

GRACE Science Lesson 2: Exploring The Great Lakes

Driving Question

What happens to water once it flows into a Great Lake?

Map Link

<http://bit.ly/1vcFcGp>

<http://nsfgrace.maps.arcgis.com/apps/StorytellingTextLegend/index.html?appid=6c421953c70e43bdb69ae00f9e4bbc0e>

(Login with username: "graceuser1" and password: "gracepassword1")

Draining Watersheds

Water makes its way out of a watershed by flowing downhill. We can use an elevation map, like the one shown on Tab 1, to determine where rain water will flow as it makes its way into one of the great lakes. The red dotted line is marking out the perimeter of the Muskegon Watershed.

- The elevation map shows the highest points in yellow and the lowest points in green. What general trend do you notice in the elevation of the watershed as you get closer to Lake Michigan?
- Starting in the middle of the state and working toward Lake Michigan, choose five points that are spread out within the Muskegon Watershed. Click on each of these five points to measure and record the exact elevation at those locations. (You may need to zoom in to avoid clicking the boundary of the watershed itself.)
- Use these data points to create a simple graph illustrating the general trend of the elevation data as you get closer to Lake Michigan?
- Since water always flows downhill, use your measurements to describe how rain water will flow through the Muskegon Watershed. Where will the water end up?

The Muskegon River

On Tab 2 of the map, you will see the Muskegon River marked out in blue. Along this river, water from all over the Muskegon Watershed flows out to Lake Michigan.

- Based on what we know so far, which end of the river will have a higher elevation and which end will have lower elevation?
- Let's use the elevation profile tool to test our prediction. This tool allows us to create a graph of the elevation along any line on a map. In this case, we will graph the elevation along the Muskegon River. Follow this link to view the elevation profile tool: <http://bit.ly/1y5uM8E>.
- Once the tool opens, close the dialog box and click on the blue Muskegon River. Within a few moments, an elevation profile graph will appear at the bottom of the screen. Hover your mouse over the graph to see a red "x" appear, which indicates the exact location on the map corresponding to that point on the graph.
- Using the elevation profile tool, check your prediction. Which end of the river is higher and which is lower?
- The elevation profile indicates a few areas where the elevation does not change for several miles and then it suddenly drops by 100 feet or so. What do you think this is?

The Great Lakes

As rain falls all over Michigan, the water gathers in small local watersheds, which feed into larger regional watersheds, which ultimately feed into the Great Lakes. Water that falls on the land in Michigan eventually flows into one of the Great Lakes because the elevation of the Great Lakes is generally lower than the elevation of the land in Michigan. But where does water go after it flows into a Great Lake? Go to Tab 3 of our original map.

- Click on each of the five Great Lakes to measure the elevation of each.
- Rank the Great Lakes from highest to lowest elevation.
- If rainwater were to fall into Lake Huron, which other Great Lake(s) could that water eventually flow into?

- Based on this information, how would you expect water to flow through the Great Lakes? Produce a simple diagram (elevation profile) that illustrates the flow of rainwater that falls into Lake Superior.

Lake Erie to Ontario

You probably noticed that Lake Ontario is significantly lower than all of the other Great Lakes. Let's take an up-close look at how water from Lake Erie flows into Lake Ontario. Visit Tab 4 of our map and navigate to the far east side of Lake Erie - there you will see a red line, which follows the river that connects Lake Erie and Lake Ontario.

- Zoom way in and look at the satellite images along this highlighted river. Do you see any visual clues that might tell you where the elevation of the water level suddenly changes?
- Let's use the elevation profile tool again to identify the exact place (or places) where the water is dropping to a lower level. Follow this link to view the elevation profile of this map: <http://bit.ly/1yahsU6>
- Once again close the dialog box and click on the red line to view the elevation profile.
- Hover over the graph to find the exact locations where the elevation changes. (You may need to zoom and pan around the map to find the locations in the satellite images).
- Based on your observations of the elevation profile and the satellite images, how would you characterize the change in elevation between Lake Erie and Lake Ontario? How large is this change in elevation? What would it look like if you were standing on the ground?