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Research Article

SPATIO-TEMPORAL VARIATIONS OF ROSE-RINGED PARAKEET (*PSITTACULA KRAMERI*) DENSITY IN ARIYALUR DISTRICT, TAMIL NADU, INDIA

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ABSTRACT

Studies on avian communities especially cavity nesting birds are significant to understand their status and distribution in relation habitat requirements. The Rose Ringed Parakeet is one of the secondary cavity-nesting bird species. The present study was carried out in two different habitats viz., Palmyra and Coconut tree plantations. The Line transect method was applied to count the Rose Ringed Parakeet bird population in both the habitats. Temporally among three years of the study the year I (2013-14) showed the highest bird density (15.1±0.63 No./km.) and the year II (2014-15) showed the lowest bird density (13.2±0.51No/km). Spatially highest bird density was recorded in the Palmyra tree plantation than the Coconut tree plantation. The density of Rose Ringed Parakeet varied significantly between the habitats and among the years ($P<0.001$). The present study revealed that fluctuations and density of Rose Ringed Parakeet could vary spatio-temporally.

Keywords: Rose ringed parakeet, Spatial, Temporal density, Conservation.

INTRODUCTION

The rose-ringed parakeet is the altricial and secondary cavity-nesting birds in the avian communities. The population of cavity-nesting birds declined over the periods (Kannaiyan and Pandiyan, 2014). The rapid of decline in a cavity nesting birds including rose ringed parakeet due to the unfavorable nesting site and competition from non-native birds that could be a major threat to the species (Kannaiyan and Pandiayan 2014). The parakeet is considered to worst avian pest in throughout world and Indian subcontinent (Ali *et al*., 1981; Forshaw & Cooper, 1989; Gupta *et al*., 1998; Juniper & Parr, 1998; Shafi *et al*., 1986). Parakeet population recoded from some parts of South Asia, Europe, North America and some region of Africa (Roberts, 1991). Rose-ringed parakeet (*Psittacula krameri)* is one of the primary vertebrate pests in fruit orchards, cultivations and native wildlife.

Most of the Parakeet nest sites are located to the food crop area, near to the water bodies (Khan, 2002; Paton *et al*., 1982). The Rose-ringed Parakeet population depends on the availability of food and major environmental factors. The rose-ringed parakeet population depends on the availability of food, environmental factors and the food supply (Lack, 1954; Newton, 1998) but the population may be fluctuated and it influenced by the different ecological factors pertinently quality of habitats (Arscott *et al*., 2002). Habitat could directly influence the population of cavity nesting birds (Martin *et al*., 2004). The population is depending on differential habitats requirement and habitat specialization. Habitat requirements are most vulnerable to population problems from habitat change (Harcourt *et al*., 2002; Julliard *et al*., 2004; Korkeamaki & Suhonen, 2002; Munday, 2004; Warren *et al*., 2001). The relationships between habitat quality and supplemental food sources to increased population size (Kennedy *et al*., 2011; Schooley & Branch, 2011). The habitat structure is influences the

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distribution and abundance of populations (Bahn & McGill, 2007; Kraft *et al*., 2008).

Nevertheless the rose ringed parakeet used secondarynests as their breeding site or roosting sites. The nest site is one of the most important determinants of individual fitness and population of bird species (Martin, 1995; Slobodchikoff, 1984). The nest site limitation is important to secondary cavity-nesting species. The cavities constitute key resources to some birds (Martin, 1995). Population declines in secondary cavity-nesting birds are usually attributed to habitat quality deterioration (Holt & Martin, 1997) and nest-site limitation (Newton, 1998). The availability of cavities can a limiting factor of the cavity nesting community (Von Haartman, 1957), particularly for secondary cavity nesting bird species (Newton, 1998). The number of cavities could determine the maximum number of pairs that breed in an area (Von Haartman, 1957). Cavity-nesting birds select their nest trees based not only cavity and tree level variables and larger scale context, such as surrounding vegetation and distance to forest edge (Aitken & Martin, 2004; Mahon *et al*., 2007 ; Koch *et al*., 2009; Politi *et al*., 2009). Based on the information the present study planned to collect the current status of Rose ringed Parakeet in two different habitats in relation to different years to understand the spatio-temporal variations of their population size.

MATERIALS AND METHODS

The present study carried out at two different habitats from November 2013 to April 2016. Habitat I all the tree cavities Palmyra tree (*Borassus flabellifer*), and which is located at Arulmozhi (11º 04' 09.09" N 79º 21' 34.34" E) and Habitat II Coconut tree (*Cocos nucifera*) and which is located at Karaikurichi (11º 07' 85.35" N 79º 35' 73.78" E) agricultural area, Ariyalur District, Tamilnadu, India. Both the study area is situated near by the Kollidam River. The Kollidam river is the major water suppliers for the area of 10000 hectares for the purpose of agricultural activities of in an around the Ariyalur District, Tamil Nadu. The study area dominated by agricultural lands particularly paddy, banana, cotton, sugarcane, coconut, black and green grams, gingelly, spices etc., Natural vegetation is very scarce, and includes small areas of short scrubland and other types of lands.

Methodology

The Line transects method used to count the Rose ringed Parakeet in both the study areas during the study periods. Line transect simply involve walking a straight line and counting the numbers of birds seen from the line (Bibby, 2004). By keeping moving, it is possible to cover more ground in a fixed time than by any more elaborate method, and large sample size generated efficiently. Long transects divided into small section whose habitats can be measured to asses bird/habitat relationship. The line transect surveys more accurately estimated the distribution of the population between habitats and recommended that line transects be used to estimate the numbers of parakeets (Casagrande & Beissinger, 1997). The both habitat divided into 10 transect, each transect were counted the birds from two times in each month during breeding season.

RESULTS AND DISCUSSION

The highest density of the rose-ringed parakeet (*Psittacula krameri*) recorded in the Palmyra tree habitat (15.7 ± 0.47 No./km.) when compared to the Coconut tree (12.3 ± 0.46 No./km.) (Table 1 and Figure1). The density of rose-ringed parakeet (*Psittacula krameri*) differed significantly between the habitats ($P<0.001$) (Table 1). Among the three years the Year I (2013 -2014) showed the highest bird density (15.1 ± 0.63 No./km.) and the Year II (2014-2015) showed the lowest bird density (13.2 ± 0.51No/km) (Table 2 and Figure 2). The density of rose-ringed parakeet (*Psittacula krameri*) differed significantly between the years ($P<0.001$) (Table 2). The bird density, the month of January showed highest bird density (21.08 ± 0.79No/km) and the month of April showed lowest density than the other months studied (8.7 ± .48 No./km.) There was a significant variation between the density of rose-ringed parakeet and among the months ($P<0.001$) (Table 3).

The present study revealed that the population of rose-ringed parakeet differed significantly between the habitats i.e. Palmyra and coconut tree plantation ($P<0.001$) (Table 1 and Figure1). A study explained that the different types of habitats and ecological factors might have influence the bird population either increase or decrease the bird population (Greene & Guo, 1997; Lysyk, 1993; Mullens & Meyer, 1987). Another study reported that the fluctuation of rose-ringed parakeet population depends on the following factors such as availability of food resources, biotic and abiotic factors, the sustainability of food resources and supply of food (Lack, 1954; Newton, 1998). Thomas, (1994) inferred that the habitat quality is strong influencing factor for bird population density, reproduction and growth of the species. The study observed more colonized rose ringed parakeet in both the habitats when compared to the unused habitat (Unpublished data) and it explained that the quality of the habitat is very vital for the attraction of birds especially for more aggregation of birds. Higher quality habitat sites more likely to be species recolonized (Kennedy *et al*., 2011; Schooley & Branch, 2009) (Robles & Ciudad, 2012) and the relationships between habitat quality and supplemental food sources to

increased population size (Kennedy *et al.*, 2011; Schooley & Branch, 2011).

The habitat structure is influences the distribution and abundance of populations (Bahn & McGill, 2007; Kraft *et al*., 2008). A study stated that the habitat requirements are most vulnerable to a bird population from habitat change (Harcourt *et al.*, 2002; Warren *et al*., 2001; Korkeamaki & Suhonen, 2002; Julliard *et al*., 2004; Munday 2004). The density of rose-ringed parakeet (*Psittacula krameri*) differed significantly among the years and months (P<0.001) (Tables 2, 3). The many communal roosting populations varied in a particular month, season and years, it might have due to temporal variations of environmental factors (Haase, 1963). Another study indicated that the annual variation of bird population influenced by the local weather condition, habitat structure and abundance and distribution of food. Several studies informed that the individual bird populations of many tropical species frequently move over large areas to follow temporal and spatial changes in food resources (Blake & Loiselle, 1990).

Table 1. Bird density (No./km.) of Rose-ringed Parakeet (*Psittacula krameri*) recorded in two different habitats from November 2013 to April 2016. (Values are Mean and SE).

S. No.	Habitat	Density (No./km.)	P. value
1	Palm tree	15.7±0.47	P<0.001
2	Coconut tree	12.3±0.46	P<0.001

Table 2. Annual variations of bird density (No./km.) of Rose-ringed Parakeet (*Psittacula krameri*) recorded in two different habitats from November 2013 to April 2016. (Values are Mean and SE).

S. No.	Years	Density (No./km.)	P. value
1	2013-2014	15.1 ± 0.63	P<0.001
2	2014-2015	13.2 ± 0.51	P<0.001
3	2015-2016	13.7 ± 0.61	P<0.001

Table 3. Monthly variations of bird density (No./km.) of Rose-ringed Parakeet (*Psittacula krameri*) recorded in two different habitats from November 2013 to April 2016. (Values are Mean and SE).

S. No.	Months	Density (No./km.)	P. value
1	November	10.9 ± 0.61	P<0.001
2	December	16.4 ± 0.69	P<0.001
3	January	21.1 ± 0.79	P<0.001
4	February	15.8 ± 0.70	P<0.001
5	March	11.2 ± 0.57	P<0.001
6	April	8.7 ± 0.48	P<0.001

The current study further showed that maximum density recorded for the month of January than the April month. It might be due to during the April the rose ringed parakeet begins their breeding session and the Parakeets critically facing new fledglings in their nest it may be the reason the declining of bird population particularly April month. A study reported that the abundance of bird species is largely influenced by the spatiotemporal distribution of some key environmental resources (McCain, 2009). In addition to that the seasonality plays a major role in determining the abundance and distribution of birds because the seasonality affects food and cover availability of bird population, which in turn affects breeding success and ultimately survival of the bird species (Mengesha & Bekele, 2008). The current results and the previous reports clearly indicated that the quality of the habitat is most essential factor for the birds especially cavity nesting birds to meet out their regular survival.

CONCLUSION

The study inferred that the viability and sustainability of rose ringed parakeet population can be determined by the nature of the habitat and rose ringed parakeet population can be varied among the months and years which means the month and years can also influence the density of rose ringed parakeet.

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