

PAIR FORMATION IN CAPTIVE TRUMPETER SWANS

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ABSTRACT

Pair formation in captive adult Trumpeter Swans (*Cygnus buccinator*) was recorded from 1993 to 1996. Pairs formed in every month except May, September and December. Copulations were seen in every month except May, July, and September to December. A male homosexual pair was recorded.

INTRODUCTION

Ontario's Trumpeter Swan (*Cygnus buccinator*) restoration program is based on placing captive, mated pairs of swans in the hands of cooperators for care and breeding. Offspring are released into the wild at 2-years of age. In recent years, we have had 22-25 mated pairs and 10-16 breeding age but unmated birds in the program.

Occasionally, we lose one bird from a pair due to accident or disease. Our practice has been to bring the bereaved bird to Aurora, Ontario, and confine it in a pen separated from the resident birds only by wire mesh. This prevents aggression toward the stranger which might cause injury or death to the bird. After about a week, the newcomer is released with the residents with the expectation that it will eventually form a new pair bond.

There are few places where studies of marked Trumpeters of known age and sex can be carried out. Consequently, the literature on pair formation is often generalized. Delacour and Mayr (1945) wrote that, "Pair formation, which occurs in the fall in all temperate zone swans, takes place without elaborate displays".

Scott (1972) in his account of pair formation in swans stated that, "It is uncertain to what extent the slow process of pair formation begins on the wintering grounds. On several occasions the wild Bewick's Swans [*C. bewickii*] at Slimbridge [Wildfowl and Wetlands Trust, UK] have seemingly established bonds during their second winter but only one of these liaisons was still intact the following year. The Mute Swan *Cygnus olor* certainly enters into courtship in autumn and winter, but here again the majority of permanent pairs are formed in the herds of young birds after the adults have left to nest. In all probability most of the migratory species do likewise."

Palmer (1976) wrote that, "It is probable that Trumpeters engage in pair formation activity in their second winter. Probably all of them the following winter, regardless of the length of interval thereafter before they first nest. Since younger cohorts contain more birds than older ones (there is less time for attrition) it follows that nonproductive mated pairs i.e. mated pre-breeders can be numerous on summer range. Captive pre-breeders form temporary attachments culminating in a stable bond."

Mackay (1978) stated that, "young Trumpeters form pairs while in nonbreeding groups on the breeding grounds during the summer months."

Two studies of marked Trumpeters gave winter and fall as the periods during which pair bonds were formed. Monnie (1966) recorded pairing in 1964 among collared Trumpeters received as cygnets in 1962 at Lacreek National Wildlife Refuge (NWR). He wrote, "Courtship displays began in mid-January and continued intermittently until about mid-March ... Beginning in mid-January and continuing for a week the birds generally mixed freely and all sorts of combinations were recorded. However, beginning 23 January, the 20-month-old swans apparently were paired."

Turner (1988) at Grande Prairie also had collared swans for observation, and he reported, "Circumstantial evidence strongly suggests that pair formation occurs in the fall before the birds reach their wintering area." He reached this conclusion because none of his marked migrant Grande Prairie Trumpeters remained in the Tristate Region to breed among that resident stock, presumably because they had not formed pair bonds during the winter when the two stocks mixed. Contrary to this conclusion, Gale *et al.* (1987) stated, "In Wyoming, pair bond initiation occurred in mid- to late winter and through the spring. Pairing followed soon after the late winter dissolution of sibling group bonds, during a swan's

second or third winter.” Lockman *et al.* (1987), writing of the same area, reported that, “a peak of courtship activity was observed in April and early May.”

The closely related Whooper Swan (*C. cygnus*) of Eurasia forms pairs in winter quarters (Dementiev *et al.* 1967), and Cramp *et al.* (1977) writes that pair formation is slow; courtship occurs in winter flocks but more often in nonbreeding herds. Black and Rees (1984) also record a higher level of courtship display on the wintering grounds in the spring months. These authors did not report pair formation. However, Rees *et al.* (1996) did record courtship and pair formation as occurring in winter.

METHODS

Pair formation at Aurora was recorded from 1993 to 1996 among the captive Trumpeters. The swans were marked with a numbered aluminum band, on the right leg on males and the left leg on females. All were also marked with coloured darvic bands and/or yellow dye (picric acid) on various parts of the plumage. It was possible to recognize individuals at a distance, and, because all were in full view of the house, it was relatively easy to keep extensive records. The pen in which they were confined was 0.63 ha (1.56 acres). The pond was 0.27 ha (0.67 acres), 85m (94 yards) long, and contained two small islands.

RESULTS

Courtship behaviour

The first indication that a pair bond may be forming normally comes from nearest neighbour records. Over a period of days, the same two birds may be seen standing or swimming close together. Later, mutual head bobbing may be seen, which in time becomes exaggerated and which may include trumpeting. Finally, in a fully developed triumph ceremony, head bobbing becomes extreme, and the wings are partially spread and waved rather than flapped. Accompanied by much trumpeting, this display is used in courtship or as a threat and usually follows a fight, whether the pair wins or loses.

The Mute Swan expresses aggression by raising the humerus, radius, and ulna and by spreading the secondary feathers. In aggression and in courtship, the Trumpeter Swan may raise the humerus, radius, and ulna slightly, but the secondaries are not spread.

The pair may stand or sit in the water with their breasts pressed together or pressed on the partner's flank. If separated, the male may swim toward the female with beak pointed slightly downward, neck feathers slightly fluffed, and turning the head from side to side. Johnsgard (1965) reports mutual head turning in the Mute Swan, but I have not seen mutual head turning in Trumpeters.

Occasionally, the initial contact between potential mates may be almost violent, as in the case of male 728 and female 785.

Normally, when copulation occurs, one can consider that the pair is bonded, although this may not necessarily follow when subadults are concerned.

Pair bonding

Formation of new pair bonds among bereaved birds sometimes occurs remarkably quickly. Male 091 lost his mate on 14 January 1996 and was moved to Aurora. Two days later, he was seen in triumph ceremony with female 123, which was, prior to that time, an unmated 3-year-old. They remained close together thereafter. On 26 January, they were moved back to his original home pond and were later seen to copulate.

Female 785 lost her mate in August 1985. She, along with her two cygnets, was moved to Aurora on 20 September and confined in a holding pen. Male 728 was pinioned at the Veterinary College at Guelph and, on 7 October 1995, was brought to Aurora and confined in a small pen adjacent to that of female 785. On 14 October at 09:15, they were all released on the main pond. Male 728 immediately and aggressively chased female 785 as if to attack her. Finally, he cornered her in the angle of a fence and twice stood with his breast pressed against her body. His wings were closed but raised slightly over his back. Both intermittently bobbed their heads. At 12:45, he was following her closely, occasionally uttering brief, rapid trumpeting notes and holding his wings slightly raised over his back. At 17:25, he left her briefly to chase another male; returning immediately, they were both seen to perform their first triumph ceremony together. Meanwhile, the cygnets kept their distance. On 16 October, the female was seen to follow the male for the first time, and, by 22 October, her two cygnets were accepted by the male and stayed close to the new pair, behaving like a normal brood. On 7 February 1996, the pair were returned to the female's home pond where they nested that summer.

Male 272 was bereaved on 23 February 1996, moved to Aurora, and released immediately on the main pond. On 24 February, he was seen in triumph ceremony with an unmated 3-year-old female, 131. They then became inseparable and were first seen copulating in March.

Not all bereaved females will accept the first male that courts them. Two previously mated males, 135 and 745, formed a same-sex liaison, behaving like a pair. Frequently they chased other swans, triumphing regularly but deferring to a mated pair. Female 110 had lost her mate on 20 March 1996. On 12 April, I released her from a neighbouring pen onto the main pond. Both males 135 and 745 chased her aggressively and performed frequent triumph ceremonies over her. On 14 April, I returned female 110, along with male 135, to her former pen, excluding male 745 and other swans. Immediately, female 110 attacked male 135 and beat him severely until he fled and sought shelter under a dense rose bush, where she left him alone. I moved her back onto the main pond where male 745 immediately chased her vigorously. On 15 April, the two were staying close together. On 16 April, the two were on the water separated by about 8 m (25 ft). The male swam slowly toward the female with neck erect, beak pointed slightly down, and turning his head from side to side. He moved very close to her, almost touching, when she slowly turned away. On 23 April, 3 May, and 8 May, they were seen copulating but did not nest in 1996.

A pair, male 105 and female 791, nested for 3 years but produced no cygnets. They were brought to Aurora on 30 June 1995 and remained together until July, when another male, 134, hatched in 1993, was seen following her without interference from her former mate. They remained together, occasionally doing triumph ceremonies, and were moved back to her home pond on 1 August. Meanwhile, on 4 August, male 105 was first seen following female 120, hatched in 1993. They occasionally performed triumph ceremonies and were seen copulating on 11 August. They continued to do so almost daily until 17 September. They were moved to a cooperators pond on 20 November where they nested in 1996.

These are a few of the case histories of pair formation among captive Trumpeters at Aurora. We have records of 15 pair bonds formed in January (1), February (3), February-March (1), March-April (2), April (1), June (2), July (1), August (1), October (2), and November (1). Among these pairs, we have seen

pairs copulate in January (1), February (2), March (1), April (1), June (1), and August (1).

Subadults

Trumpeters hatched from eggs collected in Alaska were pinioned as yearlings and moved to Aurora in August to November 1994. Some of these birds formed pair bonds with older males during the fall and were moved to cooperators' ponds.

Ten of them remained at Aurora for an average of 10 months. In February and March 1995, many of these 20-month-old swans started courtship. They were frequently seen copulating but switched partners at intervals, as recorded by Monnie (1966) at the Lacreek NWR. Many of these birds were raised as siblings, and none of their sexual activities resulted in stable bonds. However, during the summer of 1995, it was clear that some had mated with older birds. These were moved to cooperators' ponds where two of these pairs bred in 1996.

Homosexual relationships

Male 105 was hatched in 1988 and raised by Ray Nash's captive pair. 105's breeding history is described above. He was returned to Aurora on 20 September 1996 after his mate and remaining cygnet were killed by a coyote. Male 124 was hatched from an Alaskan egg in an incubator. With others, he was raised unexposed to people until 12-weeks of age. He was, therefore, not imprinted on humans and would not follow anyone. He was moved on 30 October 1994 with female 787, with which he seemed to be paired, to a cooperator's pond. They did not breed in 1995 and were returned to Aurora on 25 May 1996, at the request of the cooperator. On 11 October 96, male 105 was released from a holding pen onto the main pond where six unmated mature females were present and available as mates. Almost immediately, he formed a homosexual attachment to male 124, and they were seen copulating for the first time on 15 November. They copulated repeatedly with much trumpeting, unlike normal pairs, through November and early December. On 22 December 1996 and again on 3 January 1997, the two performed pre-copulatory head dipping, and male 105 made a half-hearted attempt to mount, but gave up.

This is clearly homosexual behaviour and differs from the behaviour of the two males 135 and 745. Both had lost their mates in March 1996. Previously, 745 had bred successfully from 1990 to 1992. They first encountered one another on 14 March 1996 and became inseparable. They harassed other birds on the

pond with frequent triumph ceremonies and behaved in every way as a mated pair, except that they did not indulge in sexual behaviour. This association finally broke up when 745 formed a pair bond with the female 110 in April (see above). Male 135 went on to form an alliance with male 108 who had lost his mate in August 1996. 108 had bred in 1995 and 1996 and was an Alaskan cygnet raised unexposed to humans in the same manner as 105. These males remained together but did not have an alliance as intense as that of 135 and 745. They seldom harassed other swans and were never seen to copulate.

These alliances cannot be called homosexual relationships because copulation is not involved. Perhaps they can best be called homomorphic behaviour since the relationship is similar in form to that of a homosexual or heterosexual pair. Of similar form is the behaviour of two siblings or two females which use their alliance to dominate other birds in the flock. This kind of homomorphic behaviour appears to confer competitive advantage on the participants in that they displace other birds from the food hoppers and take over favoured loafing spots.

DISCUSSION

These observations were made on captive, flightless Trumpeter Swans. Flying birds in nature would not have encountered the densities imposed on these penned captives. Nevertheless, these data illustrate the capabilities of the species.

It is not always easy to determine when a pair bond has been consolidated. Generally, when a male and female have not been consorting but suddenly do so and start to perform the triumph ceremony, it is a good indication that a pair may be forming. When such behaviour persists for some time and culminates in copulation, one can be fairly sure that a bond has been consolidated.

Trumpeter Swans are long-lived birds and often form pairs away from a nesting territory and a year before they actually breed (Palmer 1976). Two birds in alliance are more likely to succeed in competition for nesting space than a single bird.

These captive data, and those of other studies, show a wide range of dates when pair bonds can be formed. At Aurora, there were only 3 months when none were seen, May, September and December. It is clear that many of the copulations seen had nothing to do with procreation. Presumably, the pleasure derived therefrom served as a bonding mechanism.

Increasing day length, which activates the reproductive system in most birds and stimulates courtship, song, and territorial behaviour, presumably operates on Trumpeter Swans. Thus, the hormone balance is activated which controls the production of testosterone and estrogens and stimulates the development of sperm and eggs. It is not surprising that half the pair formation recorded at Aurora occurred from January to April. More difficult to explain is the hormonal background to pair formation seen in June, July, August, October, and November. At a time of decreasing day length, one might expect regression of gonads and a decline in the hormone pattern which stimulates and controls courtship and pair formation. Nevertheless, copulations were seen in June and August, and the homosexual pair copulated in November and December.

LITERATURE CITED

- Black, J. M. and E. C. Rees. 1984. The structure and behaviour of the Whooper Swan population wintering at Caerlaverock, Dumfries and Galloway, Scotland: an introductory study. *Wildfowl* 35:21-36.
- Cramp, S. and K. E. L. Simmons, eds. 1977. *Handbook of the birds of Europe, the Middle East, and North Africa: the birds of the western palearctic, vol. 1: ostrich to ducks.* Oxford Univ. Press, Oxford, England.
- Delacour, J. and E. Mayr. 1945. The Family Anatidae. *Wilson Bulletin* 57(1):3-55.
- Dementiev, G. P. and N. A. Gladkov, eds. 1967. *Birds of the Soviet Union, Vol. 4.* Israel Program for Scientific Translations, Jerusalem.
- Gale, R. S., E. O. Garton, and I. J. Ball. 1987. The history, ecology and management of the Rocky Mountain Population of Trumpeter Swans. U. S. Fish and Wildlife Service, Montana Cooperative Wildlife Research Unit, Missoula, MT. 314 pp.
- Johnsgard, P. A. 1965. *Handbook of waterfowl behaviour.* Cornell Univ. Press, Ithaca, NY. 378 pp.
- Lockman, D. C., R. Wood, H. Burgess, R. Burgess, and H. Smith. 1987. Rocky Mountain Trumpeter Swan Population, Wyoming flock. Unpublished report. 73 pp.

- Mackay, R. H. 1978. Status report on Trumpeter Swan (*Olor buccinator*) in Canada. COSEWIC. Unpublished report.
- Monnie, J. B. 1966. Reintroduction of the Trumpeter Swan to its former prairie breeding range. *J. Wildl. Manage.* 30(4):691-696.
- Palmer, R. S. 1976. Handbook of North American birds, Vol. 2 (Part 1). Yale Univ. Press, New Haven, CT. 521 pp.
- Rees, E. C., P. Lievesley, R. A. Pettifor, and C. Peirins. 1996. Mate fidelity in swans: an inter-specific comparison. Pages 118-137 *in* J. M. Black, ed. Partnerships in birds: the study in monogamy. Oxford Univ. Press, Oxford, England.
- Scott, P. and the Wildfowl Trust. 1972. The swans. Houghton Mifflin Co., Boston, MA. 242 pp.
- Turner, B. 1988. Summary of results of Grande Prairie Trumpeter Swan collaring program. Page 28 *in* D. Compton, ed. Proc. and Papers Tenth Trumpeter Swan Society Conf., The Trumpeter Swan Society, Maple Plain, MN.