

Michigan Technological University
School of Forest Resources and Environmental Science
Introduction to Geographic Information Systems and Remote Sensing for
Natural Resource Management
FW3540
Spring Semester 2009

Laboratory Exercise 11
Watershed Analysis

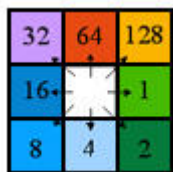
Getting Started

Open ArcCatalog and copy lab11 folder to your H: drive you can use the Indian town orthophoto on the p drive too. To enhance the visual contrast on the hillshade, go to symbology and change the stretch function to “histogram equalize”. Display the DEM over the hillshade with an appropriate color scheme and the transparency set to 50%.

Calculate Flow Direction, Sink Locations and Create a Depressionless DEM

In Arc Toolbox, open **Spatial Analyst/Hydrology**. Calculate **Flow Direction**; input is the 10m DEM. The window asks if you want to force all edge cells to flow out outward. Do you think this option should be checked? _____ Why or why not? _____

You do not need to calculate an output drop raster. Open the attribute table of the flow direction



32	64	128
16	↑ ↓ ← →	1
8	4	2

Values should be 1, 2, 4, 8, 16, 32, 64, or 128. However, there is a range of values of from 1-255. Create a legend for the flow direction values using the color scheme presented in class. Remove the remaining values from the legend. This will create an appearance of “holes” in your flow direction raster. Let’s see if we can determine what the “holes” are.

Run the **Sink** tool. Be sure the input is your **Flow Direction** raster. Display the Sinks layer and symbolize all of them with a single color that contrasts well with your flow direction legend. Where do the sinks occur when compared with the Flow Direction raster? _____

The **Fill** tool will correct all the sinks. Input is the 10m DEM. If you are questioning why the program only needs the DEM as input it is because it calculates the flow direction, identifies the sinks and fills them automatically as it works through the raster DEM, thus creating a “depressionless DEM” (you should remember this term from lecture)

Calculate a new flow direction raster using the depressionless DEM. Look at the attribute table. All values are now valid flow direction numbers.

Determine Flow Accumulation

Generate a flow accumulation raster using the Flow Accumulation Tool. Leave the input weight raster blank. Output type should be an integer. Assign a color scheme to the output raster that ranges from yellow, through red and ends in blues. What do the output values mean? _____

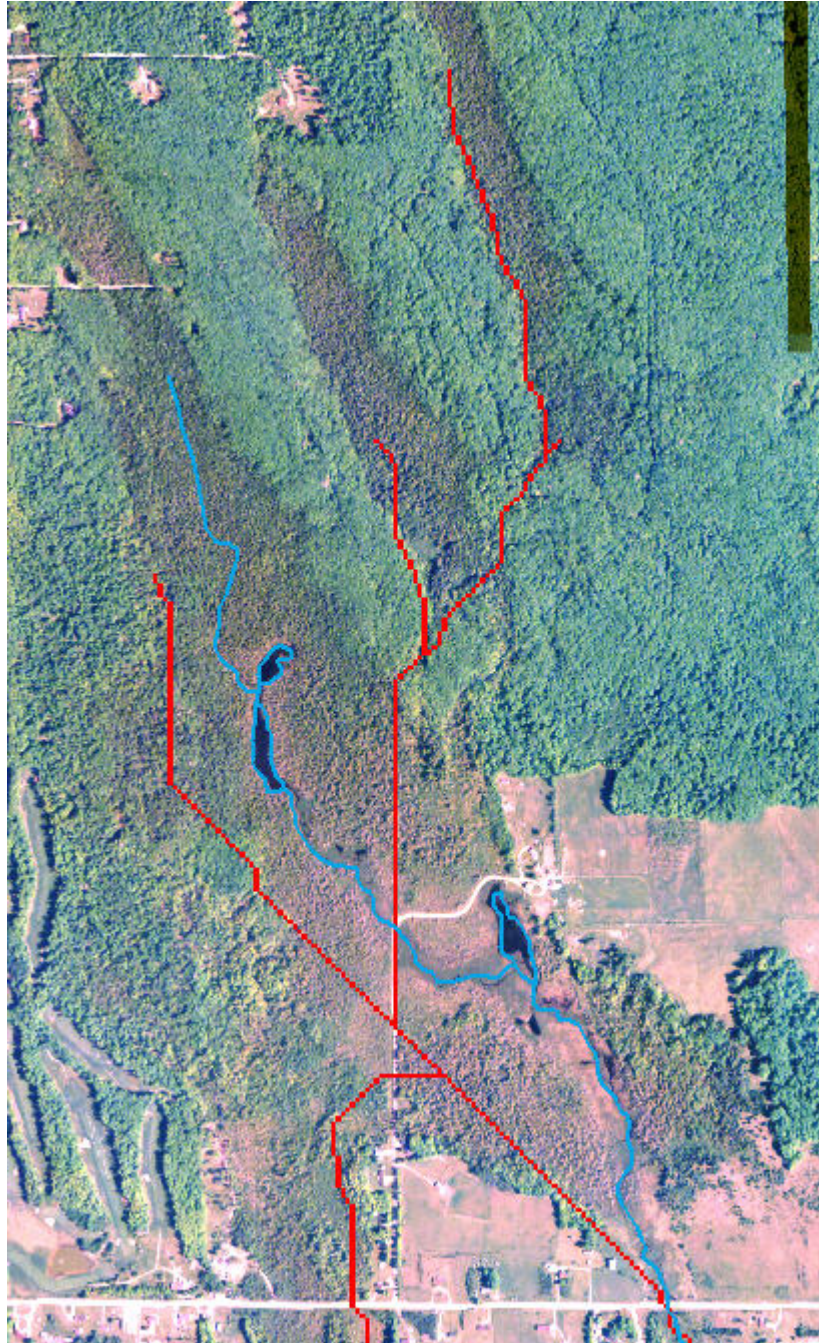
When viewing the output raster, what are you seeing? _____

To confirm your interpretation of what you are seeing, display the streams from the Michigan Framework data over the Flow Accumulation raster. For some of the streams, there is excellent delineation of stream bed. However, there appears to be too many streams compared to the framework.

Open the Symbology tab for the Flow Accumulation raster. Classify the data into 2 classes. Initially, try a breakpoint of 500 between the two classes. Use No Color for the first class and red for the second class. Display the Flow Accumulation raster and the stream framework over the hillshade. Change the breakpoint to 1,000 and keep the same color scheme. What happens to display of the Flow Accumulation raster? _____

Now try a breakpoint of 5,000. How do you interpret this display or what does the value of 5000 mean in terms of a stream being present? _____

Why are some stream segments running in straight lines (you know that this is not accurate)?



Display the stream framework and the Flow Accumulation raster over the orthophotos and find this area on your computer screen (it is almost in the center of the quad). What is happening here

to create the stream drainage? _____

Compare the framework streams to the Flow Accumulation raster when overlaid on the orthophotos. In some places the framework data is more accurate and in other the Flow Accumulation raster.

For next week- Construct a flowchart on how you would create a new updated streams layer using the data from the framework streams and the Flow Accumulation raster.