

Brood attendance and brood care in the Marbled Teal, *Marmaronetta angustirostris*

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GREEN, A. J. (1997): Brood attendance and brood care in the Marbled Teal, *Marmaronetta angustirostris*. J. Orn 138: 443–449. — Brood attendance by adults in the globally threatened Marbled Teal *Marmaronetta angustirostris* was studied in the field in Spain and Turkey. In seven broods, only one adult (thought to be the female) was seen attending. Two adults were in attendance for 10 broods, amongst which all age classes were represented. These were confirmed to be a male and a female in four broods observed at close range. When these four broods were disturbed, the female led the ducklings into emergent cover whilst the male remained close to the human observer, flying around or past him repeatedly and giving conspicuous alarm calls. This may be a form of paternal care (guarding or warning behaviour) as it was never observed in males not accompanying broods. Paternal brood attendance and care has not been reported in other Aythyini (pochards), but Marbled Teal have monochromatic plumage and other features associated with paternal brood attendance and care in Anatini (dabbling ducks).

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Introduction

Following the classification of LIVEZEY (1986), biparental care is the norm in Anatidae subfamilies Dendrocygninae (whistling ducks) and Anserinae (geese and swans), but a variable pattern is observed within the Anatinae (AFTON & PAULUS 1992). In tribes Oxyurini (stiffetails), Mergini (sea ducks) and Aythyini (pochards), only females have been reported to attend young (AFTON & PAULUS 1992). In the Anatini (dabbling ducks), biparental brood rearing is considered a primitive character (LIVEZEY 1991) and males often attend and care for broods with the females in southern hemisphere species, whereas female-only care is observed in northern hemisphere species (MCKINNEY 1991). The Marbled Teal *Marmaronetta angustirostris*, a globally threatened species (GREEN 1996a, 1996b), is the member of Aythyini considered to have the most primitive characters (LIVEZEY 1996) and its ecology is more like that of a dabbling duck than of a pochard (GREEN in press a). In this study, I provide the first detailed information on brood attendance and behaviour in Marbled Teal, and show that males often attend broods with the females and exhibit possible paternal care in the form of guarding and warning behaviour. This is the first report of possible paternal care in the Aythyini.

Methods

Male Marbled Teal are very similar to females (JOHNSGARD 1961), but when observed carefully can be distinguished by their darker and more extensive eyepatch, more squarish head, a more developed crest and a different coloured and slightly longer bill. Males have a glossy black bill,

whereas females have a dull black bill with a greenish patch of variable size at the base of the upper mandible (NAVARRO & ROBLEDANO 1995; GREEN in press b). Marbled Teal show little sexual dimorphism in body size. On average, males are only 6.0 % heavier than females and 2.7 % longer in wing chord but have 5.5 % longer bills (GREEN in press b).

Brood observations were made during studies of Marbled Teal ecology in the Marismas del Guadalquivir and El Hondo in Spain and the Göksu Delta in Turkey from 1994 to 1996 (GREEN in press a, c). Individual ducks move frequently between the different sites in Spain, but no exchange is thought to occur between Spanish and Turkish populations (GREEN 1993; NAVARRO & ROBLEDANO 1995; GREEN & NAVARRO 1997). See GREEN (1993, in press a, in press c), NAVARRO & ROBLEDANO (1995) and GREEN & NAVARRO (1997) for details of study sites.

Where second adults accompanying broods could not be sexed with total reliability, they are referred to below as *presumed* males. Broods were divided into standard age classes (LARSON & TABER 1980). Hatching date was estimated based on a study of growth of Marbled Teal ducklings in captivity (M. VANHOOF & J. HUNTER unpubl.). Each brood was observed up to three times, using location, number and age of ducklings to distinguish them. Ducklings without attending adults were not tallied as "broods". Observation periods varied from several minutes to three hours. However, owing to their preference for densely vegetated microhabitats, most broods were only seen when disturbed by my presence, and observations of undisturbed behaviour were rarely possible. Distances between birds, the observer and cover were estimated visually.

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Results

Ten of 17 (59 %) Marbled Teal broods observed at three locations were closely attended at some stage by two adults (Table 1). In all four cases where the sex of both adults was identified with certainty, they were a male and a female. Two adults were seen attending broods of all ages (Table 1). Males were not seen attending broods without females. Although broods attended by two adults hatched earlier on average than those attended by one in all three study sites, sample sizes were too small for statistical tests.

Detailed observations are presented below by locality. In all five cases where males showed guarding behaviour, they produced alarm calls from an alert posture with crest raised, thrusting the head backwards 1–2 cm while producing a call. This call sounded similar to that produced by courting males when doing *head-jerk* displays, which has been described as a nasal squeak (JOHNSGARD 1965; CRAMP & SIMMONS 1977). The head movement during these alarm calls is not as exaggerated as during courtship, when the head reaches the back (VON DE WALL 1962; JOHNSGARD 1965; CRAMP & SIMMONS 1977).

Presence of male and female Marbled Teal with broods observed in Spain and Turkey in 1994–1996. The first figure gives the number of broods attended by two adults. The second figure gives the total number of broods attended by at least one adult. Broods sometimes attended by two adults and sometimes by one were classified as attended by two. Two groups of ducklings in Turkey which were attended by no adults are excluded.

Country	Locality	Duckling age class			Total
		I	II	III	
Spain	Marismas	0/1	3/3	0/1	3/5
	El Hondo	1/2	2/3	0/0	3/5
Turkey	Göksu Delta	2/2	0/3	2/2	4/7
Total		3/5	5/9	2/2	10/17

Marismas del Guadalquivir

On 28. 7. 1994, I surprised a brood in a 60 ha reservoir in Veta la Palma estate. A female led the seven ducklings (class IIc) quietly into cover (inundated, dead *Arthrocnemum macrostachyum*). She swam very low in the water, with her neck extended and mantle submerged. As they reached cover, a male took off from nearby and repeatedly circled me, landing in the water at the completion of each revolution. After landing he observed me in alert posture for a while while swimming around and giving alarm calls before taking off again. When on the water, he kept at a distance of over 30 m to the female and brood, but was probably in vocal contact. He changed his position repeatedly in response to my own movements, maintaining a clear view of me.

On 26. 7. 1996, two class IIc broods of 8 and 7 ducklings were observed together in a similar reservoir for three hours, relatively undisturbed by my presence. The females attended closely throughout, and the two broods often mixed together and then separated again while feeding, without any aggression or changes in number of ducklings. When roosting on the shore of an island, both broods were joined for periods of c. 10 minutes by presumed males, which flew or swam to join them from a separate group of up to seven roosting adults. The presumed males left the broods again when the latter returned to the water to feed.

Alicante

On 8. 6. 1995, I disturbed a brood (class IIc) while walking along a bank above a ditch at the edge of a reservoir in El Hondo. Both adults flew away together on my approach, leaving the young to find cover in a stand of *Phragmites australis*. On 10. 6. 95, I disturbed presumably the same brood in the same place. The female led the five young away from me along the edge of the ditch to my right, walking quietly with her head held down, through a dense stand of *P. australis* and *Tamarix boveana*. The male jumped onto the water in front of me and began giving alarm calls, then flew

along the ditch, landing 30 m to my left, where he continued calling. He flew along the ditch in opposing directions three more times, passing me each time, landing and calling before changing direction, before disappearing into the vegetation in the area where the brood was now located.

On 7. 6. 1995, I disturbed a class IIa brood in similar habitat, and the six young hid under *P. australis* and *T. boveana* vegetation while the female flew from place to place in the ditch, in alert posture but without calling. No male was observed, but when I returned half an hour later, two adults flew out together, although I could not see the ducklings. I saw presumably the same brood a day later, when the female led the ducklings away across the reservoir and no male was seen.

Göksu Delta, Turkey

On 13. 7. 1995, canoeing in Lake Akgöl, I came across a female and class Ia duckling. The female conducted a distraction display, then led the duckling towards a patch of *Scirpus litoralis* 350 m away. As her distance from me increased, she began swimming quietly with her mantle submerged. As they reached cover, a male appeared and landed at the initial location of the female, giving alarm calls before flying some way towards the female and then back towards me, landing and calling repeatedly. On this occasion the male may have been alarmed because he had lost contact with the female and brood, rather than by my presence.

On 14. 7. 1995, I disturbed a class III brood attended by two adults along the bank of an oxbow lake. The female led the nine young away quietly towards an island where they took cover in *P. australis*. The male remained 20 m from me giving continuous alarm calls until the other birds reached cover. Then he began to fly up and down the centre of the oxbow, parallel to the bank, landing and calling before flying the other way and passing me again. The intervals between his alarm calls were about 1 sec in duration. Finally he flew back to rejoin the brood. Five days later, a male was still attending the young, although they had now fledged. Upon my approach, he flew up and down the oxbow and gave alarm calls as before, although less frequently, with intervals of about 5 secs. When this family was seen again on 2. 8. 95, no apparent paternal care was observed, although a probable adult male was still present.

Three other apparent family parties of fledged juveniles and adults were seen in the Göksu Delta, and two adults were present in two of these parties. This suggests that both parents may often stay with juveniles for a while after fledging.

Discussion

Owing to the previous lack of detailed studies of this species, there are no previous references to brood attendance by male Marbled Teal in the literature (CRAMP & SIMMONS 1977; GREEN 1993), yet I am not the first to make such observations. Males were reported to attend two of three broods observed closely from hatching to fledging in lagoons of the Doñana Biological Reserve, Marismas del Guadalquivir, 1974–1975

(unpublished diaries of H. KOWALSKI, held by Estación Biológica de Doñana). On 28. 6. 1974, a vigilant male was in close attendance of a brood less than five days old, but only the female was observed on 10 subsequent occasions (latest 6. 8. 1974). A second brood was only attended by the female on 11 occasions spanning from 4. 7. 1975 (when two days old) to 14. 8. 1975. A third brood was seen on six occasions between 7. 7. 1975 (when two days old) and 2. 8. 1975. On the first five occasions, only the female was in attendance. On the last occasion, two birds were with the brood but left it alone for 15 mins when they flew to another lagoon nearby. The two adults returned together, when the young joined the female who then lunged at the presumed male, who remained nearby but at some distance from the young.

Thus, male Marbled Teal regularly show brood attendance. Despite extensive field observations, I have no evidence to support previous reports that males desert their mates when egg-laying begins and then gather into small flocks (DEMENTIEV & GLADKOV 1952; CRAMP & SIMMONS 1977), which appear to be erroneous (see NAVARRO & ROBLEDANO 1995). Although I was unable to confirm the sex of attending adults on every occasion, when two adults accompany a brood in other monochromatic Anatinae species, they are almost invariably a male and a female (SIEGFRIED 1974).

Male Marbled Teal appeared to act as a guard to the female and her brood when threatened by humans. This is the most likely function of this male behaviour, since I have never observed such behaviour in other contexts (i. e. during countless observations of males in the absence of broods during the breeding or non-breeding periods). However, similar behaviour has been observed in males thought to be attending incubating females (M. YUSTE pers. comm.). There may be a division of labour in the roles played by the sexes when both are attending a brood, with males monitoring and perhaps distracting predators. However, such clear division of labour has not been reported in those Anatini showing paternal care (NORMAN & MCKINNEY 1987; MCKINNEY & BREWER 1989; LIVEZEY 1991; MCKINNEY 1991).

Male breeding strategies appear to be complex in the Marbled Teal, and males may vary in the extent to which they attend and show care for broods in a way similar to that observed in Speckled Teal *Anas flavirostris* and Brown Pintail *A. georgica* (MCKINNEY & BREWER 1989). Male roles could be subtle, e.g. sampling the environment to identify suitable feeding areas and later leading the hen and brood to those areas (see AFTON & PAULUS 1992). Paternal care may help to explain the high apparent survivorship of Marbled Teal ducklings from hatching to fledging (GREEN in press c).

In Anatinae species in which the presence of males with broods is highly variable, male presence with broods may primarily reflect the males' interest in maintaining the bond with the female to permit subsequent breeding with her the same or the following year (MCKINNEY 1991; SORENSON 1991). However, there is no evidence from the field or from captivity that Marbled Teal females with broods are capable of reneesting the same year (CRAMP & SIMMONS 1977; GREEN in press c; GREEN et al. submitted). Furthermore, long-term pair bonds appear rare or absent in Marbled Teal,

which mainly pair up on breeding sites shortly before nesting. Only about 5 % of Marbled Teal were apparently paired at Sidi Bou Rhaba, Morocco (a major wintering site, GREEN 1993) on 12–24 February 1995 (A. J. GREEN unpubl. data). I have seen pairs in the Marismas del Guadalquivir as early as 13 December, and it is possible that a small proportion of birds remain paired inbetween breeding seasons. Thus, it is unclear if males can benefit from future matings by attending females with broods in this species.

The Marbled Teal is considered as the closest living relative to the ancestor of the Aythyini (LIVEZEY 1996). The current study suggests that biparental brood rearing may be a primitive character in the Aythyini. Among the Anatini, loss of biparental care of young appears to have coevolved with characters such as seasonal plumage dichromatism, migratory habit, breeding at more extreme latitudes and predictability of food resources (KEAR 1970; LIVEZEY 1991; MCKINNEY 1991; SORENSON 1991). A similar coevolutionary trend may have occurred in the Aythyini, since Marbled Teal breed at lower latitudes than other northern hemisphere Aythyini, which show greater dichromatism, no paternal care and undergo more predictable migrations (CRAMP & SIMMONS 1977; LIVEZEY 1996). The one exception is the probably extinct, near-monochromatic Pink-headed Duck *Rhodonessa caryophyllacea*, which bred at even lower latitudes than Marbled Teal and whose parental care was never described (DEL HOYO et al. 1992).

A detailed study involving marked individuals is required to clarify the nature and function of male brood attendance in Marbled Teal. Male behaviour when broods are threatened by natural predators has yet to be described. Marking is essential to confirm that adults seen attending broods were paired prior to hatching (see MCKINNEY 1985), and to assess the frequency of mate retention between years.

Zusammenfassung

Die Anwesenheit von adulten Marmelenten bei Jungen wurde in Spanien und in der Türkei untersucht. Bei 7 Bruten konnte nur ein Altvogel festgestellt werden (vermutlich das Weibchen). 10 Bruten aller Altersklassen wurden von zwei Altvögeln begleitet. Unter ihnen konnten bei 4 Bruten aus größerer Nähe ein Männchen und ein Weibchen nachgewiesen werden. Bei Störung führte das Weibchen die Jungen in deckende Vegetation, während das Männchen in der Nähe des Beobachters blieb, ihn um- und überflog und auffällige Alarmrufe hören ließ. Dieses Verhalten kann man der Brutpflege zuordnen (Bewachung und Warnung); bei Männchen, die keine Brut begleiten, wurde es nie beobachtet. Brutbegleitung und -fürsorge von Männchen wurde bei Aythyini nie nachgewiesen. Marmelenten tragen einfarbiges Gefieder und weisen andere Merkmale auf, die bei Anatini mit männlicher Brutfürsorge auftreten.

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