

A River Runs Through It

Lab Purpose: To evaluate and interpret data flood data from Central Texas.

Lab Problem: Are houses built outside the 100-year flood plane safe from flood events?

Background Information:

Central Texas is known for long periods of drought followed by large amounts of rainfall falling in a short period of time. This kind of an event, combined with the local topography and the soil types, can lead to severe flooding resulting in death and destruction. Some national experts rate Central Texas as the most dangerous flood region of the United States.

Scientists have tried to limit the risk for people who live along the rivers in Central Texas. Using data they collect about historical flood events, scientists estimate a 100-year flood plane and a 500-year flood plane. The idea behind these calculations is to show people where they are likely to be safe from floods, even severe events. If you build a house outside the 100 flood plane, it would mean that your house would be extremely unlikely to flood, because only every 100 years or so would a flood event surpass this area. In many cities it is now illegal to build new homes within this most dangerous zone. If you built outside the 500-year flood plane, statistics would show that only once every 500 years would there be an event severe enough to flood your home.

Engineers have also tried to limit the risk for people. Central Texas has a series of dams that were built in the 1940's and 1950's that help control the amount of water that flows down the rivers (President Lyndon Johnson spearheaded this effort when he served as a congressman from Texas. One of his proudest accomplishments was bringing electricity to the Texas Hill Country, some of which was produced from the damming of rivers in the region.) During periods of heavy rainfall, reservoirs behind these dams contain the extra water and then store it for periods of drought.

Sometimes nature outsmarts even the smartest scientists and engineers. One of the most famous flood pictures of Texas shows a house going over the Tom Miller dam in Austin.

Today's activity explores the amazing flood of 1998. Work through the data, and then decide if you want to build a house where *A River Runs Through It*.

Lab Procedure: Using the following maps, graphs and charts to answer the questions. As always, use complete sentences when writing your answers.

Map #1 Guadalupe River

- 1) List the tributaries that feed into the Guadalupe River. Why is it important to include the tributaries in a discussion of the river, especially a discussion about flooding?
- 2) Why are there so many cities and towns built along the Guadalupe and its' tributaries? (Give me 3 reasons!)

Chart #1: Guadalupe River Major Floods List

- 3) During which month or months have most floods occurred on the Guadalupe River? What would be your hypothesis as to why those times are more likely to have flood events?
- 4) Draw a frequency graph that shows the number of floods that have occurred during each decade of this century. (Decades on your X axis, # of floods on your Y axis)

Graphs #1 and #2 Guadalupe River Flood of 1929 (San Marcos station)

Guadalupe River Flood of 1929 (San Marcos, Gonzales and Victoria stations)

- 5) How many days did it take for the floodwaters to get to the city of Victoria? Was the flow rate the same in Victoria as it was in San Marcos? Explain why or why not.
- 6) Which town suffered from flooding for the longest period of time from the 1929 event?

Graphs #3 and #4 Guadalupe River Flood of 1932

Guadalupe River Flood of 1935

- 7) Compare and contrast the graphs of the 1932 flood and the 1935 floods. If Spring Branch and New Braunfels received the same amount of rain during both events, what factors might affect the amount of flooding in Cuero and Victoria? Which city gets hit first?
- 8) Two times as much rain fell during the 1998 (see graph 6) storm as compared to the 1935 storm. Why wasn't the flow rate twice as high in 1998 as in 1935?

Graphs #5 and #6 Guadalupe River Flood of 1972 Guadalupe River Flood of 1998

9) Locate the town of San Marcos on Map #1 and then look at the flow rate in San Marcos on graph #6. What factors could have contributed to the extreme flooding in San Marcos?

10) Examine the y-axis in both graph #5 and graph #6. Why are they different? What does this tell you about the flood event?

Graphs #7 and #8 Potential Peak Discharge: Figure 2 and Figure 11

11) Scientists took all the historical flood data available to them to prepare graph #7. What does "Potential extreme peak discharge" mean? Why is that important?

12) The y-axis on both graph #7 and graph #8 are exponential. What does that mean? Why is it a good way to show this particular data?

13) The 1998 flood is above the potential extreme peak discharge curve on graph #8. Explain what that indicates about the flood.

Graphs #9-#16 Guadalupe River Profiles

14) Graphs #9 show the 100 and 500-year flood planes for specific places along the Guadalupe River. What elevation of water would be expected for Glen Cove during a 100-year flood event and during a 500-year flood event?

15) What type of event would the flood of 1998 be classified as?

16) Graph # 11 shows the 1972 flood and the 1998 flood compared to the 100 and 500 year expected floods. How does the 1972 flood compare? Look at graph #12 as well. How does the 1935 flood compare?

Map #2 and Map #3

17) Predict the areas of Texas that are most in danger of flash floods.

Lab Conclusion

Now that you have examined the actual flood data, what would your advice be to people building houses inside the flood plane of Central Texas Rivers? What measures could they take to try and ensure the safety of their families?