GLY 110 Recitation Assignment #5—DUE FRIDAY, MARCH 8, 2002
The 1997 Falmouth Flood
10 points total.

The U.S. Geological Survey monitors the stage (elevation) and the flow rate (discharge [Q]) of selected streams throughout the United States. At a gaging station, the stage is automatically recorded electronically or on a chart recorder. USGS staff manually measure Q (typically reported in units of cubic feet per second [cfs]) at various stages and develop rating curves to relate stage to discharge. For more information, see www.state.nj.us/drbc/gage/gageshp.htm ("The Importance of Stream Gages" [Delaware River Basin Commission]).

Between February 28 and March 3, 1997, a storm system originating along the Gulf Coast dropped as much as 1 foot of rain on the Ohio, Tennessee, and lower Mississippi River valleys. In Falmouth, Kentucky, about 45 miles north of Lexington, 5.2 inches of rain fell between 11:00 PM February 28 and noon March 1. By the evening of March 1, virtually all of Falmouth had been evacuated as the Licking River rose rapidly. The river crested March 2 at Catawba, approximately 3.5 miles downstream of Falmouth, at 24 feet above flood stage, 4 feet higher than the previous record. The USGS, which has gaged flow at Catawba since 1928, estimated that a flood of this magnitude would occur at this location less than once in 100 years. At its crest, the river inundated nearly 90% of Falmouth, displacing more than 1,500 of the 2,700 residents. Flood waters drowned five people who had attempted to return home too soon after being evacuated. Nearly 80% of homes and businesses in Falmouth were destroyed or suffered major damage, and losses totaled $36.5 million.

Refer to the hydrograph below (note that discharge values were estimated from March 2 through 14) and answer the following questions. **Show work on your calculations** and remember all your unit conversions (1 mile = 5280 feet, 60 minutes = 1 hour, 60 seconds = 1 minute, etc.).
Part 1—Short-Answer Questions  
(Do your own writing; use the back of the sheet if you need more space.)

5 points total (1 point each).

Name:      Section #:   Date:

1. What was the maximum flow rate (Q) during the flood? (Eyeball this from the graph.)

2. Why do you think the USGS would have had to estimate the flood discharge?

3. The width of the Licking River in downtown Falmouth during the crest of the flood was about 1800 feet. Assuming that the average depth of the river at its crest equaled the height above flood stage, calculate the cross-sectional area A (= width at crest x average depth).

4. Now, recalling that Q / A = velocity, estimate the average velocity of the river (in miles per hour) at the crest of the flood.

5. Do you think that the people who drowned would have been swept away by the current? Why or why not?
Part 2—Essay Assignment
(typed, two pages maximum, double-spaced)
5 points.

Some citizens of Falmouth are trying to resurrect a project, first proposed by Congress in 1936, to build a flood-control dam upstream on the Licking River. In the mid-1980s, the cost of such a dam was estimated at $125 million. Congressman Ken Lucas has suggested that an emergency-warning system would be most effective for flood prevention and control. (Note that a USGS gage on the South Fork of the Licking River at Cynthiana, upstream of Falmouth, was abandoned in 1994 because of lack of funding; it was reactivated after the 1997 flood.) Other northern Kentucky communities, such as Maysville and Covington, have built flood walls. The Federal Emergency Management Agency, which subsidizes flood insurance, provides support to communities that relocate from flood plains to higher ground, but some people are reluctant to leave sites where their families have lived for generations. As a Kentucky resident and a taxpayer, what do you think people in Falmouth should do to minimize the impacts of future floods? Support your argument with documentation from Chapter 7 of Merritts et al., especially:

p. 199 – 200 (“Runoff Processes”)
p. 200 – 203 (“The Role of Climate in Stream Discharge”)

Note that there is no single correct answer; essays will be graded on persuasiveness of the argument and the quality of writing.