

Predators of Nesting Little Terns *Sterna albifrons* at Forster, New South Wales

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Summary

Information is presented on predation on nesting colonies of the endangered Little Tern *Sterna albifrons* on the mid-north coast of New South Wales. Predation by birds, mammals, crabs and ants is described.

Introduction

The Little Tern *Sterna albifrons* is classified as Endangered in New South Wales. It nests in colonies on beaches, where predation by native and feral animals is a major problem (Higgins & Davies 1996).

This paper presents observations on predators at some of the Little Tern's few nesting colonies on the mid-north coast of New South Wales, and supplements the information of Higgins & Davies (1996). Included are accounts of predation, or possible predation, by Feral Cat *Felis catus*, Silver Gull *Larus novaehollandiae*, Whimbrel *Numenius phaeopus*, Pied Oystercatcher *Haematopus longirostris*, Caspian Tern *Sterna caspia*, corvids *Corvus* spp., Galah *Cacatua roseicapilla*, various raptor species, native Water-rat *Hydromys chrysogaster*, introduced Black Rat *Rattus rattus*, Ghost Crab *Ocyropsis cordimana* and ants *Iridomyrmex gracilis*.

Most of the observations are from Forster, where Little Terns nested at Wallis Lake (32°11'S, 152°30'E), mainly on Sand Island which is dredge spoil built up for them to nest on; they also nested in four separate colonies on Miles Island, and once at Godwin Island. A few observations were made at Harrington (31°54'S, 152°41'E) at the mouth of the Manning River 9.5 km north of Forster.

Observations

Feral Cat

December 1992 A Feral Cat wiped out the Godwin Island Little Tern colony, except for one nest, before being killed. Tracks showed that it moved from nest to nest; it stalked and sprang on the sitting birds and if it failed to catch them it scattered or broke the eggs.

Silver Gull

Silver Gulls were the main predators at the Little Tern nesting colonies, entering colonies at any time of the day, especially during bad weather. They did most damage in colonies of only a few pairs of Little Terns. In larger colonies, where there were more Little Terns to mob the intruders, they were less of a threat, although they still caused almost continuous disruption by trying to take eggs or young; even nearly fledged Little Terns were prone to attack.

In the 1992–93 Little Tern breeding season at Forster 53 eggs were laid in 26 nests, but 13 nests and 25 eggs (as well as many runners) were destroyed, probably mainly by Silver Gulls. Only 12 Little Terns fledged.

All observations are from Forster unless otherwise noted.

13 November 1992 Eight Silver Gulls over a Little Tern's nest containing three eggs were mobbed by four Little Terns, which concentrated on the Silver Gull nearest the nest.

17 November 1992 (observations from a hide from 1100–1300 h) Silver Gulls disturbed the colony 47 times. One Little Tern sat on a nest while a Silver Gull circled within 0.5 m and closer for four minutes. The Little Tern kept its bill pointing at the Silver Gull, which necessitated rapid head movements; its mate arrived and drove away the intruder.

20 December 1992 A Silver Gull walked to a Tern's nest, ducking its head as Little Terns swooped. It took an egg and swallowed it in three gulps.

21 December 1992 A Silver Gull took a Tern's egg and flew away while being mobbed by other Silver Gulls, but managed to swallow the egg in flight.

7 January 1994 A Silver Gull caught a runner which escaped when the Silver Gull was mobbed by adult Little Terns. Silver Gulls were known to have taken nine Little Tern runners.

9 January 1994 One egg and two hatchlings were taken by Silver Gulls from a Tern's nest on the edge of the colony.

2 December 1994 Five Little Tern nests were robbed and Silver Gull tracks were present at each of them; Silver Gulls were constantly present at the colony in windy weather.

4 December 1994 Six Silver Gulls flew in a group into the middle of the colony; four fluttered above a Tern's nest and were mobbed by adult Little Terns while two landed without being mobbed. One of the Silver Gulls walked to the nest, took a hatchling and flew off, pursued by the other five Silver Gulls. Half an hour later the Silver Gulls returned and two landed while four hovered over the nest. I chased them away.

26 November 1995 Silver Gull tracks were all over the Little Terns' nest-scrapes; two nests contained the remains of broken eggs. Around this date Silver Gulls took all the Terns' eggs as they were laid; the Little Terns moved to another island where predation by Silver Gulls also occurred.

December 1996 Only a few Little Terns tried to nest and Silver Gulls took the eggs immediately. The Little Terns abandoned nesting at Wallis Lake: by this time there may have been too many people, too many predatory Silver Gulls and too few Little Terns for them to nest successfully.

6 December 1993 (at Harrington) Two Silver Gulls pecked at the brain of a dead 16-day-old Little Tern runner. The runner appeared to have been healthy and had recently eaten a juvenile mullet *Mugil* sp. A Silver Gull flying across the colony swooped and picked up a small runner then flew rapidly away, chased by seven Little Terns; it eventually swallowed the runner whole.



Newly hatched Little Tern chick and egg, Forster, N.S.W., January 1996.

Plate 23

Photo: Michiala Bowen

Whimbrel

8 November 1994 Whimbrel tracks were present near a Masked Lapwing *Vanellus miles* nest from which an egg had disappeared.

3 December 1994 Wind had obliterated any tracks, but a Whimbrel feather was found among the Little Tern nest-scrapes, and three Whimbrels were present nearby.

4 December 1994 At 0826 h Whimbrel and Pied Oystercatcher tracks were all over the area of the colony, and all the Little Tern eggs and young had disappeared.

Pied Oystercatcher

11 November 1994 Pied Oystercatcher tracks were found at a Red-capped Plover's *Charadrius ruficapillus* nest from which the two eggs had disappeared.

November–December 1994 Pied Oystercatchers were mobbed by adult Little Terns when in or near the colony.

16 December 1994 A Pied Oystercatcher took a Little Tern runner. Tracks indicated that Oystercatchers probably took eggs and runners from nests near the edge of the colony, especially on the western side where the runners sought cover.

Caspian Tern

2 December 1994 A Caspian Tern flew from the centre of the Little Tern colony carrying what could have been a chick.

29 December 1994 A Caspian Tern near the colony was mobbed by Little Terns.

Galah

When present in a Little Tern colony, Galahs were usually mobbed.

Corvids

When near the Little Tern colony, corvids, especially Forest Ravens *Corvus tasmanicus*, were always immediately mobbed, however high they flew. However, there was no evidence of their causing damage in the colony and their tracks were found only after the Little Tern nesting had finished.

Raptors

Ospreys *Pandion haliaetus* and White-bellied Sea-Eagles *Haliaeetus leucogaster* occasionally flew high over the colony. The Little Terns took to the air and circled, but there was no sign of these raptors preying on Little Terns.

A Nankeen Kestrel *Falco cenchroides* was occasionally seen at Miles Island and once took a Richard's Pipit *Anthus novaeseelandiae* fledgling from grass on the edge of the colony, disturbing the Little Terns which took to the air. The Nankeen Kestrel is capable of taking a Little Tern runner, although this was not observed.

Water-rat

I found no evidence that Water-rats interfered with nesting Little Terns, but their presence near the colony on Miles Island may have kept away Black Rats. Black Rat fur was present in Water-rat droppings, but there was no other evidence of Water-rats in the colony.

Black Rat

Silver Gulls were blamed for most Little Tern predation during the day. To find out whether there were also nocturnal predators, nesting areas were searched as soon as it was light enough to see tracks. Tracks of Whimbrels and Ghost Crabs were present as well as those of Black Rats.

24 October 1989 Black Rat tracks were present on Miles Island.

30 December 1992 Three newly hatched Little Terns disappeared during the night. The only tracks present were those of Black Rats, and 3 m from the nest were three dead, partly eaten chicks. The tops of the skulls of two chicks had been opened and the brain removed, and the back and gut had been eaten; the other chick was untouched.

1993-94 breeding season Following a baiting program, and possibly assisted by the presence of Water-rats, there was no evidence of Black Rat damage in the colony although a Black Rat ate a Richard's Pipit nestling on 25 October 1993.

1994–95 breeding season Owing to poor weather, few Little Terns arrived to breed.

1995–96 breeding season Little Terns nested on Miles Island. From the presence of their tracks, Black Rats were presumed to have taken two eggs from a Red-capped Plover's nest 20 m from the nearest Little Tern nest on 6 January 1996. The eggshell was 1 m from the nest, neatly opened at the small end and licked clean.

Ghost Crab

The few Ghost Crab holes on the crest of Sand Island during the 1993–94 breeding season indicated a population that was probably too small to be a problem for the Little Terns. By the next season, however, there were many more holes, including some that were larger than those present the previous year.

29 November 1994 A Little Tern's nest which had previously contained two eggs had only one egg remaining; a crab hole had appeared in the middle of the nest-scape and the nest was deserted.

5 December 1994 A nest being brooded by an adult Little Tern contained one egg and two newly hatched young; a Ghost Crab was lying still with its two pincers gripping one chick's head behind the eyes. The Ghost Crab was taken as a specimen and two days later the chick had recovered.

7 December 1994 A nest which had previously contained two eggs now contained only one. There was a crab hole 8 cm from the nest and the second egg was 2 cm away from the hole, outside the nest-scape. I moved this egg back to the scrape but the nest was deserted and the egg remained there until 11 December.

11 December 1994 One young Little Tern that was being brooded had a damaged wing-tip which appeared to have been chewed at night by a Ghost Crab; the only tracks nearby were those of crabs.

12 December 1994 A Little Tern's nest which had contained three eggs was deserted and now contained only one egg; a crab hole was present in the nest-scape. A second nest, which had contained two eggs and one chick, had a fresh crab hole in the scrape and eggs and young were gone; I dug out the crab hole but could not find them.

14 December 1994 Three newly hatched young disappeared from a nest-scape which contained a fresh crab hole. I carefully dug out this hole (having discovered that crabs do not burrow straight but twist and turn). I found the Ghost Crab with two Little Tern chicks, both opened at the vent and the gut eaten. These were preserved. The third Little Tern chick could not be found.

I dug out a small crab from a Tern's nest-scape and kept it in a container of sand with an infertile egg to see whether a small crab could break an egg. The crab buried itself and the egg overnight but the egg was not broken. One week later I removed the sand and spread it on a sheet of paper; a careful search found no eggshell or egg yolk.

December 1994 I experimented to see what would kill Ghost Crabs. Chlorpyrifos, an ant killer, proved effective so fish baits touched with that chemical were placed in 122 crab holes in a quadrat, and after two days only 22 holes were open. Fresh holes did appear, but this baiting stopped damage to the Little Tern colony.

On Sand Island, Ghost Crabs were implicated in the loss of at least 18 eggs from seven Tern nests, although some of the eggs may have hatched before being taken. Their tracks indicated that the crabs came out to hunt at night and that they could move up to 50 m from their holes. If they found prey that could not be fully consumed they dug down and buried it. They must have disturbed the Little Terns at night and were possibly a reason why the Little Terns did not return to Sand Island the next season.

1995–96 breeding season On the north face of Miles Island there were few Ghost Crab holes, but they were common over the crest of the dunes. Crabs were not considered a problem in the Little Tern colony until late in the season. However, ten runners missing from the colony may have been taken by crabs, although no predation was seen.

24 January 1996 In daylight a Ghost Crab ran from a Little Tern nest, on the dunes, where two young had just hatched.

27 January 1996 A Ghost Crab hole was found in a Little Tern nest-scraps that had contained one egg. The crab was found 45 cm down with the remains of the egg. As no other crab holes were in the vicinity of this nest, the Ghost Crab must have travelled perhaps 50 m to reach the nest.

Ants

Iridomyrmex gracilis was common behind the dunes on Miles Island. This species does not have a sting but has strong mandibles and can squirt acid from the abdomen. Their presence in empty nest-scraps is indicative of egg predation by another predator, and Little Tern hatchlings and runners frequently have ants clinging to their eyelids.

8 January 1993 The ants were extremely active in the northern colony where children had destroyed ten nests the previous day. There were now no Little Terns nesting and the ants had been attracted to the remains of the crushed eggs.

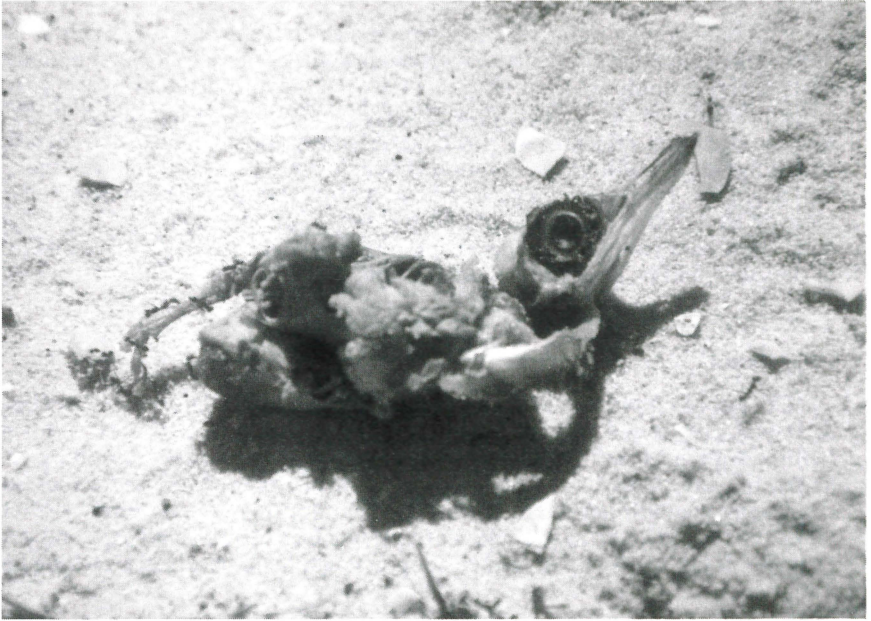
3 February 1993 A trail of ants over the dunes towards the site of the Little Tern colony led only to Little Tern droppings.

1995–96 breeding season Having nested on Sand Island in the absence of ants the previous year, the Little Terns moved to Miles Island for 1995–96, possibly because of disturbance by people at Sand Island. Hatchlings in nests near the top of the dunes were quickly covered in ants.

3 January 1996 Little Tern runners were found just beyond the dunes to the south of the nesting area. One was dead and had been eaten by ants; measurements indicated that it was about 14 days old, and its empty stomach suggested that it could have died of starvation before being found by the ants.

12 January 1996 A dead four- or five-day-old runner was being eaten by ants. The runner was well fed, with one fish in the gullet and another in the stomach (Plate 24); both fish were untouched by the ants. Ants have been seen to swarm over a chick which was immobile after a large meal.

20 January 1996 Two newly hatched chicks were covered in ants. In spite of being rescued several times by me and moved each time to an ant-free area, and in spite of the fact that the parents found and brooded them, the ants also found them and within hours the chicks were dead and covered with ants (Plate 25).



This Little Tern runner was killed by ants whilst immobilised after a large feed; one whole fish was in its stomach and one (visible here) in its gullet (both fish were untouched by ants), Forster, N.S.W., January 1996.

Plate 24

Photo: Michiala Bowen



Two Little Terns just hatched were killed by ants, despite being brooded, Forster, N.S.W., January 1996.

Plate 25

Photo: Michiala Bowen

Various methods were tried to keep ants away from Little Tern nests. Lime around the nests made nests too conspicuous to other predators. Surrounding the nests with citronella-soaked strands of wool (100% citronella oil) may have helped. Liquid ant-killer disappeared very quickly in the sand and heat. A 1:1 mixture of Dettol (Reckitt and Coleman Pharmaceuticals) and Johnson's Baby Oil was painted on the down of one chick; no ants were found on this chick but this may have been coincidental and the method needs further testing. Liquid chlorpyrifos diluted with water and poured down the holes of ant colonies apparently killed the ants but, because of the number of ant nests, large quantities of poison would be needed to eradicate ants.

Discussion

This paper supplements observations of Little Tern predators listed by Higgins & Davies (1996) and documents some previously unsuspected reasons for nest failure. Ants have not previously been implicated as threats to nestling Little Terns, but the observations here suggest that in some places and under some conditions they are persistent and vigorous attackers of young birds. Although Ghost Crabs are listed as predators of Crested Tern *Sterna bergii* eggs and young (Higgins & Davies 1996), they have not previously been observed attacking Little Tern nests.

I have previously noted that Galahs may interfere with nesting Little Terns and have suspected that they may even be implicated in the disappearance of newly hatched young (Rose 1997). Schipper & Weston (1998) observed Galahs disturbing nesting Little Terns and suggested that, whereas some encounters may have been inadvertent and resulted from the Galahs' feeding activities, in other cases the Galahs may simply have been playing, although the result was harassment and disturbance of the nesting Little Terns. During both these studies the Little Terns mobbed Galahs in the vicinity of the colony, as occurred during the observations documented in this paper.

Several wader species, including Whimbrels and Ruddy Turnstones *Arenaria interpres*, have been recorded as predators of nests of Little Terns and other tern species (Rose 1994, Higgins & Davies 1996), but Pied Oystercatchers have not previously been implicated.

Perhaps the major 'natural' threat to seaside-nesting terns is the Silver Gull (Higgins & Davies 1996, Egan & Webb 1999), and this suggestion is supported by the observations in this paper which show Silver Gulls to be relentless in their attacks on the Little Terns and their nests. Silver Gulls have increased greatly in range and numbers as the human population has increased (Higgins & Davies 1996) and may be a more significant threat to Little Terns now than they were previously.

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