

SHORT NOTE

Colony size and dispersal of white-fronted terns (*Sterna striata*) banded at Kaikōura Peninsula, New Zealand, 1959–1971 and 1999–2016

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White-fronted terns (*Sterna striata*) are widely found around the coasts of New Zealand (Higgins & Davies 1996; Heather & Robertson 2005; Mills 2013) including the Kaikōura Peninsula (42.428°S, 173.710°E) (Mills & Shaw 1980). They are considered “Near-threatened” by BirdLife International (2023) and are listed as “At risk: declining” under the New Zealand Threat Classification System (Robertson *et al.* 2021). White-fronted terns have been banded in New Zealand from at least 1945 (Cunningham 1951). Summaries of banding activities in New Zealand from 1951 onwards show that Brian Bell probably banded the first white-fronted terns in the north-east South Island, 359 at the Kaikōura Peninsula in 1958–1959 (Kinsky 1959). Banding continued from 1959–1960 when birds were banded by Brian Bell (111 birds), L.K. Clark (100 birds) and Ken Rowe (369 birds) (Kinsky 1960).

This note reports observations on white-fronted terns banded under permits held by Ken Rowe in 1959–1971 and son Lindsay Rowe in 1999–2016.

The main study area was a 1 km stretch of coastline between First Point and Whalers Bay at the Kaikōura Peninsula, centred on 42.428°S, 173.710°E. From 1959 to 1971, parties led by Ken Rowe made visits to Kaikōura Peninsula to band red-billed gull (*Chroicocephalus novaehollandiae scopulinus*) chicks over one weekend from 23 November to 16 December with extra visits in January 1959 and 1962 (Rowe submitted 2024). Banding white-fronted tern (*Sterna striata*) chicks was ancillary to banding the gulls. In 1999, when the author became a resident of Kaikōura, visits to the colonies were generally two to 10 days apart from October to February, but with some longer intervals.

Chicks were banded once they were big enough to retain the bands. Aluminium butt closure bands (4.5 mm internal diameter) were used until 1962, harder wearing monel bands through to 1963, and stainless steel bands thereafter.

Table 1. Number of white-fronted tern chicks banded at Kaikōura Peninsula from 1959 to 1971. nv denotes no visit.

Season	November or December visit	January visit	Total
1959–60	360	9	369
1960–61	101		101
1961–62	300		300
1962–63	259	154	413
1963–64	31		31
1964–65	15		15
1965–66	0		0
1966–67	8		8
1967–68	nv		nv
1968–69	0		0
1969–70	nv		nv
1970–71	0		0
1971–72	100		100
Total	1174	163	1337
Seasons	11		11
Average	107		122
SD	135		160
95% CL	±80		±94

Dispersal/resighting data used are from slips sent by the precursors to, and the Department of Conservation (DOC) Banding Office to Ken Rowe or the author that have not been lost through many household shifts, or from files sent to the author from DOC. Resightings include both live and dead birds.

From 1959–1971, 1,337 white-fronted tern chicks were banded at Kaikōura (Table 1). During this period there was a wide range in the number of chicks banded per year, from zero to 360 per visit in November/December, with an average of 121 chicks/year. While these figures will be less than the total numbers of chicks that fledged each year, the 1-day snapshot gives an indication of the variability of breeding at this site. A more definitive set of annual totals was gained during 1999–2016 when visits were made almost weekly throughout the season and an effort was made to band all chicks. During this period, 3,927 chicks were banded (0–952 chicks/season, averaging 218; Table 2, Fig. 1). There were four seasons (2010, 2012, 2013 and 2015) when no colony established despite birds roosting at the site pre-season; in 2014 none of the 10 eggs seen hatched.

This variation in numbers from year to year is not unusual as white-fronted terns have been noted as being intermittent or capricious in their breeding at a site, often breeding at a site for a few years and then breeding elsewhere before returning (Higgins & Davies 1996; Heather & Robertson 2005; Mills & Shaw 1980; Mills 2013). Adult Kaikōura-bred white-fronted terns were preyed on at a colony at the Clarence River mouth (33 km N of Kaikōura) in 2015 (LKR *unpubl. data*). At that time there was no active colony at Kaikōura Peninsula and it is likely that the Clarence River colony consisted of birds that would otherwise have bred at Kaikōura Peninsula. Another example of intermittent site selection was a bird banded as a nestling at Kaikōura Peninsula in 1961 that bred at the Clarence River colony four years later and was back at Kaikōura at ages 10 and

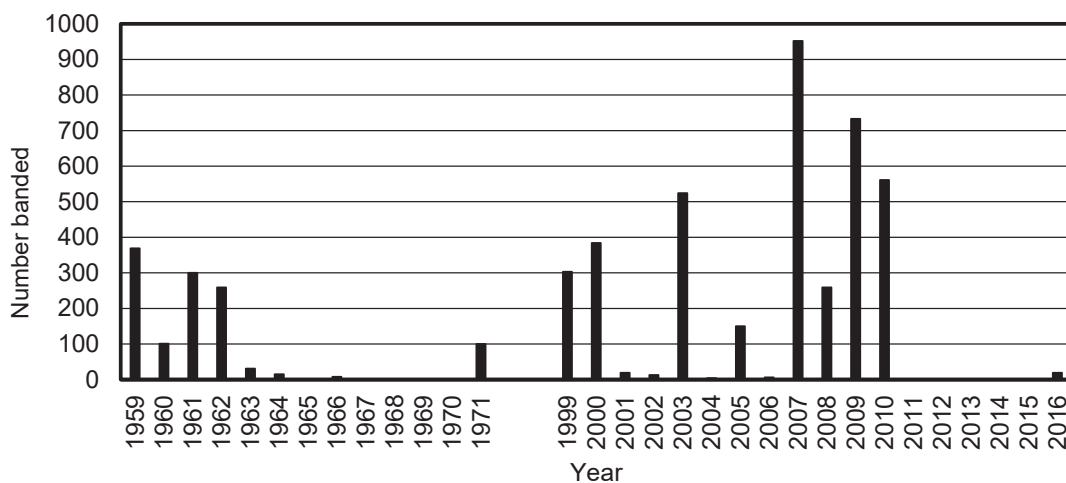
**Figure 1.** Annual numbers of white-fronted tern chicks banded at Kaikōura Peninsula. 1959–1971 were numbers banded over one weekend in November or December; 1999–2016 were season totals. There were no visits in 1967 and 1969, no colonies were present in 2010, 2012, 2013 and 2015, and no chicks hatched in 2014.

Table 2. Number of white-fronted terns chicks banded at Kaikōura Peninsula from 1999 to 2017.

Season	First egg seen	First chick seen	Last chick	Chicks banded
1999-2000	29 November	19 December	20 January	303
2000-2001	16 November	2 December	22 January	384
2001-2002	10 November	10 December	15 December	19
2002-2003	3 November	26 November	29 January	13
2003-2004	26 October	16 November	14 February	524
2004-2005	Missed	26 December	16 January	4
2005-2006	24 October	26 November	8 January	150
2006-2007	5 November	6 December	13 December	6
2007-2008	23 October	8 November	11 January	952
2008-2009	13 October	23 November	31 December	229
2009-2010	3 November	19 November	9 January	733
2010-2011	–	–	–	0
2011-2012	13 November	13 December	17 January	561
2012-2013	–	–	–	0
2013-2014	–	–	–	0
2014-2015	25 November	–	–	0
2015-2016	–	–	–	0
2016-2017	22 November	9 January	16 January	19
Total	–	–	–	3927
Seasons	13	13	13	18
Minimum	13 October	8 November	13 December	0
Average	6 November	4 December	12 January	218
Maximum	29 November	9 January	14 February	962
SD (days)	14	17	17	298
95% CL (days)	8	9	9	±138

16 years (Mills & Shaw 1980). Mills & Shaw also reported birds from colonies at the Clarence River, Ure River (65 km north), Lake Grassmere (86 km north) and Wairau River mouth (104 km north) bred at Kaikōura Peninsula.

Dates of colony establishment also varied on an annual basis. Over the period 1999–2016, eggs were first seen from 13 October to 29 November (range 47 days), chicks were first banded from 8 November to 9 January (range 62 days), and the last chicks were banded on 13 December to 14 February (range 63 days) (Table 2). The variability in breeding between seasons is shown by curves of accumulated banding throughout the seasons (Fig. 2) and reveal that laying by white-fronted terns is not always as highly synchronised as suggested by Mills & Shaw (1980) as it can take 18 to 30 days to band the majority of chicks.

Three Kaikōura Peninsula banded juvenile white-fronted terns were found dead in Australia: D-192398 at Somerton Park, South Australia, 2,302

km, 9 months 25 days after banding; D-115371 at Pittwater Beach, New South Wales, 2,187 km, 10 months 27 days; and D-9756 at Montague Island, New South Wales, 2,137 km 12 months 16 days. Hindwood (1946) speculated that a small proportion of New Zealand white-fronted terns (mainly juveniles) migrated to south-east Australia. This was subsequently confirmed by New Zealand banding studies (e.g. Clark & Dawson 1957; Kinsky 1963; Robertson 1964), and the records reported here.

In the DOC banding database, location coordinates were rounded down to 10' (e.g. 42°25' S, 173°42'E was coded as 422S 1734E) which leads to an inherent distance error up to ± 23 km. Of the 430 resightings (live or dead), 304 were less than 10 km NNW of the banding site, and so most were likely found on the colony; only two could be confirmed as off the colony and these were less than 5 km away.

There were 128 sightings over 50 days after banding and for 75 of them the calculated distances suggest that they were resighted on the

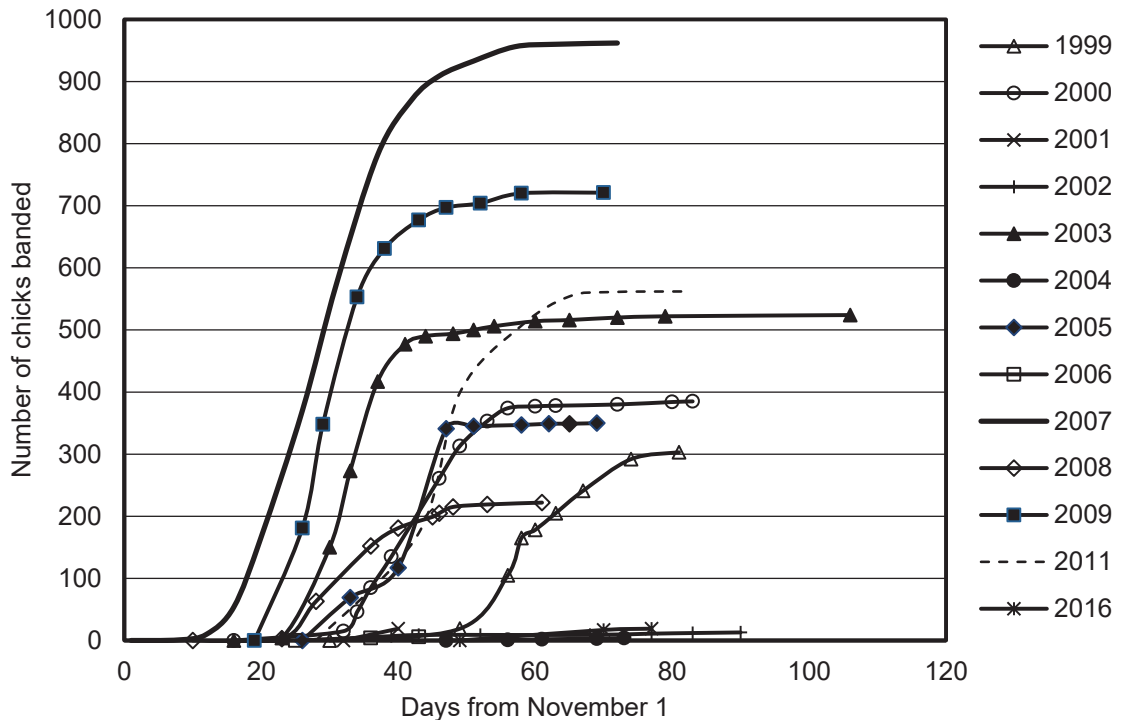


Figure 2. Timing of colony growth of white-fronted terns at Kaikōura Peninsula as shown by the accumulated number of birds banded. No colonies were present in 2010, 2012, 2013 and 2015, and no chicks hatched in 2014.

colony. Another 35 were noted 30–35 km NNE of the banding site, likely all at the Clarence River, where 24 had eggs or chicks on 12 December 1965. A bird banded at the Pinnacle Rock (13 km WSW of Kaikōura Peninsula; 46 km SSW of Clarence River) was also seen there on eggs on that date. As no chicks were banded at Kaikōura Peninsula or Pinnacle Rock that season, the colony may have moved to the Clarence River.

Excluding the three band recoveries in Australia, 15 birds (including one from Pinnacle Rock) were found >40 km from Kaikōura Peninsula: three to the south, and 12 to the north of which seven were in the North Island. The furthest north was at Waihi, 593 km from Kaikōura Peninsula and the only bird sighted on the North Island east coast. In the South Island, birds were sighted between Picton (130 km N of Kaikōura Peninsula) and Moeraki Beach (400 km S). The Waihi recovery greatly exceeds the previous within-New Zealand recovery distance for a banded white-fronted tern (305 km; Robertson 1964).

The oldest recovery was a dead bird, D-12952, picked on a beach at the Kaikōura Peninsula 25.1 years after banding. The next oldest was D-12906 killed by a stoat at 24.0 years-old, followed by eight at 17.0 years and four at 16.0 years. Mills & Shaw (1980) reported recoveries at Kaikōura Peninsula

aged 18 years. Only Heather & Robertson (2005) have reported a longer-lived bird, a banded bird that lived over 26 years. Two other long-lived recoveries were reported by Robertson (1972 & 1974) at 17.1 and 21.1 years respectively.

Juvenile birds from Kaikōura Peninsula were recovered at Wairau River 105 km N at 53 days after banding, Manawatu estuary 250 km N at 86 days, and Oamaru 370 km S after 59 days, indicating dispersal at a young age.

Data reported in this paper supports previous findings referring to: the intermittent nature of white-fronted tern colonies at a given site; the movement of birds between colonies; the variability of the onset of nesting; extends the longest within-New Zealand distance at which a bird has been recovered away from its natal area to 593 km; and gives examples of long-lived birds, up to 25.1 years.

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