

STRAW-NECKED IBIS (*Threskiornis spinicollis*) IN SOUTH AUSTRALIA: BREEDING COLONIES AND MOVEMENTS

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NOTES ON BREEDING COLONIES IN SOUTH AUSTRALIA

The following account of the places and times in which colonies of Straw-necked Ibis have, to our knowledge, bred in recent years may be of some interest and value. This information does not claim to be comprehensive.

In Bool Lagoon the species has bred every year since 1963, except in 1966 and 1967, when the water-level was too low. The birds have nested mainly in an extensive area of flooded tea trees 400 yards from the edge of the lagoon, but also in large nearby reed-beds. Smaller numbers of White Ibis (*Threskiornis molucca*) have also nested regularly in both habitats. In 1964, when the water-level was unusually high, they even nested on tussocks around the margin of the lagoon, where they were relatively accessible to ground predators. It is interesting to note that they have repeatedly changed their nesting habitat in Bool Lagoon in the past. They were recorded as nesting in the reeds, but not in the tea trees, in 1927 (Parsons, 1928), in 1930 (Sutton, 1931) and 1934 (Brummitt, 1935). According to Mr. A. R. Attiwill, they nested in the tea trees in 1919 and earlier, then, after moving out into the reeds, continued there until 1939-40, since when the main colony has invariably used the tea trees. The reeds where the nests of Straw-necked Ibis used to be concentrated in the past have been destroyed by sheep and cattle grazing.

When in use, the colony seems normally to have been the largest noted here, and quite possibly the largest in the State. From it, ibis fly some distance to feed—allegedly as far as twenty miles or more (Attiwill, pers. comm.). Thus it affords a magnificent spectacle, which has been described by Dr. G. Storr in the *South Aust. Orn.* (1951), 20, 6-8. The colony can attain a vast size, which is of course hard to estimate. In 1963, Mr. Attiwill and Mr. R. Rymill, in company

with Mr. L. Delroy and Mr. P. Macrow of the Fisheries and Fauna Conservation Department, counted nests in sample sections of the colony. Then Messrs. Delroy and Macrow, with the use of an aerial photograph, estimated the total area of tea trees in which Straw-necked Ibis were nesting, and concluded that there were approximately 500,000 adult birds in the colony. Mr. Attiwill estimated that there were 150,000 nests (*S.A. Orn.*, 24, 26)—an estimate which does not necessarily conflict with the first, because many of the adult birds may not have been breeding. In 1964, he reported still greater numbers. The following estimates of the size of colonies in earlier years are recorded. About 300-400 nests in 1927 (Parsons, 1928). 1,907 Straw-necked Ibis—presumably of all ages—were counted by Mr. Sutton, Mr. Parsons and others in a lengthy inspection of the colony on 1 December, 1930, after most of the eggs had hatched (Sutton, 1931). 'Many thousands' of adults were reported in the colony on 17 November, 1934, by Mr. Brummitt (Brummitt, 1935), and 'several thousands' of adults in December, 1947, by Dr. Storr (Storr, 1951). Although the size of the colony can fluctuate from year to year, a comparison of early with recent estimates raises the question whether it has tended to increase.

Two other colonies in the South-East—one near Glencoe, in 1970, and one at Mullins Swamp, near Rendelsham, in 1969 and 1970—have been reported by Mr. M. Feddern, Fisheries and Fauna Inspector for the area, and notified to Mr. Waterman by Mr. A. M. Olsen, the Director of the Department. The former colony, which is reported as much larger than the latter, was situated mainly in reeds, but also in tea trees. At Mullins Swamp, on 6 December, 1969, Mr. L. Moore, of the

C.S.I.R.O. Wildlife Division, estimated that there were 200 breeding adults in the colony, and found that there were eggs only, and no chicks. On 14 November, 1970, there were at least 750 pairs (by D. Close's estimate), and the great majority of eggs had hatched. In both years the nests were built on reeds, but not in a dense belt of tea trees growing at the edge of the reed beds.

There have regularly been several colonies in the Lake Alexandrina area. In Narrung Narrows, the species is known to have nested every year since 1962, except 1965, for which we have no certain record. (Breeding in 1962-4 was reported by Mr. G. R. Beruldsen, and in 1969 by Dr. J. M. Bonnin, in personal communications). Here the birds have nested in reed beds. Mr. M. H. Waterman estimates that there have been 2,000+ breeding adults in each of the three years of banding (1966-8). On the southern of the two Prohibited Islands, in Salt Lagoon, there were two mixed colonies of Straw-necked and White Ibis, nesting on trodden-down lignum, in October-December, 1962. The larger colony contained "100 or more nests" (Beruldsen, 1963). On one or both of the islands, Dr. J. M. Bonnin has reported about forty pairs of Straw-necked Ibis on 15 October, 1964, 1,000 or more breeding adults in each of the years 1965, 1966 and 1967, and many on 2 November, 1969, (Bird Reports in *S.A. Orn.*, and pers. comm.). Breeding was again recorded on 29 October, 1970, mainly on the north island, with a few nests on the south island (Mrs. R. G. M. Harvey, pers. comm.). Dr. Bonnin reported the birds, in 1966 and 1967, as using every available area of lignum for nesting (*S.A. Orn.*, 24, 146, and Bird Report). There are at least two other regularly used colonies in Lake Alexandrina—one at Boggy Lake and one on Snake Island—and may well be more (J. Eckert, pers. comm.).

Straw-necked Ibis have also been reliably reported to nest, after heavy rains, on waters in the arid interior of the continent. Dr. G. C. Gregory—formerly in medical practice in the North of the State—knows them to have nested 'in several areas along the Cooper and Diamantina Rivers in 1950 and 1956' (pers. comm.). He observed one colony at a 'semi-permanent water-hole' on Cooper Creek near Durham Downs Station, in south-western Queensland. The birds

nested on flood debris at the base of large lignum clumps.

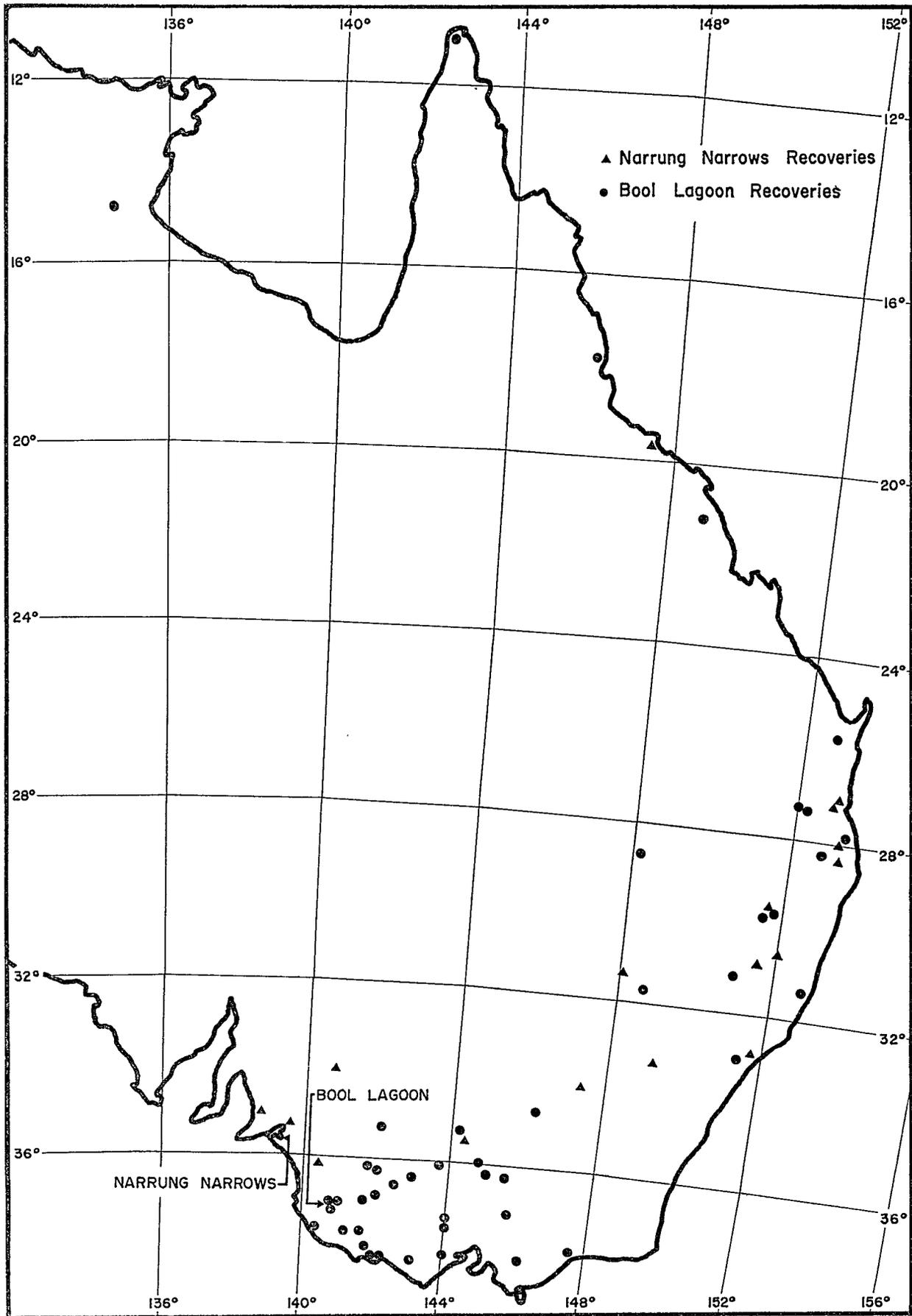
The total egg-laying period in a colony in any one year can continue for some months. Mr. Attiwill has found that 'in good wet years when [Bool] Lagoon fills early, laying commences about mid-August and continues into December.' The egg-laying period can be extended when one section of a colony begins breeding later than another. Banders of ibis have found that the dates of the main egg-laying periods can vary quite considerably (the young are banded between four and eight weeks after the eggs are laid). For example, at Narrung, in 1968, 800 young were banded on 8 December and 300 on 15 December. But in 1970, the young were found to be too old to band on 10 November. Further evidence of such variation, in the case of Mullins Swamp, has been noted above.

BANDING AND RECOVERIES

The banding of the young of Straw-necked Ibis in South Australia has been conducted as part of the Bird-Banding Scheme of the C.S.I.R.O. Wildlife Division. It has been carried out by many voluntary workers under Mr. Waterman's supervision. The project is continuing; and anyone who wants to participate is invited to contact the authors. The places and dates of banding are as follows:— Bool Lagoon, in the six seasons of 1963-5 and 1968-70; Narrung Narrows, in the three seasons of 1966-8; Mullins Swamp, in 1970. The total banded has been 16,631.

Of the 12,333 birds banded before 1970, sixty-three have subsequently been recovered. No recoveries of those banded in 1970 have been reported to date (23 July, 1971), by the Bird-Banding Scheme. The recovery-rate of those banded before 1970 is 0.51%. This rate can be expected to increase as more older birds are recovered. The recovery-rate of all Straw-necked Ibis banded under the Scheme up to 1965 is 0.53%. The Secretary of the Scheme sends a Report to Bander on each recovery, including date and exact location of recovery, and some comment on the circumstances of recovery or death. Of the sixty-three ibis recovered, forty-nine

At right: Recoveries of Straw-necked Ibis banded in Bool Lagoon and Narrung Narrows.



were reported as found dead (in three cases with clear indications as to time of death). Of those found dead, an unknown number may have been shot, three were reported to have been killed by flying into electricity wires (including one which was merely stated to have been found beneath them), and one was found after an exceptionally severe hailstorm. Five birds were found injured or dying, and one was seen near the finder's house for some days before its death. Five were reported as shot. In one case, the band alone was found, and in two cases, there were no comments in the Report to Bander.

MOVEMENTS

Many more recoveries are needed, and some years must elapse, before a final report can be made on the results of banding in South Australia. Therefore the following comments on ibis movements are only of a preliminary nature. They are based on an analysis of the sixty-three recoveries, of which forty-six were banded in Bool Lagoon, and seventeen in Narrung Narrows.

Geographical Distribution of Recoveries.

Some striking facts about the movements of Straw-necked Ibis reared in South Australia are made plain by the recovery map on p. 9. One is the distance that many of them travel: twenty-two birds were recovered between 500 and 1,000 miles away from their natal colony, and seven at still greater distances—which do not take into account the known devious nature of their wanderings. Another is the distribution of the recoveries. As this distribution is largely governed by varying chances of recovery, and by coincidence, one must be careful in drawing conclusions about the true movements of the species. But the following comments are worth making.

There is clearly a strong trend of movement eastwards and north-eastwards. No birds were recovered in Western Australia, and only four were recovered west of their place of banding (one of these being in Northern Territory). This trend seems in accordance with those trends commented on by Dr. R. Carrick (1962) with regard to Straw-necked Ibis banded in colonies in Victoria and New South Wales up to June, 1961. Carrick found that 'a lack of westerly dispersal' from these colonies was suggested by the absence of recoveries

from South Australia. He also noted 'a marked coastal and northward movement' of those banded in the Macquarie Marshes in New South Wales. The lack of recoveries in some areas could be explained by a scarcity, or relative scarcity, of birds. According to Carrick (*op. cit.*, p. 71), this like other species of ibis tends to avoid arid areas, and has not often been recorded in the centre and central south of Australia. Records of the species are scarce in Tasmania and New Guinea (though for one interesting observation in New Guinea in 1957, see K. R. Slater, *Emu*, 58, 256). But for much of the interior of Australia, the absence of recoveries could merely be due to a scarcity of humans. For example, the species can be numerous around swamps in the interior of New South Wales, and around floodwaters in the North-East of South Australia.

Some features of the distribution of recoveries in south-eastern and eastern Australia are also worth noting. The distribution of recoveries from the two colonies differs markedly in south-eastern Australia, in that only one of the Narrung birds—compared with twenty-five from Bool Lagoon—was found south of 36° latitude. So there is a strong possibility that birds from the two colonies tend to disperse in different directions, and by different routes. It also seems significant that only one recovery was made east of 147° longitude in Victoria, and none was made in the adjoining south-eastern corner of New South Wales. In the rest of eastern New South Wales, it can be seen that recoveries from the two colonies are scattered fairly evenly. In Queensland, recoveries were mainly near the coast—a fact which may be due to greater density of human population.

Analysis of Recoveries by Time and Distance.

In the following table, the recoveries are analysed according to the time that elapsed between banding and recorded date of recovery.

		<i>time in months</i>				
0-6	7-12	13-18	19-24	25-36	37-48	
35	14	6	4	1	2	
		49-60	61-72			
		0	1			

The oldest bird was reported as found dead in the north of Cape York Peninsula, 5½ years after being banded. It seems

unlikely to have died long before discovery, as decay and predators would quickly destroy the remains in a semi-tropical area. More recoveries of older birds can still be expected. But it is clear that the mortality among first-year birds is high. It may be worth noting that the two colonies differ in their proportions of first-year recoveries: 87% (forty) of the recoveries from Bool Lagoon occurred within twelve months, compared with 58% (nine) of the recoveries from Narrung.

The relationship between the age of banded birds and the distance that they cover is indicated by the following table. (The time elapsed between banding and recovery is assumed to give an approximate indication of a dead bird's age).

distance in miles	age in months		
	0-6	7-12	13+
0-200	17	5	2
201-500	8	—	2
501+	10	9	10

Thus there is no simple relationship between age and distance. Some birds were found relatively near to their natal colonies after six months, and a few after twelve months. On the other hand, many birds were found at great distances within six months. Star performers were birds from Bool Lagoon which were recovered, respectively, 720 miles away in just over six weeks after banding, 865 miles away in under ten weeks, and 1,075 miles away in under fifteen weeks. The real distances that they had travelled would undoubtedly be much greater. Nevertheless, there is a clear tendency for older birds to be found further away. (This conclusion still holds good if one omits the young that were possibly weak, by subtracting the four birds under three months old that were recovered within fifty miles). It seems, then, that the majority of birds recovered had gradually increased their distance from their natal colonies. This conclusion differs from that of Dr. Carrick (*op. cit.*, p. 80), who found no connection between age and distance in forty-one Straw-necked Ibis recovered from banding-sites in Western Australia, Victoria and New South Wales. A notable feature in the above table is that of the fourteen recoveries that were made over a year after banding, only four were within 500 miles of the colony of origin. This indicates that the species is extremely

mobile, even—as is the case with Bool Lagoon and Narrung Narrows—when its natal colony fairly regularly provides suitable breeding conditions.

No seasonal pattern of movement is revealed by analysis of the recoveries. In view of what is known about the nomadic character of the species' movements, this is not, perhaps, to be expected. The only pattern that emerges is that recoveries in Queensland tend to be later in the year than those in Victoria and New South Wales. But this could be explained by the time/distance ratio discussed above.

ACKNOWLEDGEMENTS

As can be seen from the references above, we are indebted to several people for facts about the breeding colonies, including Mr. Macrow, and also Mr. Attiwill for commenting on the section on breeding in the article. Many people apart from the authors have participated in banding. Although it is difficult to select certain names for mention, special acknowledgement should perhaps be made to John Cowled, Wayne Dodd, Noel Faint, John Jenkins, Keith and Roy Masson, and members of the South Australian Field and Game Association. Members of the Fisheries and Fauna Conservation Department have given important assistance.

REFERENCES CITED

- Bird Reports, *South Aust. Orn.*, 24, 26, 59; 25, 75.
 Beruldsen, G. R. (1963), *Emu*, 63, 228.
 Bonnin, J. M. (1967), *S.A. Orn.*, 24, 146.
 Brummitt, D. W. (1935), *ibid.*, 13, 50.
 Carrick, R. (1962), Breeding, Movements and Conservation of Ibises (Threskiornithidae) in Australia, *CSIRO Wildlife Research*, 7 (1); 71-88.
 Parsons, F. E. (1928), *S.A. Orn.*, 9, 192.
 Slater, K. R. (1958), *Emu*, 58, 256.
 Storr, G. (1951), *S.A. Orn.*, 20, 6-8.
 Sutton, J. (1931), *ibid.*, 11, 76, 82.