KITTLITZ'S PLOVER IN THE LOWER SHIRE VALLEY OF MALAWI

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Introduction

The airstrip at Nchalo, Malawi (16°16'S, 34°55'E), is at the edge of the Sucoma cane fields, about 2,5 km from the Shire River. Large numbers of Kittlitz's Plover *Charadrius pecuarius* could be found breeding on the airstrip during the winter and in June 1975, on a nightjar-catching expedition, a few plover chicks were caught and ringed. Catching Mozambique Nightjars *Caprimulgus fossii* with torch and hand net was an enjoyable way to spend an evening, but too regular trapping made the birds shy and they tended to bolt at the first glimmer of torchlight. As a result, more effort was put into catching the plover, although they were harder to trap.

Several trips at weekly, fortnightly, monthly (or something in between) intervals were made until October and several chicks were retrapped. A few adults were also caught. Then, for some reason, we stopped airstrip trapping and it was not until October-November 1980 that a few more Kittlitz's Plover chicks were ringed. More were caught in August and October 1981 and in June, July and November 1982.

Fifteen adults (unsexed) and six full-grown immatures were ringed, as well as 121 chicks. The chicks ranged from newly hatched to those whose primary wing feathers had just completed growth. Twenty-three chicks were retrapped, one twice, and from their wing and weight increases over time, it is possible to show the breeding season in the lower Shire Valley and the rate of chick development. This includes wing length at first flight and its percentage of the full-grown but immature wing, the age at which the wings start to develop, the age at first flight and the age at which the wings are fully grown. No definite information on the timing of the moult in either adults or immatures was obtained.

Results

Table 1 gives the wing length and weight of adult and immature Kittlitz's Plover. Most of the immatures were *pulli* and these are separated into groups by primary wing feather development. P0 includes newly hatched birds which had no development of the primaries, P1 chicks had the primaries in pin, P2 to P4 chicks had the feathers growing and P5 birds had very recently fully grown wings. The seven P5 birds are also included among the 13 immatures in the Table. Also given are the wing lengths of five birds judged to be only just able to fly. The mean of their wing lengths is 83,6 mm, which is 81,9% of the full-grown immature wing length of 102,1 mm.

No standard deviation for wing length or weight of *pulli* is given in Table 1, because wing length and weight differed considerably depending on the age of the chicks in each group. Minimum wing length in the P3 group should overlap with maximum wing length in the P2 group; that it does not is due to the fact that I did not catch any birds whose wing length fell between 50 and 56 mm.

Chicks hatched with the forearm tip 9-10 mm long. This elongated slightly before the feather pins appeared. Chicks weighed

4,6-6,4 g on the evening of the day of hatching and weight increased considerably over the next few days, but it decreased as soon as the feather pins appeared, hence the low minimum weight of the P1 group.

Once the primaries were growing, they developed very quickly and weight also increased quickly, but the chicks did not attain full weight until the primaries were completely grown, shown by the mean weight of the P5 group being less than that of the immatures.

Table 2 shows the primary development of 23 retrapped chicks. Weight at first and second capture is also given, as is the primary development class. Using the formula normally employed for estimating the number of days required to complete primary moult from the moult scores of retrapped birds, but using instead the actual wing lengths in millimetres compared with the mean wing length of full-grown immatures (102 mm), Table 2 shows how long each of the chicks probably took to complete primary feather growth. Many of the chicks had not started to develop pins on the first occasion and it is not known exactly when they did so. Likewise, P5 chicks had completed wing development an unknown number of days before they were recaptured. The result for most of these birds is given as 'less than' a certain number of days. However, for three chicks which were newly hatched on the first occasion and which had very small pins on the second, 10-12 days later, it is possible to guess reasonably accurately on which day they did start to develop primary pins. A 'corrected' day of starting is also suggested for a fourth chick.

Table 1. Wing length and weight of Kittlitz's Plover from Nchalo, Malawi. 'Immature' includes all young birds with full-grown wings. *'Pulli'* are divided into groups by primary wing feather development, P0 with no primaries and P5 with very recently full-grown primaries. 'First flight' is self-explanatory; the birds in this group are also included among the P4 *pulli*.

Age	No.	Wing length (mm)		Weight (g)	
		Range and mean ± SD		Range and mean ± SD	
Adult	15	103 - 113	(106,7±2,6)	30,9 - 42,9	(35,0±2,9)
Immature	13	94 - 108	(102,1±4,2)	25,3 - 36,4	(30,9±2,8)
Pulli: P0	43	9 - 14	(11,2)	4,6 - 11,6	(7,4)
P1	25	12 - 19	(14,3)	8,2 - 16,7	(12,7)
P2	23	19 - 50	(39,1)	11,2 - 22,3	(18,8)
P3	11	56 - 78	(67,3)	17,5 - 27,5	(23,5)
P4	12	75 - 103	(85,8)	22,0 - 31,0	(27,7)
1st flight	5	77 - 89	(83,6±5,3)	22,0 - 27,2	(25,8±2,2)
P5	7	94 - 104	(99,9±4,1)	25,3 - 32,7	(29,8±2,7)

Table 2. Estimating number of days to develop the full-grown wing in Kittlitz's Plover *pulli*, using wing length increase over time in retrapped chicks, compared with mean immature wing length (102 mm). Allowing 10 days before start of primary growth, age at which wing would be full-grown is estimated. In birds with primary development of P0 and P5, number of days required to grow primaries is less than number of days between captures.

Ring No.	Weight (g) 1.	2.	Wing length (mm) 1.	2.	Difference	Days	Days to f.g.	Corrected days?	Days to f.g.	Age f.g.
BB 00198	5,9	13,8	P0 10	P1 15	5	<10	<204	1,5?	31	41
BB 00199	5,4	11,6	P0 10	P1 13	3	<10	<340	1,0?	34	44
BB 14121	5,3	9,4	P0 12	P1 18	6	<12	<204	2,0?	34	44
	9,4	24,5	P1 18	P4 84	66	21	33			43
BB 00157	7,8	10,3	P0 10	P1 14	4	<7	<179	1,5?	38	48
BB 00141	8,1	18,0	P0 11	P2 45	34	<14	<42			<52
BB 00140	8,1	29,9	P0 11	P5 95	84	<28	<34			<44
BB 00164	8,4	27,1	P0 10	P3 78	68	<21	<32			<42
BB 14102	8,2	18,8	P0 14	P2 48	34	<14	<42			<52
BB 00188	9,7	31,1	P0 11	P5 102	91	<36	<40			<50
F 10001	10,6	27,1	P1 12	P4 76	64	23	37			47
BB 00195	12,2	18,7	P1 12	P2 41	29	10	35			45
BB 00238	13,9	31,0	P1 19	P4 92	73	20	28			38
BB 00159	15,3	21,1	P1 15	P2 48	33	7	22			32
BB 00192	15,8	24,8	P1 14	P3 61	47	10	22			32
BB 00163	16,1	21,4	P1 15	P2 50	35	7	20			30
BB 00155	18,4	27,1	P2 43	P5 104	61	<31	<52			<62
BB 00172	19,2	30,2	P2 46	P4 103	57	24	43			53
BB 00142	19,4	28,8	P2 43	P4 89	46	14	31			41
BB 00143	19,5	25,8	P2 44	P4 86	42	14	34			44
BB 00144	20,9	22,0	P2 45	P4 75	30	7	24			34
BB 00162	21,4	25,2	P2 50	P3 73	23	7	31			41
BB 00161	22,3	27,2	P2 50	P4 77	27	7	26			36
BB 00170	20,4	30,4	P3 56	P5 94	38	<14	<38			<48
						Mean no. of days to f.g. = <33,5			Mean age f.g. = <43,5	

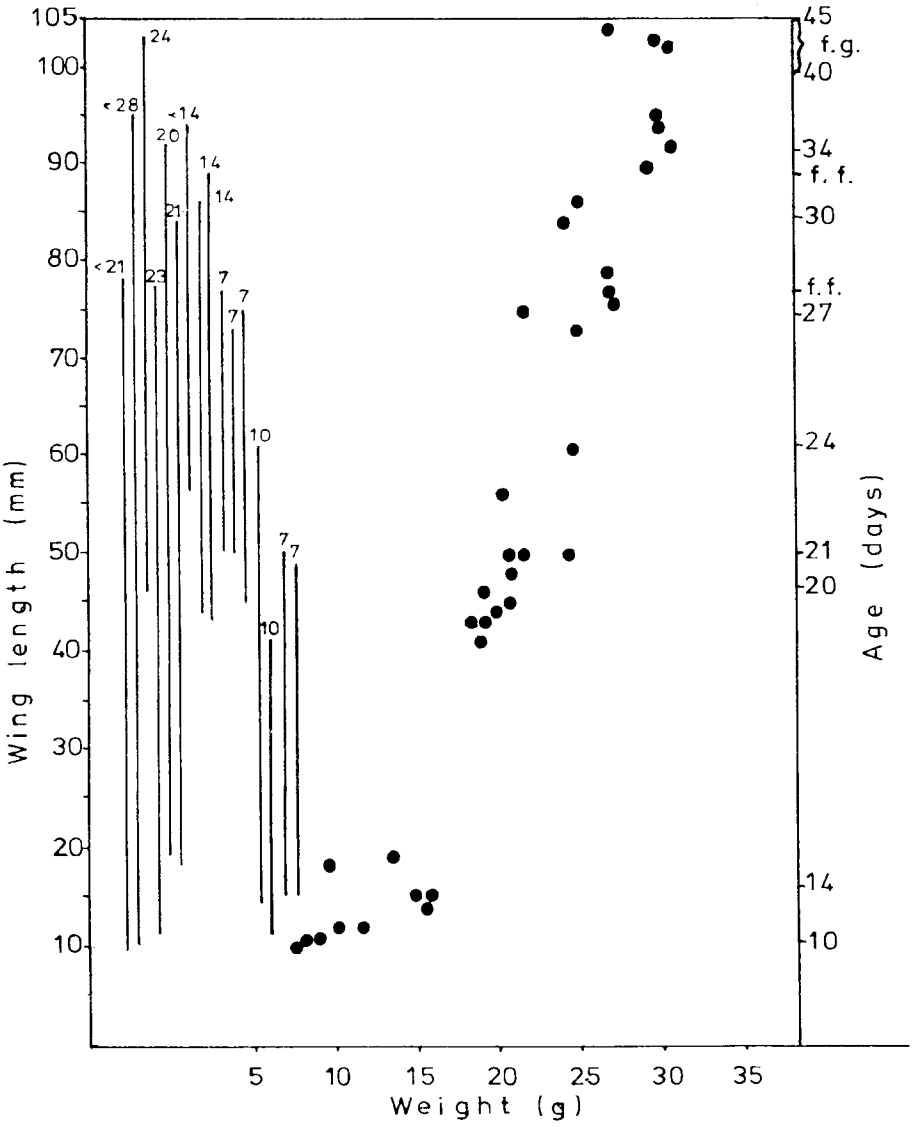

Figure 1. Graph showing wing length against weight of 18 retrapped Kittlitz's Plover *pulli* (0). Five (from Table 2) with no development of primaries at first capture being left out. On left, vertical lines indicate number of days between captures of 16 *pulli*, two with fully grown wings at recapture being left out. On right, approximate age is shown, using data on left. First flight occurred between f.f. – f.f. wing fully grown = f.g.

It appears that the primaries started to grow on about the ninth or tenth day after hatching. The initial growth was slower than that which occurred after the primaries had reached the P2 stage and growth again slowed down towards the end of the P4 stage. The mean of the estimated number of days to full-grown primaries in Table 2 is 'less than' 33,5 days, which makes the age of the chicks at that stage 'less than' 43,5 days.

To check the accuracy of the above calculation, or to correct it, Fig. 1 was constructed, graphing wing length against weight for each of the retrapped chicks. To join the pairs of dots for each bird and indicate the number of days between measurements, made a messy graph, so straight lines at the left of the graph indicate how many days elapsed between the different wing lengths of chicks whose primaries had started development on the first occasion. The other side of the graph shows the average age at which different wing lengths were attained (10 days being allowed for the P0 stage), the age at first flight and the age at which the primaries were full-grown.

Obviously this is all approximate, since there is considerable variation in full-grown wing length; a chick would presumably grow a 94 mm wing in a slightly shorter time than it would grow a 108 mm one. However, the result indicates that chicks would be about 40-44 days old when their wings were fully grown, which is similar to that found mathematically in Table 2. The graph also shows that growth is most rapid during the middle of the period of development.

From the graph, it appears that first flight occurs at about 30 days old, give or take a day or two. The five chicks considered to be just able to fly had a mean wing length of 83,6 mm, which is 81,9% of mean full-grown immature wing length. If birds of 30 days old have achieved a wing length of 82 mm, they should have a wing length of 102 mm at 37 days.

This is younger than found by other methods, but as the growth of the primaries slows down considerably towards the end, the true age would probably be a few days more and similar to that found by other means.

Table 3. Number of Kittlitz's Plover chicks of each primary development class caught each month and, estimating chick age from Fig. 1, the month each hatched. Adding 25 days for incubation, the months in which eggs were laid are shown.

Month	No. chicks caught of primary development class:							No.	No. of
	P0	P1	P2	P3	P4	P5	(Imm.)	hatched	eggs laid
April								2	24
May	1							29	28
June	12	12	14	4	4	2		27	27
July	9	1	1	2	2	1		18	10
August	12	5	2	1	1	4		13	8
September								8	15
October	2	5	6	2			(2)	18	9
November	7	2		2	5			6	0
December							(4)	0	0

Breeding

Gravid females were caught in June (1), July (1) and August (1) and newly hatched chicks were caught in June (6), July (2), August (4), October (1) and November (4). Large numbers of very young chicks were seen, in different years, from May or June until November.

Table 3 shows the months in which chicks were caught, separated into wing length classes. Using Fig. 1 as a rough means of ageing chicks of different developmental stages and adding 25 days for incubation, the two right-hand columns were constructed, to show in which month each chick probably hatched and in which month the eggs had been laid.

Unfortunately, no trapping was done in September of any year, so the figures for that month and for July and August, do not reflect the true proportion of eggs laid or chicks hatched during those months among the Kittlitz's Plover breeding on the airstrip, whereas the figures for April, May, June, October and November probably do. It is likely that similar numbers of eggs were laid each month from April to September, with fewer in October and perhaps only odd ones in November. The six birds shown in Table 3 as 'imms' cannot be aged, as they were fully grown at capture.

Moult

None of the adults caught in June, July or August were moulting, but one caught on 3 October had a primary moult score of 13 (two primaries replaced and one part-grown). It was caught in company with a ± 25 day-old chick, which suggests that moult probably starts soon after the last brood has hatched and while the chicks are still dependent, from about the end of September.

The two full-grown immatures caught in October were not moulting, but three of the four caught in December were; the fourth had not started the post-juvenile moult. The moulting birds had primary moult scores of 31, 35 and 43 (the last had almost completed moult), but it is not known how long it takes to complete moult, so that the age at which these birds started moult cannot be determined. It could have been at 4-5 months old, if these birds had hatched in May-June.

Primary moult was centrifugal and secondary moult proceeded inwards from both the proximal and distal end, starting proximally, at about the same time as the second primary and distally with the fifth primary. The last to moult appeared to be S5 or 6, some time after the primaries were completely grown. The rectrices may have moulted centrifugally, but R5 appeared to moult after R6. Tail moult started at about the same time as did primary moult, completing before the primaries were fully grown.

Discussion

The wing lengths and weights given here for Kittlitz's Plover adults and tiny chicks are much the same as those given by Urban *et al.* (1986). Those authors also give the age at first flight as 26-32 days, which is similar to the figure found here and which therefore suggests that the other calculations given here, which relate to ageing the Nchalo chicks, are correct. Urban *et al.* (1986) state that the breeding season of this plover in Malawi is August-October. No reference for this is given and I do not have the references which are mentioned, so cannot see from whence this fact was obtained. It does seem to be an extremely short breeding season, when compared with the dates given for surrounding countries. Benson & Benson (1977) also give August-October as the breeding season.

Because Benson & Benson's (1977) book was out of date before it was published, those working on the birds of Malawi

decided to publish all 'new' data in the journal *Nyala*, in order that the information required for up-dating *The birds of Malawi* would be all in the same place. Unfortunately, I was not very energetic about publishing breeding data for the Nchalo Kittlitz's Plover and few others appear to have recorded much, but the following records were published:

1982 Nchalo: Newly hatched chicks noted from 12 June to mid November.

1984 Nchalo: June, three clutches of C1, C1 and C2 found on 17 June. Eggs and/or very small *pulli* found from mid June to late November every year from 1974. (Evidently I had forgotten that I had caught several newly hatched chicks on 1 June 1975, as well as some larger ones, including a P4 chick which was just flying on 8 June!)

1989a Bunda: N/2 seen on 5 October, from eggs laid September.

1989b Nchalo: Four adults with three chicks, from two (?) clutches laid in June.

Lake Chilwa: One clutch laid August/ September.

1992a Monkey Bay: N/2 seen, from eggs laid September?

1992b Sucoma Nchalo: Tiny fledgling seen 6 July, from egg laid in June; an early record.

1993 Vwaza Marsh: Small chick seen on 21 September.

This might suggest that the Kittlitz's Plover breeding in other parts of Malawi do breed from August; at least, nobody has published the finding of chicks which hatched from eggs laid prior to August in any area but Nchalo. The Editor of 'Fauna and Flora Records' in *Nyala* appears to have been unaware of published breeding records for June at Nchalo, since he says "an early record" (Medland 1992b), but it is perhaps more surprising that the author of the section on Kittlitz's Plover (in Urban *et al.* 1986) did not locate the 1982 and 1984 records in the 'local' journal, when writing what was supposed to be "everything which is known to date about ...", for a highly expensive, definitive book on the birds of Africa.

Conclusion

From the data presented here, in the lower Shire valley of Malawi at least, the breeding season of Kittlitz's Plover is April to October or November, as found in Zambia (Urban *et al.* 1986).

Acknowledgments

I wish to thank J.A. Hanmer and Miss J.M. Hanmer for their heroic efforts to capture Kittlitz's Plovers, on an airstrip covered in 'duiweltjies', while being eaten alive by mosquitoes.

REFERENCES

BENSON, C.W., & BENSON, F.M. 1977. The birds of Malawi. Limbe: Montfort Press.

DOWSETT, R.J. (Ed.) 1982. Nyala records. *Nyala* 8(2):125.

HANMER, D.B. (Ed.) 1984. Fauna and flora records. *Nyala* 10(2):131.

HANMER, D.B. (Ed.) 1989a. Fauna and flora records. *Nyala* 14(1):63.

HANMER, D.B. (Ed.) 1989b. Fauna and flora records. *Nyala* 14(2):147.

MEDLAND, R.D. (Ed.) 1992a. Fauna and flora records. *Nyala* 15(2):83.

MEDLAND, R.D. (Ed.) 1992b. Fauna and flora records. *Nyala* 16(1):41.

MEDLAND, R.D. (Ed.) 1993. Fauna and flora records. *Nyala* 17(1):42.

URBAN, E.K., FRY, C.H. & KEITH, S. (Eds.) 1986. The birds of Africa. Vol.2. London: Academic Press.