

Population Status and Reproductive Biology of the Mute Swan, *Cygnus olor*, at Long Point, Lake Erie, Ontario

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During 1991 - 1992, a study of the population status and breeding biology of the Mute Swan, *Cygnus olor*, was carried out at Long Point, Lake Erie. Thirty-one pairs with broods were located, 9 in 1991, 22 in 1992. Brood size ranged from 2 to 10, with 4 and 5 being the most frequent. Brood size averaged 4.9 at hatching and 3.1 at fledging, a value which compares with that of rapidly expanding populations in Europe. Aerial surveys in fall at Long Point revealed a peak total of 148 in 1991 and 172 in 1992, an increase of 14 %. A high proportion of "Polish" morph juveniles were detected.

Key Words: Mute Swan, *Cygnus olor*, status, reproductive biology, Long Point, "Polish" morph.

Mute Swans, *Cygnus olor*, were first reported breeding in the wild in Ontario in 1958 (Peck 1966), and in the Long Point area in the early 1970s (McCracken et al. 1981). The species was classed as a locally rare and irregular breeder at Long Point up to 1980 (McCracken et al. 1981). The population of Mute Swans at Long Point has increased considerably in the last decade; the species appears at present to be a common, widespread, conspicuous and regular breeder in marshes and wetlands around the Inner Bay at Long Point and in Turkey Point Marsh. In this paper, I report on the results of censuses of breeding pairs and non-breeding adults in 1991 and 1992 at Long Point, on the degree of reproductive success, and on evidence of a rapidly increasing and expanding population.

Methods

A census route was set up at Long Point (42° 35' N, 80° 24' W), using road accessible locations for viewing the marshes and wetlands around the Inner Bay. The route ran from the Long Point Provincial Park on the southeast corner around the perimeter of the bay to Turkey Point at the northeast corner of the bay. Numbers and locations of adults and young were recorded during each census. Counts were carried out in the morning every five to six days from 16 May to 25 August in 1991 (N = 14) and from 5 May to 20 August in 1992 (N = 16). Breeding pairs of swans showed high fidelity to given areas, hence a pair once found was relocated regularly in subsequent censuses. Pairs with broods, especially very young cygnets, were particularly easy to relocate. The ground censuses in 1992 were supplemented by boat trips to check the status of pairs that had taken their young into areas which were not visible from shore.

As part of a larger monitoring program of populations of waterfowl gathering at Long Point during

spring and fall, aerial censuses were flown in September and October of each year, before the arrival of fall migrant Tundra Swans, *Olor columbianus*. Mute Swans are easily located from the air; during each survey, the locations and numbers of Mute Swans seen were recorded and mapped.

Results

In total, 31 pairs with broods were located, 9 in 1991 and 22 in 1992. Brood size ranged from 2 to 10 young (Table 1), with brood sizes 4 and 5 being the most frequent. Average brood size at hatching was 4.3 in 1991 and 5.1 in 1992, with a mean and standard deviation for the two years of 4.9 ± 1.9 .

Eleven of 31 broods were raised without loss, and two pairs did not raise any young. Causes of cygnet mortality were not known in most cases. Snapping Turtles, *Chelydra serpentina*, were thought to be major predators on cygnets up to one month old elsewhere in North America (Palmer 1976), and loss of young to Snapping Turtles at Long Point was suspected in some instances. Rearing success tended to increase with brood size, although sample sizes for larger brood sizes were too small for statistical analysis. Conversely, all broods over six cygnets lost at least one young (Table 1), probably through the inability of the parents to supply all cygnets equally with food or to protect them from predators such as Snapping Turtles. Rearing success varied considerably among localities. Some areas had consistently low success rates; in one marsh complex, for example, four broods (two in 1991, two in 1992) resulted in only two young fledging out of 21 hatched.

In 1991, nine pairs with young were located. These pairs initially had 39 cygnets; 25 young were raised to at least 60 days of age, giving a fledging success rate of 64% and an average of 2.8 young per pair. In 1992, a more comprehensive search revealed larger breeding numbers than in 1991; 22 nesting

TABLE 1. Analysis of rearing success within brood sizes of Mute Swans, 1991-1992.

Brood size	N	Total number of young raised	Number rearing complete broods	Number losing at least one cygnet	Number losing complete broods
2	4	5	2	1	1
3	2	5	1	1	0
4	7	21	3	4	0
5	10	29	4	5	1
6	2	10	1	1	0
7	2	6	0	2	0
8	3	13	0	3	0
10	1	7	0	1	0

pairs were found. These pairs produced 112 cygnets and raised 71 young to at least 60 days of age, giving a fledging success rate of 63%, and an average of 3.3 young per pair.

Aerial censuses gave a fairly accurate reflection of size of the Mute Swan population at the end of the breeding season. The largest total in 1991 was 148 on 13 October, and in 1992 172 on 11 September. This represents an increase of 14% in the total number of Mute Swans between years.

A non-breeding flock of Mute Swans occurred in the marshes of Turkey Point during both summers. In 1991, numbers peaked at 31 (along with a Black Swan, *Chenopsis atrata*, presumably a local escape) in early July, and in 1992, they peaked at 35 in mid-June.

Discussion

The Mute Swan population in the Long Point area is rapidly increasing. The 14 % increase recorded for maximum counts between 1991 and 1992 is similar to the annual increase (12%) calculated over a 12-year period (1969 - 1981) for a population of Mute Swans which showed rapid increase in British Columbia (Campbell et al. 1990). Mute Swans, especially females, show high site-fidelity to their natal areas (Coleman and Minton 1979); therefore the increase in swans at Long Point is probably not due to recruitment from other areas, but from nesting success at Long Point and subsequent survivorship of young birds to their first breeding.

Brood size at hatching was 4.9 for the two years combined, slightly higher than found in Europe (for example, 4.5 for 13 years in Staffordshire, England; Coleman and Minton 1980). The number of cygnets fledged per breeding pair for the two seasons combined at Long Point was 3.1, comparable to rapidly expanding populations reported in Europe; values of 3.1 were determined in an increasing population in Denmark and 3.2 for a population in Latvia (in Eltringham 1966). In Britain, where the bulk of

Mute Swan research has been undertaken and where long-established populations are mostly stable, the number of cygnets per breeding pair in long-term studies was considerably lower, ranging from 1.4 in the Outer Hebrides to 2.2 in Oxford (Perrins and Reynolds 1967; Jenkins et al. 1976; Bacon 1980a; Perrins and Ogilvie 1981).

In an expanding population, the age structure of the nesting population could be skewed towards younger birds. There are no data on the age of the nesting birds at Long Point, nor is there a clear relationship between clutch size and age of breeding female in Mute Swans (Perrins and Reynolds 1967). Clutch size is correlated with season, larger clutches being laid earlier. First-time nesting females tend to lay later than older nesters, and thus have smaller clutches; otherwise there are no age-related correlations. One positive correlation seems to be between mass of breeding female and clutch size (Reynolds 1972). However, one intriguing aspect of the growing population of Mute Swans at Long Point is the proportion of the "Polish" morph among the cygnets. Cygnets of the Mute Swan show plumage polymorphism; in juvenile plumage, the "normal" morph is gray-brown, whereas the "Polish" morph is white. Bacon (1980b) advanced the hypothesis that there is an advantage to the heterogametic female to be white, because it enables her to establish a pair-bond and begin breeding earlier in low density and expanding populations. Some of the highest frequencies recorded for the Polish gene are in such populations (e.g., Munro et al. 1968). In 1992, the majority of cygnets at Long Point were white, at a ratio of about 7:1 white:gray-brown, and Long Point's Mute Swan population is expanding, hence lending support to Bacon's hypothesis.

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Supernumerary Clutches of Common Loons, *Gavia immer*, in Ontario

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Evidence for three or four-egg clutches of Common Loons reported by contributors to the Canadian/Ontario Lakes Loon Survey, along with previously published records, suggested reneesting is at least sometimes responsible, but laying by two females is sometimes likely. Genuine three or four-egg clutches cannot be entirely ruled out.

Key Words: Common Loon, *Gavia immer*, Ontario, supernumerary clutches.

The Common Loon *Gavia immer* usually lays two-egg clutches (Bent 1919; Palmer 1962; H. H. Harrison 1975; Cramp et al. 1977; C. Harrison 1978; Johnsgard 1987; McIntyre 1988). Although J. J. Audubon believed three eggs to be the usual clutch size (Bent 1919), Bent's assertion that three-egg clutches must be very rare is borne out by McIntyre's (1988: Table 2-5) summary of eight quantitative studies. Of 622 clutches considered, only five (0.8%) consisted of three eggs. Similarly, of 125 nests in the Ontario Nest Records Scheme, only one (0.8%) contained more than two eggs (Peck and James 1983), and only one of 192 nests (0.5%) reported to the British Columbia Nest Records Scheme contained three eggs (Campbell et al. 1990). No supernumerary clutches were found in 193 nests studied by Croskery (1991) in western Ontario. Three-egg clutches have been reported in Alberta (three records: Henderson 1924; Vermeer 1973), British Columbia (one record: Bennie 1979;

Campbell et al. 1990), Minnesota (two records: Hollis La Tourelle in Olson and Marshall 1952; McIntyre 1988), New Brunswick (one record: Boyer 1961), and Saskatchewan (one record: K. Yonge *vide* McIntyre 1988). McIntyre (1988) also reported seeing "two broods of three partially grown young that I could verify had come from the same nest," and there is a report of 14 three-chick broods among 333 broods (4.2%) recorded in Minnesota (K. V. Hirsch and C. L. Henderson. 1980. Results of an observer card program for Common Loons in Minnesota - 1980. Unpublished report, Minnesota Department of Natural Resources). Three four-egg clutches have been reported, one each in Minnesota (Zicus et al. 1983), New Hampshire (Nelson 1983) and Ontario (Peck and James 1983).

Nelson (1983) summarized three possible explanations for supernumerary clutches in Common Loons. The first was that two females laid in the same nest, as also suggested by Peck and James (1983) for a



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