

Nebraska Department of Natural Resources
Stream Simulation 1: Interactions Between
Surface Water and Groundwater

KEY

Read the introduction screen, click OK, and complete the Tutorial for Stream Simulation 1. Click Next until you Exit Tutorial, then answer the following questions. You may turn Tutorial Mode back on at any time to assist with explanations, as well as reference your Word Bank.

After tutorial mode, be sure the drop down in the top right corner of the screen says **Water Table**. Answer the following questions:

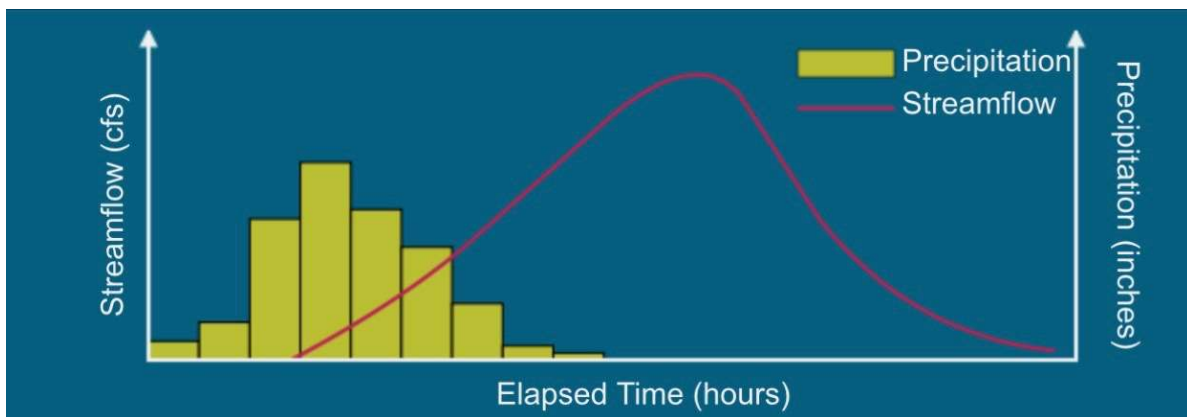
1. Make sure the slider is set to the middle setting. There is flow between the aquifer and the stream, but no net loss or net gain to the stream. The baseflow in the simulation indicates a _____.
 - a. Gaining Stream
 - b. Losing Stream
 - c. Disconnected Stream
 - d. **None of these; they are at equilibrium**
2. Set the slider in the top left to High Water Table, which sets the water table **above** the top of the stream. The baseflow here indicates a _____.
 - a. **Gaining Stream**
 - b. Losing Stream
 - c. Disconnected Stream
 - d. None of these; they are at equilibrium
3. Set the slider in the top left to Low Water Table, which sets the water table **below** the top of the stream. The baseflow here indicates a _____.
 - a. Gaining Stream
 - b. **Losing Stream**
 - c. Disconnected Stream
 - d. None of these; they are at equilibrium

Use the drop down arrow in the top right corner of the screen and select **Precipitation**. Read the introduction screen, click OK, then select Turn On Tutorial Mode in the top right corner of the screen. After you complete Tutorial Mode, answer the following questions.

4. Based on the direction of baseflow depicted in the simulation, the interaction between the aquifer and the stream creates a _____.
 - a. **Gaining Stream**
 - b. Losing Stream
 - c. Disconnected Stream
 - d. None of these; they are at equilibrium

5. Circle all of the following you would expect to be noticeably higher in a Heavy Precipitation event compared to a Light Precipitation event:
 - a. **Runoff**
 - b. Recharge
 - c. Water Table
 - d. **Stream Depth**
 - e. **Streamflow**

6. Study the hydrograph below. What do you notice about the timing relationship between precipitation and streamflow?



Answer: Students should indicate a reference to lag time between the precipitation event and the streamflow.

7. An increase in runoff leads to an increase in _____.
- a. Baseflow
 - b. **Streamflow**
 - c. Neither of these
8. An increase in recharge leads to an increase in _____.
- a. **Baseflow**
 - b. Streamflow
 - c. Neither of these

*Use the drop down arrow in the top right corner of the screen and select **Soil Texture**. Read the introduction screen, click OK, then select Turn On Tutorial Mode in the top right corner of the screen. After you complete Tutorial Mode, answer the following questions.*

9. Use the slider on the top left and select Coarse Soil Texture. A coarse soil texture (like sand) is associated with_____.
- a. More recharge and more runoff
 - b. Less recharge and more runoff
 - c. **More recharge and less runoff**
 - d. Less recharge and less runoff
10. Move the slider down to Fine Soil Texture. A fine soil texture (like clay) is associated with:
- a. More recharge and more runoff
 - b. **Less recharge and more runoff**
 - c. More recharge and less runoff
 - d. Less recharge and less runoff
11. Considering your answers to questions 9 and 10, explain which soil texture is associated with higher **runoff**.
- Answer: Clay or fine soil texture**
12. Considering your answers to questions 9 and 10, explain which soil texture is associated with higher **recharge**.
- Answer: Sand or coarse soil texture**

13. After a rain event, what impact does higher recharge have on the water table?

Answer: Higher recharge is associated with sand or coarse soil, and with coarse soil the water table is higher in this simulation

14. You and your family are on a summer vacation to Toadstool Geological Park in the Ogalala National Grassland in northwestern Nebraska. Toadstool is known to have fine clay soil textures. While visiting, a heavy rainstorm comes through the park. While huddled in your camper waiting out the rain, you, an expert on hydrology, explain to your family the effects the precipitation event has on groundwater and streamflow. Explain how a precipitation event effects:

- Runoff
- Recharge
- Streamflow
- Baseflow

If you get stuck, try looking back on previous questions you answered and running through the simulations again. *Your answer should be in paragraph form.*

Answer: Students should indicate in paragraph form that with a fine soil texture:

- Runoff: higher than other textures
- Recharge: lower than other textures
- Streamflow: higher than other textures
- Baseflow: lower than other textures

15. Your friend has also taken a summer vacation with their family, but they decided to go to the Sandhills in north central Nebraska. Your friend texts you, asking what effects the rainstorm will have on the groundwater in that area. The Sandhills have coarse sand soil textures. Send a text back to your friend explaining how their situation is different from yours, including all the effects mentioned in question 14. *Your answer should be in paragraph form.*

Answer: Students should indicate in brief paragraph form that with a course soil texture:

- Runoff: lower than clay texture
- Recharge: higher than clay texture
- Streamflow: lower than clay texture
- Baseflow: higher than clay texture