

Bald Eagle Population Graphing

Summary

Students will practice graphing skills by creating three different types of graphs that illustrate the bald eagle population in different regions of the United States and in different years.

Grade levels

5-9 (easily adapted for lower or higher grades)

Subject areas

Math (graphing/charts), reading, science

Time required

About 30 minutes

Teacher preparation: about 5 minutes

Setting

Classroom

Objectives

Students will:

1. Identify the population distribution of bald eagles in Minnesota and the United States
2. Demonstrate understanding of the necessary parts of three different graph types
3. Create graphs of three different types: line, bar, and pictograph

Materials

- Graph paper
- Colored pencils/markers
- Population graphing worksheet and questions (“Don’t Count Your Eagles before They Hatch”)

Background

The bald eagle was added to the endangered species list in 1978 due to the impacts of a pesticide called DDT and habitat loss (see Lesson “Bald Eagles on the Brink of Extinction: The History Recovery of an Endangered Species” for more details). The bird was listed as “endangered” (facing imminent extinction is human protection not provided) in the lower 48 states, except for Michigan, Minnesota, Oregon, Washington, and Wisconsin, where it was considered “threatened,” on February 14, 1978. The bird was never listed in Alaska. Because of breeding area protection and a variety of other efforts, the bald eagle’s status was changed to threatened in 1995. The bald eagle is expected to

be removed from the endangered species list in 2004.

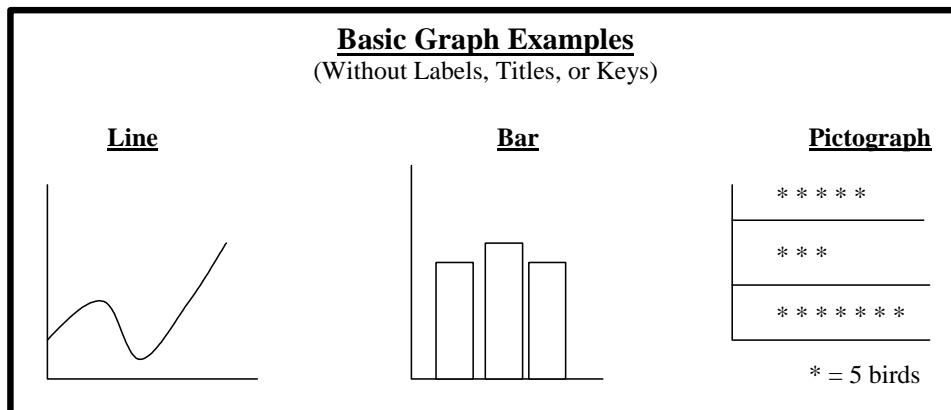
In this lesson, students are asked to create three different graph types using eagle population data from The U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources. Remind students that, in addition to a useable scale, all graphs must have:

1. A title
2. Labels of the x-axis (horizontal) and the y-axis (vertical)
3. A key explaining colors, pictures, etc.

Students will create three types of graphs: bar, line, and pictograph. A basic picture of each type as well as brief instructions on how to create each is found below.

Here are some steps to follow for a line or bar graph:

1. Decide which group of data will be placed along the x-axis (horizontal) and y-axis (vertical).
2. Decide what divisions you will use. (i.e., one square on graph paper will equal one bird or one year).
3. Label your x-axis and y-axis with correct label (example: year on y-axis).
4. Plot the data with a small dot for each.
5. If drawing a line graph, connect the dots with either a straight line or a gentle curve.
6. If making a bar graph, draw a rectangle from the base to the dot. Keep each rectangle the same width.
7. Add finishing touches such as a title and a legend. Color in the bars.
8. A *pictograph* is a drawing or picture that represents a word, sound, or idea. Pictographs can also be used to represent numerical data in a statistical or financial graph, with each value represented by a proportional number or size of pictures. Rather than using shading to show the size of categories on a bar graph, pictures form the columns or rows.



Procedure

1. Question students about how much banning DDT and placing eagles on the endangered species list affected the population of the eagles. (This may be review from the lesson “Bald Eagles on the Brink of Extinction: The History Recovery of an Endangered Species” or a very brief introduction. See the background for more information.)
2. Distribute Graphing Worksheet to students. Remind students about the types of graphs and how to graph as necessary.
3. Guide them through the graphing exercises in which they will see the impact of banning DDT on bald eagle populations and distribution of eagles in the United States in three types of graphs: line, bar, and pictograph.
4. Assist students in answering questions about the graphs.

Extensions

1. Additional data and graphing ideas can be found at <http://www.learner.org/jnorth/tm/eagle/Population.html>, comparing historical data from the National Audubon Society Christmas Bird Count and data from Hawk Ridge surveys along Lake Superior. They provide an excellent opportunity to look more at trends and data.
2. Study how bird populations are counted and where the data, especially historical data, comes from. All data for the graphing exercise was obtained from the Minnesota Department of Natural Resources and the National Fish and Wildlife Service. Extensive historical data can also be found through the National Audubon Society Christmas Bird Count.
3. Use this graphing exercise in a study of misleading graphs. How can graphs be created to make small changes in population appear much more drastic?

Wrap-up/conclusion

Discuss the appearance of the graphs and answers to the questions.

Assessment

Discussion

Population data graphing worksheet graphs and questions

Resources

- Minnesota Department of Natural Resources (2000). 2000 Minnesota Bald Eagle Survey. Retrieved August 22, 2004 from http://www.dnr.state.mn.us/ecological_services/nongame/projects/baldeagle_survey.html.
- National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available at <http://www.audubon.org/bird/cbc> [2004]
- The Raptor Center. Bald eagle information. Retrieved August 18, 2004, from <http://theraptorcenter.org>.

- U.S. Fish and Wildlife Service. Endangered species information. Retrieved August 18, 2004, from <http://endangered.fws.gov/i/BOH.html>.
- U.S. Fish and Wildlife Service Region 3. *Bald Eagle*. Retrieved August 17, 2004, from <http://midwest.fws.gov/eagle/population>.

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“Don’t Count Your Eagles Before They Hatch” Population Graphing Practice

The population of the bald eagle, America’s national symbol, has gone through many changes. Habitat loss and a pesticide called DDT caused the population to decrease and, as a result, the bald eagle was added to endangered species list.

Your task is to create three different graphs to show these population changes and the current population of bald eagles in different parts of the United States. All data and hints are found on this worksheet, but you **will need graph paper to complete the graphs.**

Note: Population surveys were not consistently done at first, so data is not always one year apart or five years apart. Pay special attention when labeling the years on your graphs!

Remember, all good graphs have the following things:

- A title telling your reader what the graph is about
- A key labeling colors and symbols
- Labels on the x-axis and y-axis

Graph 1-Line Graph: How Has the United States Bald Eagle Population Changed?

For this graph, you will create a line graph to show the change in the number of bald eagle pairs in the lower 48 states according to data from the U.S. Fish and Wildlife Service from selected years between 1963 and 2000.

Year	Number of Pairs		Year	Number of Pairs
1963	417		1991	3,399
1974	791		1992	3,749
1981	1,188		1993	4,015
1982	1,480		1994	4,449
1984	1,757		1995	4,712
1986	1,875		1996	5,094
1987	2,238		1997	5,295
1988	2,475		1998	5,748
1989	2,680		1999	6,104
1990	3,035		2000	6,471

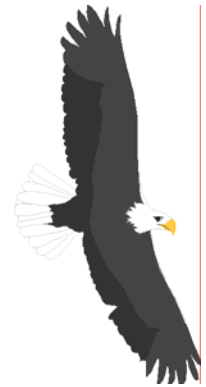


Graph 2-Bar Graph: How Do Bald Eagle Populations Compare Across the Lower 48 States?

For this graph you will create a bar graph to show the population of bald eagles in different states according to U.S. Fish and Wildlife Service data from 2000.

Data for Graph 2

State	Number of Bald Eagle Pairs
California	151
Florida	1,069
Louisiana	182
Maine	234
Michigan	362
Minnesota	681
Montana	229
Nevada	1
New York	51
North Carolina	33
North Dakota	10
Oregon	371
Rhode Island	0
Texas	78
Wisconsin	770



Graph 3-Pictograph: Where are the Most Young Bald Eagles Found in Minnesota?

Create a pictograph that shows where the most eaglets are found in Minnesota according to a 2000 census by the Minnesota Department of Natural Resources. Numbers have been rounded up or down one eaglet to make numbers easier for graphing. In the survey, the number of young eagles were counted. Create your own symbol to represent the number of eaglets. You will also need to choose how many eaglets your symbol will represent once you study the data.

Region of Minnesota	Actual Number of Eaglets Surveyed	Number of Eaglets to use for Pictograph
Northwest Minnesota	29	30
Northeast Minnesota	49	50
Central Minnesota	44	45
Southwest Minnesota	46	45
Southeast Minnesota	19	20
Twin Cities Metro	41	40



Conclusion Questions

Graphs are helpful because they present a picture that shows trends and comparisons more easily than just looking at numbers. Use your graphs to help answer the following conclusion questions.

1. According to Graph 1, what happened to the bald eagle population over the time period graphed?

2. Name two things that may have caused the population to do this:

1. _____

2. _____

3. Look only at consecutive years (for example: 1990-1991). Which years showed the greatest increase in population?

Smallest increase? _____

Did the population go down at any time during the years graphed? _____

4. Scientists may pay more attention to graphs with many years of data, instead of looking at year-to-year changes. Why do you think they do this?

5. According to Graph 2, which state that you graphed had the highest bald eagle population in 2000?

Lowest? _____

6. In Graph 2, are there any states where the bald eagle population surprises you? Why were you surprised? What do you think might explain the difference?

7. Texas is a larger state than Minnesota, Wisconsin, or Florida. Why do you think the bald eagle population was so much smaller in Texas than in Minnesota, Wisconsin, and Florida?

8. According to Graph 3, which region of Minnesota had the highest number of young eagles in 2000? Name a town, city, or other landmark that might fall in that region. Use a map of Minnesota if you need help.

9. Why do you think that region had the highest number of eaglets?

10. According to Graph 3, which region of Minnesota had the lowest number of young eagles in 2000? What might be a possible explanation for this?

11. Looking at data usually creates more questions, instead of just answering them. Think of two questions about bald eagle population that you could explore further and write them down.

1. _____

2. _____