Prolonged association between a pair and a related male in breeding Whooper Swans 
(Cygnus cygnus)

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Abstract: Waterfowl (Anatidae) are a group of birds in which parental care is performed by both parents (a pair) or, less often, by females only. Alternative social systems in this group have been recorded only occasionally. This paper describes three unusual cases of prolonged association between a pair and an additional male (the offspring or sibling of the primary pair) in breeding Whooper Swans (Cygnus cygnus). In all instances the three birds displayed no antagonistic behaviour towards family members, participated in territorial defence, and bred successfully. These cases are unusual in light of what is currently known about the social system of the highly territorial Whooper Swan in particular and of Anatidae in general, and are typical of cooperative breeding. This shows that swans may occasionally form an alternative social system.

Key words: Anatidae, cooperative breeding, kinship pattern, social system

In cooperative breeding, a pair is often accompanied by a ‘helper’ or ‘helpers’ that, though neither mate nor dependent offspring, assist in nesting, feeding, or territorial defence (Koenig and Dickinson, 2004). Far more is now known about this social system since the report by Skutch (1961). A review of parental care patterns shows that cooperative breeding occurs in 9% of bird species (Cockburn, 2006). Although this social system is more widespread than previously recognised, it is less common in nonpasserines and relatively rare in species breeding in the extreme latitudes of the Palearctic and Nearctic (Jetz and Rubenstein, 2011).

Parental care of brood and offspring in waterfowl (Anatidae) is usually undertaken by both pair members or, less often, by females only. Alternative social systems, such as cooperative breeding, in this group of birds have been recorded only occasionally (Cockburn, 2006). To date, cases of such breeding have been recorded in just four species, which may very occasionally make use of this social system: Mute Swan (Cygnus olor), White-fronted Goose (Anser albirostris), Greylag Goose (Anser anser), and Hawaiian Goose (Branta sandvicensis) (Carboneras, 1992; Ely and Dzubin, 1994; Banko et al., 1999; Włodarczyk and Kolaciński, 2001; Cockburn, 2006). In the Whooper Swan (Cygnus cygnus), however, cooperative breeding or the presence of ‘helper(s)’ has never been reported before.

The Whooper Swan, a subarctic and taiga species breeding in northern Eurasia (Cramp and Simmons, 1977; Brazil, 2003), is tending to extend its range southwards (Profus, 1999; Boiko et al., 2014; Dudzik et al., 2015). Outside the breeding season, this species is sociable and gregarious, coexisting with other swans during migration and wintering (Brazel, 2003). During the breeding season, however, it is monogamous and highly territorial (Cramp and Simmons, 1977; Rees et al., 1997; Carboneras and Kirwan, 2017), intolerant of other swans, and behaving aggressively towards other bird species (Black, 1988; Brazil, 2003). The offspring (cygnets) stay with their parents throughout the winter, not leaving them until early spring, soon after arrival at their breeding grounds (Brazil, 2003).

Based on individually marked birds, we now describe three different cases of prolonged association between a pair and an additional male in a breeding population of Whooper Swans living on the edge of their breeding range. We also highlight for the first time kinship patterns between the birds in these atypical groups.

This study was carried out in the uplands of southern Poland (the centre of the study area: 50°45’N, 19°50’E) on an area of ca. 110,000 ha, including 30 fishpond complexes (Włoszczowa Basin Important Bird Area; Dudzik et al., 2015).
surrounded by a broad belt of reeds (*Phragmites australis*), deeper than 80–120 cm and with numerous sandbanks, surrounded by a broad belt of reeds (*Phragmites australis*). The main fish species farmed there is carp (*Cyprinus carpio*). The fish were fed three times a week, mostly on wheat grain.

This new subpopulation of the Whooper Swan established itself in 2003; by 2017 a total of 53 broods in 11 breeding territories were counted. Only one pair bred at each site (i.e. fishpond complex). From the first brood onwards, we began the regular collection of data relating to the annual breeding cycle and success of each pair. During the breeding period (April–September; see Dudzik et al., 2014) we checked all the breeding sites two–four times per month, increasing the frequency of territory inspections before the expected hatching date to about twice a week. We also captured and marked individuals within the study area. Between 2004 and 2017 a total of 80 birds (46 males, 31 females, three individuals of unknown sex) from 10 territories were ringed. The captured individuals were sexed by cloacal examination based on the presence/absence of an internal penis (Baker, 1993). The birds were marked with metal rings and yellow neckbands with four-digit alphanumerical codes.

The first prolonged association between a pair and a related individual was observed at the Chorzewa fishponds (50°42ʹ N, 20°14ʹ E) in 2006. The pair was associated with an additional male in its second calendar year of life. Two of the three birds were related: the collateral male (3R23) was one of the offspring of the adult primary male (3R22). We did not observe any antagonistic behaviour between the pair and the additional male during incubation or the cygnet rearing period. The males were accepted by the female and regularly stayed together at distances as close as 1–2 m. While the female was incubating, both males remained at distances of 2–30 m from the nest. The pair and the collateral male were observed on 29 May 2006 while leading three cygnets (aged 3–4 days). The adult male behaved aggressively towards other waterfowl present in their territory, especially towards nonbreeding Mute Swans and white-plumaged domestic geese (*Anser domesticus*) from the nearby bird farm. The pair, accompanied by the additional male, nested again in 2007 and 2008, when they successfully reared three (Figure 1A) and one cygnet, respectively. During the 2008 breeding season, the three cygnets hatched the previous year were regularly recorded in close proximity (up to 5 m) to the pair, their nest, and the additional male. None of the birds exhibited any antagonistic behaviour towards each other. The three young birds remained on the territory until 17 May, when the pair was tending the 2-day old cygnet. On 5 April 2009 we found the freshly dead primary male 3R22 in the breeding area (cause of death unknown); afterwards the additional male 3R23 continued to be seen near the incubating female. The male 3R23 and the female held the territory thereafter, but none of their broods in 2009–2012 were successful.

The second such prolonged association was recorded at the Kwilina fishponds (50°41ʹ N, 20°00ʹ E) in 2014. The adult male 1R25 and female AC4972 had been accompanied by the additional male AC4971 since May 2013. In this group the female and collateral male were siblings from the same brood (the offspring of the partnership described in the first case, hatched in 2007). In 2014, these three birds spent the breeding season together; during this time they nested, chased away Mute Swans, and defended their territory. There were no hints of any aggression between the female and the two males. The distance between the two males and the female (including the incubation period) varied from 0 to 50 m. The additional male was recorded at the breeding site until 23 May 2014, after which he disappeared. On 31 May 2014 we observed this pair with one cygnet (3–4 days old). This pair, now without the additional male, bred again in 2015, when they reared six cygnets.

The third prolonged association, recorded in 2016, related to the same pair and site as described in the previous record. In spring the pair (1R25 and AC4972) and a new additional male 2T21 (one of the offspring of this pair, hatched in 2015) were seen together. The additional male stayed close (5–20 m) to the incubating female and no aggression by either of the pair against the additional male was observed. On 11 May the pair without the collateral male was seen with three cygnets (1–2 days old). After having lost all their cygnets in June, the pair was again seen with the additional male (Figure 1B).

The Whooper Swan is a monogamous and highly territorial species, defending a breeding territory, especially the nest site and its vicinity suitable for the young to forage in (Kear, 1972). In Finland, where the population of Whooper Swans was rated on 5000–7000 breeding pairs (Valkama et al., 2011), only a single pair may occupy a lake. Rarely, two pairs can breed at one water body, which however, has to be large enough (150 ha or more) and rich in emergent vegetation to limit the possibility of visual contact between pairs (Antti Haapanen, personal communication). An exceptional record of a small colony of Whooper Swans was noted once in Russian Karelia (Kivirikkko, 1942), where five pairs nested on the same small island on a lake located close to a village, where birds were fed by people.

The presence of an additional individual in the territory and the prolonged association between a pair and a closely related individual is unusual in the light of knowledge of the Whooper Swan’s social system (Brazil, 2003; Carboneras
and Kirwan, 2017). The kinship between the birds in the cases described above indicates that breeding pairs are supported by their relatives, a male sibling or descendant, which participate in territorial defence. The reciprocal interaction between the group members fulfills to some extent the criteria of cooperative breeding, in which an additional individual participates in reproduction but is not a mate (Koenig and Dickinson, 2004).

A case of prolonged association in swans between a pair and an additional individual during the breeding season was described in the Mute Swan. Here, an immature individual accompanied a breeding pair until the day before hatching, when the aggressive behaviour of the adult male increased considerably and chased the additional bird away (Włodarczyk and Kołaciński, 2001). Possible kinship patterns between the pair and the additional bird (the sex of which was undetermined) were not known in that particular instance of an alternative social system. No prolonged association between a breeding pair and a descendant/sibling in the Whooper Swan has yet been reported. Sikora et al. (2012) list four types of partnerships of the Whooper Swan in Poland: pairs (94.7% of broods, n = 297), a mixed pair with a Mute Swan (1 case; 0.3% of broods), a trio of a pair of Mute Swans and a single Whooper Swan (11 cases at 4 sites; 3.7% of broods), and a trio of Whooper Swans (4 cases in 2 territories; 1.3% of broods). In the last instance, the Whooper Swan trios successfully reared cygnets only in one case, but the large number of cygnets (10) and the differences in their plumage led the authors to conclude that two females were involved in this successful brood (Sikora et al., 2012). A record of a male associated with two females was also noted in Sweden, where all three birds occupied territory for at least 5 years and both females incubated the same nest mound side by side (Blomgren, 1974).

A pair with an additional individual may provide extra protection of the nest, nesting female, and eggs in that vigilance is enhanced and territorial defence is strengthened by the participation of the extra bird. In swans, cygnets benefit from the prolonged association with their parents (in the first autumn and winter) by learning appropriate feeding, resting, and migration behaviour (Brazil, 2003) and achieve a higher social status in a wintering flock than solitary individuals, as is the case with Greylag Geese (Kotrschal et al., 1993). Moreover, the enlarged family group improves protection of the territory against Mute Swans, which are common breeders in the same habitat of the study area (Dudzik et al., 2010a). In our study, however, the production of cygnets in broods of prolonged association between a pair and a related male (2.2 hatched cygnet per successfully breeding pair; n = 5) was noticeably lower than in normally breeding pairs (4.8 cygnet per pair; n = 31).

In the newly established population of Whooper Swans in central Europe, where the number of conspecifics is low, the level of potential competition and aggression among individuals may be rather lower than in an area with a larger population. As a result, some pairs may tolerate their relatives, such as offspring from a previous year or years, over an extended period, as Whooper Swans reach maturity at 2–3 years (in captivity) and make their first breeding attempt at age 4–7 years (Brazil, 2003). Moreover, the ready availability of foraging in food-rich fishponds may reduce territorial behaviour, which in turn might explain the acceptance of an additional, related male in the territory. Although swans in our study were rarely and irregularly observed at fish feeding sites, they may apparently consume fish feed (e.g., wheat grain). Additional food resources may limit food competition, which is common among birds arriving at breeding grounds in spring (Haapanen and Hautala, 1991). It is also worth mentioning that in the second case described above the birds from the prolonged association were siblings (the nesting female and the additional male) and offspring of the pair and additional male described in the first case.
Both birds were raised in a family with an additional male and so a social system of this kind could have been imprinted.

In conclusion, these cases of prolonged association between a pair of Whooper Swans and a closely related individual during the breeding period are unusual in light of what is known about the social systems of this species in particular and of Anatidae in general. This indicates that swans may occasionally form an alternative social system, but this will require further study.

References


