WEIGHTS AND MEASUREMENTS OF VANCOUVER CANADA GEESE

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The Vancouver Canada Goose (*Branta canadeisis fulva*) is the least studied of 10 subspecies of Canada Geese recognized by the American Ornithologist's Union (1957). This subspecies winters and breeds along the coast and on islands off the shores of southeastern Alaska and British Columbia (Delacour, 1954; Gabrielson and Lincoln, 1959). Band recoveries indicate that a small portion of the population migrates to Oregon and Washington (Hansen, 1962).

Although 4,332 *fulva* were banded in southeast Alaska prior to 1973, weights and measurements were not recorded. Consequently, a study was conducted to provide these data on Vancouver Canada Geese. Others have reported some measurements for *B. c. fulva*, but with small sample sizes which have not been subjected to statistical analysis (Delacour, 1954; Bellrose, 1976). Reference will be made to dusky Canada Geese (*B. c. occidentalis*), a subspecies of slightly smaller size which winters south of, and breeds north of, *fulva* (Hine and Schoenfeld, 1968).

METHODS

From 6-8 July 1973, 309 molting adult Vancouver Canada Geese were banded, weighed and measured in Adam's Inlet at Glacier Bay National Monument, 129 km west of Juneau, Alaska. The Glacier Bay area has the largest known concentration of molting Vancouver Canada Geese with numbers estimated between 2,000 and 3,000 birds. Methods of capture were similar to those reported by Robards (1960). "Outside tarsus" measurement refers to the distance from the distal end of the tarsometatarsus to the posterior condyle of the distal end of the tibiotarsus, with the tibiotarsus placed perpendicularly to the tarsometatarsus. All other measurements are standard according to methods of Baldwin et al. (1931).

All measurements were taken to 0.1 mm using Vernier calipers and weights were obtained by placing birds in a suspended weighing scale, graduated in grams. Tail and wing measurements were not recorded. Age, sex, and presence or absence of a brood patch on females were determined according to methods of Hanson (1962a). Measurements from 67 *fulva* taken between 1919 and 1974 were also analyzed, birds that were collected at several locations either during the winter or summer in southeastern Alaska. Results were analyzed at the Utah State University Computer Center.

RESULTS AND DISCUSSION

All 309 birds measured were classified as adults. No records are available for goslings observed or captured at Glacier Bay. Males (175) comprised 57 percent and females (134) represented 43 percent. Of the females, 58 were classified as having a brood patch. Table 1 is a summary of measurements and analyses.

TABLE 1.
Weights and measurements of 309 adult Vancouver Canada Geese.

Measurement (mm)	Mean male with 95% confidence limit (175)	Mean female with 95% confidence limit (134)	*t* value
Exposed culmen length	51.2 ± 0.45	47.6 ± 0.42	11.2[1]
Height of bill at base	27.0 ± 0.36	25.4 ± 0.19	7.0[1]
Length of bill from nostril	26.6 ± 0.60	24.6 ± 0.23	5.3[1]
Bill length	15.3 ± 0.16	14.3 ± 0.15	9.4[1]
Bill width	12.3 ± 0.15	11.6 ± 0.15	6.3[1]
Tarsus length	93.8 ± 0.5	87.1 ± 0.73	4.8[1]
Outside tarsus	111.7 ± 0.6	130.5 ± 0.68	18.1[1]
Weight (g)	3,689.6 ± 40.5	3,043.2 ± 46.3	18.7[1]

[1] $P < 0.001$.

Correlation coefficients between each possible pair of measurements revealed no significant differences. In contrast to findings of Chapman (1970) who reported weights and measurements for *B. c. occidentalis*, a *t*-test between means for each sex revealed a highly significant difference for all measurements (Table 1). Discriminant function analysis revealed that nail length, nail width, and outside tarsus measurements were most significant for sex discrimination.

Obvious protrusion of the sternum on all geese captured indicated below average mass of breast muslce tissue, which is consistent with reports by Hanson (1962b). A male goose shot 112 days after banding had gained 975 g, a 24 percent increase from molting body weight (G. J. Beal, pers. comm.). Payne (1972) suggested increased metabolic rate during molt due to the energetic cost of growing feathers and thermoregulatory response due to decreased insulation. However, Payne also suggested that body weights for some species may increase during the molt due to increases in fat, water, and blood volume associated with feather growth. This does not appear to occur in Canada Geese. Hanson (1962b: 13) reported a significant decrease in body weight for Canada Geese during molt and concluded that "the moult period is perhaps the period of greatest stress in the life of the Canada goose." Cestmir et al. (1966) found highly significant decreases in body weight of Mallards (*Anas platyrhynochos*) during molt, averaging 9.2 percent decrease from initial body weight. We believe that the weight values presented in Table 1, although an accurate representation of *fulva* weight during the molt, are lower than the annual average for this subspecies.

Table 2 provides analyses of various small samples of Vancouver Canada Geese captured in southeastern Alaska since 1919. These data have not been pooled with the data in Table 1 for two reasons:

TABLE 2.

Measurements of breeding and wintering Vancouver Canada Geese captured in southeastern Alaska, 1919-1974. Data from Aldrich and Timm.

Measurement (mm)	Mean male with 95% confidence limit (n)	Mean female with 95% confidence limit (n)	*t* value
Wing	472.6 ± 8.1 (19)	449.2 ± 10.9 (15)	3.7[2]
Rectrices	148.9 ± 4.4 (20)	142.7 ± 4.3 (16)	2.2[1]
Middle toe	79.6 ± 1.3 (20)	77.3 ± 2.0 (16)	2.1[1]
Exposed culmen length	51.4 ± 1.1 (38)	48.6 ± 1.1 (29)	3.5[2]
Tarsus length	94.0 ± 1.2 (38)	88.9 ± 1.4 (29)	5.7[3]

[1] $P < 0.05$.
[2] $P < 0.01$.
[3] $P < 0.001$.

(1) Table 1 represents a discrete collection of data obtained in a consistent manner at a specific time on molting birds, whereas Table 2 represents data collected over a period of years by various people throughout southeastern Alaska from breeding and wintering birds; (2) several measurement variables do not occur in both data sets.

t-tests between corresponding variables in Tables 1 and 2 revealed no significant difference for male and female culmen length or male tarsus length. However, female tarsus length was significantly different ($t = 2.19$, $P < 0.05$). Again, all measurements in Table 2 were significantly different between sexes.

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