# United States Department of Agriculture
# Animal and Plant Health Inspection Service
# Wildlife Services

# 2007 New York Double-crested Cormorant Management Summary Report

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**EXECUTIVE SUMMARY**

The New York Wildlife Services program conducts an integrated wildlife damage management program centered around Oneida Lake to reduce cormorant predation on walleye and yellow perch. Cormorants are managed primarily to maintain the economic benefits to local communities from recreational fishing. During 2007, management activities continued for the 10th consecutive year and resulted in further declines in cormorant abundance on Oneida and Onondaga Lakes. The mean number of cormorants observed declined to 103 birds on Oneida Lake and 103 birds on Onondaga Lake. A total of 44,462 cormorants were harassed, some multiple times, using more than 7,200 rounds of 15mm pyrotechnics. An additional 177 cormorants were killed to reinforce harassment and to remove individuals which habituated to harassment. Nesting activity on Oneida Lake was down 47% from 2006 with a total of 15 nests. Wildlife Services also removed 20 cormorant nests from the Great Swamp located in Canastota to protect other nesting colonial waterbirds on the property. Additional lakes, ponds, and rivers in the Oneida Lake watershed were monitored weekly for pioneering populations of nesting cormorants and none were found. Cormorant use of Cross Lake and Seneca River were monitored to document impacts of cormorant harassment conducted on Oneida Lake on nearby lakes and ponds.

Wildlife Services assisted the New York State Department of Environmental Conservation on management actions in the St. Lawrence River and eastern Lake Ontario. These actions benefited recreational fisheries, native vegetation on islands, and nesting colonial waterbirds, primarily several species of terns.

Research was conducted by Cornell University and the National Wildlife Research Center to answer concerns raised by the public. Cornell University conducted the first year of a 3-year study to measure recovery of walleye and yellow perch populations since cormorant populations were significantly reduced on Oneida Lake. Part of the study was continuing a cormorant food habits study to monitor fish species eaten by cormorants. The National Wildlife Research Center has been conducting an economic analysis of the impacts to local economies from cormorant management.

Nesting common terns on Oneida Lake have been increasing, in part, due to cormorant damage management activities. Hazing activity has reduced cormorant use of islands, which is allowing vegetation to recover. The recovery of vegetation has benefited nesting common terns.

## Wildlife Services Background

The US Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) is directed by law to protect American agriculture and other resources from damage associated with wildlife.

The WS program is a non-regulatory, federal, cooperative wildlife management program whose mission is to provide federal leadership in reducing conflicts between people and wildlife, and has the primary responsibility for responding to threats caused by migratory birds. A growing focus of WS is to work with agencies, organizations, and individuals to reduce damage associated with the nesting, roosting, and feeding habits of double-crested cormorants (*Phalacrocorax auritus*). The interior population of double-crested cormorants continues to increase. As a result, conflicts between human interests and cormorants have intensified. The specific impacts of nesting, roosting, and migrating cormorants include excessive predation on wild fisheries, depredation at aquaculture facilities, interspecific competition with rare bird species including common terns (*Sterna hirundo*), listed as a threatened species by New York State; black-crowned night herons (*Nycticorax nyticorax*), yellow-crowned night herons (*Nyctanassa violacea*) and great blue herons (*Ardea herodias*), and impacts to property. Property is damaged when the acidic fecal droppings accumulate and kill trees and other vegetation that have aesthetic or ecological value.

WS program uses an Integrated Wildlife Damage Management approach in which a series of methods may be used or recommended to reduce wildlife damage. Methods may include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. Controlling wildlife damage may require that the offending animal(s) be killed or the populations of the offending species be reduced.

## Background and Project History

The population of double-crested cormorants on Oneida Lake, New York, increased at an annual rate of 20.3 % from 1984 to 1997. Fall population numbers, regardless of biological carrying capacity, exceeded acceptance capacity with local wildlife stakeholder groups, resulting in the formation of a Citizens Task Force by the New York State Department of Environmental Conservation (NYSDEC) in 1996. Stakeholder concerns on the lake predominantly focused on aesthetic and economic values associated with changes in recreational fisheries, specifically loss of yellow perch (*Perca flavescens*) and walleye (*Stizostedion vitreum*). Yellow perch and walleye populations on Oneida Lake declined due to higher mortality on 1-3 year old fish; which cormorants principally prey upon (Rudstam et al. 2004). At the request of NYSDEC, biologists with USDA, Wildlife Services initiated a cooperative non-lethal hazing program in 1998 to minimize the stopover of fall migrating cormorants on Oneida Lake. Funding for the hazing program from 1998 through 2002 was provided by NYSDEC.

As a result of congressionally directed appropriations for cormorant management from 2003 through 2007, the hazing program was significantly expanded and a research and monitoring project was initiated to evaluate movement of cormorants between central New York lakes in response to management. Enhanced documentation of hazing methods was also conducted from 2003-2007. In 2007, WS hired 4 seasonal employees to assist with hazing efforts, and a full time Wildlife Research Biologist to expand research opportunities within central New York. This increased the number of hours spent on the lakes and significantly increased staff hours spent both hazing and researching cormorants in central New York. Preliminary research suggested that cormorants shifted diurnal use between lakes and roosts within the central New York watershed during hazing. Overall, pyrotechnics, chasing cormorants with motorboats, and strategic use of Mylar tape and human effigies at loafing and roosting areas were successful in reducing residence time of cormorants, thus reducing their foraging opportunities to depredate sportfish on Oneida Lake (Figure 1).

## Harassment Oneida Lake

Cormorant harassment in 2007 was conducted in three phases: spring, summer, and fall. Intensive dawn to dusk hazing was conducted during spring and fall with two-boat coverage on Oneida Lake. Spring hazing was delayed in 2007 due to hazardous weather conditions including high winds, a late spring snowstorm, and partial re-freezing. Spring hazing occurred from April 16$^{th}$ to April 27$^{th}$ lasting a total of 10 days. There was a pause during the month of May to allow State threatened common terns to establish nests undisturbed.

Summer harassment began June 4th and ended August 17th lasting a total of 48 days. On August 20th intensive fall hazing began with dawn to dusk harassment, and lasted 28 days, ending September 28th. WS wildlife biologist and wildlife specialists harassed and dispersed cormorants for a total of 86 days between April 16th and September 28th. A variety of methods were utilized to harass and deter cormorants including human effigies, Mylar tape, pyrotechnics, dispersal with a boat, and limited lethal removal to prevent habituation to non-lethal methods. A total of 99 cormorants were lethally removed from Oneida Lake in 2007. The cormorants taken were used for continuing dietary research by Cornell University as well as new research by the USDA National Wildlife Research Center on the ratio of breeding to non-breeding birds to improve population estimates. These methods were consistent with previous years. A total of 26,260 cormorants were harassed using a total of 5,143 pyrotechnics during 1,384 staff hours on Oneida Lake.

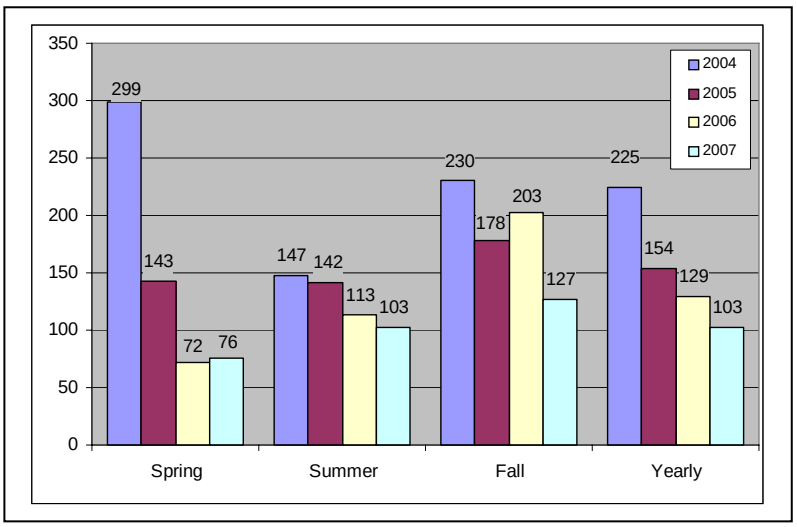


Figure 1. Average cormorant population on Oneida Lake from 2004-2007 based on weekly Monday lake survey.

## Harassment Onondaga Lake

A total of 18,202 cormorants were harassed using a total of 2,143 pyrotechnics during 440 staff hours on Onondaga Lake. To decrease habituation to non-lethal methods, 78 cormorants were lethally removed from Onondaga Lake in 2007 and were used for both dietary and population studies.

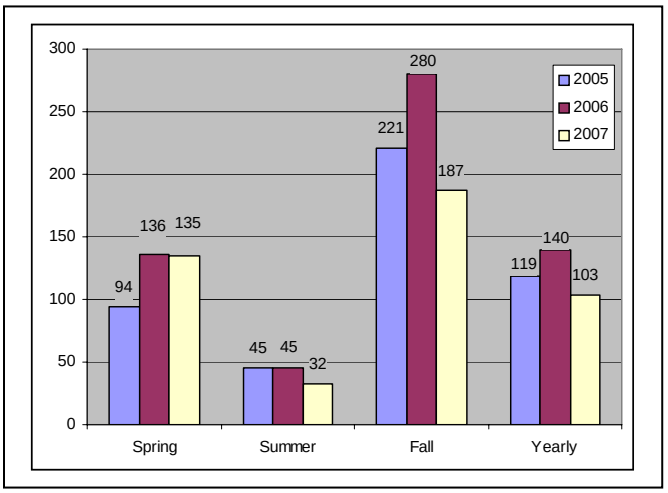


Figure 2. Average cormorant population on Onondaga Lake from 2005-2007 based on weekly Monday lake survey.

## Harassment Research Onondaga Lake

Although the hazing program has been successful in reducing cormorant use of central NY waters, the operational cost of the program has been substantial. Research aimed at maximizing the efficiency of the hazing program without compromising its effectiveness should be beneficial. As such, in 2007 we initiated a pilot study to evaluate the temporal aspects of hazing to improve efficiency. The general premise of the research was to reduce the hazing effort at Onondaga Lake by roughly one-half during 2007, while continuing the lake surveys, allowing for a comparison of cormorant numbers in 2007 with those from 2005-2006 when hazing was more intense. During spring and fall we reduced the hazing frequency from 60 hr/week to 30 hr/week, and in the summer from 26 hours/week to 12 hr/week. No management was conducted on “off days”. In 2007, total staff hours spent hazing on Onondaga Lake was 440 hours. This compared to 711 hours in 2006 and 965 in 2005. The number of cormorants harassed on Onondaga Lake in 2007 was 18,202 while 70,756 were harassed in 2006 and 60,536 in 2005. With the reduction in hazing effort, the mean number of cormorants surveyed on Onondaga Lake continued to decline in 2007 (Figure 2).

## Cormorant Nest and Egg Management

Oneida Lake

Double-crested cormorant nest management on Oneida Lake was conducted during the breeding season of 2007 (Table 1). Surveys of historic nest locations were conducted weekly around the Lake. DCCO nests began appearing on Long Island during the first week of May. In 2007, there were 15 nests with 38 eggs on Long Island compared to 28 nests with 74 eggs in 2006. All cormorant eggs were coated with 100% corn oil weekly until nesting activity ceased and/or nests were abandoned.

In addition to nest management on Oneida Lake, Wildlife Services personnel searched for pioneer nesting on surrounding bodies of water including Delta Lake, Cross Lake, and the Oswego River. No pioneer nests were found at these bodies of water.

Table 1. Summary of 2007 cormorant nest management on Oneida Lake.

2007 Cormorant Nest Management on Oneida Lake.

| Date | Location | # of nests | # of eggs | method used |
|---|---|---|---|---|
| 5/14/2007 | Long Island | 11 | 22 | oiling |
| 5/21/2007 | Long Island | 15 | 38 | oiling |
| 5/29/2007 | Long Island | 12 | 35 | oiling |
| 6/04/2007 | Long Island | 12 | 25 | oiling |
| 6/15/2007 | Long Island | 1 | 2 | oiling |
| **TOTAL** | | 51 | 122 | |

Great Swamp Conservancy

As part of the overall objective to manage pioneer nesting attempts, and to reduce competition for nesting sites with other colonial waterbirds, WS continued management of nesting cormorants at a nearby bird conservatory. A satellite marked cormorant, captured and marked from Oneida Lake was discovered nesting at the Great Swamp Conservancy, further indicating the need for cormorant nest management on a watershed level. WS also had two confirmed visual observations of satellite marked cormorants at the conservatory while conducting a survey.

A total of 20 pairs of cormorants were observed nesting within the great blue heron rookery. WS removed 20 cormorant nests, containing a total of 33 eggs and 26 chicks. All chicks were humanely euthanized in accordance with established WS protocols. Nests were in trees, ranging in height from 50-100 feet. Nests were dislodged with retractable poles quickly and with minimal disturbance to herons. Careful observation and documentation of nesting great blue herons response to management activities was monitored with only minor disturbances noted.

## Common Tern Nesting

Common terns are a threatened species in New York State. Common tern populations on Oneida Lake have been monitored since 1979 by Cornell University and NYSDEC. Negative impacts to nesting water birds are one of the concerns associated with increasing cormorant populations. A Master's thesis from Cornell University concluded researchers marking, counting, and monitoring tern behavior caused at least two and a half times more disturbance than hazing activities (Mattison 2006). Cornell counted 523 tern nests on Little Island, 174 on Long Island, 29 on Grass Island, and 18 on Wantry Island. Cornell conducted a lake-wide boat survey on August 16, 2007 and counted 474 fledged tern chicks. Most successful tern nesting occurred on Little and Long Island in 2007 (Coleman, personal consultation, 2007). With the decrease in cormorant nesting on Long Island in recent years, vegetation coverage has increased on the island, tern nesting habitat has improved and maybe in part responsible for the nesting success the terns experienced on Long Island in 2007.

## Surveys

Wildlife Services continued to monitor cormorant populations via road surveys in 2007. The data collected from these surveys is used to monitor double-crested cormorant populations and any potential negative impacts that cormorant management on Oneida and Onondaga Lakes may have on surrounding water bodies. In response to an identified increase in cormorant use of Cross Lake, WS has worked with officials and local citizens to address concerns and impacts of cormorants on the lake. Cormorant management may occur on Cross Lake in the future. From 2003 through 2007, trends indicate relatively stable cormorant populations on all other water bodies included in the weekly surveys (Table 2). Should any long term population increases become evident; Wildlife Services will use this survey data to aid in adjusting cormorant management goals to minimize impacts to other water bodies.

The primary road survey covers the central NY watershed lakes located south of Oneida Lake. Water bodies included in this survey are; Oneida River, Seneca River, Cross Lake, Skaneateles Lake, Otisco Lake, and Cazenovia Lake. The secondary road survey covers all major bodies of water north of Oneida Lake; the bodies of water included in this survey are Erie Canal, Delta Lake, Salmon River Reservoir, Lake Neatahwanta and the Oswego River. These road surveys were conducted weekly from March 23, 2007 through November 15, 2007.

A total of 2,227 cormorants were observed on the primary road survey. Cross Lake and the Seneca River had the highest number of cormorants observed; cormorant observations were highest from August through October during the fall migration. A total of 483 cormorants were observed along the secondary road survey, with the most cormorant observations on the Oswego River, Delta Lake and Lake Neatahwanta. Cormorant observations were highest during the months of April, August and September coinciding with spring and fall migrations.

Table 2. Yearly cormorant observations from 2003-2007 based on weekly road survey data.

| | Oneida River | Cross Lake | Skaneatles Lake | Otisco Lake | Cazenovia Lake | Erie Canal | Delta Lake | Salmon River Reservoir | Lake Neatahwanta | Oswego River | Seneca River |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 1 | 1229 | 2 | 13 | 4 | n/a* | n/a* | n/a* | n/a* | n/a* | n/a* |
| 2004 | 8 | 761** | 0 | 6 | 1 | n/a* | n/a* | n/a* | n/a* | n/a* | n/a* |
| 2005 | 0 | 1851 | 1 | 1 | 1 | 3 | 31 | 30 | 120 | 109 | 497 |
| 2006 | 11 | 1139 | 1 | 1 | 2 | 4 | 154 | 0 | 106 | 426 | 560 |
| 2007 | 20 | 1633 | 0 | 6 | 0 | 0 | 48 | 0 | 47 | 388 | 568 |

*Survey Began in 2005.

** Limited Hazing was conducted on Cross Lake in 2004.

## Satellite Telemetry

During the month of May WS and an NWRC biologist captured four double-crested cormorants using soft-catch foot-hold traps and fitted them with satellite transmitters in an ongoing effort to identify the pattern, distance, duration, and direction of cormorant movements in response to hazing efforts on Oneida Lake. Resulting data was used to aid Wildlife Services for identifying the location of pioneer nesting birds, track movements in response to multiple hazing techniques, locate and recover any cormorants with transmitters that were not moving, and to gain knowledge of Oneida Lake cormorant migration routes and patterns. Data and layout maps were created in the program Arc-View GIS 3.2a. The data was processed every 3 days. Currently 2 of 4 transmitters are transmitting data and both cormorants are located in Florida. Data from transmitters functioning during spring will be used to inform WS of the return of migrating cormorants.

## Cormorant Movement Summary

2006 Satellite Marked Cormorants

This was the first year that WS was able to follow the satellite marked cormorants spring migration pattern returning to the breeding grounds (Oneida Lake). Two cormorants marked on Oneida Lake in 2006 were still transmitting data in spring 2007. Both birds wintered in Florida and started to migrate north the first week of April. Figure 4 shows the pattern the cormorants took to return to Oneida Lake. Upon reaching Oneida Lake, one continued north to Lake Ontario where it stopped transmitting, and one proceeded east along the Erie Canal, to Great Sacandaga Lake, then to the Champlain Canal and up to Four Brothers Island on Lake Champlain, where it stopped transmitting.

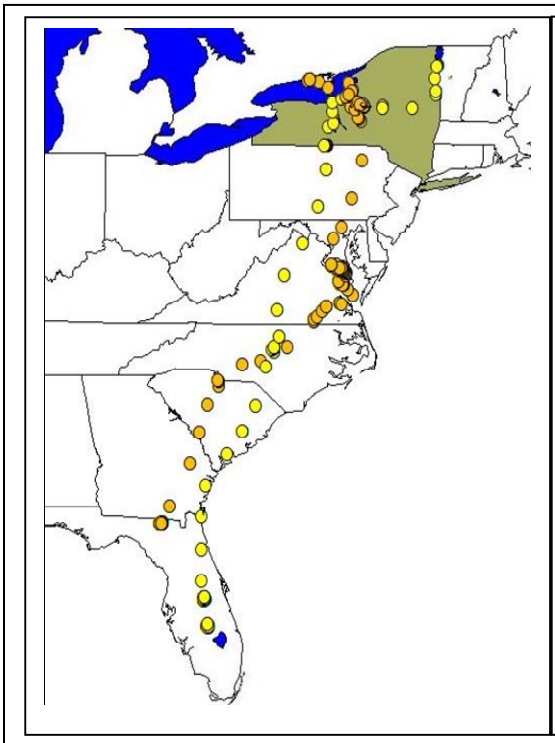

Figure 4. Spring 2007 Double-crested cormorant migratory route.

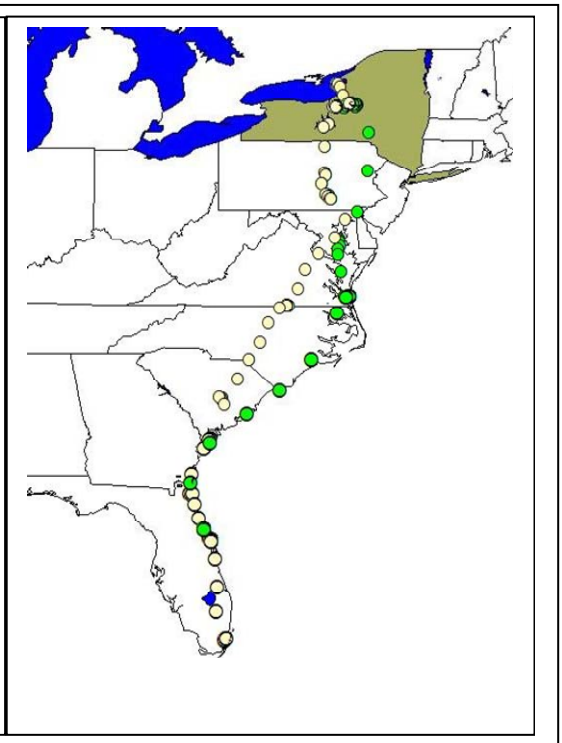

Figure 5. Fall 2007 Double-crested cormorant migratory route.

2007 Satellite Marked Cormorants

The following four cormorants were captured and marked on Oneida Lake during the spring of 2007. Results from the cormorant's movements for 2007 are summarized below.

Cormorant TX# 75368 (Figures 5 and 6, green dots) began to migrate on August 17th 2007. It moved through Pennsylvania along the Susqehanna River, through the Chesapeake Bay, and into Virginia Beach, Virginia where it remained for about 2 months. It then proceeded down along the coast of South Carolina, North Carolina, Georgia, and into Florida near the Mosquito Lagoon where it was located as of November 2007.

Cormorant TX# 75367 (Figures 5 and 6, Beige Dots) relocated to Cross Lake, NY within a few days of the onset of intense Fall Hazing, where it remained until October 16th 2007. It moved through the Finger Lakes into Pennsylvania along the Susquehanna River, through the Chesapeake Bay, South Carolina, Georgia, and to the southeast coast of Florida near Biscayne Bay where it was located as of November 2007 (Figure 5).

Cormorant TX# 75366 (Figure 6, Blue Dots) moved between Oswego river and Oneida Lake through early summer and stopped transmitting June 13, 2007.

Cormorant TX# 66674 (Figure 6, Brown Dots) nested in the Great Swamp Conservatory and moved between Oneida Lake and the Great swamp until July 24. It remained on Oneida Lake until late summer, and then moved to Onondaga Lake/Seneca River where it stopped transmitting on September 14, 2007.

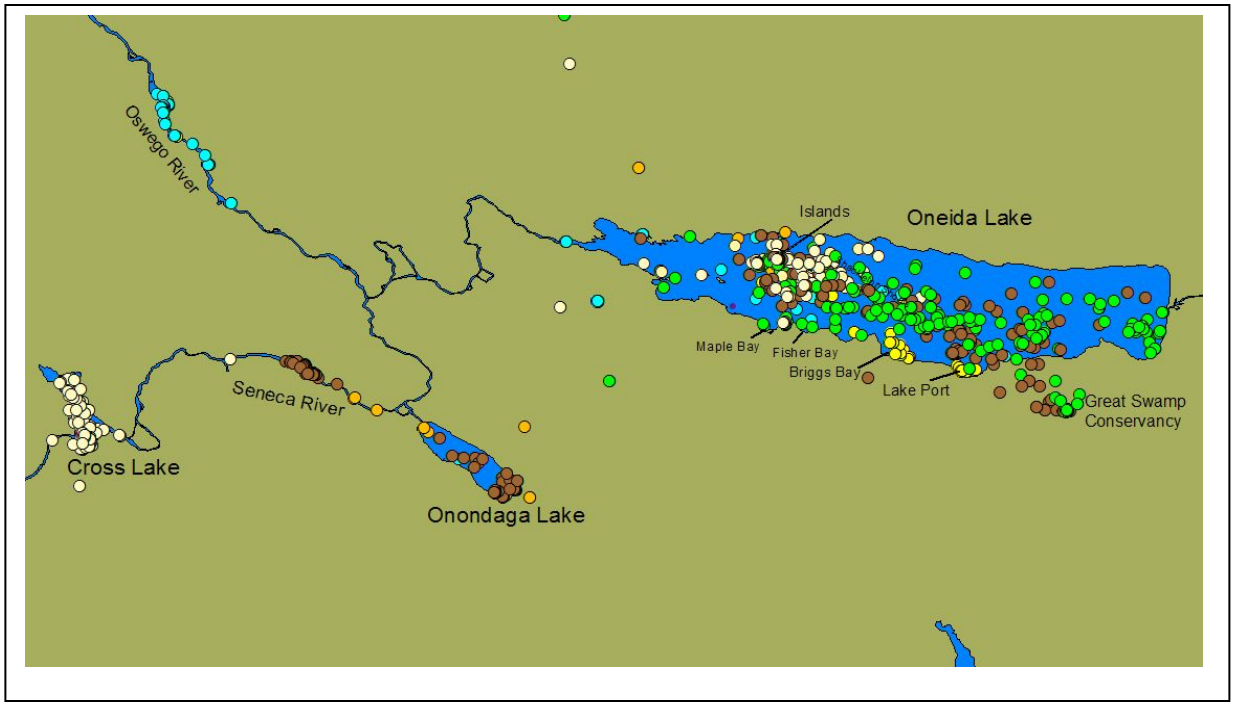


Figure 6. DCCO movements on Oneida Lake from July through November 2007.

## St. Lawrence River Cormorant Management & Lake Ontario

In response to public concerns about the increasing cormorant population along the St. Lawrence River, the St. Lawrence County Legislature continues to explore managing cormorants on the river. WS role was to provide guidance on protocol for cormorant surveys and nest management. Nest and egg management was conducted from May through August at four islands on the U.S side of the St. Lawrence River. NYSDEC removed a total of 2,055 nests from Bogardus, West Crossover, and Blanket Islands on the St. Lawrence River. NYSDEC with the assistance of WS removed a total of 244 nests and 21 cormorants from Murphy Island. Nests were dislodged from trees with a retractable pole and eggs were disposed of onsite. NYSDEC and WS also lethally removed a total of 709 cormorants from Little Galloo Island on Lake Ontario.

The results from the population surveys, nest and egg management, and input from public meetings will be presented to the St. Lawrence County legislature for further discussion of future cormorant management on the St. Lawrence River.

## Cormorant Management and Research in 2008

NWRC Research Wildlife Biologist, Dr. Travis DeVault, will continue research on cormorant impacts to natural resources in the northeastern and Midwestern U.S. during 2008. Several research projects that began in 2007 will continue in 2008, including 1) an economic analysis of cormorant impacts to natural resources in central New York, 2) a study investigating the reproductive status of cormorants in several states with the goal of refining population estimation methods, 3) collaborations with biologists at Cornell University on studies modeling impacts of cormorants on fish community structure on Oneida Lake, 4) evaluation of a new, user-activated trap to capture double-crested cormorants, and 5) investigations into improving the efficiency of cormorant harassment on central New York water bodies.

New cormorant-related projects that will begin in 2008 will include 1) a food-habits analysis of cormorants in Lake Champlain and 2) an evaluation of genetic characteristics of cormorants across the eastern U.S., with the goal of improving cormorant population models.

Given the results of the pilot study on Onondaga Lake this field season and taking into account that cormorant levels on Oneida Lake in 2007 remained near the goal of 100 individuals set by the Citizens Task Force throughout the hazing season, Wildlife Services would like to address an emerging trend in cormorant numbers during the month of October on Oneida Lake. As shown in Figure 7, average cormorant numbers during October were nearly three times the level deemed acceptable on Oneida Lake, with high population counts 5-7 times this level. WS is considering limited harassment and lethal removal during the month of October for the 2008 hazing season to maintain cormorants at an acceptable level for the maximum duration of the cormorant's fall migratory period, further reducing impacts to the Oneida Lake sport fishery. To accomplish this goal, WS will reduce hazing effort during the summer hazing period, (June-July) when cormorants remain at an acceptable level and shift these resources to the month of October when management is most needed.

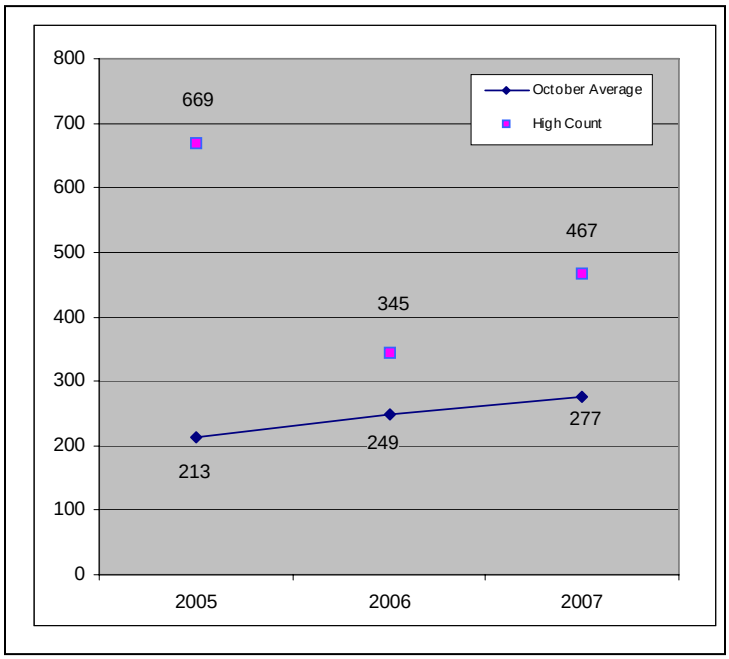


Figure 7. Average post-hazing DCCO population counts based on weekly Monday lake survey, 2005-2007.

This successful cooperative USDA, APHIS, Wildlife Services program conducted in collaboration with NYSDEC, the Oneida Lake Association and the New York Fish and Wildlife Research Cooperative at Cornell University will continue in FY2008 if federal funding is once again appropriated for this project. The focus of the management effort will continue to be on protecting fisheries and reducing interspecific competition between cormorants and rare species on Oneida Lake and throughout New York. In addition, WS will continue to explore methods for regional cormorant population management in an effort to reduce cormorant impacts in New York.

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