

## SHORT NOTE

### Population trends in black-fronted terns (*Chlidonias albobriatus*) on the Ashley River, North Canterbury

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Black-fronted terns (*Chlidonias albobriatus*) are considered 'Endangered' under global criteria (IUCN 2011) and 'Nationally Endangered' by the Department of Conservation (DOC; Miskelly *et al.* 2008). A recent detailed meta-analysis of population trends in black-fronted terns breeding on 29 braided rivers in the South I, New Zealand between 1962 and 2008 supported this threat classification (O'Donnell & Hoare 2011). O'Donnell & Hoare (2011) detected significant declines on 8 of the 29 rivers and only 1 significant increase. One of the rivers where the black-fronted tern population did not change significantly was the Ashley River in North Canterbury. O'Donnell & Hoare (2011) calculated that the breeding population there 'declined' by 2.9% annually between 1981 and 2000-2008, but that the 'decline' was not significant. However, their calculation was based on a 1981 count from a larger area than subsequent counts, which would have over-estimated population size during this early period and biased the analysis to finding a negative relationship over time. Although this error makes no difference to their

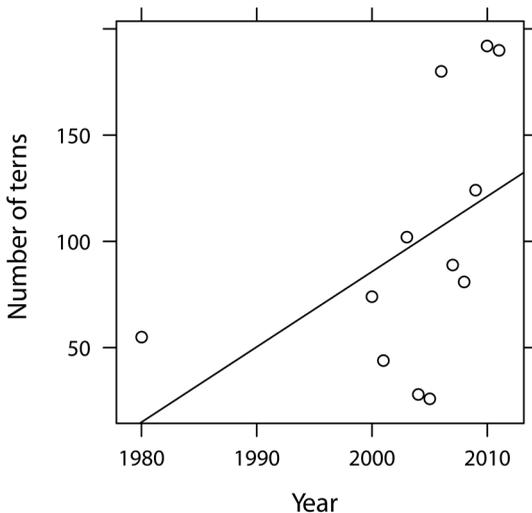
overall findings, it has important implications for the continued management of this particular breeding area. We provide a re-analysis of trends of black-fronted terns on the Ashley River, based on a corrected dataset that also includes data from the 3 additional surveys completed since 2008 (in 2009, 2010 and 2011), and comment on implications for management.

O'Donnell & Hoare's (2011) analysis of the black-fronted tern population trend on the Ashley River was based on 9 counts between 1981 and 2008. The 1981 datapoint of 194 birds (obtained from O'Donnell & Moore 1983) was the summation of 2 surveys. The 1st occurred in Oct 1980 on the lower Ashley, from the junction of the Okuku River to the sea (25 km), in which 55 black-fronted terns were counted (Moore 1980). The 2nd occurred in Nov 1981 on the upper Ashley, from the Ashley Gorge to the junction of the Okuku River (22 km), in which 139 birds were counted (Overmars & O'Donnell 1982). However, the remaining 8 counts, made in Nov between 2000 and 2008, were based on a survey of only *c.* 20 km of riverbed, from the junction of the Okuku River to State Highway 1 bridge. As such, it would have been more appropriate if O'Donnell & Hoare (2011) had used the count from only the

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**Fig. 1.** Numbers of black-fronted terns, *Chlidonias albostratus*, counted on c. 20 km of the Ashley River, North Canterbury, between 1980 and 2011. The positive trend is not significant when the 1980 point is included as shown ( $P = 0.115$ ), but is significant if excluded ( $P = 0.024$ ).

lower Ashley in 1980 as their starting point, and a distance of 20 km for all counts. We used the count of 55 birds (Moore 1980) as the 1980 datapoint in our reanalysis.

We used a linear model, with number of terns as the dependent variable and year as the predictor variable to evaluate trends in the Ashley River tern population based on corrected data from 1980 and additional data from 2009 to 2011. We used the statistical programme R (Version 2.12.1; R Development Core Team 2010) for analyses and defined significance at  $\alpha = 0.05$ . Reanalysis of the data shows that the breeding population of black-fronted terns on the Ashley River did not change significantly between 1980 and 2008, but that slope was positive ( $F_{1,7} = 0.444$ ,  $P = 0.527$ ), rather than negative as reported by O'Donnell and Hoare (2011). Despite numbers of black-fronted terns continuing to increase in the subsequent 3 years (2009 to 2011), the overall positive trend is still not significant ( $F_{1,10} = 2.979$ ,  $P = 0.115$ ; Fig. 1). However, exclusion of the 1980 datapoint (which, as an outlier in the time series, has substantial leverage on the trend) indicates that in the recent period of regular monitoring and management (2000–2011) tern numbers increased significantly on the Ashley River ( $F_{1,9} = 7.318$ ,  $P = 0.024$ ).

Two factors that O'Donnell & Hoare (2011) found influenced population trends were river flow and pest management. High flows and pest

management are considered to reduce predation risk (high flows by restricting mammalian predator access to nesting islands within the river, and pest management by reducing the number of potential predators). The Ashley is a low flow river, and the only low flow river with some pest control in O'Donnell & Hoare's (2011) analysis. As a low flow river it is highly vulnerable to access by predators. However, the Ashley-Rakahuri Rivercare Group has undertaken pest control around breeding colonies of birds in the riverbed since 2004, and also has cleared weeds from the riverbed and raised public awareness of birds breeding in the area. These actions may have contributed to the black-fronted tern population increasing in the Ashley River over the last 11 years. This is a better situation than in other low flow rivers (O'Donnell & Hoare 2011) and justifies continued management of birds breeding in the riverbed.

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