

# Recognizable Forms

## Subspecies and Morphs of the Snow Goose

by  
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### Introduction

The Snow Goose (*Chen caerulescens*) has two distinct subspecies: the nominate Lesser Snow Goose (*C.c. caerulescens*) and the Greater Snow Goose (*C.c. atlanticus*). The two subspecies differ in their distribution, size, structure and weight, and each occurs in two distinct colour morphs (phases). The blue morph is common in the Lesser subspecies, but rare in the Greater subspecies (Godfrey 1986). The two morphs were once considered separate species — the Snow Goose and the Blue Goose (A.O.U. 1957).

The Greater and Lesser Snow Goose subspecies can often be identified in the field if one knows all the differences in their distribution, morphs, size and structure.

This note first outlines important information about the distribution, populations, and identification of the two subspecies in Ontario. Secondly, it describes the historical changes in the distribution and populations of the two morphs. Thirdly, it explains the fascinating genetic and behavioral differences between the two morphs.

### Lesser Snow Goose

The Lesser Snow Goose subspecies is the normally encountered race in most of Ontario, except in eastern Ontario east of Ottawa where increasing numbers of

Greater Snow Geese have occurred in recent years. The Lesser Snow Goose breeds in the low Arctic (south and west of the Greater Snow Goose) south along the Ontario coasts of Hudson Bay and James Bay (Godfrey 1986). In Ontario populations, the blue morph is more common than the white morph. For example, the blue morph constitutes 70 to 75% of the breeders at Cape Henrietta Maria (Lumsden in Cadman *et al* 1987). Large numbers of Lesser Snow Geese stage in southern James Bay. Most of the James Bay populations migrate west of southern Ontario, but small numbers are seen in the south. Usually the blue morph predominates among migrant Lesser Snow Geese seen in southern Ontario. Since the blue morph is rare in the Greater subspecies, a mixed flock having a high percentage of blue morph birds can be identified confidently as Lesser Snow Geese. In addition, Lesser Snow Geese are noticeably smaller in comparison with the two large races of the Canada Goose (*Branta canadensis interior* and *B.c. maxima*) found in southern Ontario, whereas Greater Snow Geese appear almost as big.

### Greater Snow Goose

This larger eastern subspecies breeds in the Canadian eastern high Arctic and northern Greenland, and

winters along the Atlantic coast of the United States. Historically, the entire population staged in spring and fall along the St. Lawrence River near Quebec City (Godfrey 1986). In 1900, the population of Greater Snow Geese staging along the St. Lawrence was estimated to be 2-3,000 (Bellrose 1976). Greater Snow Geese have been increasing rapidly in recent years, with an estimated population of 356,000 along the St. Lawrence River in the spring of 1991 including 137,000 at Lac St. Pierre, approximately 100 kilometres down-river from Montreal where they were uncommon a decade ago (Yank *et al*, 1991). The population staging along the St. Lawrence River in the fall of 1991 was estimated at 500,000! (Yves Aubry, pers. comm.). Henri Ouellet (pers. comm.) of the Canadian Museum of Nature reports that Greater Snow Geese are now being seen in numbers near Montreal. This recent spread of Greater Snow Geese may be due to an increase in their food resources. They are using croplands more now which means that the population can increase and expand in distribution.

The Greater Snow Goose was not listed for Ontario by James (1991). However, the rapidly expanding numbers of Greater Snow Geese close to the provincial border suggested that they should be occurring in eastern Ontario. The first reported evidence of the Greater subspecies in Ontario was documented in the spring of 1986 when birds photographed by Bruce DiLabio (pers. comm.) east of Ottawa at Riceville, Prescott County, were identified as Greater Snow Geese by Graham Cooch of the Canadian Wildlife Service. Bruce DiLabio (pers.

comm.) reports that Greater Snow Geese now occur annually in eastern Ontario. He observed over 2,000 Greater Snow Geese at Riceville on 31 March 1991 and over 2,400 Greater Snow Geese at Bourget, Russell County, on 3 April 1991. The above flocks were more than 99% white morph birds. Some of the blue morph birds observed with the above flocks were the same size as the white morph Greater Snow Geese indicating the occurrence of blue morph Greater Snow Geese in Ontario (Bruce DiLabio, pers. comm.).

Smaller numbers of Greater Snow Geese also occur in fall. For example, Bruce DiLabio (pers. comm.) observed 11 Greater Snow Geese with a flock of Canada Geese on 3 November 1991 near Cornwall. One of the above Greater Snow Geese had been neck banded in Delaware on 8 November 1990.

Greater Snow Geese may be occurring occasionally farther west in Ontario. A flock of 40 white morph birds observed on 29 March 1991 near Lake Scugog in Durham Region could have been Greater Snow Geese (Bain and Henshaw 1992). Commenting on the above observation, Paul Prevett (pers. comm.) of the Ministry of Natural Resources stated that "there was a high probability that a flock of 40 white morph birds at this location was Greater Snow Geese".

Since the blue morph is rare in the Greater subspecies and common in the Ontario population of the Lesser Snow Goose, any large flock of all white morph birds seen in eastern Ontario almost certainly involves Greater Snow Geese. In addition,

Snow Geese often can be identified to subspecies in direct comparison with the large races of the Canada Goose. Greater Snow Geese are chunkier and thicker necked than Lesser Snow Geese and appear almost as big as large Canada Geese. Lesser Snow Geese are always somewhat smaller than large Canada Geese. In summary, as noted by J.R. Forster (*in Bent 1925*), "the measurements of the greater snow goose do not well illustrate its real superiority in size; it is a much heavier bird than its western relative, with a much more stocky build, thicker neck, and larger head. It is generally recognizable at a glance in the flesh." In the past, the Greater Snow Goose and the Lesser Snow Goose were largely isolated from one another. Recently, their ranges have begun to overlap. The two subspecies may become blurred by more intermediate-sized birds (intergrades) in the future.

### Morph Taxonomy

The Snow Goose and Blue Goose were originally believed to be distinct species. This view lasted for a long time because of the very different appearance of the two forms. Also, no mixed pairs were reported when Blue Geese were first discovered breeding in the Arctic in 1929 (Soper 1930). At that time, the Snow Goose and Blue Goose had allopatric (separate) breeding and wintering ranges, and they appeared to be distinct species. In fact, Cooke (1988) reported that the Snow Goose and Blue Goose may have been separate since the last ice age and began to interbreed 40 to 80 years ago, probably because of human alterations in their winter habitat that brought the two forms together.

The taxonomic status of the Snow Goose and Blue Goose remained confused for some time. Manning *et al* (1956) preferred to consider three subspecies: Greater Snow Goose, Lesser Snow Goose and Blue Goose. Following studies of breeding colonies with mixed pairs, Cooch (1961) proposed that the Blue Goose was a colour morph of the Lesser Snow Goose. The American Ornithologists' Union (1973) subsequently lumped the two forms as colour morphs.

There continues to be a gradual mixing of the two morphs on the breeding and wintering grounds. The first blue morph Greater Snow Geese were reported in 1973 (Palmer 1976), suggesting interbreeding (gene flow) between blue morph Lesser Snow Geese and Greater Snow Geese. Except for the size difference, the blue morph is identical in both subspecies. The blue morph appears to be increasing in the Greater Snow Goose. Nevertheless, it currently constitutes less than one percent of the populations moulting on Bylot Island, NWT or staging along the St. Lawrence in Quebec (Yves Aubry, pers. comm.).

### Morph Genetics

The plumage colour of the Snow Goose is controlled by a single gene. This gene has two forms called alleles. A blue morph has two dominant blue alleles, one from each parent. Similarly, a white morph bird has two recessive white alleles. A pair of white morphs will produce only white offspring, and a pair of blue morphs only blue offspring. However, when a white morph crosses with a blue morph, the offspring inherit both a white allele

and a blue allele for plumage colour. Since the blue allele is incompletely dominant over the recessive white allele, the offspring of a cross are more like a blue morph but with varying amounts of white on the belly. Excellent illustrations of the intermediate or white-bellied morph are found on plate 10 in *The Birds of Canada* (Godfrey 1986) and on page 65 in the *National Geographic Field Guide to the Birds of North America* (Scott 1987).

Interestingly, the offspring produced by a pair of white-bellied morphs (intermediate morphs) will occur in the ratio of two intermediates to one white to one blue morph. The reason that pure white or pure blue morphs can result from a pair of intermediates is because each intermediate carries alleles for both white and blue plumage. Each intermediate passes on only one allele (white or blue) for plumage colour to each offspring. Therefore, if the offspring inherits a white allele from each parent then it will be a white morph, and so on. The above situation is similar to a blue-eyed child being born to brown-eyed parents where the child inherits two recessive alleles for blue eyes, one from each parent. The offspring of an intermediate morph and a white morph will occur in a ratio of one intermediate to one white. Similarly, the offspring of an intermediate and a blue will also occur in a one-to-one ratio.

In the *Checklist of Recognizable Ontario Bird Forms* (Pittaway 1991), the intermediate morphs were listed as the "white x blue morph" which implied that this form was the result only of a mixed white and blue pair.

Since intermediates can result from other combinations of morphs as well, I now prefer to call this form the "white-bellied morph".

### Morph Behaviour

In mixed colonies, both morphs usually pair selectively with geese of the same plumage colour as themselves. The principal force controlling mate selection appears to be family colour, with most young geese later choosing mates of the same colour as their parents and siblings (Cooke 1988). Enough mixed pairs occur to prevent the two morphs from becoming separate species. The frequency of mixed pairs is around 15% (Cooke 1988). The offspring of a mixed pair may choose a mate of either colour. One of the reasons that mixed pairs occur is the habit Snow Geese have of laying their eggs in other Snow Goose nests. For example, if the female of a blue pair lays an egg in a white pair's nest, the young blue morph will be imprinted on a white family. As an adult, it will most likely choose a white mate. Neither morph appears to have a survival advantage over the other. Mixed pairs and their intermediate offspring also show no reduction in reproductive success.

### Conclusion

The next time that you observe Snow Geese, it is my hope that a knowledge of their subspecies, morphs, genetics, ecology and behaviour will make your birding that much more enjoyable.

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