

THE MOVEMENTS OF A POPULATION OF REDBILLED OXPECKERS (*BUPHAGUS ERYTHORHYNCHUS*) IN THE KRUGER NATIONAL PARK

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Abstract — The movements of the Redbilled Oxpecker *Buphagus erythrorhynchus* were studied in the Kruger National Park in the period March 1973 to December 1974. The study population at Skukuza showed little or no fluctuations in numbers and no local movements. The maximum distance the oxpeckers were observed away from the trapping station measured 8,0 km with a mean distance of 3,37 km. For two birds circular home ranges of 26 km² and 27 km² were calculated.

Introduction

Home range size, juvenile dispersal, migration patterns and daily movements all figure importantly in avian ecology. One objective in this study has been to measure Redbilled Oxpecker *Buphagus erythrorhynchus* population changes and trends. The area selected was the Skukuza area in the southern part of the Kruger National Park.

The number of birds in an area at a given time depends upon the amount of reproduction, mortality and movements. Bird ringing, a standard ornithological tool, is of limited value in determining the above because of low recovery rates. It was the need for a method of securing large population samples over a large area in a limited time that led to the selection of a monthly trapping, colour marking and roadside census. However, as trapping was only possible at the animal pens of the Veterinary Division at Skukuza, the term population as used in this paper refers to the total number of individuals of both sexes and all ages (other than nestlings) that visited these pens at Skukuza.

Material and Methods

The Redbilled Oxpecker spends most of its activity period on the mammalian symbiont and they are therefore not easy to trap (Stutterheim 1974). It was therefore only possible to trap oxpeckers at the animal holding pens of the Veterinary Division near Skukuza where oxpeckers are attracted by buffalo, wildebeest and cattle kept in three adjacent pens. By erecting two 20 m x 2,6 m x 36 mm terelyne mist nets in these camps a total of 155 oxpeckers were caught with 48 recaptures in a period of 19 months between March 1973 — December 1974. Because of

behavioural studies on the oxpeckers at these pens, the birds were trapped only once a month to reduce disturbance to a minimum. The birds were marked with 3 mm split ring colour rings and standard 4,3 mm incoloy rings as described by Stutterheim (1974). The marked birds were located by using a vehicle driven along regular routes and identified with 7 x 50 binoculars.

Table 1

Trapping time of the Redbilled Oxpecker at the animal pens of the Veterinary Division at Skukuza in the period March 1973 - December 1974

Time	Number oxpeckers	Per cent birds of total trapped
06h00 - 07h00	0	0
07h00 - 08h00	0	0
08h00 - 09h00	2	1
09h00 - 10h00	16	8
10h00 - 11h00	24	12
11h00 - 12h00	27	14
12h00 - 13h00	12	6
13h00 - 14h00	20	10
14h00 - 15h00	32	16
15h00 - 16h00	22	11
16h00 - 17h00	28	14
17h00 - 18h00	6	3
18h00 - 19h00	2	1
19h00 - 20h00	3	2
Total	194	
Range	0-32	

Results

Ringling and retrap data

In a 250h trapping period a trapping success of 1,2 birds per trapping hour for two 20 m nets was obtained. This gives a total trapping success of 203 birds of which 48 were recaptures. Trapping success appeared to be highest during 10h00-12h00 and 14h00-17h00 (Table 1). However, disturbances by humans could be the reason for these two peaks. A trapping success of 41% (n=85) for first-year birds was obtained. For a description of a first-year bird see Stutterheim (1977). In the Satara area, from breeding data, the replacement rate was calculated as 0,8 chicks per adult for the 1973/74 breeding season and 0,5 chicks per adult for the 1974/75 breeding cycle (Stutterheim 1976). This gives a mean age ratio of 0,65. As Satara is 90 km from Skukuza, it can be speculated that the replacement rate would be the same for the Skukuza area. The difference between these two values could therefore be due to mortality after leaving the nest.

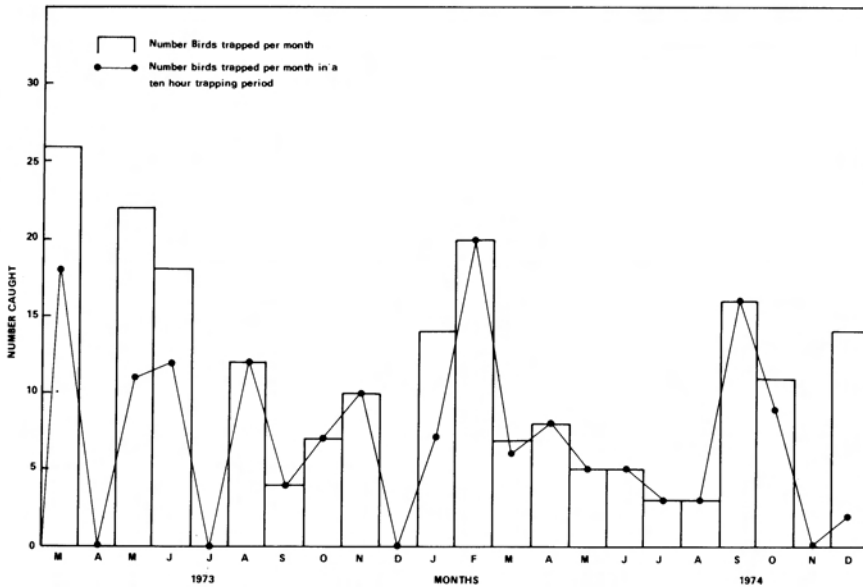


Fig. 1. Number of redbilled oxpeckers caught per month and the number trapped every month per ten hour trapping time at Skukuza during the period March 1973 to December 1974.

A big variation in the monthly trapping success was obtained (Fig. 1). However, a large number of factors could have influenced the trapping success. In this study the most obvious variations in monthly trapping success are probably due to net-shyness and disturbances by humans. A steady decrease in the percentage of accumulated new rings to the totals and a steady increase in the percentage of accumulated recaptures to the totals however points to a resident population of birds that visited the animal pens (Fig. 2). Further evidence indicating a stable population was a more or less constant increase in the number of recaptures (Fig. 3).

Net-shyness can be expected to manifest itself in a progressive decline in catch per effort. This was indicated by a steady decline in trapping success from March until September 1973 (Fig. 1). According to Stamm, Davis & Robbins (1960) an interplay can occur between recruitment and net-shyness. It appears that the only recruitment in the study population is an influx of young birds during the breeding season as seen by an increase in trapping success during the summer months despite an increase in net-shyness.

The mean recapture time in the 19 month trapping period was six months, with a maximum recapture time of 19 months (Fig. 4). From a total of 155 birds ringed, 23 were recaptured once, nine recaptured twice, two recaptured three times and one bird recaptured five times. From a high incidence of one to three months in recapture time, the conclusion can be drawn that the oxpeckers return to the trapping station after being trapped and marked. This emphasises the value of trapping only once a month and using a marking method with a minimum disturbing effect on the birds.

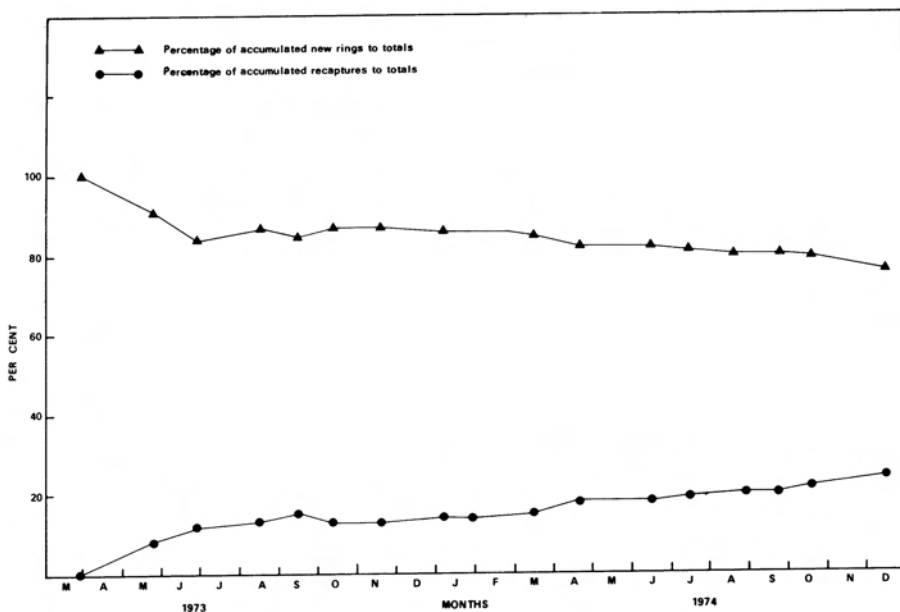


Fig. 2. The relationship between the percentage of accumulated new rings and accumulated recaptures to totals of the Redbilled Oxpecker in the Skukuza area during the period March 1973 to December 1974.

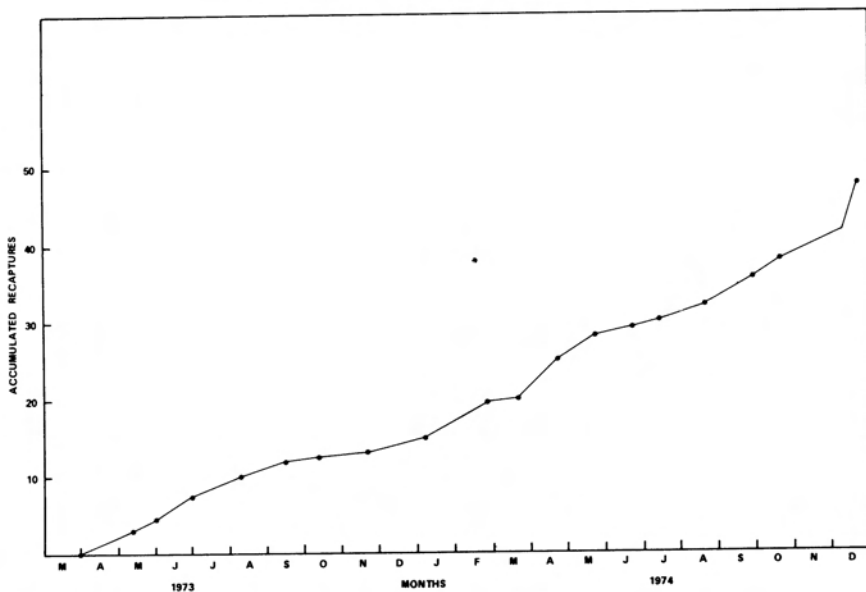


Fig. 3. The accumulation of recaptures in the Redbilled Oxpecker in the Skukuza area ringed over the period March 1973 to December 1974.

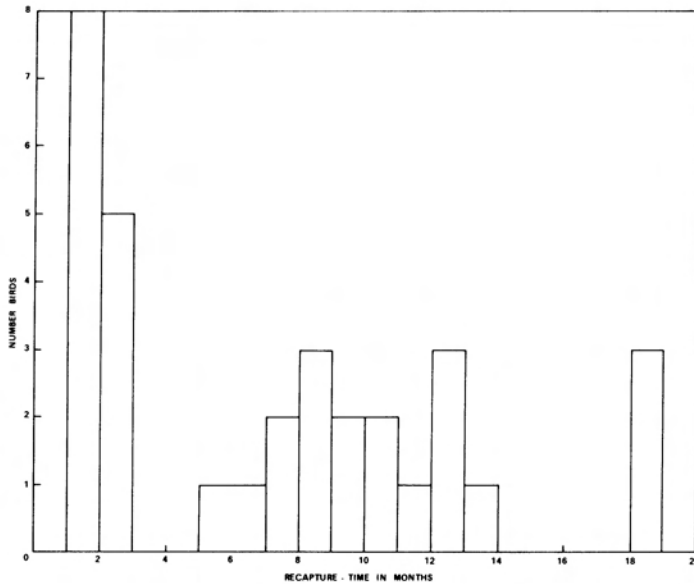


Fig. 4. Recapture-time of the Redbilled Oxpecker ringed at Skukuza over the period March 1973 to December 1974.

Number of birds in the study population

By using the Lincoln index method (Stamm *et al.* 1960) and the sampling period 10-16 December 1974 when 14 birds were trapped with 9 retraps, the study population (or the number of birds that visited the animals pens at Skukuza) was estimated as 241 (SE=48). However, trapping success was influenced by a number of factors which could have influenced this estimate. If the trapping session of every month is taken as the sampling period, the mean population size was estimated as 351 birds. If it is assumed this is the number of oxpeckers which visited the animal pens at Skukuza then it can be calculated that 42% of the study population was marked. This postulation can only be correct if no recruitment of birds occurred and that no difference in the behaviour and catchability of the oxpeckers existed. These assumptions are not valid in this study and could have an effect on the estimated number of the study population.

Sightings of marked birds

Of the 155 marked birds, 22 or 14% were resighted out of a total of 41 sightings. The frequency of distances travelled by the oxpeckers are indicated in Fig. 5. The maximum distance the oxpeckers were observed away from the animal pens measured 8,0 km with a mean distance of 3,37 km. If it is assumed that the activity zone of birds is circular and the maximum distance travelled equals the radius of the zone, the activity zone of the study population can be calculated as 198 km².

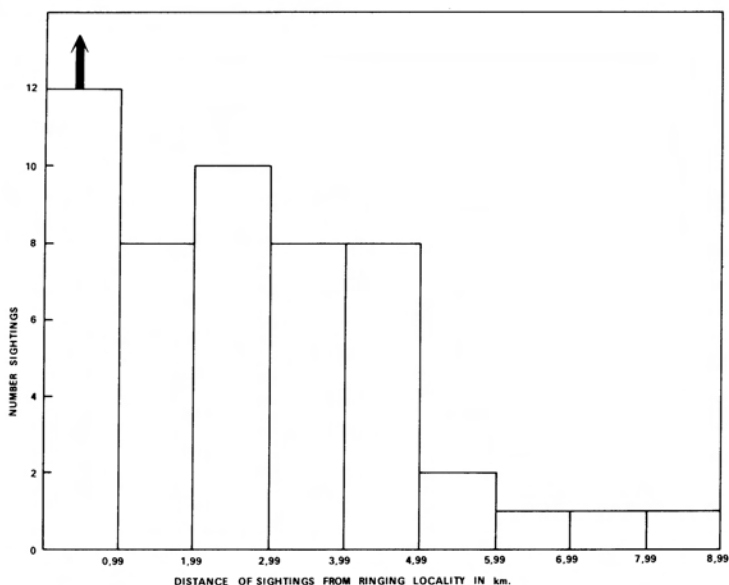


Fig. 5. Distances redbilled oxpeckers were observed from the ringing locality at Skukuza over the period March 1973 to December 1974.

Sightings of marked birds were limited to the area covered by roads. However, sufficient resightings of a marked bird when plotted on a map describe the area over which the bird ranged, hereafter called the home range. For most of the marked individuals too few data were obtained from individual birds to delimit a home range. For two birds (five and four resightings respectively) circular home ranges of 26 km² and 27 km² can be calculated from a maximum distance between resightings of 5,8 and 6,0 km, if this maximum distance is taken as the diameter. The resightings from these two birds indicate that individual birds or groups tend to feed in certain areas.

A high percentage (42%) of the birds were resighted along the Sabie River. A reason for this could be the high game concentration along the river front or could be a bias originating from the distribution of the roads. No permanent roost was found in the study area so that no account can be given of the daily movements between the roosting area and the feeding area or of any change in roosting area.

Discussion

Williams (1963) refers to the Redbilled Oxpecker as a partial migrant in East Africa, while Haldane (1951) records the numbers of the Yellowbilled Oxpecker *Buphagus africanus* varying considerably from year to year at Bufagi, Tanzania. An interesting and only reported recovery of the Redbilled Oxpecker outside the Kruger National Park is a bird shot at the Lukanga River in Zambia which had moved 64 km over a period of 16 months (Elliot & Jarvis 1970). Counts made by

Mundy & Cook (1975) at a Yellowbilled Oxpecker roost in Nigeria indicate a seasonal variation in numbers of birds which points to local movements and/or a change in roosting area. The results obtained from marked redbilled oxpeckers at Skukuza show that the study population has no seasonal fluctuations in numbers, and appears to have little or no local movements. It can thus be concluded that the population during the study period was permanently resident.

During most of the year the birds feed on very mobile mammals which may be widely scattered throughout the area. In addition, the mammals must support varying loads of parasites due both to a species and individual factor and to the local conditions prevailing (Stutterheim 1979). As would be expected from the habits of the species, their distribution, movements and abundance are related to the concentrations of their mammalian symbionts which provide their food, although no experimental data exist to prove this statement (Attwell 1966; Kemp 1974)

The distribution of large mammals in the Kruger National Park has been described by Pienaar (1963, 1966) and Joubert (1973). Although vegetation type is one of the most important factors governing an animals selection of a particular habitat (Dice 1952), water is in many instances equally important, both physiologically and ecologically (Young 1970). Not only does the availability of drinking water limit the density obtained by species in a particular area (Dasmann 1964) but should it be absent either temporarily or permanently, water dependant species will to a large extent not be able to utilise the area (Smuts 1972). The study area is transversed by the perennial Sabie River. The grazing strips surrounding the river support a biomass of 36137,6 kg/km² of mixed mammalian species during the dry season (Pienaar 1966). Although some of this game moves to more favoured summer grazing areas during the wet season the river front still supports a high summer game concentration, especially impala (*pers. obs.*).

The dependance of game on surface water can also be gauged when studying the "cruising radius" or mean daily distance which they move away from a watering point. Young (1970) found the average daily "cruising radius" for impala 1,6 km, buffalo 6,0 km, zebra 3,5 km and wildebeest 2,6 km. These distances are, however, not only determined by the water requirement of the animal, but also by the condition of the veld surrounding the particular waterhole (Van der Schijff 1958). Distances in excess of eight kilometers usually entail movement from one waterhole to the next, rather than a true "cruising radius" (Smuts 1972). Because of the fact that the Sabie River is a perennial river (at least during the study period) this does not happen along the river front.

It can thus be speculated that the study area supported a high symbiont concentration during both seasons. Hence in whatever direction a bird or a group of birds may travel they will soon encounter sufficient quantities of suitable food provided by the high symbiont concentration. This is presumably the reason for the small activity zone of the study population and the absence of any local movements. However, one would expect differences to occur within a single species — depending on its environment. In areas where seasonal ungulate migrations occur due to a decrease in water supplies and/or poor grazing conditions oxpeckers can only survive by following the symbiont movements. In this respect it may be said that local

movements occur in the case of those individuals which survive in greater numbers if they leave, than if they remain in their breeding grounds for the non-breeding season. The distances travelled by these birds are correlated with their requirements and the conditions prevailing at the particular time of the year.

The Redbilled Oxpecker, in fact, is a bird, which, due to its gregarious instinct and sociality lives harmoniously at relatively high densities. Since home range is fundamentally an area with a certain productivity that meets the energy requirements of the individual or group that occupies it (Jewell 1965), the home ranges of the oxpecker can be correlated with the distribution and concentration of their mammalian symbionts and that the size of the home ranges may vary from one area to another. Seasonal variations may also occur in individual home ranges of the oxpecker since their symbionts are mobile species. In addition, to these possible longterm effects, factors such as sudden climatic changes, variation in the availability of water and food, fires or predation could also effect the size of an individual home range. Moreover, it would appear that the small home ranges observed also suggest a very high symbiont concentration in the Skukuza area.

That individual birds are resighted in particular areas is an indication that the birds are well acquainted with all the features of the terrain within their home range. Here they are familiar with the areas utilised by their mammalian symbionts and could thus find their symbionts with use of minimum energy. Furthermore, the home range habit stabilises the community organization by reducing the amount of turmoil that would result if all the birds were constantly moving about (Dice 1952).

Acknowledgements

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