



# How Big is a Crowd?

The Great Lakes and the surrounding land provide many resources for the people who live in the area. Water for drinking and industry, fish for food, minerals, and other resources are abundant. However, people change the landscape. They create wastes and add chemicals to the environment when they use resources, and these can be harmful. When many people are concentrated in one area, they may compete for resources. In addition, the wastes these people generate tend to concentrate in the area immediately around them and may cause pollution problems.

Unlike other activities in this volume, this is written to and conducted by the teacher.

## OBJECTIVES

When students have completed this activity, they will be able to:

- Compare the relative sizes of the five Great Lakes and their human populations.
- Describe some of the problems that arise when many people depend on a limited resource.

## PRE-LAB

1. Cut lengths of string and tie the ends together to make loops proportional to the areas of the five Great Lakes. Suggested lengths in meters are given for groups of less than 30 and more than 30 participants.

### String Lengths Needed

	Class Size	
	less than 30	greater than 30
Lake Superior	8.5m	11.0m
Lake Michigan	6.0m	7.5m
Lake Huron	6.0m	7.5m
Lake Erie	2.5m	3.0m
Lake Ontario	2.0m	2.5m

2. Decide how many students will be "populating" each of the lakes. Use the chart on the next page to assign numbers of students to represent the relative numbers of people living around each lake. Numbers are given for both United States and Canadian residents (U.S./Canada). Remember that Lake Michigan is the only Great Lake that shares no border with Canada.

## Materials

- Ball of string.
- Masking tape.
- Area, Population, and Fish Production tables.
- 100 (minimum) wrapped candies or peanuts in shells.
- 5 paper bags.

## Earth Systems Understandings

This activity focuses on ESU 1 (beauty and value), 2 (stewardship), 4 (interactions), and 7 (careers and hobbies).

## Source

This activity originally came from *Supplemental Curriculum Activities to Accompany Holling's Paddle-to-the-Sea* by Marcia L. Seager, Rosanne W. Fortner, and Timothy A. Taylor.

## Note

You may want to invite another class to share in this activity, especially if your class has less than 20 people in it. Larger numbers of participants better illustrate the differing concentrations in population throughout the Great Lakes region.

## Number of People

U.S. / Canada

Total participants	15	20	25	30	35	40	45	50
Lake Superior	0/0	0/0	0/0	1/0	1/0	1/0	1/0	1/0
Lake Huron	1/0	1/1	1/1	1/1	1/1	2/1	2/1	2/1
Lake Ontario	1/2	1/3	2/3	2/4	2/4	2/5	3/5	3/6
Lake Erie	4/1	6/1	8/1	8/2	11/2	12/2	13/3	15/3
Lake Michigan	6/0	7/0	9/0	11/0	13/0	15/0	17/0	19/0

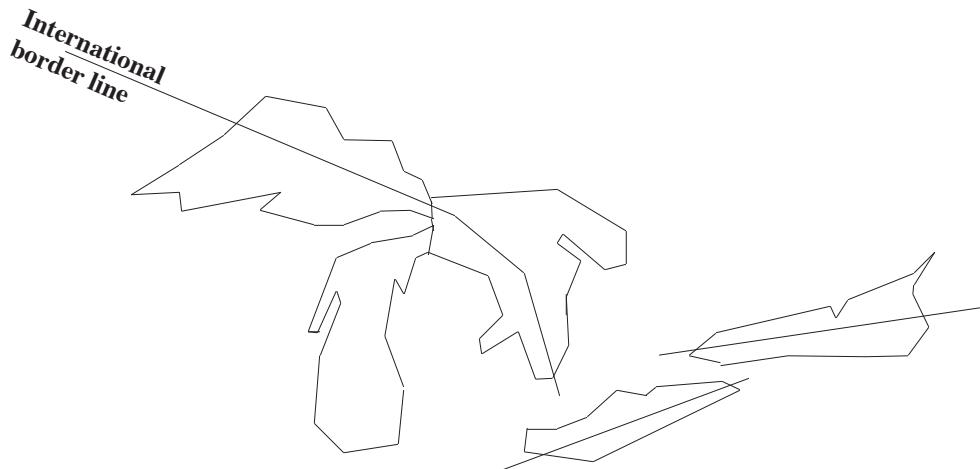
3. Divide wrapped candies or peanuts in shells into groups representing the proportional number of fish caught annually in each of the Great Lakes. You will need at least 100 candies or peanuts. One candy or peanut represents approximately 50 tons of fish. Label the five bags with the names of the five lakes and use the table below to put the correct number of "fish" in each bag. (For groups of less than 25 students, you may want to halve these numbers.)

### PROCEDURE

#### Proportional Number of Fish Caught

Lake Superior	8
Lake Michigan	35
Lake Huron	5
Lake Erie	50
Lake Ontario	2

1. Arrange the loops of string that represent the five Great Lakes into the approximate shapes of the Great Lakes. With masking tape, add a dividing line to each lake to show that each lake (except for Lake Michigan) has both a U.S. and Canadian side. Ask the students:
  - Which of the lakes has the largest area? Which has the smallest area?
  - Without using the chart as a reference, where would you guess that most people live?
2. Assign the appropriate numbers of participants to the U.S. and Canadian sides of each of the lakes. (An alternative is to assign participants to each lake without specifying a country. In this case you do not need the border.) Each participant should put one foot on the string "shore" of the lake.
  - Where are people closest together?
  - Did anyone have a hard time finding room to stand?
  - On which lake or lakes do you think the biggest cities are located?
  - Which lakes have the largest and smallest populations?
  - Are more people living near the eastern or the western lakes?
  - Are more people living near the U.S. or the Canadian shores?



3. Pass the appropriate bag of "fish" around each lake. Each person takes ONE piece of candy or peanut each time the bag is passed to him or her until the bag is empty. (If you have no one assigned to Lake Superior, set aside that bag and do not distribute those "fish" in the other lakes.)
  - Which lake had the most "fish"?
  - In which lake did people catch the most? Why do you think this is so?
4. People create waste when they use resources, and much of that waste is carried by water. Too much waste causes pollution problems. Open and eat your "fish." Put the wrappers or peanut shells on the floor inside the loop of string that is your lake.
  - In which lake is the waste most concentrated (greatest amount, closest together)?
  - Remember that the water from each lake flows into the lake downstream (in this case, to the east) of it. Which lake or lakes do you think might have the worst pollution problems? Why do you think so?
5. Have students use the Great Lakes Atlas and/or the Great Lakes Information Network (GLIN) online to find out more about the uses people make of the Great Lakes, the relative sizes of the lakes, and the human impacts on the region. Start the searches at <http://www.great-lakes.net>.
6. Clean up and discuss the activity together.

## DISCUSSION QUESTIONS

1. What relationships have you seen between population, resources, and waste?
2. What could you have done to make sure ALL participants got an equal number of "fish?" (Sell or trade for other resources or services, for example.)
3. How do you think the amount of pollution in the Great Lakes could be reduced?
4. How could you reduce the amount of waste you produce?

## EXTENSIONS

Play math games with Great Lakes areas and populations. For example, find out how many times Lake Erie could fit in one Lake Superior, how many people per square meter there are in each lake's watershed, and so on.

Organize a Clean Campaign to learn more about recycling. Find out what lakeshore communities do with wastes from fishing. Use the Internet to find out what the pollution levels are in each of the Great Lakes.