

Surface Water



Essential Standard 2.3

Explain the structures and processes within the hydrosphere.

Learning Objective 2.3.2

Explain how groundwater and surface water interact.

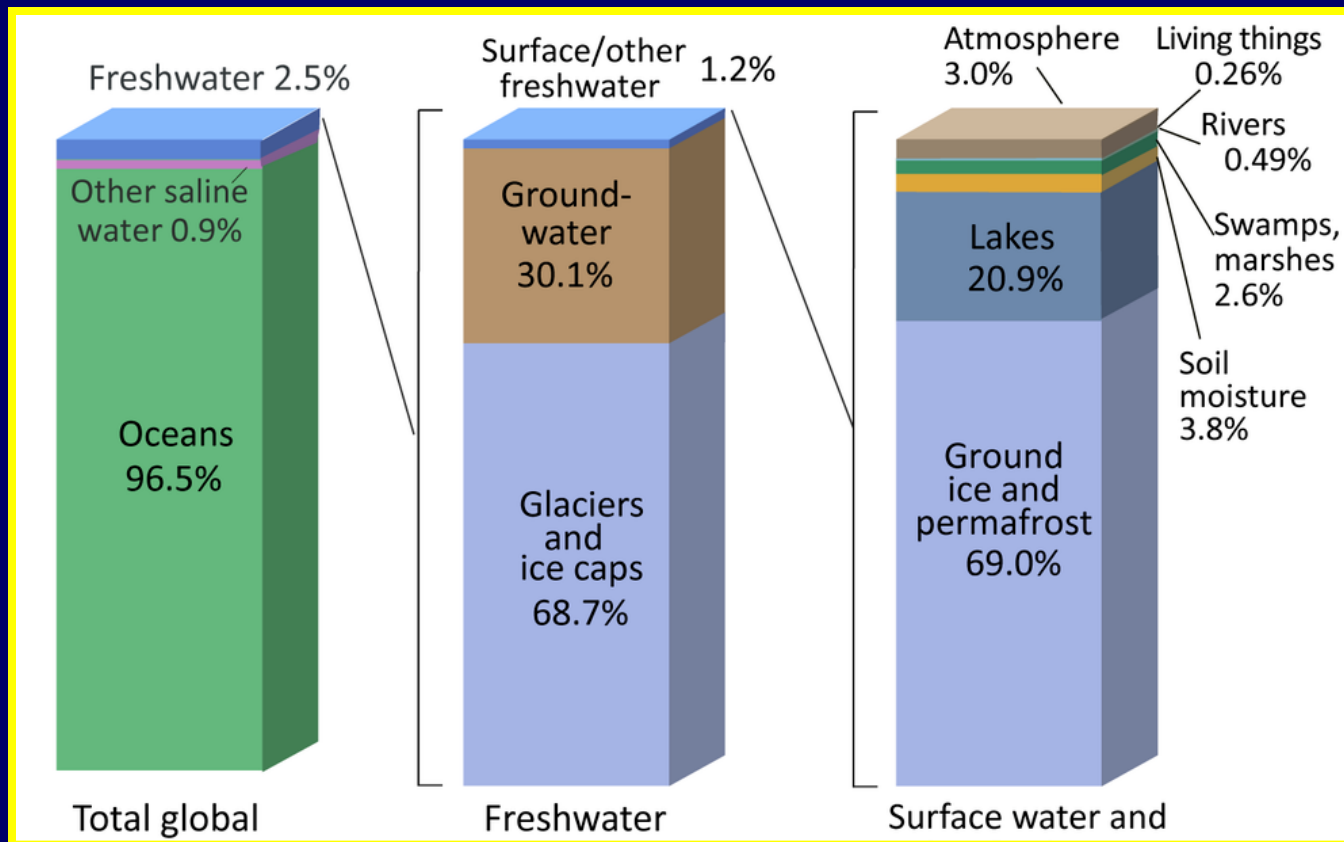
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can describe conditions that contribute to surface runoff and also increased chances of flooding.
- I can explain how streams are formed and describe various characteristics of streams.
- I can distinguish between a watershed and a river basin.
- I can explain why knowing the boundaries of watersheds and river basins is important.

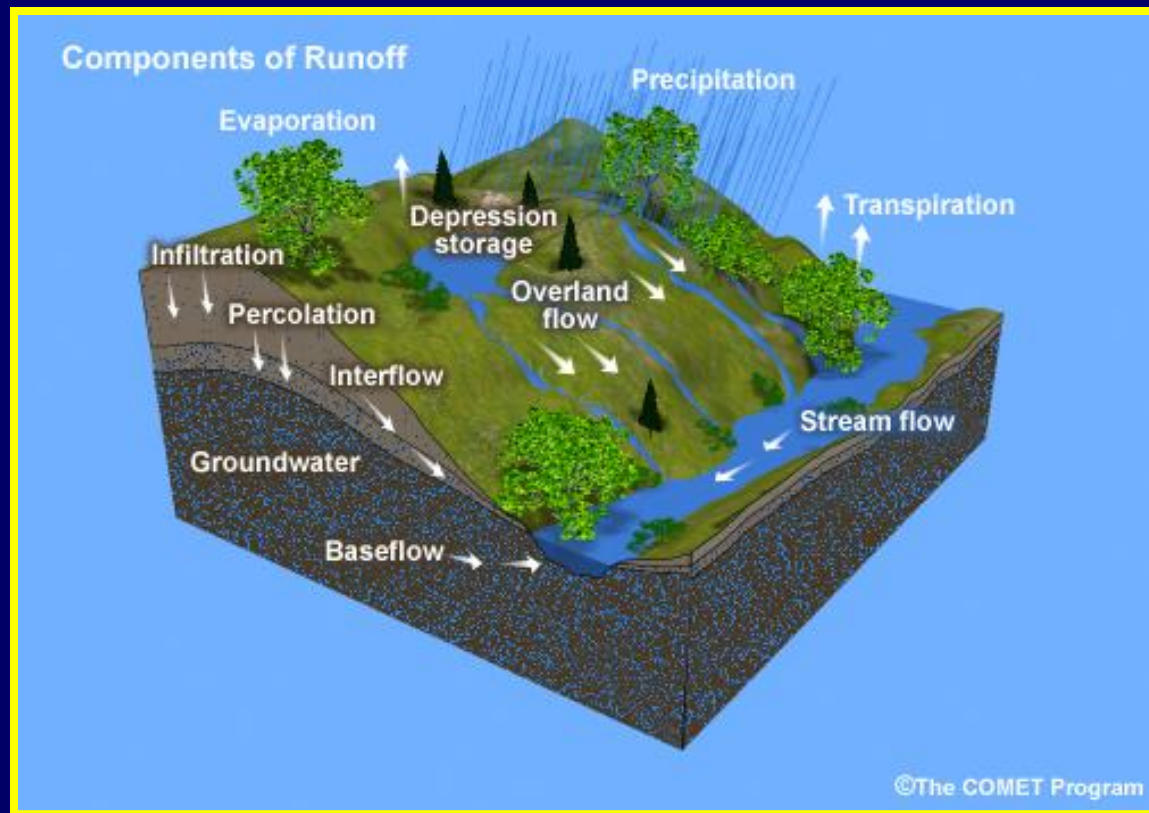
Distribution of Earth's Water

Only 2.5% of Earth's water is freshwater and of that amount, less than 1.2% is surface water found in lakes, rivers, and wetlands.



Surface Runoff

When precipitation falls on the ground or when snow melts, it can either infiltrate the ground or flow over the ground as surface runoff.



Infiltration Vs. Surface Runoff



Light, gentle rains are able to infiltrate the ground fairly easily, resulting in less surface runoff.

However once the ground is saturated, even water from gentle rains will become surface runoff.

During torrential downpours, the amount of water often exceeds the rate of infiltration and often results in more surface runoff.



Pervious Surfaces



In order for water to infiltrate, the ground must be permeable with large enough pores to accommodate the water and the pores must be connected in order for the water to flow through the ground.

Surfaces that allow water to penetrate through are called pervious surfaces.



Impervious Surfaces



Surfaces that do not allow water to penetrate through are called impervious surfaces.

Areas with large amounts of impervious surfaces will have less infiltration, more surface runoff, and will flood more easily.



Vital Part of the Water Cycle

Surface runoff is a vital part of the water cycle because it feeds our creeks and rivers and helps recharge our ponds and lakes.



Streams, ponds, and lakes are homes to numerous species as well as sources of drinking water to humans and other animals.

Flooding

But too much surface runoff results in flooding, which can destroy homes and habitats.



Pollution

Surface runoff will also pick up anything on the ground that it has the ability to carry and wash it into the streams, ponds, and lakes, leading to surface water pollution.



Stream Formation

Both surface runoff and groundwater eventually makes its way to streams.

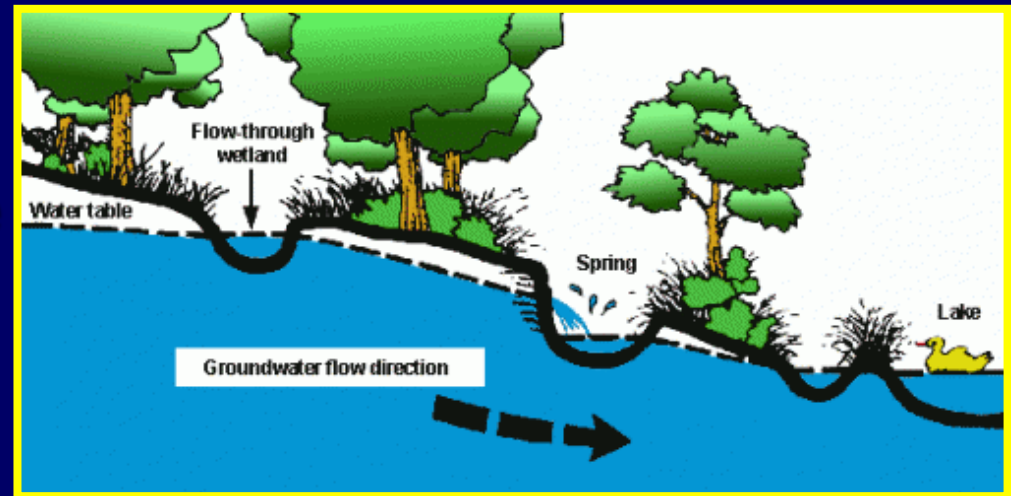


Groundwater Contribution



When the water table intersects with the ground surface, groundwater flows out onto the surface to create a spring.

Groundwater also enters stream underwater, keeping the stream supplied with freshwater even in times of low rainfall.



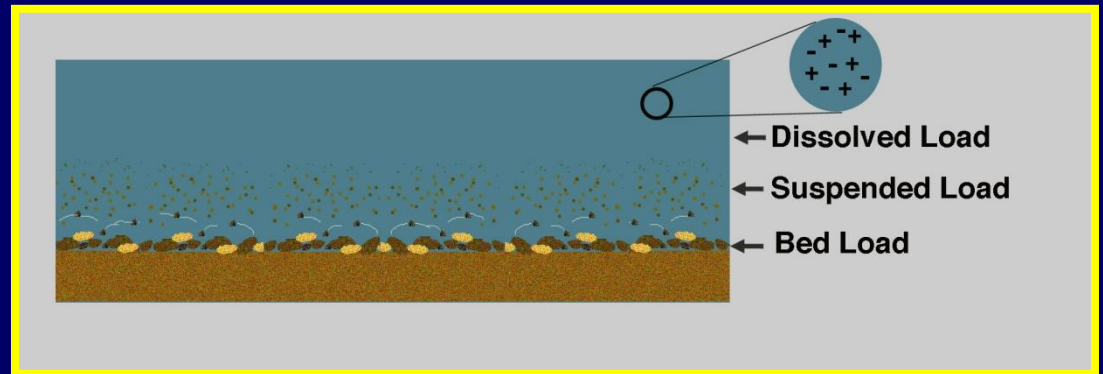
Stream Load



Surface runoff can enter streams anywhere along the stream path.

All the non-living material that a stream carries is known as its stream load.

Gases & Nutrients
Clay and Silt
Rocks

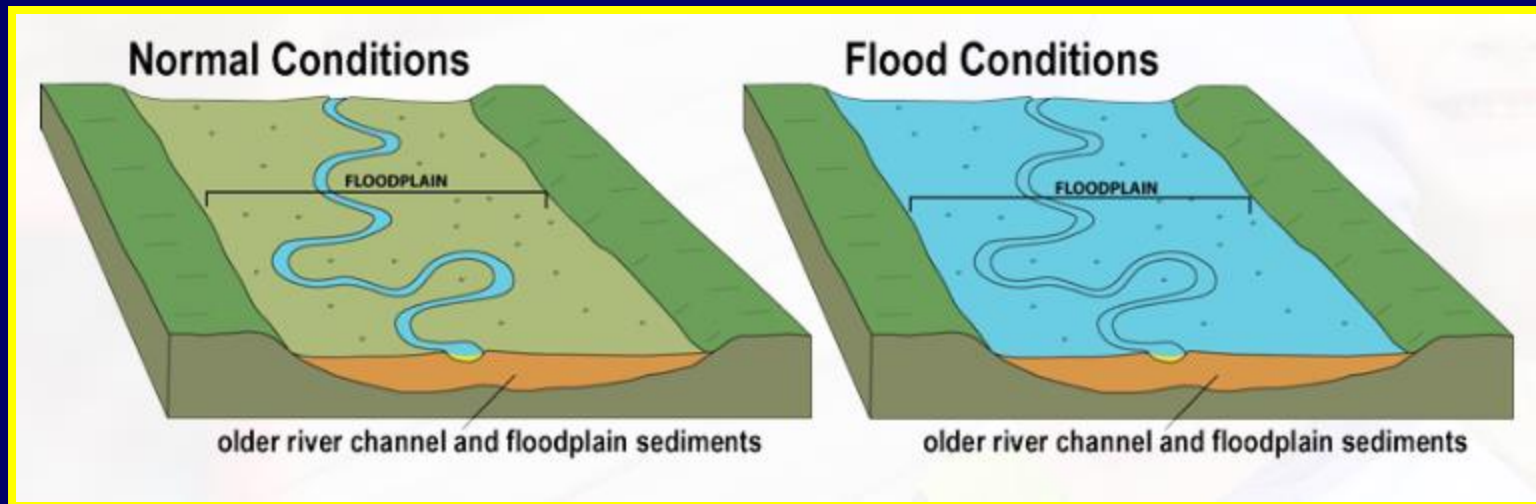


Floodplains

When the stream cannot hold anymore water, the stream will flood its banks.



The broad, flat area that extends out from a stream and is frequently flooded is called the stream's floodplain.



Headwaters

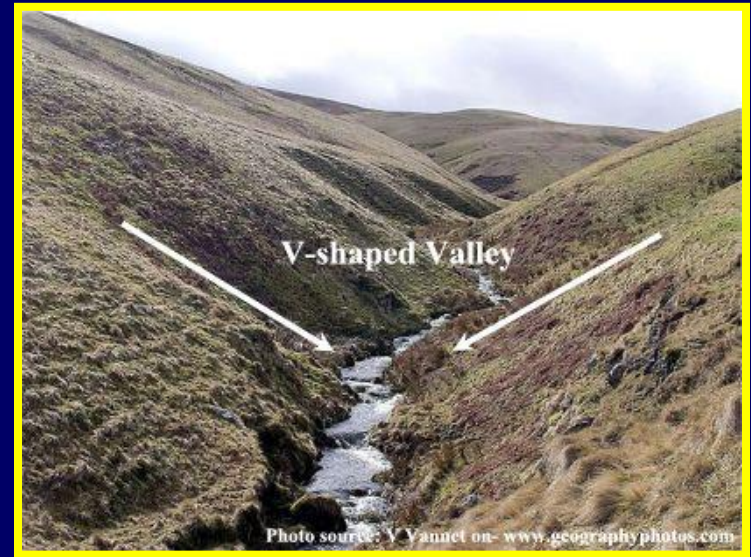
The region where water first accumulates to form a stream is called the headwaters.



The moving water is then held within the channel by the stream banks.

Valleys and Canyons

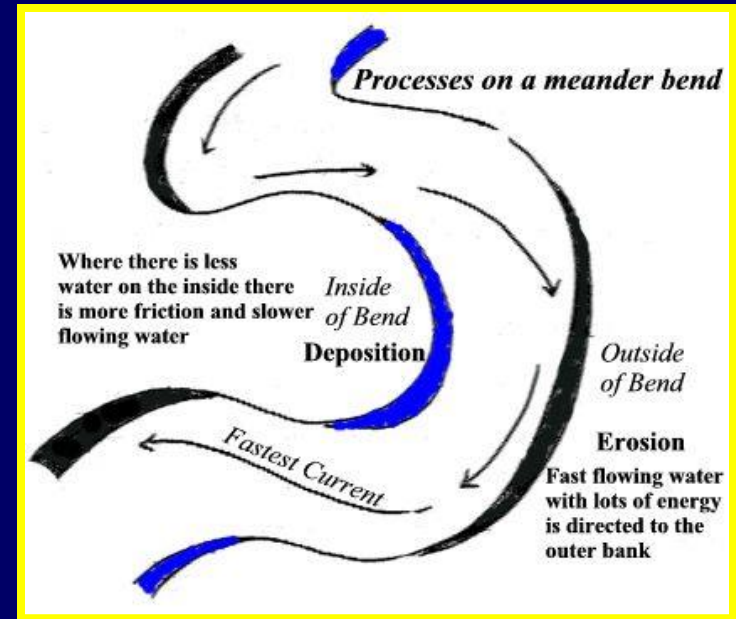
As water erodes its path through rock or sediment, a V-shaped channel develops.



If the stream flows over soft sedimentary rock, it can form canyons or gorges.

Meanders

On the outside of a bend, erosion occurs but on the inside of a bend, deposition occurs.



Overtime, most streams begin to meander or follow a curved path towards the sea, ocean, or lake.

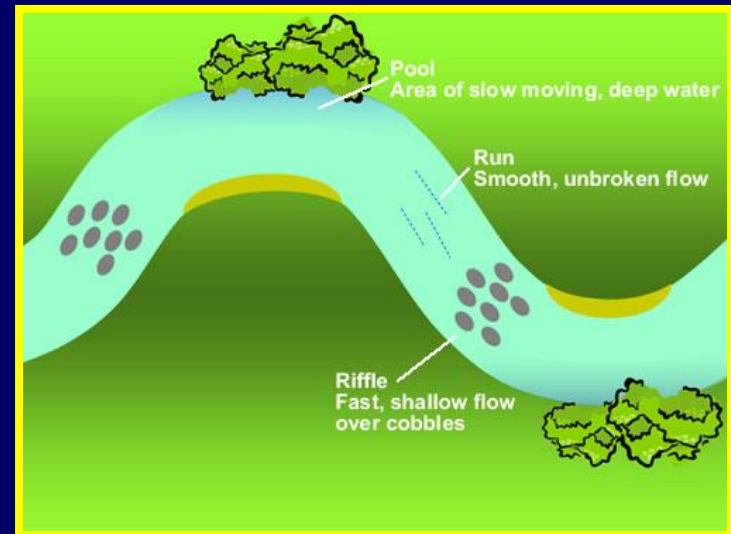
Riffles, Runs, and Pools



Riffles are areas with fast, shallow flowing water over cobbles.

Pools are areas with slow moving, deep water.

Runs are areas with a smooth, unbroken flow of water.

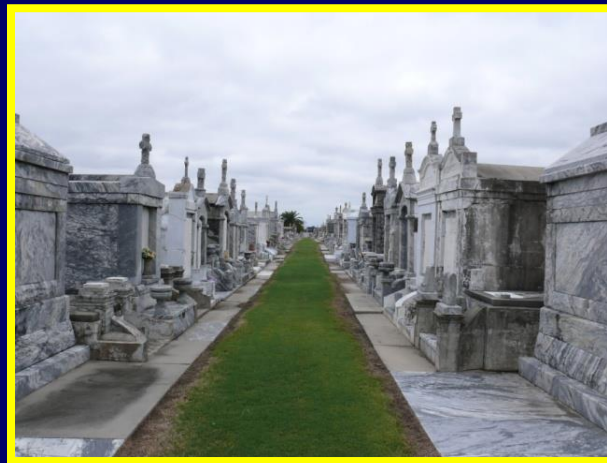


Mouths and Deltas

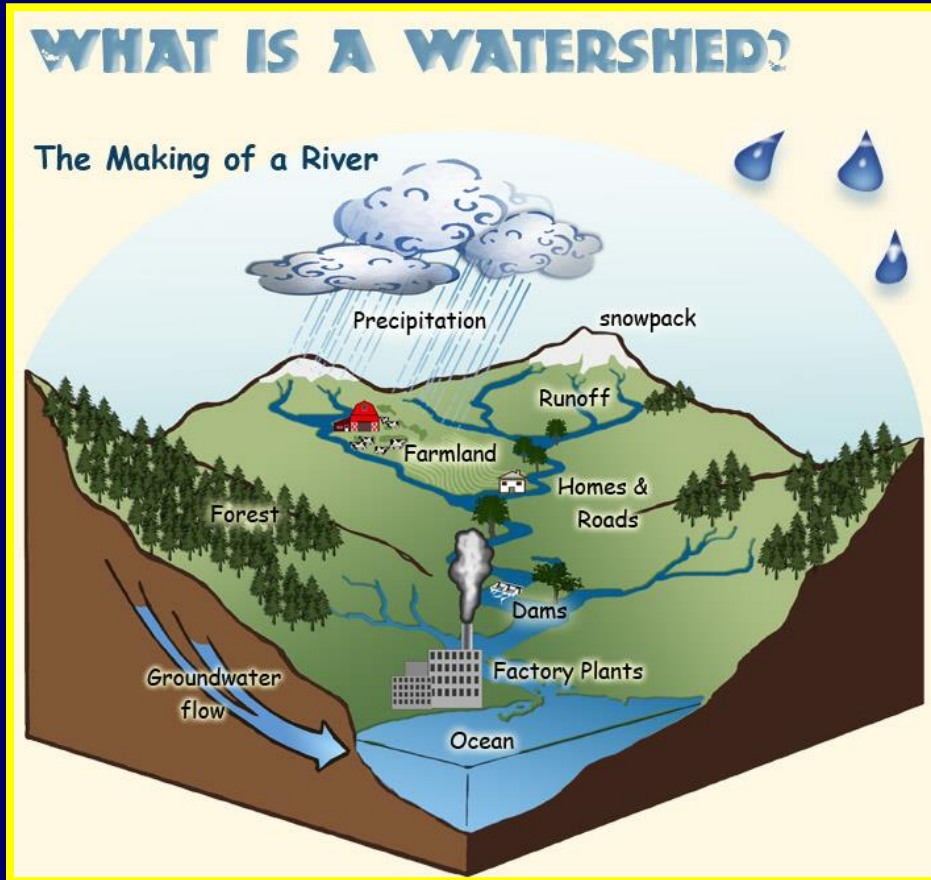


As a stream approaches another body of water, the water slows down and deposits sediments to form a delta.

The end of a stream, where it meets another body of water, is known as the mouth of a stream.



Watersheds



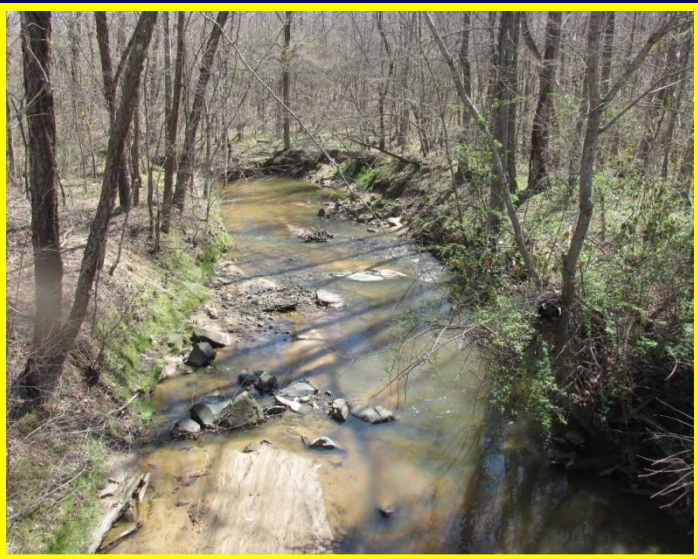
All the land area whose surface water drains into a body of water is called a watershed.

A watershed can be an area surrounding a creek, lake, or ocean.

Randleman Lake Watershed

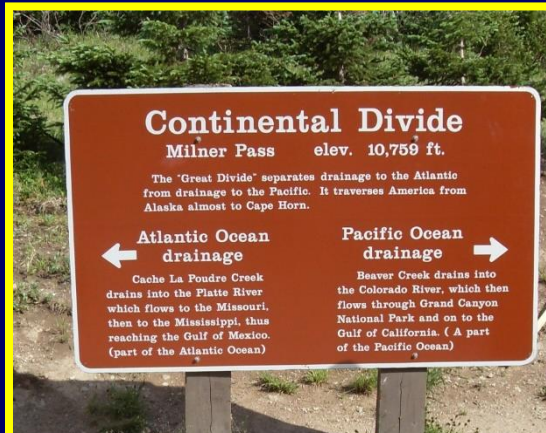


Muddy Creek that flows through Creekside Park is part of the Randleman Lake Watershed.



Great Continental Divide

A divide is high land that separates one watershed from another.



The Great Continental Divide runs through the Rocky Mountains and separates the water that flows into the Atlantic Ocean from those that flow into the Pacific Ocean.

Eastern Continental Divide



The Eastern Continental Divide runs through the Appalachian Mountains and separates the waters that flow into the Atlantic Ocean and the Gulf of Mexico.



River Basins

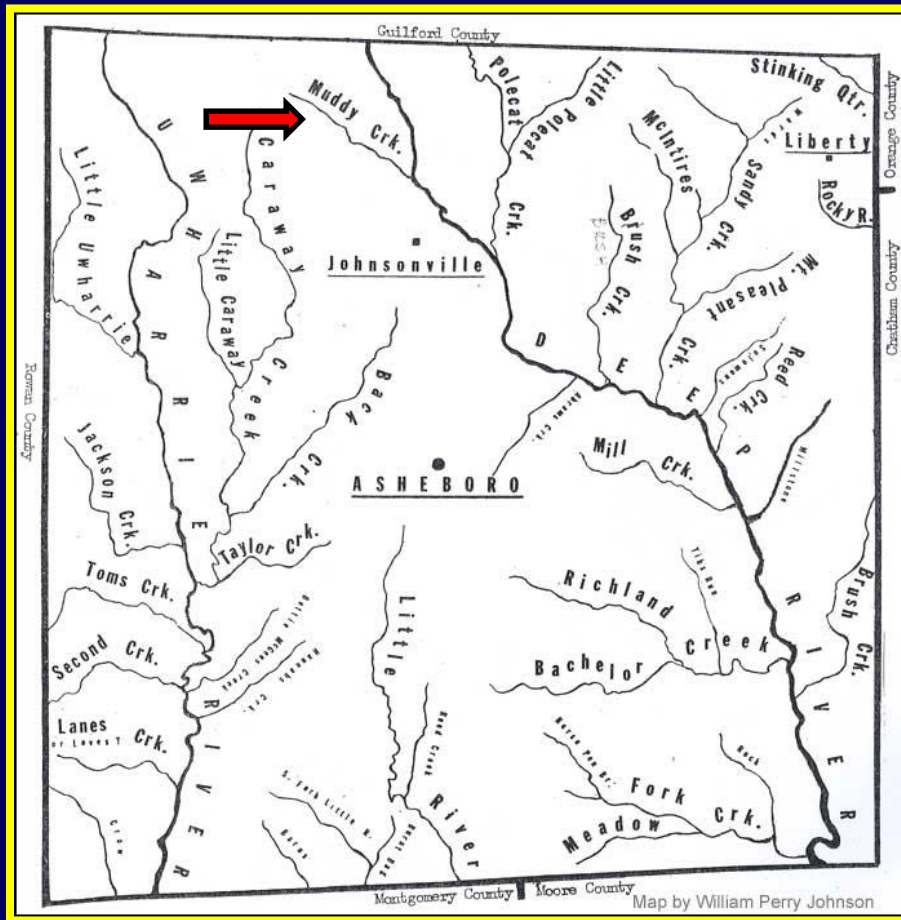
When the water within a watershed flows into a large river, the land over which the water flows is called river basin.



North Carolina has 14 river basins.

Tributaries

Tributaries are smaller streams, either creeks or smaller rivers, that flow into larger rivers.



Muddy Creek, that flows through Creekside Park, is a tributary of Deep River that flows through Randleman.

Muddy Creek is part of Deep River's river basin.

Tributaries

Deep River is a tributary of the Cape Fear River, which flows into the Atlantic Ocean in South Port.

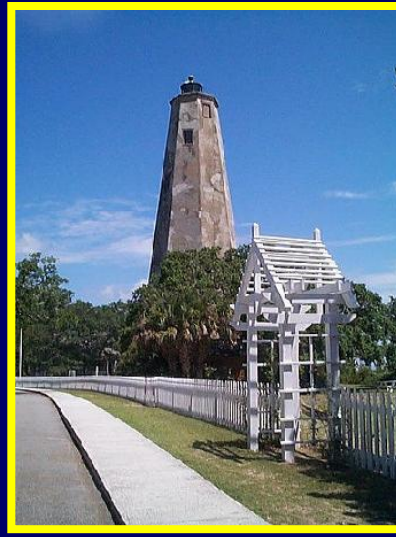


Deep River is part of the Cape Fear River Basin.

The Cape Fear River Basin is part of the Atlantic Ocean Watershed.

South Port

Gratuitous photos of Southport because it is just a fun place to visit.



Southport has been in a lot of movies (I Know What You Did Last Summer and Safe Haven) and TV shows (Dawson's Creek).

BTW, watch Outer Banks on Netflix (even though it's not filmed in the Outer Banks)

Confused?

Just keep in mind that the watershed is the actual land over which water flows into a body of water.

The body of water, for a watershed, can be anything, from a pond, to a lake, to an ocean.

A river basin is the area of land that flows into a river.
Just a river.

But due to tributaries, a river basin for a small river can also be part of a river basin for a larger river.

And all the river basins will be part of an ocean watershed.

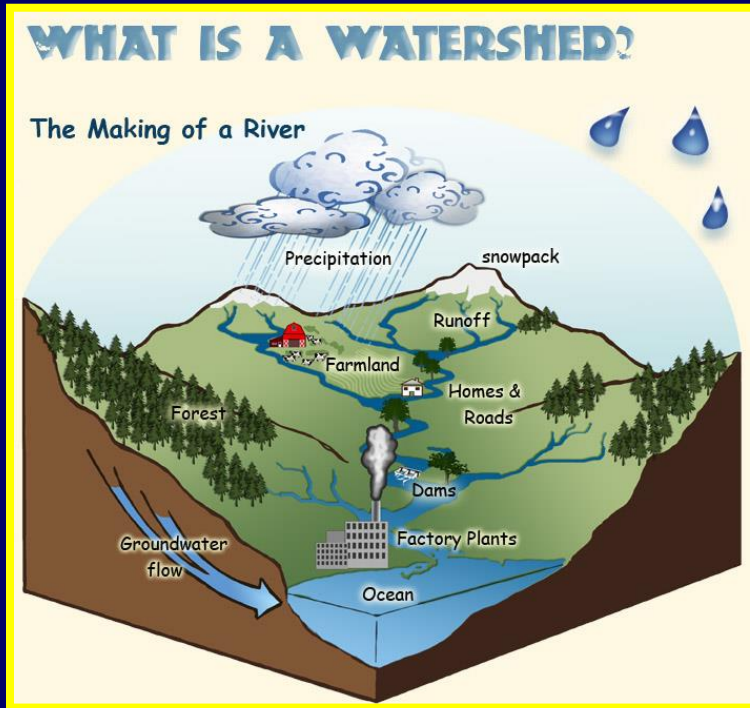
What difference does all of this make?

Because rivers flow, the water doesn't stay in one place. So, a river may be polluted in an area that was not the source of the pollution.

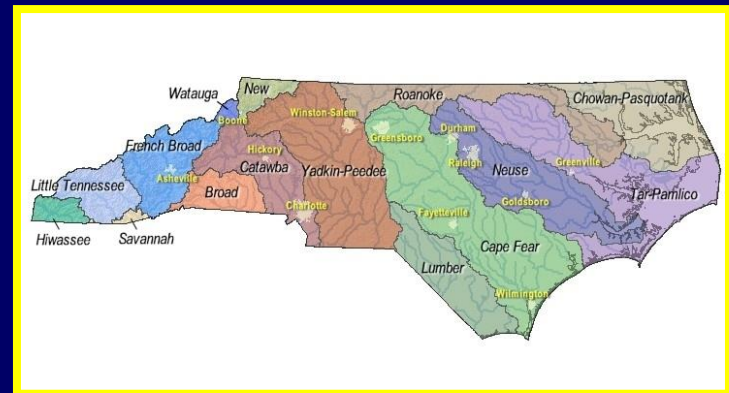


Managing Watersheds

When state and local agencies want to stop pollution, it helps them to be able to work within manageable areas, in order to find the source of the pollution.



Knowing the boundaries of a watershed or river basin, allows one to just look within that area for the source.

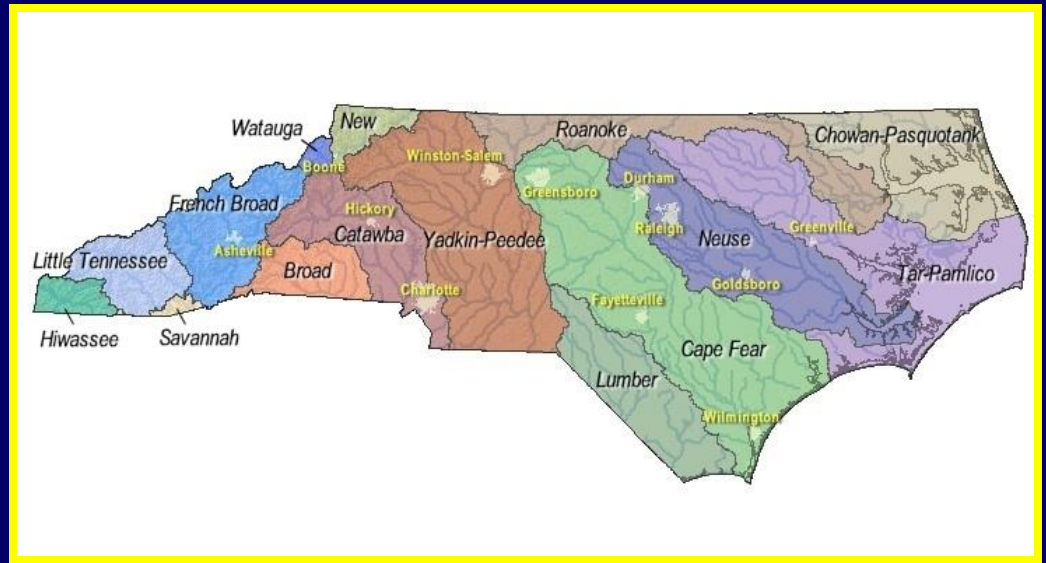


Managing Watersheds

To find the source of a water pollutant, you don't need to look further than the area of land that makes up the watershed or river basin.

WHAT IS A WATERSHED?

The Making of a River



The End

