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The Greater Snow Goose (*Chen caerulescens atlanticus*) in Nebraska

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INTRODUCTION

Recently, Mr. William Lemburg of Cairo, Nebraska, in a letter to the Editor of *The Nebraska Bird Review*, noted the following: "I have a friend who does quite a bit of goose hunting. He remarked to me that during the spring snow goose season, he occasionally shoots an extra large Snow. Thinking that maybe a few Greater Snows that winter along the Atlantic Coast may end up in the Central Flyway, I asked him to save the head of one if he bagged one the following season. This is about five years ago. The following season he did get one. Enclosed is a picture [see Figure 1], showing it with the head of a Lesser Snow and a Ross's Goose. Even though the head was dried some, the bill measured 65 mm. According to the book by Bellrose *Ducks, Geese, and Swans of North America*, this would place it with the Greater Snow."

Measurements of bills (culmen) of Snow Geese in Palmer (1976) show for male Greaters 59-73 mm, female Greaters 57-68 mm, male Lessers 52-63 mm, female Lessers 50-60 mm. Thus it seems likely this bird was indeed a Greater Snow Goose (Gilles Gauthier, pers. comm.); Palmer states that bill measurements are diagnostic.

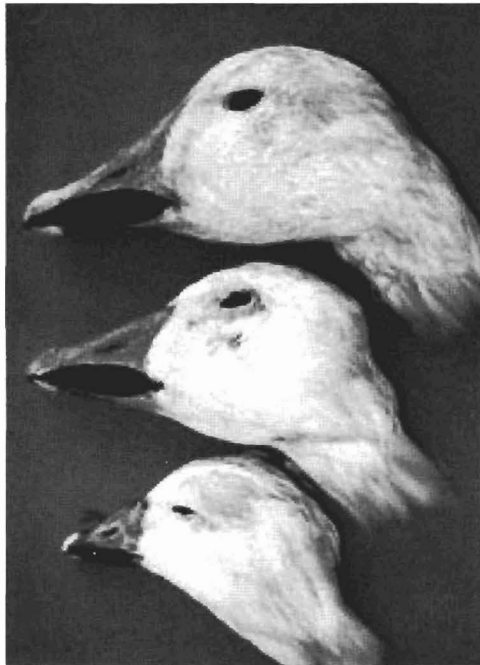


Figure 1. From top: Greater Snow Goose, Lesser Snow Goose, Ross's Goose. Photo courtesy of William Lemburg

TAXONOMY

Historically, the Snow Goose (*C. caerulescens*) bred in several widely separated locations in Arctic Canada and extreme eastern Siberia and wintered mainly along the Gulf Coast, in California, and in Washington. Migrants occurred throughout North America, but were least numerous in the Mountain West. Within the breeding range, three groups of geese were discernible as of the 1970s (Bellrose 1976, Palmer 1976). The easternmost breeding population, located in extreme northwest Greenland and adjacent Canadian islands, consists of large birds, and was (and still is) separable from other Snow Geese as the subspecies *C. c. atlanticus*, popularly known as "Greater Snow Goose" (designated *C. hyperborea atlanticus* by the American Ornithologists'

Union in 1957). The 1957 AOU Check-list listed as a separate species the "Blue Goose" (*C. caerulescens*), breeding at four locations north of Hudson Bay, from Baffin Island in the East to Queen Maud Gulf in the West. All other Snow Goose breeding populations, from Wrangel Island in Siberia east to colonies situated between the eastern breeding areas of Greater Snow Geese and Blue Geese, were designated "Lesser Snow Goose" (*C. h. hyperborea*). In the 1960s it was determined that "Blue Goose" was merely a color morph of Lesser Snow Goose, and the current Snow Goose taxonomy names only Lesser Snow Goose *C. c. caerulescens* (*caerulescens* had naming priority over *hyperborea*) and Greater Snow Goose *C. c. atlanticus*.

Because geese traditionally breed in and faithfully return to the same areas each summer, gene flow between breeding populations in different areas was thought to be minimal. Such minimal gene flow and fidelity to breeding sites usually, given time, leads to differentiation into different subspecies and even species. Perhaps the best example is provided by the several discrete breeding populations of "White-cheeked Geese" that until recently were allocated to several subspecies within (former) Canada Goose. These subspecies have now been grouped into two species, Canada and Cackling Geese. Strangely, differentiation to the subspecies level has not generally occurred as extensively in Snow Geese, even though they breed in only a few widely-separated Arctic locations whose populations rarely overlap, even in migration and winter. The sole exception is Greater Snow Goose.

DISTRIBUTION AND RECENT CHANGES

Since the 1970s, Snow Goose numbers have risen dramatically. In the 1970s, Bellrose (1976) gave the total population as about 1.3 million, but current estimates are in the 4 million range (Canadian Wildlife Service 2005). Numbers at all colonies, except that on Wrangel Island in Siberia, have increased. At the same time, and possibly the reason for the increase, Snow Geese have adapted to agricultural food sources, especially waste corn. This change, along with the advent of wildlife refuges along the traditional migration pathways, has led to significant changes in the migration and wintering behavior of these birds. Because Snow Geese are adapted to feed on rushes and aquatic plants, they traditionally had to migrate rapidly from breeding areas to wintering areas such as those along the Gulf Coast to find their preferred food sources. Nowadays, migration in fall especially is a more leisurely affair, with long stays and even overwintering some distance north of the Gulf Coast in the interior. Along with these changes, there has been significant movement of some traditional migration corridors; a Nebraska example is the westward shift of approximately 1,000,000 Snow Geese from the Missouri Valley to the Rainwater Basin during the last 20 years.

This movement and to some extent intermingling of traditional migration corridors has led to genetic mixing as well. Pairing occurs on the wintering grounds, and so ganders are the agents of gene flow; females return to their natal areas to breed. This is most evident in the case of "Blue Goose" genes. The gene for "blue" color is dominant over that for "white", and so the spread of Blue Goose genes is easy to observe. Blue Geese were until recently common only in the Mississippi Flyway (and west to eastern Nebraska), but during the last 20 years they have become more noticeable east of the Mississippi Flyway as "Blue Geese" have spread to and begun to breed in colonies previously known to contain only white birds. However in Nebraska, flocks of Snow Geese in the western part of the state,

notably at Lake McConaughy, are still predominantly white, leaving little doubt that they are derived from breeding locations in western Canada that are as yet underexposed to "Blue Goose" genes.

This mixing of genetic material has also affected Greater Snow Geese. Traditionally, Greater Snow Geese migrated from their breeding areas through a narrow corridor passing over Quebec, staged at Cap Tourmente, east of Quebec City along the St Lawrence River, and then moved to wintering areas along the Atlantic Coast, mostly in coastal Delaware, Virginia and North Carolina. As with other Snow Geese, the Greater Snow Goose population has risen dramatically; during 1955-74 the winter population, estimated from numbers staging at Cap Tourmente, was stable at about 54,000 (Bellrose 1976), but this increased to about 356,000 in 1991 (Pittaway 1992) and a rather amazing 750,000 currently (Canadian Wildlife Service 2005). An indication that Lesser Snow Geese are mixing genetically with Greater is the appearance in recent years of a few "blue Greater" in the wintering population (Pittaway 1992). These are large birds, otherwise identical to white Greater. Lesser Snow Geese (including blue morphs) have for many years staged in significant and now rapidly increasing numbers in the area of southern James Bay. For about 50 years (Haven Wiley, pers. comm.) a few Lessers (<10,000?) from this staging area have flown to the Atlantic Coast (Bellrose 1976); this population contains an increasing proportion of "Blue Geese" (about 50% among the 3000 at Lake Mattamuskeet NWR, up from about 33% in the 1980s; Kelly Davis, pers. comm.), and the presence of these birds allows observers to differentiate between them and flocks of Greater, still essentially all white. Conversely, migrant Greater have recently shifted westward, away from their traditional migration corridor. Interestingly, flocks of Lessers along the Atlantic Coast, and Greater in the interior still tend to separate from each other; the Lesser and Greater flocks at Lake Mattamuskeet NWR in eastern North Carolina generally (but not always) live at separate locations, and flocks of Greater in eastern Ontario are likewise obvious by their whiteness in comparison with the mixed-color flocks of Lessers in the same area (Pittaway 1992).

The occurrence of the Greater Snow Goose west of its traditional migration corridor has only recently been noticed. Palmer (1976) stated that Greater Snow Goose was only an "Occasional straggler well inland, there being a few alleged sightings annually, plus a band recovery in Texas and another in Ill. or that general region." I have been unable to verify any Texas records (Mark Lockwood, pers. comm.) nor any firm records from "Ill. or that general region". Westward occurrence of Greater Snow Geese was documented for eastern Ontario in 1986 (Pittaway 1992), and since then, occurrences are annual, most in spring but a few in fall also, and a few large "blue Greater" have been seen (Pittaway 1992). More recently, flocks of as many as 40,000 Greater have been found in spring (Morin 2004). Both Pittaway (1992) and Morin (2004) suggest that adaptation to agricultural food sources by Greater has allowed the shift of their migration corridor westward, and Morin noted that Montezuma NWR in nearby western New York has hosted as many as 100,000 Greater Snows in spring in recent years. These large Ontario flocks of Greater can be readily identified as they contain essentially all white birds, whereas the small locally uncommon flocks of Lessers in southern Ontario contain 65-75% "Blue Geese" (Ron Pittaway, pers. comm.)

PROVENANCE OF NEBRASKA RECORDS

The research carried out for this article resulted in 5 records of Greater Snow Goose for Nebraska. These are shown in Table 1.

TABLE 1
Nebraska Records of Greater Snow Goose (*C. c. atlanticus*)

Date	Collar	Culmen	County	Comment
spring ca. 2000	none	65 mm	Hall	shot by hunter
12-13 Mar 2002	JY03	61 mm	Phelps	female; from Bylot Island
13 Mar 2003	JP05		Hall	from Bylot Island
3 Mar 2003	KA13		Phelps	from Bylot Island
9 Mar 2003	KF09		Dawson	from Bylot Island

The only documented records of purported Greater Snow Goose west of Ontario that I was able to find, apart from that of Bill Lemburg for Nebraska, is a surprising series of observations (Michael Schwitters, pers. com.) of birds neck-collared on Bylot Island, north of Baffin Island, an important breeding area for Greater Snow Goose (<http://www.cen.ulaval.ca/bylot/ecomon-anispec-greatersnowgoose.htm>). These observations indicate that some birds originating from Bylot Island are indeed finding their way into the Central Flyway, most likely through staging areas at southern James Bay. Large numbers of Lesser Snow Geese fly southwestward from this staging area to the Central Flyway, and traditionally from there to the Gulf Coast. Gilles Gauthier (pers. comm.) indicated that of the 45,000 birds banded 1990-2003 on Bylot Island, there were 1,959 winter recoveries in the United States, including only 20 from the Mississippi Flyway and 15 from the Central Flyway. This recovery frequency suggests that fewer than 60 birds from Bylot Island may be reaching these flyways annually.

Although the vast majority of the birds banded on Bylot Island must be pure Greaters, it is likely that at least some of them may be Lessers or intergrades between Lesser and Greater Snow Geese. Interestingly, Schwitters stated that "In all cases I could not distinguish these birds as larger than the other Snow Geese in the flocks ...though I was working quickly to find as many collars as possible. They may have been Lesser Snow Geese captured in banding drives for Greater Snow Geese on Bylot Island, Nunavut." Further, Ken Abraham (pers. comm. Ron Pittaway) observed that the large Lesser Snow Goose colony south of Bylot Island on southwest Baffin Island could be an annual source for molt-migrants, including non-breeding yearlings and failed breeders, reaching Bylot Island. Nevertheless, Gauthier noted (pers. comm.) that of about 150 adult geese measured annually on Bylot Island, only 1-3 fall into the range of Lesser Snow Goose. However, the culmen measurement (65 mm) of the bird shot in Nebraska by Lemburg's acquaintance places it well within the range for Greater Snow Goose and outside that of Lesser Snow Goose (Gilles Gauthier, pers. comm.).

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