How Well Do You Know the Great Lakes?

Many people, including a large proportion of those who live close to the Great Lakes, do not have a basic understanding of the individual characteristics of and the differences between the lakes. Since it is difficult to understand many of the Great Lakes issues, such as global warming, pollution, and water use without a basic understanding of the lakes, this activity is designed to help visualize the differences in the volume, length of shoreline, human population distribution, and fish populations of the Great Lakes.

Objectives

In this activity, you will develop a perception of the differences between the Great Lakes in water volumes, length of shoreline, human population distribution, and the amount of fish harvested from each lake.

Procedure

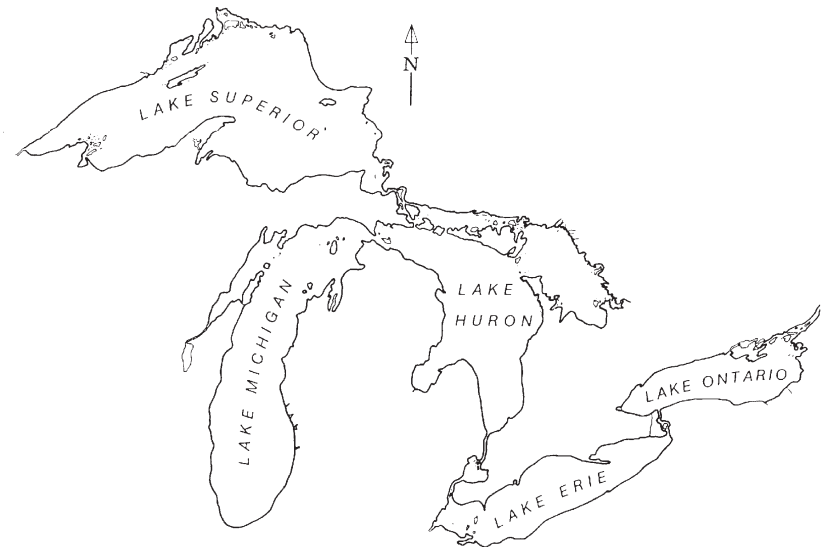
1. In this activity you will work in groups. You will be assigned to an expert group and a base group.

   Expert Groups

   There should be a total of five expert groups, one assigned to each lake. Each expert group studies one lake to become "experts" on that lake.

   Base Groups

   The base groups should have five (or more) people in them; in this group students from the different expert groups come together to share their knowledge. There must be at least one member from each expert group (in other words, a representative from each lake) in each base group so that every lake has a spokesperson.



Source

"How well do you know the Great Lakes?" by Heidi Miller, in GLIMCES, *Great Lakes Instructional Materials for the Changing Earth System*, Ohio Sea Grant Education Program, 1995.

Earth Systems Understandings

This activity relates to ESU 3 (science methods and technology) and ESU 4 (interactions).

Materials

Each base group (of five students) will need:

- A set of five labeled strings as described in step 1 of *Using the Data*.
- 100 squares of blue paper.
- Five strips of paper that will be placed next to the coastline of each lake (one strip for each lake).
- Twenty "fish" (they could be washers, corn kernels, or peanuts...).
- A pen or pencil.

Each of the five expert groups will need:

- Access to a map of the Great Lakes.
- A copy of the *Great Lakes data* (other resource books are optional).

Teacher's Note

Groups should each have a large working surface that all can gather around.

2. Gather in base groups. Discuss the following and make your group's best guess about the characteristics of the Great Lakes.

3. *Shoreline:* Arrange your labeled set of five strings to form a model of the outline of the Great Lakes.

4. *Volume:* Distribute 100 squares of blue paper among the lakes to represent all of the water contained in the lakes. For example, if your group thinks that the water is divided equally among the lakes, then put 20 blue squares into each lake.

Teacher's Notes

5. Instead of writing actual numbers on the strips of paper, the lakes could be ranked from 1-5 for most population to least population.

5. *Human populations:* Cut five strips of paper, which will be placed along the shoreline of the lakes (one for each lake). The total population of people living in the Great Lakes watershed is 33.2 million. Divide that number among the Great Lakes. For instance, if your group thinks that about half of the people in the Great Lakes watershed live on Lake Superior, then they would write 16 million on a strip of paper and place it next to the Lake Superior coastline. The goal is not to get the number correct but to start thinking about where people are located around the lakes.

6. *Fish:* Try to predict the amount of fish taken from each lake for human food. Collect 20 "fish" from your teacher. These 20 fish represent all of the fish taken out of the Great Lakes. If your group thinks, for instance, that almost all of the total fish come from Lake Superior, then they should put 18 or 19 fish in that lake.

7. You may either give them the correct percentages or have the students figure them out.

7. After the base groups have made their guesses, leave the lake models in place and move into expert groups. Your group is assigned to one of the lakes. Look at the actual data available on your lake so that when you move back to base groups you will be able to correct the guesses originally made.

8. Return to base groups to correct the models and discuss the review questions.

Answers

1. Students may find the amount of fish taken and the amount of people living on Lake Erie surprising because of the lake's relatively small size.

2. Answers will vary.

3. There are several reasons, one is that Lake Erie has a somewhat milder climate, early trade routes were along its shores, and large population centers developed early.

Review Questions

1. What was the most surprising thing about this activity? Discuss why.

2. Which guesses were not close to the correct answers? What reasoning led the group to its wrong decisions?

3. Why do the majority of the people live around Lake Erie?

4. Why don't the length of coastline and the amount of water correspond?

5. How did the groups work out differences in opinion in order to come to common agreement?

Answers

4. The depths of the lakes are very different.

5. Answers will vary.

Extensions

1. As a class or individually, make up a question pertaining to the Great Lakes (for instance: "Which lake (on a map of the Great Lakes) is Lake Huron?" or "Which of the Great Lakes has the largest human population living in its watershed?") and ask the question to a variety of people either around the school or in the community. This may lead to interesting discussions concerning the possibility that the voting public may make uninformed decisions.

2. Try to find an additional set of data about the Great Lakes such as average depth, fish populations, average water retention time, level of pollution, etc. to present to the class or to lead the class through, as with the other data sets.

Using the data

These notes should help with interpreting the *Great Lakes Data* chart and with setting up the experiment.

1. *Shoreline:* In order to make strings that depict the relative lengths of shoreline of the Great Lakes, use the relative length data in the shoreline section. Any unit of measurement may be used as long as it is used consistently. The measurement units will depend on the amount of space available for the lesson. For instance, if the lesson will be taught outdoors, a large unit of measurement may be used, such as meters. In this case, the Lake Superior string would be 3.0 meters long. Make sure each string is labeled with a piece of tape.

2. *Water Volume:* The student groups each have 100 blue squares, which represent all of the water in the Great Lakes combined. To find how 100 squares should be distributed, look at the relative volume section in the volume category. It lists 54 for lake Superior. This means that 54 of the squares should be in the Lake Superior string model (over half of the water is in Lake Superior).

3. *Human population:* The total population data figures are rounded off in the section *Population* to the nearest million. The students attempt to guess the numbers in this category. It is interesting to realize that Lake Superior has only .6 million people living near it. This is less than 2 percent of the total population of the Great Lakes watershed.

4. *Fish:* The row labeled *percentage* in the fish section of the chart indicates the number of pounds of fish that would come from each lake if the total number of pounds from all the lakes was 20. Each base group of students should be given (or make) 20 "fish" so that they can make their best guess as to how the fish should be distributed in their string bordered "lakes."

		Great Lakes Data				
	Superior	**Michigan**	**Huron**	**Erie**	**Ontario**	**Total**
Shoreline *(with Islands)*						
(miles)	2,726	1,638	3,827	871	712	10,210
relative length	3.0	1.6	3.8	0.9	0.7	10.0
Volume [a]						
(cu. miles)	2,900	1,180	850	116	393	5,439
(km^3)	12,100	4,920	3,540	484	1,640	22,684
relative volume	54	22	15	2	7	100
Human Population in Watershed						
U.S. & Canada (2000)	673,000	12,052,743	3,000,000	11,400,000	5,600,000	32,725,743
population to nearest million (approx.)	0.7	12.1	3.0	11.4	5.6	32.8
Annual Commercial Fishing Harvest						
U.S. (lbs)	2,459,256	7,541,800	4,819,119	3,929,459	70,260	18,819,894
Canada (lbs)	1,489,000	0	10,472,000	23,089,000	914,000	35,964,000
Total	3,948,256	7,541,800	15,291,119	27,018,459	984,260	54,783,894
Relative percentage of fish harvested	7	14	28	49	2	100
Number of fish species	45	78	87	100	90	

[a] Measured at Low Water Datum.
Note: The total shoreline is greater that the sum of the lakes because connecting channels are included.

REFERENCES

Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. Coordinated Great Lakes Physical Data. May 1992. Agencies represented include: U.S. Department of the Army, Department of Commerce, and Department of the Interior; Environment Canada, Department of Fisheries and Oceans, and Natural Resources Canada.

Great Lakes Facts Maps, Michigan Sea Grant College Program. 2000. Cooperative Extension Service, Michigan State Univ., E. Lansing, MI.

The Life of the Lakes, Michigan Sea Grant and Michigan State University (Revised,2003).