

VERTEBRATES FOUND IN CATTLE EGRET CHICK REGURGITATES

PATRICK J. McCONNELL¹ and NEIL G. MCKILLIGAN¹

¹Department of Biological and Physical Sciences, University of Southern Queensland, Toowoomba, Queensland 4350

Received: 14 June 1999

The vertebrate prey of the Cattle Egret *Ardea ibis* was determined from 850 boluses regurgitated by advanced chicks over 12 breeding seasons from 1981 to 1993, at three heronries in the Lockyer Valley, south-east Queensland. Vertebrates comprised one species of mammal, 16 species of reptile and nine species of amphibians and included the locally rare skinks *Ctenotus eurydice* and *Eremiascincus richardsonii* and Grey Snake *Hemiaspis damelii*. In large numbers were the Cane Toad *Bufo marinus*, the native Eastern Dwarf Tree-frog *Litoria fallax* and skink *Lampropholis delicata*. Almost 50 per cent of the amphibian and reptilian species recorded for Lockyer Valley pastures and cultivation were discovered in the Cattle Egret regurgitates.

INTRODUCTION

Studies in Australia of the Indian Cattle Egret *Ardea ibis coromanda* reveal that it feeds its chicks with a wide variety of invertebrate and vertebrate prey collected in grassland (including the margins of wetlands) and farmland habitats (McKilligan 1984; Barker and Vestjens 1989; Baxter and Fairweather 1989). Its catholic tastes, possibly indicating little selectivity in choice of prey, are also described in overseas studies of this subspecies (Mukherjee 1971) and the African Cattle Egret *Ardea ibis ibis* (Siegfried 1971; Fogarty and Hetrick 1973; Jenni 1973). McKilligan (1984) found six anuran (five native frogs and the introduced Cane Toad *Bufo marinus*) and 13 reptilian species, in the food of the Cattle Egret chick for the 1979/80 and 1980/81 nesting seasons in the Lockyer Valley, south-east Queensland. The present paper analyses the vertebrate component of chick food for the same egret population over a further 12 nesting seasons and compares these prey species with the known vertebrate fauna of local pastures and cultivation. The aims of this study are to extend the list of the Cattle Egret's vertebrate prey, to identify the most common prey species and to compare the prey taken with potential prey available locally.

METHODS

The Lockyer Valley lies on the subcoastal plain of south-eastern Queensland. The Cattle Egrets nesting here feed on grassland, wet pasture and cultivation. Boluses of food regurgitated by Cattle Egret chicks were collected (by N. McKilligan) in one or more months from November through February each year from 1981 to 1993, at one to three heronries situated within six kilometres of the town of Gatton. During this period the breeding population ranged between 1 449 and 7 953 nesting pairs annually, almost all of which were in the sampled heronries. These heronries were also used by small numbers of the Great Egret *Ardea alba*, Intermediate Egret *Egretta intermedia* and Little Egret *E. garzetta* but their nesting trees were avoided. The study area and field methods are described in more detail in McKilligan (1984).

Regurgitates were stored in 80 per cent ethanol and the vertebrates were identified by P. McConnell and R. Hobson using the reference collection of the University of Southern Queensland. The sorted vertebrates were then air dried for four days to remove all traces of preservative and then oven dried for four hours at 100°C prior to determining their dry weight. Invertebrate material was recorded as a total dry weight only.

Boluses were collected each season, on as many as eight occasions (1981/82) and as few as one occasion (1984/85, 1985/86 and 1990/91). Some boluses were fragmented on collection but, judged by the mean weight of those that were intact, approximately 850 boluses were collected. Boluses are regurgitated spontaneously by chicks older than about two weeks (branchers) and most came from these, but in 1989/90, 34 were collected directly from nestlings. A small number of jars containing specimens were lost during a period of relocation at the University. This occurred after species identification but before drying and weighing.

RESULTS

Of the 1 102.8 gram of material examined, there were 86.1 per cent invertebrates and 13.9 per cent vertebrates by weight. The latter comprised: 1.4 per cent mammal, 7.1 per cent reptile and 5.4 per cent amphibian. Of the 418 individual vertebrates examined six (1.4%) were mammals, 196 (47.1%) reptiles and 216 (51.5%) anurans. No bird or fish remains were found. Due to their advanced state of digestion, 3.6 per cent of the reptiles and 7.4 per cent of the anurans examined could not be identified further.

One mammal, the House Mouse *Mus musculus*, 16 species of reptiles and nine species of amphibians were recorded (Table 1). The most common prey items were Cane toad (124 individuals), Eastern Dwarf Tree-frog *Litoria fallax* (49), a skink *Lampropholis delicata* (76), and the skinks *Carlia vivax* (32) and *Carlia pectoralis* (29).

The largest items (with estimates of their live weights) were; a Grey Snake *Hemiaspis damelii* (240 mm long and weighing 22.0 g), a skink *Ctenotus robustus* (42.2 g), a skink *Egernia modesta* (16.0 g) and a Northern Banjo Frog *Limnodynastes terraereginae* (68 mm long and 34.2 g). One of the Cane Toads was 54 millimetres long but the others were less than 15 millimetres. Small sample sizes in some years precluded meaningful comparison between years.

DISCUSSION

Among the 26 vertebrate species in these regurgitates and the 18 collected from the same population in the two nesting seasons preceding the present study (McKilligan 1984), 11 were common to both studies. The combined total for the locality is 33 species. These include the skinks,

TABLE 1

Vertebrates found in Cattle Egret chick regurgitates in heronries in the Lockyer Valley.

Species	Number 1979-1981*	Number 1981-1993
Mammals		
House Mouse <i>Mus musculus</i>	0	6
Amphibians		
Eastern Banjo Frog <i>Limnodynastes dumerilii</i>	3	0
Brown-striped Frog <i>L. peronii</i>	0	2
Spotted Grass Frog <i>L. tasmaniensis</i>	11	5
Northern Banjo Frog <i>L. terraereginae</i>	0	1
<i>Uperoleia</i> sp.	0	1
Striped Burrowing Frog <i>Litoria albobuttata</i>	1	7
Green Tree Frog <i>L. caerulea</i>	1	0
Eastern Dwarf Tree-frog <i>L. fallax</i>	64	49
Gunther's Frog <i>L. latopalmata</i>	0	10
Lesueur's Frog <i>L. lesueuri</i>	0	1
Cane Toad <i>Bufo marinus</i>	89	124
Unidentified Amphibians	0	16
Reptiles		
<i>Delma plebia</i>	5	0
Burton's Legless Lizard <i>Lialis burtoni</i>	1	0
Jacky Lizard <i>Amphibolurus muricatus</i>	2	0
Skink <i>Carlia foliorum</i>	3	0
Skink <i>C. munda</i>	1	5
Skink <i>C. pectoralis</i>	21**	29
Skink <i>C. schmeltzii</i>	1	3
Skink <i>C. vivax</i>	21**	32
Skink <i>Ctenotus eurydice</i>	0	1
Skink <i>C. robustus</i>	13	13
Skink <i>C. taeniolatus</i>	0	5
Skink <i>Ctenotus</i> sp.	0	1
Skink <i>Egernia modesta</i>	5	4
Skink <i>Eremiascincus richardsonii</i>	1	1
Skink <i>Lampropholis delicata</i>	17	76
Skink <i>L. guichenoti</i>	0	14
Skink <i>Lygisaurus foliorum</i>	0	2
Skink <i>Morethia boulengeri</i>	2	0
Skink <i>M. taenioplura</i>	0	1
Skink <i>Anomalopus verreauxi</i>	0	1
Unidentified skinks	0	7
Grey Snake <i>Hemiaspis damelii</i>	0	1

*McKilligan (1984). ***Carlia vivax* and *C. pectoralis* were not separated in this study.

Ctenotus eurydice and *Eremiascincus richardsonii* and the Grey Snake *Hemiaspis damelii*, which are rarely found in the Lockyer Valley. *Litoria fallax* and *Lampropholis delicata* were also the most common native frog and lizard in the diet of the Cattle Egret in New South Wales (Baxter and Fairweather 1989). The preponderance of these two species and the Cane Toad in regurgitates, is most plausibly explained by them being more readily available to the egrets than were other species, not them being more palatable.

Vertebrates made up only 13.9 per cent of the Cattle Egret's diet by weight in this study compared to 27.3 per cent in McKilligan (1984) and 22.8 per cent in Baxter and Fairweather (1989). The proportions of mammals, reptiles and anurans were similar. The reduced importance of vertebrates as chick food in the period 1981-1993 compared to the preceding two nesting seasons (McKilligan 1984), may have been partly due to the Cattle Egrets over-harvesting prey populations. Cattle Egret numbers had increased in the early 1980s and doubled towards the end of the decade. It may also be due to many Cattle Egrets switching in 1987 from feeding on grassland to lucerne and cultivation, where there are likely to be fewer vertebrates (McKilligan 1994).

There are 23 species of anurans and 42 species of reptiles recorded from cultivation and grassland in the Lockyer Valley (J. Covacevich, pers. comm.; PMcC, unpubl. obs.). This study in combination with that of McKilligan (1984) reveals that 48 per cent of the recorded anurans and 46 per cent of the reptile species, were eaten by the nesting Cattle Egrets. Apparently the Cattle Egrets sample the anuran and reptile species found in these habitats widely. This study also reveals the Cattle Egret to be among the few Australian predators of the Cane Toad.

ACKNOWLEDGMENTS

We would like to thank Rod Hobson for his help in identifying the specimens and Jeanette Covacovich for supplying a current list of native vertebrates for the relevant areas of the Lockyer Valley. Also the University of Southern Queensland for its ongoing financial support of the study.

REFERENCES

- Barker, R. D. and Vestjens, W. J. M. (1989). 'The Food of Australian Birds. I, Non-Passerines.' (Lyneham, CSIRO.)
- Baxter, G. S. and Fairweather, P. G. (1989). Comparison of the Diets of Nestling Cattle Egrets and Intermediate Egrets in the Hunter Valley, New South Wales. *Aust. Wildl. Res.* 16: 395-404.
- Fogarty, M. J. and Hetrick, W. M. (1973). Summer foods of cattle egrets in north central Florida. *Auk* 90: 268-280.
- Jenni, D. A. (1973). Regional variation in the food of nestling cattle egrets. *Auk* 90: 821-826.
- McKilligan, N. G. (1984). The food and feeding ecology of the cattle egret, *Ardeola ibis*, when nesting in south-east Queensland. *Aust. Wildl. Res.* 11: 133-144.
- McKilligan, N. G. (1994). The Population Dynamics of the Cattle Egret. (PhD Thesis, Faculty of Environmental Sciences, Griffith University, Nathan, Queensland.)
- Mukherjee, A. K. (1971). Food habits of waterbirds of the Sundarban, 24 — Parganas District West Bengal, India — 111. *J. Bombay Nat. Hist. Soc.* 68: 691-697.
- Siegfried, W. R. (1971). The food of the cattle egret. *J. Appl. Ecol.* 8: 447-468.