

How does water move in the Great Lakes basin?

You are familiar with the water cycle. The sun heats the surface of the earth, water evaporates, water vapor rises in the atmosphere cools and condenses, precipitation falls and then water flows in the streams, rivers, lakes and oceans. In this activity you will find out how water moves in the Great Lakes system.

OBJECTIVES

When you complete this activity you will be able to

- Locate and identify the Great Lakes on a map.
- Identify the connecting waters.
- Define water basin.
- Begin an analysis of the flow of water.

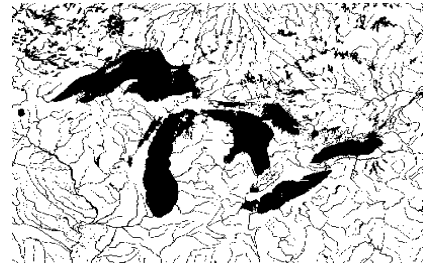
PROCEDURE

1. A basin is the area that a lake or river drains. Look at the direction that the rivers flow on your map and draw the basin lines around the Great Lakes so that all rivers that drain into the lakes are enclosed and any river that does not drain into the Great Lakes is outside of the basin. Each lake basin should be outlined in a different color.
2. Compare your map with that of other students and resolve any differences you detect. Discuss the great differences in watershed sizes. Does the biggest watershed determine the biggest lake? What other factors may be involved in lake size?
3. Locate the following and label them on your map.

Lakes: Erie, Georgian Bay, Huron, Michigan, Nipigon, Ontario, St. Clair, Superior.

Rivers and Connections: Mackinac, Niagara, St. Lawrence, St. Marys, Detroit.

4. If you did not know which way the water flowed through the lakes, what information would you need to find your answer?



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Earth Systems Understandings

This activity focuses on ESU's 3 and 4 (scientific process and interacting sub-systems).

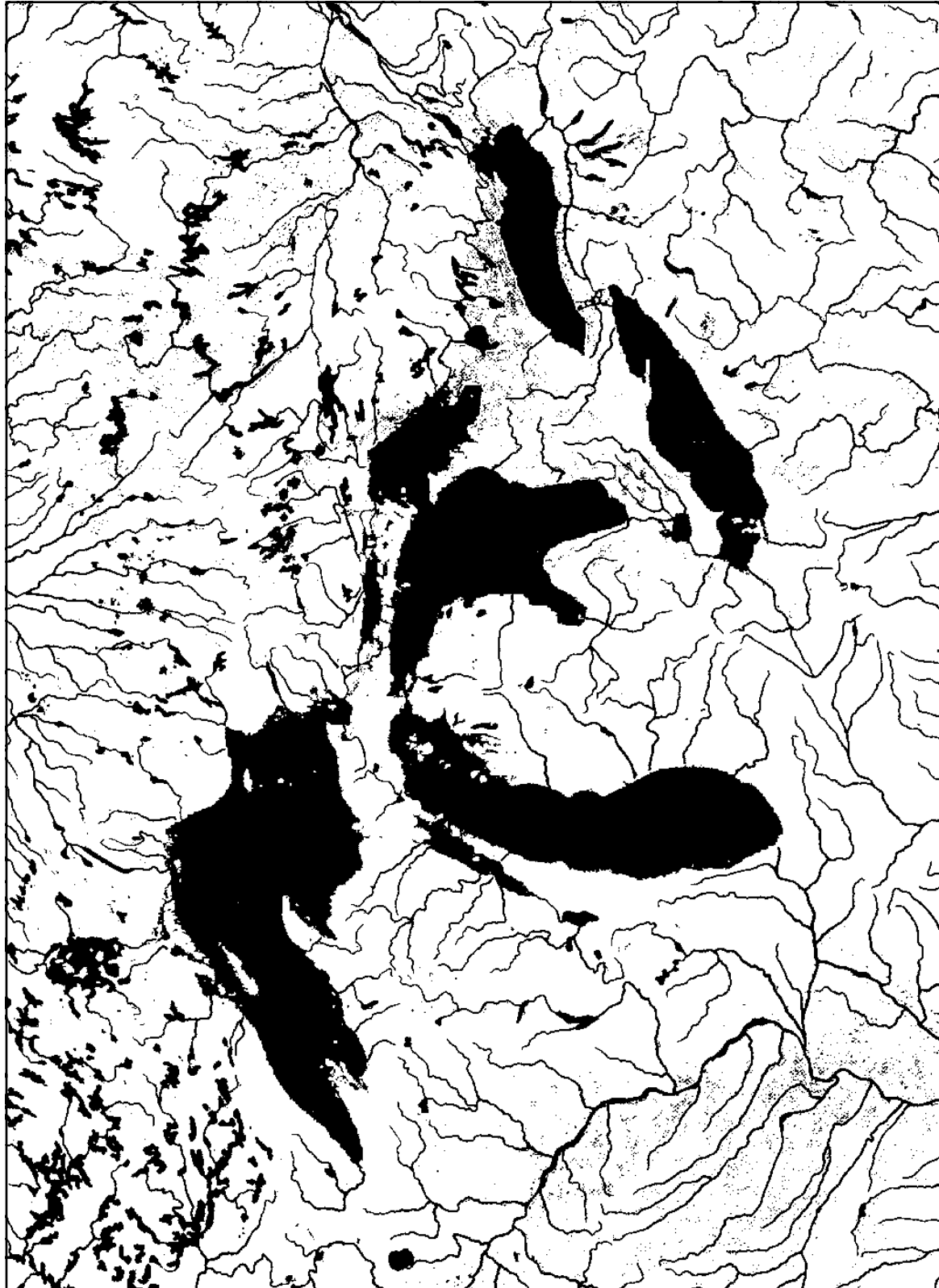
Materials

- Copies of the Map of the Great Lakes area. (One per student.)
- Colored pencils or markers.
- Copies of activity data charts.
- Paper, rulers and other supplies for student chart / diagram making.
- Atlas or Maps of Great Lakes area.

Teacher Notes

You might want to follow this activity with the activity *Out One Lake and In Another - How long does it take water to flow through the Great Lakes?*

Jigsaw: Students could work in expert groups, each group assigned a different lake to focus on and then return to base groups to put together an over all map and to share what they found significant about their lake.



*Rivers of the Great Lakes Region
Modified from "Water," a map produced by the National Geographic Society, 1993*

5. Examine Table 1 about the Great Lakes water system and choose some part of the data set that you find significant, develop a chart, diagram or some other meaningful way to display the chosen data. (Table 2 provides you with some background information about the Great Lakes. You may want to use it to help analyze Table 1.)
6. Share your chart, diagram or display with the class demonstrating how/why the data were significant to you.

Teacher Note

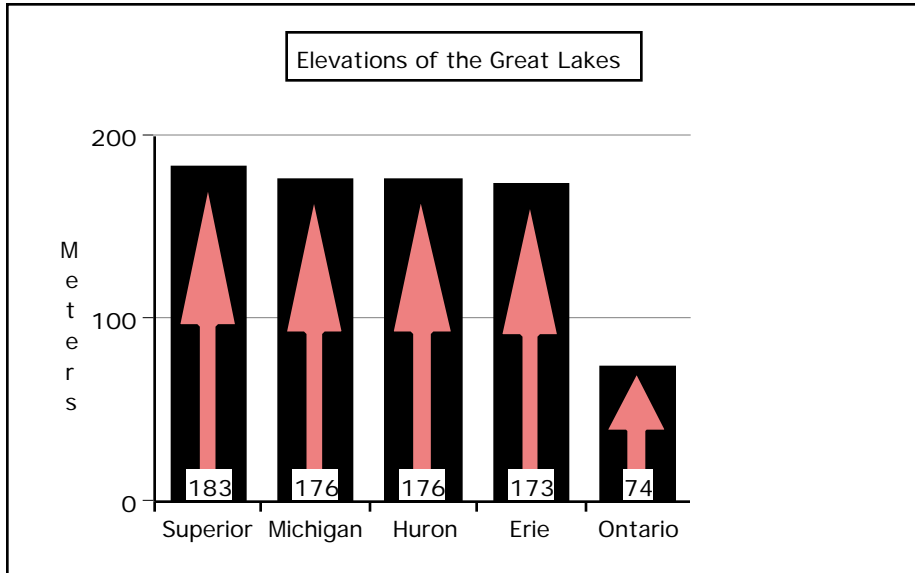
4. Elevation of lakes is the most logical.
5. Students may find that some of the numbers do not add up. (Input does not always equal output.) Have them hypothesize possible explanations (groundwater inflow and outflow, numbers rounded off, human use, etc.). The hypotheses could be used for further exploration.

The Great Lakes Water System (Figures are in thousands of cubic meters per second)	Runoff into lake	Precipitation into lake	Inflow from upstream lake	Evaporation from lake	Outflow
Lake Superior	1.4	2.1	0.2	1.4	2.2
Lake Michigan	1.0	1.5	----	1.2	1.6
Lake Huron	1.4	1.5	3.7	1.2	5.3
Lake Erie	0.7	0.7	5.3	0.7	6.0
Lake Ontario	0.9	0.5	5.8	0.4	7.1

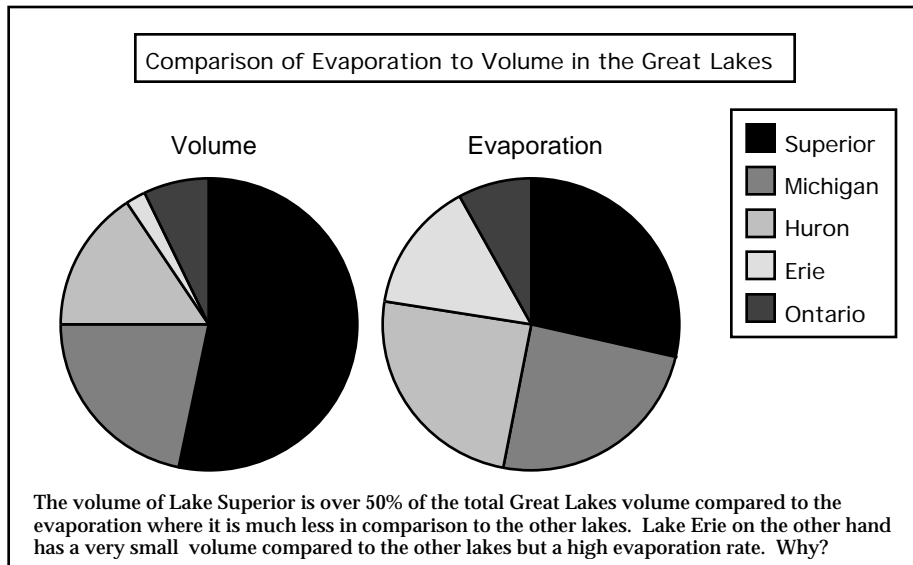
Table 1 - The Great Lakes Water System

Physical Data	Superior	Michigan	Huron	Erie	Ontario
Elevation (meters)	183	176	176	173	74
Length (kilometers)	563	494	332	388	311
Breadth (kilometers)	257	190	245	92	85
Avg. Depth (meters)	147	85	59	19	86
Max. Depth (meters)	406	282	229	64	244
Volume (km ³)	12,100	4,920	3,540	484	1,640
Surface Area (km ²)	82,100	57,800	59,600	25,700	18,960
Drainage Area (km ²)	127,700	118,000	134,100	78,000	64,030
Total (km ²)	209,800	175,800	193,700	103,700	82,990
Shoreline (km)	4,385	2,633	6,157	1,402	1,146
Retention (years)	191	99	22	2.6	6
Population 1980/81	738,540	13,970,900	2,372,119	12,968,606	6,642,175
1990/91	607,121	10,057,026	2,694,154	11,682,169	8,150,895

Table 2 - Physical Data of the Great Lakes (Data for Table 1 and 2 from: *The Great Lakes - An Environmental Atlas and Resource Book, 1987 and 1995, US EPA & Environment Canada*)



Example 1 of student data comparison for #5. Completed using ClarisWorks spreadsheet and entering the data from Table 2



Example 2 of student data comparison for #5. Completed using ClarisWorks spreadsheet and entering the data to be compared from Table 1 and Table 2.