

Ups and Downs: Swan Population Trends

Objectives

Student will learn how to analyze population data collected by biologists. They will understand how swan populations have changed in the Rocky Mountains over time.

Method

In this lesson students use graphing skills to evaluate the data collected during biannual swan surveys in Montana, Wyoming and Idaho. They identify population trends, compare populations among sites, and examine the proportions of swans in different age classes.

Materials

- Trumpeter Swan Survey Results Tables
And/or
- Microsoft Excel program and Excel files of swan survey data

Background Information

Although Trumpeter Swans were formerly abundant and widespread, their numbers and distribution were greatly reduced during the early fur trade and European settlement (1600s-1800s), when they were prized for their skins and feathers. The down was used as bedding and the plumage was desired for powder puffs and feathers in ladies' hats. Swan quills also made excellent pens. Thousands of robes made with the feathers of Trumpeters were shipped to Europe each year.

By the early 1900's, Trumpeter Swans were nearly extinct. However, a small group of 69 Trumpeters was found in the Centennial Valley of Montana in 1935 (unrecorded flocks also inhabited parts of Alaska and Canada). Red Rocks Lakes National Wildlife Refuge was created to provide protected habitat for these

Grade level: 5-8

Subject Areas: Biology, math, technology

Duration: 2 hours (depending on how data are analyzed; can be one or more sessions)

Topics: Populations, graphing, migration, conservation

National/Montana Science Standards: A, C / 1, 3

swans. Managed by the U.S. Fish and Wildlife Service, habitat conditions improved when refuge personnel restricted livestock grazing and hay cutting in the marshes, protected the muskrat population (Trumpeters use muskrat houses for nesting), provided supplementary food in the winter, controlled predators (now no longer necessary), and more recently prohibited the use of lead shot and lead fishing sinkers because of the danger of lead poisoning. Due to their protection

at Red Rock Lakes and in adjacent Yellowstone National Park, the population of Trumpeter Swans gradually rebounded there. It became high enough that biologists captured and transported small groups of Trumpeters to other areas. These efforts to reintroduce Trumpeters to other locations have helped to distribute the population of Trumpeter Swans to more areas in the Rocky Mountain region. The Rocky Mountain (Utah to Canada) population of Trumpeter Swans, which migrates through Montana, Wyoming, and Idaho, has rebounded from its precariously low size of 69 in the early 1900's to over 5000 today. Numbers have steadily increased with modern conservation, including protection from shooting, habitat preservation, and restoration programs. Over 34,000 Trumpeters now live in the wild in North America.

Because of its slow maturation, single broods, variable rates of reproduction, and high winter mortality, population growth is usually slow. Although Trumpeter numbers and distribution are increasing, populations are still at risk from continued loss of wintering habitat, concentration of wintering flocks at relatively few sites, lead poisoning, and lack of migration in several wild and restored flocks.

The U.S. Fish and Wildlife Service conducts fall and winter Trumpeter Swan Surveys of the Rocky Mountain Population. Every September and February surveys are conducted across the tri-state area of the Rocky Mountains (Montana, Wyoming and Idaho) to count Trumpeter Swans. These surveys separate the number of white birds (adult or subadult) from gray birds (cygnets). Surveys are conducted in other states as well.

February surveys, conducted since 1972, have shown some fluctuation of the wintering swan population in Montana over the last 30 years, with a record high number of 924 birds in 2006 and a low of 214 birds in 1995. Overall, the wintering Rocky Mountain Population has increased dramatically from about 609 birds in 1973 to over 4300 in 2007. Much of this increase in the Rocky Mountain Population is due to large increases in the Idaho population.

September surveys for Trumpeter Swans have been conducted since 1932. These surveys count birds in their breeding and summering areas, before fall migration. Trumpeter numbers in Montana rose from 29 birds in 1932 to a high of 452 in 1954, and then fluctuated somewhat below this number for the next few decades. After 1992 trumpeter numbers in the state declined considerably. Only 76 swans were recorded in 1993 and since that time the highest number of Trumpeter Swans recorded was 152 in 2005. The populations in Wyoming and Idaho have generally climbed throughout this period. The decline in the

Montana numbers is probably due to the cessation of the supplemental feeding program at Red Rocks Lakes in 1992.

Procedure

1. Begin by explaining to your students that biologists and managers collect *data* (pieces of information gathered in a scientific study; a single piece of information, such as one number or location, is a *datum*) to learn about populations of animals they are interested in. Population numbers are constantly changing over time, and may be very different from place to place, depending on habitat, reproduction and mortality rates, etc. Swan biologists conduct surveys to count Trumpeter Swans where they occur at the end of the summer and in the winter. We have the data from surveys of Trumpeters in a tri-state area, Montana, Wyoming, and Idaho, for fall (since 1932) and winter (since 1972).
2. Hand out the Trumpeter Swan Survey Results Tables to your students. Ask them to look over the tables and tell you what kind of information is being presented. They will use this information to describe swan fall and winter populations in the tri-state area. Graphs will help them see any existing trends in the data and allow them to compare different sets of data more easily.
3. Have your students think about the data and how to “make sense of it”. Can they figure out how to look at trends in the data? Brainstorm some questions they think it might be important to be able to answer about swan populations. (How has the population changed over time, what is the proportion of cygnets to “white birds” [one year and older], how do the populations among the 3 states compare to one another, are there more swans in each state in the fall or in the winter, etc.). How would they graph the data to answer these questions?
4. Have your students create graphs to show some of these data trends. You can have them create graphs by hand, or they can use a software program such as Microsoft Excel (instructions for using Excel to produce graphs are given at various websites; see <http://ncsu.edu/labwrite/res/gt/gt-menu.html> or http://www.internet4classrooms.com/excel_create_chart.htm).
5. Discuss the following questions when they have finished their graphing:
 - a. Have populations in each state changed over time? Describe how.
 - b. Has the overall population changed? How? Has it changed in the same way in both fall and winter?

- c. What year was the Trumpeter population highest in the fall? In the winter?
- d. Do more Trumpeters summer or winter in Montana? How about the tri-state area? What do you think accounts for the differences in winter and fall numbers?
- e. Are there any dramatic shifts in numbers in the data? What might have caused this or these changes?
- f. What is the proportion, on average, of white birds to cygnets?
- g. Do the white birds and cygnets follow the same trends over time? Would you expect the pattern you found? Why or why not?

Extensions

- Have your students further research swan population trends and conservation by using these or other sources of information:
 - US Fish and Wildlife Service Trumpeter Swan Assessment Reports: Rocky Mountain Population Status Assessments at http://www.fws.gov/mountain-prairie/species/birds/trumpeterswan/rm_population.htm
 - The National Audubon Society Trumpeter Swan page at <http://web1.audubon.org/waterbirds/species.php?speciesCode=truswa>
 - Cornell Lab of Ornithology Trumpeter Swan page at http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Trumpeter_Swan_dtl.html
 - The Trumpeter Swan Society at <http://www.trumpeterswansociety.org/>