MANAGEMENT OF DOUBLE-CRESTED CORMORANTS AT TOMMY THOMPSON PARK

2013 SUMMARY REPORT AND 2014 STRATEGIC APPROACH

Restoration Services
March 2014

TRCA
5 Shoreham Drive
Toronto, On M3N 1S4
416-661-6600
www.trca.on.ca

Tommy Thompson Park
Toronto's Urban Wilderness

Toronto and Region Conservation
for The Living City

TABLE OF CONTENTS

1.0 BACKGROUND

Tommy Thompson Park (TTP) is located on the Leslie Street Spit, a 5 km long human-made peninsula in Lake Ontario in Toronto, Ontario (Figure 1). Construction of the peninsula began in the 1950s for port-related facilities, but through natural succession and habitat enhancement efforts by the Toronto and Region Conservation Authority (TRCA), it has become the largest area of natural habitat on the Toronto waterfront. The final size of the Spit is complete at approximately 500 ha, including the associated water lots; however the Toronto Port Authority continues to run a lake filling operation in shoreline erosion areas.

The site was designated as an Important Bird Area (IBA) in 2000 due to the globally significant numbers of colonial waterbirds under the general congregatory threshold, and nationally significant numbers of waterfowl during spring and fall migration as well as during winter depending on ice conditions (Wilson & Cheskey, 2001). Six species of colonial waterbirds breed regularly at Tommy Thompson Park (Figure 2). Three species are predominately tree-nesters, Double-crested Cormorant (*Phalacrocorax auritus*), Black-crowned Night-Heron (*Nycticorax nycticorax*) and Great Egret (*Ardea alba*); and three species are ground-nesters, Ring-billed Gull (*Larus delawarensis*), Herring Gull (*Larus argentatus*) and Common Tern (*Sterna hirundo*). In 2012 Caspian Terns (*Hydroprogne caspia*) nested at TTP for the first time since 2004.

Figure 1. Tommy Thompson Park / Leslie Street Spit (TRCA, 2006)

Double-crested Cormorants began nesting on Peninsula B in 1990 (Wilson & Cheskey, 2001) and expanded to Peninsula A the following year. The population steadily increased and expanded onto Peninsula C in 2000, followed by ground-nesting on Peninsula B in 2002, likely in response to the loss of tree nesting habitat due to their nesting activities on Peninsulas A and B; as well as an increase in the overall Great Lakes population (Weseloh, et al., 1995). Today, cormorants nest on three of the four peninsulas at the park, Peninsulas A, B and C (Figure 2). In 2008, TRCA developed the Double-crested Cormorant Management Strategy in response to the significant decline and loss of forest habitat on the peninsulas and concerns expressed by the public about the loss of forest habitat (Toronto and Region Conservation Authority, 2008, 2009, 2010, 2012, 2013).

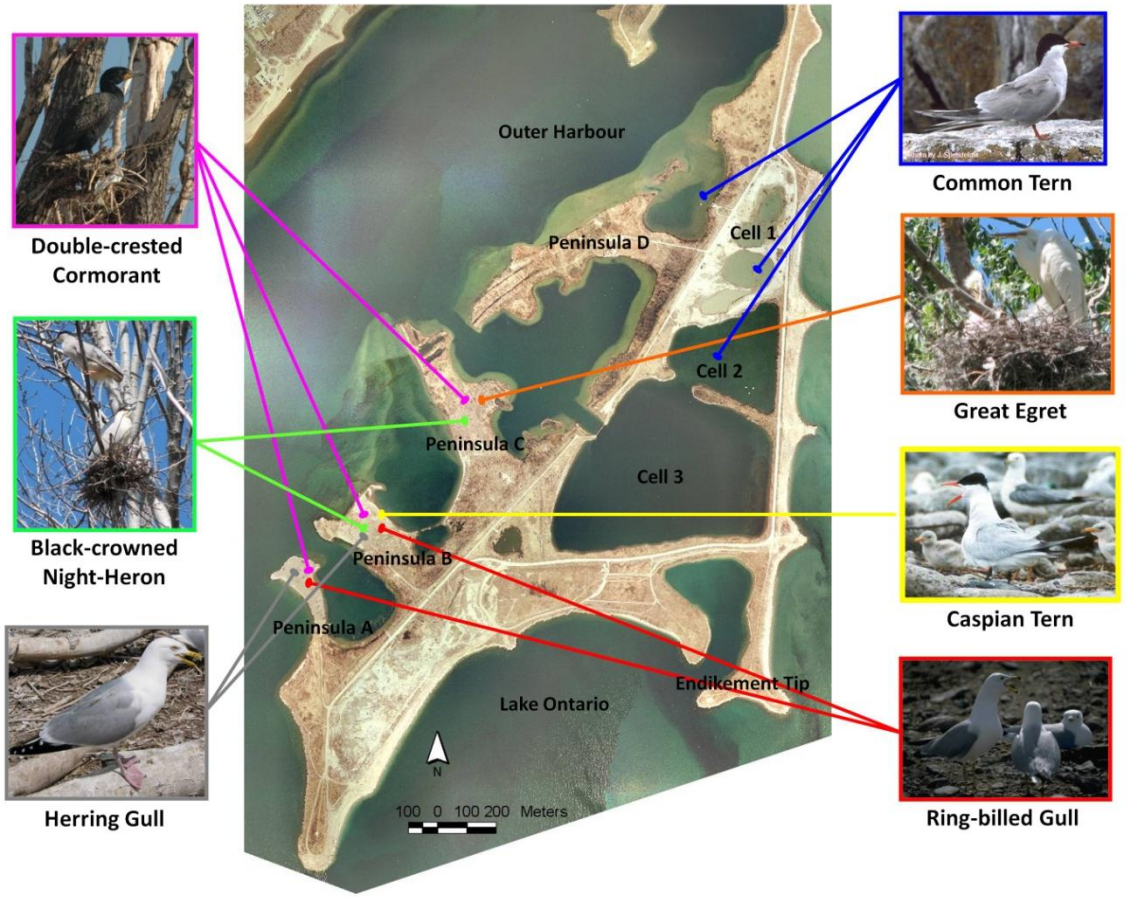

Figure 2. Colonial waterbird nesting locations in 2013 (First Base Solutions 2005)

The development of the strategy involved founding a Cormorant Advisory Group of stakeholders and experts, including conservationists, academics and interest groups from across the spectrum to provide advice and input on the management plan. The inaugural meeting was in late 2007 and the group continues to meet annually to review management results and provide input on proposed management scenarios (Toronto and Region Conservation Authority, 2008, 2009, 2010, 2011, 2012, 2013).

The overall goal of the Double-crested Cormorant Management Strategy, as established by the Cormorant Advisory Group in 2008, is to achieve a balance between the continued existence of a healthy, thriving cormorant colony and the other ecological, educational, scientific and recreational values of Tommy Thompson Park (TTP). The objectives of the Strategic Approach are to:

a) Increase public knowledge, awareness, and appreciation of colonial waterbirds;
b) Deter cormorant expansion to Peninsula D;
c) Limit further loss of tree canopy on Peninsulas A, B and C; and
d) Continue research on colonial waterbirds in an urban wilderness context (Toronto and Region Conservation Authority, 2008, 2009, 2010, 2011, 2012, 2013).

To achieve the goals and objectives of the Double-crested Cormorant Management Strategy, TRCA employed a suite of management techniques between 2009 and 2011 which included inactive nest removals, pre-nesting deterrents, active nest removals, habitat enhancements and post-nesting deterrents. Results from annual population counts during this timeframe showed an increase in the ground nesting colony and a leveling off in the tree nesting colonies. These data suggested that the

techniques had been successful in changing the nesting behaviour of cormorants. In 2012, TRCA slightly modified the strategy to reduce pre-nesting deterrents to assess whether a reduced level of intensity would be effective. Results from the 2012 season confirmed reduced pre-nesting deterrents remained as effective.

The TTP cormorant colony currently comprises three sub-colonies. Peninsula A and the current ground nesting area of Peninsula B are considered Cormorant Conservation Zones where cormorant nesting and roosting is encouraged and enhanced. Peninsula C is the most recently colonized area containing the largest tree nesting cormorant sub-colony (Figure 3). Management of tree nesting cormorants on Peninsulas B and C is complicated by the presence of nesting Black-crowned Night Herons and Great Egrets; the night heron colony is thought to be one of the largest in Canada and during its peak in 2000 represented 30 per cent of the national breeding population (Wilson & Cheskey, 2001). To date, deterrent efforts on Peninsula C have focused on the cormorant tree nesting areas with the healthiest trees in an attempt to reduce the rate of tree health decline, and in unoccupied areas to prevent tree nesting expansion (Figure 3). Deterrents on Peninsula C include human presence, use of long poles, artificial predators, noise bangers and nest removal. TRCA takes precautions to ensure management efforts do not adversely impact non-target species through monitoring bird movements and behaviours. Peninsula D is the only forested peninsula not occupied by colonial waterbird species. To date, simple human presence has been sufficient to deter cormorants from nesting and loafing in this location.

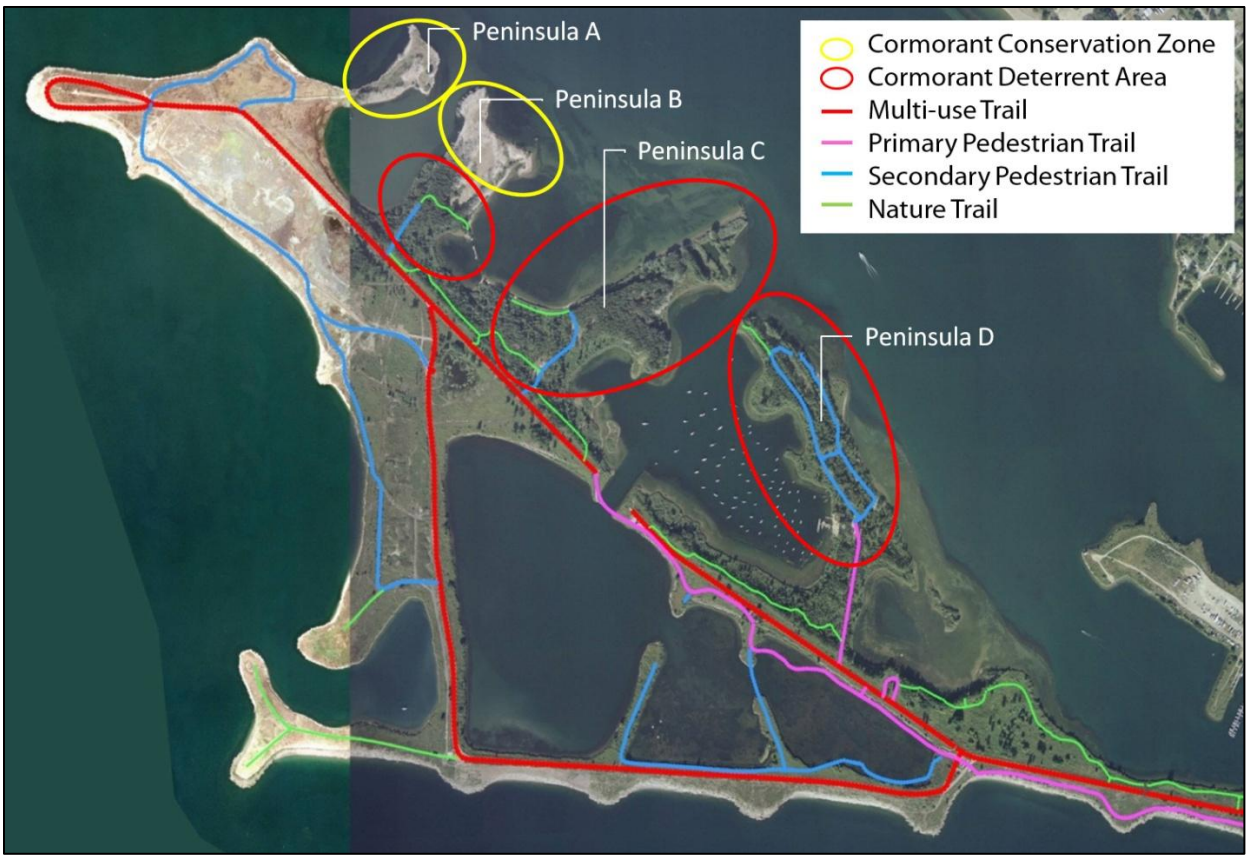

Figure 3. 2013 Cormorant management areas

2.0 2013 POPULATION & TREE HEALTH SUMMARY

Cormorants began to arrive at TTP from their wintering grounds on 3 April 2013, approximately two weeks later than in 2012. The nesting population at TTP continued to rise in 2013 with 11,990 cormorant nests counted at peak nesting during the first week of June (Table 1, Figure 4). The increase in nest numbers was mainly due to ground nesting on Peninsula B increasing from 5,812 to 6,986 nests in 2013, a 20 per cent increase from 2012. Overall the ground nest population has increased 592 per cent since management efforts began in 2008. This is a positive trend showing that ground nest enhancements are working to help achieve the goal of the continued existence of a healthy, thriving cormorant colony. The significant increase in the number of ground nests means that 58 per cent of the TTP cormorant colony nests on the ground, so their nests are not affecting the tree health.

Table 1. TTP cormorant population, 2003-2013

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pen A	55	81	311	228	101	49	22	39	19	13	5
Pen B	1582	1241	1763	1535	1072	1050	917	781	1262	982	1310
Pen B ground	948	809	872	868	1302	1009	1957	3310	4547	5812	6986
Pen C	0	0	2728	3494	4584	4609	4668	5304	5546	4934	3689
Total	**2585**	**5046**	**5674**	**6125**	**7059**	**6717**	**7564**	**9434**	**11374**	**11741**	**11990**

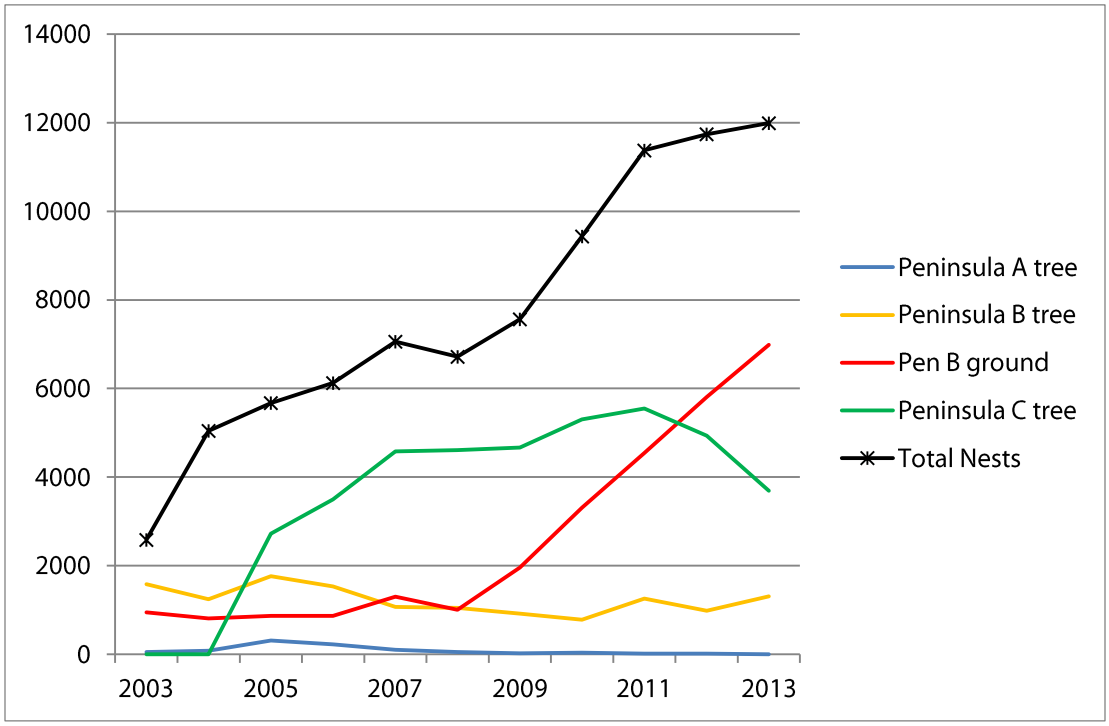

Figure 4. TTP Cormorant Population, 2003-2013

Under TRCA's Scientific Permit to Capture and Band Migratory Birds from Environment Canada

(#10716) and MNR permit #1057623, Dr. Gail Fraser, Nigel Shaw and TTP Bird Research Station volunteers banded a total of 77 cormorant chicks on the evenings of 19 June and 24 June 2013. In 2011 unique colour bands, white letters on a black band, were obtained for use strictly at TTP. These unique bands will help monitor the movements and behaviours of individuals as they mature and breed.

In 2013, cormorant tree nesting decreased by 21per cent with 24 new nest trees occupied within the current nesting areas. Tree nests decreased by 6 on Peninsula A and 1245 on Peninsula C. Nests increased on Peninsula B by 328. The average number of nests per tree was 5 on Peninsula A (just one nest tree), 7.66 on Peninsula B and 6.25 on Peninsula C, an increase in nest density on Peninsulas B and C, a decrease on Peninsula A.

The health of trees in the nest areas is evaluated annually through a qualitative ranking system that scores the tree based on the degree of impact from 1 being no impact to 5 being a severely damaged or standing dead tree (Figure 5). This survey has been completed in late August to early September since the 1990s. With over 20 years of data showing a clear decline in forest health due to cormorant nesting, tree health surveys were modified in 2012 to sample the target deterrent areas on Peninsula C, as well as the control area on Peninsula D.

Results from these surveys indicate that tree health in the deterrent areas on Peninsula C has an average rating of 3.1. The control plot of 20 non-nest trees established on Peninsula D has a rating of 2.4.

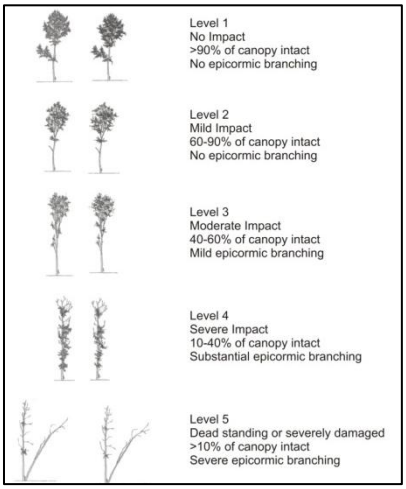

Figure 5. Tree health rating system

3.0 2013 MANAGEMENT REVIEW

Cormorant management in 2013 followed the adaptive Strategic Approach for 2013 (Table 2), as approved by the TRCA Board in Resolution #A259/12 (Toronto and Region Conservation Authority, 2013). This Strategic Approach included inactive nest removals, pre-nesting deterrents, active nest removals, habitat enhancements and post-nesting deterrents, all to be implemented as required within target areas in the cormorant colonies.

Table 2. 2013 Strategic Approach

	Peninsula A	Peninsula B	Peninsula C	Peninsula D
Inactive Nest Removal (prior to 2012 breeding season)		*	*	
Enhanced Ground Nesting	*	*		
Pre-Nesting Deterrents		*	*	*
Post-Breeding Deterrents			*	*

3.1 Increasing Public Knowledge, Awareness and Appreciation

Increasing public knowledge and fostering an appreciation for Double-crested Cormorants is an important aspect of the management plan at Tommy Thompson Park. For a third year, TRCA installed a remote camera in the ground nesting colony on Peninsula B that was intended to transmit still images of the colony to the website (www.tommythompsonpark.ca/camera) every 10 minutes. Unfortunately, technical and mechanical issues persisted through the season that prevented the website from functioning.

As in 2012, a viewing blind was installed at the edge of the colony on Peninsula C to allow the public good views of the tree nesting areas without disturbing the birds. The blind was well received however, after Black-crowned Night Herons occupied trees behind the blind it was moved further away, limiting the views to night-heron nests.

The colony was highlighted at the Spring Bird Festival on 11 May 2013 with two well attended hikes. Participants enjoyed views and learned about the colony from various lookouts. Furthermore, TRCA staff interpreted the colony for numerous corporate, academic and naturalist groups throughout the year.

3.2 Inactive Nest Removal

Inactive nest removal took place in the month of March 2013 on Peninsula C. A total of 115 inactive cormorant nests were removed. Nests were targeted based on the height and accessibility of the nests in the trees, as well as their location in relation to the Black-crowned Night Heron and Great Egret nesting sites. Trees that were not entirely dead were also targeted. Discouraging nesting in healthy trees is important to maintain overall forest health. The method used to remove the cormorant nests was the same as previous years. Trained staff used arborist poles to safely poke nests off of the branches.

3.3 Enhanced Ground Nesting

Ground nest enhancements occurred during the early months of 2013, prior to the return of cormorants in the conservation zones on Peninsulas A and B (Figure 3).

Following the unsuccessful ground nesting season of 2012 on Peninsula A, a new approach was taken in 2013. Cormorant decoys were not deployed. The decoys had been unsuccessful in previous years, and possibly acted as a deterrent due to their poor appearance after being soiled by bird excrement. To prevent early nesting Ring-billed Gulls from establishing in the targeted cormorant ground nest area, a large black tarp was placed on the ground for two weeks prior to cormorant arrival. Additionally, as in previous years, straw bales were provided for nest material and audio of nesting cormorants was played on a loop to draw cormorants to Peninsula A. Unfortunately these enhancements were not successful in attracting cormorants to nest. Given the possibility that the undulating topography of Peninsula A is the limiting factor for ground nesting, soil was added during the post-season to the target ground nest area and leveled to create a more uniform grade. Should this not successfully attract cormorants in 2014 or future years, the new soil will facilitate habitat restoration.

The successful ground nesting habitat on Peninsula B was also enhanced. 50 nests collected during

inactive nest removal, along with additional woody debris, were placed between the two sub-colonies to create one large colony. These enhancements were successful with cormorants nesting in many of the nests. Further, without any human intervention cormorants began another small satellite colony on the east side of the peninsula within close proximity to the Caspian Tern colony. In 2005 the ground nesting area totaled 319m^2 with 872 nests. In 2013 the ground nesting area totaled 6,245 m^2 with 6,986 nests (Figure 6).

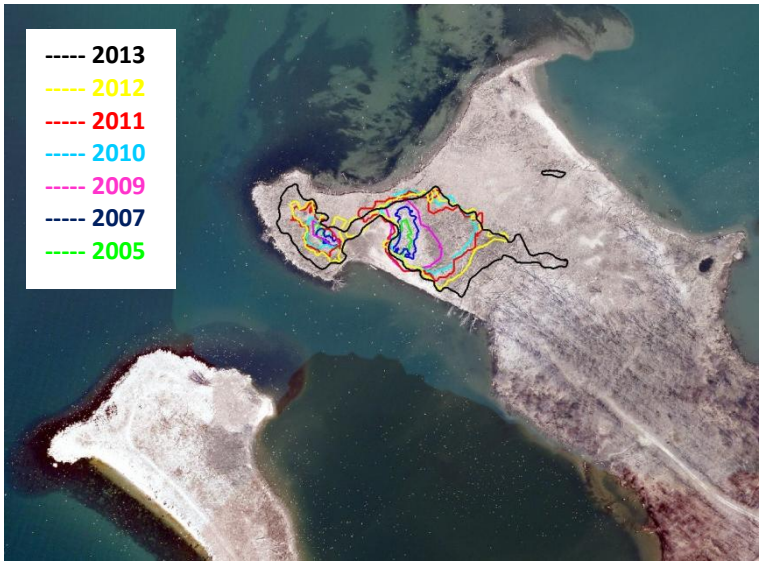

Figure 6. Ground nest colony expansion 2005 to 2013

3.4 Pre-Nesting and Active Deterrents

Pre-nesting and active deterrents were utilized as required in 2013, and only took place on Peninsula C prior to Black-crown Night Heron arrivals. Pre-nesting deterrents began on 3 April 2013, and cormorants quickly became desensitized to the progressing level of deterrents employed, from human presence to noise makers.

Pre-nesting and active deterrents were not required on Peninsula D as human presence from the Aquatic Park Sailing Club, the Tommy Thompson Park Bird Research Station staff and volunteers and park visitors was sufficient to prevent cormorants from nesting.

3.5 Active Nest Removal

Active nest removals were carried out in strategic areas of Peninsula B and Peninsula C to prevent the expansion of nesting cormorants into previously nest free areas. Depending on the location within the colony, either individual trees or large areas were monitored and managed using active nest removals. Nests were closely monitored to keep track of the age of eggs. No nests were removed containing eggs of an age greater than 10 days old; the 10 day incubation threshold followed is a conservative estimate based on current scientific literature on embryo development for altrical waterbirds (Humane Society of United States). In the event that eggs older than 10 days or nestlings were discovered, deterrent activities focusing on that nest ceased and further monitoring occurred (Figure 7). A total of 172 active nests and 147 eggs were removed. Of those, 130 nests and 108 eggs

were removed from Peninsula C; and 42 nests and 39 eggs were removed from Peninsula B. When possible, undamaged eggs were collected and float tested to confirm the incubation stage. Also, as requested by Environment Canada, 13 cormorant eggs from different nests were collected and provided to them to be used as part of a contaminant study. These efforts began on 2 May 2013 and continued until 23 May 2013.

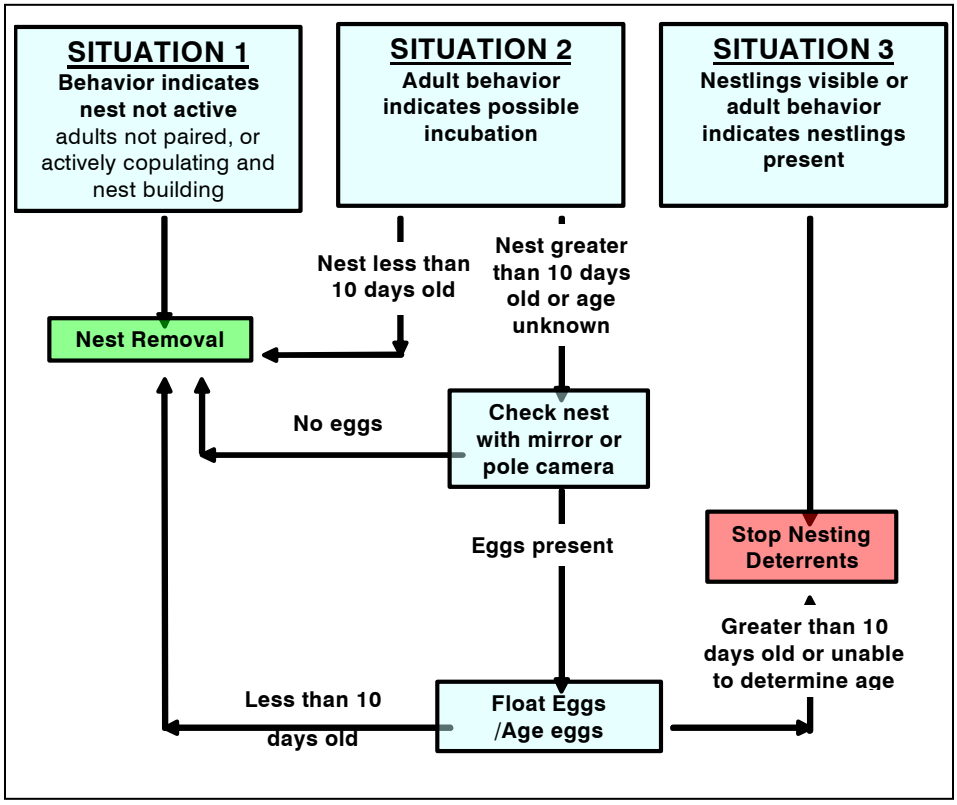

Figure 7. Active nest removal situation and action flow chart

3.3 Post Breeding Deterrents

Post breeding deterrents were identified for Peninsulas C and D but were not required as cormorants did not roost in the trees.

4.0 2014 STRATEGIC APPROACH

A suite of techniques will be utilized in an integrated and adaptive approach to achieve the goal and objectives of the 2014 Strategic Approach (Table 3), which maintains the original goal and objectives from 2007.

Table 3. 2014 Strategic Approach

	Peninsula A	Peninsula B	Peninsula C	Peninsula D
Inactive Nest Removal (prior to 2014 breeding season)		*	*	
Enhanced Ground Nesting	*	*		
Pre-Nesting Deterrents		*	*	*
Post-Breeding Deterrents			*	*

4.1 Increase Public Knowledge, Awareness and Appreciation

- TRCA website, including images from the remote camera. TRCA continues to work on improvements to the remote camera set-up, and will supplement with images taken from the remote camera with images and photo interpretation taken by York University researchers for the TRCA website.
- Conduct interpretive tours for school and interest groups, and at TTP special events.
- Maintain opportunities to view colonial waterbirds with viewing blinds.
- Present information at conferences and forums.
- Participate in working groups on colonial waterbirds.

4.2 Inactive Nest Removal

- Remove nests from target areas on Peninsulas B and C during the winter, prior to the breeding season.

4.3 Enhanced Ground Nesting

- Place natural nests collected during inactive nest removal in ground nesting areas on Peninsulas A and B.
- Place straw bales on Peninsula for nesting material.
- The lower elevation areas on Peninsula A were levelled in late 2013, this area will be seeded for vegetation cover.
- Social attraction techniques will not be employed so the soil additions can be assessed to help determine if elevation differences are a limiting factor in site selection.

4.4 Pre-nesting Deterrents

- The expansion of tree nesting DCCO beyond the existing colonies on Peninsulas B and C will be prevented. Deterrents will continue on Peninsula B and C to prevent expansion.
- The location of the trail barricades on Peninsulas B and C may be moved closer to the colony to act as a DCCO tree nesting deterrent, however if Black-crowned Night Herons nest in the area the trail barricades will not be moved to prevent disturbance to their nests.

- DCCO will be prevented from nesting on Peninsula D.
- Deterrent techniques will remain the same as 2013 and employed on an increasing scale of activity to ensure expansion of the tree nesting area does not occur.
- Staff will monitor the effects deterrent activities have on the DCCO colony as well as on non-target species.

4.5 Post-breeding Deterrents

- Deterrent activities will take place as needed on Peninsula C and D to reduce loafing in trees.
- Techniques will be the same as in previous years and will be employed on an increasing scale of activity.

4.6 Monitoring, Research and Reporting

- Undertake annual nest census for colonial waterbirds in late May.
- Conduct modified annual tree health surveys on Peninsulas A, B, C and D in late August.
- Continue to collaborate with York University on DCCO research.
- Complete annual summary report.
- Meet with Cormorant Advisory Group to review data and discuss the Strategic Approach for 2015.

5.0 REFERENCES

Feldmann, I., McDonald, K., & Fraser, G. (2012). A conspecific attraction experiment for Double-crested Cormorants at an urban park. *Unpublished manuscript* .

First Base Solutions. (2005). *Leslie Street Spit aerial ortho imagery* .

Humane Society of United States. (n.d.). *Canada Goose Egg Addling Protocol*. Retrieved March 2, 2010, from Humane Society of United States: http://www.humanesociety.org/issues/wildlife_overpopulation/tips/canada_goose_addling_protocol.html

Humane Society of United States. (n.d.). *Canada Goose Egg Addling Protocol*. Retrieved March 2, 2010, from Humane Society of United States: http://www.humanesociety.org/issues/wildlife_overpopulation/tips/canada_goose_addling_protocol.html

Jarvie, S., Blokpoel, H., & Chipperfield, T. (1999). A geographic information system to monitor nest distributions of Double-crested Cormorants and Black-crowned Night-Herons at shared colony sites near Toronto, Canada. In M. Tobin (Ed.), *Symposium on Double-crested Cormorants: Population Status and Management Issues in the Midwest*, (pp. 121-129).

Toronto and Region Conservation Authority. (2013). *Double-crested Cormorant Management Strategy, January 2013*. Authority Meeting Recommendation #A259/12.

Toronto and Region Conservation Authority. (2009). *Double-crested Cormorant Management Strategy, March 2009*. Authority Meeting Recommendation #A22/09.

Toronto and Region Conservation Authority. (2010). *Double-crested Cormorant Management Strategy, March 2010*. Authority Meeting Recommendation #A23/10.

Toronto and Region Conservation Authority. (2011). *Double-crested Cormorant Management Strategy, March 2011*. Authority Meeting Recommendation #A49/11.

Toronto and Region Conservation Authority. (2012). *Double-crested Cormorant Management Strategy, March 2012*. Authority Meeting Recommendation #A19/12.

Toronto and Region Conservation Authority. (2008). *Double-crested Cormorant Management Strategy, May 2008*. Authority Meeting Recommendation #110/08.

Toronto and Region Conservation Authority. (2006). Tommy Thompson Park/Leslie Street Spit Bird Checklist, 3rd edition.

Weseloh, D., Ewins, P., Struger, J., Mineau, P., Bishop, C., Postupalsky, S., et al. (1995). Double-crested Cormorants of the Great Lakes: Changes in Population Size, Breeding Distribution and Reproductive Output between 1913 and 1991. *Colonial Waterbirds , 18*, 48-59.

Wilson, W. G., & Cheskey, E. D. (2001). *Leslie Street Spit Tommy Thompson Park Important Bird Area Conservation Plan*. Canadian Nature Federation, Bird Studies Canada, Federation of Ontario Naturalists.