A Brazilian Merganser *Mergus octosetaceus* nest in a rock crevice, with reproductive notes

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Um ninho de pato-mergulhão *Mergus octosetaceus* foi encontrado em fenda de paredão rochoso no Parque Nacional da Serra da Canastra, estado de Minas Gerais, Brasil. Cerca de 20 dias após sua descoberta, o ninho foi visitado para medição e pesagem dos ovos e acompanhamento do comportamento parental. Nesta ocasião, os sete ovos estavam muito frios e a fêmea não foi localizada. A presença do macho chamando por ela toda manhã nos faz acreditar que ela possa ter morrido, e não abandonado o ninho. Até o presente, havia registro de apenas um ninho desta espécie, encontrado em cavidade de árvore na mata ciliar em Misiones, Argentina, em 1956. Sendo o único registro de ninho para a espécie, acreditava-se que o pato-mergulhão fosse dependente de mata ciliar com árvores de grande porte para sua reprodução. O registro aqui apresentado é de fundamental importância para a conservação e manejo da espécie.

Brazilian Merganser *Mergus octosetaceus* is one of the most endangered bird species in Brazil and the world[5,7,12]. In Paraguay, it was last recorded in 1984, and there appears to be little suitable extant habitat[5]. Only singles have recently been reported in Argentina[4,10].

In Brazil the known distribution of *M. octosetaceus* formerly encompassed the states of Goiás, Minas Gerais, Mato Grosso do Sul, São Paulo, Rio de Janeiro, Paraná and Santa Catarina[1,13]. In recent decades, it has been found in only a few regions, principally protected areas, such as Chapada dos Veadeiros National Park, Emas National Park and Serra da Canastra National Park and its surroundings[7,16,17] (Fig. 1). The species' presence was recently confirmed in western Bahia[15], and Jalapão State Park, Tocantins[6], thus broadening its known distribution.

Brazilian Merganser naturally occurs at low densities and its rarity is not only a consequence of human threat. By the 1940s it was already considered one of the rarest birds in South America[10]. There is very little biological information for the species[2,14,16]. The only documented record of a *M. octosetaceus* nest is from 1954, by Partridge, who found one in a tree hole beside the Arroyo Urugua-í, in Misiones, Argentina[14]. Giai[8] claimed that the species nests on rocks or aquatic vegetation, without providing details. Thus, it was believed that *M. octosetaceus* was dependent on gallery forests for nest sites.

Observations

While conducting a Brazilian Merganser survey in and around the Serra da Canastra National Park, Minas Gerais, we were fortunate to find a nest of the species on 27 June 2002, beside the Matinha watercourse. We initially observed a female landing on a rocky wall a few metres above the stream. As we already suspected this habitat could be used for nesting, we searched several crevices and soon found the female incubating. The eggs were laid in a depression in the rock, and the female did not leave the nest while we were close to the crevice.

Only the female incubated, leaving the nest at least once per day to feed. The male spent most time feeding or resting nearby, constantly vigilant, but sometimes flew off, departing the area for several hours. Once, the female left the nest, flew to a nearby river pool calling and was joined immediately by the male. They vocalised for several minutes. When leaving the nest, the female covered the eggs with down feathers, apparently from its own body.

The region surrounding the nest was dominated by open grassland, grassland with scattered shrubs and fields. The stream has a number of waterfalls and pools of different sizes and depths. Immediately in front of the nest, the stream flows through a small, narrow canyon. A few metres upstream is a large pool, where the male frequently swam, sometimes calling the female. The canyon opened into other smaller pools where the pair fed (Fig. 2).

The rock wall harbouring the nest was c.13 m high (Fig. 3) and the crevice used for nesting was 10.5 m above water level. The opening faced east, but sunlight did not enter the crevice, at least at this season. Minimum temperatures within the crevice were 13ºC and 14ºC on two consecutive nights. Maximum daytime temperature was 22ºC. The crevice measured as follows: maximum height at entrance, 30 cm; minimum height at entrance, 18cm; maximum internal width (c.0.60 m near the opening), 0.7 m; maximum depth, 2.1 m; distance between the nest and entrance, 1.5 m; crevice height at the nest, c.0.5 m.

In July, c.20 days later, a visit was made to monitor the nest and observe parental behaviour. Only the male was observed on this occasion. On visiting the nest, we found seven eggs (Fig. 4), laid on a thin layer of sand and soil. They were oval in shape and pale beige, almost white, in coloration.

Mean mensural data were as follows: 61.7 mm (length), 42.5 mm (width) and 59.86 g (weight). Data for each egg were as follows: egg 1: 62.0 mm x 42.1 mm, 55 g; egg 2: 60.2 mm x 42.7 mm, 57.0 g; egg 3: 61.4 mm x 43.2 mm, 59.0 g; egg 4: 61.7 mm x 41.3 mm, 63.0 g; egg 5: 60.8 mm x 43.6 mm, 63.0 g; egg 6: 62.0 mm x 42.6 mm, 61.0 g; egg 7: 64.0 mm x 42.2 mm, 61.0 g.

For three days we watched the nest, but the female was not seen and the eggs were cold. Each morning, at c.06h50, the male called close to the nest. Thus, we believe that either the female abandoned the nest or died. Although nest abandonment is not rare among birds[9], we believe that the most likely reason for the female's absence was predation, as the male continued to solicit for her. Giai[8] reported a male returning on 20 consecutive days to the same pool where a female had been collected.

Discussion

Many potential predators of Brazilian Merganser exist. Recent surveys have been conducted in Serra da Canastra National Park with the aim of revising its management plan. It has been speculated that several mammals and birds recorded in the area might prey on Brazilian Merganser, based on their diet, size and habitat. Among mammals, Rogério de Paula (pers. comm. 2002) cites Puma *Puma concolor*, Ocelot *Leopardus pardalis*, Margay *Leopardus wiedii*, Jaguarundi *Herpailurus yagouaroundi*, Maned Wolf *Chrysocyon brachyurus*, Crab-eating Fox *Cerdocyon thous*, Tayra *Eira barbara* and Neotropical River Otter *Lontra longicaudis*. For birds, Dante Buzzetti (pers. comm. 2002) highlights Black-chested Buzzard-eagle *Geranoaetus melanoleucus*, Crowned Eagle *Harpyhaliaetus coronatus*, Aplomado Falcon *Falco femoralis*, Grey-headed Kite *Leptodon cayanensis*, Black-and-white Hawk-eagle *Spizastur melanoleucus*, Collared Forest-falcon *Micrastur semitorquatus* and Great Horned Owl *Bubo virginianus*. Partridge[14] also drew attention to the Black-and-white Hawk-eagle as being amongst the most dangerous predators of *M. octosetaceus* in Argentina.

After verifying that the nest had been abandoned, and with authorisation from the Brazilian Environment Agency (IBAMA), the eggs were collected. Three eggs with embryos still in good condition had the DNA extracted and this is stored in the Laboratory of Biodiversity & Molecular Evolution at the Universidade Federal de Minas Gerais. The other four eggs, which were in an advanced stage of decomposition, had their shells preserved and have been deposited at the Museu de Zoologia da Universidade de São Paulo.

Among *Mergus* spp., Chinese Merganser *M. squamatus* has similar reproductive traits to *M. octosetaceus*. *M. squamatus* nests in tree holes along creeks in forests of north-east China[18]. Other *Mergus* lay their eggs in cavities beside pools, lakes and rivers. The eggs of *M. squamatus*, like those of *M. octosetaceus*, are incubated by the female alone, and are covered with feathers when it leaves the nest. Egg size is similar to *M. octosetaceus*: 63.3 mm x 45.9 mm and 61.9 g. Incubation apparently lasts 35 days[18].

Chinese Merganser was observed using the same tree hole, in China, for three consecutive years[18]. We subsequently visited the nest site on Matinha stream on 25 July 2003, but found no evidence of recent use.

Brazilian Mergansers are estimated to breed in June–August[5]. We observed adults with young in August–December. The large size of some young observed in August demonstrates that hatching occurred, at the latest, in mid-June, thus eggs were probably laid in mid-May. Therefore, we believe the breeding season, at least in the Serra da Canastra, extends more than six months.

In another family group, medium-sized young were seen with their parents in November–January. In February we observed three individuals in another stream. It is probable that this observation involved a pair with their young from the previous season. If so, parental care extends to February and young can remain with the adults for more than three months before dispersing. In many instances young stay with the parents until December–January, prior to the next breeding season[3]. Age of sexual maturity is two years or more in the Mergini tribe, apparently a derived condition shared by all members of the grouping[11].

No mergansers were observed in March–May 2002. The moulting period of the species is poorly known, but may occur at the end of the rainy season[16], which coincides, in southern Brazil, with March-April. That the birds are moulting may explain the lack of records at this season[16]. Because they temporarily lose their capacity to fly, the birds are shyer and more difficult to locate.

Our discovery is significant for conservation and management, as it demonstrates that the absence of large trees is not a crucially limiting factor on the species' breeding ecology. The availability of rock walls with crevices may represent a far more abundant nesting resource than tree holes in our study region.

Conservation of watercourses and their margins is essential for the Brazilian Merganser's survival. Besides being naturally rare, *M. octosetaceus* populations suffer many pressures that have contributed to their decline. In the Serra da Canastra, the main threats appear to be degradation and destruction of the species' favoured habitats, and intensifying ecotourism. All

human activities that impact the quality and integrity of rivers and their margins potentially threaten the species. Unfortunately, the destruction of gallery forests, although prohibited by law, is still common practice on many properties. Erosion and the silting-up of streams appears to be a consequence of the exploitation of marginal vegetation. *Mergus octosetaceus* conservation depends on the restoration and preservation of streams, their riverheads and margins, including gallery forests, although we have proved that these forests are not the exclusive site for their nests.

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Figure 1. Brazilian Merganser *Mergus octosetaceus* in Santo Antônio stream, at the border of Serra da Canastra National Park, Brazil (Carlos E. A. Carvalho)

Figure 2. One of the feeding areas used by the nesting pair of Brazilian Mergansers (Ivana R. Lamas)

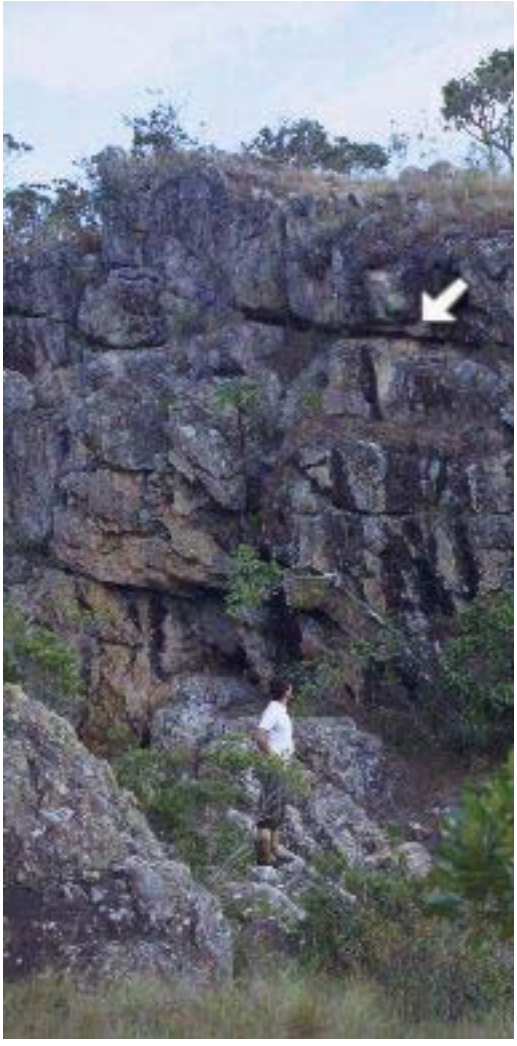

Figure 3. Rock wall where the Brazilian Merganser nest was found (Ivana R. Lamas)

Figure 4. Brazilian Merganser eggs (Ivana R. Lamas)

Figure 5. Brazilian Merganser *Mergus octosetaceus* (Carlos E. A. Carvalho)