Biometrics and moult of the Cape Reed Warbler *Acrocephalus gracilirostris* in southern Gauteng and northern Free State, South Africa

J.M.H. Raijmakers & J.H.F.A. Raijmakers

PO Box 5067, Vanderbijlpark, 1900. raijmakersk@telkomsa.net

Introduction

There is limited published information available on moult in the Cape Reed Warbler in southern Africa. The only known information about moult in Cape Reed Warblers comes from a study by Hanmer (1988) carried out in Malawi. This paper examines, in detail, moult and biometrics of Cape Reed Warblers *Acrocephalus gracillirostris* from localities in central South Africa.

Study sites and methods

This study was carried out between December 1992 and December 2001 in the southern Gauteng and northern Free State districts of Vanderbijlpark and Sasolburg (27°38' to 27°47'S and 27°45' to 27°50'E), although some data from Knysna (34°03'S, 23°03'E), Secunda (26°31'S, 29°11'E), Potchefstroom (26°45'S, 27°06'E) and Wakkerstroom (27°20'S, 30°07'E) were also included.

The majority (over 90%) of birds were caught at the Yscor Bird Sanctuary (26°38'S, 27°50'E). This area consists of large reed fringed dams of semi purified effluent and rainwater. The area around the dams is marshy with *Phragmites* reeds, weeds, grass and sedges. Ringing sessions occurred throughout the year but were more frequent from October to May than for June to September, this being due to the cold winter months. Effective net area used varied between 100 and 220 running metres in length depending on the number of ringers available.

Data that were collected included wing length, tail length, tarsus, culmen, head length and mass. All measurements were done according to De Beer *et al.* (2000). In the last two years of the study birds were aged into immatures and adults while birds with prominent brood patches were recorded as females. For this paper, however, the sex of the bird was not taken into account as data is insufficient at this stage. Young birds were classed on plumage colouration and plumage characteristics and also on tongue spots and gape flange. Birds with prominent tongue spots were taken to be immatures as some birds in their second year still had faint tongue spots. Many young birds that had fledged recently had tongue spots that covered the complete rear of the tongue. From January to May approximately 40% of the birds caught were immatures and could be aged by colour and tongue spots, the upperparts of the immatures being much richer in colour – a warm rufous brown compared with the dull or cold darker brown of the adults. This colour difference is prominent and has been noted by Tree (1999).

Results

Over the period a total of 1940 warblers of ten species was netted and ringed. Of this, 524 (27%) comprised Cape Reed Warblers. A total of 450 controls was made of which 146 were Cape Reed Warblers, giving a recapture rate of 27.9%. The longest elapsed time from ringing to last control was 60 months. Only three birds (0.57%) were controlled longer than three years after ringing.

The average number of birds caught per ringing session was fairly low from October to December (average of two birds per session), with December the main breeding month being the lowest (only one bird per

session). From January to May the average number of birds caught per session increased to approximately five birds per session. The highest number of birds caught in a single session was 44 on 20 January 2000.

a. Biometrics

Measurements for all birds, irrespective of sex or age, from 1992 to 2001 are given in Table 1, while Tables 2 and 3 give the measurements for adult and immature birds over the period 1999 to 2001 respectively.

Size differences between adult and immature birds are small but are significant especially if one compares the wing-length distribution between adults and immatures; young birds have shorter wings than adults (Fig. 2). Although the numbers of birds caught at Knysna (n = 7) and Wakkerstroom (n = 6) were considerably less, the size and wing-length distribution compared favourably with the Yscor birds.

Table 1. Summary of biometric data for all Cape Reed Warblers examined during this study.

	Wing[1]	Tail[1]	Tarsus[1]	Culmen[1]	Head[1]	Mass[2]
Minimum	64	50	20.3	16.0	35.7	11.5
Maximum	82	82	31.8	24.1	41.6	27.2
Average	73.4	68.1	27.4	20.3	38.8	18.2
SD	2.94	4.11	1.45	1.21	1.10	1.90
No. of birds	595	539	549	550	500	622

Table 2. Summary of biometric data for adult Cape Reed Warblers examined during this study.

	Wing[1]	Tail[1]	Tarsus[1]	Culmen[1]	Head[1]	Mass[2]
Minimum	64	56	24.6	16.0	37.0	14.5
Maximum	82	78	31.5	23.5	41.1	24.2
Average	73.3	68.6	27.7	20.2	38.8	18.0
SD	3.31	3.94	1.31	1.37	1.02	1.79
No. of birds	74	69	72	72	69	71

Table 3. Summary of biometric data for immature Cape Reed Warblers examined during this study.

	Wing[1]	Tail[1]	Tarsus[1]	Culmen[1]	Head[1]	Mass[2]
Minimum	68	50	24.9	17.0	35.8	14.5
Maximum	79	75	30.0	23.0	40.0	21.0
Average	72.3	67.1	27.0	19.6	38.2	17.4
SD	2.90	4.85	1.17	1.31	1.10	1.55
No. of birds	48	46	48	48	44	48

[1] measurements in millimetres, [2] measurements in grams

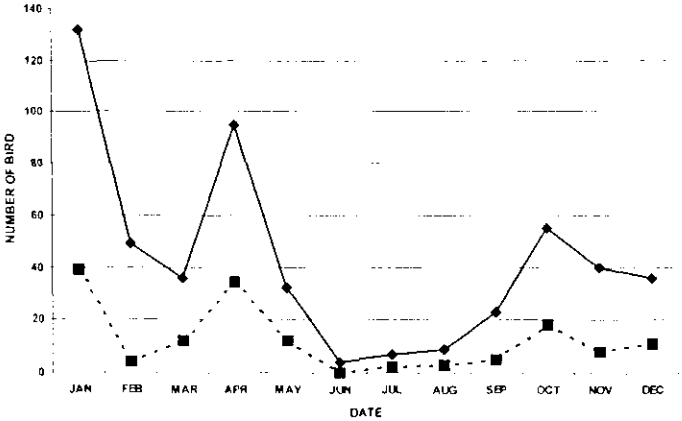

Fig. 1. Number of Cape Reed Warblers caught (solid line) and number of retraps/controls (dotted line) per month during this study.

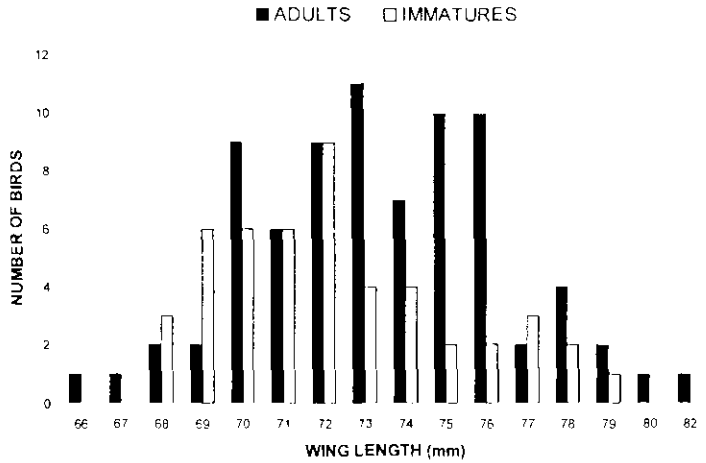

Fig. 2. Comparison of wing length distribution between adult and immature Cape Reed Warblers.

b. Moult

The Cape Reed Warbler has 10 primaries, six secondaries and three tertials with the outermost primary reduced. The rectrices number six in each half tail. Moult starts after the breeding season initially with head and body moult, the primary moult starting between two to four weeks later. There is a well defined moulting period from approximately the middle of January to the end of April with some birds starting in May. Most birds, however, have completed moult towards the end of April. A few birds with moult were still netted in August and November. This is in contrast to what was found by Hanmer

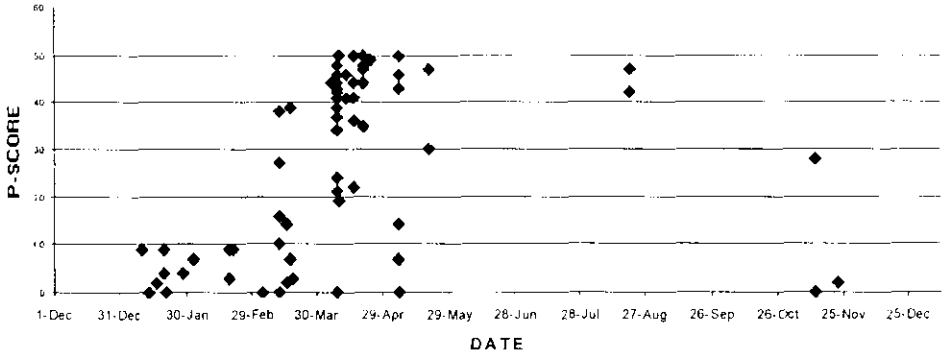

Fig. 3. Scatter diagram of moult score versus date for 64 Cape Reed Warblers caught at Yscor Bird Sanctuary.

(1988) in Malawi where there wasn't a well defined single moult season but rather three less defined seasons with the October to December season being the most prominent. For this study 290 birds were examined for moult and 75 completed moult cards were available for examination.

Primary moult

Moult in the wing starts with the innermost primary and is descendant towards the wing tip. The primaries moult in sequence and are dropped consecutively. The first three primaries are dropped very quickly in succession with all of them sometimes with the same moult score. The first three primaries then grow to a score of three or four before the next primaries are dropped. From here on the primaries are then dropped with the previous primaries having a score of one or two. Moult is rapid and up to seven primaries at various stages of development are in growth simultaneously. Primary ten is dropped last but is fully renewed just before primary 9 is fully-grown. No birds with suspended moult were recorded.

Secondary and tertial moult

Secondaries and tertials are numbered S1 to S9 (as on the moult cards) from the middle of the wing towards the body.

The first secondary dropped is S8 and usu-

Table 4. Moult duration of selected Cape Reed Warblers based on retrap data and calculated on a linear growth for nine primaries.

	Ring Number						
	F66682	**F66762**	**F66774**	**F68959**	**FA02791**	**FA02791**	**FA02791**
1st date	13/3/1996	13/3/1996	13/3/1996	16/3/1996	18/3/2000	18/3/2000	9/4/2000
2nd date	20/4/1996	20/4/1996	8/4/1996	8/4/1996	9/4/2000	24/4/2000	24/4/2000
Days elapsed	38	38	26	23	22	37	15
1st score	27	16	10	2	23	23	43
2nd score	47	44	34	21	43	49	49
P-score difference	20	28	24	19	20	26	6
Duration of moult (days)	85	61	50	54	52	66	113

ally starts after P1 has dropped or is in pin with a P-score usually less than 10. However, in approximately 25% of the birds S8 was dropped simultaneously with P1. In 78% of the cases S9 was dropped second with S7 third, while S7 was dropped second with S9 third in 22% of the birds. S1 is dropped with or just after S7 with a P-score of 15 to 25. Moult of the secondaries is ascendant from S1 to S4 with S6 being dropped simultaneously with S3 or S4 and S5 following soon after. Secondary moult is usually completed after primary moult but in a few cases we recorded it complete just before primary moult had ended, with a P-score between 43 and 50. Each secondary feather has a score of one to three before the next is dropped. Hanmer (1988) recorded that in some birds the tertials were renewed twice in a single moult cycle. This was also recorded in this study with 4 birds replacing the tertials a second time.

Wing coverts and alula

The greater wing coverts including the carpal covert moult in quick succession often with all having the same score. This normally starts when P1 is dropped and is completed at a P-score between 16 and 25; there was only one case where this was not true. The lesser and median coverts start moult simultaneously with P1 and is completed at a P-score of approximately 45.

Alula moult starts at a P-score of about 30 and is completed at a P-score of 45. Alula moult is rapid and all feathers come into pin simultaneously.

Rectrices

Rectrice moult is random and highly irregular, sometimes with two or three feathers in moult and sometimes with all twelve feathers having the same moult score. Rectrice moult starts at a P-score between 4 and 35 and is usually completed just before or simultaneously with primary moult. In about 5% of cases rectrice moult was completed after primary moult.

Body and head moult

Head and body moult starts two to four weeks before primary moult and is completed simultaneously with primary moult. Hanmer (1988), however, found that body moult was only completed a month after primary moult had ended.

Moult duration

Moult duration as determined by a scatter diagram is approximately 65 days (Fig. 3). Moult duration as determined by retrap data gives 50 to 85 days (Table 4); this is calculated on a linear growth for nine primaries as primary ten is completed just before primary nine. Recapture data shows that moult in the early stages is faster than moult towards the closing stage (Table 4). Score differences at the lower range of the P-score give a much shorter moult duration than what score differences give at the higher range of the P-score when used for calculating the moult duration.

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