

Student Name: _____ **Date:** _____

Objective: Students will use online interactive maps to identify water features in the local area and identify the health designation of their closest stream.

Useful Vocabulary

GPS Coordinates: a precise geo-location based on a grid system created for the earth. GPS (global positioning system) is generally expressed in a combination of latitude and longitude.

Floodplain: an area of land adjacent to a stream or river which experiences flooding during periods of high discharge.

Watershed: the area of land that discharges to a specific water body

Use the directions below to complete the worksheet.

▪ **MERLIN ONLINE** (<http://dnrweb.dnr.state.md.us/MERLIN>)

MERLIN Online allows a user to produce a custom "map" for any location in Maryland, including their choice of base map and theme data layers.

Depending on internet connectivity and the large data available, actions in MERLIN may take a short while to load. Be patient when turning layers on and off for changes to occur on your screen.

1. From the main URL above, click on "Interactive Map" to open the MERLIN Program
2. Find your location

- Enter address in the Search Bar, Pan and Zoom on the map, or use 'My Location' button



3. Turn on 'Watersheds' Layer
4. Turn on 'Waterbodies' Layer

What is your closest stream?

Follow the flow of the stream. Where does your local waters flow to?

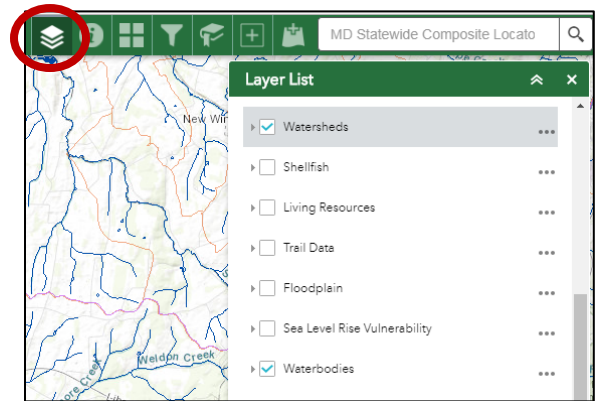
5. Turn on 'Floodplain' Layer

Is your school in a designated floodplain?

YES / NO



Use the Legend tool to understand the color coding of each layer



Scroll around your neighborhood and observe if any buildings have been built in the floodplain. Describe your observations:

6. Turn on the 'Wetlands' Layer

Describe where the closest wetlands are to your school.

Scroll around your neighborhood or County. Describe your observations of area wetlands:

Bonus: Why are wetlands important Land Cover?

- **MD STREAM HEALTH** (<https://geodata.md.gov/streamhealth/>) from the MD Department of Natural Resources Stream Health Website

The Maryland Department of Natural Resources collected different types of data from our Maryland streams to assign each stretch a "health score". The data includes physical observations, habitat quality, water quality data and benthic macroinvertebrate ("stream insects") data which is compiled to assign an overall rating of "good", "fair", or "poor" for streams in the watershed.

Use the Interactive Maryland StreamHealth Map to complete the questions below. Features and actions on the website are similar to MERLIN site, previously used on this worksheet.

To get to the MD-DNR site:

- Return to the MERLIN Home page, select "STREAM HEALTH" from the menu on the RIGHT side of the screen.
- Select: **Interactive Maryland StreamHealth Map**

1. Find your location

- Enter address in the Search Bar, Pan and Zoom on the map, or use 'My Location' button



2. What are the GPS Coordinates of your school? Select:



Then:  to mark the center of your schoolyard property on the map.

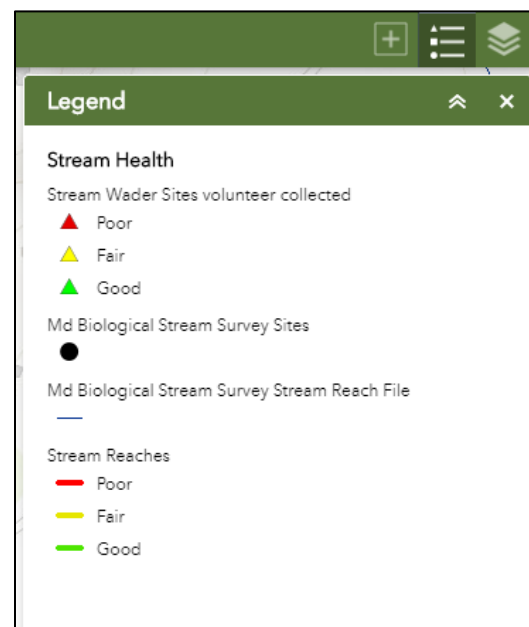
It's best to use the coordinates next to the green tag where you clicked on the property.

Latitude	Longitude

3. Identify the stream closest to your school. Compare the color of the stream to the Legend to identify the health level. Stream Health: _____

Option: Select some of the Survey Sites on your screen, then select the "MORE INFO" link in the popup window to read about the sampling conducted at the survey site.

4. Based on your existing knowledge, why do you think your stream's health has its current rating?



What temperature should your stream be?

The State of Maryland classifies all of its streams and rivers into four main use classes in order to assign each specific water quality standards for each class. Numeric water temperature criterion have been developed for each use class. In general the four main use classes and temperature limits are:

Use Class	Temperature Criterion
I – Water contact recreation, and protection of Nontidal Warmwater Aquatic Life	May not exceed 90°F [32°C]
II – Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting	Same as Class I (above)
III – Nontidal Cold Water (III-P, Nontidal Cold Water & Public water supply)	May not exceed 68°F [20°C]
IV – Recreational Trout Waters (IV-P, Recreational Trout Waters & Public water supply)	May not exceed 75°F [23.9°C]

Ref: State of Maryland regulations (COMAR 26.08.02)

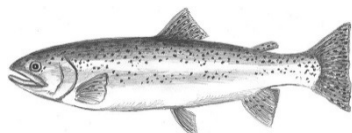
Determine your stream's use class designation, visit MDNR Designated Use Interactive Map: <http://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/DesignatedUsesMaps.aspx>

- Scroll to your schools location on the map, or enter the school's address in the search bar.

- Click on the stream that you are interested in, and a pop-up window will provide you Use Class details

>Enter the Use Class for the stream closest to your school: _____

>In the table above, CIRCLE the Temperature that applies to your stream.



Option: Investigate Temperatures of a Local Trout Stream

Trout are sensitive species which require cool, clean, running water to maintain a healthy, reproducing population.

Remember, the Maryland State Stream Use Class III, requires water temperatures for non-tidal cold water streams not to exceed 20.0°C to protect these sensitive populations.

The United States Geological Society (USGS) maintains water data loggers in streams nationwide and the data is available to the public online. Look up temperatures for a local trout stream (Use Class III(-P)) and determine if recent average temperatures exceeded the recommended State Criterion.

>Use USGS Station on Hunting Creek in Frederick County.

- Frederick County: USGS Station #: 01640975 in Hunting Creek, near Thurmont:
https://waterdata.usgs.gov/nwis/inventory/?site_no=01640975

>Select: "[Current / Historical Observations](#)"

>Scroll down the page view a chart of the past week's temperatures. Alternatively you can query other dates, like during hot summer months.

Did temperatures exceed 20.0°C? If so, what was the maximum temperature?

Develop a Deeper Understanding: Significance of Stream Temperature

The temperature of the water has much influence over stream health. Chemical toxicity, dissolved oxygen, stress on biological organisms and other measures are directly related to the temperature of the water. The temperature of the water is generally related to the temperature of the air. Surface water cools in the winter and warms in the summer along with air temperature. However, water changes temperature more slowly than air, so it is possible to have warm air temperatures and cold water or vice-versa, especially in the spring and fall.

You can predict the temperature of the stream when you consider many different factors effecting the temperature of the water.

1. The **air temperature**, especially over the last few days, can help warm or cool the water. Scientists are concerned that long-term increases of air temperature due to climate change will drastically impact the health of our streams.
2. **Geographic location of the stream**, although a constant, will factor into the overall expected temperature of the stream when comparing other streams in different latitude, elevation, and climate.
3. A stream with a very healthy **riparian zone** (trees and grasses on the bank) is more shaded than if there is no riparian area (crops or urban development right up to the streambank). Shaded water will have a cooler temperature than a stream in full sun.
4. If the stream is **spring-fed**, the cold groundwater will cool down the temperature of the stream.
5. **Land use** around the stream will change the temperature of the stormwater running into the stream. Rain water running over streets and parking lots picks up a lot of heat, especially in the summer. When that water reaches a stream or river, it heats up the temperature of the