5B River Floods Lab Exercise 10 Part A

TABLE 10.1 Flood Data for Mercer Creek and the Green River. Discharge Data in cfs.

Mercer Creek-Data Set 1				Mercer Creek-Data Set 2			
Year	Peak Flood Discharge	Rank (1 is greatest)	Recurrence interval	Year	Peak Flood Discharge	Rank (1 is greatest)	Recurrence interval
1957	180	9	1.33	1979	518	5	2.4
1958	238	2	6	1980	414	7	1.71
1959	220	4	3	1981	670	2	6
1960	210	5	2.4	1982	612	4	3
1961	192	7	1.71	1983	404	8	1.5
1962	168	10	1.2	1984	353	9	1.33
1963	150	11	1.09	1985	832	1	12
1964	224	3	4	1986	504	6	2
1965	193	6	2	1987	331	10	1.2
1966	187	8	1.5	1988	228	11	1.09
1967	254	1	12	1989	664	3	4

Green River-Data Set 1				Green River-Data Set 2			
Year	Peak Flood Discharge	Rank (1 is greatest)	Recurrence interval	Year	Peak Flood Discharge	Rank (1 is greatest)	Recurrence interval
1941	9310	10	1.2	1976	4490	11	1.09
1942	10900	7	1.71	1977	9920	4	3
1943	12900	4	3	1978	6450	9	1.33
1944	13600	3	4	1979	8730	7	1.71
1945	12800	5	2.4	1980	5200	10	1.2
1946	22000	1	12	1981	9300	5	2.4
1947	9990	8	1.5	1982	10800	3	4
1948	6420	11	1.09	1983	9140	6	2
1949	9810	9	1.33	1984	10900	2	6
1950	11800	6	2	1985	7030	8	1.5
1951	18400	2	6	1986	11800	1	12

2. Use the formula $T = (n+1)/m$ and determine the recurrence interval of each of the 11 floods. Write the results for each year in the "recurrence interval" column. ✓

3. Determine an appropriate vertical scale for your discharge data. The vertical scale should be chosen such that the numbers you plot from the data above fill about one-half or slightly more of the length of the scale. Write the appropriate numbers for your discharge along the left edge of the scale. ✓

4. Plot the discharge and recurrence interval for each of your 11 floods. ✓

5. Draw a best-fit straight line, not a dot-to-dot curve, through the data points. Extend your line to the right side of the graph. ✓

6. Based on your data, what is the predicted discharge for a 100-year flood?

MC1 – 315 cfs

MC2 – 1260 cfs

GR1 – 165000 cfs

GR2 – 32000 cfs

7. Either find someone who has plotted the second set of data for your stream, or repeat steps 1 through 7 to determine the predicted discharge for a 100-year flood, using the second set of data for your stream. (You may plot the second set of data on Figure 10.1; note that depending on your choice of numbers for the first plot, you may need to have a second set of values on the vertical axis.) How does your prediction made in Question 6 compare with the answer from the other set of data for the river you plotted?

The 2nd data sets for both streams predict a much higher disharge for the 100yr-flood than the 1st data set.

8. Suggest possible human activities in the watershed that could have caused the differences in predicted floods that result from the two sets of data. - a dam could be removed, a clear cut occured, reduction of water reserved for agriculture, oversteepening slopes,

9. When you have completed interpretation of the stream you selected, find students who have done the other stream. How do their data compare with yours? What human activities did they suggest for the changes in flood predictions they discovered? · Clearcuts, road building, water usage, farming

10. Based on the flood predictions for all four data sets, what does the contrast in predicted flood discharges imply about the usefulness of the 100-year flood as a legal designation for these two streams? It implies that they could occur more than every 100yrs, and that there is roughly 1% chance a flood of that magnetude can occur in any given year.

11. What information do you need to know if you are about to buy a house that is located adjacent to, but just outside of, the 100-year floodplain? Every year there is a 1% chance the big one is gonna come and sweep away your house.

Large Floods in the United States

Data in Table 10.2, partly from the U.S. Army Corps of Engineers, show the damages suffered and deaths due to flooding. The U.S. Army Corps of Engineers (2000) provides data on *damages avoided* by flood projects and by emergency activities of the Corps. For example, in 1999 flood projects reduced potential damages by $2.8 billion (75% by reservoirs and 25% by levees), while emergency activities of sandbagging and technical assistance saved $48 million in losses, a much smaller amount.

Do Questions 12–16, which refer to Table 10.2.

12. On Figure 10.2, place a point for each decade to show monetary flood loss (in billions of dollars) for each decade. What is the general trend in flood loss in the United States between 1900 and 2000 as determined from Table 10.2 and your graph?

13. Now place an open circle for each decade to show the U.S. population in millions of people at the end of each decade.

14. a. For flood damage losses in the 20th century in Figure 10.2, describe and explain the trend.

b. What is the role, if any, of growth in population and rising flood losses in the 20th century?

c. What other factors contribute to increased losses?

15. Discuss the effectiveness of flood mitigation in the 20th century with your lab group. Are flood control systems effective?

16. According to the Corps of Engineers (2000), for the decade of the 1990s, the average damage loss per year was about $5 billion. For the same period the average value of flood damage reduction by projects per year is estimated at $20 billion. Using this information and that in the graphs you plotted discuss the statement "Flood-control dams and levees have been effective in reducing flood damage" and suggest additional measures for reducing flood damage.

The Discharge/Area Ratio

Questions 17 and 18 investigate ranges in flood discharge (Q) with drainage basin size (A) for several different sizes of rivers. This **flood intensity** comparison is based on data in Table 10.3, which will be plotted in Figure 10.3.

17. Use the flood records in Table 10.3 to calculate the discharge/area ratio for each river. Record your calculation in the column on the table. Plot the calculated ratio against drainage-basin area in Figure 10.3. Identify the six rivers that you are able to plot.

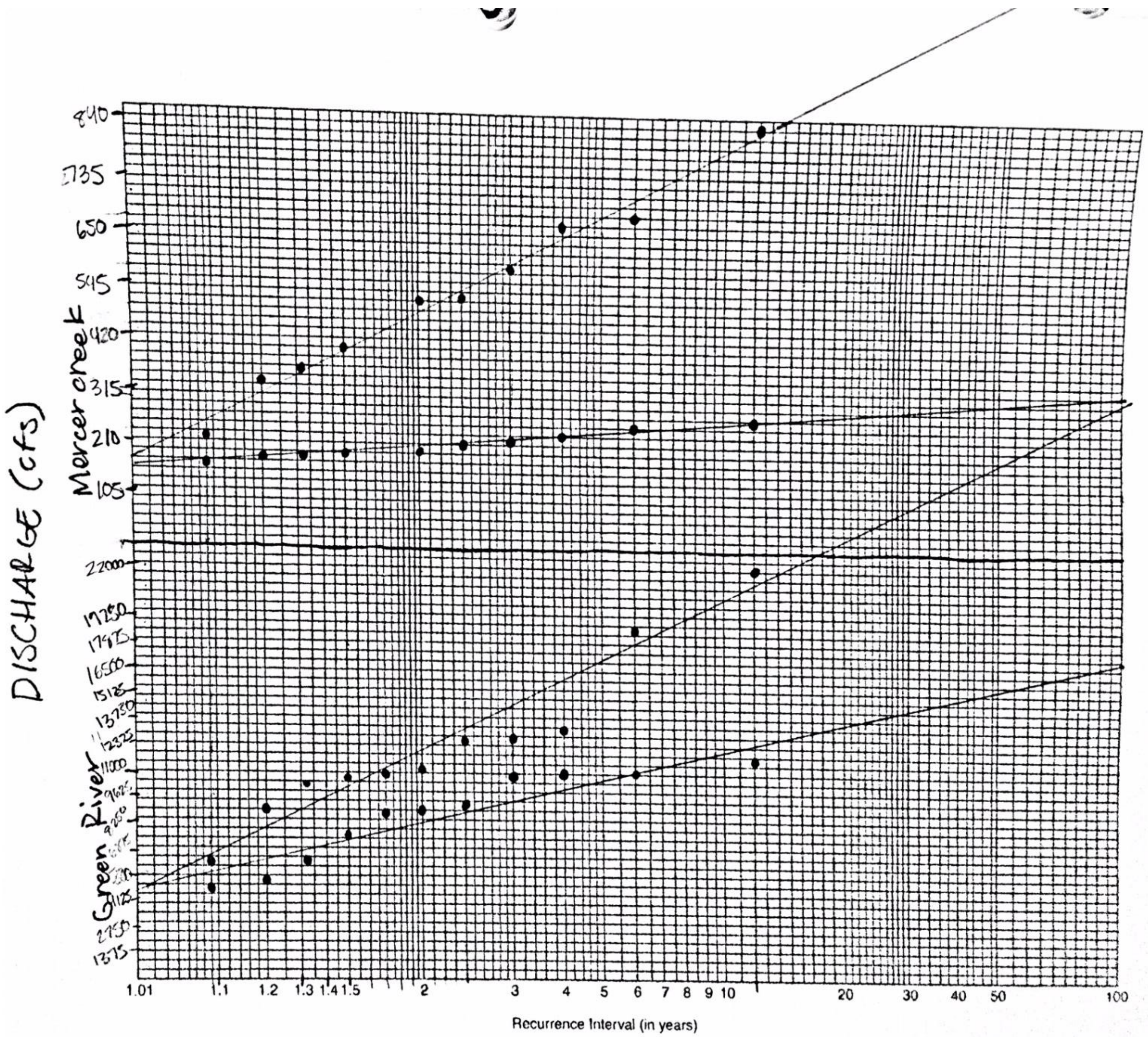

FIGURE 10.1 Flood frequency curve based on data from Table 10.1.