Physical Geology
Delaware River Watershed Analysis

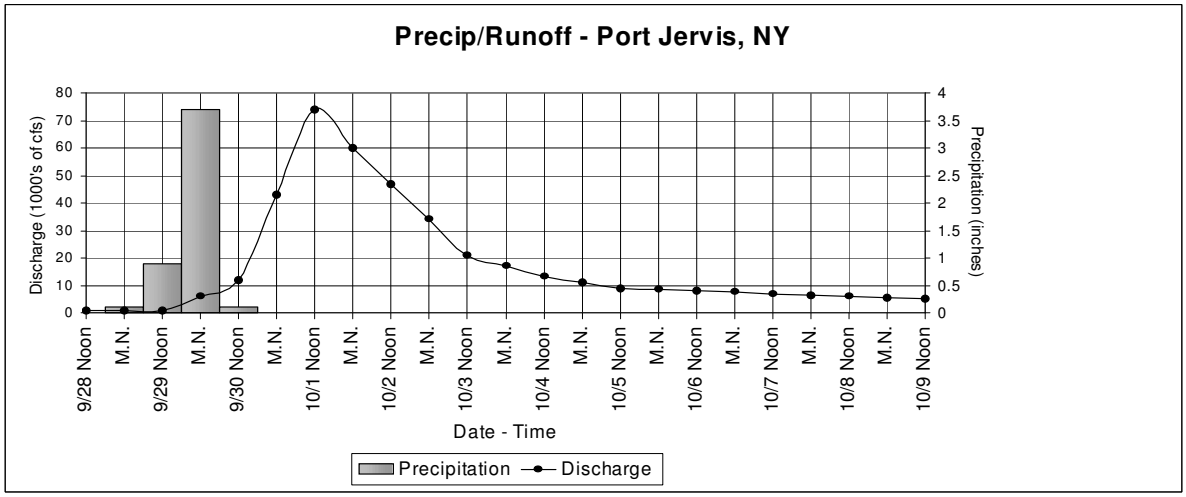
Introduction: When rain falls, some of it will soak into the ground, some will evaporate, and some will run off into streams. This lab examines the runoff produced during an early autumn rainstorm on the Delaware River basin, gauged at Port Jervis NY.

Procedure:

Go to http://stevekluge.com/geoscience/apg/labs/drwa.xls and save that spreadsheet to your hard drive/floppy disk (make an extra copy!)/network as *lastname*drwa.xls (for example, if your name is Walter Walcarpit, save your spreadsheet as walcarpitdrwa.xls

First: Type in your name and dates in the gray-shaded cells. Then:

1. Create a single chart of both discharge and precipitation over time. Graph the discharge as a smoothed line graph on the left-hand y-axis, and the precipitation as a bar graph on the right-hand y-axis. Label everything. Include both horizontal and vertical gridlines, and a properly labeled legend. Your graph will look something like the sample below:



2. Print your graph. Estimate the positions of the centers of mass of precipitation (CMP) and the center of mass of runoff (CMR). Note that the centers of mass refer to the points on the graph where half of the rain has fallen, and where half of the runoff has passed through the river - these points DO NOT NECESSARILY coincide with the peak rainfall and discharge.

   Place a dot at your estimated CMP and CMR, and label the dots

3. Estimate the lag time between precipitation and runoff, and report the lag time here: _____hours

4. Assume that the base flow increased steadily from 1000 cfs at Noon on 9/29 to 5000 cfs by Noon on 10/9. Write a formula for the spreadsheet to calculate the base flow in each of the *yellow shaded* cells of the spreadsheet.

5. Write a formula to calculate the Net Discharge (Discharge-Base Flow) in each of the *green-shaded* cells of the spreadsheet.

6. The net discharge is reported in cfs. Assume that those values are the average discharges for each 12 hour period, and write a formula to find the Half Day Volume of runoff in each of the *blue-shaded* cells (Net Discharge X 43200 seconds). Finally, sum those values to determine the Total Storm Runoff in the *blue-shaded* cell.

7. The watershed area is 3076 square miles. Write a formula to calculate the basin area in square feet in the *purple-shaded* cell.

8. Imagine taking the total storm runoff and spreading it evenly over the entire basin area. The thickness of the resulting layer of water is the *mean depth of the storm runoff*. Write a formula to determine the mean depth of the storm runoff in inches (to 2 decimal places) in the *gray-shaded* cell. (Unless your value is around 2 inches, you've erred somewhere)

9. Write a formula to determine the total storm precipitation in the *orange-shaded* cell.

10. Finally, write a formula to calculate the percentage of the storm precipitation that ran off into the Delaware in the *plum-shaded* cell. (*plum-shaded*? You know, the purply red colored cell G39)

ANSWER THE FOLLOWING QUESTIONS:

1. Make a list of what possibly could have happened to the precipitation that DID NOT run off into the river.

1.

2.

3.

4.

More?

2. Think of/read about as many factors as you can that would affect the percentage of rainwater that runs off into streams. List and describe how and why those factors would have an effect.

3. Think of/read about as many factors as you can that would affect the lag time between precipitation and runoff. List and explain them.