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CANADA GOOSE NUMBERS, DAILY MOVEMENTS AND FORAGING PATTERNS ON PRINCE EDWARD ISLAND

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Numbers, daily movements and foraging patterns of Canada geese (*Branta canadensis*) on 2 watersheds in Prince Edward Island were examined in 1974-1975. In spring, geese arrived before traditional feeding areas were free of ice, and remained for 2 months reaching a maximum of 6,200 birds. Regular daily movements from resting sites to cultivated fields where the birds remained for 6-12 hours were noted. As the estuaries became free of snow and ice, geese spent more time loafing and feeding in salt marshes. In autumn, geese were present for four months with peak numbers less than 40% of those recorded in spring. In fall, geese restricted their foraging to large fields, until extensive autumn cultivation forced them to feed mainly on tidal flats. Resting areas least accessible to hunters were utilized most commonly.

En 1974 et 1975, les déplacements quotidiens et les patrons de recherche de la nourriture de l'Oie du Canada (*Branta canadensis*) furent examinés dans deux bassins hydrographiques de l'Ile-du-Prince-Edouard. Au printemps, les oies arrivèrent avant la disparition de la glace des aires traditionnelles de nutrition. Elles séjournèrent pendant deux (2) mois et atteignirent un nombre de 6,200. Les déplacements reguliers des oiseau depuis les sites de repos vers les champs cultives, ou les oiseaux séjournent pendant 6 à 12 heures, furent notés quotidiennenment. Après la disparition de la glace et de la neige des estuaries, les oies passerent plus de temps dans les marois salants a flâner et a se nourris. En automne, les oies furent présentes pendant quatre (4) mois mais leur nombre maximum representait moins de 40% de celui en régistré au printemps. A l'automne, les oies ont recherché leur nourriture dans les grands champs jusqu'a ce que les travaux de culture de grande envergure les forcent à se nourrir principalement dans les plaines intertidales. Les aires de repos les moins accessibles aux chasseurs étaient utilisées plus courament.

Introduction

In the North Atlantic Flyway, Canada geese (*Branta canadensis*) winter on ice-free coasts of eastern Canada and northeastern United States, migrate through the Maritime Provinces and breed primarily in Newfoundland, Labrador and Quebec (Bellrose 1976). Prior to arrival at the breeding grounds, Canada geese undergo a hyperphagic phase and body weights increase by about one-third of winter weight (McLandress and Raveling 1981a). In giant Canada geese (*B.c. maxima*), these energetic reserves were obtained on the wintering area (McLandress and Raveling, 1981b), but for interior Canada geese (*B.c. interior*), birds were heaviest on a migratory stopover area, and Hanson (1962) suspected that geese in this population attained their peak body weight during spring migration. Birds probably leave wintering areas in varying body conditions depending on the severity of weather, and during a late spring breakup, geese may rely on foraging areas enroute to accumulate the reserves necessary for breeding. Despite their potential importance in the life cycle, migratory stopover areas for Canada geese have received remarkably little attention, especially the Atlantic Flyway population.

The expansive shallow bays and estuarine salt marshes of Prince Edward Island traditionally have been attractive to migrating Canada geese in spring and fall. During the past 2 decades, the number of migrant geese has increased and they have altered their feeding habits, choosing large exposed agricultural fields in preference to marshes and tidal flats. Implications of these changes have been discussed by Reed (1970). To begin documentation on changing patterns of use by Canada geese of migratory stopover areas, we provide in this paper data on numbers of geese and their daily activity patterns in spring and autumn on a 20,000 ha area of southwestern Prince Edward Island during 1974 and 1975.

Study Area

The study area, located on the southern coast of Prince Edward Island, included sections of the Dunk and Wilmot Rivers and Salutation Cove, plus surrounding lands almost entirely devoted to agriculture. A narrow band of fresh water marsh occurred along both rivers and gradually broadened downstream into salt marsh and extensive tidal flats (Fig. 1). Salt marsh vegetation was composed primarily of *Spartina patens* with patches of *Scirpus maritimus*, *Carex paleacea* and *Spartina pectinata*. A narrow band of *Spartina alterniflora* and *Solidago sempervirens* grew along the edge of the water. Due to heavy siltation, there was very little submergent vegetation in the Dunk and Wilmot estuaries. *Ulva lactuca*, *Zostera marina* and *Enteromorpha* sp. were the most abundant submergents available in Salutation Cove.

Major agricultural crops grown in the study area were potatoes (*Solanum tuberosum*), oats (*Avena sativa*) with barley (*Hordeum vulgare*) and clover (*Trifolium spp.*) with small acreages of peas (Pisum sativum) and corn (*Zea mays*). Most fields were relatively large (40-100 ha) separated by sparse hedgerows and interspersed with small wood lots. A network of roads provided easy access for field observations.

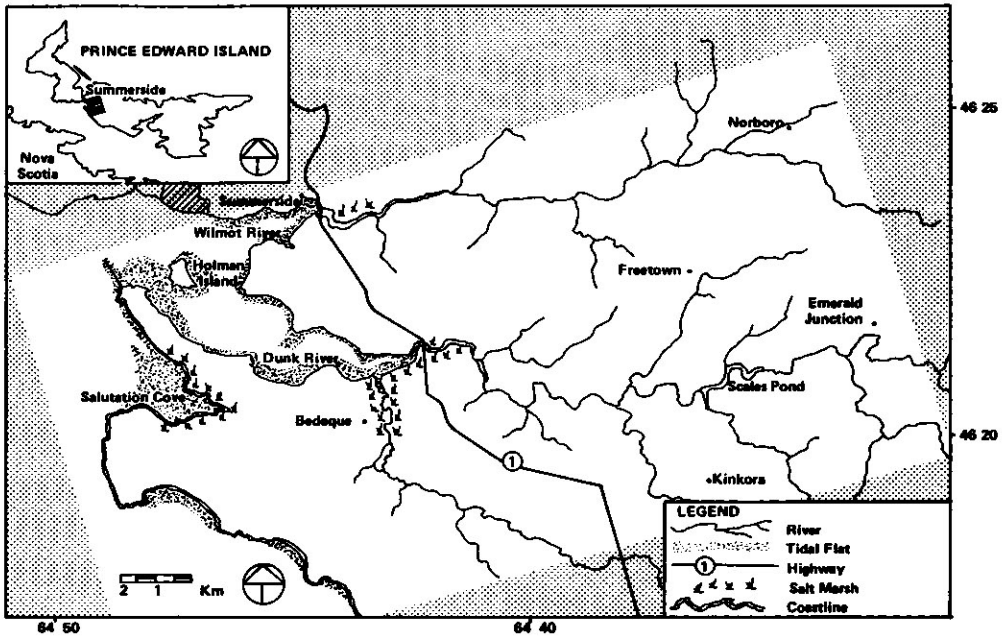

Fig 1 Study Area, Prince Edward Island, Canada.

Methods

In spring, at least 1 complete census was obtained for each 10-day period that geese were present during both years. Data on time, numbers, and direction of geese leaving and returning to resting sites were obtained by positioning 2-4 observers on high ground viewpoints. In 1975, to supplement spring ground observations, an aerial survey was conducted at 10-day intervals. We flew over the study area in a Cessna 172 at 200 m following a grid pattern. As well, geese were observed while they fed and loafed, and flock size, movements and habitat were recorded.

During autumn of both years, regular ground observations were made, and aerial surveys were conducted twice weekly.

Weather information was obtained from the Canadian Forces Weather Office, Summerside, 10 km west of the study area.

Results

Spring Numbers

March was relatively mild in 1974 with at least 0.25 cm of snow falling on 10 different days but usually only a trace remained on the ground. In March 1975 over 0.25 cm of snow fell on 16 days and the cumulative depth on the ground varied from 38-104 cm.

In 1974, geese arrived on the study area in early March and numbers increased rapidly to approximately 1,800 by mid-March (Fig. 2A). By mid-April, 5,760 geese were observed and a month later all had departed.

Owing to greater snow depth and harsher weather conditions, numbers of geese increased later in 1975, but as in 1974, a peak in numbers occurred by mid-April (Fig. 2B). Inclement weather in late April prevented an aerial census. Since ground counts generally were 20-30% lower than aerial counts, the decline during late April indicated in Fig. 2B may not have occurred. Numbers of geese using the area in spring may be increasing. On 21 April 1977, at peak spring numbers, an aerial census showed 8,300 birds, approximately 2,100 more than were observed at the peak 2 years earlier.

Spring Movements and Foraging Patterns

When geese arrived in early March, they roosted in the Dunk River estuary, Wilmot River (upstream from Route 1) and Salutation Cove (Fig. 1). Numbers in these sites were variable and occasionally almost all geese would concentrate in 1 of these areas. The Dunk River estuary was the largest resting site, usually accommodating over 65% of the migrants. Salutation Cove was used extensively after spring cultivation was well underway.

For the first 2 weeks after they arrived, geese remained at the resting sites from 1-4 hours after sunrise. By the end of March, geese began calling just after dawn as they concentrated near the center of their roost. The first geese left the site shortly after sunrise, and within 5-10 minutes groups of 2 to 300 were departing rapidly. Although suitable fields were available to the east, south and north, most geese on any particular day flew in 1 direction. As noted by Raveling (1969), the direction of initial take-off from rest sites was determined by wind but this did not influence the predominant direction flown to fields. Mean time required for all geese to leave the resting site was approximately 1.5 hours in both years.

For the first half of the stopover period, geese spent 6-12 hours away from the roost. Generally, a flock moved at least once to another field in the morning and sometimes also in the afternoon. While in fields, they frequently were observed loafing. In late April and early May, after many fields had been cultivated, geese re-

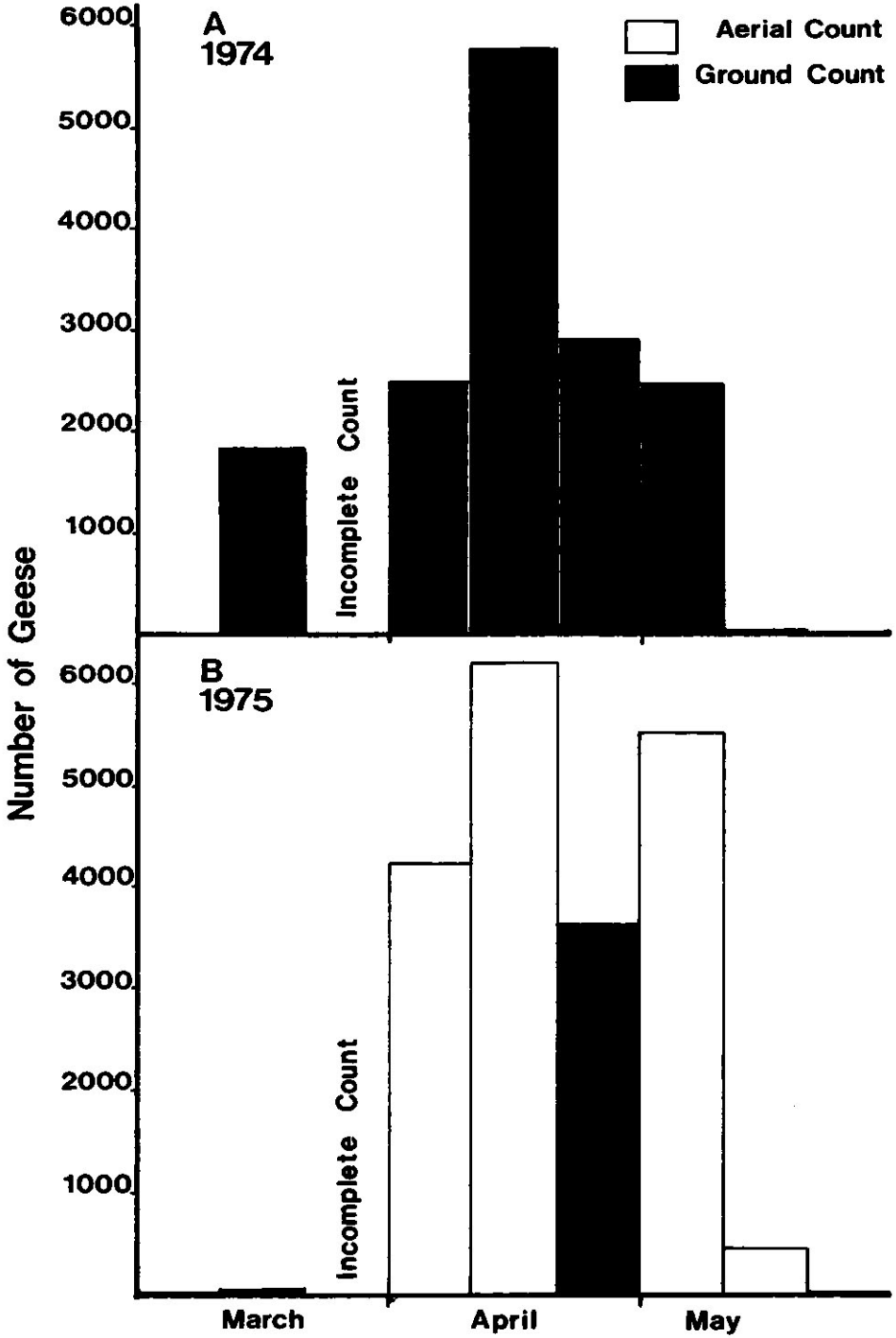

Fig 2 Maximum number of Canada geese observed during 10 day periods in spring on southwestern Prince Edward Island, 1974-1975.

turned by midmorning to loaf and feed on salt marshes where some remained for the rest of the day.

Fields available for foraging varied with crop rotation, snow conditions, and extent of cultivation the previous fall. Early in 1974, grain stubble near resting sites was used extensively, but as these food resources were depleted, geese moved further inland. Most observations of foraging geese occurred in grain stubble but potato and pea fields were also utilized. Deep snow cover during March 1975 caused problems for foraging geese; snow buried grain stubble and birds were obliged to feed on partially exposed potato fields. On 16 April 1974 and 14 April 1975, geese were observed grazing on salt marshes for the first time. Later in the season much time was spent feeding and loafing in salt marshes.

Flock size in fields varied from 4 birds to as many as 4,000; groups of 1,000-2,500 foraging geese were common.

Autumn Numbers

In 1974, only 32 geese were observed on the study area on 7 October, the opening day of the hunting season. Numbers built to a peak of 2,050 in late October and by mid-December most geese had left (Fig. 3A). In 1975, geese were seen first on 25 August, and 291 were present on the study area when the hunting season opened. A peak in numbers was not reached until the third week of November when 2,400 geese were present (Fig. 3B). In autumn, peak numbers of geese observed on the study area were less than 40% of spring numbers.

Autumn Movements and Foraging Patterns

In autumn, movements and feeding patterns were determined by hunting pressure, weather and agricultural activities. There was no evidence of a regular daily movement from resting sites to fields (≈ 40 ha) in autumn, and as in spring, they preferred grain stubble but also utilized pea and corn fields. Geese were not observed feeding in potato fields in fall.

Geese spent more time loafing and feeding in areas relatively inaccessible to hunters such as Salutation Cove and south of Holman Island. In 1975 favorable weather permitted early harvest of crops. Autumn cultivation was extensive and little grain stubble remained; thus geese resorted to feeding primarily on tidal flats. By late December geese no longer used the study area.

Discussion

It is not possible at present to determine what proportion of the North Atlantic Flyway population of Canada geese migrate through Prince Edward Island. Midwinter censusing of geese along the Atlantic coast has indicated a sharp increase over the past 3 decades (Bellrose, 1976). Aerial surveys conducted along the Prince Edward Island coastline in late autumn by the Canadian Wildlife Service and the P.E.I. Fish and Wildlife Division also indicate a dramatic increase recently in the number of geese. November surveys from 1967-1975 resulted in counts of from 8,000-10,000 geese. From 1976-1979 the number of geese observed during late fall surveys averaged almost 20,000 birds.

These numbers do not represent total counts since some geese would be feeding inland during the coastal flights. The rapid increase in numbers of geese visiting Prince Edward Island in both spring and fall may be due to changes in agricultural practices. Hankla and Rudolph (1967) report that the increased use of mechanized equipment and combining of small fields into large open blocks coincided with a change in feeding areas for Canada geese from coastal areas to inland agricultural

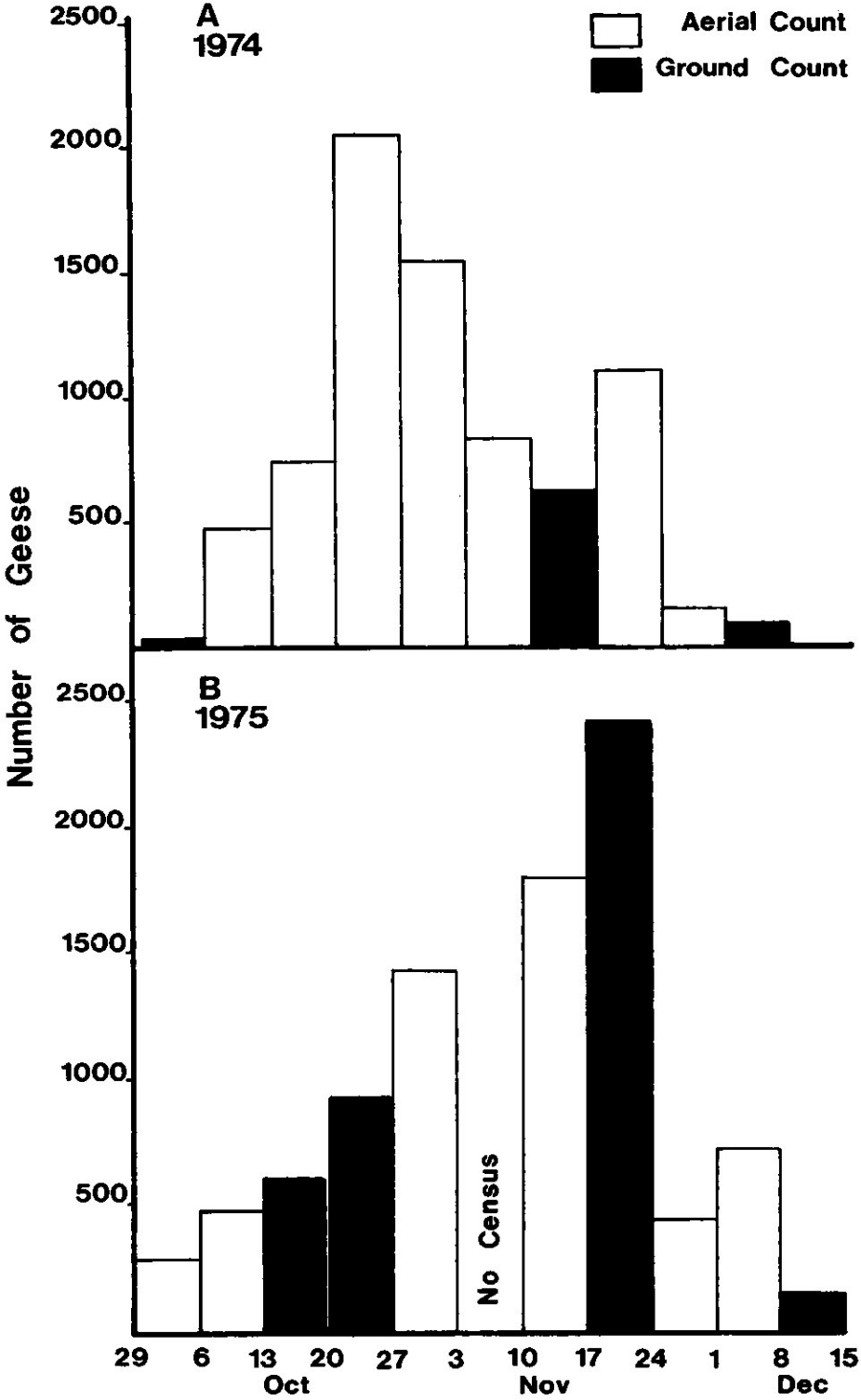

Fig 3 Maximum numbers of Canada geese observed weekly in autumn on southwestern Prince Edward Island, 1974-1975.

fields in north Florida and south Georgia. The average farm size on Prince Edward Island has increased from 32 to 68 ha over the last 85 years (Royal Commission Report 1973). Corporate farming operations and government incentives to remove hedgerows have led to much larger fields and because of their wind-swept nature, sections of these have little snow cover, thus providing exposed feeding sites long before snow and ice thaw on rivers and marshes.

Although quantitative data are limited, the period of spring hyperphagia for Canada geese appears variable; it may be completed before they leave the wintering grounds (McLandress and Raveling 1981a) or during migration (Hanson 1962). When feeding on agricultural land, geese in spring spent 6-12 hours daily on Prince Edward Island farmland. Reed et al. (1977) found that Canada geese migrating through the St. Lawrence Valley, Quebec, spent 4-8 hours per day on farmland. The proportion of spring weight gain that occurs on these migratory stopover areas is unknown, and it may change annually or vary according to length of migratory flight.

The literature on how geese exploit agricultural lands is substantial and relative forage values have been compared (Newton and Campbell 1973, Kear 1963), but the question of the nutritional corresponding reproductive consequences of switching from coastal feeding areas to agricultural lands has barely been addressed. Generally, cultivated crops are considered to be more nutritious than marsh plants (Kear 1963), but it is unknown whether agricultural lands can provide the balance of nutrients necessary for breeding. However, Reed (1976) noted that many geese which have made the switch to agricultural lands have increased their numbers. Current agricultural practices on Prince Edward Island are providing increased acreages for feeding, and thus the province can be expected to play an increasingly important role in ensuring that migrating geese in the Atlantic Flyway arrive on the breeding grounds in peak reproductive condition.

To proceed beyond this study, detailed observations on time spent foraging, type and amount of food items ingested and subsequent weight gain would be extremely valuable in determining the importance of migratory stopover areas. With color-marked individuals or flocks, precise information about length of stopover period, flock movements and behaviour could be obtained. Finally, we know almost nothing of relationships between habitats used for foraging, length of migration stopover, and the age and reproductive status of Canada geese.

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