# Great Lakes in Perspective

## Activity A: 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. These categories are visually represented so that students can put the lakes in perspective with each other. This activity could be used as an introductory activity to the study of other Great Lakes issues.

### OBJECTIVES

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

### PROCEDURE

1. In this activity the students will work in groups. Each student should be assigned to a base group and an expert group.
   *Expert Groups*
   There should be a total of five expert groups, one assigned to each lake. Each expert group studies one lake and members 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.
2. After group assignments have been made, the students begin by gathering in their base groups. These groups should each be situated around a cluster of desks or in an open area. The base groups then make their best guess about the following characteristics of the Great Lakes:
   *Shoreline*
   Give each group one of the prepared sets of five strings (See *Using the Data* Step 1). The groups should try to

#### Earth System Understandings

This activity relates to #3 (science methods and technology) and #4 (interactions). Refer to the introduction of this book for a full description.

#### Materials

Each base group (of five students) will need:
- A set of five labeled strings as described in step one of *Using the Data*
- 100 squares of blue paper
- One sheet of paper cut into five strips (1 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

An easy way to divide the students into base groups and expert groups may be to divide them into groups of five students (base groups) and have each member of those groups choose a lake (which hasn't already been chosen by a member of their group), thus creating the expert groups.

arrange their labeled strings to form a model of the outline of the Great Lakes (without referring to an actual map).

*Water volume*

Have each group of students distribute their 100 squares of blue paper among the lakes. The 100 squares together represent all of the water contained in the lakes. If a group thinks that the water is divided equally among the lakes, then they would put 20 blue squares into each lake.

*Human population*

Have each group cut five strips of paper which will be placed along the shoreline of the lakes (one for each lake). Tell the students the total population of people living in the Great Lakes watershed (31.7 million). The students should then divide that number between the Great Lakes. For instance, if they think 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 for the students to get the number correct but for them start thinking about where people are located around the lakes. Instead of writing actual numbers on the strips of paper, the lakes could be ranked from 1-5 for most population to least population.

*Fish*

Try to predict the amount of fish taken from each lake for human food. Give each group 20 "fish." These 20 fish represent all of the fish taken out of the Great Lakes. If the students think, for instance, that almost all of the total fish come from Lake Superior, then they should put 18 or 19 fish in that lake.

3. After the base groups have made their guesses, the students move into their expert groups. These five groups, each assigned to one of the lakes, look at all the data available on their lake so that when the students move back to their base groups they will be able to correct the guesses that their base group made. You may either give them the correct percentages or have the students figure them out.

4. Students return to base groups to correct their models and discuss the review questions.

**Answers**

1. Students may find the amount of fish gathered 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 produces more fish for human consumption than all the other lakes combined. Also, its climate is warmer.
4. The depths of the lakes are very different.
5. Answers will vary.

## 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 of opinion in order to come to common agreement?

## EXTENSIONS

1. As a class or individually, pick 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 have the students ask the question to a variety of people either around the school or in their communities. This may lead to interesting discussions concerning the possibility that the voting public may make uninformed decisions.

2. Each group of students could 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.

*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.

*Water volume*

The student groups each have 100 blue squares that represent all of 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).

*Human population*

The total population data figures are rounded off in the section Population to the nearest 0.5 million. The students attempt to guess the numbers in this category. It is interesting to realize that Lake Superior has only 0.5 million people living near it. This is less than 2 percent of the total population of the Great Lakes watershed.

*Fish*

The row labeled *"amount of fish if the total number was 20"* 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 | 2,980 | 1,659 | 3,827 | 871 | 726 | 10,063 |
| | Relative length | 3.0 | 1.6 | 3.8 | .9 | .7 | 10.0 |
| Water 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 (1991) | 500,000 | 8,500,000 | 2,700,000 | 12,000,000 | 8,000,000 | 31,700,000 |
| | Population to nearest 1,000,000 | .5 | 8.5 | 2.7 | 12 | 8 | 31.7 |
| Annual Commercial Fishing Harvest | U.S. (lbs) | 2,877,240 | 44,000,000 | 4,747,267 | 5,793,590 | 232,551 | 57,650,648 |
| | Canada (lbs) | 1,648,681 | | 6,378,861 | 40,620,666 | 1,212,728 | 49,860,936 |
| | Totals: | 4,525,921 | 44,000,000 | 11,126,128 | 46,414,256 | 1,445,279 | 107,511,584 |
| | Amount of fish harvested if the total number was 20 | 1 | 8 | 2 | 9 | 0 | 20 |
| | Number of fish species | 45 | 78 | 87 | 100 | 90 | |

[a] Measured at Low Water Datum

## REFERENCES

Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. Coordinated Great Lakes Physical Data. May, 1977.

Extension Bulletins E-1866-70, Michigan Sea Grant College Program. Cooperative Extension Service, Michigan State Univ. E. Lansing, MI. 1985.

The Life of the Lakes, Michigan Sea Grant and Michigan State University (1991 Data).