

Trumpeter Swans and Mute Swans compete for space in Ontario

H.G. Lumsden

Introduction

Trumpeter Swans (*Cygnus buccinator*) (henceforth trumpeters) in North America occupy freshwater marshes, ponds, lakes and occasionally rivers (Mitchell 1994). They were extirpated over much of their range east of the Rocky Mountains by the 1930s. Their restoration in Ontario started in 1982 and has been very successful. In 2010, 594 trumpeters were counted on their wintering grounds in southern Ontario (Lumsden 2012). In a wider aerial survey in winter 2015, covering shorelines and coastal marshes of the lower Great Lakes and some inland areas of Ontario, 924 trumpeters were counted. Some Ontario swans winter in the United States and thus were not counted. In the Fort Francis, Dryden and the Kenora area of northwestern Ontario, aerial surveys in summer 2015 found 1,076 swans (Badzinski and Earsom 2015).

Mute Swans (*Cygnus olor*) (henceforth mutes) range extensively across Eurasia (Dement'ev and Gladkov 1967), occupying large open lakes with extensive shallows, deltas, sluggish rivers and

saltwater inlets (Cramp and Simmons 1977). Releases of mutes in New York State over 100 years ago (Swift *et al.* 2013) and releases 70 years ago in Michigan (Michigan DNR 2003) established mutes in North America. Colonization of Ontario followed and the first documented nesting in Ontario occurred in 1965 (Peck 1966). A 2011 survey in the lower Great Lakes of Ontario recorded 3,062 mutes (Meyer *et al.* 2012). Barney and Badzinski (2015) reported 3,028 mutes in the same Lower Great Lakes Study Area in a summer survey in 2014, and 109 adults and 22 broods in an Inland Survey Area.

There are now substantial numbers of both trumpeters and mutes spread over the wetlands of southern Ontario. The similarity of their habitat choices and their overlapping breeding distribution makes potential competition for territories, nest sites and food inevitable. This paper examines aggression between trumpeters and mutes and their competition for space in Ontario (Figure 1).



Figure 1. A Trumpeter Swan family confronts two Mute Swans at LaSalle Park, Burlington, Ontario.
Photo by Susan Grexton.

Methods

Aggressive encounters between trumpeters and mutes were recorded at LaSalle Park, Burlington Ontario, (43° 19' N, 79° 47' W), using activity budget samples of 15 seconds every 2 minutes. Observations were made on a boat launching ramp and at different locations on a beach. Counts were made opportunistically during two time periods: in spring from 16 March-2 April 2011 (147 observation periods on 4 days) and in the winter from 22 November 2011-14 March 2012 (602 observation periods on 17 days). Weather records were provided by Environment Canada for the Royal Botanical Gardens at Hamilton, Ontario.

The two species of swans are accustomed to being fed at the LaSalle Park banding station. A person standing on the shore usually attracted a stable mixed group of expectant swans. A handful of

corn scattered on the water held a small group. At lengthy intervals, when needed to discourage the group from dispersing and to facilitate capture for banding, more corn was scattered. The species directing a single peck at a victim was tallied only if there was physical contact. The age and sex of the trumpeters in the groups were determined by their wing-tags and for cygnets additionally by their partially grey plumage. Mute cygnets were not individually distinguishable because they were not wing-tagged and most were the "Polish" white morph (Scott 1972). To compare trumpeter and mute aggression, the total number of attacks/hour was calculated and these were standardized to reflect single attackers attacking single victims. Means and standard deviations are presented and t-tests applied for significance.

Because differences in nest phenology between species can influence their level of aggression, nest initiation dates for both species were recorded. Nest phenology for Ontario mutes was recorded by nest visits in 1984-1990. Nest initiation dates for trumpeters were determined in 1993-2014 from nest visits and egg dates. Because size can be important in the outcome of agonistic interactions, the body mass of trumpeters and mutes weighed in Montana and Idaho and in England were compared.

Results

Intraspecific and interspecific aggression at LaSalle Park

At LaSalle Park in 2011 and 2012, the numbers and group sizes of trumpeters and mutes participating in the feeding groups varied by season. In spring (16 March-2 April 2011), the mean group size for trumpeters was 8.75 and for mutes was 13.75. In winter (22 Nov 2011-6 February 2012), mean group size

was 8.0 for trumpeters and 7.4 for mutes. In late winter (13 February-14 March 2012) mean group size was 13.5 for trumpeters and 12.0 for mutes.

In the winter of 2011-2012, the frequency of attack of mute on mute ($\bar{x} = 0.29 \pm 0.25/\text{hour}$) and trumpeter on trumpeter ($\bar{x} = 0.45 \pm 0.39/\text{hour}$) (Table 1) did not differ significantly ($t = 1.4532$, degrees of freedom (df) 30, not significant (NS)). Similarly, in the spring of 2011, the frequency of attack by mute on mute ($0.48 \pm 0.63/\text{hour}$) and trumpeter attack on trumpeter ($\bar{x} = 0.23 \pm 0.13/\text{hour}$) did not differ significantly ($t = 1.7912$, df 6, NS).

In the winter of 2011-2012, trumpeters attacked mutes 22 times more frequently than they received attacks from mutes ($\bar{x} = 0.43 \pm 0.41/\text{hour}$ versus $\bar{x} = 0.02 \pm 0.02/\text{hour}$). In the spring of 2011, trumpeters attacked mutes 55 times more frequently than mutes attacked trumpeters ($\bar{x} = 0.49 \pm 0.51/\text{hour}$ versus $\bar{x} = 0.0089 \pm 0.0049/\text{hour}$) (Table 1).

Table 1. Aggressive attacks/hour between Trumpeter Swans and Mute Swans at LaSalle Park in Spring (16 March to 2 April 2011) and Winter (22 November 2011 to 14 March 2012). Standardized to show attacks by 1 aggressor on 1 victim/hour (Mean \pm S.D).

	Spring	Winter
Time span of observations	11:05-15:58	10:50-16:02
Mean temperature at 12:00	4.9° C	1.97° C
Trumpeter vs Mute/hour 1 attack 1 victim/hour	42.58 \pm 9.67 N = 191 0.49 \pm 0.51	24.91 \pm 10.84 N = 493 0.43 \pm 0.41
Mute vs Trumpeter/hour 1 attack 1 victim/hour	1.54 \pm 1.04 N = 6 0.0089 \pm 0.0049	1.95 \pm 2.40 N = 20 0.02 \pm 0.02
Mute vs Mute/hour 1 attack 1 victim/hour	44.53 \pm 16.29 N = 202 0.48 \pm 0.63	26.85 \pm 23.76 N = 439 0.29 \pm 0.25
Trumpeter vs Trumpeter/hour 1 attack 1 victim/hour	22.70 \pm 11.63 N = 108 0.23 \pm 0.13	26.73 \pm 11.86 N = 531 0.45 \pm 0.39



Figure 2. A mixed group of Trumpeter Swans and Mute Swans at LaSalle Park, Burlington, Ontario, on 22 March 2011. The trumpeter cygnet with yellow wing tag H88 is attacking an adult Mute Swan. *Photo by H.G. Lumsden.*

The attacks of both species were very brief, amounting to a single peck. Pecks by mutes were directed at the head of an opponent. The aggressor usually missed but sometimes gripped the neck of the opponent. In contrast, trumpeters directed their attacks at the body of the victim (Figure 2).

When threatening an opponent, trumpeters typically bob the head and wave the open wings while trumpeting while mutes threaten with secondary feathers fanned and raised over the back. These displays did not precede the attacks counted at LaSalle Park, although on 2 April 2012, the mutes sometimes raised the wings slightly without spreading them. At the termination of a fight, the victor typically grasps the back feathers of a victim, swims and flaps in hot pursuit across the water. This behaviour was not seen at LaSalle Park during the activity budget attacks. There was no retaliation by the victim.

Nest Phenology

Mute nests were initiated 21-31 March (3 nests, 2% of total nest numbers), 1-10 April (39 nests, 33% of total), 11-20 April (50 nests, 42% of total), 21-30 April (21 nests, 18% of total) and 3-10 May (6 nests, 5% of total). Trumpeters nested later, 1-10 April (1 nest, 2% of total nests), 11-20 April (4 nests, 9% of total), 21-30 April (27 nests, 63% of total) and 1-10 May (11 nests, 26% of total) (Figure 3).

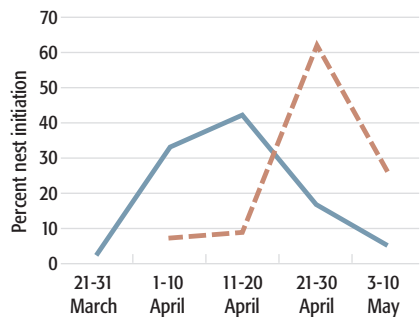


Figure 3. Percent of nest initiation by date in southern Ontario by Mute Swans (1983-1990, solid line) and Trumpeter Swans (1993-2010, broken line). Data pertain only to first clutches.

Discussion

Intraspecific and interspecific aggression at LaSalle Park

Aggression plays an important part in relationships within swan social groups, especially at times such as brood breakup and territory establishment. The swans observed at LaSalle Park were not defending territories or broods at the times when observations were made. They were responding to another swan at close quarters with one quick peck. I suggest that they were maintaining individual distance. Conder (1949) defined individual distance as “an area round a bird, which moves with it, has no topographical reference and into which no other individual is allowed to come.” The swans at LaSalle Park maintained a distance of at least one body length from one another (about 0.7m). It is likely that crowding the swans due to the distribution of food increased the frequency of these aggressive encounters. This is not likely, however, to have altered the relationship between the species.

In winter, the two species had similar rates of intraspecific aggression, i.e. frequency of attacks of mute on mute did not differ from those of trumpeter on trumpeter. One might expect that a species closer to the peak of its breeding cycle might register a higher level of aggression than those with a later peak, however, this was not the case. In spring, the frequency of intraspecific attacks by the earlier nesting mute on mute did not differ compared with the frequency of attacks by later nesting trumpeter on trumpeter. This indicates that intraspecific aggressive behaviour was similar

between the species and did not alter with the approach of the breeding season.

In contrast to intraspecific aggression, interspecific aggression was not similar between species. In winter, trumpeters attacked mutes 22 times more frequently than they received attacks from mutes. In spring, trumpeters attack mutes 55 times more frequently than mutes attacked trumpeters. The frequency of these attacks appeared to be more than a response to violation of individual distance. The trumpeters recognised mutes as more than just associates and as something different from themselves.

Nest Phenology

That mutes nest earlier than trumpeters by about two weeks suggests that mutes should have an advantage over trumpeters in establishment of territories (i.e., pre-emptive exclusion competition). Their lack of dominance in individual encounters as documented here in the non-breeding season, if it carries through to the breeding season, may offset this possible advantage. They often must yield their territories to trumpeters (see below).

Body Mass of Trumpeters and Mutes

Large species can be expected to dominate small species. The mean winter mass of male (11.9 ± 1.1 kg) and female (10.3 ± 1.0 kg) trumpeters from Idaho and Montana (Drewien and Bouffard 1994) is comparable to winter mass of mute males (11.8 ± 0.89 kg) and female (9.67 ± 0.69 kg) in the Upper Thames Valley, England (Reynolds 1972) (Table 2).

Table 2. Body mass (kg) of male and female Trumpeter Swans and Mute Swans [Mean \pm S.D. (N)].

Winter Trumpeter Swans Idaho and Montana: November-January (Drewien and Bouffard 1994)	♂ 11.9 \pm 1.1 kg (N=152)	♀ 10.3 \pm 1.0 kg (N=120)
Winter Mute Swans England, Upper Thames Valley: September-March (Reynolds 1972)	♂ 11.8 \pm 0.89 kg (N = 59)	♀ 9.67 \pm 0.69 kg (N=35)

These mass records indicate no significant difference between the North America trumpeters and the European mutes. Trumpeter dominance over mutes is, therefore, not because of superior size.

Brood Breakup

Norman (1977) found that the grey plumage of juvenile mutes largely protected them from attacks by adults. I assume that the grey juvenile plumage of trumpeter cygnets serves the same function. In late March 2011, the trumpeter cygnets were well advanced in the molt and were dorsally predominantly white although still grey on the rest of their bodies. The broods were breaking up and particularly parent females (recognised by their wing-tags), were aggressively attacking and pursuing their own tagged cygnets.

Territory sizes of Trumpeters and Mutes

Trumpeter territories are relatively large. They were 60 ha on Peninsula Lake in Alaska. On the Copper River basin, nests were 1.6 km apart (Hansen *et al.* 1971). At Swan Lake in the Red Rock Lakes National Wildlife Refuge, Montana, which is shallow with irregular shoreline and numerous islands, seven pairs shared 500 acres (28 ha/pair). On the deeper, less well screened Lower Lake in that

refuge, 10 pairs shared 1500 acres (60 ha/pair) (Banko 1960). In Yellowstone Park, occupancy by a single pair was found on 29 lakes, some as small as 3.6 ha (Condon, 1941 MS and unpublished data cited in Banko 1960). On the entire 1200 ha of Wye Marsh, in Ontario, where trumpeters have nested since 1993, an aerial survey in July 2010 found five pairs, or 240 ha/pair. In spring 2015, there were four pairs, or about 300 ha/pair. In Ontario, small isolated lakes or wetlands are also occupied by single pairs.

Mutes in England, on the Windrush Trout Stream, held 12-20 territories on 39 km (1.9-3.3 km/pair). On the Upper Thames River, England, there were 7-12 territories on 40 km (3.3-5.7 km/pair) (Bacon 1980). Mutes sometimes nest colonially: at Abbotsbury, England, on the marine tidal Fleet, nests were within a few metres of one another (Birkhead and Perrins 1986); in colonies at Fulehøj, Denmark, territories were limited to 1-2 m surrounding the nest (Bloch 1970). These marine colonies were supported by superabundant food, usually in the form of beds of eelgrass (*Zostera marina*). At a shallow weedy fresh water lake at Alstar, Germany, territory size was 0.22 ha (150 x 300 m) (Hilprecht 1970, in Birkhead and Perrins 1986).

In Ontario, on the 16 ha Cranberry Marsh, seven pairs of mutes nested in 1983, holding territories of 2.3 ha/pair. In 1984, eight pairs held 2.0 ha/pair (Lumsden, unpub data.). Their assessment of adequate food for cygnets presumably cued these pairs to acquire and hold such small territories. Mutes defend their territories as vigorously as trumpeters and in rare instances, they can seriously injure or even kill antagonists (Ogilvie 1967, Birkhead and Perrins 1986).



Photo by Susan Grexton.

Changes in Territory Occupation in Ontario

While trumpeters have wintered in substantial numbers within the Ontario Mute Swan breeding range, they have only recently begun to nest there in any numbers. Domination by trumpeter pairs of mute pairs in breeding areas is usually accomplished by direct attack. At the Second Marsh in Oshawa, Ontario (43° 52' N, 078° 48' W), a trumpeter pair evicted the nesting mute pair in 2003 and successfully raised cygnets. In 2004-2006, the trumpeter pair did not raise cygnets. They raised four cygnets in 2007 but

failed again to raise any in 2008-2010 (D. McLaughlin, pers. comm.). From 2005 to 2009, mutes were present in this large marsh but did not nest. On a pond near Caledon, Ontario (43° 52' N, 80° 00' W), a sub-adult trumpeter, H19, and his mate evicted a pair of mutes in 2010 from the territory the mutes had occupied since 2008. In 2011, at the Valley Inn Marsh (47° 17' N, 79° 53' W) west of Burlington, Ontario, an adult trumpeter, A59, and his mate chased a mute female

off her nest, built their own nest at the other end of the marsh and hatched four cygnets (B. Kingdon, pers. comm.). In an encounter on 26 April 2011 at the mouth of the Credit River, Ontario (43° 33' N, 79° 35' W), an adult trumpeter male, E90, severely beat a territorial male mute (M. Bowers, pers. comm.). The pair, however, are not known to have nested there subsequently. On 19 September 2011, at LaSalle Park, an aggressive male mute with three cygnets charged a pair of non-

territorial trumpeters, 548 and E32. There was a fight and the mute was badly beaten. The male trumpeter chased the mute for over 200 m across the water, gripping the mute's back feathers and swimming and flapping in hot pursuit before he let go. The female trumpeter then joined her mate for a triumph ceremony (K. Intini, pers. comm.).

There are other marshes in Pickering, Ontario, including McLaughlin Bay (43° 52' N, 78° 47' W) and the Hydro Marsh (43° 52' N, 79° 02' W), in which mute pairs formerly bred and where trumpeters



Photo by Susan Greston.

now nest. It is not known if the trumpeters drove the mutes out or if the mutes moved away or died. There are three large wetlands in which several pairs of mutes now breed and have bred for many years: these are at the mouth of the Rouge River (43° 48' N, 79° 07' W), on Frenchman's Bay (43° 49' N, 79° 05' W) and Cranberry Marsh (43° 51' N, 78° 56' W). Trumpeters have bred in each but it is not known if they ousted a mute competitor at that time (H. Lumsden, pers. obs.).

Territorial mutes are sometimes able to defend their territories against sub-adult and unmated trumpeters. On 28 October 2011, a territorial pair of mutes in the cove at Bellhaven near LaSalle Park, chased seven unmated trumpeters. The male mute did not make contact with any, but flew and swam after them going from one bird to another, whichever was closest. He chased them for about

15 minutes and the trumpeters did not retaliate (K. Intini, pers. comm.).

Meyer *et al.* (2012) conjectured that "trumpeters were introduced into Cootes Paradise in 1982 with the hope that they would displace and exclude mutes. To date this has not happened. Instead Mute Swans appear to be outcompeting Trumpeter Swans for nest sites." The authors present no data in support of their conjecture of competition for nest sites. There were no trumpeters released in Cootes Paradise in 1982; the first release consisting of six yearling trumpeters occurred there in August 1988. It is not known when trumpeters first nested there. A pair nested successfully in 2005. Two pairs nested in 2014 but they failed to raise cygnets. One male was conspicuously aggressive to mutes. In 2015, a trumpeter pair excluded 30-40 non-territorial mutes from an extensive area;

however, they and another pair are not known to have bred. (T. Theismeyer, pers. comm.).

In Europe, the Whooper Swan (*Cygnus cygnus*), although smaller than the mute (Cramp and Simmons 1977) dominated both mutes and Tundra Swans (*Cygnus columbianus bewickii*) at the Caerlaverock National Nature Reserve in Scotland (Black and Rees 1984).

Conclusion

The activity budgets at LaSalle Park and the observations of displacement of territory holders during the breeding season shows that trumpeters consistently dominate mutes in Ontario. Trumpeters will prove to be very formidable competitors with the more established mute swans and I suggest they will eventually occupy the best habitat within the present Ontario Mute Swan range.

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Harry G. Lumsden
 44 Hillview Road
 Aurora, Ontario L4G 2M5