Cormorant Management Activities in Lake Ontario's Eastern Basin

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Double-crested Cormorants (*Phalacrocorax auritus*) on the Great Lakes have undergone a tremendous population increase in the past 30 years (Hatch 1995). First reported on Lake Superior in 1913, Double-crested Cormorants expanded eastward throughout the Great Lakes and began nesting on Lake Ontario in 1938 (Baille 1947). Populations increased steadily during the 1930s and 1940s, and by the early 1950s the cormorant was so common that control measures were authorized in some parts of Ontario, Canada to reduce suspected competition with recreational interests (Gross 1950). The first reported breeding in New York State occurred in 1945 at Gull Island, Lake Ontario (Miller 1998).

The Great Lakes population declined throughout the 1960s and early 1970s, from a peak of about 900 nests in 1950 to 114 in 1973 (Weseloh and Collier 1995, Weseloh et al. 1995). This decline, along with that of other fish-eating birds, was associated with high levels of toxic contaminants, particularly DDE and PCBs, found in the Great Lakes ecosystem (Miller 1998). Due to government anti-pollution programs and laws, contaminant levels were reduced and cormorant numbers made a remarkable recovery in the Great Lakes and elsewhere (Price and Weseloh 1986). In 2000, there were over 8,000 pairs of cormorants in Lake Ontario's eastern basin, on five active Canadian sites and one active American site.

In New York State, breeding numbers and locations have increased dramatically over the past two decades. There are currently five areas in interior New York State where cormorants nest and four areas where control measures are being used. Little Galloo Island, in the eastern basin of Lake Ontario, was first colonized by cormorants in 1974. It currently supports the largest Double-crested Cormorant colony and the only Caspian Tern (*Sterna caspia*) colony in the state. Other areas of New York State that have recently been colonized by Double-crested Cormorants include: Lake Champlain in 1982, Oneida Lake in 1984, and the Niagara Frontier in 1997. Concerns about the impacts Double-crested Cormorants have on fish populations, other colonial waterbird species, private property and unique ecological sites followed this population and range expansion.

Research by New York State Department of Environmental Conservation (NYSDEC) to determine the impacts of Double-crested Cormorants began in 1992 and is ongoing. In 1994, the NYSDEC adopted recommendations from the Citizens Task Force on Cormorants in an effort to discourage the expansion of cormorants. Cormorants on Little Galloo Island have been a particular focus of both the general public and resource managers. Cormorant numbers on Little Galloo Island have increased from 22 nests in 1974 to a peak count of 8,410 nests in 1996. In 1998, NYSDEC and United States Geological Survey (USGS) research identified a connection between cormorant numbers and excessive mortality of young smallmouth bass (*Micropterus dolomieui*) (Adams et al. 1999, Lantry et al. 1999). These findings accelerated the implementation of a five year management plan for U.S. waters of the eastern basin of Lake Ontario by NYSDEC.

The goal of this management plan is to improve the benefits people derive from Lake Ontario's eastern basin ecosystem by:

1) restoring the structure and function of the warmwater fish community.

2) reducing the negative impacts of Double-crested Cormorants on nesting habitats and other colonial waterbird species.

3) improving the quality of smallmouth bass and other fisheries.

4) fostering a greater appreciation for Great Lakes colonial waterbird resources.

Oiling teams also recorded the number of nests treated,

the number of eggs in each nest, the number of chicks observed and the number of nests not treated (generally tree nests). Once the technique is proven, data gathering could be reduced and two teams of two each would probably be adequate. Application of oil at two week intervals ensured that each nest would be treated at least twice during the incubation period.

In addition to nest removal and oiling activities, NYSDEC continued cormorant diet studies by collecting regurgitated pellet samples biweekly at Little Galloo Island from mid-April through mid-October. In 2003, NYSDEC also collected pellet samples at Snake and Pigeon Islands in Canadian waters, under permit from the Ontario Ministry of Natural Resources, for the fifth consecutive year. Samples were collected from these islands monthly from early May through September. All samples were analyzed by the U. S. Geological Service Great Lakes and Leetown Science Centers (Johnson et al. 2004, Ross et al.2004).

In 2002, a VHF telemetry study was conducted to monitor movements of Little Galloo Island cormorants to other colonies in relation to egg oiling activities (Mazzocchi 2003).

Results

Since the nest removal program began in 1994, there had been no successful Double-crested Cormorants reproduction on Gull, Bass and Calf Islands, until 2003 when 35 nests high in trees did produce young. Nesting attempts (including re-nests) have varied from year to year with a dramatic peak of 1,368 nests in 2000 .

Nests were removed from Gull and Bass Islands between April 30 and 23 June 2003. Repeated visits were necessary to discourage nesting in 2003, at both Bass and Gull Islands (Table 2). No nests were found on Calf Island in 2003.

This was the fifth year of egg oiling treatments at Little Galloo Island. The number of eggs oiled on Little Galloo Island in 2003 ranged from 852 to 9,557 per trip (Table 2). Peak nest count was 4,251 including tree and empty nests. Hatching success (number of chicks hatched per eggs counted) for oiled nests was less than 1% . This meets the objective set in the NYSDEC five year management plan to reduce the number of successful cormorant nests on Little Galloo Island by 90%. These results are comparable to those of a study conducted in Ontario in 1998 using mineral oil (Shonk 1998). We estimate that less than 150 cormorants fledged on Little Galloo Island in 2003, mostly from untreated tree nests.

Telemetry results indicate that undisturbed cormorants remained at Little Galloo Island throughout the nesting period to a greater degree than cormorants exposed to egg oiling and pellet collection activities. In 2002, 79% of cormorants at the control (undisturbed) sub-colony remained at Little Galloo Island through the chick rearing period (through July), compared to 50% of cormorants from treated nests (Mazzocchi 2003). In addition, the mean nest site departure date for cormorants from the control sub-colony was 16 days later than that for birds from the treated site. The relative degree to which reproductive suppression (absence of chicks) and disturbance due to human activity affect this movement remains uncertain.

Discussion

There are many variables which can influence the actual results of egg oiling over time. Immigration and emigration rates to and from sites within the eastern basin (particularly emigration from Little Galloo) are perhaps the most likely factors to consider. In 2000, 2002, and 2003 an increase in nesting attempts at Bass and Gull Islands may be the result of birds that have abandoned Little Galloo Island due to management activities.

Modeling (NYSDEC 2000) suggests that an overall reduction in cormorant numbers within the eastern basin can be expected as a result of egg oiling on Little Galloo Island. To reach the objective of 1,500 nesting pairs of cormorants, oiling of all nests on Little Galloo Island would need to occur through 2008. A less intensive maintenance program would begin in 2009. Residual effects would carry into the year 2010, at which time the target population of 1,500 pairs would be achieved. From 2010 on, the eastern basin cormorant population would be predicted to again increase slowly if Canadian sites continued to show growth. Cormorant populations have continued to grow on Lake Ontario over the past several years with the exception of 2003, but less predictably than in the 1980s and early 1990s (Weseloh and Pekanik 1999).

Reduced population levels at Little Galloo Island, probably related to egg oiling, first became noticeable in 2002, as predicted. Johnson et al. (2004A) report a substantial decline in fish consumption by this colony. Lack of consumption by chicks and lower numbers of feeding adults both played a role in this reduction.

Site-specific management is a moderately labor intensive undertaking, although not particularly expensive in comparison to other mortality control projects, such as sea lamprey (*Petromyzon marinus*) management (Schiavone and Adams 1995). These management actions can be effectively implemented to resolve conflicts on the local scale. The efforts undertaken in New York over the past few years have been operationally successful, for example, exceeding expectations for limiting production of cormorants on Little Galloo Island. Management has moved towards meeting objectives for protecting waterbird and fish communities by maintaining nesting populations of Black-crowned Night Heron on Bass and Gull Islands and by substantially reducing consumption of smallmouth bass by cormorants on Little Galloo Island (Johnson et al. 2000).

Management of Double-crested Cormorants is a controversial topic that requires careful consideration of many issues. Cormorant management, whether implemented locally, regionally, or across their entire range, should be considered in a broad, long term context to ensure that management actions remain sound, integrated and effective.

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Table 1. Estimated breeding pairs of colonial waterbirds on Little Galloo, Gull, Calf, and Bass Islands, 1999-2003.

	Year	Little Galloo Island	Gull Island **	Bass Island **	Calf Island
Double-crested Cormorant	1999	5,681	0	0	0
	2000	5,119	0	0	0
	2001	5,440	0	0	0
	2002	4,780	0	0	0
	2003	4,251	0	35	0
Ring-billed Gull	1999	53,000*	0	2,300*	0
	2003	60,000*	0	2,500*	0
Herring Gulls	1999	275*	45	10	0
	2003	313	42	10	0
Great Black-backed Gull	1999	8	0	0	0
	2001	19	0	0	0
	2002	15	1	0	0
	2003	12*	0	0	0
Caspian Tern	1999	1,440	0	0	0
	2000	1,350	0	0	0
	2001	1,590	0	0	0
	2002	1,585	0	0	0
	2003	1,658	0	0	0
Black-crowned Night heron	1999	1	46	9	6
	2000	1	20	36	0
	2001	1	50	13	0
	2002	1	24	36	0
	2003	3	35	44	0

* estimate ** after nest removal

Table 2. Number of cormorant nests removed or oiled by trip date. Nests with no intact eggs were not oiled.

Trip Date	**Little Gallo Island** (Nests Oiled)	**Little Galloo Island** (Eggs Oiled)	**Gull Island** (Nests Removed)	**Bass Island** (Nests Removed)
30 April 03			18	5
05 May 03	675	2456		
15 May 03	3288	9557	480	76
19 May 03			358	55
27 May 03			188	10
28 May 03	3389	8446		
02 June 03			315	
11 June 03				117
12 June 03	3297	7317		
06 June 03			8	6
25 June 03	2847	5743		
07 July 03	2016	3692		
25 July 03	479	852		

*no nesting attempts observed on Calf Island in 2001

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