

Weather and Whooping Cranes

Key Concept

Many aspects of any organism's habitat are important in that organism's survival. When an organism is endangered, all that is possible must be done to study it and its habitat and protect that organism from extinction.

Skills Focus

inferring, calculating, graphing

Time

40 minutes

Materials (per group)

ruler

calculator

pencil

Teaching Tips

- Review with students how to label axes on a graph. Be sure that the intervals chosen are equal.
- If students have trouble visualizing what Data Table 1 represents, have them create as a class a visual representation of some of the data. You might duplicate pictures of adult whooping cranes, eggs, and young birds. Students could use the pictures to model the number of birds at the end of a particular year and the number of birds from that year that died before migrating time the next year, for example.
- If computers are available, students can use a spreadsheet to find the hatching success rate.
- Encourage students to use a wide variety of resources. *The World Almanac* provides an up-to-date list of endangered and threatened species. The Internet is another good source. Be sure students understand that they must evaluate information obtained from the Internet. Web sites for the U.S. Fish and Wildlife Service (www.fws.gov), National Wildlife Federation (www.nwf.org), and Audubon Society (www.audubon.org), and universities are some reliable sources.

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Weather and Whooping Cranes

Pre-Lab Discussion

The whooping crane is a tall, white bird with red markings on its forehead and face. It is native to certain North American wetlands. In the twentieth century, the population of this magnificent bird has decreased almost to the point of disappearing. In 1941, only 14 cranes were living. Although more than ten times as many cranes are now living in the wild, they are still at risk. About half of the cranes live in the wild. Most breed in Wood Buffalo National Park in Canada and winter in Aransas National Wildlife Refuge in Texas.

Scientists, working to save the whooping cranes, investigated what abiotic factors affect the birds. In this investigation, you will analyze the data from one such study.

1. What do whooping cranes need to obtain from their habitat?

2. What abiotic factors might limit the population of whooping cranes?

Problem

How does precipitation affect the population of whooping cranes?

Materials *(per group)*

ruler

calculator

pencil

Procedure

1. Using Figure 1 and the data in Data Table 1, plot a graph showing how the crane population changed from year 1 to year 16 of the study. The crane population in any given year is the total number of migrating adults and hatched eggs. Answer Questions 1–3 in Observations.
2. Study the data in Data Table 1. Answer Questions 4–6 in Observations.
3. Using a calculator, determine the hatching success rate for each year.

$$\text{Hatching success rate} = \frac{\text{Number of eggs hatched}}{\text{Number of eggs laid}} \times 100\%$$

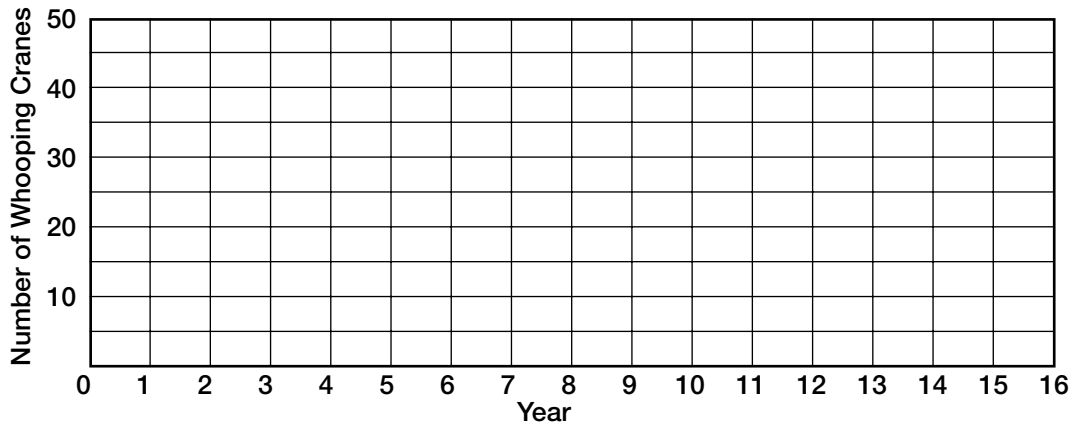
Write these values in the corresponding boxes in Data Table 2. Answer Question 7 in Observations.

Populations and Communities ▪ *Laboratory Investigation***Weather and Whooping Cranes** (*continued*)**Data Table 1****One Study Relating Weather and Reproductive Rate of Whooping Cranes**

| Year | Migrating Adults | Number of Nests | Eggs Laid | Hatched Eggs | Rainfall (cm) | Snowfall (cm) |
|------|------------------|-----------------|-----------|--------------|---------------|---------------|
| 1 | 21 | 6 | 6 | 4 | 8.9 | 3.6 |
| 2 | 20 | 3 | 2 | 0 | 15.0 | 0.5 |
| 3 | 20 | 4 | 4 | 3 | 11.7 | 2.0 |
| 4 | 22 | 5 | 5 | 4 | 6.1 | 2.8 |
| 5 | 23 | 4 | 6 | 2 | 6.4 | 14.2 |
| 6 | 23 | 8 | 8 | 4 | 8.1 | 4.6 |
| 7 | 30 | 6 | 6 | 5 | 7.4 | 0.0 |
| 8 | 32 | 0 | 0 | 0 | 19.3 | 7.6 |
| 9 | 28 | 4 | 6 | 2 | 15.0 | 1.3 |
| 10 | 26 | 10 | 10 | 7 | 8.1 | 2.0 |
| 11 | 32 | 10 | 10 | 6 | 7.4 | 2.5 |
| 12 | 36 | 2 | 2 | 0 | 13.7 | 7.4 |
| 13 | 30 | 4 | 4 | 3 | 8.9 | 1.0 |
| 14 | 32 | 3 | 4 | 3 | 7.1 | 1.8 |
| 15 | 33 | 3 | 3 | 1 | 14.7 | 6.1 |
| 16 | 32 | 5 | 5 | 4 | 5.3 | 1.5 |

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Observations



1. When was the crane population at its highest level? When was it at its lowest level?

2. During which year did the population increase the most?

3. In which year did the most adult cranes die?

4. Which four years were the poorest breeding years for the cranes? In which year were the most eggs laid and hatched successfully?

5. During which five summers was rainfall greatest?

6. Was snowfall ever high the same year that rainfall was high? If so, in which year or years?

7. In which year was total precipitation (rainfall plus snowfall) lowest? What was the hatching success rate that year?

Data Table 2

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| Hatching Success Rate (%) | | | | | | | | | | | | | | | | |

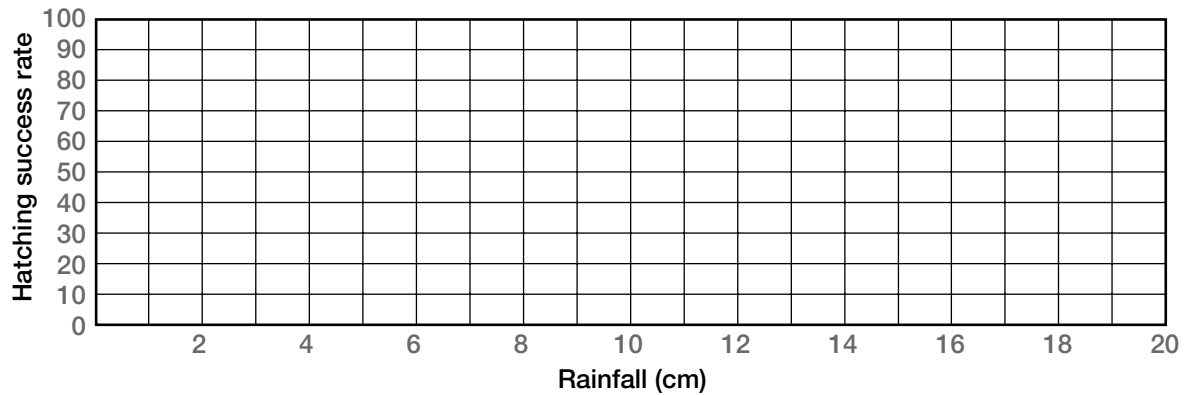


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Weather and Whooping Cranes *(continued)*

Analyze and Conclude

1. Using data from data tables 1 and 2, plot the points that relate hatching success rate to rainfall on Figure 2 below. What is the relationship between rainfall and hatching success rate? Why do you think this relationship exists?



2. Suppose you want to find out how rainfall affects the whooping-crane population. Why would you use daily or weekly amounts of rainfall rather than seasonal amounts?

3. Suppose that years 10 and 11 had high levels of precipitation. How would this have affected the population? Give a reason for your answer.

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Critical Thinking and Applications

1. What other factors besides weather might influence the population growth of whooping cranes? What do you think lowered the whooping-crane population to the endangered level?

2. Once laws protecting the American alligator went into effect, the alligator population recovered quite rapidly. In contrast, the whooping-crane population has remained low in spite of protection. What factors might prevent a rapid increase in the number of cranes?

3. Why is international cooperation necessary to protect species that migrate, such as the whooping crane?

4. Whooping cranes often lay two eggs. However, a pair can rarely raise two chicks. Therefore, wildlife biologists sometimes “steal” one of the two eggs in the nest and replace it with a fake one of plastic. What do you think the biologists do with the stolen eggs? Why?

More to Explore

Find out the difference between an endangered species and a threatened species. Is the whooping crane endangered or threatened? List three species that are endangered and three species that are threatened. What is being done to protect each species?