

**Title:** Watershed Warriors

**Grade Level:** Upper Elementary

**Duration:** Lesson 1: (2 class periods), Lesson 2: (MWEE no less than 3 class periods)

**Objective:** At the culmination of this lesson, students will be able to:

- Define a watershed
- Identify smaller watersheds within a larger watershed.
- Delineate a watershed using a topographic map.
- Delineate a watershed using USGS StreamStats or ModelMyWatershed
- Determine some characteristics of a watershed.
- Determine their HCU
- Determine direction of streamflow using a topographic map.
- List 5-10 characteristics of streams in their area.
- Recognize natural physical features that define watersheds.
- Understand that the Upper Susquehanna - Lackawanna is a part of the Chesapeake Bay Watershed.

**Materials:**

- paper topographic map of the area they live in with a creek or stream flowing through it. (USGS –[usgs.gov](http://usgs.gov) – provides free resources to view topographic maps with various base layers: USGS-The National Map, USGS-National Map Viewer.)
- colored pencils
- device with internet access
- tarp or plastic tablecloth
- blue paint (nontoxic)
- water spray bottles
- iron oxide pigment or orange paint (nontoxic)
- journals/paper
- writing utensil
- water quality testing equipment (can be borrowed from local Intermediate Unit)

**Standards:**

**NGSS Science Standard: HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. (Grades 9 - 12)

**Standard 1.2 Reading Informational Text** -Students read, understand, and respond to informational text—with an emphasis on comprehension, vocabulary acquisition, and making connections among ideas and between texts with a focus on textual evidence

**Standard: HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. (Grades 9 - 12)

STEELS:

3.1.K.A Use observations to describe patterns of what plants and animals (including humans) need to survive

3.1.6-8.J Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

3.1.3.G Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3.1.2.C Make observations of plants and animals to compare the diversity of life in different habitats

### **Environmental Literacy Goal:**

Enable students in the region to graduate with the knowledge and skills needed to act responsibly to protect and restore their local watershed.

### **Introduction:**

- **Tarp Activity** – Have a tarp/ plastic tablecloth set up outside with newspaper or foil underneath, representing the topography of the watershed. Add blue paint to certain points on the tarp. This can represent the path water will travel through precipitation events. Have students gather around the tarp with water bottles. As students spray the tarp, have them observe how the water flows down slopes to a common point, or water body. All the surface area of the tarp that leads to the same water body represents the watershed.
- **Non-point Pollution Extension** – Extend this activity by adding iron oxide pigment in spots on the tarp, representing mine impacted areas with abandoned mine drainage non-point pollution. Have students observe how this AMD pollution collects and travels downstream, affecting stream life.

### **Background Information:**

#### **1. What is a Watershed?**

- Read the following passage: <https://www.mbgnet.net/fresh/rivers/index.htm>
- Identify the main idea of the passage: [Main Idea Worksheet](#)
- Watch the following video: <https://www.youtube.com/watch?v=2pwW2rIGIa8>
- Fill in the guided notes: [Watershed Notes](#)

#### **2. HCU:**

Find your watershed address and use the features to discover information about it and even delineate your watershed. Go to [modelmywatershed.org](http://modelmywatershed.org) and click “Get Started”

Additional Info:

Enter your zip code in the box at this site to find your HCU and other information about your watershed. Guide students to explore their watershed by clicking on the tabs and the waterbodies on the map. Prompt students find identified issues and the health score.

<https://www.epa.gov/waterdata/hows-my-waterway>

\*\*\*Take it further: Give students a different city in Pennsylvania (or let them choose) to compare and contrast to their watershed using the same site.

### 3. Watershed Issues

- Engage students in a discussion about environmental issues in our watershed. Lead them to understand that what happens in a watershed affects the water downstream.
- Divide students into groups. Give each group a set of environmental watershed issues cards. Have each group decide on what they feel is the most important issue to address within their watershed based on what they have researched. Have them brainstorm ways they can help.
- 4. **Watershed Delineation:**
  - Present the [Watershed Delineation PowerPoint](#).
  - Have students act as civil engineers by using topographic maps to delineate watersheds:  
<https://www.youtube.com/watch?v=f7aVNyVMO5g>  
<https://www.teachengineering.org/activities/view/vpi-2594-watershed-delineation-activity>  
Use the link below to delineate your own watershed:

>> **Step 1: Draw a circle at the outlet or downstream point of the wetland in question**  
>> **Step 2. Put small "X's" at the high points along both sides of the watercourse, working your way upstream towards the headwaters of the watershed.**  
>> **Step 3. Starting at the circle that was made in step one, draw a line connecting the "X's" along one side of the watercourse. This line should always cross the contours at right angles (i.e. it should be perpendicular to each contour line it crosses).**  
>> **Step 4. Continue the line until it passes around the head of the watershed and down the opposite side of the watercourse. Eventually it will connect with the circle from which you started.**

<https://www.epa.gov/waterdata/waters-geoviewer-tutorial>

Example: <https://www.youtube.com/watch?v=ajF0DsuuY4k>

Teacher resource on [Delineating watersheds](#).

- 4. Compare the topographic map to the online delineation tool at [modelmywatershed.org](http://modelmywatershed.org) (Click on “Get started” and scroll down to “delineate”)