Movements and timing of moult and breeding of the Cape White-eye *Zosterops pallidus* in KwaZulu-Natal

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Introduction

Over a 50 year period the Cape White-eye *Zosterops pallidus* was the 13th most common bird species ringed in southern Africa (Oschadleus & Underhill 1999). If not for specifically targeted species like European Swallow *Hirundo rustica*, African Penguin *Spheniscus demersus* and Redbilled Quelea *Quelea quelea*, it would possibly rate higher up the list. The Cape White-eye is common in KwaZulu-Natal (KZN) (Maclean 1994; Nuttall 1997), yet little is documented on the timing of breeding, moult and movements in the region. This summary of ringing efforts by the authors reports recaptures and timing of breeding and moult in the Cape White-eye in KwaZulu-Natal accumulated over a seven year period (1994–2001). Recaptures are reported and discussed.

Methods

Cape White-eyes were trapped using mist nets (12 m × 2.4 m; 16 mm mesh) supplied by SAFRING and ringed by registered ringers of the University of Natal, Pietermaritzburg. No ringing sessions targeted capture of Cape White-eyes. Primary moult score was recorded (De Beer *et al.* 2000). Active breeding was determined by the presence of a distinct brood patch on individual birds. Ringing occurred at 22 different sites (Table 1). All data were accumulated for each month.

Results

Most captures occurred at two Afromontane forest ringing sites in the KwaZulu-Natal midlands, i.e. Hlabeni and Ngele forests (Table 1; see Symes *et al.* in press for site details and bird species lists).

Moult and breeding

Occurrence of moult is indicated by the proportion of caught birds each month undergoing active moult of the remiges. Occurrence of breeding is represented by the proportion of caught birds with an distinct brood patch. This was used as evidence of breeding in the region (Fig. 1). Frequency of breeding as

Table 1. Cape White-eye ringing sites in KwaZulu-Natal showing habitat type, and number of captures and recaptures at each site.

Locality	Habitat	Caught	Recap.
High Birnham Farm, Merrivale Heights	protea patch	97	17
Hlabeni Mountain, Creighton	protea patch & forest	122	7
Ngele Forest, Weza	forest	72	3
Pietermaritzburg (9 sites within city surrounds)	gardens & proteas	47	7
Other southern KZN (4 sites)	garden, protea & bushveld	42	1
Other south central KZN (4 sites)	protea, bushveld & forest	23	0
Sani Pass & Top Lodge, Drakensberg	garden & proteas	5	0
Total		**408**	**35 (8.6%)**

indicated by nest record cards is also shown (n = 185) (LePage 1999).

Recapture rate and movements

A total of 408 Cape White-eyes were caught and twenty-six individuals were recaptured (Tables 1, 2). Seven were recaptured twice and one was recaptured three times (Table 2). The highest recapture rate (17.5 %) was at a *Protea* farm near Merrivale (Table 2), although the greatest ringing effort was not here.

Discussion

In many temperate zone species the timing of moult in relation to breeding may be mutually exclusive (Dwight 1900; Maclean 1990). However, in some species wing moult may occur during breeding (Craig 1983; Jenni & Winkler 1994). Also, interrupted moult may occur, yet in southern African birds this moult strategy is still unclear (Craig 1983).

The results of this study indicate that breeding of the Cape White-eye in KwaZulu-Natal, although skewed by the small sample size of July, is most prevalent in December and January. However, this is contrary to nest record card data where breeding is indicated as most common from September to December, peaking in October (Lepage 1999; Fig. 1). Maclean (1994) indicates breeding of the Cape White-eye as occurring from July to March in KwaZulu-Natal, and mostly from October to December throughout the country. Nuttall (1997) indicates breeding as occurring from August to March, peaking in December. In winter rainfall regions a breeding peak is realized earlier in November (Nuttall

Table 2. Recapture of Cape White-eye's reporting capture site and number of days since first ringed. * recaptured in Ladysmith, KZN.

Ring no.	Location	1st retrap	2nd retrap	3rd retrap
AD85104	22 Petrea Ave., Cleland, Pmb	83	118	
AD85102	22 Petrea Ave., Cleland, Pmb	118		
AD90935	68 New England Rd, Scottsville, Pmb	125		
AD85289	68 New England Rd, Scottsville, Pmb	78		
AD29431	High Birnham Farm, Merrivale Heights	84		
AD85235	High Birnham Farm, Merrivale Heights	57		
AD93576	High Birnham Farm, Merrivale Heights	33		
AD93577	High Birnham Farm, Merrivale Heights	33		
AE18445	High Birnham Farm, Merrivale Heights	378	498	
AE18446	High Birnham Farm, Merrivale Heights	414		
AE18451	High Birnham Farm, Merrivale Heights	378	404	414
AE18608	High Birnham Farm, Merrivale Heights	36		
AE18631	High Birnham Farm, Merrivale Heights	10	33	
AE18957	High Birnham Farm, Merrivale Heights	10		
AE18664	High Birnham Farm, Merrivale Heights	93		
AD29431	High Birnham Farm, Merrivale Heights	1265	1349	
AD90968	Hlabeni Forest, Creighton	484	1579	
AD90970	Hlabeni Forest, Creighton	484	1579	
AD85252	Hlabeni Forest, Creighton	763		
AE18659	Hlabeni Forest, Creighton	65	171	
AD85256	Ngele Forest, Weza	334		
AD85121	Ngele Forest, Weza	276		
AD85256	Ngele Forest, Weza	1250		
AE18332	SAFCOL Forestry Offices, Weza	510		
AE18680	3 Lincoln Mews, Hayfields	254		
GA05926	3 Lincoln Mews, Hayfields	117*		

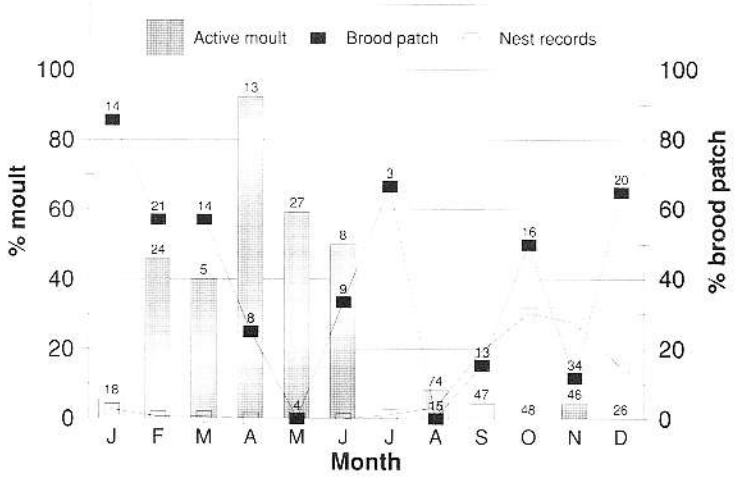

Fig. 1. Occurrence of breeding and moult in the Cape White-eye as expressed by the percentage of birds caught each month with moulting remiges and displaying a brood patch respectively. Breeding is also indicated by fraction of records in which breeding was recorded (LePage 1999).

1997). Cyrus & Robson (1980) indicate breeding as occurring from September to March, but also note breeding as occurring in July. In light of these data it is clear that further investigative work on the breeding of this species is required. Analyses of additional ringing data by region may provide greater insight into breeding seasons of the Cape White-eye on a regional scale.

The occurrence of primary moult in the Cape White-eye in KwaZulu-Natal is predominantly from February to June, with a peak in April. This suggests that the occurrence of moult directly follows the annual breeding cycle. This moult is in agreement with that of Earle (1981) who recorded a postnuptial moult of remiges between February and June. However, in the Eastern Cape moult in 27 specimens was in all months except March (Craig 1983). It is likely that interspecific variation between different regions exists in the timing of moult and breeding in this widespread species.

In some families (e.g. Alaudidae, Paridae, Pycnonotidae) a partial post-juvenile moult appears to be the rule (Craig 1983). Detailed information collected and published by ringers may help us to understand some of the underlying principles in the moult patterns of this species.

Local and/or altitudinal migrations have been suggested in the Cape White-eye (Clancey 1964; Johnson & Maclean 1994). Seasonal movements may occur to some extent with birds remaining faithful to an area when breeding (Nuttall 1997). Strong site and flock fidelity are supported by the recapture of two birds (likely a pair) at Hlabeni 484 and 1579 days later. This may indicate some level of monogamy in a species regularly occurring in flocks. In the Cape White-eye, DNA analyses indicate that flocks form cohesive groups with little gene exchange between populations (Brown *et al.* 2000).

Long distance movements of Cape White-eyes are not commonly known. Most SAFRING recoveries reveal Cape White-eyes as being sedentary (Nuttall 1997). Only three recoveries of greater than 100 km have been recorded (SAFRING). These include a

10 year old bird recovered in Free State Province, 405 km from the ringing site in KwaZulu-Natal, another movement of 164 km, and the individual in this study recovered 117 days after moving a distance of 135 km (SAFRING). The fourth greatest distance is only 31 km. These movements may not be regular as indicated by few long distance movement records for a species where a high number of species have been ringed. The reason for these movements is not known and may simply be random wandering movements. Further research into the movements of the Cape White-eye are therefore required.

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Electronic schedules

In the 2000 ringing year 93 ringers sent 41 892 ringing records electronically to date. Paper schedules accounted for 29 778 records submitted by 38 ringers. While a high percentage of ringers (71%) submitted electronic schedules, their proportion of ringing records is much lower at 58%. Clearly some of the most prolific ringers submitted paper schedules.

It is very encouraging to see that the numbers of ringers and records are increasing annually. Keep it up!