

Colony distribution and nest numbers of Double-crested Cormorants on the upper St. Lawrence River, 1991 – 2007

D.V. Chip Weseloh, Irene Mazzocchi, Tania Havelka, Lee Harper, James Farquhar III, Cynthia Pekarik and Bud Andress

Introduction

The Double-crested Cormorant (*Phalacrocorax auritus*, henceforth cormorant) was first reported to nest in the upper St. Lawrence River (USLR), i.e. from Kingston, ON and Cape Vincent, NY to Lake St. Francis, at Black Ant Island in 1945 (Baillie 1947, Postupalsky 1978, Weseloh *et al.* 1995) (Figure 1). The nesting of cormorants in the USLR came at the end of an eastward expansion of their breeding range from Lake-of-the-Woods, which had been underway for more than 30 years. Cormorants were first known to nest in the Great Lakes, on Lake Superior, in about 1913, and they

spread eastward during the next three decades (Postupalsky 1978, Weseloh *et al.* 1995 but also see Wires and Cuthbert 2006 for an alternative view). They were found nesting in the North Channel and Georgian Bay sections of Lake Huron in 1932 and 1936, respectively (Baillie 1947), in Lake Erie in 1936 (Ligas 1952) and in Lake Ontario in 1938 (Baillie 1947). Nesting cormorants increased quickly on the Great Lakes during the 1940s, so much so that population control measures were instituted in some areas (Omand 1947, Baillie 1947, Postupalsky 1978).

Figure 1: After an absence of at least 15 years, the Double-crested Cormorant resumed nesting in the upper St. Lawrence River in 1991.
Photo: Brian Morin





Figure 2 : Double-crested Cormorant on nest. Photo: John Mitchell

While no specific studies are known for the USLR, numbers there are presumed to have followed those on the Great Lakes proper once the species was established there. Numbers of breeding cormorants on the Great Lakes, and presumably on the USLR, declined dramatically during the “pesticide era” from the 1950s through the early 1970s, due to the effects of DDE-induced eggshell thinning (Weseloh *et al.* 1983). During this period, the number of cormorant nests across the Great Lakes declined from nearly 1,000 to less than 100 (Weseloh *et al.* 1995). At some point during this time, cormorants ceased to breed on the USLR. They were not known to nest there during either the 1st or 2nd Binational Great Lakes Colonial Waterbird Survey (1976-77 and 1990, respectively).

During these surveys, all islands in the USLR were checked for nesting colonial waterbirds (Blokpoel 1977, Blokpoel and Tessier 1996, Scharf and Shugart 1998).

The first known nesting of cormorants in the USLR, after the pesticide era, occurred in 1991 on Strachan Island (see below). Thus, the return of the cormorant as a nesting bird to the USLR is considered to have started in that year. The purpose of this paper is to track the growth and distribution of cormorant colonies in the USLR during this period of resurgence, from 1991 to 2007 (Figure 2).

Methods

Beginning in 1976, during May and June, much of the USLR was surveyed annually as part of several other studies (L. Harper, unpubl. data, B. Andress,

Table 1. Number of nests of Double-crested Cormorants in the Upper St. Lawrence River from Kingston, ON and Cape Vincent, NY to Lake St. Francis, 1990 – 2007. The censuses in 1999 and 2002 were incomplete.

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SITE	0							0			
1. West Spectacle I.	0							0			
2. Black Ant I.	0							0			
3. Blanket I.	0							0			
4. Little Corn I.	0							0			
5. Corn I.	0							0			
6. Scorpion I.	0							0			7
7. Gull I. (2 rocks near Griswold I.)	0							0			
8. Griswold I.	0		0	0	2	7	41	137	242	343	323
9. West Crossover I.	0							0			
10. McNare I.	0						61	105	168	133	224
11. Murray I.	0							0			13
12. Bogartus I. (Three Sisters)	0							0			11
13. Spencer I. Pier	0							0			3
14. Murphy I.	0							0			
15. Island SW of Bergin I.	0							0			
16. Bergin I.	0							0			158
17. Strachan I. (5 islands)	0	12	38	115	290	314	329	485 ¹	433	400 ²	356
18. Dickerson I.	0							0			250
19. Dodens I.	0							0			
20. Butternut I.	0							0			
21. Navigational marker D41	0							0			275
TOTAL	0	12	38	115	292	321	431	727	843	876	1,620

¹ = This figure includes 65 and 29 nests on the ground of the east and west arms of Strachan Island, respectively, on 10 June 1997 (LH, pers. obs.). This is the only time ground-nests of cormorants are known to have occurred on this island.

² = estimate

2001	2002	2003	2004	2005	2006	2007
				64	0	0
		50	150	265	300	260
18	0	60	200	263	111	35
		0	20	0	47	51
	15	9	46	13	0	0
	0		16	17	31	115
		30	84	66	267	278
274	394	291	313	334	120	322
4	7	14	0	16	7	1
251	166	266	373	536	578	603
0	0	0	0	0	0	0
20	17	0	0	0	0	0
8	0	0	1	0	0	0
	24	40	60	108	67	93
		41	33	21	41	51
259	183	394	432	559	586	475
386	215	332	244	281	313	286
145		496	326	245	252	18
				+ ³	72	167
		191	199	38	0	0
		330	332	171	64	30
1,365	1,021	2,544	2,829	2,997	2,856	2,785

³ = nests present but not counted

pers. comm., Weseloh *et al.* 1995, Blokpoel and Tessier 1996, Scharf and Shugart 1998, CWS unpubl. data) and observations on the presence and absence of colonial waterbirds were noted. Annual systematic counts of cormorant nests began in 1991 and were conducted usually in the latter half of June (Ewins *et al.* 1995). All nests that appeared to be active in the given year were counted, regardless of contents. All nest counts were conducted by direct visitation; there were no aerial counts. New cormorant nesting islands were not searched for each year and, hence, some colonies were only discovered when they may already have been established for a few years. For example, note the relatively large number of nests recorded on Bergin and Dickerson islands in 2000, their first year of record (Table 1). On densely forested islands, e.g. Butternut Island, each nest tree was marked with flagging tape to keep track of which trees had been counted before recording their number of nests. At large ground-nesting colonies, e.g. on Navigational Aid D-41, nests were sometimes sprayed with a small spot of paint for the same reason.

Results

Numbers and Distribution of Colonies

Twenty-one cormorant colonies were located in the USLR during the study period. They were distributed in five groupings. From west to east, sites 1-6

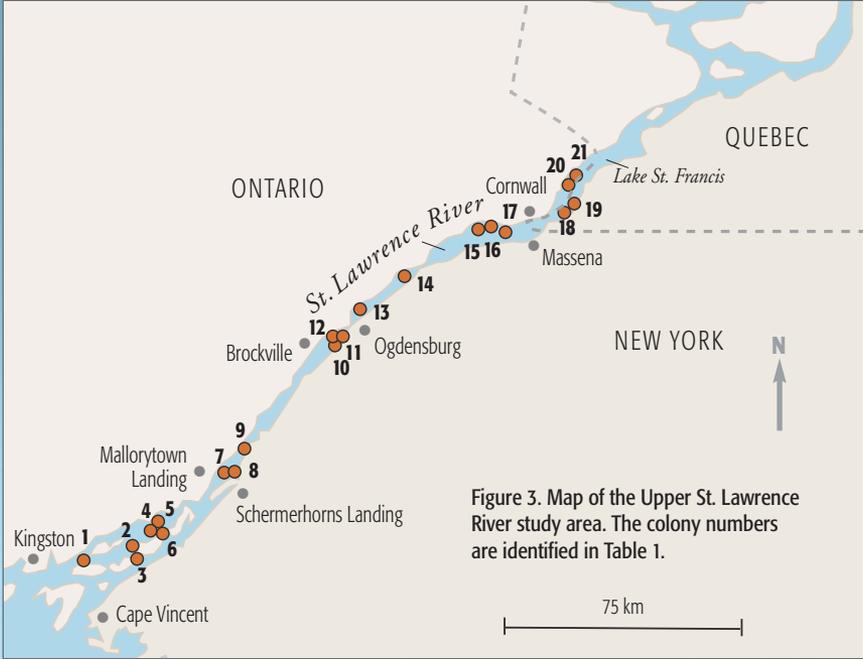


Figure 3. Map of the Upper St. Lawrence River study area. The colony numbers are identified in Table 1.

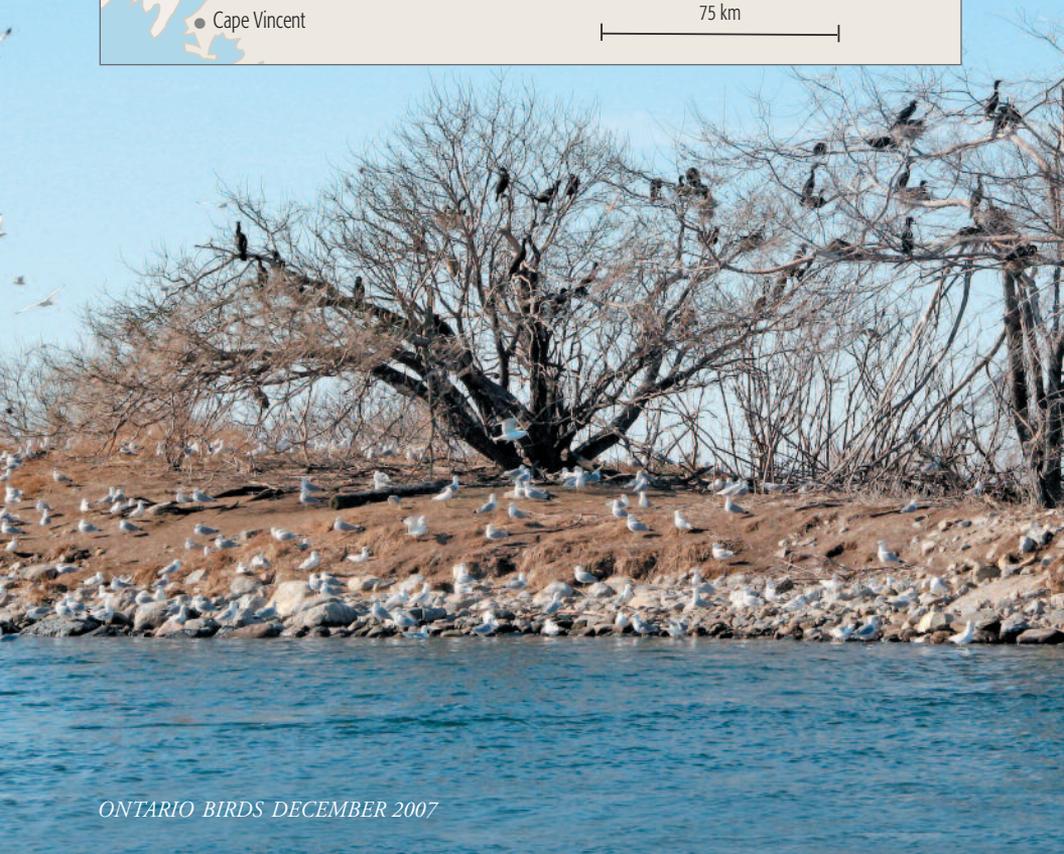


Figure 4. Cormorants nesting in trees in late April on Strachan Island near Cornwall/Massena. Ring-billed Gulls are nesting on the ground.

Photo Credit: Brian Morin



(Figure 3) were just downstream from the Kingston-Cape Vincent area, sites 7-9 were near the Mallorytown Landing-Schermerhorns Landing area, sites 10-14 were near Brockville-Ogdensburg, sites 15-17 were above the dam at Cornwall-Massena and sites 18-21 were downstream from Cornwall-Massena (Figure 3). The only suggested pattern in the colonization of the upper St. Lawrence River was that the first four cormorant colonies were well separated; each was in a different section of the river as defined above.

Annual Nest Numbers and Population Growth

Cormorants first nested in the USLR during this study period in 1991 when 12 nests were found in the trees on the five island complex known as Strachan Island (Blokpoel 1977, Blokpoel and Tessier 1996), just above the dam near Cornwall, Ontario and Messina, New York (Figures 3 and 4, Table 1). This colony tripled in size in each of the next two years. In 1994, a second colony was found on Griswold Island (Figure 5) near Mallorytown Landing, Ontario and Schermerhorns Landing, NY; it contained two tree-nests. It also grew rapidly and contained over 100 nests within three years. In 1996, a third cormorant colony of over 60 nests was discovered at McNare Island near Brockville-Ogdensburg. Thus, within five years of the first nesting at Strachan Island, from 1991 to 1996, the cormorant population in the



Figure 5. Cormorants nesting on the small stone house and on the ground at Griswold Island, near Mallorytown/Schermerhorn's Landings.

Photo: Lee Harper

Figure 6. Cormorants nesting in the trees at Murphy Island, downstream from Brockville/Ogdensburg.

Photo: Lee Harper

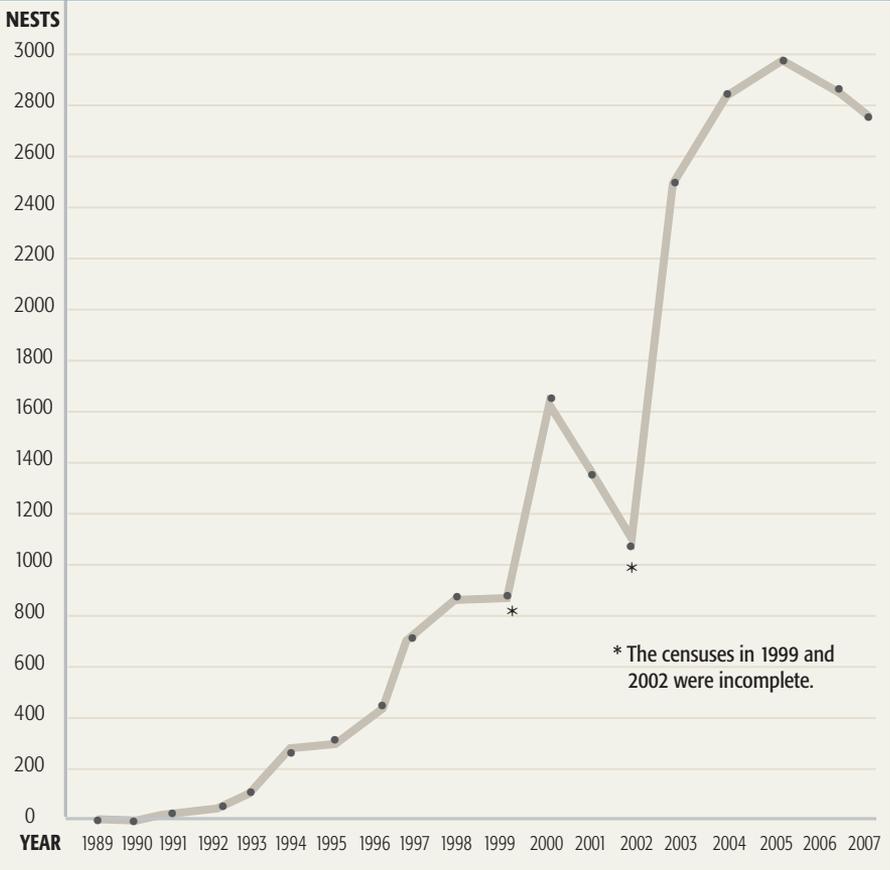


USLR had reached over 400 pairs (Figure 6). This is an average annual growth rate of more than 100% (104.7%). The number of known colonies remained stable from 1996 to 1998 but the population nearly doubled to over 800 pairs (39.9% growth per annum).

From 1999 to 2000, the number of known cormorant colonies in the USLR more than tripled (from 3 to 10) and the number of nests increased from an esti-

mated 876 to 1,620. (Although data are missing for Strachan Island for 1999, it was active in both 1998 and 2000 and it seems safe to assume that it would have been active in 1999 with at least 400+/- nests.) Based on the relatively large number of nests present at some of these sites when first discovered, e.g. Bergin and Dickerson islands and Navigational Aid D-41, some of these colonies presumably had been in existence prior to 2000 but

Figure 7. Number of nests of Double-crested Cormorants in the Upper St. Lawrence River from Kingston, ON and Cape Vincent, NY to Lake St. Francis, 1989–2007.



had escaped detection by researchers (see below). We assume these colonies, which were active in 2000 but whose date of origin is not known, were probably established in 1998 or 1999. They were not known to be active in 1997, when all islands were visited (Cuthbert *et al.* 2006). Thus, the growth of the USLR cormorant population from approximately 431 nests in 1996 to 1,620 in 2000 includes the start-up of the new

colonies first found in 2000. This growth yields an average annual rate of increase of 39.2%.

Cormorant nest numbers appear to have kept increasing over the next five year period, though again, some data points are missing, and reached a maximum of 2,997 nests in 2005 (Table 1). From 2000 to 2005, the average annual growth rate was 13.1% (Figure 7). Nest numbers declined slightly in 2006 and

2007 and currently stand at 2,785 nests at 15 active colonies. Since 2005, this represents an average decline of -3.6% per year. By 2007, six previously active colonies had been abandoned and, during the period 2005 to 2007, eight additional colonies declined.

The overall annual growth rate from the year of first nesting until the cormorants reached their peak nest numbers in 2005 was 48.3% per year. Since 1991, cormorants have nested at 21 different locations in the USLR but never at more than 17 sites in any one year.

The USLR forms the border between Canada and the United States for much of its length. From 1991-1999, all known cormorant colonies in the USLR were located in Canada. In 2000, cormorants were first found nesting in the U.S. waters of the USLR. During 2000-2007, four colonies were established there: sites 3, 9, 12 and 14 (Table 1). Their numbers increased slowly and comprised from 0.6 to 12.9% of the total USLR population. Numbers on the Canadian side have always comprised at least 87% of the population. Measures to reduce the number of cormorants nesting on US sites 3 and 12 were begun by New York State Department of Environmental Conservation (NYSDEC) in 2003. In 2004, site 9 was managed by the United States Department of Agriculture (USDA) and, since 2006, all four US sites have had some control by NYSDEC under the Public Resource Depredation Order (PRDO) (50 CFR 21.48 available at [\[rybirds/issues/cormorant/FinalRule/fed1regdccofinalrule.pdf\]\(http://www.fws.gov/migrator/birds/issues/cormorant/FinalRule/fed1regdccofinalrule.pdf\)\). As a result, the number of nests reported here for some of the U.S. colonies in mid-June is substantially reduced from what they were in May. For example, 538 nests were counted on Blanket Island \(site 3\) on 29 May 2007, before management activities. The mid-June count recorded only 35 nests, after management. Presumably most of the birds which left this site \(due to management activities\) went elsewhere to nest, where their numbers would have been captured by other counts.](http://www.fws.gov/migrato-</p></div><div data-bbox=)

Discussion

The Double-crested Cormorant resumed nesting in the USLR in 1991 after an absence of at least 15 years, since at least 1976. From 1991 to 1996, the average annual rate of increase was over 100%. However, from 1996 to 2000 it was 39.2% per annum and from 2000 to 2005 it was 13.1% per annum. From 2005 to 2007, the population declined at an annual rate of 3.6%. Price and Weseloh (1986) examined the population growth of cormorants on Lake Ontario from 1974 to 1982. They noted that an average annual rate of increase as high as 56% could be achieved without immigration but only under very favourable conditions of recruitment, age at first breeding and pre-breeding and adult mortality. Growth rates of over 100% would have to had been supplemented by immigration. Thus, it was not until

the 1996 to 2000 period that the average annual growth rate of the USLR cormorant population was in a range where it could have been self-sustaining; prior to that, population growth would have been maintained through immigration. Cormorants are known to move from eastern Lake Ontario to the St. Lawrence River. Cormorants, marked with colour-bands and/or satellite transmitters, have been found to move from Little Galloo Island in eastern Lake Ontario to colonies in the St. Lawrence River within a season, but only when harassed/disturbed at the Little Galloo Island colony (Mazzocchi 2003, B. Dorr, pers. comm.). To what extent they make that same move when not harassed is not known.

Six cormorant colonies were abandoned during the study period: sites 1, 5, 11-13 and 20; the years of colony abandonment ranged from 2001 – 2006. Also, since 2005, nest numbers have declined substantially (> 20%) at four other sites but the colonies have remained active: sites 3, 9, 18 and 21. Various human activities were probably responsible for several of these situations. Active shooting, or evidence of recent shooting, was noted by DVCW at three of the above colonies: sites 1, 20 and 21. At site 1 (West Spectacle Island), shooting was done under permit from the Ontario Ministry of Natural Resources to prevent fouling of a small cottage (J. Stewart, pers. comm.). Active shooting at cormorants was observed on site 20 (Butternut Island) on 17 May

2004 and spent shotgun shells and more than 250 dead birds were found on site 21 (Navigational Aid D-41) on 7 June 2004. An additional 65 dead cormorants, also apparently shot, were found on at the same site on 16 June 2006 (DVCW, unpubl. data) It is not known if permits were issued in these cases.

At site 5 (Corn Island) in 2001, 50 Great Blue Heron (*Ardea herodias*) nests were constructed and occupied, presumably by herons forming outlying colonies from the break-up of the dwindling heron colony on Ironsides Island (6.8 km to the south). By 2002, cormorants had taken over 15 former heron nests on Corn Island. Within a couple of years, the herons had abandoned the colony and by 2006 a cottage had been built where none existed previously and the cormorants also abandoned the site (B. Address pers. obs.). At sites 3, 9 and 12 extensive nest removal was conducted by NYSDEC under the PRDO resulting in reduced nest counts or possibly abandonment. At site 18 (Dickerson Island), tracks of at least one raccoon (*Procyon lotor*), a documented predator of waterbird nests (Ellis *et al.* 2007), were noted (L. Harper, pers. obs.) and predation may have been a factor in the decline of cormorant nests at that site. There are no known factors contributing to the decline in nest numbers or colony abandonment at sites 11 and 13.

In 2006, Black-crowned Night-Herons (*Nycticorax nycticorax*) also nested

on 3 of the 15 active cormorant colonies in the USLR: McNare, Bergin and Strachan islands (CWS, unpubl. data). On all three of these islands, there were areas where nests of the two species were interspersed between one another. In these areas, there were also instances of cormorants occupying nests which, based on the size of twigs used in the construction of the original nest platform, appeared to have been first built by night-herons. The take-over of night-heron nests by cormorants is a condition which has led to the abandonment of their colony by the night-herons at other sites. Several night-heron colonies on Lake Ontario have suffered just such a fate (Jarvie *et al.* 1999, Weseloh *et al.* 2002). This condition of cormorants nesting in close proximity to night-herons, Great Egrets (*Ardea alba*) or Great Blue Herons should be monitored carefully to track potentially positive or negative impacts to the heron species (Cuthbert *et al.* 2002).

The Future for Cormorants on the Upper St. Lawrence River

Allowing for years when data are missing, the nesting cormorant population on the upper St. Lawrence River increased each year from 1991 to 2005. For the last two years, 2005 – 2007, it has decreased. Since 2005, nest numbers have declined on 11 colonies and increased on 7 colonies. Management (either legal or illegal) has occurred on at least 6 of the 11 sites which have

declined, but on only one 1 of the 7 sites that has increased. Colonies which have decreased have lost 842 nests (-40.6%). Colonies which have increased have gained 630 nests. This latter figure represents an annual growth rate of 29.8%, well within the range of normal growth for a cormorant colony (or population) (Price and Weseloh 1986), i.e. immigration to colonies which are growing need not to have occurred. Major colonies (those with > 170 nests in one of the years 2005-2007, N=9) lost 413 nests and declined from 2,720 and 2,307 nests. Minor colonies (N=9) gained 201 nests and increased from 277 to 478 nests (31.3% per annum). Again, it would appear that cormorants from major colonies are leaving the USLR area and are not simply moving to minor colonies. At present, it would appear that management activities, augmented by possible predation (Dickerson Island), are the major influences on the number of cormorants nesting in the USLR.

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Tania Havelka, Canadian Wildlife Service -, Ontario Region, 4905 Dufferin St. Toronto, ON M3H 5T4. Current address: 1321 Kim St., Sarnia ON. N7V 3T6

Lee Harper, Riveredge Associates, 58 Old River Rd, Massena, NY. 13662

James Farquhar III, New York State Department of Environmental Conservation, 317 Washington Ave. Watertown, NY. 13601

Cynthia Pekarik, Canadian Wildlife Service - Ontario Region, 335 River Road, Ottawa, ON. K1A 0E7

Bud Andress, Parks Canada, St. Lawrence Islands National Park, 2 County Rd. 5, R.R. # 3, Mallorytown Landing, ON. K0E 1R0

D. V. Chip Weseloh, Canadian Wildlife Service – Ontario Region, 4905 Dufferin St. Toronto, ON M3H 5T4

Irene Mazzocchi, New York State Department of Environmental Conservation, 317 Washington St. Watertown, NY. 13601