

MORTALITY IN SOUTH AFRICAN CATTLE EGRETS *BUBULCUS IBIS* FROM 1951 TO 1987

Grzegorz Kopij

ABSTRACT

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Of 46,160 birds ringed in South African heronries from 1951 through 1987, 481 were subsequently recovered (recovery rate: 1.04%). Most of these birds were ringed in the Western Cape ($N = 173$), KwaZulu-Natal ($N = 142$) and Gauteng ($N = 106$). The age of the recovered birds ranged from 0 to 23 years. Almost two thirds were 0-2 years old, and only 1.2% were 15 years or older. The average age of the recovered birds was 4.9 years ($N = 465$). The mortality rate was highest in their first and second year (31-36%). Nearly one third of the birds recovered ($N = 134$) were sick or injured, and 30.6% had been shot. Relatively low mortality, a long life span and relatively low predation pressure may contribute to the great success of the Cattle Egret in colonising various parts of the world. The paper presents the initial state for the likely future evolution of the distribution of the species.

Department of Vertebrate Ecology, Wrocław University of Environmental & Life Sciences, Kozuchowska 5b, 31-651 Wrocław, Poland; e-mail: grzegorz.kopij@unam.na
Department of Wildlife Management, University of Namibia, Katima Mulilo Campus, Private Bag 1096, Wenela Rd., Katima Mulilo, Namibia; e-mail: gkopij@unam.na

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INTRODUCTION

Mortality is one of the most important characteristics of any animal population. It is, however, difficult to investigate under natural conditions, especially in highly mobile groups of animals such as birds. One of the methods traditionally employed by avian researchers is analysis of recoveries of ringed birds. When birds are ringed as nestlings, their exact age is known. If the recovery rate is relatively high and continues over a longer period of time, this can indeed provide valuable information on age-specific mortality rate and longevity, as well as causes of death. In South Africa, the Cattle Egret *Bubulcus ibis* is one of the species with the highest number of recoveries. Therefore these data have been used to analyse the past state of some aspects of Cattle Egret population ecology so that later changes may be tracked.

In the last few decades, the Cattle Egret has become a common breeder in many parts of South Africa which were not previously within its range (Siegfried 1966, Hockey *et al.* 2005, Kopij 2008). Range expansion still continues in this region and elsewhere in the world (Kushlan and Hefner 2000, Kopij 2008). It is facilitated by the bird's highly opportunistic feeding behaviour (Kopij 1998, 2003, 2005) and high reproductive success (Kopij 1995, 1997, 1999). Its relatively low mortality rate and high longevity might be other factors contributing to this success. In this paper I examine these parameters.

MATERIAL AND METHODS

This analysis is based on ringing recoveries obtained from the Animal Demography Unit of the University of Cape Town. Birds were ringed as chicks mainly in 12 heronries in South Africa, most of which were situated in the Western Cape and Gauteng provinces. This ringing programme was conducted from 1951 to 1987. During this period 46,160 birds were ringed. Most of these (94%) were ringed before 1973. Among all ringed birds, 481 were recovered between 1951 and 1987 (recovery rate: 1.04%). Most recoveries were of birds ringed in the Western Cape and Gauteng (Table 1). Of the 481 recovered Cattle Egrets, 478 were aged, and among those aged, 193 (40.4%) were found dead (Table 2). As many as 72.7% of these birds were recovered within 100 km of their ringing sites and 10.5% within 101-300 km; only 9.4% of birds were recovered further than 1,000 km from the ringing sites (Kopij, in press).

Table 1
The origin (ringing sites) of recovered Cattle Egrets

Locality	Coordinates	Number of recoveries	%
Rondevlei, Western Cape	31°30'S, 18°30'E	140	29.1
Westdene Pan, Benoni, Gauteng	26°11'S, 28°17'E	90	18.7
Strandfontein Sewage, Western Cape	29°44'S, 39°31'E	38	7.9
Albert Allison Sanctuary, KwaZulu/Natal	29°36'S, 30°23'E	31	6.4
Faithful Fountains, Eastern Cape	29°47'S, 29°30'E	24	5.0
Bayhead, Durban, KwaZulu/Natal	26°13'S, 28°02'E	22	4.6
Paarl, Western Cape	33°38'S, 19°00'E	18	3.7
Scottsburg, KwaZulu-Natal	28°44'S, 31°53'E	18	3.7
Barberspan Nat. Res., Gauteng	26°33'S, 25°36'E	16	3.3
Geduld Dam, Springfontein, Gauteng	26°13'S, 28°25'E	9	1.9
Paardevlei, Somerset, Western Cape	33°48'S, 19°00'E	8	1.7
Kinkelbos, Alexandria, Eastern Cape	33°49'S, 18°52'E	7	1.5
Other sites		60	12.5
Total		481	100.0

Table 2
Proportion of live Cattle Egrets among those recovered between 1951 and 1987

Year	Recovered	Dead	%
0	212	38	17.9
1	49	36	73.5
2	45	17	37.8
3	22	16	72.7
4	29	19	65.5
5	22	12	54.5
6	23	13	56.5
7	23	9	39.1
8	9	7	77.8
9	10	5	50.0
10	10	5	50.0
11	7	5	71.4
12	5	5	100.0
13	5	1	20.0
14	1	1	100.0
15	2	1	50.0
15	4	3	75.0
Total	478	193	40.4

For most recoveries, the following data were available: date and site (with coordinates) of ringing and recovery, the age of the bird (in months/years or as nestling, juvenile, immature, or adult), and sex (if known). Three broad age groups were distinguished: immature birds (in their first year of life), mature (2-10 years old) and old (more than 10 years old).

Causes of death were reported by some observers (134 out of 193 records; 69.45%) based on observation of dying birds or careful examination of bodies found; no autopsies were performed. Mortality rate was calculated as the percentage of recovered dead birds in the total number of all recoveries (both live and dead birds) in a given age class (years of life).

RESULTS AND DISCUSSION

Most Cattle Egrets are mature in their second year of life and breed in August-December in the Western Cape, October-December in the Free State, August-January in KwaZulu-Natal and September-January in the former Transvaal (Hockey *et al.* 2005).

The age of the recovered birds ranged from 0 to 23 years. Almost two thirds were aged 0-2 years, 20.7% were seven years and older, and only 1.5% were 15 years and older (Table 2). The oldest birds were 16, 18, 19 and 23 years old (Fig. 1). The average age of recovered birds was 4.9 years ($N = 465$). Similarly, Elliott and Jarvis (1970, 1973) reported that 11-28% of recovered Cattle Egrets were aged seven years and older.

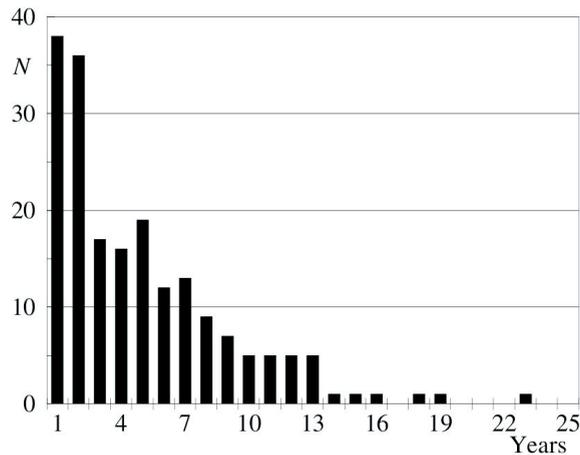


Fig. 1. Number of Cattle Egret recoveries in relation to their age (in years)

Middlemiss and Skead (1962) and Siegfried (1970) recorded the oldest ringed Cattle Egret as 13.5 years old. In this study the oldest ringed bird was almost twice as old (23 years). The average life span appears to be higher in Cattle Egrets than in other egrets and herons (Ardeidae). For the Little Egret *Egretta garzetta* and the Yellow-billed Egret *Egretta intermedia* the maximum recorded age was 10 years (Hockey *et al.* 2005). Cattle Egret can therefore be regarded as species with a long life expectancy.

The mortality rate of Cattle Egrets changed with their age; it was highest in the first two years (31-36%), 12-19% at 3-7 years, 5-9% at 8-13 years less than 1% after 14 years of life. Siegfried (1970) recorded similar rates in the first (37%) and second year (25%). Thus the mortality rate is apparently lower in the Cattle Egret in the two first years of its life in comparison with other herons (Brown *et al.* 1982; Hockey *et al.* 2005). Figure 1 may better describe an age pyramid than a mortality rate. When the proportions of recovered live to recovered dead birds are compared in each year, there is no clear relationship between the mortality rate and age of the birds. However, there was a much higher proportion of recoveries of live birds than dead ones in immature Cattle Egrets ($\chi^2 = 43.6, p < 0.01$), while in adult birds the proportion was almost equal ($\chi^2 = 1.9, p > 0.05$) (Fig. 2).

The causes of death were known for 134 of 193 (69.45%) Cattle Egrets recovered as dead. Nearly a third of them were sick or injured, 30.6% shot, and 11.9% preyed upon, while 11.9% had collided with various objects, 4.5% were victims of weather, 3.0% were poisoned, and 2.2% entangled (Table 3).

Natural predation on Cattle Egrets appears to be rare (Hockey *et al.* 2005). The following predators have been recorded: African Fish Eagle *Haliaeetus vocifer*, Martial Eagle *Polemaetus bellicosus*, Tawny Eagle *Aquila rapax*, Wahlberg's Eagle *Aquila wahlbergi*, Black Sparrowhawk *Accipiter melanoleucos*, Lanner *Falco biarmicus* (Hockey *et al.* 2005) and Water Monitor *Varanus niloticus* (G. Kopij).

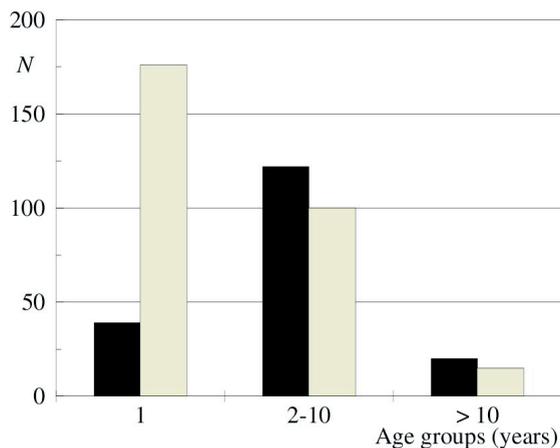


Fig. 2. Number of dead (black columns) and live (light columns) Cattle Egrets in each age class recovered

Table 3
Known causes of death

Cause	<i>N</i>	%
Natural causes		
Sickness or injury	44	32.8
Predation	(16)	(11.9)
by a bird of prey	12	9.0
by a mammal	2	1.5
by domestic dog	2	1.5
Victim of weather	(6)	(4.5)
hail	4	3.0
rain	1	0.7
wind	1	0.7
Drowned	4	3.0
Human-induced causes		
Shot	41	30.6
Collision	(16)	(11.9)
with a wall, fence or wire	7	5.2
with a human artefact	5	3.7
with a motor vehicle	3	2.2
with an aircraft	1	0.7
Poisoned	4	3.0
Entangled	(3)	(2.2)
in fishing lines or net	2	1.5
ring entangled in an object	1	0.7
Total	134	100

The data analysed here suggest that a relatively low mortality rate for subadults, a long life span, and relatively low predation pressure, in addition to a high reproductive rate, may further contribute to the great success of the Cattle Egret in colonising all zoogeographical regions of the world.

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