# THE IDENTITY OF NEW ZEALAND'S CANADA GEESE

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**ABSTRACT**

Canada Geese **Branta canadensis** became established in New Zealand following the introduction of 50 from central or eastern U.S.A. in 1905. In 1920 ten more were brought from western Canada. Examination of plumage, weights and measurements of the present population shows that it belongs predominantly to the giant race **B. c. maxima** *Delacour*. There is a possibility that **B. c. canadensis** interbred to a limited extent with it. Behaviourally and ecologically **maxima** appears very well suited to the South Island habitats in which it multiplied quickly.

The first successful introduction of Canada geese *Branta canadensis* into New Zealand was in 1905, when 50 were introduced by the Government from the U.S.A. (N.Z. Department of Tourist and Health Resorts 1905, Thomson 1922, Donne 1924, Delacour 1954). The only other successful introduction (that is, the birds bred in captivity and their offspring were liberated) was by the North Canterbury Acclimatisation Society, in 1920, of 10 from Vancouver, Canada (North Canterbury A.S. 1920, Delacour 1954). Although a few of the 1905 geese went to game farms in the North Island, it was only in the South Island that they established themselves in the wild. The South Island populations originated from less than 43 birds, for many died in captivity without breeding (Annual Reports of Acclimatisations Societies 1905-25). Regarding the genetic contribution to present populations of the geese imported in 1920, we should note that:—

(a) the 1905 birds had established flocks of up to three hundred in several places throughout their present range before birds from the later importation were liberated (North Canterbury A.S. 1921, 1922, Otago A.S. 1922); and that

(b) 6 of the 10 Vancouver birds were released on private waters well away from the breeding areas in the wild (North Canterbury A.S. 1921).

Thus it is probable that the genetic contribution of this later introduction was small.

At the time of the introductions only five subspecies were recognised (Kortright 1942) and those brought to New Zealand were undoubtedly *B. c. canadensis,* the common Canada goose as then known. But since then 7 more subspecies have been described (Delacour 1954) of which 3 have been separated from the original *canadensis.* Thus the breeding range of modern *canadensis* is but a small part of that original range, quite apart from reductions caused by exploitation and habitat alteration. Furthermore, the identity of our geese has become a matter for speculation.

The 1905 shipment was purchased by T. E. Donne of the Tourist and Health Resorts Department, on behalf of the New Zealand Government (Donne 1924). Donne went to the U.S.A. as Commissioner General for New Zealand at the Louisiana Purchase Exposition in St. Louis, Missouri, and to take delivery of wapiti or elk *Cervus canadensis* made available by President Roosevelt. In addition to these Donne procured a varied assemblage of game birds

and deer, including 50 Canada geese. Examination of Donne's book and Departmental files has not revealed reliable information about where the geese were bought. It is likely that they were obtained in central or eastern U.S.A. from a game dealer because Donne made enquiries about purchasing game during his stay in St. Louis; he made some purchases in Massachusetts and New Hampshire; and the whole collection was assembled at the Zoological Gardens in Washington D.C. before transportation. Nothing is known of the origin of the 1920 importation from Vancouver. Even so, the place of origin may well be misleading since C. Edward Carlson (pers. comm.) points out that " there was considerable traffic in live Canada geese back in 1904 for hunting decoys and other purposes, and it is quite possible that examples of other subspecies could have been included in the lot sent to New Zealand."

Donne (1924) records buying Canada, Snow and Hutchins Geese but does not mention the seller. The name Hutchins Goose then referred to a medium-sized race of the Canada Goose now called the Lesser Canada goose, *B. c. parvipes* (Kortright 1942). But the annual report of the Department of Tourist and Health Resorts (1905) does not record either Snow or Hutchins Geese in the consignment; instead 2 Brant Geese *Branta bernicla* and 4 White-fronted Geese *Anser albifrons* are listed. As far as can be ascertained from the annual reports of Acclimatisation Societies only Canada Geese bred and only they were liberated.

A prominent ornithologist and officer of the North Canterbury Acclimatisation Society, E. F. Stead, has indicated that races of different size were liberated here (Delacour 1954: 157). Unfortunately he gave no further details but Delacour suggested that the smaller race may have been *B. c. taverneri.*

To identify the geese in New Zealand I have compared their dimensions and plumage with descriptions of present North American races. Direct comparisons of live birds by the U.S. Fish and Wildlife Service at Jamestown, North Dakota, have helped to clarify the situation.

## RESULTS

Between 1967 and 1970 Wildlife Service staff collected data from various places in Canterbury, and at various times of the year, on weights and dimensions and plumage of Canada Geese. The best opportunities for collecting data were during the annual banding operations at Lakes Ellesmere and Forsyth in January when geese are moulting. Hence there is an excess of data for this season but a scarcity for the winter particularly. In addition, many hunters in Canterbury weighed a large number of geese during the special shooting season around Lake Ellesmere (January to March). Because of the changing (increasing) weight of geese during this special season, comparisons with North American data would have had doubtful value.

### *Weights*

Geese are at their lowest weight during the non-flying period of the post-breeding moult, and are heaviest in winter. The comparisons at both these times (Tables 1 and 2) show that New Zealand geese come within the range of weights of the Giant Canada Goose, *B. c. maxima.*

TABLE 1: A comparison of the weights of non-flying, moulting Canada geese in North America and New Zealand. North American data from Hanson (1965, pp. 22-23). According to Hanson, *Branta canadensis interior* is the next largest subspecies to *B. c. maxima*.

| Subspecies | Locality | Season | Adult Weight (gms.) Males No. | Mean | SD* | Females No. | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| maxima | Missouri, U.S.A. | July '63 | 55 | 4626 | - | 74 | 3830 | - |
| " | L.Forsyth, N.Z. | Jan. '69 | 24 | 4360 | 319 | 24 | 3625 | 322 |
| " | S. Dakota, U.S.A. | July '63 | 20 | 4135 | - | 17 | 3579 | - |
| " | L.Forsyth, N.Z. | Jan. '70 | 58 | 4078 | 268 | 45 | 3320 | 235 |
| interior | Akimiski, CANADA | July-Aug. | 45 | 3946 | - | 30 | 3349 | - |

* Standard deviation.

TABLE 2: A comparison of wintering weights of Canada geese in North America and New Zealand. North American data from Hanson (1965, pp. 20-21) and from Elder (1946, p. 96).

| Subspecies | Locality | Winter Weight of Males (gms.) Adults No. | Mean | SD | Yearlings No. | Mean | SD | Juveniles No. | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|
| maxima* | Round Lake, U.S.A. | 7 | 6525 | 893 | - | - | - | 9 | 5963 | 747 |
| " * | Ohio, U.S.A. | 8 | 6132 | 587 | - | - | - | - | - | - |
| " | Canterbury, N.Z. | 15 | 5154 | 572 | 7 | 4808 | 332 | 6 | 4613 | 486 |
| " * | Rochester, U.S.A. | 13 | 4884 | 354 | 11 | 4411 | 212 | 20 | 4261 | 418 |
| moffitti* | Utah, U.S.A. | 3 | 4093 | 290 | 1 | 4275 | - | - | - | - |
| interior* | Illinois, U.S.A. | 31 | 4069 | 304 | 7 | 3960 | 249 | 37 | 3615 | 318 |
| " + | " | 41 | 4055 | 281 | with adults | | | 91 | 3547 | 349 |

| Subspecies | Locality | Winter Weight of Females (gms.) Adults No. | Mean | SD | Yearlings No. | Mean | SD | Juveniles No. | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|
| maxima* | Round Lake, U.S.A. | 13 | 5514 | 598 | - | - | - | 3 | 5245 | 694 |
| " * | Ohio, U.S.A. | 5 | 5387 | 845 | - | - | - | - | - | - |
| " | Canterbury, N.Z. | 14 | 4489 | 327 | 3 | 4233 | 160 | 11 | 4103 | 304 |
| " * | Rochester, U.S.A. | 7 | 3868 | 267 | 11 | 3690 | 247 | 15 | 3821 | 315 |
| moffitti* | Utah, U.S.A. | - | - | - | - | - | - | 1 | 3080 | - |
| interior* | Illinois, U.S.A. | 10 | 3561 | 268 | 4 | 3466 | 313 | 35 | 3071 | 249 |
| " + | " | 40 | 3280 | 399 | with adults | | | 77 | 3074 | 290 |

* Hanson

\+ Elder

It would appear that the moulting *B. c. interior* weighed by Hanson (1965: 22) were unusually heavy, for their mean weights are hardly less than wintering weights of this race (compare Tables 1 and 2).

TABLE 3: A comparison of exposed culmen lengths of the larger races of Canada geese in North America with those of New Zealand specimens. North American data from Hanson (1965, p. 32). All data are for adults and yearlings combined.

| Subspecies | Source | Exposed culmen (mm.) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Males | | | Females | | |
| | | No. | Mean | SD | No. | Mean | SD |
| maxima | U.S. Museums | 16 | 60.0 | 1.4 | 5 | 56.8 | 2.5 |
| " | South Dakota | 13 | 58.6 | 2.9 | 8 | 53.5 | 1.7 |
| " | N.Z. | 39 | 56.5 | 2.1 | 32 | 52.6 | 1.9 |
| moffitti | U.S. Museums | 14 | 54.6 | 2.1 | 10 | 51.6 | 2.5 |
| canadensis | " | 15 | 56.1 | 3.1 | 11 | 51.0 | 2.8 |
| interior | Illinois | 110 | 53.7 | 2.8 | 92 | 49.8 | 2.4 |

TABLE 4: A comparison of mid-toe plus claw lengths of the larger races of Canada geese in North America with those of New Zealand specimens. North American data from Hanson (1965, p. 35).

| Subspecies | Source | Mid-toe plus claw (mm.) | | | | | |
|---|---|---|---|---|---|---|---|
| | | (a) in Immatures | | | | | |
| | | Males | | | Females | | |
| | | No. | Mean | SD | No. | Mean | SD |
| maxima | Illinois | 14 | 110.8 | 9.4 | 22 | 100.3 | 4.0 |
| " | New Zealand | 9 | 99.8 | 5.2 | 10 | 91.9 | 3.7 |
| " | Manitoba | 21 | 97.5 | 3.5 | 8 | 92.0 | 3.7 |
| interior | Illinois | 15 | 92.8 | 4.5 | 11 | 87.9 | 3.3 |
| | | (b) in Adults and Yearlings | | | | | |
| | | Males | | | Females | | |
| | | No. | Mean | SD | No. | Mean | SD |
| maxima | U.S. Museums | 12 | 98.3 | 5.0 | 5 | 92.4 | 6.8 |
| " | New Zealand | 72 | 98.1 | 3.6 | 89 | 91.4 | 4.4 |
| moffitti | U.S. Museums | 8 | 94.6 | 3.9 | - | - | - |
| canadensis | " | 7 | 90.1 | 3.1 | 3 | 87.3 | 0.2 |

The heaviest weight taken during this study has not been included in Table 2 because this adult male was held in captivity. It weighed 7122 gms. (15.7 lbs). Judging by all weights taken during this study, 14 lbs (6350 gms) is the normal limit in the wild and is attained by some adult males during winter.

*Dimensions*

Tables 3 and 4 compare measurements of exposed culmen and mid-toe and claw. Length of bill (exposed culmen) is just below that range reported by Hanson (1965) for several populations of *maxima* but the length of mid-toe and claw is within the range of *maxima.*

*Variation in Weights and Dimensions*

As *maxima* is the largest race, interbreeding can only be with races of smaller size. If interbreeding of races had happened on a large scale one would expect that the degree of variation in dimensions and weights in the interbred population would exceed that in the pure races. Casual observers have suggested that the size of our geese is so variable that much interbreeding seems likely to have occurred. However, natural variation due to age, sex and condition can result in some birds among healthy geese being simultaneously twice as heavy as others.

In Tables 1 to 4, the standard deviation (SD) of each mean is listed where available. It is a measure of the extent of variation in the sample. Comparison of these reveals that the variation in

FIGURE 1 — Adult male Giant Canada Goose *Branta canadensis maxima* at Lake Ellesmere, New Zealand, January 1970. Note the pale breast and dark mantle; the forehead patch and shape of the posterior edge of the cheek patch, characters found in some members of this race; and the metacarpal spur on the wing, most prominent in adult males.

New Zealand geese, at least in these dimensions, does not exceed that in the larger races in their native land. All the populations of *maxima* for which Hanson presents data, and the New Zealand population, tend to have greater variation than other races cited.

*Plumage*

These geese are light-breasted; in a few the entire under surface of the body is pearly white.

TABLE 5

The occurrence of some plumage characters in 87 adult Canada geese examined at Lakes Forsyth and Ellesmere in January 1970 (moulting).

| *Plumage character* | *Occurrence percent* |
|---|---|
| White feathers on the forehead | 6 |
| Upper posterior part of white cheek patch having a backwards extension | 47 |
| More or less white feathers in a ring round base of black neck | 9 |
| Upper back (mantle) behind black neck pale like upper breast | 3 |

Four other characters in the plumage were of particular interest. Their occurrence in our geese is tabulated (Table 5). Hanson (1965) found that forehead spotting (Figure 1) is frequently found in populations of *maxima,* but may be absent; it is " quite rare " in other subspecies. Of the shape of the cheek patches Hanson states " . . . the presence of a small, often hooklike, extension near the top of the posterior margin of the cheek patches may be regarded as an excellent indicator of a *maxima* population " (1965: 37). This character is common in our geese (Figure 1).

However, white neck rings are hardly noticeable in New Zealand geese. Delacour (1951, 1954), describing *maxima,* writes that " a white ring at the base of neck is often present " and Hanson (1965) agrees. Some of our geese do have white or partly-white feathers at the base of the black. But few occur on each bird and there is little contrast with adjacent cream-coloured feathers so that a neck ring is practically never visible in the wild. I was very surprised, however, to find that two specimens made into study skins at the Dominion Museum clearly showed white neck rings that had not been apparent in the natural state. The contraction of the neck in preparation of the skin had brought the white feathers together to make the ring visible.

As the subspecies in New Zealand has been, until now, called *B. c. canadensis* (Fleming 1953, Imber and Williams 1968), we examined the colour of the upper back which in *canadensis* is the same as the upper breast. Only 3 percent had this cream colour right over the upper back, the others being buffy brown as on the back.

*Colouration of the Goslings*

It is noticeable in a few newly-hatched families that some goslings are almost uniformly pale yellow on the face whereas others are darker around the eye and on the crown, and are generally more olive-green. The paler goslings markedly predominate, and these

agree with descriptions of *maxima* (and *moffitti*) goslings given by Delacour (1954). Darker goslings may be related to *B. c. canadensis.*

## DISCUSSION

Plumage characters, weights and measurements indicate that the New Zealand populations are predominantly Giant Canada Geese. It appears that there has been some interbreeding with a slightly smaller subspecies, probably the Atlantic Canada Goose *B. c. canadensis.* These are subspeciies very likely to have been obtained by Donne in 1904-5. The range of *maxima* in the wild once included Missouri, and this is the race that breeds in the centre of North America east of the Rocky Mountains (Hanson 1965). Donne may also have obtained geese from a game dealer in Massachusetts which is within the range of *B. c. canadensis.*

The geese that came from Vancouver are a mystery. E. F. Stead has apparently suggested that these were smaller birds (Delacour 1954: 157). They may have been western Canada geese *B. c. moffitti* which, being nearly identical in colour with *maxima* but slightly smaller, would by now have lost their identity through interbreeding.

Nevertheless, although having some slightly smaller dimensions such as bill length, New Zealand geese are almost identical with Giant Canada Geese in North America as described by Hanson.

This has recently been confirmed. T. A. Caithness (New Zealand Wildlife Service) visited the Northern Prairie Wildlife Research Center of the U.S. Fish and Wildlife Service in Jamestown, North Dakota, in 1969. Biologists at the Center expressed interest in the geese in New Zealand and suggested direct comparisons be made. Accordingly, eggs were collected from Lake Forsyth and from the Waimakariri river headwaters and sent to Jamestown the same year. Six goslings were hatched and their development was compared, under similar conditions, with that of the Center's own Giant Canada goslings. Harvey K. Nelson, Director of the Center, has informed us as follows (letter of 6 April 1970): "Generally speaking the New Zealand goslings have exhibited characteristics very similar to other Giant Canadas in all the comparisons that we have made to date." Growth in length of the tarsi was nearly identical, as was the age at full development of the primaries and age at commencement of the first body moult. At 13 weeks of age the New Zealand goslings were heavier by about 300 grammes. Their weight then was just below winter weights of juveniles here, shown in Table 2.

Furthermore, H. C. Hanson has identified as *maxima* several geese taken at random from Lake Ellesmere and photographed by C. F. Yocom (Yocom 1970).

When we consider some of the characteristics of the Giant Canada Goose, it is not so surprising that it became established so quickly in the South Island.

It is not a highly migratory subspecies and some populations are sedentary. There is little scope or need for migration in New Zealand. "It readily accepts the proximity and protection of man" (Hanson 1965) and thus will breed in captivity given suitable conditions. The popular method of acclimatising these and other birds at the time was to breed in captivity, liberating the progeny. About half the geese imported and kept in captivity for several years bred within 3 or 4 years (Imber in prep.). Referring to *interior* and

*canadensis,* Dawson (1968) states that " even when captured and kept in captivity for long periods, these wild migrants frequently refuse to take family-rearing responsibilities seriously, and fail to nest."

But most important in their establishment was the type of habitat to which they were introduced in New Zealand. In North America, in Hanson's words (1965: 43), " with minor exceptions, its primary range has been confined to the tall-grass and mixed prairie areas with their lake and marsh complexes . . ." This habitat (biome) closely resembles the South Island's tussock grasslands (tall-tussock and short-tussock) which lie to the east of the Southern Alps as the prairies lie to the east of the Rocky Mountains. Into this grassland habitat, with its multitude of large and small lakes and associated marshes, these geese were liberated. For Giant Canada Geese the South Island's tussock grasslands are probably the next best place to home.

New Zealand's climate is mainly temperate (Robertson 1960) whereas that of the North American prairies is continental. However, Hanson (1965: 198) observes that " no other subspecies of wild goose in North America nests over so large an area or one which includes such a diversity of habitats and climates." The majority of South Island breeding grounds have the mean January temperature about 63°F (17°C) and about 110 frost-free days per year. These are at the low end of the range reported by Hanson (his Table 28) for breeding localities in North America but winters here are correspondingly milder.

The Giant Canada Goose was thought to be extinct for many years (Delacour 1951, 1954) but was re-discovered in 1962 in Minnesota. Hanson determined that there were about 55,000 wild birds in North America in 1963, and up to 14,000 in private collections (1965: 204). The present New Zealand populations are estimated to have a combined annual peak between 15,000 and 20,000 birds (Imber and Bucknell in prep.). Thus New Zealand populations represent a fair proportion of the total numbers of the biggest wild goose.

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# SHORT NOTE

## DOLLAR-BIRD NEAR DARGAVILLE

A Dollar Bird or Broad-billed Roller *Eurystomus orientalis* was on or around Mr. Clive Wood's farm in Waihue Valley, nine miles north of Dargaville, from 3rd to 16th May 1971. Mr. and Mrs. Wood watched it periodically during its stay; on 6th May I spent two periods totalling three hours closely observing the bird with 10 x 50 binoculars and a x 30 telescope at ranges down to 30 feet, in good light.

The farm on which the Dollar Bird was observed is pasture land with totara trees singly or in clumps. The bird was first sighted perched on a gatepost and some days later was noticed by passers-by on a fence-post not far away. Its usual feeding perches were the "cups" on the crossbars of power and telephone poles close to the homestead. For the first few days it used these high perches regularly from about 1000 - 1400 hours and again from 1600 - 1800 hours, by which latter time it was nearly dark. Heavy rain which fell one day made no difference to the bird's routine. After some days the duration of its visits decreased but it still came twice daily. Its habit was to sit motionless for periods of 5 - 15 minutes; at intervals it flew, first sideways and downwards, then round in a wide arc of 90 - 100 feet ending with an upward swoop back to a perch. At other times of day it was observed to perch on a dead limb of a gum tree about 60 feet above ground, on a 15 foot dead sapling, and on a power line. No record of any call. Flight buoyant, wing beats strong but fairly slow; in flight the wings are broad but taper sharply towards the tip and the "dollar" marks, barely visible on the closed wing, are clearly seen. The black tail, square-ended at rest, is spread at take-off and landing. When perched the bird has a short-necked stocky appearance; the large head, flattened on the crown, large brown eye under heavy brows and broad flattened bill with upper mandible slightly hooked at the tip are noticeable field features; the reddish feet are usually hidden. Length about 12 inches. Head brownish, upper surface brownish green, wing coverts greenish blue; "dollar" patches on the primaries white with a bluish tinge. Bristly green feathers on chin; a striking bright blue streak on throat; under surface green, tinged smudgy brownish on breast. The dusky brown bill with only a very small but detectable reddish area at the base of the lower mandible indicated that the bird was not fully mature.

Photographs, though not suitable for reproduction, show the bird on, leaving and returning to its perch, and have been inspected by Mr. F. C. Kinsky, Dominion Museum. I am grateful to Mr. A. T. Edgar for discussions during preparation of this note, and to Mr. Kinsky for his comments on the draft. — C. D. CLUNIE