

NESTING BEHAVIOUR AND ECOLOGY OF THE WHITE-BROWED FANTAIL FLYCATCHER (*RHIPIDURA AUREOLA*) IN SRI LANKA

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Abstract. The White-browed Fantail Flycatcher (*Rhipidura aureola*) is a widely distributed species in tropical regions of the Indian subcontinent and in Southeast Asia. We determined the breeding biology and nest site characteristics of *R. aureola* in Sri Lanka during 2012 to 2017. All the nests observed were small cup-shaped and without a ‘tail’ extending below the nest base. Both male and female *R. aureola* built their nests within 9–13 days with an average mean external diameter, mean internal diameter, and mean depth of, respectively, 6.4 ± 0.32 , 5.6 ± 0.22 , and 2.9 ± 0.21 cm. The *R. aureola* we found used various habitats such as home gardens, forest boundaries, sanctuaries, man-made tanks/water bodies, stream banks, tea plantations and road edges to build their nests. We did not find any change in clutch size (2–3 eggs) with different elevation gradients. The eggs were oval-shaped with the ground colour of pale warm yellow-brown to pink and lots of spots or blotches in dark gray-brown. More than 60% of nests were built in a high to medium range of visibility to predators, without a specific location or tree preference, which resulted in nest failure due to predation by domestic cats or birds of prey. Also, we found nest failure due to washing away by abundant rains. Detailed studies on ecological and environmental parameters with respect to nesting or breeding success will help to better understand the species.

INTRODUCTION

The White-browed Fantail Flycatcher (WBFF) (*Rhipidura aureola*) is a member of the family Rhipiduridae. It is a small passerine bird (adults around 17–18 cm long), a specialist aerial feeder, and named a “fantail”. The WBFF can be found across the tropical regions of the Indian subcontinent and also in Southeast Asia. Both sexes have similar morphological characteristics, and adults have dulled black upperparts with long, broad white eyebrows, white breast and belly, a row of white spots across the throat, two rows on wing-coverts and white tips to outer tail feathers (Henry 1971; Harrison 1999). This avian species can be identified as a common and ecologically important bird, which is generally distributed throughout the forests, wooded gardens and all tall scrub lands in Sri Lanka (Henry 1971; Harrison 1999; Surasinghe and De Alwis 2010; Dissanayake et al. 2014), and out of these common living grounds of this bird in Sri Lanka, the hills in Uva Province can be named a very popular habitat of the WBFF (Henry 1971).

The WBFFs can mostly be seen during the daytime if you know where to look for them. But depending upon the staple of their feeding, their best active times are often found to be early morning and evening when insect abundance is greater in the environment. According to the International Union for Conservation of Nature, the

conservation status of the WBFF is of ‘Least Concern’ (Birdlife International 2018).

Breeding biology, ecology and behaviour studies help to understand the important and hidden basics of animal life. The results gained through a study like this can even unveil many unseen parts of animal life. Also, this information is even more important for those species which are poorly known or threatened (Dowling 2003; Green 2004). The breeding behaviour of a bird can supply insights into the selection pressure that individuals of the particular species have over time, and for an evolutionary biologist these details can help to determine many aspects of the life of that bird species. Also, studying the breeding ecology of a species which is previously unstudied can reveal valuable information to understand its population. This data will help to establish an effective conservation management and strategies and can give a remarkable assistance to develop new methods to support the efforts in minimizing the ongoing loss of biodiversity.

Most of the resident bird species in Sri Lanka lack information regarding their breeding biology and phenology, nest microhabitat and ecology, and causes of reproductive failure. Even the most common bird species that are widely distributed or associated with home gardens have deficiency of information about their life, and this includes the WBFF. With literature on WBFF nest ecology and behaviour being inadequate, in this study

we present undescribed natural history information on the breeding biology and nest site characteristics of the WBFF in Sri Lanka, and this information will support future conservation and management of this species within Sri Lanka.

Methodology and study area

During the current study, a total of 14 nests were opportunistically observed during 2012 to 2017, from the end of March to May, in different locations in Sri Lanka, covering wet, dry and intermediate climatic zones (Figure 1). Nest location was detected by observing the behaviour of parental bird activity and searching all suitable nesting habitats. A nest was considered active if adults were seen nest building, incubating, or feeding the young in or near the nest. When we detected a nest, we marked its exact location and altitude with a Global Positioning System (GPS) device (Garmin eTrex). All the nests we recorded in this study were outside the land managed by the Forest or/and Wildlife Department of Sri Lanka. Out of 14 nests, 6 nests were observed regularly every 2–3 days during the period, except if close to the expected hatching or fledging date when they were checked on alternate days (typically during early incubation). We obtained data on the

breeding behaviour, ecology, clutch and brood size, egg colour and shape by using 8×32 binoculars. Then we determined the breeding losses and breeding success of observed nests.

At each nest, we recorded different ecological variables: a) nest tree species; b) nest tree height (m), using a clinometer; c) nest tree girth at breast height (gbh) (cm); d) nest height (m), using a clinometer; e) canopy cover (%), using a hand mirror marked with a grid and estimating the shaded area, following Martin and Roper (1988); f) distance to nearest large tree (m); g) distance to nearest man-made structure (m); h) nest visibility (%) by viewing the nest at nest-level at a distance of 2, 5, 7 and 10 m in each of four cardinal directions (Martin and Roper 1988) and then calculating the percent of positions from which it was viewable (Gokula and Vijayan 2003); i) average ground cover (%) in one sq. meter area.

RESULTS AND DISCUSSION

All the nests observed in this study were found to be small cup-shaped without a ‘tail’ extending below the nest base and built with fine fibres and roots plastered with cobwebs and very neatly finished off everywhere; the rim was very thin and formed nearly a circle (Figure 2). Like all flycatchers, the WBFF has a habit of revolving clockwise and anticlockwise. During the nesting period, we observed a pair holding fine fibres and roots in their beaks for nest construction. Then one partner brought some cobwebs and other nesting material and plastered a cup. After putting small pieces of fibres inside the cup, birds were seen pressing the bodies into the cup with clockwise and anticlockwise belly movements. This gave a nice shape to the nest and formed a firm bed.

Out of 44 species of fantails recognized by Boles (2006), 21 build a typical fantail nest with a ‘tail’, such as *R. leucothorax* (White-bellied Thicket Fantail, found in New Guinea), *R. atra* (Black Fantail, found in Indonesia and Papua New Guinea), *R. hyperythra* (Chestnut-bellied Fantail, found in the Aru Islands and New Guinea), *R. rufidors* (Rufous-backed Fantail, found in Indonesia and Papua New Guinea), *R. fuliginosa* (New Zealand Fantail, found in New Zealand), *R. albolimbata* (Friendly Fantail, found in the highlands of New Guinea) *R. rufifrons* (Rufous Fantail, found in a wide range in the south-west Pacific, occurring in New Guinea, the Northern Mariana Islands, the Federated States of Micronesia, Papua New Guinea, the Solomon Islands and Australia), *R. rufiventris* (Australian northern fantail, found in the northern part of Australia), *R. albogularis* (White-spotted Fantail, distributed in peninsular and eastern India, Thailand, Viet Nam),

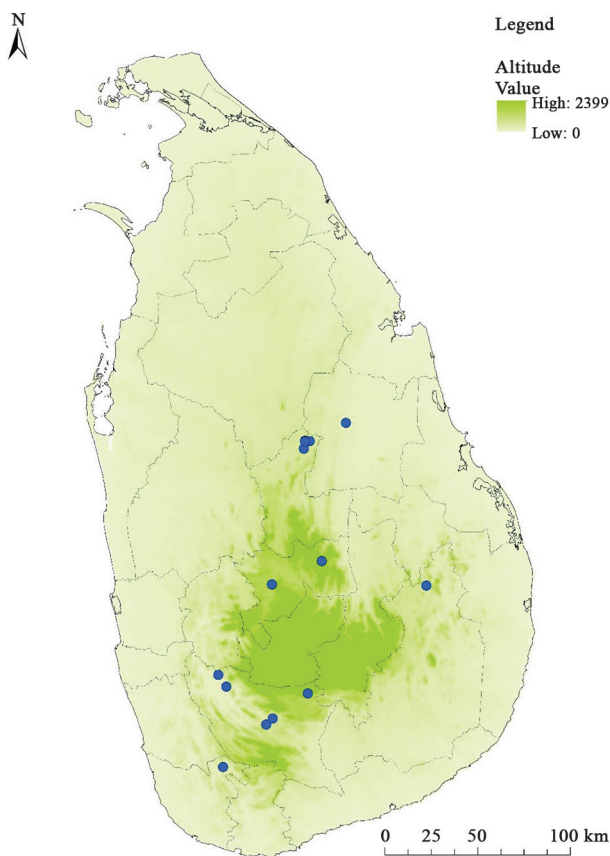


Figure 1. Nest localities of White-browed Fantail Flycatcher (*Rhipidura aureola*) in Sri Lanka.



Figure 2. Adult White-browed Fantail Flycatcher (*Rhipidura aureola*) with chicks inside a nest on *Filicium decipiens* tree.

R. albicollis (White-throated Fantail, having a large range extending from the foothills of the Himalayas from northeast Pakistan and India east to western Nepal, Bangladesh, Bhutan, Myanmar, southern China, Thailand and northern Indochina, Peninsular Malaysia, Sumatra to Borneo). However, two species (Dimorphic Fantail, *R. brachyrhyncha* and *Stenostira scita*, Fairy Flycatcher) build atypical nests from moss (Boles 2006; Donaghey 2015). The White-spotted Fantail (*R. albogularis*) from India usually builds nests with a tail, but in some places (Sangmeshwar, Maharashtra and Tarangana hills, Gujrat) nests were constructed without a tail on *Delonix regia* and *Anacardium occidentale* trees, with a horizontal twig support. There are still 15 species of fantail flycatchers whose nests are undescribed (Donaghey 2015) and need to be studied.

The WBFFs build nests with an average mean external diameter, mean internal diameter, and mean depth of, respectively, 6.4 ± 0.32 cm (range 6.1–7 cm), 5.6 ± 0.22 cm (range 5.4–6.1 cm), and 2.9 ± 0.21 cm (range 3.2–2.6 cm). Compared with other fantail flycatchers, the observed values were quite similar, and also these values showed a possible variation of nest parameters within genus *Rhipidura* (Stidolph 1923; Higgins, Peter, and Cowling 2006; Donaghey 2015).

Both male and female birds build their nests within 9–13 days. Nest site characteristics vary according to the geographic location and individual character (Table 1). The WBFF uses various tree species to build nests, including, *Filicium decipiens* (Common Sinhala Name (CSN): Pehimbiya), *Drypetes sepiaria* (CSN: weera), *Flacourtia indica* (CSN: Uguressa), *Tamarindus indica* (Siyambala), *Spondias dulcis* (CSN: Ambarella), *Mangifera indica* (Mango), and *Terminalia chebula* (CSN: Aralu). These nests were quite exposed and could be easily viewed in

most of the places that we observed. More than 60% of nests were built in a high to medium range visibility to predators. This indicates a high possibility of nests to be attacked by predators and a high potential of egg and chick loss. During our study, we observed that one nestling was eaten by a domestic cat (secondary information from an interview with local personnel), two nests were destroyed by some other predators (birds of prey) and one nest was fallen due to high rainfall and wind. During our study, we found that WBFFs had no specific location or tree to build up their nests, and we observed that WBFFs used various habitats and scattered locations to build their nests, such as home gardens, forest boundary, sanctuaries, man-made tanks/water bodies, stream banks, tea plantations and road edges.

Female WBFFs lay stubby oval shape eggs (clutch size of 2–3), which are of ground colour of pale warm yellow-brown to pink with an area having a lot of spots and blotches in dark gray-brown. Some species decrease their clutch-size with the elevation gradient (Harrison and Frith 1970; Coates 1990; Donaghey 2015); however, according to our study, the WBFFs in Sri Lanka did not indicate any difference in clutch size with respect to the elevation gradient. We tried to avoid a high risk of damage and disturbance to the nests, so this study did not involve egg dimensions but, according to literature, egg size is 16.6×13.2 mm (Henry 1971). The WBFF's clutch size is similar to that of other fantail species (Peckover and Filewood 1976; Coates 1990; Dyrce 1994), except for the Black Fantail, which has a clutch size of one (Harrison and Frith 1970).

As per our observations, both parents incubate eggs and brood chicks. Both parents spent approximately equal time in feeding their fledglings. This indicates that both sexes invest considerable amounts of time and energy not only to nest construction but also to bringing up their offspring by feeding, warming and protecting them. These observations concur with observations of many monogamous bird species, where males and females make approximately equal numbers of food deliveries

Table 1. Nest ecology of White-browed Fantail Flycatcher (*Rhipidura aureola*).

Variables	Mean	SD
Nest tree height (m)	10.1	8.16
Nest tree gbh (cm)	38.66	19.79
Nest height (cm)	4.76	1.39
Ground cover (%)	38.92	28.36
Canopy cover (%)	49.64	12.38
Shade over the nest (%)	82.76	6.4
Distance to nearest large tree (cm)	2.1	0.769
Distance to road or man-made structure (m)	13.88	10.72

to nestlings (Emlen and Oring 1977; Oring 1982, Greenberg and Gradwohl 1983; Paillisson et al. 2007).

More observations in different habitats covering all geographical areas are necessary to identify all the constraints on the breeding behaviour, clutch-size, nesting success, foraging behaviour, predation and starvation risks which influence the behaviour of the WBFF in Sri Lanka.

DISCLOSURE STATEMENT

Authors has no conflict of interest.

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