

Moult migration of Lesser Snow Geese

KENNETH F. ABRAHAM

Salomonsen (1968) classified moult migration of waterfowl according to the age, sex, and reproductive status of participants, the number of individuals involved, and the relative locations of the moulting and breeding areas of the population. Those of several species of geese involve primarily the non-breeding segment of the population (but see Krohn & Bizeau 1979) and moult areas usually lie to the north of the breeding areas. The number of participants varies among species and populations, and in response to seasonal and demographic changes.

In North America, moult migrations of Canada Geese *Branta canadensis* and Emperor Geese *Anser canagicus* have been described (Sterling & Dzubin 1967; Krohn & Bizeau 1979; Blurton Jones 1972). Convincing evidence of moult migration by other North American goose populations, including Snow Geese *Anser caerulescens*, was lacking at the time of Salomonsen's (1968) review, but he reported its possible occurrence in the Wrangel Island Snow Goose and Brent Goose *Branta bernicla* populations (Salomonsen 1968; Uspenski 1960, 1965).

In this paper, I describe an annual moult migration of Lesser Snow Geese *A. c. caerulescens* from a breeding colony at La Pérouse Bay, Manitoba, Canada.

Study area and methods

The biology of Lesser Snow Geese has been studied since 1968 at a breeding colony at La Pérouse Bay, Manitoba (58° 30'N, 94° 25'W) (Figure 1). Activities are monitored from spring arrival until approximately four weeks after peak hatch; geese are captured and banded at that time. Coloured leg bands with unique alphanumeric codes have been attached to approximately 2,000–3,000 geese annually since 1972. This permits identification of individuals by observation at a distance with the aid of binoculars or telescopes.

Observations of yearling and adult non-breeding geese have been made in most years of the study, but these were intensified in 1976–1978. Observations of behaviour and distribution were made from

portable hides in 1976, and from a permanent live-in tower in 1977 and 1978. In 1976, eight females were trapped on nests and coloured with feather dyes at mid-incubation. Their eggs were removed to simulate predation, and the subsequent movement of these 'failed breeders' throughout the colony area were monitored. Aerial surveys were made during the late hatch period in 1976–1978 to determine the presence and distribution of non-productive geese.

Results

Non-productive geese at La Pérouse Bay had three options: leave the breeding area on a moult migration, or remain and moult either dispersed amongst flocks of productive adults with goslings, or in segregated flocks. The evidence summarized below indicates that the majority make a moult migration, but that some do join adults and young. There is no evidence for the local presence of moulting flocks of only non-productive geese.

The majority of yearlings and non-breeding adults remain at La Pérouse Bay for four to six weeks until around mid-hatch. During this period, they use a great variety of habitats within or near the periphery of nesting areas. Virtually all non-defended space in the colony is used. Individual yearlings and sibling groups were often closely associated with their parents during egg-laying and early incubation. Later, these and adult non-breeding pairs congregated in flocks of up to 400 birds. The geese whose 1976 nests were destroyed joined these groups of non-productive geese within hours of nest loss. The eight marked pairs were sighted 40 times during the two weeks after nest loss; 31 times they were in flocks which averaged 59 birds (range 3–400), 60% of which were yearlings.

By the late incubation period there was a noticeable increase in flock size and in local movements, presumably associated with premigration restlessness. Ground counts of non-productive geese at La Pérouse Bay immediately prior to hatch gave estimates of 3,700 in 1976, 5,000 in

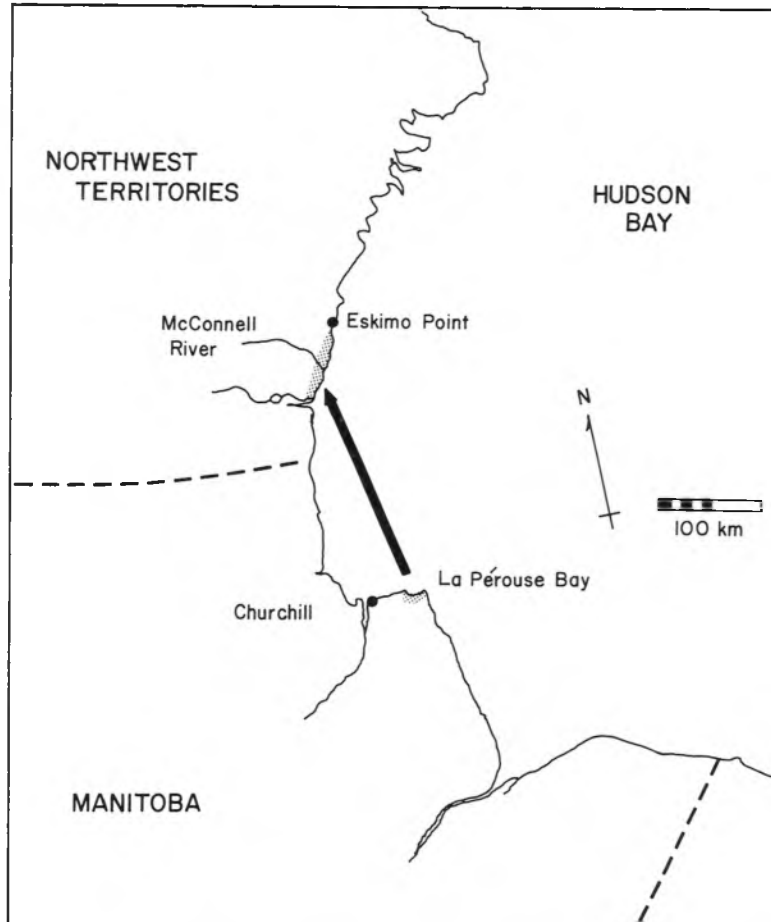


Figure 1. Location of La Pérouse Bay breeding colony and the McConnell River area where La Pérouse Bay non-productive snow geese were caught after moult migration.

1977, and 1,500 in 1978 (Table 1). The large number in 1977 was due to the presence of many failed and non-breeders that year. The smaller number in 1978 reflects both low production in 1977 and a generally successful nesting season in 1978.

The large, mobile flocks so evident immediately prior to the commencement of hatch were absent each year during the post-hatch period. The idea that they might simply alter their behaviour (i.e. become flightless and thus less visible to ground observers) was tested by aerial surveys. No flocks of non-productive geese were located in any year. Boag (1974) had earlier shown that geese without young comprised less than 2% of the adult and sub-adult geese in post-hatch flocks photographed during aerial surveys. J. A. Smith

(pers. com.) also found this to be true during ground observations in 1977.

Small numbers of Snow Geese were observed in flocks of moult migrant Canada Geese in each year from 1976–1978. Moult migrant geese of both species passed over La Pérouse Bay flying in a northwesterly direction on 16–20 June 1976, 14–17 June 1977, and from 19–29 June 1978. Some flocks of migrating geese in 1978 landed on the bay shore; later these, and others which did not land, flew out of sight over Hudson Bay. Although the Snow Geese with them may have originated far south of La Pérouse Bay, these observations provide positive evidence of moult migration. The disappearance of the prominent flocks discussed above occurred at the same time as the Canada Goose

Table 1. Summary of La Pérouse Bay banding data from 1972–1978 and estimated number of non-productive geese. Numbers given for banding include only mass-capture drives in which all geese were handled.

	1972	1973	1974	1975	1976	1977	1978	1972–1978 average
Number of yearlings in banding drives	11	17	31	13	50	98	14	—
Number of yearlings plus adults in banding drives	985	1,257	593	1,005	1,558	1,800	1,513	—
Percent yearlings	1.1	1.4	5.2	1.3	3.2	5.4	0.9	2.7
*Estimated number of non-productive geese present before hatch	—	—	—	—	3,700	5,000	1,500	—
†Estimated number of non-productive geese moulting at La Pérouse Bay	—	—	—	—	348	388	258	—
Estimated number and percent of total non-productive geese making a moult migration	—	—	—	—	3,352 (90.6)	4,612 (92.2)	1,242 (82.8)	90.3

* Aerial survey in 1976, ground surveys in 1977 and 1978.

† An estimated 23, 34, and 17 percent of post-hatch population at La Pérouse Bay was handled in mass capture drives in 1976, 1977, and 1978 respectively. These estimates thus represent the number of captured yearlings adjusted for proportion of colony handled, plus 2% of the adjusted number of adults (Boag 1974 and see text).

migration during mid-June each year.

In 1976, the feather-dyed 'failed breeders' remained close to their nest sites until hatch, then began to range the entire colony as hatch approached. They were last sighted on 20 June 1976, again at the same time moult migration was noted. Although it is difficult for ground observers to distinguish an actual departure flight from local movements, and thus establish the exact date of the migration exodus from the colony area, the observations above provide strong circumstantial evidence for a moult migration of La Pérouse Bay Snow Geese.

Banding data collected from 1972 to 1978 at La Pérouse Bay is summarized in Table 1. No flocks consisting only of non-productive geese were observed or captured. The proportion of yearlings in the captured sample (excluding goslings) varied from 0.9 to 5.4%. Even in the year of highest numbers (1977), this yields an estimate of only 388 non-breeders, or 10% of the estimated pre-hatch numbers. Thus, about 90% of La Pérouse Bay's non-productive geese leave the area to moult. A continued attachment to parents probably encourages some yearlings to remain at the colony for the wing moult. Of a small sample of 10 yearling geese, whose parents were identifiable and known to nest during the year, 4 were captured in the same flock as their parents.

Conclusive evidence of moult migration is provided by the case history of a female Snow Goose from La Pérouse Bay banded as a gosling in 1975. During the period of 14 May to 4 June 1977, she was sighted on seven days in a nesting area of the colony. She showed no attachment to a nest site, and her behaviour was inconsistent with that of known nesting birds although she was with a mate. It can be concluded that she was a non-breeder that year, as are most 2-year-old Snow Geese (Finney & Cooke 1978). Seven weeks after the final sighting at La Pérouse Bay, she was captured during her wing moult in a flock of non-productive Snow Geese near the McConnell River, Northwest Territories, 250 km to the north (Figure 1). She returned to La Pérouse Bay in 1978 and nested there, successfully raising four young. Another 65 geese banded at La Pérouse Bay between 1969 and 1976 were captured near the McConnell River in 1977.

Discussion

Non-productive Snow Geese from the La Pérouse Bay, Manitoba colony make an annual moult migration in mid- to late June after a 4 to 6 week residence at the colony. The number and age of individuals involved varies, but may have included as

many as 4,600 birds in 1977. At least some of the geese migrate 250 km northward. Thus the numbers, age and reproductive status of participants, and the direction of the migration are in agreement with known moult migrations for other *Anser* and *Branta* species (Salomonsen 1968).

Moult migrations involving other breeding colonies of Snow Geese are suspected but have not been documented. In the eastern arctic population, no moulting concentrations of non-breeders have been reported at locations remote from breeding areas, although Brace *et al.* (1978) and C. D. Ankney (pers. com.) have suggested that some non-breeders from the McConnell River colony migrate to other areas to moult. It is known only that many non-breeding geese moult near the large breeding colonies at the McConnell River, on Southampton Island, and on Baffin Island (Manning 1942; Cooch 1958; Barry 1962; Hanson *et al.* 1972; Kerbes 1975; Brace *et al.* 1978). For the western arctic population, Uspenski (1965) and Barry (1967) reported that the non-breeding geese did not return in spring to the colonies at Wrangel Island, Siberia, and Anderson River and Kendall Island, NWT, respectively. King (1970) and King & Hodges (1979) located moulting Lesser Snow Geese near Teshekpuk Lake, on Alaska's arctic slope, approximately mid-way between the Wrangel Island and western Canadian breeding areas. The decreasing numbers of Snow Geese moulting there in the 1970s (Derksen *et al.* 1979) suggests a link with the Wrangel Island colony which has been declining (Dzubin 1979). However, banding data (King & Hodges 1979) suggest ties with both breeding areas. The small number of geese means that this is not the only moulting location for non-breeders from those colonies. Barry (1967) had previously reported concentrations of non-breeding Snow Geese on the north end of Banks Island (Thomsen River and Castel Bay).

The significance of moult migrations in the life history of geese is not yet completely understood, although several explanations have been proposed (Salomonsen 1968). The data from La Pérouse Bay show

that some mixing of Snow Geese from different colonies occurs as a result of moult migration. This may also be the case at other eastern arctic colonies and the Alaskan moulting area. Whether the mixing is temporary, or permanent and leading to genetic exchange between colonies, has important implications. For example, Dzubin (1979) suggested that mixing during the moult could have contributed to recent increases in the frequency of blue phase Snow Geese in western North America. These findings and lack of information about the moulting areas of the large eastern arctic population underscore the need for further studies of moult migration.

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Summary

Over 90% of the yearling and non-productive adult Lesser Snow Geese *Anser c. caerulescens* from the La Pérouse Bay colony annually participate in a moult migration during mid-June, after a 4–6 week residence. Some of them undergo moult 250 km to the north, at the McConnell River, Northwest Territories. The occurrence of moult migration at other Lesser Snow Goose breeding colonies is suspected but not yet documented. Further study is required to locate moult areas of non-productive geese and to ascertain the significance of intercolony mixing.

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- Kenneth F. Abraham**, Dept. of Biology, Queen's University, Kingston, Ontario K7L 3N6, Canada.