

Letter From the Desk of David Challinor
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Even as a child I was fascinated by birds, especially those found around my home in Connecticut. It followed, therefore, that I was excited to read that some greater snow geese had been seen in northwest Connecticut on their fall migration to Currituck Sound in North Carolina. The Connecticut location was somewhat east of their then migrating route from their nesting grounds in Greenland. Although they used to fly down the Connecticut River Valley in the nineteenth century, today they follow the Hudson River to the coast before turning south.

I was never lucky enough to see snow geese migrating, but my interest was rekindled by Paul Gallico's (1941) popular book "The Snow Goose," a short, touching story of an errant snow goose that turned up on the southeast coast of England where it was wounded by a hunter. Evidently a greater snow goose, blown east from its breeding ground in Greenland, migrates south with alien flocks from Iceland and Spitsbergen. The goose returns to the same coastal marsh with the European geese species, none of which are white-plumaged. It eventually guides a small boat owner to participate in the evacuation of Dunkirk – an emotional (and improbable) tale that was very popular at the time. Millions of Americans first learned about snow geese from Gallico's book.

When I moved to coastal Texas after World War II, I finally witnessed the spectacularly large flocks of the lesser snow goose that at that time wintered on the coastal pastures along the Gulf of Mexico. Although not particularly tasty, it was a popular game bird that readily came to decoys of large white paper balls carefully scattered over recently harvested rice fields. Bag limits were modest and the population was a relatively stable one million birds. Since then, especially over the past two decades, the central flyway population of lesser snow geese has exploded in an extraordinary fashion; current counts on their Hudson Bay breeding grounds reach five or six million birds, a five-fold increase from their estimated 1980 wintering count in central Texas and Louisiana. The burgeoning number of breeding lesser snow geese is now threatening the carrying capacity of their arctic coastal habitat. This letter will discuss some of the causes for the population expansion and suggest steps that might be taken to prevent a catastrophic die-off of geese from starvation.

There are two subspecies of snow goose, the most numerous of which is the lesser (*Anser caerulescens caerulescens*). The greater (*A.c. atlanticus*) is primarily an east coast bird about 8% larger than the lesser; it is not nearly as numerous and has no blue phase. Birds in the blue phase have a white neck and slate blue body, and until the 1960's those in the blue phase were thought to be a separate species; today both phases are recognized as being the same bird. Genetic investigation revealed that the white color phase is determined by the bird having two white alleles, the all-blue ones with two blue alleles, and an intermediate form with a white-belly having one allele of each. An allele is any of a group of possible mutational forms of a gene. The all-white phase has strikingly black wing tips (outer primary feathers), a common characteristic in other all-white birds such as white pelicans and gannets, but oddly not in white

swans. There is some evidence that black-pigmented feathers are more resistant to wear than white ones.

The lesser snow goose's recent rapid population growth seems attributable to its adaptability to a changing human-altered world. Although human activity may not be a direct cause for such an explosion, it is an indirect one. Just as Canada geese are exploiting the heavily fertilized lawns and golf courses of eastern U.S., so the snow geese have taken advantage of grain crop residues of rice, wheat and sorghum that farmers now ubiquitously plant well inland from the coastal marshes whose plants once satisfied the snow goose's wintering food requirements.

As the birds migrate in the spring and fall, they stop to feed and rest in farmers' fields along the continent's central flyway. Now instead of confining themselves to the Gulf's coastal marshes, the wintering birds have spread to Arkansas, Oklahoma and as far west as New Mexico. Their new food sources allow them to return to the arctic in prime condition for breeding. Thus a relatively high percentage of nesting geese survive even when late spring snow storms block access to food. At the end of four weeks incubation, about five precocious goslings immediately follow their mother, who is also flightless for almost a month while she moults. This interval is when the geese are most susceptible to predation and most dependent on the local vegetation for sustenance. Unlike Canada geese, snow geese do not merely clip the tender shoots of plants, but use their strong large bills to pull out salt marsh grasses and sedges by their roots. In the arctic, plants grow slowly and the pressure from feeding geese on the coastal marshes of Hudson Bay have left vast areas damaged almost beyond repair. Normally grazed areas recover when the geese depart south in the fall, but if overgrazed, with the sedges completely consumed – roots and all – the vegetated layer of living and dead plants that would serve as insulation for the soil is no longer effective. Evaporation increases, causing subterranean salts to move to the surface where they effectively bar the growth of all but halophilous (salt-tolerant) plants, most of which the geese find inedible. Unlike the temperate zone where a de-vegetated area normally recovers in a couple of growing seasons, in the arctic it often takes 15 to 20 years to be restored.

With the loss of nutritious arctic coastal vegetation, the adaptable snow geese have moved inland and southward to freshwater sedge meadows. In fact when food becomes extremely scarce in their natal areas to which they generally return, the geese will fly to nest in new areas where food is more plentiful. Goose nesting habitat along Hudson Bay's coast is not limitless and is estimated at about 135,000 acres. A recent thorough survey by foot and air revealed about one-third of the suitable nesting areas to be badly damaged, another third damaged but recoverable, and the balance, although heavily grazed, in fair condition. As a result of over-exploiting their breeding grounds, more snow geese are now dying during the summer and fall than in the winter hunting season. Fewer goslings survive and those that do fledge are frequently so weakened by inadequate nutrition that they cannot migrate south.

Other indirect consequences of the population explosion are becoming evident. Snow geese breeding range is expanding into those of other tundra nesting species – not only other goose species but such birds as red-necked phalaropes and semipalmated sandpipers. Furthermore, when waterfowl concentrations become too large, particularly in migration staging areas, the danger of the spread of avian cholera increases; once started, an epidemic can rapidly spread to other species of ducks and geese sharing the same fields and ponds.

One unanticipated consequence of the population explosion is the reduction in palatability of thin snow geese in the fall when they are traditionally harvested for food by indigenous hunters. Never a particularly tasty bird, the geese have become noticeably less savory. The birds also seem to be increasingly more difficult to hunt with the result that fewer birds are being harvested.

What can be done about this problem? Computer models show that reducing adult survival has about eight times the effect of changing either juvenile survival or reproductive success as does trying to affect those two qualities directly. Scientists explain this approach by observing that snow geese begin to breed when two or three years old during an expected life of seven years. Canadian and U.S. wildlife managers are therefore concentrating on reducing the survival rate of adult lesser snow geese that use the mid-continent flyway by changing hunting regulations to increase the annual harvest. For example, bag limits would be increased for both sport and subsistence hunters with the latter also allowed to collect eggs. Baiting, electronic calls and live decoys might also be permitted. Even refuges used by migrating snow geese could be open for hunting. Some effort would also be needed to convince the hunters who eat these geese that they can be prepared in a tasty fashion.

Although North American hunters now account for about 68% of adult snow goose mortality and the harvest has doubled in the past two or three years as a result of increased bag limits and a longer hunting season, the overall snow goose population has been scarcely affected. However, the increasing antipathy towards hunting in general will make implementation of these suggestions to reduce the population difficult. The Humane Society of the U.S. has already expressed its opposition to the proposed hunting regulation changes.

Whatever is eventually done, some scientists are pessimistic about the effectiveness of increased hunting pressure to reduce the numbers of lesser snow geese. They feel such measures are already too late and should have been started decades ago. If these skeptics are correct, it may mean that the snow goose population will crash when they have consumed their breeding ground forage. However, before this occurs, changes in snow goose behavior could prevent such a catastrophe, but might create another. For example, wintering snow geese of the central flyway have extended their traditional range north and west to take advantage of new food sources, especially shattered grain left behind combines. Just as snow geese are showing flexible foraging behavior on their wintering grounds, so might they also alter their traditional spring migration patterns and not return to Hudson Bay to breed. Some Canadian geese populations no longer migrate north, but remain to compete successfully with lawn owners and golf course

managers for carefully grown grass. It may not be too far-fetched, therefore, to predict that the lake shores of southern Ontario and Quebec may be occupied by breeding colonies of snow geese, a species whose eating habits are considerably more destructive to shore-side vegetation than their larger Canada geese relatives.

Whatever the future of these beautiful birds, their image is fixed in my mind. Last Friday (September 18th) I looked down from a small plane flying at 2500 feet just north of Topeka, Kansas and was emotionally rewarded to see a skein of snow geese pass below heading south. I was touched as Gallico's protagonist was when "he turned his eyes upward to the evening sky in time to see first an infinite speck, then a black-and-white-pinioned dream...It was the snow goose."

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Note: Much information for this letter is based on a feature article by E.T. Ben-Ari in BioScience (Sept. 1998, pp. 667-673).