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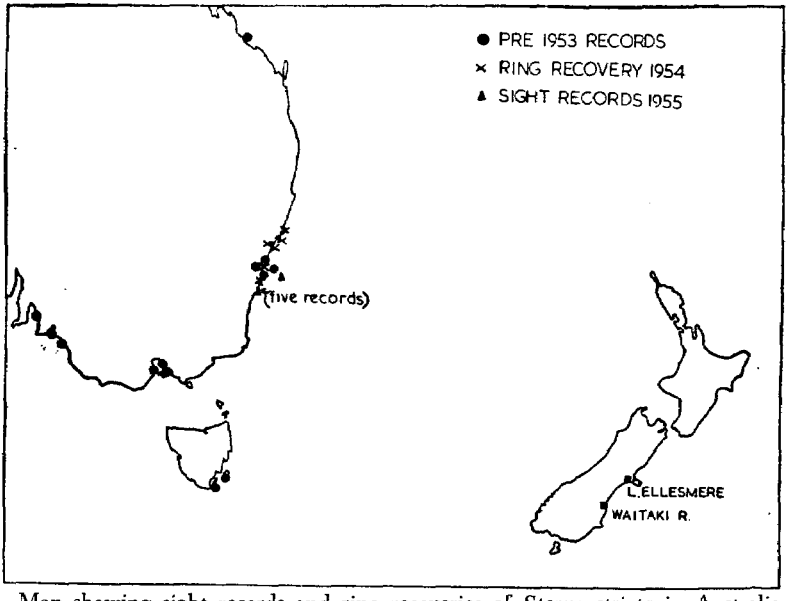
THE TRANS-TASMAN DISPERSAL OF THE WHITE-FRONTED TERN (*Sterna striata*, Gm.)

By W. C. CLARK and E. W. DAWSON

Zoology Department, Canterbury University College, Christchurch

It has long been suspected that the White-fronted Tern (*Sterna striata*, Gmelin), which is common on New Zealand coasts and on the outlying islands, migrated to Australia in the winter months. This hypothesis has been well supported circumstantially by Hindwood (1946), and by Hitchcock and Favaloro (1951). Hindwood summarised all previous records of this species in Australia and gave an account of his observations of these birds on Long Reef, Sydney. He gave dates for the first and last of them seen in the 1941 and 1942 seasons, and these were: first records, 25 May 1941 and 3 May 1942; last records, 22 November 1941 and 29 November 1942 (at Cronulla, N.S.W.). He also threw considerable doubt on the supposed breeding of *Sterna striata* on islands in Bass Strait and off other parts of the coast of Tasmania.

Hitchcock and Favaloro recorded observations of three birds present at Williamstown, near Melbourne, Victoria, from 11 July to 4 September 1948, and gave details of a specimen taken.



Map showing sight records and ring recoveries of *Sterna striata* in Australia. The New Zealand ringing stations mentioned in the text are also shown.

To obtain definite data on the movements of White-fronted Terns the species was placed on the ringing list of the Ornithological Society of New Zealand. Small numbers of birds were ringed by various workers during the early years of the ringing scheme, but until 1954 none had been recovered at any distance in excess of 100 miles from the place of ringing. Early in 1954 we ringed 447 White-fronted Tern chicks in a colony at Lake Ellesmere, South Island. Two of these ringed chicks were later recovered dead on the breeding ground. During the following winter six rings were recovered from the New South Wales coast. Details of these are as follows:

7184, ringed 3/1/54: Bird flew on board s.s. *Waipori*, 14/5/54, when ship was near Port Stephens, N.S.W. Bird died the next day; reported by G. R. Finn.

20803, ringed 3/1/54: Caught in hand by fisherman four miles east of Swansea, Lake Macquarie, about 2/6/54. Ring returned by W. Wilson, who also reported, 'Others in vicinity. Birds appear quite tame and can easily be taken by hand. Appear in good condition.'

20789, ringed 3/1/54: Found dead at Bulgo Beach, about 30 miles south of Sydney, on 26/6/54 by R. C. Butt.

20815, ringed 3/1/54: Found in poor condition with both legs broken at 'local beach', Randwick, Sydney, on 28/6/54 by N. Bond. The bird was destroyed.

20735, ringed 3/1/54: Caught on a fishing line at Stockton, N.S.W., on 1/7/54 by R. S. Willis. The ring was removed and the bird released in a healthy condition.

20885, ringed 3/1/54: Found as a corpse on a farm at Tumbi Umbi, on the south side of Tuggerah Lake, about five miles inland and 40 miles north of Sydney, about 23/8/54 by R. Smithers.

1955 Operations

Breeding at the Lake Ellesmere colony was unsuccessful during the 1954-55 season, but 301 chicks were ringed at the Waitaki River mouth, about 100 miles further south. On this occasion 100 birds were ringed with yellow plastic rings as well as with the numbered aluminium rings.

There were no recoveries of ringed White-fronted Terns from Australia during the winter of 1955, but the following sight records, abridged from letters of K. A. Hindwood and D. Gibson, are of considerable interest.

18/9/55: Tom Thumb Lagoon, near Port Kembla (50 miles south of Sydney), one banded *S. striata* amongst *c.* 60 others resting on the sand. From observer's description the bird was in immature plumage. Ring on left leg. Observer, D. Gibson.

24/9/55: Tom Thumb Lagoon. Another banded *S. striata*, ring on right leg, seen in same circumstances as previously. Observer, D. Gibson.

24/9/55: One banded bird seen resting with about 25 others on outer rocks at Boat Harbour, 10 miles south of Sydney. More birds were seen later in the day three miles north of Cronulla. Observers, E. S. Hoskin, L. Haines and K. A. Hindwood.

3/10/55: Tom Thumb Lagoon. Two banded birds seen together, each with aluminium band on right leg. Observer, A. Sefton.

17/10/55: Same locality. About 60 *S. striata* present. One bird with a ring on each leg, buffy-white (yellow?) band on left, aluminium coloured band on right. Observers, G. Waters, A. Sefton, D. Gibson.

It is interesting to note that in all cases the birds involved were juveniles. After the last observation Mr Gibson noted: 'Even from a fairly close viewpoint both bands were not always visible, depending on lighting and position. In view of this, some of our earlier records of birds with one band could possibly have had two.'

Mr Gibson also mentioned that he has seen a flock of 500 White-fronted Terns on sand flats at the entrance to Lake Illawarra, four miles south of Port Kembla, and that in the past twelve months he has found seven derelict White-fronted Terns on local beaches (all unringed).

On 10 August 1955 one of us (E.W.D.) saw a small party (c. 10-12) of White-fronted Terns fishing well off the coast near Cronulla, N.S.W., and other groups of small terns were seen in the distance.

New Zealand Sight Records and Recoveries

Sight records and recoveries within New Zealand of terns ringed by us have been remarkably few. On 12 November 1955 one of us (W.C.C.) saw a juvenile bird with yellow and aluminium rings in a flock of 48 adult birds at Taumutu, Lake Ellesmere. On 27 November 1955, also at Taumutu, W.C.C. saw a bird with an aluminium ring standing amongst a flock of 64 other terns. This bird was in practically mature plumage except for four or five tiny white flecks in the dark cap.

The only recoveries have been of four birds ringed as chicks at the Waitaki River mouth on 15 January 1955, and are as follows: 6868, trodden on, Waitaki mouth, 3/2/55, M. Tonkin; 6857, found wounded, released when recovered, Oamaru, 26/2/55, G. D. Sutherland; 6887, caught on fishing boat, Moeraki coast, Otago, 28/2/55, S. J. Dodd; 24798, found dead at North Spit, Dunedin, about 23/3/56, J. M. Flannery.

Discussion

These six recoveries (1954) and six sight records of ringed birds (1955) in Australia comprise the first definite evidence to support the theory that White-fronted Terns wintering on the coasts of New South Wales and Victoria are birds of New Zealand origin. The twelve records of ringed birds in Australia all occur along a relatively short stretch of coastline (about 100 miles). When this distribution is compared with previous records of the species in Australia it is seen that it is possible that the birds are not normally restricted to the coast near Sydney. Indeed, it may be that the map records the distribution of observers more accurately than the distribution of terns.

As stated earlier, the White-fronted Tern is widespread and abundant in New Zealand, and, although nesting is notoriously erratic, when it is successful large numbers of young are reared in the colonies. The 1954 Lake Ellesmere colony was estimated at 1500 pairs of breeding birds, and the 1955 colony at the Waitaki River at about 5000 pairs. E. F. Stead (1932) discussed breeding activities in a colony in the Rakaia River, a few miles south of Lake Ellesmere, estimated as containing about 35,000 birds in 1903. Other colonies in various favourable localities may contain many thousands of breeding birds similarly. The usual clutch appears to be one, and often two, which means that a very great number of chicks may be reared in good years, but reports from Australia to date do not indicate adequately large populations to account for all the birds of the year, even assuming a 50 per cent mortality. As the birds reported from Australia are predominantly juveniles, we believe, at the moment, that the normal dispersal of White-fronted Terns to Australia consists, like that of the Gannet (Stein and Wodzicki, 1955), of a small proportion of the birds of the year.

The recovery reports contain interesting notes on behaviour of the birds in Australia. Bird 20803 ' caught in hand ' and the ' birds appear quite tame and can easily be taken . . .' D. Gibson said, in a letter, ' I find they are invariably easy to approach, standing their ground long after Crested and Little Terns have flown.' K. A. Hindwood was able to approach close enough to see the join in the ring. This is far from typical of their behaviour in New Zealand, where they rise suddenly in flocks if approached very closely other than at nesting time.

It is striking that, while up to 31 March 1955, 1843 White-fronted Terns had been ringed in New Zealand, the only ringed birds seen in Australia

have been from the Waitaki River and Lake Ellesmere. Since we were the only operators on this species in 1955 and all the sight records for the following winter concern juvenile birds it may be assumed at present that these were all birds from the Waitaki River. However, it is too early to say if any special significance is to be attached to this.

Similarly, it is too early to speculate very far as to the actual routes of migration, particularly since counts of gatherings of birds in coastal regions are not always truly indicative of seasonal movements. For example, Fleming (1940), in an endeavour to follow up the suggestion that White-fronted Terns are absent from the Chatham Islands from March to August (Fleming, 1939), made counts of coastal flocks in the Auckland district in the winters of 1939 and 1940. The numbers of birds present showed '. . . little evidence for migration away from coasts, but indication of more pelagic habits, possibly resting ashore at night.' He concluded that: 'Variation in numbers present on beach seems somewhat dependent on weather conditions.' Wodzicki (1946) presented tables and graphs showing occurrences of White-fronted Terns on the estuary at Waikanae, Wellington west coast, for 1941-42 and 1942-43, and he suggested that these indicate that '. . . while almost completely absent at the end of the winter and during the nesting period, large numbers, including many immature birds, were seen in summer and later in autumn. . . The explanation of their almost complete disappearance in winter cannot be determined without more observations from other parts. . .' Wodzicki later mentioned that '. . . it seems likely that a large number of species such as the Banded Dotterel . . . and possibly the Whitefronted . . . Terns migrate regularly every year towards the northern districts of the North Island, whilst some of the birds stay behind or their place is taken by arrivals from the South Island. . .' Sibson (1951) and Falla (1953) have given concise summaries of the known facts about trans-Tasman bird movements, and it appears that the traffic is much greater, as far as numbers of species are concerned, from Australia to New Zealand, as Falla (1955) has pointed out: 'In the New Zealand region today the nearest large land masses lie to the north and west and that is the direction in which a good deal of strong and regular air movement has its origin.' However, the movements of Gannets, Banded Dotterel and White-fronted Terns (probably also Fluttering and Hutton's Shearwaters) show that reverse traffic does regularly occur and may exceed, in numbers of individuals, the traffic of various species straggling to the western coasts of New Zealand. Falla has remarked upon the movements of these three species that: 'It may well be . . . a drift dispersal of immature birds, for the time of the year is the only period at which a south-east or easterly component is regularly dominant in the winds in the area between northern New Zealand and New South Wales.' However, a study of synoptic weather charts for the Tasman Sea over this period, kindly made available by Dr J. F. Gabites, N.Z. Meteorological Service, does not give any evidence of any regular seasonal conditions, particularly for South Island birds, which might be expected to assist such reverse traffic. Stein and Wodzicki (1955) show a possible dispersal route from New Zealand for juvenile Gannets, but we think that those White-fronted Terns which find their way to Australia from colonies in the South Island do not necessarily do so by moving to the North Auckland region first, but perhaps rather by following the coast round either north to Cook Strait (*cf.* movements of Hutton's Shearwater) or south to Foveaux Strait.

Further information leading to the elucidation of the movements of the White-fronted Tern both to and from Australia and within New Zealand would be welcomed, and the following ways, as well as those 'desiderata' given by Stidolph and Fleming (1941) for the Banded Dotterel, are suggested by which this might be achieved: (1) seasonal counts, particularly in relation to weather conditions, similar to those of Fleming (1940) or Wodzicki (1946), at estuaries or other Tern haunts, as well as observations in breeding colonies; 2) random observations in coastal or off-shore regions, the equivalent of road-counts for terrestrial birds (*cf.* Dawson, 1950); (3) trans-Tasman bird-logs

from passengers or crew of ships traversing this region, which may yield valuable information about bird movements in a relatively little known sea; (4) records of apparent departures and arrivals of flocks at breeding colonies, and on coastal sites in April-May and October-November, and finally (5) the prospect of more extensive observtaions on the Australian coast beyond the Sydney area to see whether the recoveries are an indication of distribution of observers or of birds.

We wish to acknowledge the assistance of those who returned rings, of the Sydney newspapers who gave the work the necessary publicity, and of Mr K. A. Hindwood, of Sydney, and Mr D. Gibson, of Thirroul, N.S.W., who supplied observations and answered many queries; we are especially grateful to the Council of the Royal Society of New Zealand for a grant enabling this work to be carried out.

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A BRIEF SUMMARY OF TAKAHE RESEARCH FOR THE 1955-56 SEASON

By G. R. WILLIAMS and K. H. MIERS

Wildlife Division

There were two periods of study: 5-24 November, when the party consisted of K. H. Miers and G. R. Williams; and 3-15 February, when the party was made up by Professor G. T. Baylis, Mr P. Dorizac (Lands Department Ranger), and G. R. Williams. The general object of the parties was to continue the plan of work already outlined last year (see Kennedy, *this journal* 6: 164-166, 1955) and, in particular, to carry on observations that might throw light on the factors affecting the degree of success of breeding seasons. On the suggestion of the Fauna Protection Council (Takahe Committee) Professor Baylis was invited to make a survey of the vegetation of the area so that a general account might be prepared which would have great value in (among other things) following changes in the plant covering of the main colonies and in assessing the likely value of other localities for takahe intro-