

First specimens of free-flying Canada Geese *Branta canadensis* from Australia

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Abstract. The Canada Goose *Branta canadensis* occurs in a feral state in New Zealand and rarely strays to Australia. There are two mainland records for Australia. The second of these pertains to four birds that were first observed on the south coast of New South Wales (NSW) in late 2007 before eventually being culled at Killalea State Park, NSW, in early March 2008. These specimens, three females and a male, the first from Australia, were incorporated into the collection of the Australian Museum. They are considered to have been free-flying adults of the subspecies *B. c. maxima*, that which occurs in New Zealand, from where they are assumed to have originated. The destruction of these Geese was consistent with guidelines for dealing with any appearance of this invasive species in Australia.

Introduction

The Canada Goose *Branta canadensis*, a native waterfowl of the Palaearctic, exists in a feral state in New Zealand. From an initial introduction of 50 individuals, the population there numbered 35 000 or more in 1990 (Marchant & Higgins 1990) and now may have 60 000, two-thirds of which live in the South Island (New Zealand Birds Online 2016). Within Australia, occasional vagrant individuals appear on Lord Howe Island (summarised by McAllan *et al.* 2004). Mainland Australian records, however, are much rarer, with only two observations accepted to date by the BirdLife Australia Rarities Committee (BARC). The first (BARC Submission no. 401) was a single bird sighted at Shoalhaven Heads, NSW, on 18 October–21 November 2002 (Carter 2006). It was considered to be a wild bird, probably originating from the feral population in New Zealand, rather than an escapee: it acted as though wild, there was no evidence of its having been previously pinioned, there was no leg-band, and there were no known birds missing from captive collections (BARC Submission no. 401). Plumage characters identified it as an adult. Vagrants, presumably from New Zealand, have also been reported from the Kermadec, Chatham and Auckland Islands and New Caledonia (see OSNZ 2010), demonstrating this species' ability to cross extensive expanses of ocean.

The second series of sightings of Canada Geese was from the south coast of NSW in late 2007 through to early 2008. A newspaper story revealed that the birds were initially observed locally on 26 December 2007 (Condie 2008). The first record on Eremaea Birds (Birdline New South Wales) was of four Canada Geese reported by Mike Jarman from Burrill Lake, south of Ulladulla, on 29 December 2007 (Eremaea Birds 2007). They were also observed on 31 December 2007 by Jim O'Shea. BARC Submission no. 551 was made by Peter Marsh and Rohan Clarke based on observations from Milton, NSW, on 30 December 2007 and 5 January 2008. The four birds continued to be observed in this area until 23 January 2008. On 9 March 2008, Iain Blake reported to Birdline New South Wales that four Canada Geese were present at a lagoon at Killalea State Park, Shellharbour, NSW,

~90 km north of the previous sightings (Eremaea Birds 2008). This was accompanied by a colour photograph of the four birds. In early March, under the guidance of the Park's Manager, two Game Council staff killed the Geese in a humane manner by shooting (Game Council New South Wales 2009). The carcasses were forwarded to the Australian Museum for incorporation into the institution's collection. These are the first specimens of free-flying (i.e. not escapees; evidence for this is presented below) Canada Geese from Australia. This note presents information on these birds obtained by examination at the Museum.

Results

All four Canada Geese were made into study skins and registered with the following sequence of numbers: O.74667–O.75670. Damage to the bodies from the gunshot precluded preparing any as mounts, and only one (O.74667, a female) could have its sex determined by internal examination. All four birds were then sexed genetically. Andrew King, of the Australian Centre for Wildlife Genomics, Australian Museum, conducted an analysis of the avian *CHD* gene (a molecular marker for sex determination in birds: Vucicevic *et al.* 2013) from tissues of the specimens. In birds, females have two different sex chromosomes, a W and a Z, whereas males have two Z chromosomes, and this distinction is evident in genetic analyses. The examination of the known female showed the presence of two dissimilar markers. These were likewise found in two of the other birds (O.74668, O.74669), both also regarded as females. The remaining bird (O.74670) had two similar markers and, thus, was assumed to be a male, although no direct comparison with a known male was possible.

Information on the specimens is given below. Samples of liver, heart and pectoral muscles for each specimen were retained in the Museum's frozen tissue collection. Measurements were taken by LT (Table 1). Mass shown was less than that of the live birds because of the damage sustained during culling. The upper mandibles were black, the lower ranged from dark brown to dark olive-brown. Legs were dark brown. All birds showed some moult of the

Table 1. Details of Canada Geese culled from Killalea State Park, New South Wales, in March 2008: sex, mass (g), wingspan (mm) and lengths (mm) of wing (taken as flattened chord), tail, culmen (to skull and exposed), tarsus, and total head for each specimen. F = female, M = male.

Registered number	Sex	Mass	Wingspan	Wing	Tail	Culmen (to skull)	Culmen (exposed)	Tarsus	Total head
O.74667	F	3792	1675	478	145	71.4	50.8	85.0	121.1
O.74668	F	3850	1625	450	158	66.2	56.8	85.2	126.4
O.74669	F	3484	1672	484	147	73.3	53.5	85.7	122.9
O.74670	M	4159	1651	476	157	62.2	52.9	82.4	125.3

body feathers, generally slight, but more pronounced in O.74670, and all had active moult of rectrices. In O.74668, some retained rectrices were very worn, contrasting markedly with new, incoming feathers.

All four of the Canada Geese were judged to be adults, based on criteria given by Hanson (1962), Mowbray *et al.* (2002) and Sibley (2009). Feathers on the back were wide; these and the flank feathers had pale tips, which imparted a barred appearance (Figure 1; also see colour photograph in Sibley 2009). These tips exhibited varying degrees of abrasion. The remiges and rectrices were dark, broader and less pointed than juvenile feathers. They were largely fresh, although in O.74668 some much-worn and contrasting rectrices had been retained. The knob-like projection on the carpometacarpus at the bend of the wrist was strongly developed.

Discussion

For the same reasons given for the Shoalhaven Heads bird, these four individuals are regarded as being free-flying (wild) Canada Geese, rather than escapees from captivity. Convincing evidence, researched by Rohan Clarke, that this was the case was included as supplementary material

in Submission no. 551 to BARC. He concluded that a captive origin of these birds could be discounted because (1) there were no known escapes from south coast zoos nor a presence of this species in private collections in the Ulladulla area, (2) the Geese were quite wary near humans, (3) they exhibited no evidence of wing clipping nor (4) evidence of unnatural abrasion to primaries or rectrices such as would occur in a caged situation and (5) there were no bands on their legs.

Based on plumage characters and size, Imber (1971) ascribed the New Zealand birds to the subspecies *B. c. maxima*, a large-bodied subspecies from southern central Canada and northern central and central United States of America. In this subspecies, the white on the cheek extends further along the side of the head on the dorsal posterior section. The plumage is rather pale overall, particularly on the underparts. This is the largest subspecies of the Canada Goose. There is considerable seasonal variation, but on average males are always heavier than females, as well as slightly greater in linear dimensions, albeit with considerable overlap in ranges [see Imber (1971) and Coluccy (2001) (values cited in Mowbray *et al.* 2002)]. The plumage and range of measurements of the four Killalea birds are consistent with this subspecific identification, although white feathers on the forehead



Figure 1. Dorsal (above) and ventral (below) views of Canada Goose specimen AM O.74668 (female) showing the barring on the back and flanks. Photo: Walter E. Boles

(which are sometimes evident in this subspecies: Imber 1971) are absent.

This subspecies is not highly migratory in its native distribution, and some individuals within this range are sedentary. White (1986, p. 6) commented that in New Zealand “resident Canada Geese tend to be dispersive rather than truly migratory”. Heather *et al.* (2011) noted the South Island birds as being partially migratory.

No indication of age was given in previous observations of individuals observed on Lord Howe Island or at Shoalhaven Heads. The photograph of the Shoalhaven Heads bird in Carter (2006) shows that it was an adult (BARC Case no. 401). In many species, most dispersal is undertaken by young birds. Given that all five free-flying Canada Geese recorded on the Australian mainland have been adult, it is likely that their movement across the Tasman Sea was not as a result of juvenile dispersal.

This species has demonstrated that it is very successful at establishing itself and rapidly increasing its population size. In North America, the overall Canada Goose population increased from 1.26 million in 1970 to 5.69 million in 2012, including a mean annual increase of 12.7% between 1990 and 2000 (Dolbeer *et al.* 2014). In the United Kingdom, the introduced population there exhibited an annual rate of increase of 8.7% between 1966–1967 and 1986–1987 (Hughes *et al.* 1999). Problems created by these growing Goose populations have included agricultural damage, human health threats, aircraft strikes, eutrophication of water sources and aesthetic conflicts from droppings (Hughes *et al.* 1999). For these reasons, the Canada Goose is regarded as a pest (Department of Agriculture & Food 2010) and a potential danger to the Australian environment. A report to the Invasive Animals Co-operative Research Centre, prepared soon after the early observations of the species at Milton, noted that such establishment in Australia could “result in damage and nuisance to airports, public health, agriculture and the natural and urban environments” and recommended that “The immediate eradication of Canada geese should be an agreed predetermined response to their incursion into any part of Australia” (Dawes 2008, p. 12). The destruction of these Geese was consistent with the guidelines for dealing with any appearance of this species in Australia (Department of Agriculture & Food 2010; Dawes 2008).

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