

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. 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.

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.

Nest removal activities on Gull and Bass Islands have been conducted annually beginning in 1994. In 1997, Calf Island was included in nest removal activities following an attempt by cormorants to establish a colony. 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 included two to four people.

Annual treatment of accessible cormorant nests on Little Galloo Island with pure food grade vegetable oil began in spring 1999. Oil was applied from a backpack sprayer unit in sufficient volume to cover the exposed surface of each egg, approximately 6 ml/egg. The oiling process was conducted four or five times, at two week intervals (four complete and two spot treatments in 2002). Each nest or group of nests treated was marked with spray paint to ensure treatment of all nests

accessible from the ground. In 2002, a control sub-colony, of about 200 nests, was left undisturbed as part of a telemetry study, and to provide nest productivity data for a fish consumption model. 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.

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 a project begun in 1992 by collecting regurgitated pellet samples at Little Galloo Island for diet analysis biweekly from mid-April through mid-October. In 2002, NYSDEC also collected samples at Snake and Pigeon Islands in Canadian waters, under permit from the Ontario Ministry of Natural Resources, for the fourth 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.

Results

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 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 June 6 and July 17, 2002. Repeated visits were necessary to discourage nesting this year, particularly at Bass Island (Table 2). No nests were found on Calf Island in 2002.

This was the fourth year of oil treatment at Little Galloo Island. The number of eggs oiled on Little Galloo Island in 2002 ranged from 237 to 9,507 per trip (Table 2). Peak nest count was 4,780 nests recorded on June 19.

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 600 cormorant chicks fledged on Little Galloo Island in 2002, mostly in untreated tree (190) and control (350) nests. Fewer than 50 chicks were hatched in treated nests.

Preliminary telemetry results indicate that 79% of cormorants at the undisturbed control sub-colony remained at Little Galloo Island through the chick rearing period (through July) while only 48% of cormorants in areas where eggs were oiled and pellets collected remained through the same period.

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. 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. This was not observed in 2001/2.

A three year telemetry study begun in 2000 on Little Galloo Island should measure egg oiling related movement of cormorants to other colonies. Preliminary telemetry results indicated 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. The relative degree to which reproductive suppression (absence of chicks) and disturbance due to human activity effect this movement remains uncertain.

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. 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, but less predictably than in the 1980s and early 1990s (Weseloh and Pekanik 1999).

Reduced population levels (probably) related to egg oiling first became noticeable in 2002, as predicted. Johnson et al. (2003) 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 (Schiafone 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, 1999-2000.

	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
Ring-billed Gull	1999-2002	53,000 *	0 *	2,300 *	0 *
Herring Gulls	1999-2002	275 *	45 *	10 *	0 *
Great Black-backed Gull	1999-2000	8 **	0 *	0 *	0 *
	2001	19	*	*	*
	2002	15	1	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
Black-crowned Night heron	1999	1	46	9	6
	2000	1	20	36	*
	2001	1	50	13	*
	2002	1	24	36	0

* population not surveyed in 2000 or 2001 **population not surveyed in 2000

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)
05/6+05/8/02	-	-	76	77
05/07/02	812	2,091	-	-
05/20/02	3,304	8,801	-	-
05/23/02	-	-	-	279
05/30/02	-	-	11	189
06/06/02	3,523	9,507	16	89
06/12/02	-	-	-	116
06/19/02	3,707	8,278	-	-
06/27,28/02	-	-	51	174
07/03/02	2,514	4,889	-	-
07/09/02	-	-	2	51
07/17/02	-	-	-	12
07/24/02	117	237	-	-

*no nesting attempts observed on Calf Island in 2001