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A STUDY ON THE POPULATION STATUS AND DISTRIBUTION OF THE RUFOUS-TAILED FANTAIL (RHIPIDURA PHOENICURA) IN THE TELAGA WARNA AND JEMBER NATURE RESERVE AND RECREATION PARK, PUNCAK, WEST JAVA, INDONESIA

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ABSTRACT

The Rufous-tailed Fantail (Rhipidura phoenicura) is one of Indonesia's endemic bird species, found exclusively on the island of Java. Its distribution is restricted to montane forests extending from West Java to the western part of East Java. Since 2018, the species has been designated as protected under the Wildlife Protection Regulation of Indonesia. This study was conducted to assess the current population status, distribution, and habitat characteristics of the Rufous-tailed Fantail in the Telaga Warna and Jember Nature Reserve and Recreation Park, Puncak, West Java. Bird observations were carried out over 20 days between 28 November 2022 and 8 January 2023 using the Point Count method. A total of 67 observation points were established, each with a radius of 25m and spaced 50m apart. The Importance Value Index (IVI) of tree species serving as bird habitat was analyzed using the quadrant method. Six quadrants were established, and at each point, measurements were taken for four nearest trees, including tree height, branch-free height, trunk diameter, and distance from the center point. Based on data analysis, the population density of the Rufous-tailed Fantail was estimated at 10.83 individuals/km^2, which is categorized as moderate. The species' distribution in Java extends from Mount Lawu in East Java; Mount Merbabu, Mount Prau, Mount Sindoro, and Mount Slamet in Central Java; to Mount Ciremai, Mount Cikuray, Mount Sawal, Kamojang Crater, Ratu Crater, Mount Salak, Mount Gede Pangrango, Mount Halimun, and the Telaga Warna-Jember, Puncak area in West Java. The dominant tree species providing habitat and shelter for the Rufous-tailed Fantail were Castanopsis acuminatissima (IVI = 114.84%), Schima wallichii (IVI = 40.36%), Acer laurinum (IVI = 39.99%), and Castanopsis argentea (IVI = 25.17%). Further studies on nesting behavior and daily activity patterns are needed to support more effective management and conservation strategies for this species.

Keywords: Rufous-tailed Fantail, population, distribution, habitat, nature reserve, recreation park.

1. INTRODUCTION

The *Telaga Warna and Jember Nature Reserve and Recreation Park* (CATWA Telaga Warna and Jember), located in Puncak, West Java, serves as one of the habitats for a wide variety of bird species in the foothill forests of Mount Gede Pangrango. No fewer than 56 bird species have been recorded in this area (Syaepul-Rohman, 1997). From an ecological perspective, birds play an essential role as bioindicators and as natural controllers of environmental quality within ecosystems.

The dynamics of land use and regional development have led to fluctuations in both the diversity and population of bird species in the CATWA Telaga Warna and Jember area. In 2006, the number of bird species in this conservation site declined from 56 to 45 (Suhandi, 2006), whereas a subsequent study reported an increase to 60 species representing 31 families (Ekowati et al., 2016).

One of the notable insectivorous bird species with a restricted distribution in this area is the **Rufous-tailed Fantail (*Rhipidura phoenicura*)**, known locally as *Kipasan Ekor-merah* (Rombang & Rudyanto, 1999). This species is endemic to Java and is distinguished by its characteristic reddish-brown tail feathers. According to the Regulation of the Indonesian Ministry of Environment and Forestry No. P.106/MENLHK/SETJEN/KUM.1/12/2018, *Rhipidura phoenicura* has been designated as a protected species.

As a member of the *Muscicapidae* family, the Rufous-tailed Fantail is recognized for its melodious song and is relatively popular among bird enthusiasts. However, information regarding its population dynamics in the wild remains limited. Recent indications suggest that its numbers may be declining in natural habitats. Although the International Union for Conservation of Nature (IUCN) currently categorizes *Rhipidura phoenicura* as "Least Concern" (BirdLife International, 2022), this does not preclude potential local population declines. Such declines are believed to be associated with its restricted distribution in Java's montane forests, which are found at elevations of 1,000-2,500 meters above sea level. The montane forests of Mount Lawu are considered the easternmost limit of the species' range in Java (MacKinnon et al., 1998).

A previous study conducted in 1998 at CATWA Telaga Warna, Puncak, West Java recorded between 39 and 48 individuals of *Rhipidura phoenicura* (Kohanta, 1999). Since then, no specific research has been undertaken to reassess the population status of this species in the Telaga Warna and Jember area.

This study aims to monitor the current population of the Rufous-tailed Fantail (*Rhipidura phoenicura*) and to identify environmental factors that may influence fluctuations in its population trends within the Telaga Warna and Jember Nature Reserve and Recreation Park, Puncak, West Java. This preliminary assessment seeks to estimate the present population size and to characterize the specific habitat types occupied by this species. The findings are expected to provide insights and recommendations for relevant management authorities to support sustainable conservation planning.

2. METHOD

2.1. General Description of the Study Area

The *Telaga Warna and Jember Nature Reserve and Recreation Park* (CATWA Telaga Warna and Jember) is located approximately 32 km southeast of Tugu Kujang, Bogor. Telaga *Warna* was designated as a conservation area under the Decree of the Minister of Agriculture No. 394/PDts/Um/6/1979 dated 23 June 1979, covering an estimated 373.86 ha. The *Telaga Warna Recreation Park* (TWA Telaga Warna) was later established under the Minister of Agriculture Decree No. 481/PDts/Um/6/1981, with an area of 5 ha (Ria, 2011). Meanwhile, *TWA Jember* encompasses 50 ha, established by the Minister of Agriculture Decree No. 393/PDts/Um/6/1979 on the same date, 23 June 1979. The Telaga Warna and Jember conservation complex features a natural lake surrounded by montane tropical rainforests.

Administratively, CATWA Telaga Warna lies within Tugu Utara Village, Cisarua Subdistrict, Bogor Regency. The area extends between 6°42'24"-6°43'24" S and 107°11'05"-107°20'00" E. In contrast, *TWA Jember* is situated within the administrative boundaries of Ciloto and Batulawang Villages, Cipanas Subdistrict, Cianjur Regency, spanning 6°42'23"-6°43'24" S and 106°50'12"-106°51'14" E.

According to Syaepul-Rohman (1997), the dominant higher plant species found in CATWA Telaga Warna and Jember include *Castanopsis argentea* (saninten), *Pongamia pinnata* (kibangkong), *Schima wallichii* (puspa), *Quercus* sp. (pasang), *Litsea* sp. (huru), and *Sloanea sigun* (beleketebe). Several rare and legally protected plant species are also found in the area, such as *Nepenthes gymnamphora* (pitcher plant), *Macodes petola* (Javan jewel orchid or *kiaksara*), and the parasitic root fungus *Balanophora* spp.

2.2. Methods

Prior to fieldwork, a literature review was conducted using various references, followed by a preliminary site survey and the preparation and approval of a research proposal in collaboration with relevant partners. The study was focused on the

CATWA Telaga Warna and Jember area, located in the Puncak region of Bogor-Cianjur, West Java.

Field observations employed the **Point Count method** (Bibby et al., 2000). At each observation point, the observer remained stationary for approximately 10-15 minutes to record bird species and individual counts, with a particular focus on the Rufous-tailed Fantail (*Rhipidura phoenicura*). Each count station had a radius of 25 meters, measured using a roll meter, and the distance between points was set at 50 meters. Observations were carried out intensively for 2-3 hours per day during clear weather conditions. When conditions were unfavorable (e.g., overcast, drizzle, or heavy rain), surveys were postponed to the following day.

The fieldwork spanned 20 working days, conducted between 28 November 2022 and 8 January 2023. Due to steep and inaccessible terrain at certain sites, the number of observation points was adjusted accordingly. In total, 67 observation points were established, where 49 in the Telaga Warna area and 18 in the Jember area (Puncak Pass).

On separate days, vegetation data were collected to characterize tree species that serve as roosting and foraging habitats. At six selected observation points, measurements were taken from the four nearest trees at each point, including the distance from the point center, trunk diameter, and basal area. The tree community structure was analyzed using the quadrant method (Indriyanto, 2006).

In addition to field observations, a morphological examination of the Rufous-tailed Fantail was conducted to describe external characteristics and body size variations between male and female individuals. This analysis was carried out through a literature-based study at the Bird Biosystematics Laboratory, National Research and Innovation Agency (BRIN).

2.3. Data Analysis

The Point Count results were used to determine bird density, expressed as the number of individuals recorded within a defined sample area. Population density (PD) was calculated using the following formulas:

$$PD = \frac{n}{A} \text{ (individuals/ha)}$$

$$A = n\pi r^2 (m^2)$$

Where:

PD = bird population density (individuals per hectare) n = number of birds (individuals)

A = area (ha)

r = radius of the observation point (m) π = 3.14

Additional ecological parameters such as the Shannon-Wiener diversity index, species richness index, and dominance index for the overall bird community in the study area were analyzed following standard references (Odum, 1993; Ludwig & Reynolds, 1998; Magurran, 1998; Krebs, 2001). The Importance Value Index (IVI) for vegetation was determined based on methods proposed by Indriyanto (2006) and Fachrul (2007).

3. RESULTS AND DISCUSSION

3.1. Morphological Characteristics

Morphologically, the Rufous-tailed Fantail (*Rhipidura phoenicura*) exhibits distinctive plumage coloration. The facial region, including the bill, head, and throat, appears dark gray with a slight whitish hue, whereas the lower parts, encompassing the breast, wings, abdomen, and undertail, are reddish-brown. The upper parts, consisting of the back, rump, and upper tail, vary from brown to rufous. The tail feathers of males are relatively longer and display a more pronounced reddish coloration compared to those of females.

The external morphological characteristics of the Rufous-tailed Fantail are illustrated in Figure 1a and Figure 1b.

Figure 1a. Ventral appearance of *Rhipidura phoenicura* (Rufous-tailed Fantail) from the Telaga Warna Nature Reserve, Puncak.

Figure 1b. Plumage color variation of *Rhipidura phoenicura* (Rufous-tailed Fantail) from the Telaga Warna Nature Reserve, Puncak.

The variation in body size between male and female Rufous-tailed Fantails (*Rhipidura phoenicura*) is presented in Table 1, and the corresponding statistical test results are shown in Table 2. Based on Table 1, male Rufous-tailed Fantails tend to have larger or relatively longer body dimensions than females, particularly in bill, head-bill, wing, tail, and total body length measurements. Statistical analysis following Fowler and Cohen (1996) confirmed that there were significant differences ($P \leq 0.05$) in body length, wing length, and head-bill length between males and females.

Table 1. Variation in body size of the Rufous-tailed Fantail (Rhipidura phoenicura) (mm)

Sex	No.	B	BT	HB	W	T	TR	MF	TL
Male (n=10)	1	9.84	4.46	21.68	66.74	83.5	20.09	10.85	157
	2	10.16	2.77	16.83	70.83	95.72	19.79	9.96	156
	3	13.82	3.92	18.52	82.78	89.45	19.54	10.82	155
	4	10.44	4.66	20.32	72.56	93.80	19.23	11.54	170
	5	9.89	2.44	19.17	73.92	91.21	19.67	9.15	167
	6	9.86	3.82	19.68	71.95	95.24	19.0	11.40	170
	7	13.79	3.84	18.73	74.12	95.67	19.03	10.45	168
	8	11.42	3.66	19.14	75.71	98.83	17.86	12.67	153
	9	10.60	4.41	19.80	69.42	86.55	20.03	9.05	156
	10	11.09	3.59	19.34	73.62	96.37	19.84	9.46	155
	Avg.	11.09±1.52	3.76±0.71	19.32±1.25	73.17±4.25	92.63±4.85	19.41±0.67	10.54±1.16	160.7±7.06
Female (n=5)	1	10.77	3.80	18.0	66.11	84.3	18.79	10.34	141
	2	10.69	4.21	18.88	65.84	88.37	19.35	9.16	153
	3	13.17	3.19	15.67	69.08	81.05	20.81	9.45	157
	4	9.42	2.79	16.49	60.82	93.40	18.53	12.03	150
	5	10.09	3.36	19.01	66.77	94.10	19.61	10.05	150
	Avg.	10.83±1.42	3.47±0.55	17.61±1.48	65.72±3.02	88.24±5.66	19.42±0.89	10.21±1.12	150.2±5.89

Note: B = bill; BT = bill thickness; HB = head-bill; W = wing; T = tail; TR = tarsus; MF = middle finger; TL = total length (body length).

Table 2. Statistical test results for selected body size parameters of male and female Rufous- tailed Fantails (Rhipidura phoenicura)

No.	Measured parameter	Male (n=10)	Female (n=5)	T_calculated	T_table (t 0.05,13)	Remark
1	Body length	160.7±7.06	150.2±5.89	2.85	2.16	*
2	Wing length	73.17±4.25	65.72±3.02	3.46	2.16	*
3	Tail length	92.63±4.85	88.24±5.66	1.57	2.16	ns
4	Head-bill length	19.32±1.25	17.61±1.48	2.35	2.16	*
5	Bill length	11.09±1.52	10.83±1.42	0.14	2.16	ns
6	Bill thickness	3.76±0.71	3.47±0.55	0.73	2.16	ns
7	Tarsus length	19.41±0.67	19.42±0.89	0.02	2.16	ns
8	Middle finger length	10.54±1.16	10.21±1.12	0.52	2.16	ns

***= significant ($P \leq 0.05$); ns = not significant**

The greater body, wing, and head-bill lengths observed in male Rufous-tailed Fantails (*Rhipidura phoenicura*) compared to females are presumed to be related to the males' higher activity levels, particularly during mate attraction and foraging. During these activities, the males frequently engage in rapid movements such as hopping and fluttering, involving continuous use of their legs, wings, and head. This behavioral pattern has been observed when Rufous-tailed Fantails forage within the mid-canopy strata (approximately 5-15 or 20m above ground) in the montane forests of Mount Slamet, Baturraden. The species often moves actively while joining mixed-species flocks, notably with *Sitta azurea* (family Sittidae) and *Lophozosterops javanicus* (family Zosteropidae), to capture insects along tree trunks. Escaping flying insects are then swiftly pursued and caught by the fantail (Widodo, 2012).

The Rufous-tailed Fantail is almost invariably described as a highly active bird and constantly moving, with its characteristic fan-shaped tail repeatedly spread and flicked up and down. It typically flies at low heights, perches only briefly, and hops continuously among leaves or near the forest floor. Consequently, this species, particularly males during the breeding season, requires substantial energy expenditure.

As an insectivorous bird, the Rufous-tailed Fantail primarily feeds on flying insects. Such prey are favored by insectivorous species due to their high availability, conspicuous size, and relative ease of capture (Lala et al., 2013). Hunting and capturing flying insects demand considerable energy. According to MacKinnon et al. (1998), the Rufous-tailed Fantail also exhibits unique and distinctive behaviors, characterized by constant motion and the rhythmic spreading and fanning of its tail feathers.

3.2. Diversity and Population Values

Field observations of bird communities in the CATWA Telaga Warna-Jember, Puncak area recorded at least 41 species comprising a total of 402 individuals (Table 3). Ecological analysis of the site revealed a relatively high level of avian diversity, with a Shannon-Wiener diversity index (H') of 2.88, a species richness index (R) of 5.99, and an evenness index (E) of 0.77.

Overall, approximately 92% of the total individuals were represented by only three dominant species: *Collocalia linchi* (C=6.43%), *Pycnonotus aurigaster* (C=1.55%), and *Orthotomus sutorius* (C=0.94%). In contrast, the endemic *Rhipidura phoenicura* exhibited a dominance index value of less than 1% (C=0.17%). According to Ario et al. (2020), bird species with a dominance index of less than 1% within a habitat are categorized as non-dominant. The three dominant species, such as *Collocalia linchi*, *Pycnonotus aurigaster*, and *Orthotomus sutorius*, are insectivorous birds known for their ability to adapt readily to varying environmental conditions.

Detailed estimates of bird population density are presented in Table 3.

Table 3. Estimated population density of bird species in the Telaga Warna and Jember Nature Reserve and Recreation Park, Puncak, West Java

No.	Scientific name	English name	Number of individuals	Estimated density (individuals/Ha)
1	*Ictinaetus malayensis*	Black Eagle	2	0.154
2	*Spizaetus cirrhatus*	Changeable Hawk Eagle	13	1
3	*Loriculus pusillus*	Yellow-throated Hanging Parrot	1	0.077
4	*Cuculus saturatus*	Oriental Cuckoo	3	0.231
5	*Cacomantis merulinus*	Plaintive Cuckoo	14	1.077
6	*Cacomantis sepulcralis*	Brush Cuckoo	11	0.846
7	*Centropus sinensis*	Greater Coucal	2	0.154
8	*Collocalia fuciphaga*	Edible-nest Swiflet	10	0.769
9	*Collocalia linchi*	Linchi Swiflet	102	7.846
10	*Ceyx erithacus*	Black-backed Kingfisher	1	0.077
11	*Halcyon cyanoventris*	Javan Kingfisher	4	0.307
12	*Megalaima armillaris*	Blue-crowned Barbet	6	0.462
13	*Picoides macei*	Fulvous-breasted Woodpecker	2	0.154
14	*Hirundo tahitica*	Pacific Swallow	3	0.231
15	*Hemipus hirundinaceus*	Black-winged Flycatcher Shrike	8	0.615
16	*Aegithina tiphia*	Common Iora	1	0.077
17	*Pycnonotus aurigatus*	Sooty-headed Bulbul	50	3.846
18	*Pycnonotus bimaculatus*	Orange-spotted Bulbul	19	1.462
19	*Lanius schach*	Long-tailed Shrike	3	0.231
20	*Brachypteryx leucophrys*	Lesser Shortwing	1	0.077
21	*Enicurus velatus*	Lesser Forktail	9	0.692
22	*Pnoepyga pusilla*	Pygmy Wren-Babbler	5	0.385
23	*Stachyris melanothorax*	Pearl-cheeked Tree-Babbler	15	1.154
24	*Megalurus palustris*	Striated Warbler	8	0.615
25	*Cisticola juncidis*	Zitting Cisticola	4	0.307
26	*Prinia polychroa*	Brown Prinia	1	0.077
27	*Prinia inornata*	Tawny-flanked Prinia	16	1.231
28	*Orthotomus sutorius*	Common Tailorbird	39	3
29	*Ficedula hyperythra*	Snowy-browed Flycatcher	2	0.154
30	*Gerygone suphurea*	Flyeater	1	0.077
31	*Rhipidura phoenicura*	Red-tailed Fantail	17	1.307
32	*Dicaeum concolor*	Plain Flowerpecker	5	0.385
33	*Dicaeum trochileum*	Scarlet-headed Flowerpecker	3	0.231
34	*Arachnothera longirostra*	Little Spiderhunter	3	0.231
35	*Zosterops plapebrosus*	Oriental White-eye	4	0.307
36	*Lonchura leucogastroides*	Javan Munia	4	0.307
37	*Lonchura punctulata*	Scaly-breasted Munia	2	0.154
38	*Passer montanus*	Eurasian Tree Sparrow	5	0.385
39	*Oriolus cruentus*	Black and Crimson Oriole	1	0.077
40	*Dicrurus leucophaeus*	Ashy Drongo	1	0.077
41	*Dicrurus paradiseus*	Greater Racket-tailed Drongo	1	0.077
	Total		402	

Note: Surveyed area= 67 × 3.14 × (0.025 km)² = 0.1314875 km² (approximately 13 ha); PD = population density (individuals/ha).

During the study, 67-point count stations were established, covering a total area of 0.1314875 km² (approximately 13 ha). Within the survey area, at least nine bird species exhibited a population density (PD) of ≥1 individual/ha. These species included the Changeable Hawk-Eagle (*Spizaetus cirrhatus*, PD = 1 individual/ha), Plaintive Cuckoo (*Cacomantismerulinus*, PD = 1.077 individuals/ha), Crescent-chested Babbler (*Stachyris melanothorax*, PD = 1.154 individuals/ha), Tawny-flanked Prinia (*Prinia inornata*, PD = 1.231 individuals/ha), Rufous-tailed Fantail (*Rhipidura phoenicura*, PD = 1.307 individuals/ha), Orange-spotted Bulbul (*Pycnonotus bimaculatus*, PD = 1.462 individuals/ha), Common Tailorbird (*Orthotomus sutorius*, PD = 3 individuals/ha), Sooty-headed Bulbul (*Pycnonotus aurigaster*, PD = 3.846 individuals/ha), and Linchi Swiftlet (*Collocalia linchi*, PD = 7.846 individuals/ha).

When illustrated graphically, the variation in bird population densities in the CATWA Telaga Warna-Jember, Puncak area appears as shown in Figure 2.

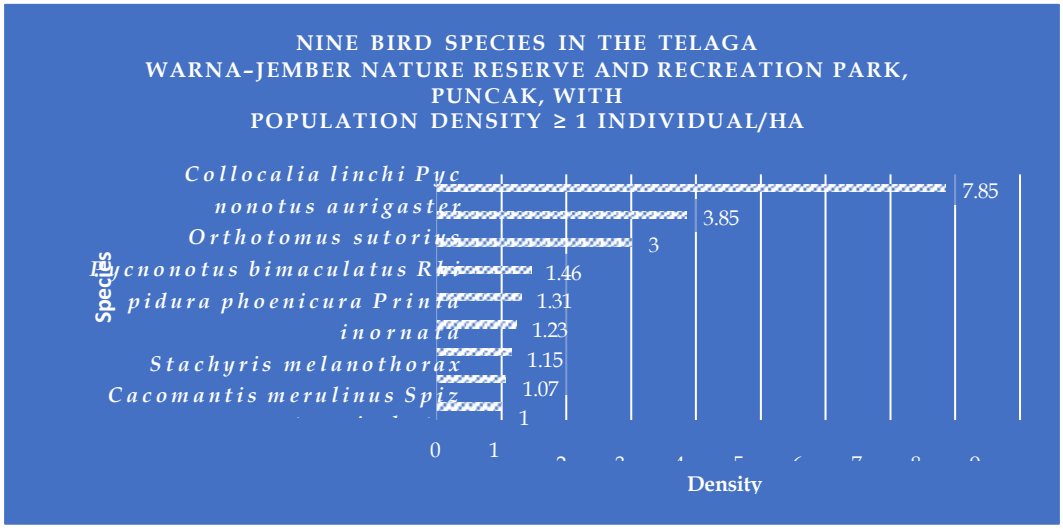

Figure 2. Population density values of bird species in the Telaga Warna-Jember Nature Reserve and Recreation Park, Puncak, West Java

Approximately 78% (or 32 species) of the recorded bird species exhibited population densities below 1 individual/ha. Based on these calculations, bird populations in the CATWA Telaga Warna-Jember, Puncak area can be categorized as relatively low. Nevertheless, the population density of the Rufous-tailed Fantail (*Rhipidura phoenicura*), which is the focal species of this study, was estimated at 1.3 individuals per hectare. This indicates a decline compared with previous records. A population survey conducted in 2007 at CATWA Telaga Warna recorded 96 individuals of *Rhipidura phoenicura* (Azharudin, 2007). At that time, several supporting ecological factors, such as abundant food resources, the presence of multiple water sources (lakes and streams), and dense, diverse vegetation, were observed to favor the species.

The fluctuations in bird population sizes within the CATWA Telaga Warna-Jember, Puncak area, particularly for the Rufous-tailed Fantail, are also influenced by the species' limited distribution in Java's montane forests, which range from 1,000 to 2,500 meters above sea level. The montane forests of Mount Lawu represent the easternmost extent of *Rhipidura phoenicura* distribution in Java (MacKinnon et al., 1998).

Furthermore, the forest buffer zones surrounding CATWA Telaga Warna-Jember, which function as supporting habitats for the Rufous-tailed Fantail, have undergone dynamic changes. These changes are primarily driven by fragmentation due to land use conversion, especially for tourism-related development in the Puncak Pass area and its surroundings. Consequently, the buffer zones serving as bird habitats have been shrinking, resulting in reduced breeding areas for *Rhipidura phoenicura* and, subsequently, lower individual counts over time. Collar and Lambert (2002) highlighted that continuous forest fragmentation poses one of the most critical threats to the survival of forest-dwelling birds in Java.

In addition, the effects of climate change have long been recognized as influencing bird populations. Species with limited dispersal ability may fail to relocate when their habitats become fragmented (Crick, 2004). When population sizes are small and climatic conditions change rapidly, such species become more vulnerable to environmental stressors.

On the other hand, *Rhipidura phoenicura* is also favored by certain urban bird enthusiasts. The growing popularity of bird singing contests in urban areas has indirectly contributed to increased illegal capture of songbirds from natural forests. Consequently, this practice has led to a decline in the populations of several bird species, some of which have become rare (Iskandar & Iskandar, 2015).

3.3. Distribution

Based on various literature sources, scientific specimen records, and direct field observations, the distribution of the Rufous-tailed Fantail (*Rhipidura phoenicura*) in Java is documented as follows. In **East Java**, the species has been recorded on Mount Lawu (Cemoro Sewu) at elevations of 1,700-2,300 m above sea level. In **Central Java**, it has been found in several mountain ranges, including Mount Merbabu (Salatiga/Boyolali, 1,000-1,800 m), Mount Prau (Dieng/Wonosobo, approximately 2,500 m), Mount Sindoro (Kedu, 1,700 m), and Mount Slamet (Baturraden, 1,200-2,000 m). In **West Java**, occurrences have been recorded on Mount Ciremai (Majalengka, 2,300 m), Mount Cikuray (Garut, 1,300 m), Mount Papandayan (Garut, 2,675 m), Mount Sawal (Ciamis, 800-1,100 m), Kamojang Crater (Garut, 1,400 m), Ratu Crater (Sukabumi, 1,350 m), Mount Gede Pangrango (Cianjur, 2,700 m), Mount Salak (Sukabumi, 2,211 m), Mount Halimun (Bogor/Sukabumi, 1,000-1,100 m), and in the Telaga Warna-Jember Nature Reserve and Recreation Park, Puncak/Bogor (1,400-1,500m). Detailed records of *Rhipidura phoenicura* distribution from various sources are presented in Table 4.

Table 4. Distribution of the Rufous-tailed Fantail (Rhipidura phoenicura) in Java based on various sources

Province	Locality	Habitat Type	S	E	Altitude (m dpl)	Sources
EAST JAVA	Mt. Lawu (Cemorosewu)	Protected Forest	7° 39' 52"	111° 11' 29"	1700-2300	Sari *et al.* (2015); MZB28261 (1961)
CENTRAL JAVA	Mt. Merbabu (Boyolali)	National Park Forest Area	7° 27' 13"	110° 26' 22"	1000-1800	Aditya *et al.* (2019)
	Mt. Prau (Dieng/ Wonosobo)	Mountain tourism (Protected Forest)	7° 06' 41"	109° 33' 08"	2590	Abdullah *et al.* (2024)
	Mt. Sindoro (Kedu)	Protected Forest (Perum Perhutani)	7.3010463°	109.9968767°	1400-1700	MZB5497 (1927)
	Mt. Slamet (Lereng Timur, Purbalingga)	Natural + Production Forest Perum Perhutani	7° 13.571'	109° 15.863'	1505-2088	Widodo, W. (2010)
	Mt. Slamet, (Lereng Selatan, DamMuntu/Baturaden)	Natural Forest + HPT Perhutani	7° 18.745'	109° 12.651'	700-1200	Widodo, W. (2012); MZB33937 (2013)
WEST JAVA	Mt. Ciremai (Kuningan/ Majalengka)	National Park Forest Area	6° 50' 25" - 6° 58' 26"	108° 28' 00" - 108° 21' 35"	700-1200	MZB 31139 (2006); Yuniarsih (2014)
	Mt. Sawal (Ciamis)	Wildlife Reserve	7° 12.18' 39.23"	108°15'15.58"	800-1100	Widodo, W. (2013)
	Telaga Bodas (Garut)	PERHUTANI Forest	7° 11' 44.1" - 7° 12' 11.2"	108° 03' 24" - 108° 03' 55"	1589-1655	Widodo, W. (2015)
	Mt. Cikuray (Garut)	Pasir Kiara	7° 20.444'	107° 53.953'	1300	MZB 30769 (2006)
	Mt. Papandayan (Garut(	Nature Tourism Park	7° 19' 42"	107° 44' 00"	2675	Hilman & Masyrafina (2015)
	Kawah Ratu (Mt.Salak)	National Park Forest Area	6° 43' 49.8"	106° 42' 23.76"	1437-1873	MZB34265 (2013)
	Mt. Salak (Sukabumi)	National Park Forest Area	6° 43' 00"	106°44' 00"	2211	MZB 29491 (1984)
	Telaga Warna (Puncak)	Tourism Residence Park	6° 41' 57.4"	106°59'42.2"	1425	Cholifatullah et al. (2020); The research (2022)
	Jember (Puncak)	Tourism Residence Park	6° 42' 13.9"	106°59' 38.1"	1507	The research (2022)
	Cibodas (Cianjur)	Botanical Garden	6° 44' 10"	106° 59' 25"	1250-1425	MZB 3760 (1916)
	Mt. Halimun (Cianten+ Garehong)	National Park Forest Area	6° 45' 53.6"	106° 36' 31.5"	1049	MZB9680 (1932) Widodo *et al.* (2025)
	Mt. Gede Pangrango	National Park Forest Area	6° 47' 00"	106° 59' 00"	2700	MZB14297 (1940)

Not all montane forests in Java support the presence of *Rhipidura phoenicura*. The species is predominantly found in Central and West Java, while in East Java its range extends only as far as Mount Lawu. This limited distribution is likely related to the species' ecological preference for cool

montane forests that depend heavily on the availability of water sources, such as river catchments or lakes. These aquatic systems serve as year-round breeding sites for insects, which constitute the primary food source of the Rufous-tailed Fantail (Sari et al., 2015).

For example, in the Lawu mountain range of East Java, the distribution of *Rhipidura phoenicura* is concentrated around the Telaga Sarangan area, particularly in the Cemoro Sewu forest. Similarly, in West Java, particularly in the CATWA Telaga Warna and Jember, Puncak area, the species inhabits riparian zones supplied by multiple springs and streams connected to Telaga Warna Lake. In Central Java, its occurrence in the Baturraden region of Mount Slamet is closely associated with watercourses such as Pancuran Tujuh and the Dam Muntu hydropower stream.

Several ecological factors may influence the distribution patterns of montane forest birds: a) Altitudinal range plays a key role because each elevation zone supports characteristic avian communities; b) Physical and biological environmental conditions, including climatic variation, food resource availability, and vegetation composition at different altitudes, also determine the presence and spread of bird species; c) Interspecific interactions, particularly competition among species for shared resources, can further affect distribution; d) Habitat

discontinuity, which occurs at the boundaries between different habitat types (ecotones), shapes the overall pattern of species occurrence; and e) Geographical and topographical factors, such as the distribution of endemic and migratory species, influence the composition of avian communities within montane forest ecosystems.

Geologically, Mount Lawu is an active volcano with a humid structural environment influenced by its proximity to Telaga Sarangan. This geological condition contributes to the formation of diverse microhabitats that support the persistence of *Rhipidura phoenicura* within the area.

3.4. Habitat

Field observations showed that the Rufous-tailed Fantail (*Rhipidura phoenicura*) is an active montane forest bird that constantly moves and hops from one tree branch to another. The species was more frequently observed in the lower and middle strata of forest vegetation, where it often vocalized to mark its territory.

The list of tree species serving as habitat components within the bird observation plots at the study site is presented in Table 5.

Table 5. List of tree species recorded within bird observation plots at the study site

No.	Local name	Scientific name	D (trees/H a)	RD (%)	D (m^2)	Rd (%)	F	RF (%)	IVI (%)
1	Jabon	*Neonacluea* sp	6.81	4,17	3.67	2.79	0.17	5.26	8.05
2	Riung anak	*Castanopsis acuminatissima*	61.31	37.5	51.90	39.31	0.83	26.3	103.1
3	Saninten	*Castanopsis argentea*	13.62	8.33	8.55	6.48	0.33	10.5	25.3
4	Muncang cina	*Aleurites moluccana*	6.81	4.17	5.35	4.05	0.17	5.26	13.5
5	Huru bodas	*Acer laurinum*	6.81	4.17	32.09	24.31	0.17	5.26	33.7
6	Hamirung	*Ficus elegans*	6,81	4.17	4.93	3.73	0.17	5.26	13.1
7	Ganitri	*Elaeocarpus ganitrus*	6.81	4.17	1.92	1.45	0.17	5.26	10.8
8	Huru angin	*Macaranga rhizinoides*	6.81	4.17	2.93	2.22	0.17	5.26	11.6
9	Puspa	*Schima wallichii*	20.43	12.5	16.69	12.64	0.33		35.6
10	Kijeruk	*Acronychia pedunculata*	6.81	4.17	0.39	0.29	0.17	5.26	9.72
11	Pasang bodas	*Lithocarpus indutus*	6.81	4.17	0.69	0.52	0.17	5.26	9.95
12	Kibangkong	*Erdiandra rubescens*	6.81	4.17	0.75	0.57	0.17	5.26	10
13	Buah ara	*Ficus festulosa*	6.81	4.17	2.14	1.62	0.17	5.26	11.0
∑			163.46	100.0	132.0	100.0	3.19	99.9	299.9

Note: D = density (trees/ha), RD = relative density (%), D = dominance (m^2), Rd = relative dominance (%), F = frequency, RF = relative frequency (%), IVI = Importance Value Index (%).

Table 5 indicates that the tree species providing habitat and shelter for the Rufous-tailed Fantail at the study site were dominated by *Castanopsis acuminatissima* (IVI = 103.1%), *Schima wallichii* (IVI = 35.6%), *Acer laurinum* (IVI = 33.7%), and *Castanopsis argentea* (IVI = 25.3%). Understory vegetation in this area is highly susceptible to changes in weather and microclimate conditions, therefore large canopy trees such as *Castanopsis acuminatissima* serve an essential role as protective cover during extreme weather events and as nesting shade.

This tree species is characterized by its evergreen foliage, broad canopy, and fragrant flowers. In addition to its ecological role, *Castanopsis acuminatissima* also provides valuable timber and natural shade.

Aside from *Castanopsis acuminatissima*, other important tree species dominating the CATWA Telaga Warna and Jember, Puncak area include *Castanopsis argentea* and *Schima wallichii*. During the observation period, both species were flowering and

attracting a variety of insects. These flying insects represent a major food source for insectivorous birds, including the Rufous-tailed Fantail.

3.5. Management Efforts

Rhipidura phoenicura is one of the insectivorous bird species inhabiting the montane forests of Telaga Warna and Jember, Puncak. The species has not been exempt from the pressures of modernization and various disturbances, including habitat destruction, pesticide exposure, hunting, and illegal capture. Therefore, several measures are necessary to support its conservation. These include providing environmental education to local communities regarding the ecological importance of *Rhipidura phoenicura* within forest ecosystems, restoring and reconstructing its natural habitat, halting unsustainable resource extraction, and promoting community-based economic practices.

Local communities are aware that one of the buffer zones of the Telaga Warna and Jember, Puncak area consists of tea plantations, where leaf pest control spraying is carried out monthly. Consequently, plantation managers need to anticipate and prevent the potential accumulation of toxic substances that could affect wildlife in ecotone or forest-edge habitats, including *Rhipidura phoenicura*, particularly during strong winds blowing from plantation areas toward the forest.

On the other hand, according to Makoginta (2016), agroforestry practices developed around forest areas have increasingly expanded into forest interiors. In the case of the Telaga Warna-Jember Recreation Park (Puncak), this expansion has occurred from the Jember sector toward the Ciloto area. This shift is largely due to the adoption of modern agroforestry systems that pay less attention to maintaining high diversity of useful tree species and to integrating wildlife as part of traditional agroforestry systems. Therefore, sustainable harmony among environmental, social, and economic aspects must be continuously pursued. As Suharjito et al. (2023) explain, conservation success should not be measured solely in economic terms but also in relation to its impacts on the environment and local communities.

4. CONCLUSION

This study provides an updated assessment of the population status, distribution, and habitat characteristics of the Rufous-tailed Fantail (*Rhipidura phoenicura*) in the Telaga Warna and Jember Nature Reserve and Recreation Park, Puncak, West Java. Based on point count surveys conducted across 67 observation stations, the population density of *R. phoenicura* was estimated at approximately 1.3 individuals per hectare (equivalent to 10.83 individuals/km^2), indicating a moderate but declining population compared to previous records from the same area. Despite its current classification as a protected species and its status as "Least Concern" at the global level, local population trends suggest increasing vulnerability.

The species exhibits a restricted distribution limited to montane forests of Java, particularly in areas closely associated with water sources such as lakes, streams, and riparian zones. Its presence in Telaga Warna–Jember is strongly supported by forest structure dominated by *Castanopsis acuminatissima*, *Schima wallichii*, *Acer laurinum*, and *Castanopsis argentea*, which provide essential shelter, foraging substrates, and insect prey availability. However, ongoing habitat fragmentation, tourism development, agroforestry expansion, pesticide exposure, and illegal bird capture pose significant threats to the long-term persistence of the species.

The findings highlight the importance of maintaining intact montane forest ecosystems and buffer zones to support endemic insectivorous birds with limited dispersal ability. Strengthening habitat protection, regulating land-use change, promoting environmentally friendly agroforestry practices, and enhancing community awareness are crucial for effective conservation management. Further research focusing on breeding ecology, nesting behavior, seasonal activity patterns, and long-term population monitoring is recommended to support adaptive conservation strategies for *Rhipidura phoenicura* in Java's montane forests.

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