Comparison of the breeding of Canada and Snow Geese at Westham Island, British Columbia

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Introduction

Canada Geese *Branta canadensis* have nested commonly on the Fraser Delta since the 1960's. Before 1940 they were not known to breed there (Dawe and Davies 1975). Pinioned Canada Geese, consisting of several races, were introduced to the George C. Reifel Migratory Bird Sanctuary on Westham Island from 1967 to 1972. One of the densest breeding concentrations of Canada Geese in British Columbia now occurs on the sanctuary (Figure 1).

Lesser Snow Geese *Anser c. caerulescens*, raised in captivity from eggs collected from the west coast of Hudson Bay, were brought to the sanctuary as adults in the autumn of 1973. Their wings were clipped and they were released in pens. They escaped to the sanctuary in 1974 and a few nested that year. After the geese moulted that year they became a free-flying flock but remained in the Westham Island region. In 1975, 23 pairs of Snow Geese nested in the display field of the sanctuary. Steps are now planned to restore the flock to captivity in order to eliminate the possibility of their mixing with the Wrangel Island (Siberia) flock that winters on the Fraser River Delta.

The objectives of this study were to compare the nesting of the two species at the sanctuary as well as with that of Canada and Snow Geese at other locations, to determine similarities and differences in chronology, nesting parameters and reproductive success.

The George C. Reifel Migratory Bird Sanctuary has been described by Dawe & Davies (1975) who conducted a preliminary study on Canada Geese there in 1973. Hence a short summary suffices here. The sanctuary is located about 30 km south of Vancouver in southwestern British Columbia and consists of approximately 340 hectares, 80% of it estuarine marsh. Except for the marsh, the sanctuary habitat has been dyked to develop grazing crops, nesting and loafing areas for waterfowl. The main study was conducted on a 12 hectare display field, consisting of grassland, mud flats, ditches and ponds with islands, available to public viewing. This field is crossed by paths. The vegetation consists of grasses, with *Juncus* sp. lining ponds and ditches and with trees and shrubbery growing mainly along the paths (Figure 2).

In 1975, the second author checked nests of Canada Geese in the developed area of the sanctuary once or twice a week from egg-laying to hatching. Sixty-two clutches of Canada Geese were removed that year after completion of egg-laying and during the first

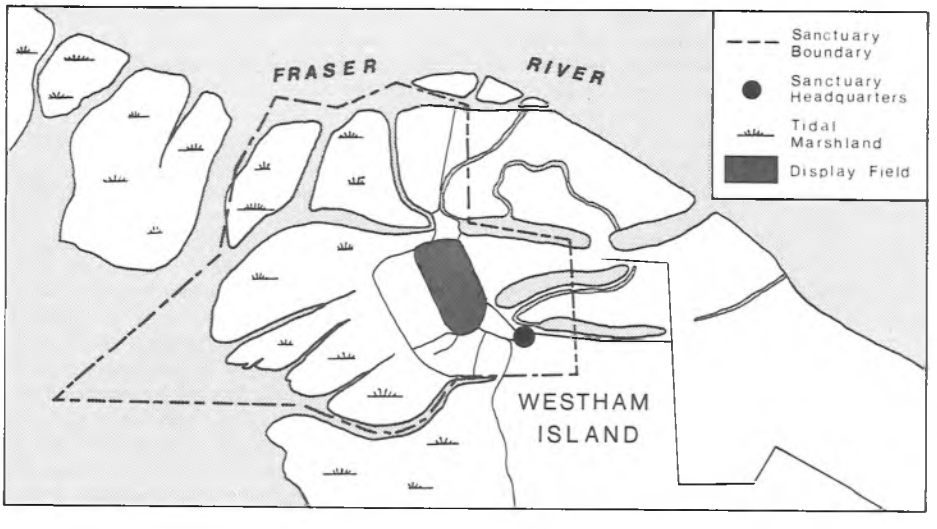

Figure 1. George C. Reifel Migratory Bird Sanctuary on Westham Island, British Columbia.

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Figure 2. Nesting habitat of Canada and Snow Geese on sanctuary display field.

days of incubation. They were placed in incubators by the British Columbia Fish and Wildlife Branch to raise goslings for the purpose of establishing Canada Goose populations in the Fraser Valley, British Columbia. Data were recorded on egg-laying and hatching success of initial and replacement clutches in 1975. In 1976 the first author checked Canada and Snow Geese clutches every alternate day during egg-laying, twice a week during incubation and on alternate days or daily during hatching. In 1977, a similar removal of Canada Goose clutches took place. Only subjective observations were made on Canada Geese in 1977, but the first author checked nesting Snow Geese twice weekly that year from egg-laying to hatching. In 1975, fields were systematically searched for nests which were given a number marked on a map, and recorded on record sheets. In 1976, the study was chiefly conducted on the display field and all nests were provided with a 25 cm wood block with a number painted on it, placed approximately one meter from the nest. The checking operation took about two minutes per nest site. Distances were measured between nests of nearest neighbours after the nesting season for both species in 1976 and for Snow Geese in 1977. Distances were also measured between Canada and Snow Geese nests where laying and incubation periods overlapped between the species.

Chronology and nesting period

Canada Geese and introduced Snow Geese are present all year in the Westham Island region. Paired Canada Geese were observed to visit the nesting platforms built for them in the sanctuary on sunny days at the end of January and beginning of February. Introduced Snow Geese are seen in the sanctuary all winter. The first wild Lesser Snow Geese, originating mostly from Wrangel Island (according to band recoveries), visit the sanctuary the beginning of October on their migration southward. From mid-October to November they arrive by the thousands. From then on a flock of about 10,000 Snow Geese frequent the vicinity of the Fraser River mouth until the latter half of April. Thousands of Snow Geese arrive at Westham Island in April during their northward migration from Oregon and California to Wrangel Island. The introduced Snow Geese have not been observed to mix with those wild Snow Geese.

Approximately 120 pairs of Canada Geese nested in the sanctuary in 1976, of which 53 pairs nested in the display field. In 1976 and 1977, 64 and 80 introduced Snow Geese, young included, were counted in the sanctuary. In 1975, 1976 and 1977, 23, 18 and 16 pairs of Snow Geese nested in the display field. One Lesser Snow Goose female mated to a Ross Goose male *Anser rossi* also nested there in those years.

Canada Geese initiated their clutches about four weeks before and hatched earlier than Snow Geese on the average (Figure 3). However, both species finished hatching during the first week of June in 1976. Canada Geese started laying at similar times in 1975 and in 1976 (Figure 4). Snow Geese commenced laying much later in 1975 than in 1976 and 1977 (Figure 5). The delay may have been the result of the generally lower air temperatures that occurred in the spring of 1975. However, a few weeks before laying in 1975, temperatures approached similar levels to those of 1976 and 1977 when most clutch commencement occurred (Figure 6). Therefore, if temperature was the sole factor responsible for late laying, Snow Geese should have laid earlier in 1975. Since Snow Geese bred for the first time that year, their breeding inexperience may have been a factor delaying egg-laying. First-time breeders generally lay later in the season than experienced birds. Thus Coulson & White (1958) found from a study of colour-banded kittiwakes that birds breeding for at least a second time bred 7·5 days earlier. Of three banded Snow Geese pairs, the laying dates in 1976 and 1977, namely 16th and 17th April, 26th and 28th April, 25th and 28th April were similar. In addition to the passerines it has been shown for penguins (Richdale, 1957), scoters (Koskimies, 1957), gulls (Vermeer, 1963) and shorebirds (Nethersole-Thompson, 1951), that the same females lay at similar dates from one year to the next.

The nesting period of Snow Geese at Westham Island, the time between the first egg laid and the last successful clutch hatched, lasted 44 to 51 days (Table 1). The nesting period for this species at McConnell River, western Hudson Bay, at Southampton Island and at Karrak Lake, central arctic Canada was 38 to 40 days (Cooch 1958, MacInnes 1962, Ryder 1971). The first eggs of Snow Geese were laid at the McConnell River from 28th May to 1st June (MacInnes 1962). Egg-laying of Snow Geese at Westham Island, except 1975, therefore was much earlier than in their native habitat on the west coast of Hudson Bay. The start of egg-laying of Lesser Snow Geese in the Arctic appears to be much influenced by snow conditions. It was shown in this study that in

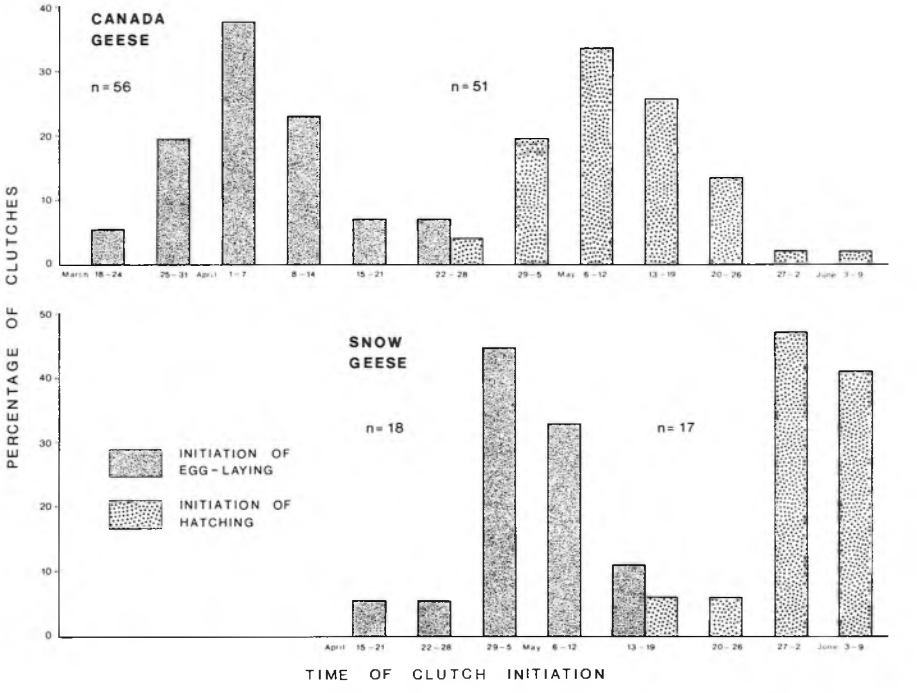

Figure 3. Comparison of egg-laying and clutch initiation of Canada and Snow Geese on display field, Westham Island, in 1976. Three additional Canada Goose clutches, located between the display field and sanctuary headquarters, are also included.

Table 1. Comparison of nesting periods of Canada and Snow Geese, Westham Island.

Species	Year	Nesting period Dates	Days
Canada Goose	1975	March 15–June 12	89
	1976	March 19–June 5	78
	1977	March 18–June 12	86
Snow Goose	1975	May 16–June 9	44
	1976	April 19–June 9	51
	1977	April 17–June 4	48

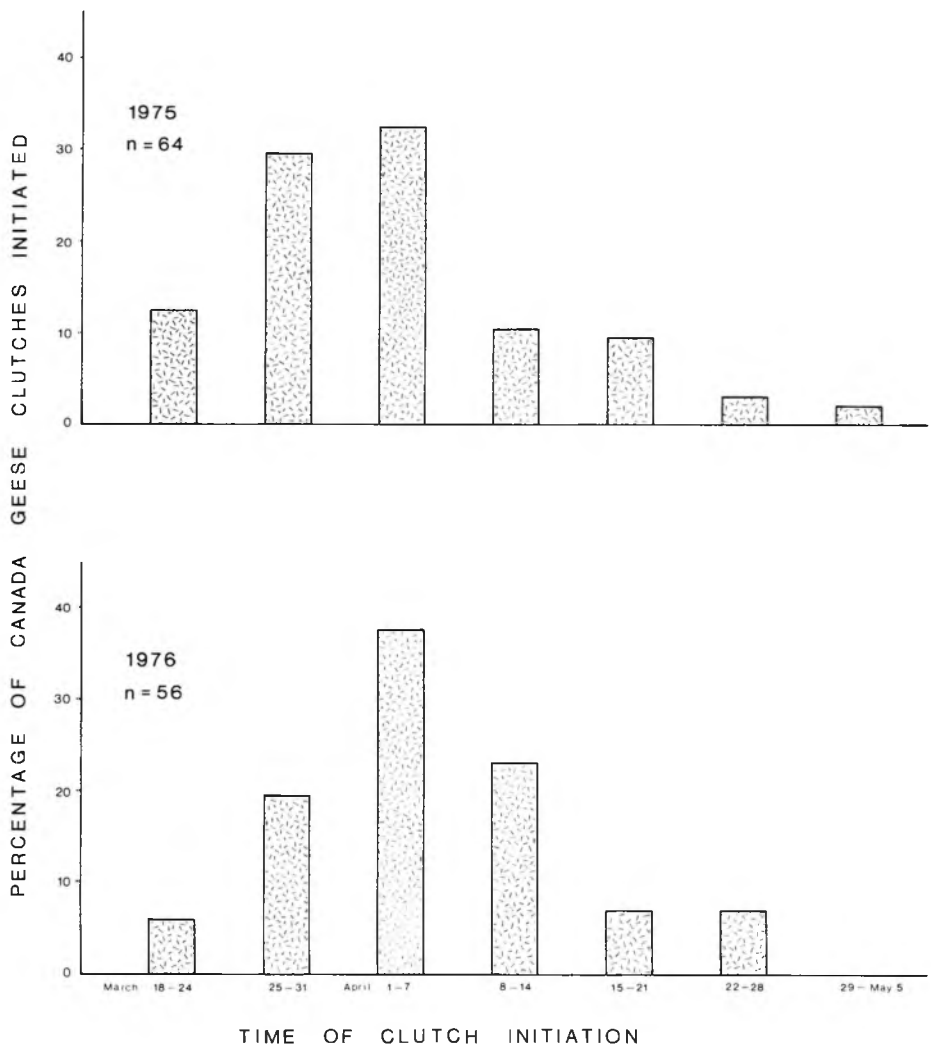

Figure 4. Comparison of commencement of initial clutches of Canada Geese in 1975 and 1976.

the absence of such limitations Lesser Snow Geese may start laying as early as mid-April. The nesting period of Canada Geese at Westham Island lasted 78 to 89 days and was approximately 35 to 40 days longer than that for Snow Geese (Table 1). MacInnes (1962) who compared the nesting periods for large and small races of Canada Geese at different North American latitudes reported that the period varied from 65 to 83 days for large geese in California to from 38 to 45 days for small geese in the Canadian Arctic. Dates of first clutch initiation varied from the first days of March in California to the beginning of June at McConnell River, Northwest Territories (MacInnes 1962). The relative shortness of the nesting period of Canada Geese at McConnell River appeared related to snow disappearance as well as time available for the young to develop during optimal plant growth (MacInnes *et al.* 1974). No re-nesting was observed in 10

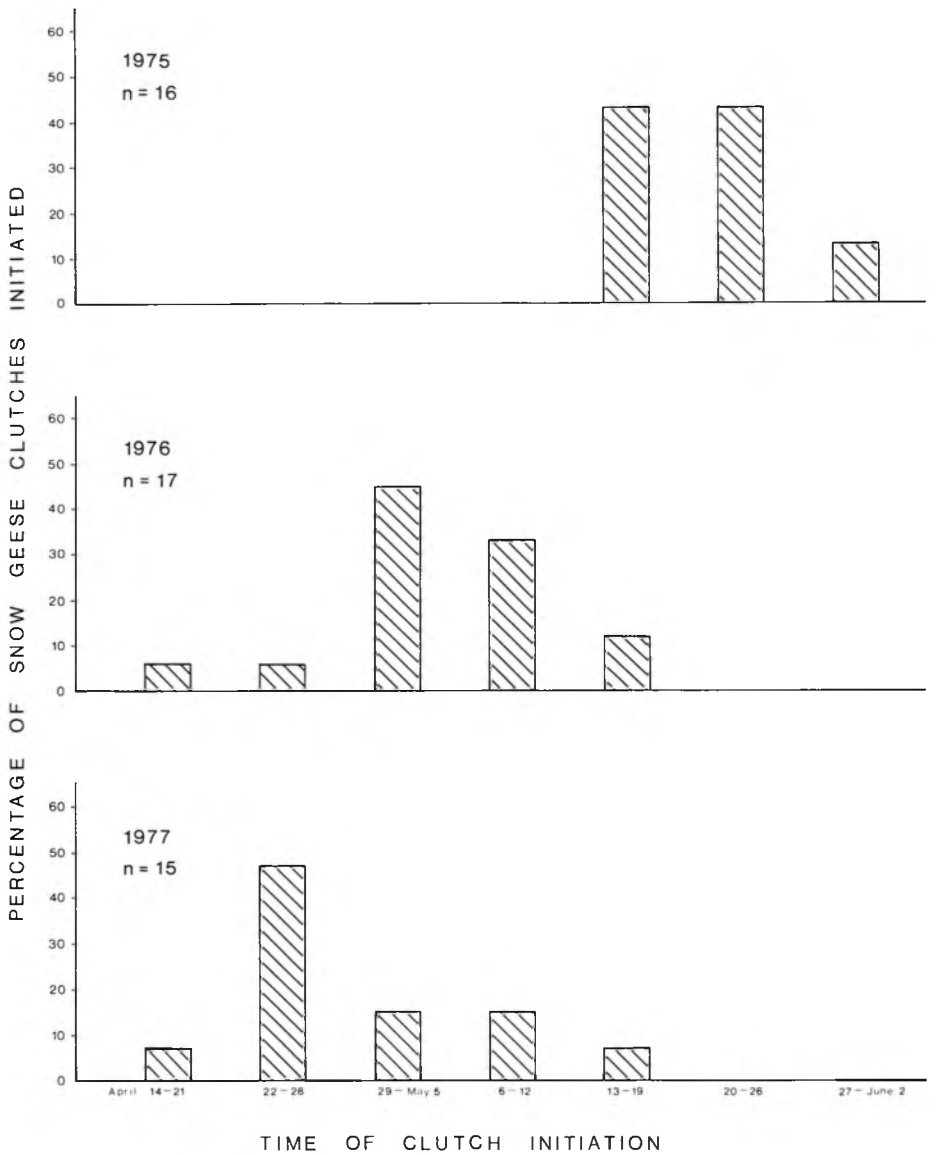

Figure 5. Comparison of clutch initiation of Snow Geese in 1975, 1976 and 1977.

years of study at McConnell River. The long nesting period and extensive re-nesting of Canada Geese at Westham Island perhaps can be explained on basis of the absence of snow and a long growing season. Inland nesting gulls in North America also have a shortened breeding season and show little repeat laying compared to marine forms. The difference appears related to a shorter growing season in the inland than in the marine habitat (Vermeer 1970a).

Canada Geese nest soon after snow disappearance from their nesting localities in Alberta (Vermeer 1970b). The length of time the geese spend near to or on the breeding grounds prior to nesting appears to have little or no relation to the time of clutch initiation. Canada Geese at Westham Island and at Newell Reservoir, Alberta, nest at similar latitudes. Both populations started laying during the second half of March, although the birds at Newell Reservoir were absent from four to five winter months (Figure 7).

In 1975, 62 Canada Geese clutches were removed shortly after clutch completion. It is thought on the basis of an observed second peak of clutch initiation two to three weeks after the first peak, that at least 50 per cent of the geese relaid. However, only 19 pairs could be identified as repeat layers with certainty from leg band numbers, morphological and behavioural characteristics and knowledge of initial nesting history. Renesting intervals, periods between removal of completed initial

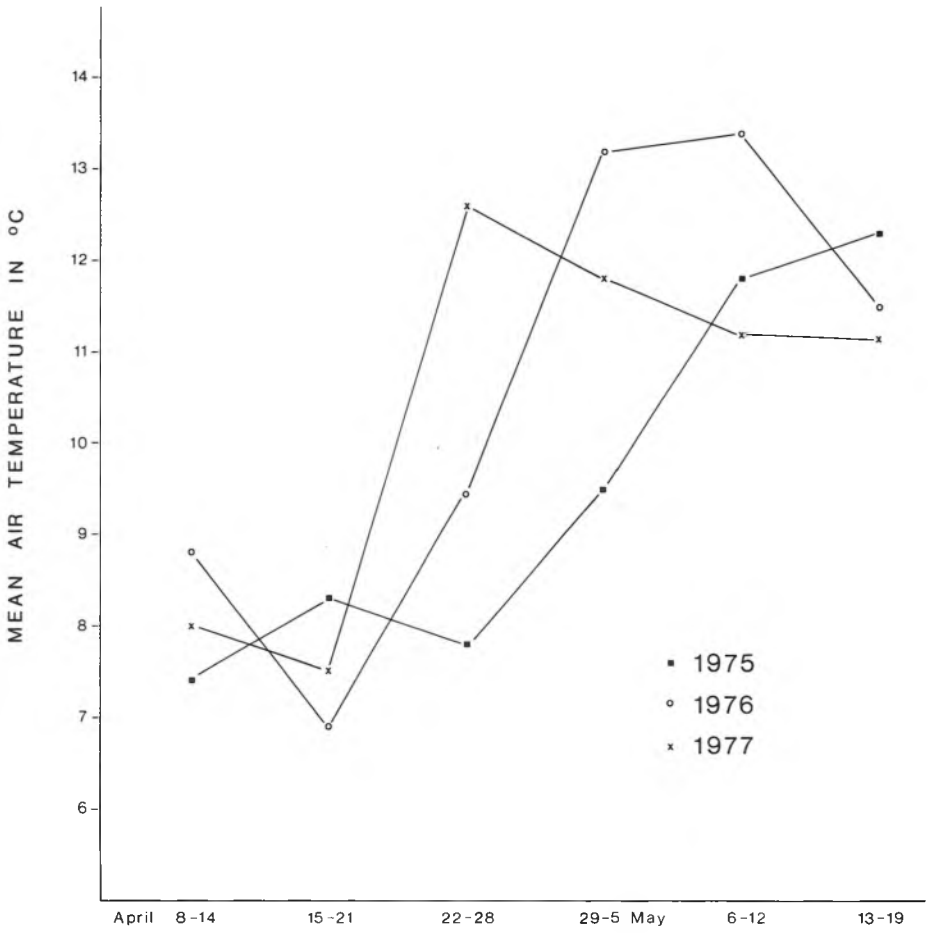

Figure 6. Comparison of mean weekly air temperatures at Vancouver International Airport in 1975 1976 and 1977.

clutches and the initiation of replacements, for 17 pairs averaged 16 and ranged from 13 to 21 days (Table 2). Brakhage (1965) reported an average renesting interval of 13 and a range from 5 to 22 days. Perhaps the lower limit of 5 days reported by Brakhage may have been derived from a case in which the initial clutch was incomplete when lost. Atwater (1959) reported a renesting interval of 17 days for Canada Geese and observed that renesting birds frequently moved far away from the original location. Our data on renesting distances of Canada Geese are limited as the study was restricted to the sanctuary. Repeat layers within the sanctuary ranged from 0 to 120 metres from the original nest site. In several cases another pair took over the nest site after removal of the clutch belonging to the original pair. Renesting appeared to extend the nesting period

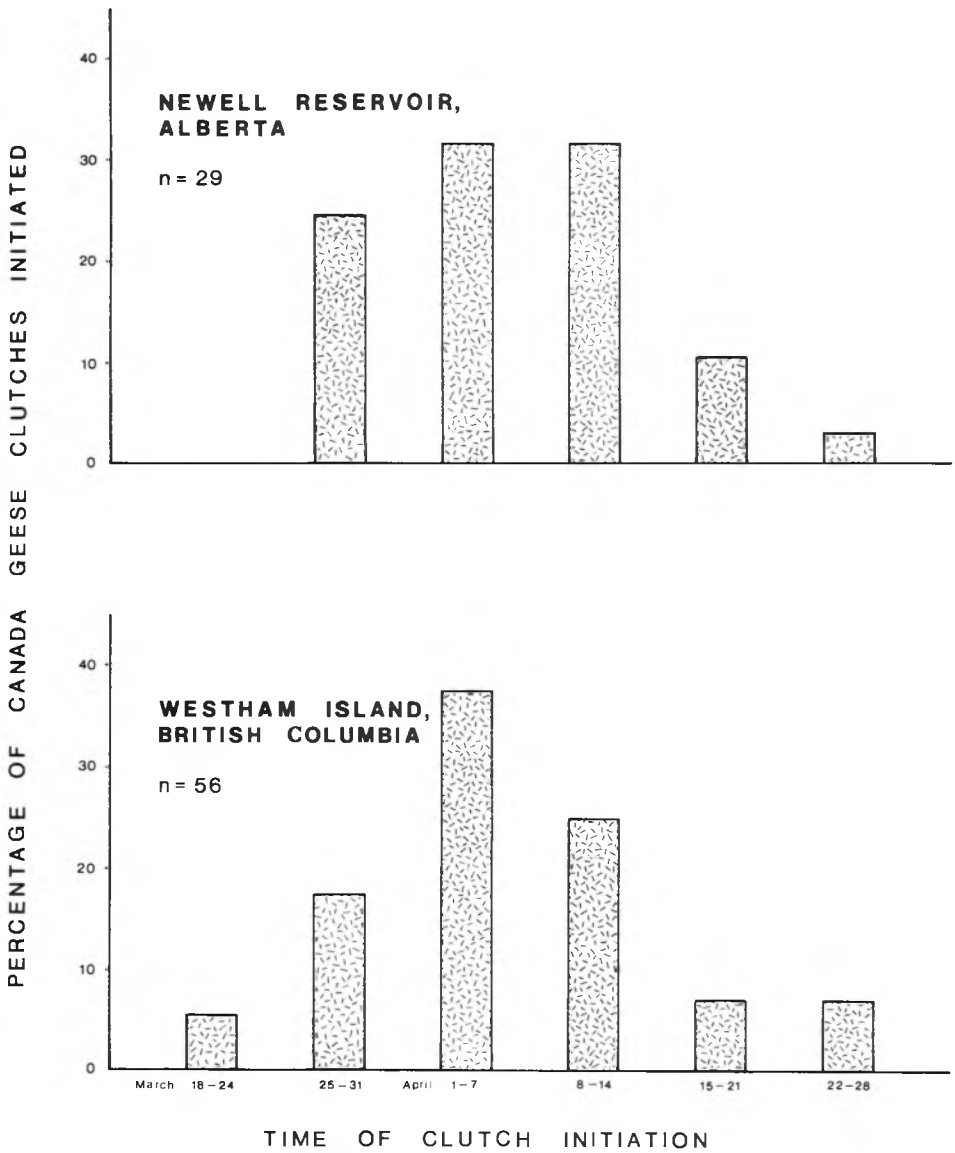

Figure 7. Comparison of clutch initiation of Canada Geese at Newell Reservoir, Alberta, 1969 (Vermeer 1970), and at Westham Island, British Columbia, 1976.

Table 2. Re-laying intervals between 17 initial and replacement clutches of Canada Geese, Westham Island, B.C. 1975.

First clutch taken	Re-laying intervals in days
March 31	17, 17
April 4	15, 15, 17
April 8	15, 16, 16, 21
April 11	14, 16, 16
April 15	13, 15, 15, 15, 15
Average re-laying interval	15·8 days

by about one week. In years of extensive clutch removal, 1975 and 1977, the last Canada Geese hatched around 12th June, while in 1976, in the absence of removal, the last hatched on 5th June.

Nesting parameters

The nest distribution of Canada and Snow Geese in the 12 hectare display field in 1976 is shown in Figure 8. It was similar in 1977. The display field approaches an island situation, where the geese are relatively free from mammalian predation. Snow Geese nested only in the display field and Canada Geese nested many times more densely within its boundaries than outside it. Canada Geese nested everywhere in the display field while Snow Geese were restricted to its northern portion. The habitat there did not visibly differ from the remainder of the display field. The restricted nesting pattern of Snow Geese may therefore relate to their more colonial nesting habits. The method of Clark & Evans (1954) was used to test whether the observed distribution of Canada and Snow Goose nests in the whole display field in 1976 departed from a random distribution. The distribution of Canada Goose nests showed a significant deviation from randomness in the direction of uniform spacing while that of Snow Goose nests showed a significant deviation in the direction of aggregated spacing. A similar uniform distribution of Canada Goose nests was observed in Alberta, where 129 nests of Canada Geese were situated on a 6·5 hectare lake island and the tendency toward uniform spacing in this species was related to its strong territoriality (Vermeer 1970b). Significant deviation from randomness in the direction of aggregated spacing has also been observed in Black-headed Gulls *Larus*

Table 3. Comparison of frequency distribution of distance to closest neighbouring Canada and Snow Geese nests, Westham Island.

Distances between nests in metres	Between Canada Geese, 1976	Between Snow Geese 1976 and 1977	Between Snow and Canada Geese 1976 and 1977
5·0	2		2
10·0	1	2	2
15·0	4		1
20·0	12	10	5
25·0	7	7	6
30·0	6	7	4
35·0	6	3	4
40·0	2	2	4
45·0	4		2
50·0	2	1	2
55·0	4		1
60·0	1	1	1
65·0			
70·0	1	1	
75·0			
80·0			
85·0			
90·0			
95·0	1		
Total distances measured	53	34	34
Mean distance ± 95% conf. int.	29·5 ± 4·7	26·5 ± 4·7	27·5 ± 5·4

ridibundus in the north of England (Patterson 1965) and in Ring-billed Gulls *Larus delawarensis* in Alberta (Vermeer 1970a). Aggregated nesting in gulls is thought to be a mechanism to protect gulls against predators. Perhaps Snow Geese nest in colonies to protect them from avian and mammalian predators. If the Clark-Evans method is applied only to the northern portion of the display field where the Snow Geese nested, a significant deviation from randomness in the direction of uniform spacing is found for this species in that area, which may relate to a strong territoriality.

Quantitative data on agonistic behaviour between species was not collected, but on a few occasions Canada Geese were seen driving off Snow Geese from nesting territories and vice versa. Measurements of distance from nearest neighbouring active nests within and between species showed that Snow Geese, the smaller species, nested as close to their con-specifics as to active nests of Canada Geese (Table 3). This obser-

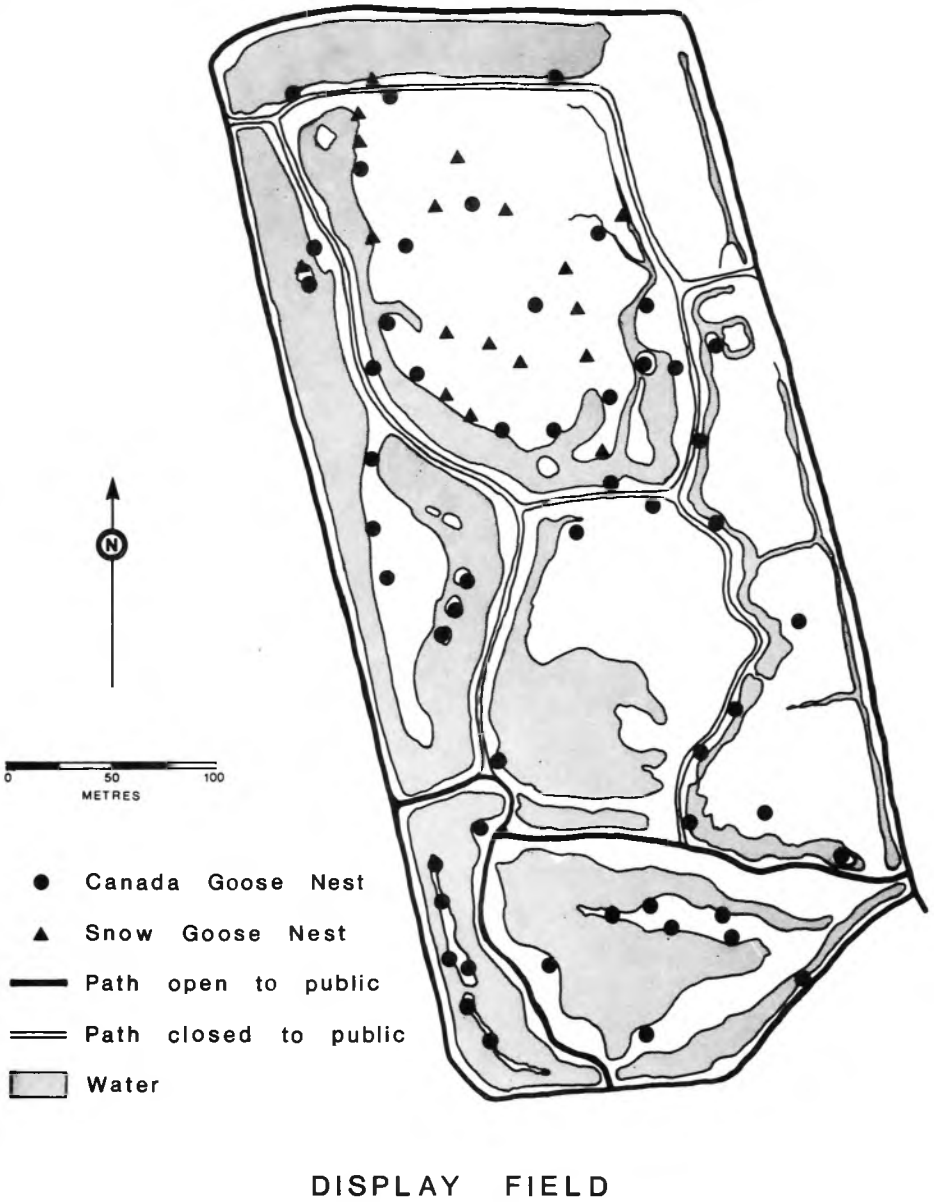

Figure 8. Nest distribution of Canada and Snow Geese on the sanctuary display field, Westham Island, 1976.

vation and the fact that Snow Geese eggs hatched successfully shows that Snow Geese can hold their own against the much larger Canada Geese during the nesting period. Fabricius (1974) also observed that Greylag Geese *Anser anser* bred successfully near larger and stronger Canada Geese in Sweden.

The average Canada Goose clutch of 6·2 eggs at Westham Island appears to be at the mean upper limit for this species. Clutches of western Canada Geese averaged 5·3 eggs for 6·366 nests (Bellrose 1976). At Westham Island in 1976 initial Canada Goose clutches laid during the first half of the laying period averaged significantly larger than those laid in the second half (Table 4), presumably reflecting younger geese laying at a later date. Brakhage (1965) found that older females laid larger clutches and earlier in the season than younger females. Replacement Canada Goose clutches in 1975 were also significantly smaller than initial clutches (Table 4), perhaps as a result of depletion of nutrient reserves or atretia of ovarian follicles in re-nesting females, or both.

The average Snow Goose clutch (excluding one with 2 eggs deserted during laying) over a three-year period at Westham Island was 4·6 eggs (Table 5). The smaller clutch size in 1975 than in 1976 and 1977 probably reflects different methods of investigation. In 1975, nests were only occasionally checked during laying and incubation and some disappearance of eggs between visits would not have been noticed. Lesser Snow Goose clutches averaged 3·9 eggs for 3,514 nests, in six studies, and the largest average clutch size 4·4 eggs was reported from Southampton Island (Bellrose 1976, Cooch 1958). Therefore, the average Snow Goose clutch at Westham Island of 4·6 eggs, like that of Canada Geese, appears to be at the upper limit. Barry (1966) reported that the smallest average clutch size of Lesser Snow Geese in eight seasons at Anderson Delta was 3·2 eggs. It occurred in a year when the snow melt was delayed the longest, while the largest clutch size, 4·3 eggs, occurred with one of the earliest snow melts. Perhaps the large Snow Goose clutch size at Westham Island can be explained on the basis of the absence of limitations such as snow at the time of laying.

Egg-laying intervals, between the appearance of eggs within the same clutch, averaged 1·7 days for Canada Geese and 1·2 days for Snow Geese (Table 6). Intervals appear to vary according to race and latitude for Canada Goose populations. Those for a large race at Dowling Lake, Alberta averaged 1·87 days (Vermeer 1970b), while those for small races at McConnell River, western Hudson Bay and at the Yukon-Kuskokwim Delta, Alaska averaged just over one day (MacInnes 1962, Mickelson 1975, Bellrose 1976). Ryder (1971) reported a 1·3 day laying interval for Lesser Snow Geese at Karrak Lake, which is similar to that for the species on Westham Island. Cooch (1958) and Ryder (1971) found that Blue and Lesser Snow Geese laid one egg per day for the first few days, skipped one day, and then completed their clutches. A similar pattern was observed in Snow geese at Westham Island. Incubation periods for Canada and

Table 4. Comparison of early and late and initial and replacement clutches of Canada Geese, Westham Island, 1975 and 1976.

	Early and late clutches, 1976			Initial and replacement clutches, 1975	
	March 18–April 7	April 8–April 28	All clutches	Initial	Replacement
Total no. clutches	34	22	56	19	19
Range of clutch size	5–9	3–7	3–9	4–8	2–7
Mean clutch size	6·56	5·68	6·21	6·79	5·42
95% conf. int.	±0·29	±0·46	±0·27	±0·50	±0·76

Table 5. Clutch size of Snow Geese, Westham Island, 1975–1977.

	1975	1976	1977	All years
No. of clutches	23	17	15	55
Range of clutch size	2–6	4–7	2–6	2–7
Mean clutch size	3·9	5·1	4·5	4·6

Table 6. Calculation of average egg-laying interval in Canada and Snow Geese, Westham Island, 1976.

No. days between visits to nest	No. visits		Total no. days		Total increase in no. eggs	
	Canada Geese	Snow Geese	Canada Geese	Snow Geese	Canada Geese	Snow Geese
1	62	6	62	6	45	5
2	36	3	72	6	40	6
3	29	5	87	15	47	12
Total			221	27	129	23

Mean no. eggs laid: Canada Geese 221/129 = 1·71 days. Snow Geese 27/23 = 1·17 days.

Snow Geese at Westham Island averaged 26·5 and 22·4 days (Table 7). Similar incubation periods for Canada Geese have been reported by Kossack (1950) in Illinois and Vermeer (1970b) in Alberta. Incubation periods for Lesser Snow Geese averaged 23·1 days for 201 clutches observed by Cooch (1958) and 22·4 days for 48 clutches observed by Ryder (1971). Those are similar to the periods observed in Snow Geese in this study.

Hatching success

In the literature hatching success of geese is most frequently given on a nest basis in which the term 'nest' appears to apply to a nest containing a clutch of eggs and in which a clutch is considered successful if at least one egg hatches. On that basis, 89·3% of the Canada Geese clutches on Westham Island in 1976 hatched (Table 8). In 14 investigations of western Canada Geese, 69·2% of 6,724 nests hatched (Bellrose, 1976). For a ground nesting population, as distinct from one utilizing artificial platforms, the Canada Geese at Westham Island approached the upper limit of hatching success for the species. Hatching success of Lesser Snow Geese in this study was similarly high (Table 8). Bellrose (1976) concluded that Lesser Snow Geese are successful nesters except during years of unusually severe weather. In several studies on Lesser Snow Geese in the Arctic only 11–14% of Lesser Snow Goose clutches failed to hatch at least one egg. The Snow Geese on Westham Island were at least as successful breeders as arctic populations. Predation on goose eggs in the display field was an almost negligible factor (Table 8). Predation on Canada Geese in the sanctuary outside the display field appeared more substantial. In 1976 about a dozen Canada Geese clutches there were found preyed upon. Raccoons were thought to be responsible.

Table 7. Incubation periods for Canada Geese and Snow Geese, Westham Island.

	Canada Geese	Snow Geese
No. of clutches	37	23
Range	25–28 days	22–24
Mean	26·5 days	22·4 days

Table 8. Hatching success of Canada and Snow Geese, Westham Island, B.C.

Fate of clutches and eggs	Canada Geese 1976	Snow Geese All years
No. of clutches	56	56*
% clutches producing young	89·3	91·1
% clutches deserted	7·1	5·3
% clutches incubated but not hatched	3·6	3·6
Total no. eggs laid	348	244
% eggs hatched	77·0	83·6
% eggs not hatched	22·4	16·0
% eggs preyed upon	0·6	0·4

* Original 57 clutches, one taken to incubator.

Canada Geese which laid early (18th March to 7th April) produced significantly more goslings (81·2% of 223 eggs) than those who initiated their clutches later (8th to 28th April), which produced 68·0% of 125 eggs. A higher percentage of goslings also hatched from larger than from small clutches. Thus 10 clutches of 3–5 eggs hatched 58·7%, 23 of 6 eggs hatched 73·2% and 23 of 7–9 eggs hatched 83·8%. As discussed earlier, this phenomenon may be related to older females laying earlier, having larger clutches and being more successful in raising goslings than younger and inexperienced females. Nineteen replacement clutches produced 80 goslings from 103 eggs, representing a hatching success of eggs of 77·7%. This percentage compares favourably with 77·0% eggs hatched from 56 (most or all initial) clutches in 1976 (Table 8). Replacements therefore can be equally important to the reproductive output of Canada Geese as initial attempts.

Few records were kept on broods after hatching. On 9th and 10th June 1976, 170 and 56 goslings of different ages of Canada and Snow Geese respectively were observed on the display field. The display field gates were left open soon after 10th June and geese and their broods dispersed over the sanctuary.

Blue phase geese

The Lesser Snow Goose is a polymorphic subspecies, *Anser caerulescens caerulescens*, and is distinct from the Greater Snow Goose *Anser caerulescens atlanticus*. The latter is somewhat larger, has a longer bill and consists of white phase geese. The Lesser Snow Goose includes two colour phases, white and blue. This dimorphism appears to be determined by a single autosomal gene with the blue phase dominant over white (Cooke & Mirsky 1972). The Lesser Snow Geese breed from Wrangel Island, USSR to Baffin Island and the west coast of Hudson Bay in the eastern Canadian Arctic. They are predominantly white on Wrangel Island and in the western Canadian Arctic, while there is a high ratio of blue geese in the eastern Canadian Arctic.

Among the Snow Geese breeding in the sanctuary there were four and one blue geese mated to white geese in 1976 and 1977 respectively. In four of those matings, the colour phase ratios for goslings were known. The white/blue ratios for goslings from the mating of a Ross Goose gander and a white female Lesser Snow Goose were also known for 1975, 1976 and 1977. The overall white/blue colour phase ratios for Ross × Snow Goose and white × blue Snow Goose offspring were 5:7 and 5:9 respectively. The 2-year-old 1975 offspring of the Ross × Snow Goose are at present held in captivity. One is a white female and looks like a Ross, and the two others are blue males and appear like blue Lesser Snows. It is unknown why there is a gradient in Lesser Snow Geese from predominantly white phase geese in the western Arctic to a high proportion of blue phase birds in the eastern Arctic. Blue morphs may also derive from the interbreeding of Lesser and Greater Snow Geese. Inasmuch as hybrid offspring of white Lesser Snow and Ross Geese can be blue, perhaps so can the offspring resulting from the interbreeding of Lesser and Greater Snows. Blue phase hybrids may only result under certain gene combinations as white offspring of Lesser and Greater Snow Goose crosses have been observed (F. G. Cooch, pers. com.). A blue phase goose with Greater Snow Goose characteristics has now been recorded and is present in the natural Museum of Canada (F. G. Cooch, pers. com.). The breeding populations of Greater Snow Geese are restricted to the Canadian eastern Arctic, Baffin Island and north-west Greenland. Blue geese recently constituted from 20–25% of the Lesser Snow Goose population on western Hudson Bay, from 23–37% at Southampton Island and from 40–80% on Baffin Island (Kerbes 1975). It is either highly coincidental or very relevant that the highest proportion of blue geese occur on Baffin Island where both species breed. A few Greater Snow Geese may have settled in the large Lesser Snow Goose colony at Bowman Bay, Baffin Island, during their northward migration in the spring and interbred. The Bowman Bay colony had the highest percentage of blue morphs in 1940 (95%) and in 1959 (97%) on Baffin Island (Cooch 1961). Another high proportion of blue morphs, i.e. 73% of the Lesser Snow Goose population, occurs at Cape Henrietta Maria which is among the most southeastern colonies for this subspecies. The high ratio of blue geese there may derive from the emigration of Lesser Snow Geese to that location from Baffin Island (Cooch 1964; Hanson *et al.* 1972). Lumsden (1971) reported that blue geese constituted 67–95% of the Lesser Snow Goose population in the fall at the lower end of James Bay, which is at that latitude the most eastern staging area for that subspecies during migration.

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Summary

The breeding of Canada Geese *Branta canadensis* and Lesser Snow Geese *Anser c. caerulescens* was investigated at Westham Island, British Columbia in 1975, 1976 and 1977. Snow Geese laid significantly later in 1975 than in 1976 and 1977. Lower air temperatures and inexperience may have been responsible for the late clutch commencement in 1975. Snow Geese bred much earlier and over a longer period at Westham Island than in the Arctic, perhaps because of absence of snow at the time of laying and a longer growing season at the former. Although Canada Geese nesting at Westham Island are not migratory, they commence egg laying at approximately the same date as migratory Canada Geese that nest at a similar latitude in Alberta. Renesting intervals for this species averaged 16 days. The nest distribution of Snow Geese was more restricted than that of Canada Geese, which may relate to the colonial nesting habits of the former. Both species tended to have nests uniformly spaced, which may reflect intraspecific territoriality. Clutch sizes of both species at Westham Island were at the upper limit of those reported elsewhere. Canada Goose clutches were significantly larger during the first half than the second half of the laying period and initial clutches averaged significantly larger than replacements. Egg laying intervals and incubation periods for Canada Geese averaged 1·7 and 26·0 days and for Snow Geese 1·2 and 22·4 days respectively. Those periods were similar for Snow Geese in the Artic. Canada Geese had a high hatching success at Westham Island compared to geese elsewhere and their replacement clutches produced as many young as initial clutches. This study showed that Snow Geese can breed as successfully in temperate as in Arctic regions. Blue phase offspring were observed from a Ross's Goose gander and a white female Lesser Snow Goose. It is suggested that blue phase geese may also derive from the interbreeding of Lesser and Greater Snow Geese.

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A small flock of Lesser Snow Geese *Anser c. caerulescens.* (*Philippa Scott*)