precision), rectrice width, and culmen, tarsus, and wing cord length. These measurements were used to determine the sex of each captured bird as outlined in two morphometric studies (Bedard et al. 1995, Glahn and Mc Coy 1995).

From 2 May through 10 October the three nesting colonies were visited via boat or airplane to collect VHF and biological data. In addition, four trips were made to LGI to oil eggs (Table 1). Prior to landing on the nesting islands all frequencies were scanned to determine presence or absence of each tagged bird. All valid signals detected were recorded on data sheets and included frequency, location and time of day. Visits were made to LGI at least biweekly through 10 October and to Snake and Pigeon Islands at least every three weeks until 8 August, with a final trip on 5 September. Visits were also made throughout the breeding season to other Lake Ontario and St Lawrence River islands such as: Gull (both US and Canadian), Bass, Calf, Grenadier, Scotch Bonnet, High Bluff, Main Duck, Griswold, Strachan, McNair and Stoney Islands to track movements of the VHF tagged birds. On 13 July, an aerial survey was made covering the three breeding colonies and the St. Lawrence River downstream to Chippewa Bay, scanning both the Canadian and U.S. sides. Five surveys (four from shore, one by boat) were conducted on Oneida Lake from 22 August to 24

October. One survey by boat was conducted on Onondaga Lake on 11 September.

In order to assess nest site fidelity, the chick rearing period was identified as 30 May-31 July and birds detected at their respective capture site throughout this time period were considered to show site fidelity. Prior to 30 May was considered pre-chick time period and after 31 July post-chick.

In addition to manual tracking, two stationary receivers with data loggers were placed on the St Lawrence River in mid May, one near the mouth of the river at the NYSDEC Cape Vincent Fisheries Station (CVFS) and one 27.5 km (16.5 mi) downstream on Governors Island (Figure 1). The data logger placed at the CVFS ran continuously from 23 May through 19 November. The data logger on Governors Island ran from 11 May until 4 September and was then relocated to Oneida Lake until 10 October to detect birds during migration. Data loggers scanned at two second intervals, twenty-four hours per day. Radio signals were detectable within 2.5 km (1.5 mi) of the receivers. If the data logger registered a radio signal with the correct frequency and pulse rate, it was regarded as a valid "hit". Any frequencies logged that did not record the correct pulse rate were disregarded. For analysis purposes, valid hits were sorted by frequency, nesting stage (based on date), and time of hit rounded to the closest hour (Figure 2).

## **Results**

Of the 73 birds tagged with VHF transmitters, 55 (75.3%) were males, 12 (16.4%) were females and the sex of six (8.2%) was unknown. One bird from Pigeon Island was found dead on Milton Island (Canada) within three weeks after being captured and tagged. This bird was sent to the NYSDEC toxicology unit in Albany, but the cause of death has yet to be determined.

Data loggers recorded information from 27 birds (6 LGI, 12 Pigeon, 9 Snake). There were only five data logger hits during the pre-chick (May) time period. A total of 96 hits were recorded during the chick rearing time period with the majority of hits occurring between 06:00 and 19:00 (Figure 2). Two peaks occurred at 06:00 and 14:00. The majority of post-chick hits (n=60) occurred between 06:00 and 18:00.

### *Little Galloo Island*

Twenty-five (100%) of the tagged birds on LGI were detected at the capture site on or within 11 days of being trapped. Fifteen (60%) of these birds exhibited nest site fidelity and the remaining 10 birds exhibited movements or abandonment as described in Table 1. One bird was detected on LGI just prior to the first egg oiling on 15 May and was not detected again until 9 July on Scotch Bonnet Island, a distance of 91 km (54.6 mi).

Data collected by the data loggers indicate that three tagged birds that nested on LGI traveled as far as Cape Vincent or Governors Island, a distance of 27.6 km (17.1 mi) and 50.8 km (31.5 mi), respectively, during the chick rearing time period (Figure 1). These birds were presumed to be foraging. The distance from LGI to Governors Island was calculated over water, as cormorants are seldom seen flying over land in this area. Two other LGI birds were detected via data logger as follows: one bird that had not been detected since the second egg oiling trip was detected on 4 September at Governors Island and one bird that had not been detected since the fourth oiling trip was detected at Cape Vincent on 11 August.

Two LGI birds were detected on 22 August on Oneida Lake prior to hazing. One of these birds was last detected on LGI on 1 August and was also detected via data logger on Oneida Lake on 14 September. The second bird was last detected on LGI on 26 June just prior to the fourth oiling trip and was not detected again until the Oneida Lake survey on 22 August. This same bird was detected on 11 September on Onondaga Lake after hazing began.

### *Pigeon Island*

Three weeks after being trapped 17 (70.8%) of the Pigeon Island birds were detected at the capture site. Three additional birds were detected back on the island two weeks later for a total of 20 (83.3%). Fourteen (58.3%) birds were considered to exhibit nest site fidelity. Four birds relocated to LGI, three birds relocated to Snake Island and one relocated to Blanket Island area, a distance of 37.1 km (23 mi). Two birds had #2 hits for the season. One of the birds that had relocated to LGI was last detected there just prior to the fourth egg oiling (Table 1).

Twelve birds from Pigeon Island were detected by data loggers placed on the St Lawrence River and were considered to be foraging in U.S. waters. Seven of these birds exhibited nest site fidelity and were detected on the St. Lawrence River during the chick rearing time period. The other five birds had relocated to either LGI, Snake or Blanket Islands.

### *Snake Island*

On Snake Island, 14 (60.9%) birds were detected at the capture site three weeks after being trapped and tagged. One additional bird was detected on the island two weeks later for a total of 15 (65.2%). Ten (43.5%) birds on Snake Island were considered to exhibit nest site fidelity. One of the tagged birds was never detected following tagging, three birds relocated to LGI, two relocated to Pigeon Island and one relocated to Blanket Island area, a distance of 32.1 km (19.9 mi). Five birds had #2 hits and one had a transmitter that failed. The three birds that relocated to LGI were last detected there just prior to the fourth egg oiling trip (Table 1).

Nine birds from Snake Island were detected via data loggers and were presumed to be foraging in U.S. waters. Four were birds that exhibited nest site fidelity and the remaining five were birds that had relocated to LGI, Pigeon, or Blanket Islands.

## **Discussion**

An initial concern of this study was whether capture techniques (leg hold traps) and handling of the birds would cause them to abandon their breeding colony. Eleven days after being trapped 100% (n=25) of the LGI birds were detected at the capture site. On Pigeon Island 70.8% and on Snake Island 60.9% of the tagged birds were detected at their respective capture sites three weeks after being trapped. Over 100 adult double-crested cormorants were captured from the three nesting islands in less than five days with six injuries and two deaths. This capture method is not without risk, but is an effective and efficient means of capturing nesting birds.

Nest site fidelity (43%-60%) was lower in 2001 than in 2000 (66%-75%). LGI exhibited the greatest nest site fidelity despite disturbances such as egg oiling and collecting pellets bi-weekly. Snake Island, the smallest

island of the three, had the lowest percentage of birds exhibiting nest site fidelity. This island is only 3 km from Kingston, Ontario and may receive additional disturbances from public “visits” above and beyond research activities. It is very possible that it is not the type of disturbance (ex. egg oiling, nest counts, trapping) on the island that will cause the birds to relocate, but instead the amount of disturbance they experience. In 2002, we plan to tag 40 cormorants on LGI with VHF transmitters and will further assess the movement of birds in relation to egg oiling and pellet collections.

A total of ten birds were thought to abandon LGI; four sometime after the first egg oiling, four between the second and third egg oiling and two after the fourth egg oiling (Table 1). It is not clear whether general disturbance on the island or the actual oiling process caused birds to relocate or whether these birds would relocate in the absence of human disturbance. There were no LGI birds detected on Pigeon or Snake Islands, but Pigeon and Snake Island birds were detected on LGI. Five birds were also detected near a new nesting colony on the St. Lawrence River (Blanket Island). There appeared to be substantially more movement of birds from island to island in 2001 than was seen in 2000 (Mazzocchi 2001).

Twenty-one (44.7%) of the Pigeon and Snake Island birds were detected at least once by the data loggers, indicating that these birds were likely feeding in NY waters. This suggests that the effectiveness of managing cormorants on NY islands to protect the local fishery may be hampered by cormorants foraging from Canadian nesting areas. LGI birds were also detected foraging on the St. Lawrence River, a distance of up to 51 km and within the range reported in *The Birds of North America* (Hatch and Weseloh 1999).

Data from the telemetry study in both 2000 and 2001 indicate some Lake Ontario cormorants utilize Oneida Lake and Onondaga Lake as a stop over during fall there migration, thereby contributing to the concerns on these two lakes. Management of cormorant numbers on LGI through egg oiling will continue to play an important role in protecting the fisheries of the eastern basin of Lake Ontario and other NY waters, however, population control will

need to be more regional in scale across Lake Ontario and possibly the St. Lawrence River to be truly effective.

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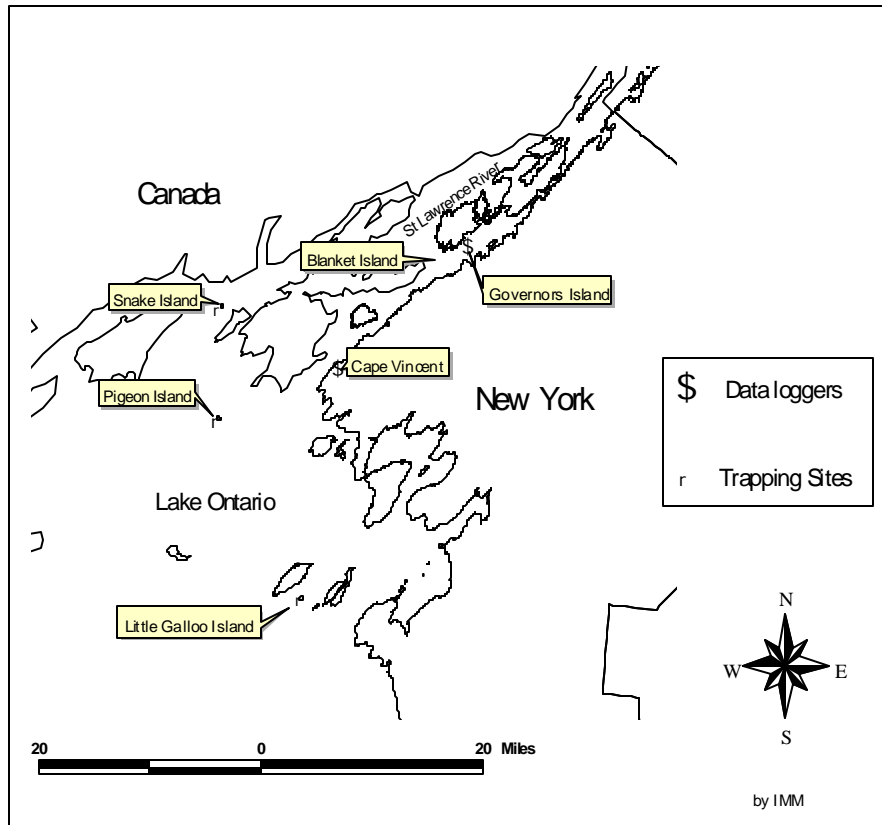
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**Table 1.** Movements of double-crested cormorants that abandoned Little Galloo Island (LGI) in 2001.

Date	Oiling Trip #	# LGI Birds last detected on LGI	# Pigeon or Snake Island Birds last detected on LGI	Comments: (location of birds post oiling)
5/15/01	1	4	0	2 birds never detected again, 1 detected on Scotch Bonnet Island (Canada), 1 detected on Pigeon, LGI & Blanket Island
5/29/01	2	4	0	4 birds never detected again
6/12/01	3	0	0	
6/26/01	4	2	4	1 bird never detected again, 2 detected on Pigeon Island, 2 detected by data logger on Governors Island, 1 detected on Oneida Lake (pre-hazing) & Onondaga Lake (post hazing)

**Figure 1.** Double-crested Cormorant Trapping and Data Logger Sites, New York, 2001.



**Figure 2.** Cormorant data logger hits on the St Lawrence River, NY, 2001.

