

OBSERVATIONS ON NESTING BEACH THICK-KNEES *Burhinus neglectus* AT RED ROCK, NEW SOUTH WALES

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Observations on Beach Thick-knees breeding at Red Rock on the N.S.W. north coast are presented. Plumage details of juvenile and adult birds are discussed and measurements of juveniles included. Eleven breeding attempts were observed and the details of these are tabulated. Breeding success was affected by both natural phenomena and human activity. Other aspects of breeding activity and behaviour are presented.

INTRODUCTION

A pair of Beach Thick-knees *Burhinus neglectus* has continually inhabited the one sand bar at Red Rock, N.S.W. (29°59'S., 153°15'E.) since 1976 and was first recorded breeding there in 1979 (Clancy and Christiansen 1980), during a survey of Little Tern *Sterna albifrons* nesting colonies. Between 10 October, 1979 and December, 1982 observations were made on this pair of Beach Thick-knees. These observations were aimed mainly at gathering information on the biology of the species, with particular emphasis on the breeding habits; as Frith (1976) stated "Little is known about the species".

METHODS

A total of 36 visits was made to the study site during the above period. These visits were irregular in frequency although a more regular schedule was adopted during the breeding season, that is October to February when 22 visits were made to the study site. Reaching the sand bar involved either wading up to the neck in fast flowing water or the use of a boat. Once on the sand bar a search was made for an egg or young bird. Adults and immatures were usually quite obvious and no search was required to locate them.

Details of the nest and egg, runner or juvenile, as well as the plumage and behaviour of adults were noted. Runners which had a suitably developed tarsus were banded with bands supplied by the Australian Bird Banding Scheme, CSIRO; measurements were taken and descriptions of plumage and soft parts were noted. Measurements of total length and wing length were made by use of a tape measure and vernier calipers were used to measure tarsus length, bill length and bill width. Adults and immatures were observed through 8 x 40 binoculars.

Additional breeding records (1983-1984) were supplied by S. G. Lane and D. Geering and are included in Table 1.

RESULTS

Observations were made during 11 breeding attempts, five of which resulted in a young thick-knee being hatched, two eggs were destroyed by natural phenomena (high tides), two almost certainly were stolen by an egg collector and the fate of the other two is not known. Of the five birds that were hatched, one is known to have been killed, one was subsequently observed at Nambucca Heads and one was still present at Red Rock in December, 1984. The fate of the

TABLE 1

Chronology of Beach Thick-knee breeding activities at Red Rock, New South Wales, 1979-1985.

Date	Particulars
26 Nov. 79	Runner 1 banded (band number 100-11460) — see Clancy & Christiansen (1980).
1 Jan. 80	Runner 1 found dead (broken neck).
22 Mar. 80	Egg 2 located.
1 Apr. 80	Runner 2 located.
25 Apr. 80	Runner 2 banded (band number 100-11463).
31 May 80	Runner 2 recaptured.
29 June 80	Juvenile 2 observed with adults, able to fly but not as strong as adults.
30 June 80	Juvenile 2 observed with adults.
1 Sept. 80	Immature 2 observed with adults.
3 Oct. 80	Immature 2 observed with adults.
5 Oct. 80	Egg 3 located.
26 Oct. 80	Egg 3 observed.
2 Nov. 80	Immature 2 observed with adults, runner 3 located.
6 Nov. 80	Immature 2 observed with adults, runner 3 caught and measured.
1 Dec. 80	Immature 2 observed with adults, runner 3 banded (band number 110-88008).
18 Dec. 80	Immature 2 observed with adults, runner 3 recovered.
16 Apr. 81	Immature (?) observed with adults.
7 Oct. 81	Pair of adults present, mated then one scraping sand or shingle with foot.
20 Oct. 81	Egg 4 located.
6 Nov. 81	Adult sitting on egg 4, other adult nearby.
12 Nov. 81	Egg 4 observed, adults nearby.
17 Nov. 81	Egg 4 missing — almost whole sand bar had been inundated by high tide.
15-25 Mar. 82	Egg 5 located by P. Imrie (subsequently egg not found — fate unknown).
Dec. 82	Egg 6 washed away by high tide.
21 Oct. 83	Egg 7 located, subsequently disappeared (? egg collector).
15 Nov. 83	Egg 8 located.
17 Nov. 83	Egg 8 taken illegally by collector.
29 Dec. 83	Egg 9 laid, fate unknown.
14 Mar. 84	Egg 10 located by D. Geering.
1 Apr. 84	Newly hatched young located by D. Geering.
27 Apr. 84	Runner 10 banded by D. Geering (band number 110-26356).
23 June 84	Runner/Juvenile last observed by D. Geering.
13-24 Oct. 84	Egg 11 laid (per S. G. Lane).
21 Nov. 84	Adult on egg 11.
28 Nov. 84	Chick present (estimated 5-6 days old).
15 Dec. 84	Runner 11 banded by S. G. Lane (band number 110-89004).

other two birds is not known. Table 1 details, in chronological order, the 11 breeding attempts at Red Rock. Table 2 shows measurements of

runners at various ages and includes adult measurements from Rand & Gilliard (1976) for comparison. Frith (1976) gave the total length of adults at between 530 to 570 mm.

DISCUSSION

Breeding Season: Frith (1976) listed the breeding season as October to February. Generally the observed breeding season at Red Rock supported Frith (1976); however there were two unseasonal breeding events in the autumns of 1980 and 1982. Both of these followed an unsuccessful breeding attempt during the preceding summer.

Although the 1980 autumn breeding was successful a normal breeding event occurred in the spring and summer of 1980.

NEST AND EGG: The nest located on 20 October 1981 consisted of a shallow scrape in sand surrounded by shingle with some kelp near the edge. It was lined with pieces of plant material, *Casuarina* cladodes and an *Acacia* phyllode. It was situated within an area containing a Little Tern nesting colony.

The egg in the above nest was 66 mm long, greyish/white marked with black blotches, smaller grey blotches and brown squiggles and more heavily marked at the larger end. All clutches observed consisted of only one egg.

INCUBATION PERIOD: The incubation period was not determined precisely as eggs were not observed at the time of laying or hatching. One egg was observed being incubated over a 22 day period before being lost and another, which successfully hatched, was observed over a 21 day period. Subsequently an egg found on 24 October 1984 had still not hatched by 21 November 1984 (4 weeks later) but a runner 5 to 6 days old was found on 28 November 1984 (S. G. Lane, pers. comm.).

JUVENILES AND IMMATURES*: Juvenile Beach Thick-knees are, at first, covered in grey-buff down and are strongly marked with black on the upperparts. These black markings take the form of four longitudinal stripes on the back (the inner two being broken into blotches) and an irregular pattern on the crown, face and neck.

*For the purpose of this paper the term "immature" is applied to birds that have reached a size similar to that of adults.

TABLE 2
Measurements from Beach Thick-knee runners.

Band Number	Average Estimated Age (weeks)	Total Length (mm)	Wing Length (mm)	Tarsus Length (mm)	Bill Length (mm)	Bill Width (mm)	Date of Measurements
110-11463	0.6	155	—	31	18	—	1 Apr. 80
110-11463	4.3	289	—	52	40	—	25 Apr. 80
110-11463	9.4	470	203	80	54	—	31 May 80
110-88008	1.1	167	—	32.7	20.4	5.8	6 Nov. 80
110-88008	4.9	340	—	68	42	—	1 Dec. 80
110-88008	7.3	427	160	82	53	—	18 Dec. 80
Adult Measurements	ADULT*	—	280	85	76	—	*

*Adult measurements from Rand and Gilliard 1976.

The facial markings are somewhat similar to the adult facial markings. The bill is dark grey to black, the legs and feet are grey and the iris is grey-brown. At about 5 weeks of age the juvenile down begins to be replaced by feathers similar to those of adults (although some down may remain until sometime after week 12). A pale wing bar is present and the breast and undertail coverts are buff with the remainder of the underparts being whitish. The legs are green/yellow, the bill has turned dark brown and has a yellow base, and the iris is dull yellow. The distinctive facial markings are present as a large white ear patch, relatively larger than in the adult, a dull whitish eye-brow and a similarly coloured area running from the gape to the throat. There is no obvious tail. The secondary wing feathers have begun to emerge although the primaries are still only pin.

By week 7 the juvenile more closely resembles an adult, having developed a tail with a white band, although some down may still remain on the head, neck, back, wings and rump. The facial markings are brighter but the eyebrow and ear patch are still separate. The primaries and secondaries have all partly emerged, although the bird is still unable to fly. The legs are greenish yellow or yellow.

The juvenile is able to fly quite strongly by week 12 but is still noticeably a novice at that stage. Its plumage resembles that of the adult but the eyebrow and ear patch (which is now smaller due to the growth of dark feathers above the ear) are still separate. The overall size is still slightly smaller than that of the adult.

Once the young bird reaches full size, between 3 and 5 months of age, it is still distinguishable from an adult by the incomplete facial pattern, the paleness of the wing bar and the buff colouring on the breast and flanks. It is not known at which age immature thick-knees become independent of their parents. One bird at Red Rock still accompanied its parents over 12 months after hatching, although it had been chased by one parent at the age of 7 months. It is likely that the normal age at independence would be closer to 7 months than to 12 months. This bird subsequently turned up at Nambucca Heads where it found a mate and successfully nested. Another juvenile at Red Rock could not be located after it had reached 13 weeks of age. This bird may have successfully left the breeding site but it is unlikely to have been capable of independent survival at that age.

ADULT PLUMAGE: Slater (1970) described the adult Thick-knee as follows: "Brown above, grey throat and breast, white abdomen. Wing with dark brown shoulder, white bar, grey band and black and white tip. Black band through eye with white bands above and below it. Bill robust, black tip and yellow base; legs and feet greenish-yellow; iris: yellow."

Frith (1976) stated: "Adults: Sexes alike. Brown above, shoulder darker, white wing stripe. Black band through eye with white bands above and below. Throat and breast grey; belly white. Eye yellow; bill yellow with black tip; legs green-yellow." Pizzey (1980) and Simpson and Day (1984) differ only slightly from these descrip-

tions. Pizzey highlights the "surprisingly white downcurved wings with broad dark bar" and Simpson describes the bill as "Large . . . with yellow base, black tip".

The adult birds observed at Red Rock generally conformed to the above descriptions although the bill colour was primarily black with a yellow base rather than being yellow with a black tip. The illustration on page 167 of Frith shows a bird with a primarily black bill.

A field character not mentioned by Slater, Frith, Pizzey or Simpson and Day is an obvious white patch above the bend in the wing. This patch is a section of the white flank colour and in the field may appear to be a part of the wing pattern. This white patch is clearly seen in the photograph on page 167 of Frith and in the illustration on page 93 of Simpson and Day. Despite the fact that this white patch may occasionally be obscured by the wings it is considered an important field character as it is usually very prominent. In fact, it is generally more obvious than the relatively narrow white wing bar. This wing bar is depicted in Simpson and Day as being somewhat thicker than on Red Rock birds and the bird illustrated in Frith.

Another character similarly not mentioned is the pattern of banding on the tail. The tail is generally mottled with a whitish subterminal band and black tips to the rectrices. This character is not easily observed in the field but was apparent on juveniles from about the age of 7 weeks. Walter Boles (pers. comm.) states that the three preserved specimens held by The Australian Museum display this band in the tail.

DISTURBANCES: Nesting activity was interrupted by both natural phenomena and human activity. The breeding season coincides with the summer holiday period and Red Rock is a popular holiday resort. The nest island is regularly visited by people fishing, swimming and sunbathing and some accidental disturbance occurs. The National Parks & Wildlife Service erected signs informing the public that the island is a breeding area for seabirds. The signs request that people stay close to the water's edge. Occasionally dogs are taken onto the island or swim across from the village area. On 5 October 1981 a dog was observed chasing both adult thick-knees. A dog was also suspected of contributing to the death of the juvenile found dead on 1 January 1980.

Not all human disturbance was accidental. On 17 November 1983 a suspected egg collector was seen on the island. The solitary egg disappeared that day. A further egg laid on 29 December 1983 disappeared mysteriously. High tides contributed to the loss of eggs in November 1981 and December 1982.

THICK-KNEES AT OTHER LOCATIONS: On 14 October 1982 Jack Willows observed a pair of Beach Thick-knees tending a nest with one egg at Belongil Creek, Byron Bay. An inspection of the site on 26 October 1982 revealed no birds or egg; however, numerous human footprints, dog tracks and four-wheel-drive vehicle tracks were observed.

The late Ian Eckford observed one bird digging into dry sand at Sawtell on 29 September 1983 and David Secomb observed single birds at Nambucca Heads during the period 7 February to 19 October 1982. During January and February 1984 Nel Wakeling observed a pair of Beach Thick-knees with a nest and egg at Nambucca Heads. One of these birds was wearing a metal band (band number 100-11463) which I had placed on it at Red Rock on 25 April 1980 when it was only a runner. The band number was read by David Secomb with the aid of a telescope. The egg successfully hatched and the young bird was banded by S. G. Lane on 14 March 1984 (band number 110-26138). Presumably the same pair were nesting again in November 1984 and the runner from this breeding event was banded (band number 110-89005) on 22 December 1984.

BEHAVIOUR: Frith (1976) referred to "Displays of nodding and tail-wagging" and stated that "The birds also seemed to sneak forward in a crouched position, like a Mangrove Heron does". The Red Rock birds behaved in a similar manner and became very agitated when an egg or young bird was approached. Sometimes they would appear very agitated when no egg or young could be found. Perhaps an intrusion into the breeding area at a critical time in the reproductive cycle was the reason for this behaviour. Both adult birds usually uttered an agitated whistle increasing in frequency with increasing excitement. The "curlew" call was never heard even though one night was spent on the island banding Little Terns.

Feeding was observed on only one occasion when two adults were moving over the mudflats and appeared to be catching small crabs. A runner which was being handled on 31 May 1980 had a large number of hard rounded objects in

its throat, for the whole length of its neck, which were thought to be Soldier Crabs. These crabs occur in large numbers on the mudflats at Red Rock.

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BIRDS KILLED ON SOME SECONDARY ROADS IN WESTERN AUSTRALIA

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Between January 1984 and December 1985 the corpses of 127 birds of 32 species were collected during routine journeys along secondary roads in an area of approximately 40 km² near Manjimup in the south west of Western Australia. Peak months were November to March and 57% of the casualties were juveniles. Ten banded birds were recovered during the study.

INTRODUCTION

Since 1977 birds were banded by (RB and MB) in four areas of remnant forest and on 10 irrigation dams, all within 5 km of where we live. Prior to December 1983, we attempted to recover banded birds by examination of corpses found on the secondary roads in this area. This paper originated when one of us (BP) suggested that all road kills should be collected and examined. It represents data gathered over 2 years, from January 1984 to December 1985. Previous analyses of road kills in Australia have been made by Vestjens (1973) and Disney and Fullagar (1978).

METHODS

Although roads were travelled every month of the year, the timing of the journeys was irregular, and no special searches were made. Dead birds were collected, as we drove between properties (BP), or to the study areas (RB & MB). Inter-property journeys were by tractor or "Land Rover" giving slower speeds and good vision. The majority of the casualties were collected this way by (BP). The road pattern within the study area is shown in Figure 1. The South-west and Muir Highways formed the western and north-eastern boundaries of the study area, and these were not examined for road casualties.