

Population Densities of Spotted Owlet *Athene brama* (Aves: Strigiformes) in Madurai District, Tamil Nadu, India

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Abstract: Population densities of Spotted Owlet *Athene brama* was studied in four habitats viz. rural, urban, agricultural lands and riverine in Madurai District, Tamil Nadu, India during 2007-2009. Regardless of habitats and years, Spotted Owlet densities varied from 10.4 to 35.6/km² and among the habitats rural and agricultural lands supported comparatively higher number of owlets than others. Moreover, within habitats, density of owl population varied among seasons. In pre-monsoon, rural (26.4/km²) and urban (23.2/km²) habitats had higher number of owlets, while agricultural lands (29.6/km²) and riverine habitats (22.6/km²) had higher density during post-monsoon. Yearly variations of population densities showed that the urban (25.4/km²), agricultural lands (31.7/km²) and riverine (25.6/km²) had higher mean densities during 2009 and in rural it was higher (29.2/km²) in 2008. Spotted Owlet densities significantly varied ($P < 0.05$) among years in all habitats.

Key words: Spotted Owlet • *Athene brama* • Density • Habitats • Madurai • India

INTRODUCTION

Spotted Owlet *Athene brama* (Temminck, 1821), a small, common, nocturnal and resident raptor, is distributed south of 20°N latitude [1]. It survives in all possible types of biotopes, adapts to the changing environment both natural and man-made and usually is absent on high mountains [2]. During day hours they roost under thick shady vegetation, cavities in trees, man-made structures including functional or non-functional irrigational wells and crevices found in rock cliffs. With regard to their diet insects have been reported to form a significant part of its diet [3-6], besides rodents, birds, reptiles and amphibians were also eaten in different proportions [7-10]. Detailed ecological studies on this species in India are scanty except a very few reports that do exist on food habits and breeding activities [3, 6-8]. Though a handful of information on this species is available no estimates on the population size or density of this owl are attempted in Tamil Nadu or elsewhere in India. Hence, the present study aimed to provide first hand information on the population densities of Spotted Owlet in different habits in Madurai District, Tamil Nadu, India.

MATERIALS AND METHODS

The present study was carried out in Madurai District (9°30 'N, 77° 28 'E), Tamil Nadu, India between 2007 and 2009. The mean monthly maximum and minimum temperatures during the study period ranged between 33.6°C (range 29.1-36.9°C) and 22.8°C (19.7-25.1°C) respectively. The major precipitation of the study area is north-east monsoon which usually brings rain during October-December and the hottest season occurs during April-June. The precipitation and other climatological factors of the study area seem to be erratic and discontinuous locally. The presence of hillocks viz. Pasumalai, Yanamalai, Nagamalai, Alagarmalai and Thiruparankundram give a panoramic landscape of Madurai. Although paddy is the predominant cultivated crop in the study area, other crops such as sugarcane, banana, jasmine, betlevine, groundnut and sorghum are also being cultivated in different portions.

We used line transect method [11, 12] to census the population of Spotted Owlet. Census was carried out in four different habitats viz. rural, urban, agricultural lands and riverine. The size of each transect was 4500m length and 100m width. Censuses were carried out monthly once

during the study period in all the four habitats. Rainy and cloudy days were avoided during all the census operations. Each census was conducted between 18:00 and 22:00hrs. Transect was walked at a normal and regular speed. At each transect, we recorded the time of each bird contact, number of individuals and angular distance. Bird calls were not taken in to account for the calculation of density estimation. Population density of Spotted Owllet was estimated by using following formula

$$\text{Density} = \frac{\text{No. of owls}}{2 \times \text{length} \times \text{width}}$$

In addition to descriptive statistics, one-way ANOVA was used to detect if any difference in the mean population density between seasons and years. All the analysis was performed by MINITAB statistical software. Significance of all tests was assessed at $P = 0.05$. Statistical inferences were made by following Sokal and Rohlf [13].

RESULTS

Spotted Owllet density varied between 10.4/km² (in summer 2007 at riverine habitat) and 35.6/km² (in post-monsoon of 2009 at agricultural lands). In general, the rural and agricultural lands supported relatively higher number of Spotted Owllet than other habitats (Table 1). Within habitats densities were higher during monsoon of 2007 (20.7/km²), pre-monsoon of 2008 (33.3/km²) and post-monsoon of 2009 (28.1/km²) in rural and during the monsoon of 2007 (20.0/km²), summer of 2008 (27.4/km²) and pre-monsoon of 2009 (27.4/km²) in urban habitats. In agricultural lands the highest densities were recorded during the monsoon of 2007 (27.4/km²), summer of 2008 (33.3/km²) and post-monsoon of 2009 (35.6/km²) and in riverine the densities were highest during monsoon of 2007 (20.7/km²) and summer of 2008 (25.3/km²) and 2009 (30.4/km²) (Table 1).

Seasonal variations in the Spotted Owllet density inferred that the rural (26.4/km²) and urban (23.2/km²) habitats had comparatively higher during pre-monsoon and the agricultural lands (29.6/km²) and riverine

Table 1: Habitat-wise variations in the density (owls/km²) of the Spotted Owllet in different habitats from 2007 to 2009. Values are mean ± SD.

Year	Season	Habitats			
		Rural	Urban	Agricultural lands	Riverine
2007	Summer	17.8 ± 6.65	13.3 ± 2.25	20.0 ± 2.20	10.4 ± 3.36
	Pre-monsoon	18.5 ± 5.58	16.3 ± 2.60	23.7 ± 6.78	14.8 ± 6.78
	Monsoon	20.7 ± 2.54	20.0 ± 3.81	27.4 ± 3.40	20.7 ± 3.36
2008	Post-monsoon	21.5 ± 5.58	17.8 ± 2.20	23.7 ± 2.60	17.0 ± 1.27
	Summer	30.4 ± 2.54	27.4 ± 2.60	33.3 ± 3.87	25.3 ± 3.42
	Pre-monsoon	33.3 ± 2.25	25.9 ± 3.42	28.1 ± 3.42	25.2 ± 3.42
	Monsoon	31.9 ± 5.59	25.2 ± 3.42	30.4 ± 3.36	22.2 ± 4.45
2009	Post-monsoon	28.1 ± 5.59	26.7 ± 4.45	35.6 ± 5.88	26.7 ± 5.14
	Summer	26.7 ± 4.45	26.7 ± 2.25	27.4 ± 3.40	30.4 ± 2.20
	Pre-monsoon	27.4 ± 3.40	27.4 ± 3.40	34.1 ± 4.64	23.0 ± 2.54
	Monsoon	20.7 ± 2.83	20.7 ± 2.20	29.6 ± 3.21	22.2 ± 1.88

Table 2: Seasonal variations in the density of Spotted Owllet in different habitats from 2007 to 2009. Values are mean ± SD.

Habitat	Owl density /km ²				ANOVA	
	Post-monsoon	Summer	Pre-monsoon	Monsoon	F	P
Rural	24.8 ± 6.17	24.9 ± 7.00	26.4 ± 7.33	24.4 ± 5.16	2.21	0.106
Urban	22.2 ± 5.78	22.4 ± 7.15	23.2 ± 5.89	22.0 ± 4.51	2.23	0.103
Agricultural lands	29.6 ± 7.66	26.9 ± 6.42	28.6 ± 6.34	29.1 ± 3.61	1.96	0.138
Riverine	22.6 ± 6.92	21.4 ± 8.89	20.9 ± 6.19	21.7 ± 4.22	1.61	0.205

Table 3: Yearly variations in the density of Spotted Owllet in different habitats during 2007-2009. Values are mean \pm SD.

Habitat	Owl density /km ²			ANOVA	
	Year			F	P
	2007	2008	2009		
Rural	19.0 \pm 4.71	29.2 \pm 6.04	25.7 \pm 3.63	14.21	0.000*
Urban	16.5 \pm 3.86	24.0 \pm 4.62	25.4 \pm 4.27	12.50	0.000*
Agricultural lands	23.7 \pm 5.08	28.8 \pm 4.64	31.7 \pm 3.40	6.93	0.003*
Riverine	15.3 \pm 6.11	22.4 \pm 4.48	25.6 \pm 3.08	11.57	0.000*

*Differences between years (One-way ANOVA; $P < 0.05$)

(22.6/km²) habitats had higher during post-monsoon (Table 2). However, there were no significant differences (One-way ANOVA; $P > 0.05$) in mean density of Spotted Owllet between seasons (Table 2).

Yearly variations of population density showed that the urban (25.4/km²), agricultural lands (31.7/km²) and riverine (25.6/km²) had higher mean densities during 2009. In rural the density was relatively higher (29.2/km²) in 2008. Significant yearly variations in Spotted Owllet densities was existed in all the habitats (One-way ANOVA; $df = 2, 30$; $P < 0.05$) (Table 3).

DISCUSSION

Mean density of Spotted Owllet in the study area varied from 10.4 to 35.6/km². This estimated density suggests that this species can be considered to be common in the study area. There is no previous report on the densities of Spotted Owllet that can be directly compared with the present findings. Spotted Owllet density differed among habitats and in general the density was comparatively higher in agricultural lands and rural habitat. Density fluctuations in different area reflect the difference at the habitat level [14-18]. For example, more Spotted Owllet in agricultural lands and rural habitat might be provided relatively rich supply of insects and rodents and the low density of owllets in urban and riverine habitats might be due to lesser food availability coupled with greater human disturbances. Food availability is one of the main factors determining the habitat use by several bird species [19], but other factors also determine habitat use. For example, occurrence of owls may be influenced by vegetation type rather than by food availability [20], because habitat structure is essential for protection, nesting and perching sites [21]. Besides, the rural habitats provide adequate roosting and nesting sites, more foraging perches and camouflaged dense vegetation to the Spotted Owllet which is highly essential during rainy season and these facilities were relatively lesser in other habitats.

The seasonal variations of Spotted Owllet population inferred that the density was more or less stable in all the habitats and seasons. But a slight increased pattern was noticed during post-monsoon (January-March), summer (April-June) and pre-monsoon (July-September). This increased response could be related to the reproductive period of this species. The Spotted Owllet breeding seasons in the study area sets in January and ends in April. The high density estimates reported in summer and pre-monsoon may be a reflected by the addition of recently emerged independent owls. During this time, food availability is high because insects and small vertebrates increase in abundance [22, 23]. Smith *et al.* [24] and del Hoyo *et al.* [25] reported that density estimates of Eastern Screech Owl *Megascops asio* increase at the end of breeding season as juveniles are added to the population as independent individuals. However, other studies have reported that detectability of owl's increases during the courtship period [26]. Relatively lower density estimates during monsoon (October-December) may be associated not only with the post-reproductive status and dispersal of owls and also with fewer food resources during the colder seasons.

Yearly variations of population densities were differed among habitats. Various factors may be cited for yearly variations in bird densities *viz.* predation, intra and interspecific completion, parasites and diseases, habitat availability, weather, food habits and migratory status [23, 27-32].

We believe that this preliminary or baseline data will be helpful so as to know the number of owls operating in the study area in different habitat and investigating the factors attributed to the decline in the population of Spotted Owllet. However, in future, call play back method and radio telemetry study will provides more accurate census values, home range size and life history of Spotted Owllet.

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