

Physical Hydrology for Ecosystems

BEE 3710

Assignment #2: Watersheds and Hydrology (due Feb. 7)

The purpose of this assignment is to familiarize you to determining watershed characteristics. For this assignment we'll use a topographic map to summarize the general characteristics of the Sixmile Creek watershed. Summarize the following information in a clear, meaningful format (1-2 pages max) and answer the questions below.

General Watershed Characteristics

- Drainage Areas (Area of watersheds)
- Length of longest flow path
- Total stream length (sum of all stream segments)
- Number of 1st order, 2nd order, etc... streams
- Largest stream order
- Drainage density

Questions

- 1) Use the USGS website (<http://ny.water.usgs.gov/>) to find the annual discharge data for Sixmile Creek. There are lots of ways to navigate this site and it seems complicated the first time you use it but gets easy quickly. For this assignment click on: "Surface Water" in the top paragraph. Type "Sixmile Creek" in the "select site by number of name" box and submit, click on the site number for the Bethel Grove gauge. Then choose Time-series: Annual statistics from the drop down menu. Then check the box for discharge, scroll-down and click submit. You should be at a screen that has the data you selected. What's the average annual discharge over the past several (~5-10) years in ft³/s, m³/day, m³/yr, mm/day, and cm/yr?
- 2) Find local, annual precipitation data on the Internet: e.g., <http://www.nrcc.cornell.edu/>. What was the average precipitation over the same time period you used in (1) in m³/yr, mm/day, and cm/yr?
- 3) Calculate the average annual evapotranspiration (ET) over the past five years (use the average values from (1) and (2)). What's the average annual ET in m³/yr, cm/day, cm/yr and m³/yr/m² of watershed area? (The last value is the same as m/yr but when we get to ET we will be considering various energy fluxes in terms of energy/m² so it's good to get use to thinking this way). What fraction of the precipitation is lost to ET?
- 4) What fraction of the precipitation leaves the watershed via stream flow, i.e., determine the runoff coefficient for Sixmile Cr.
- 5) I'm not sure how many people live in the Sixmile Cr. watershed but let's guess ~10,000 people, mostly using groundwater. Compare the water supply demand to the available water, i.e., precipitation-ET (assume water use is ~100 gal/day/person).

EXTRA CREDIT:

- 1) Look at the entire record of stream flow (beginning in the 1920s) for Fall Creek and precipitation and determine if there are any long-term trends in annual ET. Historical monthly precipitation is available at: <http://cdiac.ornl.gov/epubs/ndp/ushcn/monthly.html>.
- 2) Find a clean storm hydrograph for Salmon or Fall Creek and use one of the baseflow separation techniques we discussed to determine storm runoff. How much of the rainfall that caused the storm hydrograph produced "runoff."