

## 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 antipollution 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. In response to this population and range expansion have come concerns about the impacts Double-crested Cormorants have on fish populations, other colonial waterbird species, private property and unique ecological sites.

Research by New York State Department of Environmental Conservation (NYSDEC) to determine the actual impacts caused by 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 dolomieu*) (Adams et al. 1999, Lantry et al. 1999) which 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.

Management of cormorant colonies in NY has involved egg oiling, nest removal, harassment of migrant cormorants and habitat modification. There has been no lethal control of adults or chicks.

### **Methods**

Cormorant management activity in the eastern basin of Lake Ontario has focused on Bass, Calf, Gull and Little Galloo Islands. All four islands are located in Jefferson County, New York. Gull and Little Galloo Islands are owned by NYSDEC. Bass and Calf Islands are privately owned. The islands contain several colonial waterbird colonies (Table 1). Management and monitoring activities for all four islands were carried out by Region 6 NYSDEC staff. A United States Fish and Wildlife Service (USFWS) depredation permit was obtained to oil eggs on Little Galloo Island and remove nests on Bass, Calf and Gull Islands.

Nest removal activities on Gull and Bass Islands began in 1994. In 1997, Calf Island was included in nest removal activities following an attempt by cormorants to establish a colony. Visits to Gull and Bass Islands in 2000 were made weekly beginning in mid-May and continued until mid-July. All ground nests were removed by hand while tree nests were removed with a telescoping pole. Each nest removed was scattered as much as possible to discourage rebuilding. Nest removal teams generally included two to four people. No cormorant nests were present on Calf Island in 2000.

NYSDEC staff began treating all accessible cormorant nests on Little Galloo Island with pure food grade vegetable oil beginning 16 May 2000. This was the second year of treatment. The oiling process was conducted four times, at two week intervals (Table 2). Oil was applied from a backpack sprayer unit in sufficient volume to cover the exposed surface of each egg, approximately 6 ml/egg. Oil use for all visits totaled 55 gallons, down from 78 gallons in 1999. Fewer nests were present in 2000 and four treatments were applied rather than five as in 1999. Each nest or group of nests treated was marked with spray paint to ensure treatment of all nests accessible from the ground. Two or three teams of two to three persons each completed the spraying in three hours or less (not including travel time). Each team could effectively oil 500 to 700 nests per hour, depending on nest density.

In addition to applying oil the teams 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 collected regurgitated pellet samples for diet analysis at Little Galloo Island beginning April 25, and made collections every two weeks through September 26. Regurgitated pellets have been collected at Little Galloo Island since 1992. In 2000 NYSDEC collected samples at Snake and Pigeon Islands in Canadian waters, under permit from the Ontario Ministry of Natural Resources, for the second time. Samples were collected from these islands monthly from April 30 through September 14. All samples were analyzed by the U. S. Geological Service Great Lakes and Leetown Science Centers.

Cormorant nests, eggs and chicks were counted on all visits to Little Galloo, Snake and Pigeon Islands during the 2000 season.

### **Results**

On Little Galloo Island, cormorant reproduction was controlled to maintain nesting opportunities for other colonial waterbird species and protect the declining smallmouth bass fishery. Gull, Calf, and Bass Islands were managed to prevent the establishment of new cormorant colonies as recommended by the 1994 Citizens Task Force on Cormorants and to protect a Black-crowned Night Heron (*Nycticorax nycticorax*) colony on Gull Island.

Since the nest removal program began in 1994, there has been no successful Double-crested Cormorants reproduction on Gull, Bass and Calf Islands. Nesting attempts (including renests) have varied from year to year with a peak, prior to 2000, of 345 nests in 1997. In 2000 nesting attempts on Bass and Gull Islands increased dramatically to 1,368 (including renests).

The number of eggs oiled on Little Galloo Island in 2000 ranged from 5,509-10,917 per trip (Table 2). Peak

nest count was 5,119 nests recorded on May 30. 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 those of the 1999 effort at Little Galloo Island and to a study conducted in Ontario in 1998 using mineral oil (Shonk 1998). We estimate that less than 300 cormorant chicks hatched on Little Galloo Island in 2000, mostly in untreated tree nests.

### **Discussion**

Site-specific 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).

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. Increased nesting attempts at Bass and Gull Islands in 2000 may have involved young birds temporarily abandoning Little Galloo Island after unsuccessful nesting attempts in 1999. A late peak of nesting at Pigeon Island (early July rather than mid-June) may have resulted from disturbed birds leaving Little Galloo Island. A three year satellite telemetry study begun in 2000 on Little Galloo Island should measure egg oiling related movement of cormorants to other colonies. In addition, cormorant populations have continued to grow on Lake Ontario over the past several years, but less predictably than in the 1980s and early 1990s (Weseloh and Pekanic 1999). Continued monitoring of the Canadian colonies will therefore be necessary to maintain an accurate assessment of the eastern basin cormorant population.

Allowing for considerable uncertainty, 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 goal of 1,500 nesting pairs of cormorants, oiling of all nests on Little Galloo would need to occur through 2008 and a less intensive maintenance program would begin in 2009. The residual effects of egg oiling 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.

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 (Schiafone and Adams 1995). Management of Double-crested Cormorants is a controversial issue that requires careful consideration of many issues. Cormorant management should ultimately be conducted in a broad, long term context to ensure that management actions remain sound, integrated and effective, whether applied locally, regionally, or across their entire range.

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**Table 1. Estimated breeding pairs of colonial waterbirds on Little Galloo, Gull, Calf, and Bass Islands, 1999-2000.**

	<b>Year</b>	<b>Little Galloo Island</b>	<b>Gull Island</b>	<b>Bass Island</b>	<b>Calf Island</b>
Double-crested Cormorant	1999	5,681	0	0	0
	2000	5,119	0	0	0
Ring-billed Gull*	1999-2000	53,000	0	2,300	0
Herring Gulls*	1999-2000	275	45	10	0
Great Black-backed Gull *	1999-2000	8	0	0	0
Caspian Tern	1999	1,440	0	0	0
	2000	1,350	0	0	0
Black-crowned Night heron	1999	1	46	9	6
	2000	1	20	36	?

\*Gull populations not surveyed in 2000

**Table 2. Number of cormorant nests destroyed or oiled by trip date.**

<b>Trip Date</b>	<b>Little Gallo Island (Nests Oiled)</b>	<b>Gull Island (Nests Removed)</b>	<b>Bass Island (Nests Removed)</b>	<b>Calf Island *</b>
05/15/00	-	478	757	-
05/16/00	2,613	-	-	-
05/22/00	-	92	36	-
05/28/00	-	4	1	-
05/30/00	4,301	-	-	-
06/14/00	3,907	-	-	-
06/28/00	2,929	-	-	-

\*no nesting attempts observed on Calf Island in 2000