

## SHORT NOTE

Single season colony records of black-fronted terns (*Chlidonias albostratus*) spanning their entire breeding range

ANN-KATHRIN V. SCHLESSELMANN

JAMIE COOPER

Department of Zoology, PO Box 56, University of Otago, Dunedin 9054, New Zealand

RICHARD F. MALONEY

Science and Capability Group, Department of Conservation, Private Bag 4715, Christchurch Mail Centre, Christchurch 8140, New Zealand

Black-fronted terns / tarapirohe (*Chlidonias albostratus*) are braided river specialists, which are endemic to New Zealand (Higgins & Davies 1996). They breed in the braided riverbeds of the South Island from as early as September through to January, and migrate to the coast of all three main islands for the remainder of the year (Lalas 1979; Higgins & Davies 1996). Breeding occurs in loose colonies ranging from a few pairs to over 400 nests on shingle bars or islands in the riverbeds (Keedwell 2005; Department of Conservation (DOC) *unpubl. data*). The incubation period is ~25 days with chicks leaving the nest after a few days and fully fledging after 30 days (Lalas 1977; Keedwell 2005). Overall hatching and fledging success is low and highly variable among individual colonies (Keedwell 2005; Cruz *et al.* 2013).

The main threats to black-fronted terns are predation, as well as on-going habitat degradation and loss (Maloney *et al.* 1999; Keedwell *et al.* 2002;

Sanders & Maloney 2002; Keedwell 2005; Duncan *et al.* 2010; Steffens *et al.* 2012, O'Donnell *et al. in press*). A recent meta-analysis of trends in breeding populations of black-fronted terns predicted a decline of about 50% over the next 30 years with more severe reductions of around 90% on rivers with relatively low mean flows (< 30 m<sup>3</sup>s<sup>-1</sup>; O'Donnell & Hoare 2011). Currently black-fronted terns are nationally and internationally classified as 'Endangered' (BirdLife International 2012; Robertson *et al.* 2013). This classification is based on rapid and ongoing population reduction at some wintering and breeding sites due to recruitment failure, the small overall population size and the sparse nature of colonies across their distribution (BirdLife International 2012; Robertson *et al.* 2013). The most recent total population estimates are variable and range from 6,000 to 10,000 individuals (Keedwell 2002; O'Donnell & Hoare 2011).

Information on black-fronted tern populations comes mostly from walk-through counts along braided river beds. However, not much information is published on the distribution and size of breeding

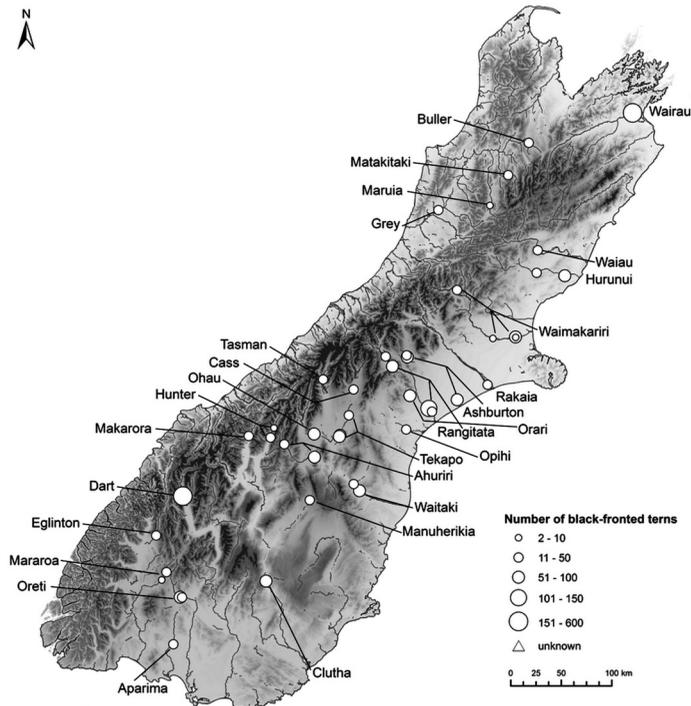


Fig. 1. Location and size of black-fronted tern (*Chlidonias albostratus*) breeding colonies in the 2014 season (Oct 2014 – Jan 2015).

colonies on a nation-wide scale. In walk-through counts, only a few rivers are surveyed each year due to the challenging environment and need for skilled observers (O'Donnell & Hoare 2011; DOC *unpubl. data*). Overall there are reports of black-fronted terns from 61 rivers in the South Island, with major populations (> 200 birds) on only 13 rivers in most recent counts covering the period from 1988 to 2008 (O'Donnell & Hoare 2011). These rivers are the Ahuriri, Aparima, Hurunui, Mararoa, Upper Ohau, Oreti, Rakaia, Rangitata, Tekapo, Waiau (Canterbury), Waimakariri, Wairau, and Waitaki (O'Donnell & Hoare 2011). Fidelity to breeding sites and rivers is not thoroughly understood and some locations are only used once, others intermittently, and some are used each year (Higgins & Davies 1996; Keedwell 2005).

We searched 28 rivers spanning the entire known breeding range, including those with records of previous major populations for black-fronted tern colonies, as part of a genetic study. Observations of the location and size of these colonies made during a single breeding season spanning their entire known

breeding range are reported here, with the aim of providing baseline information for future surveys and research into black-fronted tern colonies.

We searched for breeding colonies during the period from 9 October 2014 to 7 January 2015. A colony was considered to be one or more pairs within a 1 km stretch of river with clearly discernible nest scrapes, eggs, and/or chicks present. These were located by searching river stretches on foot targeting areas of past colony records (DOC *unpubl. data*) and by following feeding birds back to colony locations using binoculars from a distance. Colonies were very conspicuous when a section of river was searched. The size of each colony was estimated by counting flying birds. Searches within rivers were generally abandoned once a colony was detected as the main aim was to confirm the presence of breeding on a river. Thus, this paper reports only on the minimum number of colonies per river.

We located a total of 44 colonies with nest scrapes, eggs, and/or chicks present in the 28 rivers that we searched (Fig. 1). We assumed that breeding attempts occurred in the Dart River on

an inaccessible island we could see from an island nearby and based on the behaviour of adult terns vigorously dive-bombing Southern black-backed gulls (*Larus dominicanus*). In addition, while a colony location was not found in the Upper Rakaia River, we observed fledglings on an adjacent farm paddock and therefore assumed successful raising of fledglings occurred on that river (see Appendix 1 for further details). Colonies were found throughout the South Island spanning from 46°S to 41°S in latitude and from 26 m to 610 m in altitude above sea level. The most remarkable discovery was a colony in the Grey River, only 25 km from the ocean on the West Coast. No previous breeding record of black-fronted terns existed from this site and so far west from the main divide (Higgins & Davies 1996; O'Donnell & Hoare 2011).

Colony size varied from a single breeding pair up to 300 pairs, with the mean size being 61 ( $\pm 15$  se; median = 40) pairs per colony. We found the largest colonies in the Upper Ohau (600 individuals), Wairau (200 individuals), lower Rangitata (150 individuals), Clutha (100 individuals), Tekapo (100 individuals) and lower Waitaki (100 individuals). The largest number of fledglings (35 individuals in one colony and 20 roosting further upstream) was also observed in the Waitaki River; although this might reflect the timing of visits as many other colonies were surveyed earlier in the breeding season.

Previous reports of black-fronted tern populations have also shown strongholds in Canterbury and Marlborough (Oliver 1955; Lalas 1979; O'Donnell & Hoare 2011), which is also where the majority of braided rivers are located (Caruso 2006). Based on the classification used by O'Donnell & Hoare (2011), all of the rivers in which we observed the larger colonies have high mean flows ( $\geq 100 \text{ m}^3\text{s}^{-1}$ ), apart from the Upper Ohau colony. However, in the case of the Upper Ohau, this area is subject to intensive predator control (Anderson 2013a, 2013b, 2014). Overall, we observed 2,612 breeding black-fronted terns in the subsample of known tern breeding rivers that we surveyed.

The timing for finding colonies is crucial as colony size can fluctuate quite rapidly (Keedwell 2005). When we re-visited some colony locations, we observed either drastic declines or total failure in the span of 14 days due to predation and/or disturbance. If those colonies had been found at a later stage, they would have provided different estimates of numbers. In other cases, we were not able to search a river until late in the breeding season (mid-December) due to logistical constraints and adverse weather. In the upper Rakaia River, for example, we observed 14 adult birds with six fledglings feeding in adjacent farmland, but it was not possible to determine the original location

and size of that breeding colony (Appendix 1). Monitoring of tern colonies in the Ohau river has also shown how the number of adult terns in colonies fluctuates between weekly counts (Keedwell 2005; Anderson 2013a, 2013b, 2014).

It is not well understood in which way black-fronted tern individuals and/or entire colonies move within and between catchments within the same year. There is a possibility that some colonies counted later in the season contained birds that we may have recorded earlier in the breeding season in a nearby catchment. However, we caught and banded a total of 417 adult terns (20%) during our visits and did not recapture any of these birds in other rivers later in the season.

In conclusion, this paper reports the first breeding record of black-fronted terns far west of the Main Divide and provides insights into the distribution and sizes of breeding colonies within a single breeding season. The surveys provide contemporary data to compare with historical counts and a baseline for future research into colony locations and size.

#### ACKNOWLEDGEMENTS

The authors thank Mike Bell, Simone Cleland, Phil Guildford and Claudia Mischler who assisted with fieldwork and shared information on colonies. Further we thank Helen Clark, Jacob Dexter, Hannah Edmonds, Florence Gaud, Ray Molloy, Colin O'Donnell, Kate Steffens, PC Taylor and Keri Uren for providing information on past breeding colonies. We are also grateful for Colin O'Donnell and two anonymous reviewers who provided valuable comments on earlier versions of this manuscript. The research was undertaken in consultation with Te Runanga o Ngāi Tahu and was funded by the Department of Conservation and the University of Otago.

#### LITERATURE CITED

- Anderson, S.J. 2013a. *Upper Ōhau black-fronted tern predator-control project: operational report July 2009 – February 2011. Project River Recovery Report 2010/03*. Twizel, Department of Conservation.
- Anderson, S.J. 2013b. *Upper Ōhau black-fronted tern predator-control project: operational report March 2011 – February 2012. Project River Recovery Report 2011/02*. Twizel, Department of Conservation.
- Anderson, S.J. 2014. *Upper Ōhau black-fronted tern predator-control project: operational report March 2012 – February 2013. Project River Recovery Report 2012/02*. Twizel, Department of Conservation.
- BirdLife International 2012. *Chlidonias albobristatus*. The IUCN Red List of Threatened Species 2012. www.iucnredlist.org. Downloaded on 22 July 2016.
- Caruso, B.S. 2006. Project River Recovery: Restoration of braided gravel-bed river habitat in new Zealand's high country. *Environmental Management* 37: 840-861.
- Cruz, J.; Pech, R.P.; Seddon, P.J.; Cleland, S.; Nelson, D.; Sanders, M.D.; Maloney, R.F. 2013. Species-specific responses by ground-nesting predators and river

- flows in the braided Tasman River of New Zealand. *Biological Conservation* 167: 363-370.
- Duncan, M.J.; Hughey, K.F.D.; Cochrane, C.H.; Bind, J. 2010. River modelling to better manage mammalian predator access to islands in braided rivers. *BHS 10<sup>th</sup> National Hydrology Symposium Exeter*: 487-492.
- Higgins, P.J.; Davies, S.J.J.F. (editors). 1996. *Handbook of Australian, New Zealand & Antarctic birds. Volume 3: Snipe to Pigeons*. Melbourne, Oxford University Press.
- Keedwell, R.J. 2002. *Black-fronted terns and banded dotterels: Causes of mortality and comparisons of survival*. Unpublished PhD thesis, Massey University, Palmerston North, New Zealand.
- Keedwell, R.J.; Sanders, M.D.; Alley, M.; Twentyman, C. 2002. Causes of mortality of black-fronted terns *Sterna albobriata* on the Ohau River, South Island, New Zealand. *Pacific Conservation Biology* 8: 170-176.
- Keedwell, R.J. 2005. Breeding biology of black-fronted terns (*Sterna albobriata*) and the effects of predation. *Emu* 10: 39-47.
- Lalas, C. 1977. *Food and feeding behaviour of the black-fronted tern, Chlidonias albobriatus*. Unpublished MSc thesis, University of Otago, Dunedin.
- Lalas, C. 1979. Seasonal movements of black-fronted terns. *Notornis* 26: 69-72.
- Maloney, R.F.; Keedwell, R.J.; Wells, N.J.; Rebergen, A.L.; Nilsson, R.J. 1999. Effect of willow removal on habitat use by five birds of braided rivers, Mackenzie Basin, New Zealand. *New Zealand Journal of Ecology* 23: 53-60.
- O'Donnell, C.F.J.; Hoare, J.M. 2011. Meta-analysis of status and trends in breeding populations of black-fronted terns (*Chlidonias albobriatus*) 1962-2008. *New Zealand Journal of Ecology* 35: 30-43.
- O'Donnell, C.F.J.; Sanders, M.; Woolmore, C. *in press*. *Conservation strategy for New Zealand braided rivers: biodiversity values, issues and priority actions*. Wellington, Department of Conservation.
- Oliver, W.R.B. 1955. *New Zealand birds. 2<sup>nd</sup> ed.* Wellington, A.H. & A.W. Reed.
- Robertson, H.A.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; O'Donnell, C.F.J.; Powlesland, R.G.; Sugar, P.M.; Scofield, R.P.; Taylor, G.A. 2013. Conservation status of New Zealand birds, 2012. *New Zealand Threat Classification Series 4*. Wellington, Department of Conservation.
- Sanders, M.D.; Maloney, R.F. 2002. Causes of mortality at nests of ground-nesting birds in the Upper Waitaki Basin, South Island, New Zealand: a 5-year video study. *Biological Conservation* 106: 225-236.
- Steffens, K.E.; Sanders, M.D.; Gleeson, D.M.; Pullen, K.M.; Stowe, C.J. 2012. Identification of predators at black-fronted tern *Chlidonias albobriatus* nests, using mtDNA analysis and digital video recorders. *New Zealand Journal of Ecology* 36: 48-55.

**Keywords** black-fronted tern; *Chlidonias albobriatus*; distribution; breeding colony; braided river bird count

**Appendix 1.** Overview of rivers searched for black-fronted tern (*Chlidonias albobristatus*) breeding colonies.

River	Description of colony location	Northing (NZTM)	Easting (NZTM)	Date	No. individuals	Notes
Ahuriri	0.5 km downstream of SH 8 bridge	5071445	1361023	16-Nov-14	80	-
Ahuriri	Ben Avon	5084059	1331208	5-Dec-14	50	-
Aparima	Shaws Trees Rd	4886514	1221309	13-Dec-14	20	-
Ashburton	Wakanui School Rd	5128049	1502344	30-Nov-14	70	Colony declined due to predation/disturbance. 18-Dec-2014 only 12 birds.
Ashburton	1 km downstream of Butcks bridge	5171919	1452244	8-Dec-14	14	-
Ashburton	Entrance at boarder of conservation land	5170319	1452858	17-Dec-14	60	-
Buller	Downstream of Howard confluence	5381865	1573231	14-Nov-14	30	-
Cass	Downstream from Cass bridge	5138227	1399753	22-Nov-14	40	Very scattered colony from 500 m below bridge to almost the delta.
Clutha	Grover's Island	4948963	1313064	14-Dec-14	100	On same island as black-billed gull colony.
Dart	Humes Rd	5032945	1230719	8-Dec-14	-	Not possible to access colony, ca. 20 adults seen flying and dive-bombing/mobbing black-backed gull.
Eglinton	Walker Creek	4994033	1204315	11-Dec-14	40	-
Grey	Brandy Jack Creek	5315493	1483684	3-Dec-14	30	-
Hunter	Upstream of Cofters Ck confluence	5100218	1320866	7-Jan-15	4	-
Hunter	Lake Delta	5090686	1317534	7-Jan-15	16	-
Hurunui	Downstream of SH1 bridge	5250610	1608784	10-Nov-14	70	-
Hurunui	Just upstream of SH7 bridge	5253451	1580968	6-Dec-14	50	-
Makarora	Wilkin Rd	5092229	1295935	17-Nov-14	40	Next to black-billed gull colony.
Manuhēria	Above Fall's Dam	5028943	1356375	29-Oct-14	30	Birds dive-bombing/warning on 29-Oct-2014, scrapes (nest bowls) seen. Colony not active on 18-Nov-2014.
Mararoa	1 km upstream of Mararoa Downs Station	4949984	1209785	24-Oct-14	4	Next to small black-billed gull colony.
Mararoa	Little Hill	4957833	1214440	24-Oct-14	12	-
Maruia	Between Kowhai Downs and Rocky Hill	5320082	1534697	1-Dec-14	8	-
Matakaitaki	5 km downstream of Matakaitaki Station	5349993	1552755	1-Dec-14	16	-
Ohau	Ohau Tern Island	5094245	1360688	1-Nov-14	600	-
Opihi	Waitohi Pleasant Point Rd Bridge	5098690	1451811	17-Oct-14	50	-
Orari	Burma Rd	5132112	1455574	21-Dec-14	70	Next to black-billed gull colony.
Oreti	SH97 Bridge Mossburn	4932780	1229908	25-Oct-14	20	Just downstream of large black-bill gull colony.
Oreti	Quarry Rd	4933054	1228150	5-Nov-14	60	Just upstream of large black-bill gull colony
Rakaia	Dobbins Ford angler access	5142881	1532332	20-Nov-14	50	-

## Appendix 1. Continued.

River	Description of colony location	Northing (NZTM)	Easting (NZTM)	Date	No. individuals	Notes
Rakaia	-	-	-	17-Dec-14	-	14 adults and six fledglings observed in field next to river
Rangitata	Dip Rd	5116346	1477349	17-Oct-14	20	-
Rangitata	Old Main 5th Rd	5119552	1474243	2-Nov-14	150	-
Rangitata	Confluence of Potts River	5170777	1431512	5-Dec-14	18	-
Rangitata	Forest Creek	5161133	1438275	15-Dec-14	86	-
Tasman	1 km downstream of airport	5148125	1369537	17-Dec-14	40	-
Tekapo	Below gorge	5091732	1385582	16-Dec-14	70	-
Tekapo	5 km downstream of Paterson ponds	5112669	1395043	23-Nov-14	40	-
Tekapo	Iron Bridge	5092953	1386288	23-Nov-14	100	-
Waiau (Canterbury)	Stinking Stream	5275823	1582010	11-Nov-14	30	-
Waimakariri	Courtney Rd	5188667	1537639	14-Oct-14	2	-
Waimakariri	Hauls Rd	5189738	1560230	16-Oct-14	2	-
Waimakariri	Diversion Rd	5190133	1560039	24-Nov-14	70	-
Waimakariri	St Andrews Shelter	5236530	1502185	5-Dec-14	30	-
Wairau	Selmes Rd	5411501	1675937	7-Dec-14	200	-
Waitaki	0.5 km upstream of Kurow (SH82) bridge	5044787	1399867	28-Nov-14	30	-
Waitaki	0.5 km upstream of Otiake confluence	5038226	1405582	14-Dec-14	100	Flock of 30 fledglings observed near colony
Total	-	-	-	-	2,612	-