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Banding and Observations of Rainbow Bee-eaters

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Banding* and detailed observations of Rainbow Bee-eaters *(Merops ornatus)* at Mount Isa, Queensland, in the period from June 1963 to March 1968, give what is probably a typical picture of movement and breeding pattern of the species in northern Australia. Observations during this period at various other locations in north-western Queensland and Northern Territory seem to support the findings of the study at Mount Isa.

Since 1968, observations have been made at a number of locations throughout Australia which may add to the overall knowledge of distribution and movement of the species. Limited observations in other parts of north Australia also appear to support the findings of the Mount Isa work.

The results of banding and observations at Mount Isa are discussed in some detail, while observations in other places are recorded with appropriate comments.

Mount Isa

Banding in the Mount Isa district was undertaken on an intensive and regular basis from May 1963 until March 1968. With the exception of the garden in my home on the south-western outskirts of the township, most banding sites were in the vicinity of permanent water along the creeks and rivers near the Leichhardt Dam or East Leichhardt Dam. Banding of Rainbow Bee-eaters was undertaken as part of the overall study of migratory species and no special banding project was attempted with this particular species.

The numbers of Rainbow Bee-eaters caught by me each month are shown in Table 1. This Table could indicate that there is a maximum population density in the period October to March, with a negligible number of birds present in the period May to August. However, from observations the population density appears to be at much the same level throughout the year. This is indicated in Table 2, which sets out general observations from my house for the 24 months, March 1966 to February 1968.

The discrepancy between banding and observation results appears to be due to the difference in behaviour and habitat preference of breeding (stationary) and migratory birds. In all districts visited in northern Australia, breeding was confined to areas near water and breeding birds tended to feed over or near the water. In such locations they were able to be captured by netting.

Wintering (stationary non-breeding) birds and migratory birds, however, showed no preference for such habitat and were more widespread or, in the case of migrants, almost completely aerial and well above mist net height. Because of this, few if any migratory birds were captured and the banding figures are probably indicative of the population of stationary birds only.

Breeding in the Mount Isa district took place in two separate time and weather periods, and in largely different habitats for each period. It was estimated that about equal numbers bred in each period. In the first period, August to December, breeding and distribution of the stationary segment of the population were con-

* *Bands used were provided by the Australian Bird-banding Scheme, Division of Wildlife Research, CSIRO.*

fined to the surrounds of the major dams and their backwaters, and the permanent seepage below the dams. In the second period, January to April, the breeding and stationary population was more widespread and scattered along the rivers and creeks that held some water from the wet season.

Nest site selection varied markedly between the two seasons. In the earlier period, most nests were found on the bare flats around the dams in relatively hard clay soil. Nesting tunnels on these flats were generally declined at 30° to 40°. During the wet season (January to March), sites were normally in sandy or loamy soil on the face of creek banks or on the steeper slopes of river levees; usually the nesting tunnels were only slightly declined or nearly horizontal.

It is notable that all of the 87 birds banded were recorded as 'adults' and no recognised juveniles or immatures were captured. This is in direct contrast to my experience with the Sacred Kingfisher *Halcyon sancta* which has a very similar breeding pattern; of 130 Sacred Kingfishers captured, 47 (36 per cent) were juveniles or immatures.

The most obvious conclusion that can be drawn from these results is that the birds move away from the area as soon as the young fly. If this is the case, the overall movement pattern is probably complex, and in the north, movement spreads over a much longer period than previously thought. The detailed observations from my residence in Mount Isa indicate some migratory movement virtually throughout the year, and some unexpected directions of movement in some months. This lends support to the complex movement theory.

Examples from Table 2 of movements that conflict markedly with the normally accepted simple spring/autumn migration are:

a. November 1966—flocks flying south.
b. December 1966—one flock flying north.
c. January 1967—flocks almost daily moving NW to SE.

Return to breeding site in a subsequent season was recorded by Lane (1963) at Broke, New South Wales, and by Waterman (1965) near Gawler, South Australia. Similar evidence was recorded at Mount Isa; two birds were recaptured at the East Leichhardt Dam at about the same date a year after banding:

040-47914 banded 2.10.66; retrapped 25.11.67.
040-47894 banded 11.11.65; retrapped 2.10.66.

In each case the birds were considered to be breeding adults because of the bill and tail feather wear apparently due to burrowing.

Apart from the two retraps already noted, I obtained only one shorter-term retrap. This could indicate either that the species quickly becomes net conscious and avoids capture or that it is stationary for only a short period during nesting.

As seen from Table 2, most movement recorded was in a northward or southward direction. In

TABLE 1

Rainbow Bee-eaters (individuals) caught by R. K. Carruthers each month in the Mount Isa district from June 1963 to March 1968.

Month	1963	1964	1965	1966	1967	1968	Totals
January			10		2	6	18
February			3		1	3	7
March		6		3	2	3	14
April				1	7		8
May							
June							
July		1					1
August							
September				2	1		3
October		1	4	6	5		16
November		5	2	3	3		13
December	4	4	1		1		10
Total	4	17	20	15	22	12	90

the spring the southward flight was maintained largely against the prevailing SE winds. During this period the birds seemed to favour flight paths above or just on the western sides of the extensive north-south ridges in the area. They appeared to use upcurrents created by the wind striking the ridges obtusely.

Northern Territory and North-West Queensland Observations

Some 25 visits were made to the McArthur River area and three to the Sir Edward Pellew Islands, N.T., in the period 1964 to 1967, and the CSIRO undertook a fauna survey of the Pellew Group from July 1966 to July 1967. Rainbow Bee-eaters were seen regularly in all seasons in the McArthur area although only one nest record was obtained. Records for the lower McArthur and Pellew Islands include:

7 Aug. 64—Pair nesting in steep bank some 50 m from river at McArthur Station.

25 Feb. 65—A few about McArthur Station.

18-27 Nov. 67—Common in McArthur River area; several birds seen at Vandelin Island.

July 66—Two single sightings in Pellew Group.

Feb. 67—Several single sightings in Pellew Group.

July/Aug. 67—Common on main islands of Pellew Group.

Visits were made to Gregory Downs Station in August 1965, and to Burketown and the lower Gregory River, Qld., in September 1965. A few Rainbow Bee-eaters were caught and banded on both visits. Birds were breeding at both places and the breeding pattern in the area appeared to be similar to that at Mount Isa, though because of wet season flooding, the spring breeding period may be the most important.

Six visits were made to Brunette Downs and various other points on the Barkly Tablelands in north-west Queensland, and some 20 to the northern sections of the Georgina River basin across the border in the Northern Territory during the months of May to September between 1962 and 1968. No sight records of the species were obtained in these areas. It is assumed that the Rainbow Bee-eaters avoid these areas of extensive open grass plains and blacksoil both for breeding and migration. However, detailed long-term observation in these areas would almost certainly produce some records of migratory birds.

TABLE 2

Summary of daily observations by R. K. Carruthers at Mount Isa from March 1966 to February 1968.

Month	1966		1967		1968	
	Status	Direction of Movement	Status	Direction of Movement	Status	Direction of Movement
January			Numerous (almost daily)	south-east (high)	Numerous (daily)	not recorded
February			Numerous—very large numbers		Numerous	
March	Two	west (high)	Large numbers	north		
April	Three	west	Numerous (daily)			
May	Two		Numerous (daily)	north		
June	Numerous	mainly north	Numerous flocks	north		
July	One		Common	(not apparent)		
August	Numerous		Numerous			
September	Numerous	south	Very numerous	variable (east, west, south)		
October	Numerous		Numerous			
November	Numerous	south (high)	Numerous			
December	One flock	north	Very common			

Observations Since 1968

On 20 August 1971 at Coolum on the south-east coast of Queensland some 100 km north of Brisbane, many hundreds of these birds were observed moving south near the sea front. The birds appeared to be using the assistance of the updraft from the coastal dunes while flying across the easterly breeze, in similar manner to the spring migrants at Mount Isa.

Some 30 to 40 birds were observed along the Hastings River, N.S.W., about 11 km west of Port Macquarie in September 1972. They appeared to be 'stationary' and no migratory movement was observed. I also had regular nest records for this area in the 1930s, and they breed consistently in numerous suitable places on the coast of N.S.W. although Slater (1970) excludes these locations on his distribution map.

In Western Australia I obtained the following records:

March 1970—Yalgoo, 200 km NNE of Geralton —Flocks moving north.

Sept. 1971—Cue, 400 km NE of Geralton—Flocks moving south.

7 Mar. 74—15 km E of Kalgoorlie—Flocks of about 50 birds moving north.

8-30 Mar. 74—100 km E of Kalgoorlie—Flocks of 10 to 200 birds moving north most days.

29 Jan. 75—100 km E of Kalgoorlie—One flock of several hundred birds resting and feeding (observed for two hours) near dam. Not seen on subsequent visits to dam.

On a visit to Jabiluka on the East Alligator Plains, N.T., in September 1974, the Rainbow Bee-eater was common in the timber margins of waterholes. No migratory movement was observed and no evidence of nesting was obtained. On a second visit in January 1975, no Rainbow Bee-eaters were recorded in the area.

Schodde (1974, unpublished data) stated that the species was common in all habitats in the Alligator River region, and gave its status as "a partly migratory breeding species, most abundant in the dry season and 'locally absent' in the wet".

Frith and Calaby (1974) quoted the status of the species on the Cobourg Peninsula, N.T., in similar terms though they did not find any evidence of breeding. In discussing movement and status, these authors again suggested only a partial migration with the statement "although some birds remain throughout the year . . .". The inference appears to be that some birds are stationary and remain in the area throughout the year; probably 'present throughout the year' would be more correct unless individuals were identified.

On the basis of the Mount Isa results and observations, observations at various other northern locations, Schodde's comments and my observations in the East Alligator River region, it appears difficult to accept the possibility of a partial migratory status only, i.e. a portion of the population sedentary, in the East Alligator River or Cobourg Peninsula areas.

Conclusions

From these banding results and observations, the following conclusions are drawn:

1. In the southern half of Australia, the movement pattern is probably one of southerly migration in spring (August and September), late spring and early summer breeding, and northerly migration in the late summer and early autumn (February to April).

2. In the north, the movement and breeding pattern is complex. In the same location there are two distinct breeding periods, and possibly two or more distinct populations; there appears to be almost continuous migratory movement.

3. In north-western Queensland and adjacent areas of the Northern Territory, migration routes probably follow the relatively heavily timbered country east and west of the Barkly Tableland and the Georgina Valley grass plains.

4. Migrating birds were seen to use assistance of natural features such as ridges and sand dunes which create updrafts in adverse wind conditions.

References

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