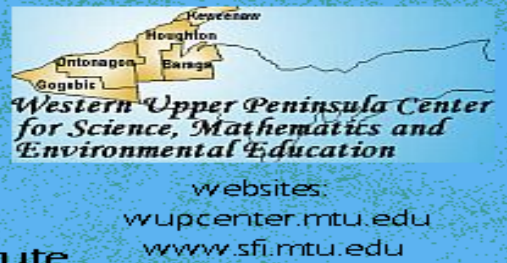




Western Upper
Peninsula Center
for Science,
Mathematics and
Environmental
Education
&
Sustainable Futures Institute



Lake Superior Watershed Floor Map Activity

Subject: Science, Social Studies

Grade: 4-8

Duration: one class period

Materials

Per group

- Lake Superior Floor Map
- Lake Superior Circle Tour Map or State Highway Maps
- Yard sticks or measuring tapes
- Great Lakes Chart
- "Rivers" consisting of name and blue yarn
- Yarn (for plotting watershed boundary)
- Laminated plant and animal figures
- Lake Superior/ Gt. Lakes Watershed Hand-outs

Lesson Overview

Students become familiar with Lake Superior Geography as they explore the concept of a watershed by mapping rivers and plotting the Lake Superior Watershed boundary. Students identify natural characteristics of the Lake Superior Watershed, and learn that each river system is a part, which makes up the whole of the Lake Superior Basin.

Essential Questions

Why is it important to know where a watershed boundary is?

Objectives

Students will be able to:

1. Define 'watershed.'
2. Explain why human activities within one watershed can affect all of Lake Superior (and eventually the entire Great Lakes Basin).

Advance Preparation

Spread the Lake Superior Floor Map out on the floor. Have the students gather around the edge of the map. (Tell students to take off their shoes so that the map stays clean, or have them kneel on map with feet off the map.)

Introduction

Ask what is this a map of? (Lake Superior) Have one student place the *Lake Superior* sign in the middle of the lake. Continue by asking students what they already know about Lake Superior. (Where is the lake located from here? How big is Lake Superior? Is it cold? etc.)

Procedure

Activity 1: Basic Geography and Mapping

1. Explain that all maps must have:
 - a) some kind of scale
 - b) some way of orienting you to the compass directions. [This map has a bar scale and a compass rose. Other maps may use ratio scales and latitude-longitude lines for orientation.]
2. Ask students where we are located on the map. Have one student place "You Are Here" sign.
 - Next pass out the international signs, state/province, towns and island-park signs to students and have them place their sign in its proper position.
3. Population Comparisons in Great Lakes Basin
Ask students if they think the Lake Superior area is heavily populated or lightly populated. Show students page 30 in "The Great Lakes: an Environmental Atlas and Resource Book" as a means for demonstrating how few people we have around Lake Superior.
4. Determine length and width of Lake Superior
Have students guess the dimensions of Lake Superior, then measure length [Duluth to Wawa, approx. 360 miles] and width [Munising to Rosspoint Canada, approx. 170 miles] using yarn and scale.

Activity 2: The Watershed

Ask students, Where does all the water in Lake Superior come from? [Precipitation onto the lake and runoff from surrounding land. A small component also comes from ground water seepage, but the ground water contribution is assumed to be insignificant, hence we will not discuss it here.]

1. Mapping Rivers

Pass out 1 piece of blue yarn to each student. Demonstrate how a river might look on a map by pointing out the head and the mouth of the river. Then have each student "map" their river.

Once students have finished "mapping", have them stand around the map. Ask them if they have any knowledge of what the river looks like...How is the fishing? etc. Then tell the students that these are just some of the rivers which flow into Lake Superior. There are actually over 300 rivers that flow into the Lake, and all these rivers contribute a large amount of water to the lake. (A little less than half of the water in Lake Superior comes from runoff.)

2. Identifying the Watershed Boundary

Now pick a point between two rivers and ask: if a rain drop falls here where will it run-off to? (The drop may runoff to one of the rivers and then flow into Lake Superior.) Next, pick a point away from the rivers, at the edge of the floor map, and ask the same question: if a rain drop falls here where will it run-off to? (This raindrop may flow into Lake Michigan, Hudson Bay or the Mississippi River, depending on location.) So somewhere, there is a line or boundary, which separates which way a drop of water will flow; toward Lake Superior, or away from Lake Superior.

Lake Superior Watershed Floor Map Activity

With students standing at the head of their river(s), pass a ball yard (any color other than royal blue) around the Lake, from the head of one stream to the next. Tell students that this line represents the boundary that defines whether water will flow into Lake Superior or toward some other body of water, in some other direction. Tell them the line is literally called a **DIVIDE** and all the area within the yarn represents the **LAKE SUPERIOR WATERSHED**. It is a nice visual effect to have students lift up the map along the watershed boundary just a little bit to show how water flows downhill toward Lake Superior.

Each river flowing into Lake Superior is part of a watershed (an area on the earth's surface that receives runoff from precipitation). All the watersheds from the individual rivers around Lake Superior combine to make up the Lake Superior Watershed.

Students may be a little confused when it comes to the St. Mary's river. Ask them why the yarn is placed at the beginning of the St. Mary's River? It is because this river drains water away from Lake Superior. The water in the St. Mary's River is not flowing **INTO** Lake Superior, but **AWAY** from the lake.

3. Identify Natural Characteristics of the Lake Superior Watershed

Begin by reviewing facts about Lake Superior:

- Deepest of Great Lakes (Max. = 1333 ft., Avg = 490 ft.)
- Cleanest of Great Lakes
- Holds ½ of water in Great Lakes, 10% of fresh surface water in world and 95% of United States' fresh surface water
- Holds 3 quadrillion gallons of water (enough to cover lower 48 states with 5 feet of water)!

Ask students to describe the Lake Superior region. [Topics to address are many and it will be easy to get carried away with detail. Try to stick to the highlights.]

1. Is this area highly developed? [L.S. basin population is approx. 700,000 as compared to 34,000,000 for the other four Great Lakes basins, combined]
2. Is there agriculture here? [A little, but generally the growing season is too short, and soils are not very fertile.]
3. What kind of industry is here: iron mining, shipping, logging, tourism

While you are discussing these points, have students place the laminated plant/animal pictures around the lake. We are trying to emphasize that the Lake Superior watershed is relatively natural.

4. Why Are Watersheds Important?

Tell students the watershed that they have just generated is a close approximation to the real Lake Superior watershed. Show them a map of the actual watershed. Ask students: Does your school lie within the Lake Superior Watershed? How about your home? [Identify which river's watershed the school is within.]

Lake Superior Watershed Floor Map Activity

“Now what could happen if I pour a gallon of motor oil on the ground out behind my house, could that have an impact on Lake Superior?” (Yes! Anything dumped within the Lake Superior Watershed has the potential to impact the Lake.) “There are quite a few paper mills in Ontario, and the paper-making process generates a significant quantity of pollutants. Where might those pollutants end up if the manufacturers are not careful? [Lake Superior.]”

5. Great Lakes Watershed

Show a map of the Great Lakes Watershed and tell students that Lake Superior is just one of the five Great Lakes. Ask students “where does the water from Superior flow? (Into the Lake Huron-Michigan system.) Continue in the same way, following water through the entire Great Lakes system, out to the Atlantic Ocean.

Give students a map of the Great Lakes Watershed. Have them label each lake.

Learning Assessment

1. What must all maps have on them? [a scale and a compass to indicate direction]
2. What did you learn about the geography around Lake Superior?
3. What did we learn by mapping the different rivers that flow into Lake Superior?
4. Where and what is the boundary or divide of the Lake Superior Watershed?
5. Identify where the watersheds for the other Great Lakes are located.
6. What human activities can negatively impact the Great Lakes?

Geography of Lake Superior:

United States and Canada States and Provinces surrounding Lake Superior

Ontario
Michigan
Wisconsin
Minnesota

Towns/Cities around Lake Superior:

Sault Ste. Marie, Canada & Michigan
Munising
Marquette
L'Anse
Baraga
Houghton
Hancock
Ontonagon
Superior
Duluth
Thunder Bay
Wawa
Marathon
Ironwood
Ashland

Lake Superior Floor Map: Rivers to “Map”

Michigan: Tahquamenon
Two Hearted
AuTrain
Huron
Sturgeon
Ontonagon
Wisconsin: Montreal
Bad
Boise Brule
Minnesota: St Louis
Temperance
Pigeon
Ontario: Kaministiquia
Nipigon
Gravel
Aguasabon
Pic
White
Pukaskwa
Michipicoten

Parks

Isle Royale National Park
Apostle Islands National Lakeshore
Michipicoten Island Provincial Park

Great Lakes Physical Features & Population

	Superior	Michigan	Huron	Erie	Ontario	Totals
Elevation^a (feet) (meters)	600 183	577 176	577 176	569 173	243 74	
Length (feet) (kilometers)	350 563	307 494	206 332	241 388	193 311	
Breadth (feet) (kilometers)	160 257	118 190	183 245	57 92	53 85	
Average Depth^a (feet) (meters)	483 147	279 85	195 59	62 19	283 86	
Max Depth^a (feet) (meters)	1332 406	925 282	570 229	210 64	802 244	
Lake Volume^a (miles ³) (km ³)	2,900 12,100	1,180 4,920	850 3,540	116 484	393 1,640	5,439 22,684
Lake Surface Area (miles ²) (km ²)	31,700 82,100	22,300 57,800	23,000 59,600	9,910 25,700	7,340 18,960	94,250 244,160
Drainage Area^b (miles ²) (km ²)	49,300 127,700	45,600 118,000	51,700 134,100	30,140 78,000	24,720 64,030	201,460 521,830
Total Area (land+water) (miles ²) (km ²)	81,000 209,800	67,900 175,800	74,700 193,700	40,050 103,700	32,060 82,990	295,710 765,990
Shoreline Length^c (miles) (kilometers)	2,726 4,385	1,638 2,633	3,827 6,157	871 1,402	712 1,146	10,210 ^d 17,017 ^d
Retention Time (years)	191	99	22	2.6	6	
Population U.S. (2000) Canada (1991)	519,728 181,573	9,820,6200 0	2,651,04 5 1,191,46 7	8,133,93 2 1,664,63 9	2,907,91 9 5,446,61 1	24,033,244* 10,000,000* *
TOTALS	701,301	9,820,6200	3,842,51 2	9,798,57 1	8,354,53 0	34,033 ,244
Outlet	St. Mary's River	Straits of Mackinac	St. Clair River	Niagara R. Welland Canal	St. Law- rence River	