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# THE BREEDING STATUS OF THE LITTLE TERN *Sterna albifrons* ON THE NEW SOUTH WALES NORTH COAST, 1979 to 1982

GREG P. CLANCY

56 Armidale Road, Coutts Crossing, NSW 2460

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The results of a three year survey of Little Tern breeding colonies are presented. Details of reproductive success, nests, clutch size, threats to breeding success and management techniques are discussed. The presence of eclipse plumaged birds is noted and briefly discussed.

## INTRODUCTION

Surveys of all nesting colonies of the Little Tern *Sterna albifrons* known to exist on the North Coast (Forster 32°11′S., 152°31′E. to Tweed Heads 28°10′S., 153″33′E.) of New South Wales, as identified by Morris (1979), were carried out during the 1979-1980, 1980,1981 and 1981-1982 breeding seasons (See Figure 1.). In addition, areas considered potential nesting sites were also investigated, mainly during the first season. Two colonies were regularly surveyed by local residents. The surveys were the result of an increased awareness within the National Parks and Wildlife Service of the apparent decline in the species' population within the state.

## METHODS

During the spring of 1979, 27 known and potential nest sites were visited once. Ten sites were found to be active and were inspected again during January 1980. Sixteen sites, including those active during the previous season, were visited once during November to December 1980. The Sawtell colony was inspected on 17 occasions during the period October 1980 to January 1981 by a local resident. A limited follow-up survey was carried out in January 1981. The survey carried out during the 1981-1982 season involved visiting nine colonies once whilst carrying out regular surveys at five relatively accessible sites. Fourteen visits were made to Red Rock, ten to

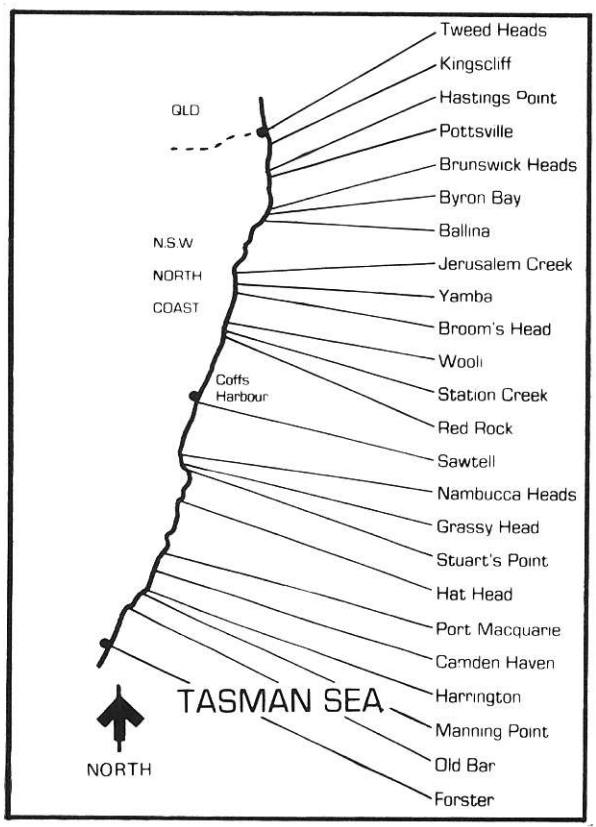


Figure 1. *Map of north coast of New South Wales showing locations mentioned in text.*

Station Creek, eight to Wooli (North Shore), four to Wooli (Jones Beach) and seven to Sawtell. In addition, local residents regularly visited the Sawtell and Byron Bay sites.

Access to the sites varied from rather easy walking from a road to wading up to the neck in swift flowing water. Some sites were only accessible by boat. Nests were usually located by observing the behaviour of adult birds. The numbers of breeding birds, nests, eggs and young were recorded for all sites. Details of any threats or disturbances were noted. The numbers and activity of other shoreline nesting species were also recorded. All nestling and runner Little Terns located were banded and morphometrics and details of plumage and soft parts were noted. Bands were supplied by the Australian Bird Banding Scheme, CSIRO Division of Wildlife and Rangelands Research.

## RESULTS

The 1979-1980 survey located between 69 and 70 breeding pairs of Little Terns at 11 sites. Forty-two pairs were located at 11 sites during the 1980-1981 season and 63 pairs at 12 sites during the 1981-1982 season (Appendix 1). These figures compare favourably with those of Morris (1979) who estimated the total breeding population of the state to be 49 pairs (1976-1977), 87 pairs (1977-1978), and 32 pairs (1978-1979) whilst suggesting that the 1976-1977 and 1977-1978 figures could have been as high as 58 and 126 respectively. The North Coast figures were 31-33 (1976-1977), 6 (1977-1978), and 12 (1978-1979) pairs.

*Reproductive Success*

The total numbers of nestlings and runners recorded were 16, 17 and 27 in successive seasons. These figures constitute minimum numbers only as they are the result of infrequent visits (often only one per season) frequently at a time when many eggs were still unhatched. The increased figures for 1981-1982 reflect a greater concentration of observations at Sawtell, mainly by the late Ian Eckford. A total of 31 eggs was laid that season at Sawtell and 14 (45.2%) of these successfully hatched and produced offspring that were subsequently banded. No offspring were produced from 48 eggs at Red Rock during the same season due to high tides.

*Clutch Size*

From a total of 143 clutches examined, 33 possessed one egg, 64 two eggs and 46 three eggs.

*Nests*

All nests located consisted of a shallow scrape or hollow, generally in sand, at times being lined with grass seeds, small pebbles or shell fragments. Nest scrapes also occurred in areas of shingle or shellgrit but rarely amongst driftwood.

*Banding*

Table 1 details the numbers of tern nestlings and runners banded at each location during each of the three surveys. In addition, one adult Little Tern was caught on the nest at Sawtell on 17 November 1981 and seven others were mist-netted at night at Red Rock on 18 December 1981 and were banded. The birds at Red Rock comprised three adults in breeding plumage and four birds in non-breeding plumage.

The only recoveries to date have been of runner terns captured and released by the late Ian Eckford at the banding site at Sawtell. Ten terns were recaptured a total of 45 times and the longest elapsed time between banding and last recapture was 19 days.

*Non-breeding Little Terns*

Table 2 details the number of non-breeding terns at various locations on the North Coast of New South Wales during the three year study period. A total of 2 823 terns in this plumage were recorded, 1 108 in 1979-1980, 840 in 1980-1981 and 875 in 1981-1982. The greater number recorded in 1979-1980 partly reflects the wider coverage of the field surveys during that season. The total for that year, excluding sites not visited in subsequent years, was 945.

## DISCUSSION

The breeding population of the Little Tern on the North Coast of New South Wales remained fairly constant at approximately 60 pairs during the study period. The lower total during the 1980-1981 season can be attributed to the absence from the statistics of the Forster colony which probably bred but was not located. Human disturbance and natural events are regular problems and appear to be severely limiting breeding success at some locations. In spite of the fact that the breeding population has remained rather constant, a severe collapse of the population could occur in future years because an ageing population with a poor breeding success may reach a crisis point as breeding birds die or become less fertile.

TABLE 1

Numbers of Little Tern nestlings and runners banded 1979 to 1982

| Location | 1979-1980 | 1980-1981 | 1981-1982 |
|---|---|---|---|
| Tweed Heads | 0 | 0 | 0 |
| Pottsville | 0 | 2 | 0 |
| Brunswick Heads | 0 | 1 | 0 |
| Jerusalem Creek | 0 | 0 | 2 |
| Wooli (Nth.) | 0 | 3 | 0 |
| Wooli (Jones Beach) | 0 | 1 | 0 |
| Station Creek | 0 | 2 | 0 |
| Red Rock | 5 | 1 | 0 |
| Sawtell | 3 | 4 | 15 |
| Nambucca Heads | 5 | 1 | 9 |
| Forster | 2 | 0 | 2 |
| TOTALS | 15 | 15 | 28 |

3 year total=58

TABLE 2

Maximum numbers of Little Terns in non-breeding (eclipse) plumage 1979 to 1982

| Location | 1979-1980 | 1980-1981 | 1981-1982 | TOTAL |
|---|---|---|---|---|
| Tweed Heads | 4 | 11 | 15 | 30 |
| Kingscliffe | 15 | N.S. | N.S. | 15 |
| Norries Head | 1 | N.S. | N.S. | 1 |
| Hastings Point | 9 | 7 | 2 | 18 |
| Pottsville | 8 | 2 | 3 | 13 |
| Brunswick Heads | 11 | nil | nil | 11 |
| Byron Bay | 4 | 200 | 20 | 224 |
| Ballina/South Ballina | 5 | N.S. | N.S. | 5 |
| Evans Head | 3 | N.S. | N.S. | 3 |
| Jerusalem Creek | N.S. | N.S. | 108 | 108 |
| Yamba | 12 | N.S. | N.S. | 12 |
| Sandon River | 10 | N.S. | N.S. | 10 |
| Brooms Head | nil | N.S. | N.S. | nil |
| Dry Bar (Yuraygir) National Park | 2 | N.S. | N.S. | 2 |
| Wooli (North Shore) | nil | nil | nil | nil |
| Wooli (Jones Beach) | 48 | 84 | nil | 132 |
| Station Creek | 280 | 71 | 105 | 456 |
| Red Rock | 30 | 120 | 270 | 420 |
| Sawtell | 400 | 125 | 120 | 645 |
| Nambucca Heads | 89 | 164 | 180 | 433 |
| Stuarts Point/Grassy Head | 10 | N.S. | N.S. | 10 |
| Hat Head/South-west Rocks | nil | N.S. | N.S. | nil |
| Point Plomer | nil | N.S. | N.S. | nil |
| Camden Haven/Laurieton/North Haven | nil | N.S. | N.S. | nil |
| Harrington | 26 | 13 | 2 | 41 |
| Manning Point | 6 | 43 | N.S. | 49 |
| Old Bar | 105 | N.S. | N.S. | 105 |
| Forster/Tuncurry | 30 | nil | 50 | 80 |
| TOTAL | 1 108 | 840 | 875 | 2 823 |

N.S.—Not Surveyed

*Clutch Size*

The clutch size of the Little Tern is stated by the Reader's Digest (1976) to be 'two, rarely three' eggs. The majority of clutches during the current surveys possessed two eggs (35.3%, 44.5% and 52.3% respectively), however clutch sizes of three were by no means rare, constituting 29.4, 37.0 and 32.3 per cent of all clutches. Some clutches of one or two may have been incomplete at the time of survey and thus would have eventually contained additional egg(s).

Larkins (1984) found the mean clutch size at Port Botany (34°00'S., 137°17'E.) to be 2.46±.58, 2.10±.55, and 2.40±.65 in respective years. Two egg clutches constituted 46.4, 70.0 and 44.0 per cent of all clutches and three egg clutches amounted to 50.0, 20.0 and 48.0 per cent of the yearly totals. The low percentage of clutches with three eggs in the middle study period may have been due to disturbance or other environmental factors. The work of Larkins suggests that approximately 50 per cent of all clutches might normally contain three eggs but disturbances could result in incomplete clutches of two being recorded as the most frequent size.

*Nests*

The Reader's Digest (1976) states that the nest is 'a simple hollow, sometimes decorated with dry seaweed'. In the present surveys nests were located that were lined with either grass seeds, small pebbles or shell fragments. Some were placed close to driftwood as well as seaweed and occasionally close to living vegetation. Hollows or scrapes sometimes disappeared due to wind action and the eggs or young were found sitting on flat sand with no indication of a hollow. Rarely did the birds build an elevated mound into which a nest scrape was formed. Nest scrapes appear to be dug with the feet and shaped by the bird pressing its breast against the edges of the scrape.

*Non-breeding Little Terns*

Lane (1978) and Morris (1979) discuss the presence of large numbers of Little Terns in non-breeding plumage throughout the breeding season. The origin of these eclipse plumage birds has yet to be determined but they are assumed to be migrants from the Northern Hemisphere. Whether immature birds from local colonies constitute part of this non-breeding summer population is not known. In fact, whether the Little Tern has a distinct immature plumage phase is also unclear but the Reader's Digest (1976) states that immatures are similar to adults in non-breeding plumage. Slater (1970) states 'immatures have dusky leading edges to wings, darker primaries and upperparts contrasting with pale inner flight feathers'. The numbers of these non-breeding terns recorded during the surveys are detailed in the Results section. The variation in total numbers from survey to survey was not large, although Martindale (1985), found quite the reverse. Some tallies were recorded as a minimum count and would cause the total numbers to be somewhat deflated. This would partly account for the apparent fluctuation in numbers. The habit employed by these non-breeding terns, of feeding some distance off shore also makes exact counting difficult. These birds also appear to be nomadic with numbers fluctuating greatly from visit to visit such as at Sawtell where numbers varied from 2 to 120 birds.

*Threats to Breeding Success*

Threats to breeding success of Little Tern colonies resulted from both natural sources and accidental or wilful interference.

(i) *Natural Sources* The major natural threat arises when abnormally high tides cover the nests and eggs, the latter often being completely washed away. This threat would have plagued nesting terns in the past but may have been exacerbated by human disturbance. For example, Little Terns nesting at Red Rock, in a location frequently inundated by very high tides, are probably refugees from the heavily disturbed Station Creek site. Egg collectors have been very active at the latter site and disturbance from people and vehicles has always been a problem, especially when there has been no fence. High tides are usually not a problem at this site.

Natural predation appears to be rare and no instances were observed during the surveys. Potential predators were strongly attacked by adult terns and this may have prevented frequent predation. Adult terns were seen to mob the following bird species: Osprey *Pandion haliaetus,* Brahminy Kite *Haliastur indus,* Whistling Kite *H. sphenurus,* Silver Gull *Larus novaehollandiae,* Crested Tern *Sterna bergii,* Gull-billed Tern *Gelochelidon nilotica,* Beach Thick-knee *Burhinus neglectus,* Australian Magpie *Gymnorhina tibicen,* and Torresian Crow *Corvus orru.*

Raptors, gulls, terns and a corvid species were referred to by Vincent (1983) as 'birds . . . . recorded as appearing to cause the most concern to the colony' (at Lakes Entrance, 37°53'E., 148°00'S., Victoria).

(ii) *Accidental or Wilful Interference* Accidental interference resulted mostly from people fishing, swimming, walking, boating and driving off-road vehicles in the vicinity of nests. Dogs accompanying people or straying from nearby villages cause frequent disturbance to nesting Little Terns at many sites. Wilful interference mainly involved the illegal taking of eggs by collectors. Although the exact extent of this practice involving Little Tern eggs is not known it appears that many eggs were taken from the Byron Bay and Station Creek sites. The habit of marking nest sites with sticks, as described by Vincent (1983), was observed only once, at Hastings Point on 29 November, 1979.

*Management*

In an attempt to prevent accidental disturbance to breeding birds, signs requesting that people stay close to the water's edge were erected by the National Parks and Wildlife Service at Station Creek during the 1979-1980 season. Fences and signs were erected by the Service at Station Creek, Sawtell and Byron Bay during the 1980-1981 and 1981-1982 seasons. The value of signs alone is doubtful, at least at some locations. Vincent (1983) found that the erection of signs at Lakes Entrance had only limited results and recommended that the erection of a fence and full-time supervision of the area were essential.

In 1980 the fences and signs were not erected until late October to early November. At Sawtell at least four young were successfully hatched by 3 December 1980; no young were produced by the same date in 1979. At Station Creek two pairs of Little Tern were active inside the fenced area, one pair rearing two young to the flying stage by 12 December 1980. No young were reared at Station Creek during the 1979 breeding season.

A total of 17 nests was constructed at Sawtell during the 1981-1982 season, eight inside and nine outside of the fence. Three nests inside the fence produced five young and four nests outside produced nine young. The greater success of nests outside of the fence is enigmatic but does not mean that fences are unnecessary as the pre-fence situation produced only three offspring from two nests. Breeding data from subsequent years should reveal the extent of the success of the fence.

The Byron Bay fence was far too low and fragile in appearance and its value was counteracted by the opening of the Belongil Creek mouth by the council at a critical time for the breeding terns. A combination of fences, signs and regular patrolling would appear to produce the maximum Little Tern breeding success rate.

Continued monitoring and positive management are considered essential to the continued existence of the Little Tern as a breeding species in the study area. Research into the origin and composition of the non-breeding populations present during the breeding season would be of interest to enable a better assessment of reproductive success of local colonies.

## ACKNOWLEDGEMENTS

I would like to dedicate this paper to the late Ian Eckford who, under medical supervision, managed to visit his beloved Little Terns at the Sawtell colony only days before his death. His dedicated effort ensured the successful breeding at Sawtell detailed in this report. It is hoped that his efforts were not in vain.

I also wish to thank Mark Christiansen, Nel Wakeling, Merv Whicker and Jack Willows who contributed records of Little Tern breeding and assisted with the fieldwork at various locations.

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## APPENDIX 1

Summary of Little Tern breeding data (Showing numbers of breeding pairs) North Coast, NSW 1979 to 1982.

| Site | Year 1979-1980 | 1980-1981 | 1981-1982 |
|---|---|---|---|
| a | 1-2 | Nil | ½ (one bird) |
| b | Nil | NR | Nil |
| c | 3 | Nil | Nil |
| d | Nil | 1 | ½ (one bird) |
| e | 5 | 1 | 2 |
| f | 4 | 4 | 1 |
| g | Nil | NR | NR |
| h | NR | 3 | 6 |
| i | Nil | NR | NR |
| j | Nil | NR | NR |
| k | 7 | 6 | 1 |
| l | Nil | 2 | 2 |
| m | 1 | 3 | 3 |
| n | 6 | 6 | 13 |
| o | 2 | 9 | 9 |
| p | 18 | 6 | 9 |
| q | Nil | NR | NR |
| r | Nil | NR | NR |
| s | Nil | NR | NR |
| t | Nil | NR | NR |
| u | Nil | NR | NR |
| v | 2 | Nil | Nil |
| w | Nil | Nil | NR |
| x | Nil | NR | NR |
| y | 20 | 1 | 16 |
| TOTAL | 69-70 | 42 | 63 |

'Nil' means that the site was visited but no terns were found nesting.

'NR' means that the site was not visited and no reports of nesting terns were received.

### Site Descriptions

a = Tweed Heads, southern entrance to Tweed River on beach near breakwall.
b = Kingscliff, site 1.6 km south of Kingscliff near Cudgen Creek entrance.
c = Hastings Point. Site on Cudgera Creek entrance on sandspit north of creek.
d = Pottsville. Site on Mooball Creek entrance on sandspit.
e = Brunswick Heads. Site on sandspit north of Brunswick River entrance.
f = Byron Bay. Site near entrance to Belongil Creek on sandspit.
g = Ballina. Site on southern side of Richmond River entrance, at South Ballina.
h = Jerusalem Creek. Site on sandspit southern bank of creek.
i = Yamba. General area investigated, no sites located.
j = Broom's Head. Site 1 km south of village.
k = Wooli. Site at Jones Beach south of Wooli.
l = Wooli. Site on northern bank of Wooli River, in low dunes.
m = Station Creek. Site on sandspit within Yuraygir National Park where Station Creek enters the sea.
n = Red Rock. Site on sand island in Corindi River.
o = Sawtell. Site at entrance to Bonville Creek on southern sandspit.
p = Nambucca Heads. Site on shifting sandbars north of Warrell Point; alternative site in dunes at southern entrance to Nambucca River/Warrell Creek.
q = Grassy Head. Site 2-3 km south of headlands in dunes.
r = Stuart's Point. Site at entrance to Macleay River on sandspit.
s = Hat Head. Site located 4 km north of Hat Head, within National Park, in dunes.
t = Port Macquarie. Site at Queens Head, south of Point Plomer.
u = Camden Haven. Potential sites at Camden Haven, Laurieton and North Haven investigated in 1979. No breeding colonies located.
v = Harrington. Site in dunes east of village.
w = Manning Point. Site on sandspit on southern entrance to Manning River.
x = Old Bar. Site on north side of Manning River entrance.
y = Forster. Site on sand islands in Wallis Lake between Forster and Tuncurry.