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MOVEMENTS OF GREY TEAL *Anas gracilis* FROM A DRYING, ARID ZONE WETLAND

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Grey Teal (746) were banded on Lake Salisbury, an ephemeral lake in north-western New South Wales in June 1987, before the lake dried. By June 1991, 19 of these birds had been shot by hunters in south-eastern Australia, and their bands recovered. Such recoveries show that Grey Teal, including juveniles, travel to wetlands in south-eastern Australia from drying, ephemeral wetlands in north-western New South Wales.

INTRODUCTION

Grey Teal *Anas gracilis* move widely over the Australian continent (Frith 1959, 1962; Lavery 1970; Norman 1971). Grey Teal banded in southern inland New South Wales have been recovered in the arid regions of north-western New South Wales and south-western Queensland (Frith 1962), but Grey Teal have not been banded on ephemeral wetlands in either of these arid regions.

The aim of this study was to determine whether Grey Teal moved from a drying, ephemeral wetland in arid north-western New South Wales to wetter and more heavily hunted (Caughley and Briggs 1983; Briggs *et al.* 1985) areas in south-eastern Australia. The study relied on band returns from hunters, so it could not investigate movements to regions outside major hunting areas.

When they fill, the wetlands of north-western New South Wales provide extensive waterbird habitat, including breeding sites (Goodrick 1984; Braithwaite *et al.* 1986; Maher 1988; Kingsford 1990; Lawler and Briggs 1991). Many of the wetlands in this region filled from heavy rain in winter and spring 1986, and commenced drying in December 1986. Grey Teal nested in late September (Lawler and Briggs 1991). The Grey Teal in this study were banded from a population of up to 3 150 which gathered on the residual water of Lake Salisbury in June 1987.

METHODS

Study site

Lake Salisbury (Lake Altiboulka) (29°50′S, 142°44′E) is a 630 ha terminal lake which fills predominantly from local runoff, and occasionally from major rainfall events in the Bulloo River catchment in south-western Queensland. In June 1987 Lake Salisbury, which was the last remaining water body of any size in the north-west of New South Wales, was drying out. The central open basin of 200 ha had shallow water and broad, muddy banks. One elevated sandbank was available as a roosting site for waterbirds.

Trapping

Six cage traps (McNally and Falconer 1953) were positioned in 250 mm deep water offshore from the sandbank where Grey Teal concentrated, and were baited with wheat. The traps were set pre-dawn and kept under surveillance throughout the day to prevent predation by raptors. The traps were not set at night, to avoid predation by foxes and feral cats. Ducks were retrieved mid-morning, mid-afternoon and last light. This gave a full day of trapping almost every day between 7 and 29 June 1987.

The ducks were sexed by cloacal examination (Hochbaum 1942), weighed, aged and banded (n = 746) with Australian Bird and Bat Banding Scheme (ABBBS) bands (Lowe 1989). Birds were aged as juveniles (less than 5.5 months old) by the presence of one or more notched tail feathers ($\bar{x}$ time from hatching to loss of last notched tail feather ± SE = 4.7 months ± 2 days; range 4.0 to 5.5 months, Milkovits unpubl. data) or adults (no notched tail feathers). The ages, sexes and weights of a sample (ages, n = 160; sexes and weights, both adults only, n = 148) of the banded Grey Teal were analysed for comparison with the ages, sexes and weights at banding of the recovered birds.

RESULTS

Nineteen of the 746 Grey Teal banded at Lake Salisbury in June 1987 were shot by hunters between 26 March 1988 and 2 May 1991, and their bands subsequently sent to the ABBBS. The distances of recovered birds from the banding site ranged from 423 km to 996 km, and their bearings ranged from 148° to 206° (Fig. 1). Seven bands were recovered from birds shot in south-eastern South Australia, seven from Victoria and five from south-western New South Wales. Five bands were retrieved from birds shot in the hunting season following banding (March to May 1988), five from the 1989 hunting season, four in the 1990 season, and five from the 1991 season.

There were no significant differences in sex ratios ($\chi^2 = 0.58$, df = 1, $P > 0.10$) or weights at banding ($t = 0.136$, df = 111, $p > 0.10$ for males; $t = 0.424$, df = 49, $p > 0.10$ for females) between the sample of adult banded birds and the birds subsequently recovered. One hundred and fifty-four of the sample of banded Grey Teal were adults (no notched tail feathers), and six were juveniles (≥ 1 notched tail feather). Seventeen of the banded birds shot in south-eastern Australia had been adults when banded, and two had been juveniles. These numbers are too low for statistical comparison.

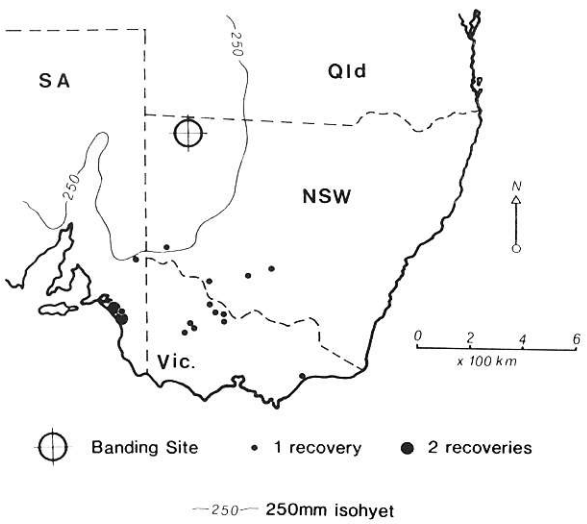

Figure 1. *Distribution of recoveries of Grey Teal banded in June 1987 at banding site, Lake Salisbury, north-western New South Wales and shot by hunters up until June 1991. The mean annual isohyet approximates the limit of aridity.*

DISCUSSION

The band recoveries demonstrate that some Grey Teal moved from this ephemeral, arid zone wetland in north-western New South Wales as it dried, to the more permanent wetlands of south-eastern Australia (Fig. 1). Ephemeral wetlands such as Lake Salisbury are remote from hunting, while the recoveries of the banded Grey Teal were from wetlands in the region of Australia where hunting is concentrated (Caughley and Briggs 1983; Briggs *et al.* 1985). Therefore this distribution of band recoveries probably reflects the distribution of duck hunting in eastern Australia, rather than the distribution of the Grey Teal which dispersed from Lake Salisbury. The relative proportions of Grey Teal which travelled to south-eastern Australia, and elsewhere, from Lake Salisbury hence cannot be quantified.

The recoveries of shot Grey Teal from those banded as juveniles at Lake Salisbury, show that there is movement of juvenile Grey Teal from north-western New South Wales into the hunting areas of south-eastern Australia. Juvenile Grey Teal may disperse more widely than adults (Braithwaite 1971). The arid and semi-arid regions of Australia could provide the breeding grounds for many of the Grey Teal present, and sometimes shot, in the better watered areas of the continent (also see Gentilli and Bekle 1983).

The results of this study confirm that individual Grey Teal use wetland habitats over large parts of Australia. Maned Duck *Chenonetta jubata* banded in the north-west of New South Wales showed similar movements to these Grey Teal (Lawler and Briggs 1991). It remains unknown if individual waterbirds travel back and forth between arid and wetter regions in response to habitat availability, or just in one direction. The former is possible given the movements of waterbirds on to freshly flooded wetlands in arid and semi-arid areas (Frith 1959; Gentilli and Bekle 1983; Lawler and Briggs 1991; Briggs 1992, references therein). The results of this study corroborate the statements by Maher (1988) that conservation of waterbird habitats should be tackled on a regional and national level, and they indicate that conservation of ephemeral wetlands in western New South Wales is an important part of this process.

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PREDATION BY BOYD'S FOREST DRAGON ON BIRDS CAUGHT IN MIST NETS

This note reports instances of confirmed and likely predation by Boyd's Forest Dragon *Gonocephalus boydii* on birds caught in mist nets set in rainforests of north-eastern Queensland. Instances of predation on birds caught in mist nets are not often published (but see, for example, Recher *et al.* 1985). I hope that by reporting these cases I might alert other bird banders to be especially aware of the possibility of this form of mortality.

Five instances of predation are here reported. In each case the dead bird was preserved as a voucher study skin and lodged in the Queensland Museum; tissues (heart, liver and breast muscle) were taken and preserved in liquid nitrogen (four cases) or 70 per cent alcohol and will ultimately be lodged with the collection of the CSIRO, Division of Wildlife and Ecology, Canberra.

On 20 November 1991 while mist-netting in a fragment of rainforest *ca.* 3 km north-east of Millaa Millaa, three Mountain Thornbills *Acanthiza katherina* were found dead at ground level in a mist net. Their heads had been crushed and had the appearance of having been sucked. The nets had been left for no more than between 20 and 30 minutes since last being checked.

On 4 December 1991 while mist-netting at Roaring Meg Creek *ca.* 5 km west of Cape Tribulation another Mountain Thornbill was found dead in a mist net. Again the head was crushed but no more than 20 minutes had passed since the nets were last checked. The net was closed immediately as our departure from the site was imminent anyway.

On 6 December 1991 while mist-netting at the Windsor Tableland (16°18′S, 145°05′E) a Boyd's Forest Dragon was found attacking a Fernwren *Oreoscopus gutturalis* caught in the bottom of a net. It was crushing the bird's head and the bird was already dead when found. The net had been open no more than 20 minutes. The dragon