

Out of Control: Problem Handouts



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Out of Control

Part 1



You have arrived at Baffin Island, Canada, on July 6 for the Midnight Run. This is the "land of the midnight sun" and the Midnight Run is a marathon that begins at midnight on July 8. It is in its 35th year and has historically been routed outside of Baffin Island National Park. Instead of using the salt marsh trail through the park, the race used to go along a highway. The reason for this detour was concern for the salt marsh nesting and feeding grounds of the Lesser Snow Goose, *Cher caerulescens caerulescens*.

However, this year, Parks Canada, along with environmental groups, have approved the use of the national park for the race, because they have a new concern about snow geese—there has been a population explosion of them in the past 25-30 years. In 1970, the population of snow geese was about 2 million, but in the late 1990's, it was 5 million. A study in Perouse Bay, Manitoba, found 2,000 nesting pairs of geese in 1968, and 22,500 nesting pairs in 1990. (Some areas have about 1,000 nests per square mile, others have 8,000).

In the days before the marathon, you visit the National Park Visitor Center and learn more about snow geese. Their growth rate is about 5% per year; their death rate is half the rate it was in the 1960s and 1970's (about 50% of goslings die before they fly at six weeks of age because of predation and weakening during long walks). 30% of adults die annually. Young are born in the summer in Canada in nesting grounds around Hudson Bay, James Bay, Foxe Basin, La Perouse Bay and Baffin Island. At one day of age, goslings begin feeding on roots and rhizomes of *Puccinellia* and *Carex* (marsh grasses) before the plants start growing; if the plants grow, they are devoured. As one area is denuded, the goslings will walk inland as far as 50 miles, if necessary, to feed in dryer areas on tundra plants. (They will return to this area, where they learned to fly, the following summer). In winter, the geese fly south to the US. As of the early 1900s, the geese wintered and fed only in the marshes of Texas and Louisiana, where a limited supply of grasses (bulrush and cordgrass) kept the population at a constant level. However, a number of conditions allowed the population to escalate to the point that it is now growing out of control.

Questions

1. By what methods could biologists have determined the size of the snow goose population?

2. What conditions in the winter feeding grounds could have allowed the increase in the snow goose population?
3. Draw a curve (very rough sketch) showing the population dynamics of snow geese from the early 1900's to the present. What role, if any, did K have in regulating the snow goose population in the early 1900's? in the 1990's?
4. Would the growth curve look any different if the geese were not able to walk miles to new grazing grounds in Canada?
5. Draw a survivorship curve for snow geese.

Lesser Snow Geese images courtesy of [Pacific and Yukon Region Environmental Indicators](#)

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Part 2



Changes in the US have increased the carrying capacity of winter feeding grounds for snow geese. These changes include:

1. Urbanization and building of oil rigs in Texas and Louisiana have forced birds inland.
2. Mid-continental agricultural resources became very abundant (rice fields, corn, soybeans), allowing birds to move inland away from coastal marshes.
3. Wildlife refuges were created by conservationists in northern prairies (IA, ND).
4. Hunting restrictions reduced the hunting of all waterfowl.

Since the 1970s and continuing up to the present, snow geese have fed as far north as Nebraska and Iowa.

Questions

1. What effects would be expected in both ecosystems that the geese inhabit (their summer and winter feeding grounds)? Cattle graze in fields without damaging them. Why are marshes and other geese grazing grounds more seriously damaged? In which feeding grounds, the summer or winter ones, would geese do more serious damage? Why? What are your criteria for "serious" damage?
2. What effects would geese have on other species—i.e. what kind of interspecific interactions would occur in the communities visited by snow geese?
3. Propose solutions for this problem.

Image courtesy of [Snow Geese, U.S. Fish and Wildlife Service](#)