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Breeding Success and Social Mating System of the Bay-capped Wren-Spinetail (*Spartonoica maluroides*)

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ABSTRACT.—We studied breeding biology, parental roles, and social mating system of the Bay-capped Wren-Spinetail (*Spartonoica maluroides*), a habitat specialist furnariid, in the Argentinean pampas. We found 42 nests during 2004–2007, two during egg laying, 28 during incubation, and 12 with nestlings. Mean clutch size was 3.17 eggs ($n = 29$), the incubation period was 13 days, and nestlings remained in the nest for 12 days before fledgling. Bay-capped Wren-Spinetails are socially monogamous; both males and females develop a brood patch and contribute to incubation, brooding, and provisioning of nestlings. Wren-Spinetails are unique among furnariids as they build an open cup nest with a few presenting a loose domed roof. Breeding success of Bay-capped Wren-Spinetails was higher (total probability of nesting success = 0.508) than other species of sympatric passerines because of low nest predation and high nest survival rates during incubation and nestling rearing stages. *Received 20 January 2009. Accepted 17 June 2009.*

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The members of the Furnariidae (236 described species) inhabit a great diversity of biomes in the Neotropics, including lowland and montane

forests, grasslands, salt and fresh water marshes, and rocky areas and meadows in the High Andes (Ridgely and Tudor 1994, Remsen 2003). Furnariids show no variation in mating systems and parental roles, and all species studied have been described as socially monogamous with males and females having similar parental roles (shared incubation, brooding, and feeding nestlings) (Remsen 2003). However, studies of color-banded populations are rare and current knowledge on parental roles and breeding biology is based on a small number of species.

Bay-capped Wren-Spinetails (*Spartonoica maluroides*) are small (10–12 g), insectivorous, habitat specialists that inhabit fresh water and brackish marshes in the Pampas region in north-central Argentina, southeastern Brazil, and Uruguay (Ridgely and Tudor 1994). The reproductive biology and social mating system of the Bay-capped Wren-Spinetail have not been previously described due to its elusive breeding habits. Wren-Spinetails, as habitat specialists, are vulnerable to habitat transformation and are considered near threatened (Birdlife International 2008). The objective of this paper is to provide basic information on the life history, breeding success, and social mating system of the Bay-capped Wren-Spinetail.

METHODS

We conducted field work at a private cattle ranch, Los Zorzales (36° 25′ S, 56° 58′ W), in Buenos Aires Province, Argentina between September and December 2004–2007. The habitat is characterized by small wetlands, salt marshes, and isolated patches of *Celtis tala* woods. Wren-Spinetails breed in this area during the austral spring (Oct–Jan) in salt marshes where sedges (*Spartina* spp.) and rushes (*Juncus* spp.) predominate.

We located nests of Wren-Spinetails using both behavioral cues of adults and systematic searching. We checked nests every 2–4 days to assess clutch size, hatching success, and fledging success. Nests were checked every day when eggs were close to hatch or nestlings close to fledging to ascertain incubation period (number of days from laying of the last egg until hatching of the first young) and nestling period (number of days from hatching of the first young until fledging of the last nestling). We used mist nests to capture adults close to the nest and color-banded 24 pairs during 2004–2007.

We considered a nest to be depredated if eggs or nestlings that were younger than 10 days disappeared from the nest. We considered a nest to be successful if nestlings fledged and were observed being fed by adults.

We monitored nests during incubation and when nestlings were 2–3, 7–8, and 11–12 days of age to assess parental roles. We observed nests from a distance of 50 m with 10 × 42 binoculars and identified the individuals attending the nest. We assumed the adults were incubating eggs or brooding nestlings when they remained on the nest for more than 5 min. Wren-Spinetails are elusive close to the nest, and we limited observations to a minimum to avoid disturbance, remaining in the area sufficiently long to confirm that both adults were attending the nest. Thus, we did not assess parental provisioning rates.

We calculated clutch size as the number of eggs observed in the nest. This method may underestimate clutch size as partial predation can reduce the number of eggs in the nest. We did not observe partial nest losses during 162 days of observation of the 29 nests we monitored during incubation. We took particular care not to disturb the vegetation in the area or leave any marking that could attract the attention of potential nest predators during nest checks and observation bouts.

We estimated nest survival and daily mortality rates of nests following Mayfield (1975). We estimated the time the nest survived as 40% of the length of the period between visits (Johnson 1979). We estimated the overall probability that one chick would fledge from a nest as the sum of daily survival rates for each nesting stage elevated to the exposure time (number of days the nest remained in that stage). We estimated exposure time at 13 days for incubation and 12 days for the nestling rearing stage based on nests monitored in the area. We performed all statistical analyses using SPSS Version 14.0 software (SPSS 2005).

RESULTS

We found 42 nests during 2004–2007, two during the egg laying period, 28 during incubation, and 12 with nestlings. Nests were both open cup or presented a simple roof, built deep inside sedges and rushes. Success of 34 nests (8 nests were not monitored through the entire nestling cycle) was ascertained of which 21 produced fledglings, 12 were predated, (2 during incubation and 10 with nestlings), and one was abandoned

after a rain storm. Both adults had brood patches and were involved in incubation (14/14 nests), brooding (16/16 nests), and feeding nestlings at day 2–3 (16/16 nests), day 7–8 (20/20 nests), and day 11–12 (15/15 nests).

Mean (± SD) clutch size was 3.17 ± 0.47, (n = 29 nests); 22 nests contained three eggs, six contained four eggs, and one contained two eggs. We did not observe Shiny Cowbird (*Molothrus bonariensis*) eggs, although this species was abundant in the area. The mean (± SD) number of fledglings for successful nests was 2.62 ± 0.80 (n = 21 nests).

We were only able to calculate the incubation period for two nests (13 days). The mean (± SD) nestling period was 12.38 ± 0.92 (n = 8 nests), and ranged from 11 to 14 days. Daily survival rate based on 162 nest days during incubation was 0.987 with a total survival rate for the incubation period of 0.846. Daily survival rate based on 277 nest days during the nestling period was 0.958 with a survival rate for the nestling period of 0.601. The total probability of nesting success was 0.508.

DISCUSSION

Furnariids are present in all terrestrial habitats in the Neotropics and exhibit extreme variation in nest architecture (Remsen 2003). Nest structure has been used to study phylogenetic relationships in the family (Vaurie 1980, Zyskowski and Prum 1999) and nest building evolution in passerines (Collias 1997). Bay-capped Wren-Spinetails have a central role in these studies since they are the only furnariid to construct a rudimentary nest (Vaurie 1980). Narosky (1973) noted there were strong discrepancies in the literature concerning the nest structure of Wren-Spinetails. Some authors have considered it an open structure, while others have described it as an enclosed nest. We observed that some nests had a rudimentary roof, but others were built as an open cup with few *Juncus* spp. stems barely covering the top. It is likely that open cup nests were found later in the breeding stage when the cover was lost as a result of the adults coming in and out of the nest.

Wren-Spinetails may be the only furnariid to build a simple nest, but several aspects of its breeding biology are similar to other members of the Furnariidae. The mating system of Wren-Spinetails is social monogamy, similar to other members of the family (Remsen 2003). Cooperative breeding has been documented in the Rufous-fronted Thornbird (*Phacellodomus rufifrons*) (Rodriguez and Carrara 2004), Lark-like Brushrunners (*Coryphistera alaudina*) (Areta and Bodrati 2007), and is suspected in the Firewood-gatherer (*Anumbius annumbi*) (Rodriguez and Carrara 2004), Pink-legged Graveteiro (*Acrobatornis fonsecai*) (Whitney et al. 1996), Caatinga and Brown cacholotes (*Pseudoseisura cristata* and *P. lophotes*) (Zimmer and Whittaker 2000), and Orange-fronted Plushcrown (*Metopothrix aurantiaca*) (Remsen 2003). We did not observe more than two birds attending a nest; thus, cooperative breeding is unlikely in Wren-Spinetails in our study area.

Both male and female Wren-Spinetails have brood patches and share incubation, brooding, and feeding of nestlings. Similar results have been reported for Rufous Hornero (*Furnarius rufus*) (Fraga 1980), Brown Cacholote (Nores and Nores 1994), and Thorn-tailed Rayadito (*Aphrastura spinicauda*) (Moreno et al. 2007); it is likely this pattern is typical of all furnariids (Remsen 2003). No variation in parental roles and social mating system has been reported for furnariids. Only three other suboscine passerine families have a similar broad neotropical distribution: tapaculos (Rhinocryptidae), cotingas (Cotingidae), and tyrant flycatchers (Tyrannidae). Tapaculos exhibit similar parental roles and are socially monogamous (Krabbe and Schulenberg 2003). However, social polygyny has been observed in flycatchers and cotingas, but only the female develops a brood patch, incubates, and broods the young (Fitzpatrick 2004, Snow 2004). Male furnariids and tapaculos appear to be constrained to monogamy because parental care may be essential during incubation.

Polygyny and polyandry are present in other passerine species, such as Eurasian Penduline Tit (*Remiz pendulinus*), where both males and females incubate eggs and brood nestlings (Valera et al. 1997). An alternative view would be that in species with similar parental roles either gender can desert, and polyandry and polygyny could be expected. Bennet and Owens (2002) proposed that entire bird lineages are predisposed to a particular mating system (as in the case of furnariids and tapaculos) while in other groups, ecological variables may facilitate differences within the lineages.

The clutch size of Wren-Spinetails is small and similar to other members of the family. Shiny Cowbirds parasitize several sympatric marsh nesting passerines (Massoni and Reboreda 1998,

Fernández and Mermoz 2000), but we did not observe cowbird eggs in nests of Wren-Spinetails. Nest survival was also higher than other sympatric passerines. The probability of a Wren-Spinetail nest surviving the entire nesting cycle was relatively high (0.51) when compared to two sympatric marsh-nesting birds, Scarlet–headed Blackbird (*Amblyramphus holosericeus*) and Brown-and-yellow Marshbird (*Pseudoleistes virescens*) with a probability of 0.25 and 0.11, respectively (Fernández and Mermoz 2000) and a cavity nester, House Wren (*Troglodytes aedon*), breeding in adjacent woods with a probability of 0.25 (Llambías and Fernández 2007). Differences in brood parasitism and predation rates of sympatric passerines may be due to microhabitat characteristics, nest location, or behavior. Future research should focus on examining the environmental and behavioral factors responsible for the low predation rates observed.

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