Corella, 1991, 15(2): 41–44

KLEPTOPARASITIC SILVER GULLS *Larus novaehollandiae* ON THE NORTHERN GREAT BARRIER REEF QUEENSLAND

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Received 15 March 1990

Low frequencies of prey stealing behaviour were exhibited by Silver Gulls in Black-naped Tern and Crested Tern colonies on a tropical sand cay on the northern Great Barrier Reef, Queensland. Egg predation by Silver Gulls in Black-naped Tern colonies was lower at this site compared with a southern Great Barrier Reef locality. Chick mortality attributed to gulls in Black-naped Tern colonies was similar between sites. Fledging success was higher at the northern site compared with the southern for both tern species. Lower levels of kleptoparasitism at the northern site were probably a consequence of the low population density of Silver Gulls in the area. An increase in gull numbers could present a more serious threat, as it has done on the southern Great Barrier Reef.

INTRODUCTION

Accompanying the rise in seagull populations around the world, there has been increasing concern for the welfare of other wildlife. Gulls can change the nesting habitat of another species, compete with other species for nesting space or steal food from other species (Furness and Monaghan 1987). The stealing of food, eggs and chicks from other seabird colonies constitutes kleptoparasitism. In high latitudes, a low incidence of kleptoparasitic behaviour was found to have little effect on puffin and tern colonies (Veen 1977; Pierotti 1983), but in low latitudes, such as on the southern Great Barrier Reef, kleptoparasitism can severely reduce survival of chicks in tern colonies (Hulsman 1977; Walker 1988).

This paper reports on the growth of a Silver Gull population on islands of the northern Great Barrier Reef, Queensland, Australia (Fig. 1) and the incidence of kleptoparasitic behaviour on tern colonies.

METHODS

All data were collected between 1982 and 1986 from the Lizard Island group (14°41′S, 145°28′E) comprising Lizard, Seabird, Palfrey, South and Osprey Islands (Figs 1 and 2), which are all continental islands (Domm 1977), and Eagle Island (14°42′S, 145°23′E) a sand cay 8 km to the WSW of Lizard Island (Smith and Buckley 1986; Smith 1987). Silver Gulls were counted during peripheral circumnavigations.

Observations of interactions between gulls and terns were made from hides placed near colonies at Eagle Island where there were colonies of nesting Black-naped *Sterna sumatrana* and Crested Terns *Sterna bergii*; colony sizes are given in Table 1. Rates of chick predation were noted during 603 hours of observations at the colonies (331 hours at Black-naped Tern colonies and 271 hours at Crested Tern colonies). Rates of stealing food were calculated as percentages of prey deliveries to chicks; 2 638 feeds were observed in Black-naped Tern colonies and 303 in Crested Tern colonies.

Egg mortality was calculated as the percentage of eggs that did not hatch. Chick mortality was the percentage of hatched chicks which failed to fledge. Fledging success was the percentage of eggs laid that produced fledglings (=breeding success of Hulsman 1977 and Hulsman and Smith 1988).

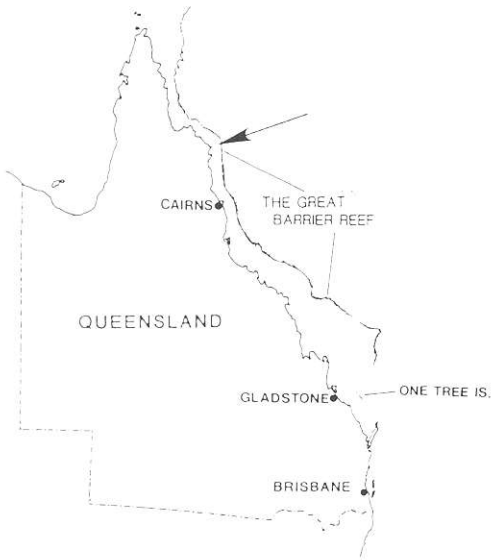

Figure 1. *A map showing localities of study on northern Great Barrier Reef and major nearby towns.*

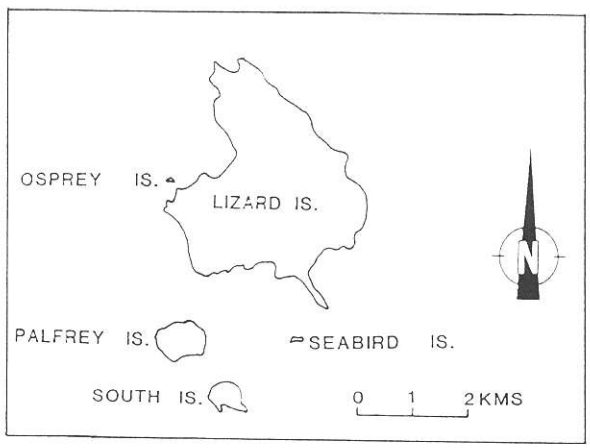

Figure 2. *The Lizard Island group.*

RESULTS

The breeding population

In February 1982, 43 nests were recorded at Seabird Islet and, assuming that there was one adult pair at each nest, the population would have been at least 86 gulls. In 1986, breeding commenced at Osprey Islet in February; prior to this, on 11 February 1986, 92 adults had been counted around Lizard Island. The tern colonies at Eagle Island varied in size between breeding seasons (Table 1).

Kleptoparasitic behaviour

The number of gulls recorded at Eagle Islet were low and did not increase appreciably between 1983 and 1986 (Table 1). Kleptoparasitic behaviour was not observed frequently in tern colonies. Fish were rarely stolen from Black-naped and Crested Terns (Table 1). Eggs were never observed being taken from Black-naped Tern nests, and were taken from Crested Tern colonies only when intruders were in the colony. The rates at which chicks were taken by gulls per hour of observation over colonies as a whole are given in Table 1.

Predation rates on Black-naped Terns varied: low egg and chick mortality and high fledging success coincided with low observed loss rates in 1983–1984 compared to the other seasons for Black-naped Terns. Fledging success of Crested Tern chicks was higher in 1984–1985 than 1985–1986 yet the observed loss rate of chicks was lower in 1984–1985 compared to 1985–1986.

DISCUSSION

Between season comparisons at Eagle Island, northern Great Barrier Reef

Since rates of stealing food by Silver Gulls did not vary appreciably between seasons for either tern species whereas fledging success did, prey loss *per se* probably did not lead to low survival for either species. Thus, loss of prey did not appear to be a cause of increased mortality of chicks.

For Black-naped Terns, egg and chick mortality correlated positively with observed rates of predation by gulls and negatively with fledging success. In contrast, fledging success in Crested Tern colonies did not have a corresponding relationship. Most chick loss in Crested Tern colonies was, in fact, due to White-bellied Sea-eagles *Haliaeetus leucogaster*. Thus, fledging success was not a useful index of the severity of

Silver Gull predation. While Black-naped Tern chicks remained vulnerable to Silver Gulls for approximately 10 days after hatching, Crested Tern chicks were at risk for only approximately two days and then became prey for White-bellied Sea-eagles.

Hulsman's (1977) assumption that most loss of Black-naped Tern chicks, including those in the unknown and other category, is due to Silver Gull predation, is probably correct. Furthermore, Hulsman (1977) did not use Crested Tern data in a similar way which also appears to be prudent.

Between site comparison — northern v. southern Great Barrier Reef

The incidence of kleptoparasitic behaviour exhibited by Silver Gulls in the tern colonies at Eagle Island on the northern Great Barrier Reef was low in comparison to the high incidence seen at One Tree Island (23°30'S, 152°05'E) on the southern Great Barrier Reef. There, the incidences of fish stealing were 20 per cent (n = 10 fish) at a colony of 51 pairs of Black-naped Terns (Hulsman 1976), and ranged from 11 per cent (n = 2 272) to 17 per cent (n=1 660) of fish from

TABLE 1

Population sizes of gulls and terns, the incidence of kleptoparasitic behaviour among Silver Gulls in tern colonies, and mortality and fledging success of terns from the Lizard Island region.

	1983–1984	1984–1985	1985–1986
Maximum Silver Gull population at Eagle Island	16	22	15
Colony sizes of terns			
Black-naped Tern			
Number of adults	142	251	70
Number of clutches	103	335	58
Crested Tern			
Number of adults	2 330	2 162	1 200+
Number of clutches	1 165	1 420	660
Interspecific stealing			
Black-naped Tern colonies			
Total feeds observed	1 646	771	221
% feeds stolen by gulls	0	0	0
Crested Tern colonies			
Total feeds observed	166	81	56
% feeds stolen by gulls	1	2	4
Predation on chicks			
Black-naped Tern colonies			
Total hours observed	153	141	37
Rates of chick predation per hour	0.01	0.09	0.08
Crested Tern colonies			
Total hours observed	83	135	54
Rates of chick predation per hour	0.08	0.02	0.07
Mortality and survival			
Black-naped Tern			
Number of eggs*	207	214	125
Egg mortality (%)*	26.1	33.6	31.2
Chick mortality (%)*	52.7	86.9	98.1
Fledging success (%)	34.4**	6.1†	0.8**
Crested Tern			
Fledging success (%)	—	31.3	63.9

*Data are based on a larger sample size than that given by Hulsman and Smith (1988).

**Data are from Hulsman and Smith (1988).

†Estimates given by Hulsman and Smith (1988) were in error.

Crested Tern colonies which contained 179 and 432 pairs respectively. Higher rates of fish stealing by Silver Gulls may have more of a detrimental effect on the breeding success of terns on the southern Great Barrier Reef.

Hulsman (1977) reported losses of eggs due to Silver Gulls of 49.4 per cent to 63.1 per cent from colonies of Black-naped Terns. These are considerably higher than those for the northern site (Table 1). Predation of chicks was approximately the same at both localities. Fledging success was higher at the northern site.

The fledging success in Crested Tern colonies on the southern Great Barrier Reef ranged from 0.5 per cent to 48.6 per cent (Hulsman 1977). Fledging rates at Eagle Island were higher (Table 1).

Silver Gull populations

Domm (1977) recorded a population of 50 Silver Gulls in the vicinity of Lizard Island between 1973 and 1976. Given the estimates presented in this paper for 1982 and 1986, the population appears to have doubled over the past 15 years.

The size of gull populations in relation to the size of tern colonies is much greater in the south. Thus, it would appear that the increased incidence of kleptoparasitic behaviour is a consequence of the size of the local Silver Gull population. This behaviour can become an important source of prey, egg and chick loss as gull numbers increase.

The large populations of Silver Gulls on the southern Great Barrier Reef are probably a consequence of large urban centres on the mainland, the number of tourist facilities, the frequent use of the area by human visitors and the practice of dumping garbage from boats. Should such developments occur further north, it appears likely that a similar problem may develop and threaten breeding seabirds. Clearly, changes in gull populations in this region will need to be monitored carefully.

ACKNOWLEDGMENTS

I wish to thank the staff of the Lizard Island Research Station for logistical support. Financial aid was received from a Lizard Island *Reader's Digest* Doctoral Fellowship, the Great Barrier Reef Marine Park Authority, the Ecological Society of Australia, the M. A. Ingram Trust, Griffith University, and a Commonwealth Postgraduate Research Award.

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EDITORIAL

Life Histories

In Recovery Round-up (pp. 63, 64) will be seen many recoveries of old birds. Often concealed within these data are life histories which are known in remarkable detail. Irynej Skira has kindly supplied the following information on a Short-tailed Shearwater which has recently been found dead, 33 years after being banded by Dom Serventy.

50650/40095 was banded as a breeding female incubating an egg in November 1957 on Fisher Island, Tasmania. She was missed the following year, but was subsequently found every year in the same burrow until November 1988, the last time she was handled alive. During this period she had only two mates, the first from November 1959 to November 1972, and the second from November 1973 to November 1988. She produced 23 chicks of which at least eight have been recaptured on Fisher Island.

I hope that we shall be able to report more examples of interesting life histories.

M. D. Murray