Introduction: Give each group a set of puzzle pieces of the 5 Great Lakes. Have them attempt to put them in the correct position on their tables. Use the Great Lakes land use map to check positions. Trace the path of the water in the Great Lakes through the St. Lawrence River system, mentioning the Welland Canal, the St. Lawrence Seaway, and the connections to the Mississippi River system. Also share the recovery rates of the lakes. (See Quick Lake Facts included in this packet). Today we will learn about how people use this area.
PROCEDURE:
1. Demonstrate amount of water in the world:
   - 5 gallons = all water in world (tint water blue for effect)
   - 2 ½ cups = all fresh water.
   - ¾ cup = all unfrozen fresh water.
   - 1 ¼ tsp = all water in lakes and rivers.
   - 20% of that fresh water is in the Great Lakes
   Ask: Where does the water come from that flows into the Great Lakes?

2. Optional Activity: Play RIVERS by Kitty Donahoe (found on Bunyans and Banjoes CD, http://kittydonohoe.com/music/). Pass out the lyrics and have students underline the names of each river.

3. Using Michigan Rivers map, find the Saginaw Bay and the Saginaw River. Trace all the rivers that flow into it, and outline the Saginaw Basin (watershed). (Tracing rivers flowing into Lake Michigan in one color, into Lake Huron with another color, Lake Erie with another color, Lake Superior with a fourth color, will show the Michigan side of the watersheds of each Great Lake.) Using 2 colors (one east, one west) will show Michigan's higher elevation in center of state. Compare the topographical map of Michigan to the Michigan Rivers map. Discuss the following statement:
   The topography of Michigan determines the direction of the rivers in Michigan.

4. Talk about watershed, basin, drainage, elevation, directions. Use watershed maps of Saginaw River (largest in Michigan), Michigan Rivers, Great Lakes area, or U. S. Have students point out where they live and discuss the fact that what we put into watershed eventually gets to the Great Lakes. Be sure students can trace how the water from the nearest river flows into the Atlantic Ocean. Outline watershed areas of Great Lakes. Discuss size, what other natural and cultural features are in each (cities, farm and forestland).

5. Simulate the population (and pollution) of the Great Lakes area with the following activity:
   Using yarn cut to the following lengths and tied to form a loop, make a general representation of the Great Lakes on the floor. Divide the participants into groups (use the following chart depending on the size of your group) to sit on the Canadian or US side representing each Great Lakes population. Discuss where most of the people live. What would be the likely effect in the heavily populated areas? Participants could simulate pollution by eating peanuts while throwing the shells in their respective lake, or by eating Hershey Kisses while throwing the foil in the lake.

   Cut yarn to the following lengths (Groups of less than 30/ more than 30):
   - Lake Superior 8.5/1 1 m
   - Lake Michigan 6/7.5 m
   - Lake Huron 6/7.6 m
   - Lake Erie 2.5/3 m
   - Lake Ontario 2/2.5 m

<table>
<thead>
<tr>
<th>NUMBER OF PEOPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S./CANADA</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Total Participants 15 20 25 30 35 40 45 50</td>
</tr>
<tr>
<td>Lake Superior     0/0 0/0 0/0 1/0 1/0 1/0 1/0 1/0</td>
</tr>
<tr>
<td>Lake Huron        1/0 1/1 1/1 1/1 2/1 2/1 2/1 2/1</td>
</tr>
<tr>
<td>Lake Ontario      1/2 1/3 2/3 2/4 2/4 2/5 3/5 3/6</td>
</tr>
<tr>
<td>Lake Erie         4/1 5/1 8/1 8/2 11/2 12/2 13/3 15/3</td>
</tr>
<tr>
<td>Lake Michigan     6/0 7/0 9/0 11/0 13/0 15/0 17/0 19/0</td>
</tr>
</tbody>
</table>
6. Look at LAND USE maps. Considering what we just learned about the populated areas, what danger is there in eating the fish from each of the lakes? (The most fish are caught from Lakes Erie and Michigan, which are also the most populous, and are probably the most polluted.)

7. List 3 types of land uses in the Great Lakes watershed. (forest, agriculture, urban areas)
   Why does each occur where it is? (Forests in the north where few people live. Agriculture and housing in the southern parts where the climate is better and more industry is located)

8. What kinds of human activity occur around lakes? Make a chart of human activities for each land use:

<table>
<thead>
<tr>
<th>FOREST</th>
<th>AGRICULTURE</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>tourism, camping, timbering</td>
<td>fertilizing, clearing, grazing</td>
<td>construction, paving, sewer, industry, landscaping</td>
</tr>
<tr>
<td>parks</td>
<td>farming</td>
<td></td>
</tr>
<tr>
<td>winter sports</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Ask questions such as the following:
   Which lake would most likely have the least pollution from detergents and fertilizers? Why? (Superior, because all others have either agricultural or urban land uses or both and Superior doesn’t have agriculture or many people)
   Which land uses cause pesticide pollution? (Those surrounded by farms and urban uses: Huron, Michigan, Erie, Ontario)
   Which land use causes the least pollution? (forestry, although paper mills create pollution problems)

   The high population and industry may be thought of as negative impacts of human interaction with the Great Lakes. What are some of the positive interactions? (transportation, agriculture, housing, drinking water, industry (jobs), recreation)

Extending the Lesson:
   Tourism is the 3rd largest industry in Michigan and the Great Lakes area, next to manufacturing and agriculture. Michigan has the most second homes, and the most acres in golf courses. What are some ways people in the Great Lakes region enjoy the area? Make a chart of the following (sample answers provided):

<table>
<thead>
<tr>
<th>WATER</th>
<th>FOREST</th>
<th>HILLY AREAS</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>boating, swimming</td>
<td>camping, hiking</td>
<td>hiking, skiing, sledding</td>
<td>scenic tours, golf, snowmobiling, cycling, cultural activities</td>
</tr>
<tr>
<td>fishing, water sports</td>
<td>bird-watching</td>
<td>snowboarding, ATV’s</td>
<td></td>
</tr>
<tr>
<td>hunting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Background Information: A well-defined four-season climate supports many types of recreation from ice fishing, skiing and snowmobiling in the winter to golf, fishing, boating and swimming in the summer. The eight Great Lakes states have about 3.7 million registered recreational boats, or about a third of the nation’s total. Michigan and Minnesota lead the nation in the number of boat registrations, and six Great Lakes states rank in the nation’s top ten in total number. The commercial and sport fishing industry is collectively valued at more than $4 billion annually.

The Great Lakes Circle Tour is a designated, scenic road system connecting all of the Great Lakes and the St. Lawrence River. The Circle Tour, established by the Great Lakes Commission in cooperation with its eight member states and the province of Ontario, promotes travel and tourism along the shores of "North America's Fresh Coast." The Circle Tour is over 6,500 miles or 10,500 kilometers long, encompassing individual lake Circle Tours. (www.great-lakes.net/tourism/circletour/)
Have students conduct surveys in the class, school, or community using questions such as the following:
- Where did you travel on your last vacation in Michigan or the Great Lakes Region?
- How long was the trip?
- How did you travel?
- What were the three most fun activities?

Use a Michigan or Great Lakes region map to mark the most common vacation destinations of classmates. Use a road map to determine routes. Make graphs of the most popular activities. Each student should use the map or the graph to write sentences for the following:
- Explain some ways vacationers in (a specific place name) impact the environment.
- Who might benefit from the vacationers in (a specific place name) and how?
- What are some jobs connected to the tourist industry?

CONNECTIONS:
1. ART: GREAT LAKE ART; Posters on the benefits of and dangers to the Great Lakes.
2. SCIENCE: Water cycle; environmental issues
3. MATH, Miles of river, shoreline, distances of shipping routes, percentages of fresh, frozen water.
QUICK LAKE AND WATERSHED FACTS

Lake Michigan
- Third largest of the Great Lakes and sixth largest lake in the world.
- Only one of Great Lakes entirely within the U. S.
- Large industrial region at south end and rich agricultural land throughout the Lake Michigan basin; key products include iron ore, steel, limestone, and grain and farm products.
- Although similar in size and depth to Lake Huron, it has a longer retention time of 99 years because water enters and exits through the same path, slowing circulation.

Lake Huron
- Second largest of the Great Lakes and fifth largest lake in the world.
- Surrounded by the world’s largest limestone quarries; other major resources include salt, copper, silver and uranium.
- Major agricultural production region for beans, including 20% of all dry beans grown in the U. S.
- Lake water retention time is 22 years.

Lake Erie
- Different from the other lakes; it is shallow, warm, lies on rich soil and averages 95% winter ice cover.
- Has the largest walleye fishery in the world.
- Large glass and steel production area for both countries; 13 ports also serve as major distribution centers for iron ore, coal and grain.
- Has a retention time of only three years.

Lake Ontario
- Slightly smaller in area than Lake Erie but much deeper, holding four times the amount of water.
- 80% of water supply comes from the upper lakes, the remainder from precipitation.
- Retention time for water entering Lake Ontario is six years.

Lake Superior
- World’s largest freshwater lake by surface area
- Deep, cold, least polluted of the 5 lakes
- Sparsely populated; economically dependent on surrounding natural resources, including timber, metals and recreational opportunities; supplies U. S. with 97% of the country’s iron ore.
- Water entering the lake will stay there for almost 200 years.

<table>
<thead>
<tr>
<th>Land Uses in the Great Lakes Watershed</th>
<th>Forest</th>
<th>Agriculture</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>92%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Michigan</td>
<td>42%</td>
<td>45%</td>
<td>10%</td>
</tr>
<tr>
<td>Huron</td>
<td>68%</td>
<td>27%</td>
<td>2%</td>
</tr>
<tr>
<td>Erie</td>
<td>21%</td>
<td>65%</td>
<td>11%</td>
</tr>
<tr>
<td>Ontario</td>
<td>50%</td>
<td>40%</td>
<td>6%</td>
</tr>
</tbody>
</table>
ASSESSMENT ACTIVITIES:

- Ask students to choose a river in Michigan and trace it. Then color the land on either side according to its elevation (green being the lowest, then yellow, orange, brown and red). Using complete sentences, describe the topography of the course of this river.

- Using a Michigan Rivers map, circle areas of high elevation.

- Using the chart of land use in the Great Lakes Watersheds, have students make a graph and use the graph to answer the following:

  1. Which Great Lake is least likely to be affected by pollution caused by pesticides and fertilizers?
     A. Michigan
     B. Huron
     C. Superior
     D. Ontario

  2. Which two watersheds probably have the highest population and why?
     A. Superior and Michigan, because they are popular tourist areas
     B. Michigan and Erie, because they are heavily industrialized
     C. Michigan and Huron, because they have good fishing
     D. Ontario and Superior, because they are located the farthest north

  3. One reason that Lake Michigan and Lake Erie Watersheds have a higher percentage of agricultural land use is:
     A. There are more people and cities around these lakes
     B. There is more pollution in these lakes
     C. There are more fish in these lakes
     D. The climate is milder and the land is flatter around these lakes

  4. Which two industries are most likely to be located in the forested areas?
     A. Timber and Tourism
     B. Paper and Car Factories
     C. Restaurants and Education
     D. Timber and Candle-making

  5. What is the relationship between the percentage of forest land and the percentage of land used for housing?
     A. The higher the percentage of forest land, the higher the percentage of housing
     B. The lower the percentage of forest land, the lower the percentage of housing.
     C. The higher the percentage of forest land, the lower the percentage of housing
     D. There is no relationship.

Answers: 1 (C) 2 (B) 3 (B) 4 (A) 5 (C)
RIVERS
By Kitty Donahoe
Bunyans and Banjoes
http://kittydonohoe.com/music/

THERE’S THE TITABAWASEE AND SHIAWASSEE TOO,
THE BOLD RED CEDAR AND THE KALAMAZOO
AND THE BIG TWO-HEARTED AND THE LITTLE MANISTIQUE
THE HURRICANE RIVER AND ST. PAUL’S CREEK

CHORUS:
WATER, WATER, ALL AROUND
CREEKS AND STREAMS FOR MILES ABOUND
BLUE AND ROLLING, CALM AND GREEN
MICHIGAN’S RIVERS RUN COLD AND CLEAN

THERE’S THE PIGEON RIVER AND THE PERE MARQUETTE
THE ONTONAGON AND THE SWEET LITTLE BETSIE
RIVER RAISIN AND THE SALT AND THE CASS
THE MAPLE RIVER AND THE LOOKING GLASS

(CHORUS)

THERE’S THE RIFLE RIVER AND THE PINE AND THE FORD
THE ESCANABA AND THE BLACK AND THE BOARDMAN
DEVIL’S RIVER AND THE OLD PAW PAW
THE THORNAPPLE RIVER AND THE CHIPPEWA

(CHORUS)

THERE’S THE ST. MARY’S RIVER AND THE BELLE AND THE FLINT
TAHQUAMENON RIVER AND THE FLAT AND THE CLINTON
SAGINAW RIVER AND THE LONG AU GRES
THE PAINT AND THE RABBIT AND THE THUNDER BAY.

(CHORUS)