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## Double-crested Cormorants: Adult Response To Egg Oiling

### *Georgian Bay and North Channel Region of the Great Lakes Ontario*

**Peaceful Parks Coalition**  
**October 2003**

#### **Introduction**

There is much research on Double-crested Cormorants (DOCC), especially since their numbers plummeted in the 1960s and 1970s because of toxic contaminants in the Great Lakes. After such contaminants were prohibited and cormorants began to recover, studies began focusing on their increasing numbers and the potential impacts their thriving population might have on other natural resources such as vegetation and other colonial birds. But since Double-crested Cormorants are skillful and impressive aquatic predators, most of the current studies focus on fisheries with the aim to suppress cormorant populations in order to increase fish species important to the sport fishery.

The Ontario government initiated such a study in 2000 and has since “oiled” thousands of cormorant nests in the Georgian Bay and the North Channel of the Great Lakes region as part of an experimental study to assess the impacts of cormorant predation on local fish stocks through population suppression.

While researchers continue to record the number of cormorant nests and population trends, very little research is concerned with the cormorant itself as a recovering species. For example, little research currently explores how the growing cormorant population is influenced by natural limitations such as predation, the availability and crowding of nesting sites, nutritional requirements and their influence on prey selection or how its role as predator, and hence predator control through egg oiling, influences the overall aquatic ecosystem.

The Peaceful Parks Coalition (PPC) has begun observing Double-crested Cormorant colonies in the Georgian Bay and North Channel region of Lake Huron in Ontario – the site of a current “egg oiling” project by the Ontario Ministry of Natural Resources (OMNR). The aim of our study is to observe cormorant colonies that have been oiled as part of the government study and record adult cormorant response to egg oiling.

#### **Study Area and Method**

The Georgian Bay and the North Channel region of the Great Lakes is the junction of Georgian Bay, Lake Huron, and Lake Superior and home to the largest concentration of nesting Double-crested Cormorants on the Canadian Great Lakes. (Weseloh et al. 2002)

It is also a popular tourist destination for both naturalists and anglers and supports a commercial fishery. All these activities progressively intensify through the spring and summer months – the cormorant breeding season – with leisure motor craft activity being most prevalent. Cormorant colonies in this area are numerous but much smaller than the large concentrations seen in southern waters such as Lake Ontario. They nest on gra-

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nitic gneiss (metamorphosis granite) rock and limestone islands and shoals, both inshore and open waters. Some of these colonies are situated on very busy water corridors and the birds have become tolerant of speeding motorboats.

Since the Ontario Ministry of Natural Resources was already planning to oil cormorant eggs, we felt it would be a waste of resources to oil additional nests for this study. Therefore, the Ontario government agreed to release a short list of colonies that were oiled in 2002.

Our intention was to observe four colonies in total – two oiled and two not oiled but during our scouting visits to these colonies, we discovered not all the colonies listed would qualify for our study. One colony had been vandalized and abandoned. Another colony was situated just beyond the fishing and tourist resort of Killarney Ontario, and was notorious for being vandalized (pers. com).

Weseloh, 2002).\* Two others were in busy water corridors and another colony was situated in an area where the Ministry was planning to oil all local colonies leaving no control colonies nearby.

The sample was too small but the Ministry refused to reveal any additional locations of their oiling program. Therefore, we settled on two remote colonies for this study. One colony – West Rock - was oiled, and the other, the control colony – Southwest Hawk Island. The remoteness of these colonies reduced the possibility of further disturbance by recreationalists and local residents, but inaccessible in times of uncertain weather.

This year's study (2003) was an observational study only; no samples were taken. The only hard data collected were nest counts, video and photographs. We limited disturbance as much as possible. Nesting birds were observed for periods of approximately 8-12 hours at a time with two overnight visits to each colony. The primary observation method used to observe the birds was the utilization of a small tent in which the observer spent the total duration of the visits. The tent was pre-set prior to arriving at each colony, and a motorized boat was utilized in which the operator delivered and retrieved the observer in order to minimize the level of disturbance to each colony. Each colony was observed on consecutive days.

The oiled colony, West Rock, is a flat limestone island and was visited three times in total – June 14, July 1 and July 12. This colony was first oiled in 2002, and it was oiled twice this year - on June 12 and July 2. According to the Ontario Ministry of Natural Resources, the West Rock colony was late arriving from their winter habitat with very few nesting adults on May 17, 2003.

Tent placement was next to tall vegetation but very close to the edge of the colony – approximately three metres. The ground cover consisted of large rocks and boulders, which presented some difficulty for the placement of the tent. The cormorant colony shares this island with a Herring Gull colony; however, the gull colony is located more towards the centre of the island amongst the low lying vegetation. The cormorant colony was built around the few snags remaining on the island. All nests were ground nests.

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The control colony, Southwest Hawk Island, is a high granitic gneiss rock island and was visited on five occasions: May 19, June 13, July 1, July 13 and July 27. The tent observations took place only May 19 and June 13, and lasted 8 -12 hours. The visits on July 1, 13 and 27 were more brief – lasting less than twenty 20 minutes at a time - to assess the state of the colony. This colony consisted of one main colony and three sub-colonies. From the vantage point of our tent, the observer was able to view the main colony and one sub-colony. Tent placement was approximately 15 metres from the main colony and 10 metres from the sub-colony. Most of the colony was fully exposed; one sub-colony was situated under shrubs and dead wood, but the main colony and sub-colony under observation were in the open.

In addition to these visits, the observer visited a second un-oiled colony twice and three additional oiled colonies were also visited twice. These visits were surveys of approximately 30 minutes or less.

Nest counts were done for all colonies but only after oiled colonies had abandoned, and after the incubation period had ended for the un-oiled colonies. For oiled colonies, we dropped a marker in all apparently occupied nests (AONs) - nests that were built up and remained moist inside. The markers were then collected and counted. For those colonies not oiled, we counted nests in sections and then added these totals for a final total.

*\*Commercial fishers and recreational anglers perceive cormorants as competitors for fishery resources and have been known to vandalize cormorant colonies.*

## Results

### West Rock - experimental colony

**Visit - June 14, 2003**

**Oiled - June 12, 2003**

On June 14, this colony was fully engaged in nest building and incubation. It had 169 active nests. The nests were clustered closely together within a beak radius, and therefore better protected from gull and raven predation. As cormorants protected their own nests, they also extended protection to unattended neighbouring nests. While there was a great deal of activity among partners arriving and departing from the colony, nesting adults concentrated on incubating their eggs.

**Visit - July 1, 2003**

On the first visit on June 14, clutch size varied between 2, 3 and 4 eggs. On this visit many of the nests had fewer eggs, averaging 1 –3 eggs per nest. Approximately 50% of the nests were unoccupied. No active nest building occurred. Only one nest was observed to have re-clutched – the one closest to the observation tent. This nest had lost its clutch to a raven. It now contained three eggs. We would have expected more birds to have attempted another clutch since the previous visit on June 14, as there was still time to successfully fledge young. However, this would depend on the time the nests became empty. It may have already been too late in the season. Many of the male birds no longer displayed a crest, prominent during the mating season, and the cobalt blue colour of the inner mouth had begun to fade.



On this visit there was cause of some “edginess” among both the gulls and the cormorants. Nesting birds were restless, often perching on or near the nest, rather than sitting on the eggs. There was a constant, strong wind throughout the day which caused the tent to flap continuously thus creating a higher than usual degree of noise. The cormorants were easily startled, and they took flight at one point and did not return for approximately forty minutes.

**Visit - July 12, 2003: Overnight**

**Second oiling - July 2, 2003**

This “oiled” colony was now totally abandoned. Not one egg remained. Even though the colony was clearly deserted, we decided to stay overnight to observe whether any of the birds might return. One flock of cormorants was floating nearby upon our arrival, but no other birds returned during the duration of our visit.

As a result of West Rock having been abandoned, we decided to survey three additional colonies that had also been oiled. These were Rock SW of St. Mary’s Island, Heywood Rock and Kokanongi Single. These colonies had been oiled three times - May 21, June 12 and July 2, 2003.

Rock SW of St. Mary’s Island and Heywood Rock had also been oiled last year, as was West Rock. Kokanongi Single was oiled for the first time this year.

All three colonies are located in a busy boat corridor in the North Channel, in particular Rock SW of St. Mary’s Island and Heywood Rock. These two colonies had grown so accustomed to motorized boat traffic that the birds seemed to be slow to leave the colonies upon our arrival and quick to return when we departed. Kokanongi Shingle has become notorious for vandalism.

Our first visit was on July 13, 2003. All three colonies still had nests that contained eggs, and it appeared the birds were still nesting. (While we were unable to directly observe the birds sitting on their nests, some were observed perched on or near the nests).

**Rock SW of St. Mary’s Island**

Rock SW of St. Mary’s Island had two colonies. Approximately 50% the nests in on colony (centre island) still contained eggs, and the second colony (south end) had approximately 25% of its nests with eggs. All were ground nests.

Nest count – 197 and 185

Total nest count – 382

**Heywood Rock**

Approximately 1/3 of the nests contained eggs. There was just one colony, and all nests were ground nests

Total nest count – 71



### **Kokanongi Shingle**

Some nests managed to successfully hatch. These eggs were probably missed during oiling. This was a fairly large colony covering a large area. It was difficult to survey without spending more time, but approximately 25% of these nests contained eggs. We surveyed the total number of nests containing eggs by counting sample areas and then estimating the total percentage of nests with eggs.

Total nests count - 421

We returned to survey these colonies on July 27. Kokanongi Shingle, Heywood Rock and Rock SW of St. Mary's Island had been abandoned. It appeared that adult cormorants continued to use these areas as roosting points, especially Rock SW of St. Mary's Island. Numerous freshly regurgitated food pellets were found near abandoned nests, and at St Mary's Island, fresh food pellets were found in some of the nests.

The Ontario Ministry of Natural Resources also reported another area colony, Parsday Craig, which was oiled for the first time this year, as being inactive on June 9, 2003. A total of 8 colonies were recorded by the Ministry as being inactive prior to the completion of their "oiling" program. It is not known why these colonies were abandoned, but the Ministry suspects some colonies were vandalized.

### **Southwest Hawk Island – control colony**

#### **Visit - May 19, 2003**

Herring Gulls and Double-crested Cormorants were observed to be nesting in close proximity to each other. The gulls were nesting in the low lying vegetation along the sloping edges of the island, and the cormorants nested on the highest levels. The cormorants occupied any available woody shrubs for nesting. Both the cormorant and the gull colonies were fully engaged in nesting, and as a result, we did not witness any predation by the gulls. The nest count for the main colony was 42; the sub-colony had six active nests. The total count - including all splinter groups - was 94.

#### **Visit - June 13, 2003: Overnight**

Fewer cormorants were observed to be nesting on this visit. The colony appeared thinner but the majority of birds remained. Shortly after the arrival of our observer, but after most cormorants resumed nesting, in a span of an hour and a half, one gull systematically stole eggs from the main colony and killed one chick. One nest was completely emptied of its three eggs. Approximately eight eggs were taken during these "raids". Nesting birds did very little to protect neighbouring unattended nests from predation, but eventually the gull left the colony. Most gulls on the island were no longer nesting; they were rearing young chicks.

Incubation time for cormorants is 25-28 days (Weseloh and Ewins, 1994). Twenty-five days had elapsed since the last visit, but few hatchlings were present. We speculated that many nests must have lost eggs to predation, and the birds re-clutched because they continued to incubate. Without predation, these nests would have had hatchlings present. Nest building and what was believed to be courtship behaviour by one cormorant were observed. In its mouth it rapidly shook a full branch of leaves and then flew off.

The sub-colony had only three of its six original nests still active. We surveyed the colony the following morning prior to our departure, and discovered broken eggs littering the colony. Many nests had less than a full clutch and/or were completely empty. Only those nests near or beneath dead wood escaped predation.



On our first visit, no predation was observed; on this visit we witnessed heavy predation. However, it was possible that predation had occurred prior to our arrival, as there were far more broken eggs than what were witnessed being “stolen”, and it appeared that re-clutching had occurred.

Since it was difficult to access what level the presence of the observer contributed to gull predation, we decided to visit a neighbouring colony to determine how that colony fared in comparison to this one. However, we waited until the incubation period had mostly ended.

#### **Visit - July 1, 2003**

We visited the control colony and a second un-oiled colony nearby. We assessed the current state of the control colony and compared it to its sister colony located on the island directly north, and a stone’s throw away.

On our last visit to the control colony on June 13, predators had ravaged many of the nests of the main colony. Nests contained either broken eggs, or less than a full clutch, or were totally empty.

On this visit, eggs were once again in many of the nests. Cormorants had re-clutched. The clutch size was smaller, 2, 3 and 4 eggs. Initially, clutch size averaged 4 eggs.

Nests spared of predation in the main colony were mostly located under dead wood. These nests contained young birds, approximately two weeks old. These birds wandered away from their nests upon our approach but always remained close-by. There were also hatchlings, but the majority of nests contained new eggs. Approximately, a quarter of the nests were empty.

All nests in the sub-colony were empty – with the exception of one. This bird too had re-clutched. The other nests appeared to have been abandoned. Three of the original six nests were empty on the last visit, with no signs of attempts to re-clutch. Now five of them are empty. Cormorants may still attempt to lay another clutch but the season is rapidly coming to an end.

#### **Hawks Island – sister colony – not oiled**

##### **Visit - July 1, 2003**

This island is a stone’s throw from the island where our control colony is situated. It is slightly higher with steeper slopes. Nesting cormorants are better protected here because this colony is situated beneath small trees and large shrubs and away from direct sunlight. These nests were also ground nests.

This colony was larger than the control colony with an approximate total nest count of 120. Most nests still contained eggs. There were approximately two dozen young birds, and some nests with hatchlings. The ratio of young - to newly hatched - to eggs was comparable to the control colony except that most nests appeared to be occupied whereas the control colony had approximately 25% of its nests now empty.

Herring gulls also use this island as a nesting ground, but no partially eaten eggs were observed. Similar to the nests situated under the shrubs within the control colony, this colony seems to have fared better against predators. There was no obvious litter of broken eggshells or empty nests. Being away from direct sunlight, nesting could possibly have been more comfortable, and therefore birds less distracted. This colony also had no prior visitations.



It is difficult to assess whether the number of nests that contained eggs were re-clutched as a result of predation or just a later start to the nesting period.

#### **Visit - July 13, 2003**

We visited the control colony and the sister colony. The one nest of the sub-colony that had re-clutched now had a hatchling, and another nest contained three new eggs.

The main colony had many young birds, some on the verge of taking flight, others just recently hatched. No eggs were found in any other nests.

The sister colony had many young birds, some prepared to fledge, others just recently hatched. Only one nest containing eggs was observed. This nest also had one newly hatched bird.

#### **Visit - July 27, 2003**

This would be our last visit to all the colonies.

On our previous visit to Southwest Hawk Island on July 13, one nest in the sub-colony had a hatchling, and another nest had re-clutched. There were three eggs in the nest. On this visit, all the nests were empty. The young cormorant was too young to have fledged since our previous visit, and therefore one can assume that both eggs and chick did not survive.

On the main colony, birds had fledged or were on the brink of fledging. Some birds were still too young to leave the nests, but no hatchlings remained. This was also the case with the sister colony.

### **Discussion**

Double-crested Cormorants at West Rock arrived later than other area colonies to their summer nesting ground and abandoned their colony earlier than was the case with other "oiled" colonies, with the exception of Parsday Craig, which was abandoned by June 9. The Ontario Ministry of Natural Resources reported few nesting birds at West Rock on May 17, but by June 14 this colony was fully engaged in nest building and incubation. By July 12, the colony was deserted. Birds made very few attempts to re-clutch.

It remains difficult to determine when and why birds abandoned their nests, however our findings are consistent with observations made by The New York State Department of Environmental Conservation (NYSDEC) during their oiling activities at Little Galloo Island (LGI) in the U.S. waters of eastern Lake Ontario (Dorr et al, 2003 & 2002). The NYSDEC began oiling Little Galloo Island in 1999.

Little Galloo Island, unlike the colonies in Georgian Bay and the North Channel is a very large colony, peaking at 8410 nests in 1996 (Weseloh, unpubl. data). While control effects may not have resulted in complete abandonment of LGI by cormorants during the treatment period, it has likely influenced temporary relocation to other sites (Dorr et al 2003).



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In May 2000, the NYSDEC initiated a two-year (2000-01) satellite telemetry study to evaluate cormorant emigration, reproductive success, nest-site fidelity, and site-specific foraging distribution following control activities at Little Galloo Island. Preliminary insights indicate approximately 39% of cormorants left LGI during egg oiling activities, most noticeably during the last two weeks of egg oiling (Dorr et al 2002).

Other islands on Lake Ontario have seen an increase in cormorant nests since oiling activities began at Little Galloo Island in 1999. Some colonies have seen dramatic increases suggesting oiling activities at Little Galloo Island are causing cormorants to abandon the colony and not return.

For example, in 2001, NYSDEC officials removed 21 cormorant nests from Gull Island, and no nests were found on Bass and Calf Islands (Schiavone, 2001). In 2002, 156 cormorant nests were removed from Gull Island and 987 from Bass Island. No nests were found on Calf Island (Schiavone, 2002). Swetman (False Duck) Island had 153 nests in 1999. This increased to 2037 nests in 2000 (Weseloh, unpubl. data). Cormorant nests at High Bluff Island (110 km. to the NW) increased from 6741 in 1999 to 8105 in 2000 and 9532 in 2001 (Weseloh, unpubl. data).

This could be happening in our study area too. Kokanongi Shingle was oiled for the first time this year. The last census conducted by the Canadian Wildlife Service (Ontario region) in 2000, put the nest count at 40. This year the nest count reached 421. The sister colony to Southwest Hawk Island is a new colony consisting of 120 nests. This colony was not recorded on the 2000 survey. Oiling of colonies in the Georgian Bay and North Channel began in 2002.

The Ontario Ministry of Natural Resources has begun a new census of all colonies in the Georgian Bay and North Channel region this summer (2003), but this information has not as yet been released. However, through the Freedom of Information legislation, we were able to obtain a partial list of these colonies and preliminary counts show a declining trend in nesting cormorants across the region. While some colonies may be increasing, it is possible that the Ministry's "oiling" program is causing birds to abandon original colonies and re-nesting elsewhere. It could be the birds are avoiding a disturbance or perhaps oiling in particular.

The Ontario Ministry of Natural Resources practices a strict protocol of minimal disturbance when visiting these sites. The time it took to oil colonies averaged 10 minutes (Riche, OMNR). The level of disturbance caused by this study could arguably have been greater, but yet while some individual birds on the control colony abandoned their nests, the colony as a whole completed the nesting cycle in spite of the presence of our observer. And while the control colony did not have compounded visits from both the Ministry and the PPC, visits for the study were more numerous at the control colony than those of the experimental colony.

### **More Research Needed**

Each time we visited the experimental colony, it took almost a full hour before cormorants resumed nesting. Cormorants from the control colony returned within 10 to 30 minutes (the sub-colony was always slower to return), but predation did not appear to be excessive compared to the control colony.

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Levels of disturbance need to be studied further. We attempted to measure the level of disturbance by the Ministry's oiling visits and compare them to those created by this study, but scheduling problems were encountered. The Ministry recorded only the time it took to complete the task at hand but not the length of time cormorants were away from their nests.

On July 13, we visited three additional oiled colonies. They showed partial abandonment but also possible extended nesting periods. The Ministry oiled these colonies on May 21, June 12 and July 2, 2003. On our visit approximately 50% to 25% of nests still contained eggs, and while some of these birds may have attempted late nesting, it is not likely that so many would. Late nesting reduces the survival rate of young birds. Further observation is needed to determine 1) whether cormorants are incubating oiled eggs longer than colonies that have not been oiled; 2) measure time between feeding periods; 3) compare this to birds that re-clutch and hence sit on nests for conservative incubation periods.

To expand this study, the colonies under observation should also be expanded. Through Freedom of Information we obtained an extended list of colonies destined for oiling, and therefore now have a better sample to work from. The experimental colony - West Rock, and the control colony - Southwest Hawk Island will continue to be observed but other selected colonies will also be considered.

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