

## **I. Objectives**

1. Delineate approximate watershed boundaries using channel networks
2. Delineate watershed boundaries using a topographic contour map

## **II. Introduction**

Watersheds or drainage basins are those regions upstream from a given point on a river, usually a stream gauge or where a river reaches a coast or lake, whose waters drain past that point. Drainage divides are topographically high ridgelines that separate adjacent drainage basins. The most familiar is the Continental Divide through the Western Rockies. One of the ideas in the “Visualizing Watershed – Module 2” video referenced above is that “we all live in a watershed,” which points to the fact that watersheds are all around us, no matter where we live.

Another popular expression might be restated as “What happens in your watershed stays in your watershed,” which suggests that any upstream contamination or degradation of the ability of the watershed to naturally release water downstream, as might happen after a forest fire or clear cut logging, will affect downstream users for some time. Because most maps do not show watershed boundaries, it is important to learn how to recognize or distinguish one watershed from another.

## **III. Materials**

Map of Western river networks, any topographic map, colored pencils, crayons or markers

#### **IV. Prelab Definitions**

1. watershed
2. drainage basin
3. drainage divide
4. contour line
5. channel

## V. Lab Procedure

Work in groups of 2. All students should be able to identify watershed boundaries from channel networks. The trick is to understand that watershed boundaries cannot cross any river networks on your map so must fall in between networks, each of which represents a different drainage basin. Using the following steps trace a watershed boundary based on channel networks. Try it using the attached map of western rivers label “Channel networks.”

1. Trace the main channel of the river from its mouth to the headwaters.
2. Trace the major tributaries starting at the coast and/or gulf.
3. Find the drainage divides by marking a dot above the top of each river, midway to the adjacent watershed. A watershed boundary will NEVER cross a stream channel line!
4. Starting at the mouth connect the dots to form the watershed boundary.
5. Identify sub-watersheds of major tributaries

Once everyone finishes, the instructor will provide feedback.

Tracing watershed boundaries on topographic maps is more challenging unless you have worked with contour maps as it requires you to visualize the topography based on the contour lines. Remember that contour lines represent lines of equal elevation like a shore line, and that the steepest slope is perpendicular to the contour lines. One way of visualizing what is happening within a watershed is to imagine that you are a raindrop that falls at some point, and then trace out the path this drop or unit of rain takes as it flows downhill to the nearest stream channel. Using the attached contour map:

1. Identify the gauge point – lowest area
2. Identify river valleys – low areas
3. Identify drainage divides lines – high areas
4. For clarification identify lower tributaries
5. Continue tracing drainage divide
6. Move uphill from gauge to ridge, moving perpendicular to the contour lines
7. Watershed boundaries will only cross the stream at one point (lowest elevation)

The trick to drawing the boundary in the vicinity of your gauging point (step 6) is to stop thinking about ridge lines and instead identify the fall line or drainage line from the nearest ridge line to your gauge point as the final segment of your boundary.

Again, once everyone finishes, the instructor will provide feedback.

## **VI. Lab Discussion**

1. Although watersheds are not used as political boundaries very often, rivers sometimes are. Using a map or other resource list at least three political boundaries that are formed by rivers.
  - a.
  - b.
  - c.
2. A political dispute may erupt when a river making up a political boundary changes course. Explain why is this is not a significant problem for watershed boundaries.
3. Think of one situation where you might be able to see a drainage network but not have a map handy. Where might you be and how might this skill be useful?
4. Watershed boundaries mainly affect the drainage of surface water and precipitation. Is groundwater flow generally controlled by these same boundaries? Why or why not?
5. What were the most difficult aspects of this exercise for you? Explain your answer.

Lab courtesy of Dr. Jim Washburne