

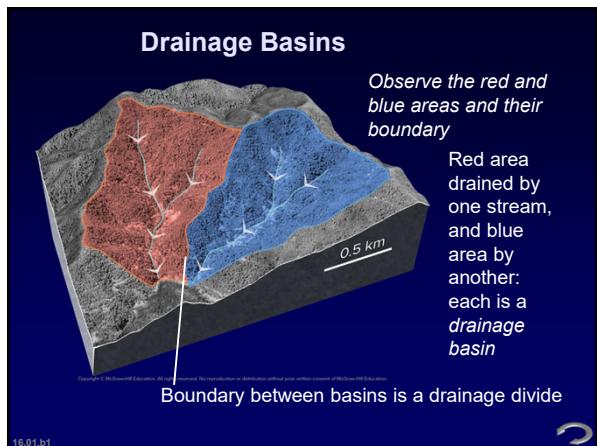
Streams and Flooding Chap 16

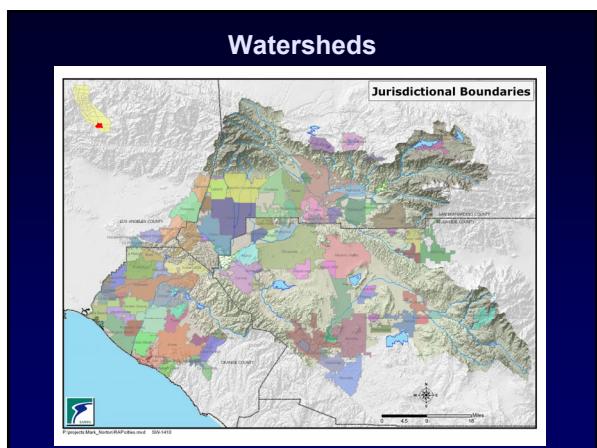




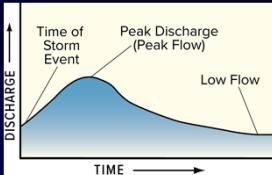






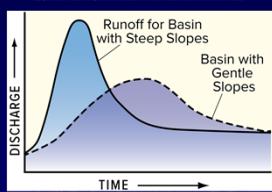


Volume of Flow Versus Time



Plot of discharge versus time is a *hydrograph*

This hydrograph shows discharge (flow) increasing during a flood, then decreasing as flood ends

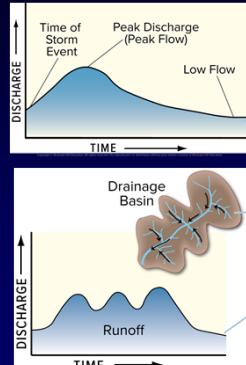


Runoff from steep drainage basin is fast and most water arrives downstream at once

Runoff from basin with gentle slopes is spread out over time; less peak flow

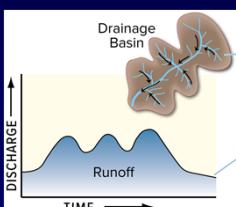
16.01.a,b

Discharge Versus Basin Shape



For a simple drainage basin: runoff reaches main drainage in orderly way

Has simple hydrograph for a single storm or snowmelt



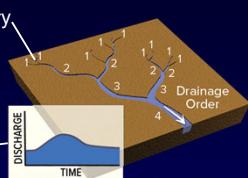
More complex basin shape: water shows up at different times

More complex hydrograph reflects something about basin shape

16.01.b

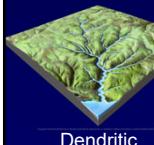
Tributaries and Drainage Networks

Smaller subsidiary channels are *tributaries*

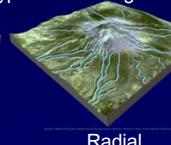


Tributaries spread out discharge over time

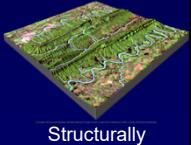
Types of Drainage Patterns



Dendritic



Radial

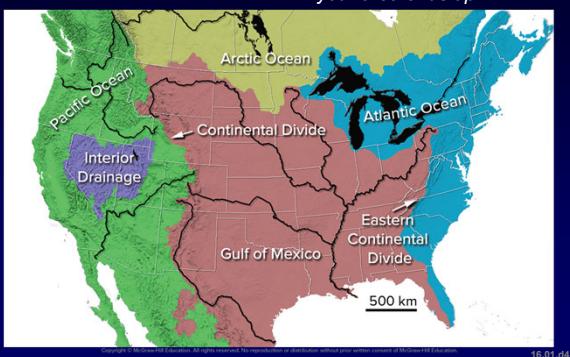


Structurally controlled

16.01.c-d

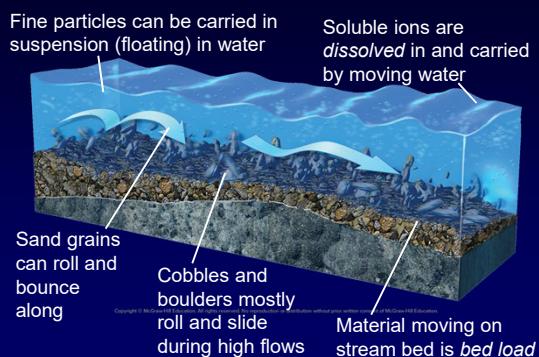
North American Drainage Basins

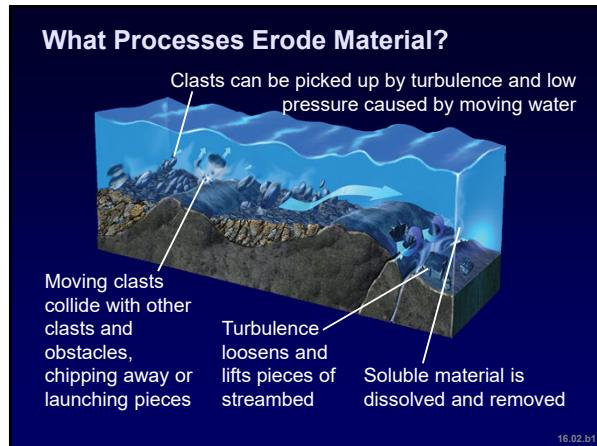
Observe these drainage basins and find where runoff in your area ends up

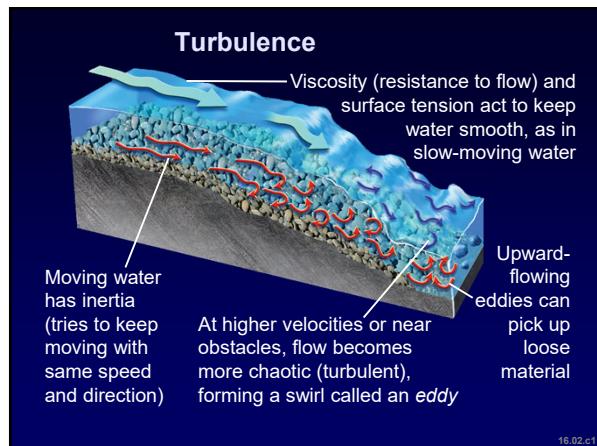


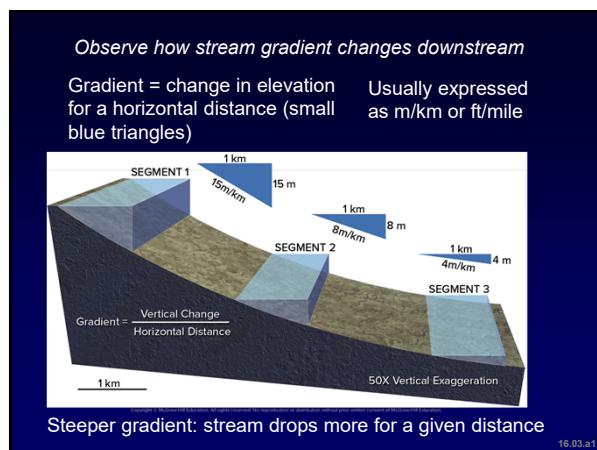


How is Material Transported and Deposited?

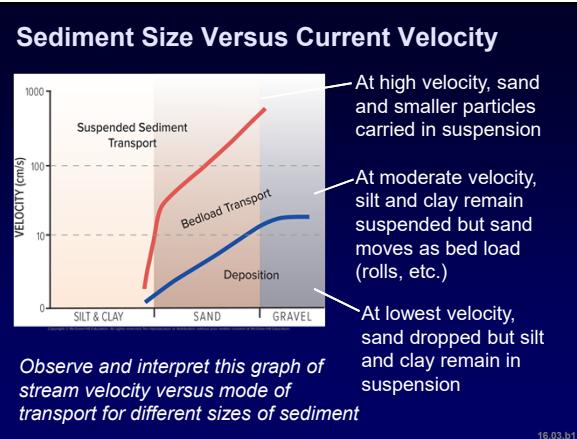
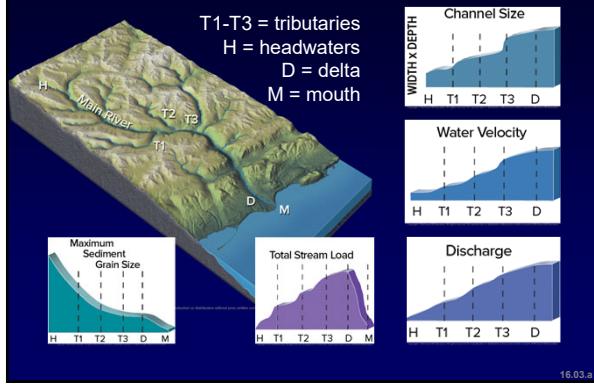






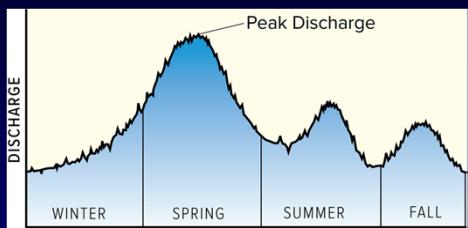


How Does a Stream Change Downstream?

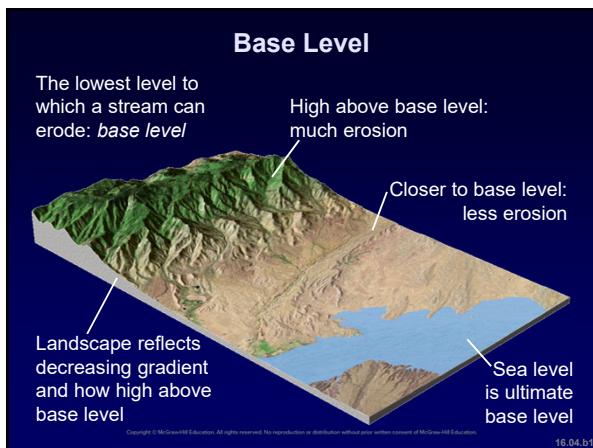
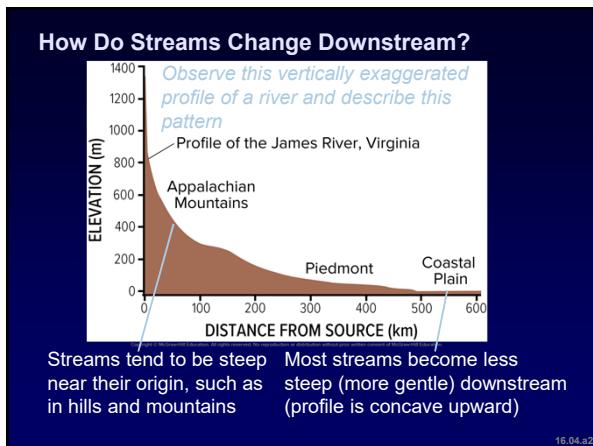
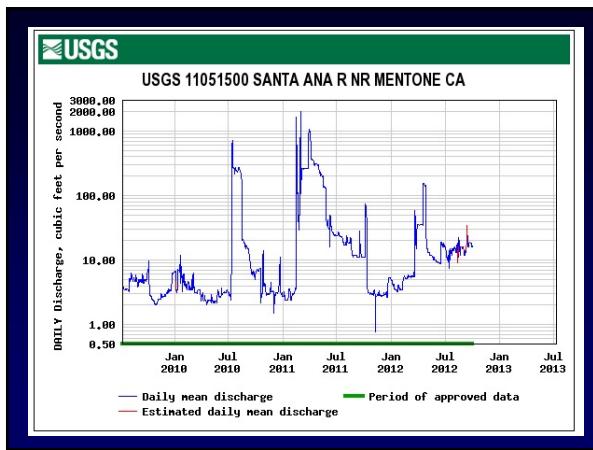


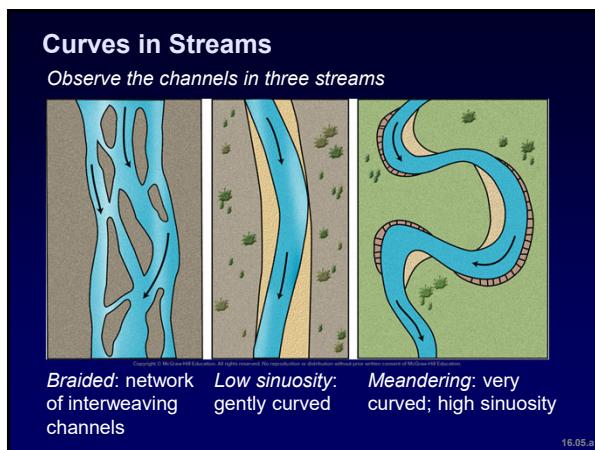
How Do Streams Vary Over Time?

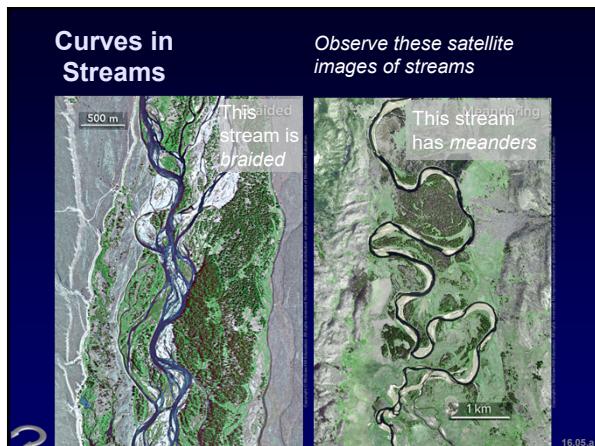
Streams vary in discharge during the year due to snowmelt, wet/dry seasons, etc.

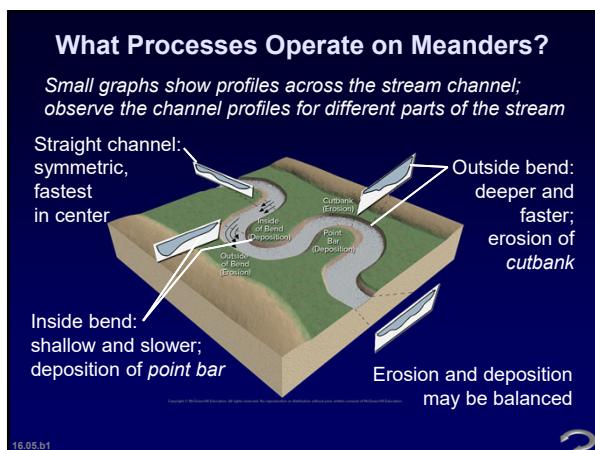


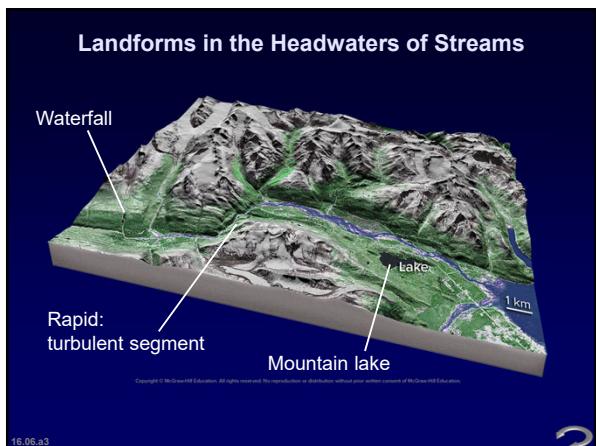
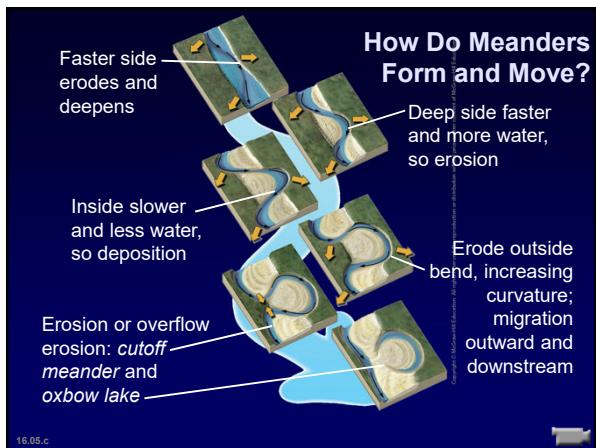
Suggest some factors that might explain this pattern above (many possible answers)



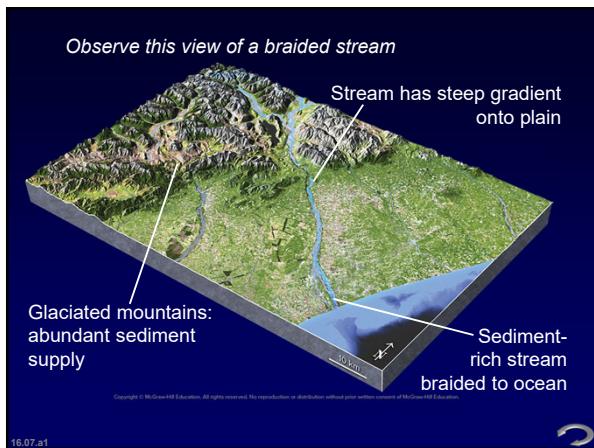


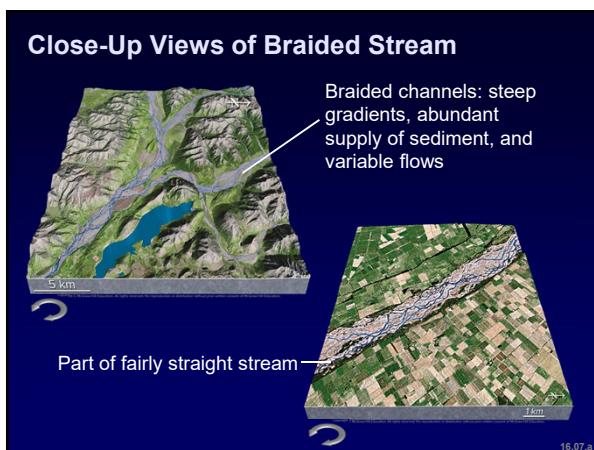


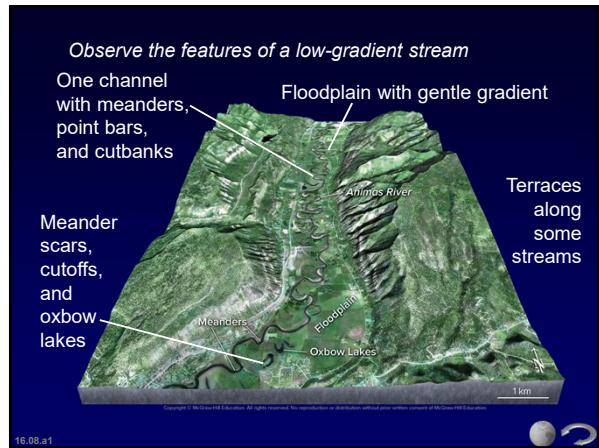






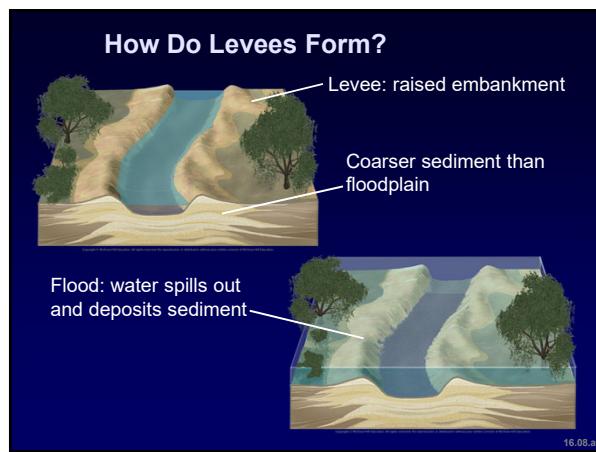




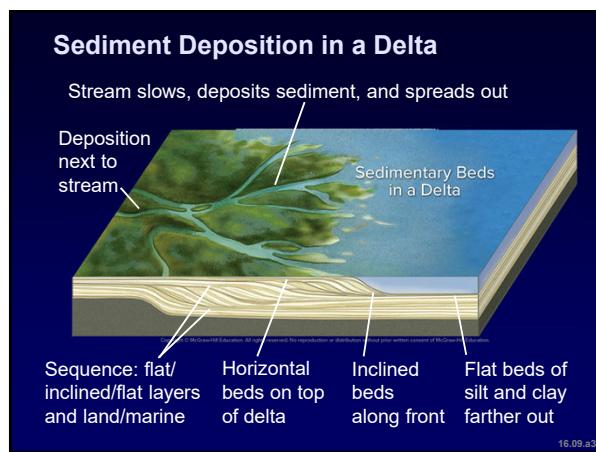












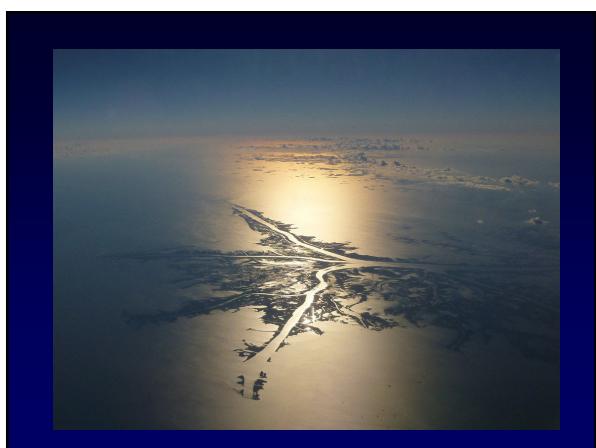
When a Stream Approaches Base Level

Nile River spreads out and deposits sediment (*delta*)



16.09.a-b

Lena River splits into distributary system



What do you think are the consequences of a dam?

New temporary base level

Clear, cold water released and erodes downstream

Deposits sediment

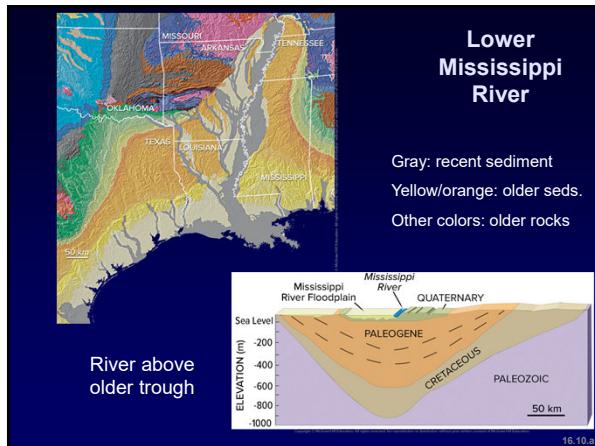
Delta builds into reservoir

Post-Dam Equilibrium Gradient

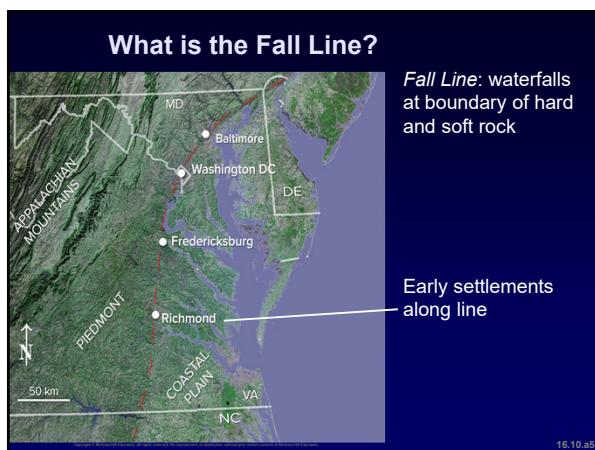
Pre-Dam Gradient

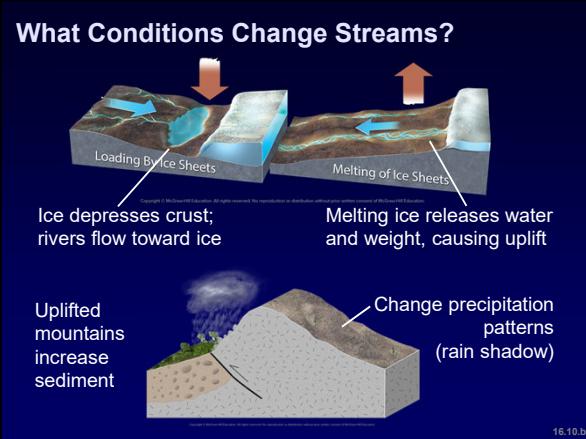
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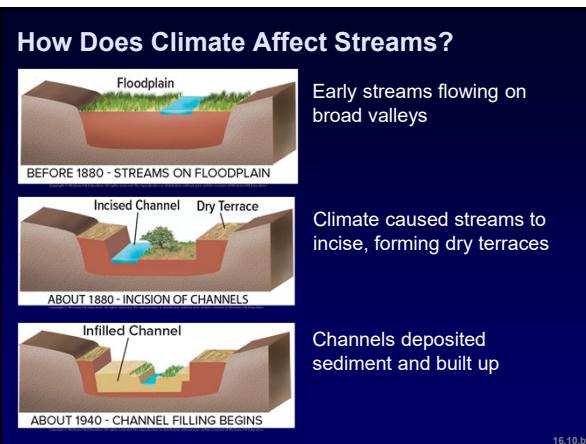
16.09.c1

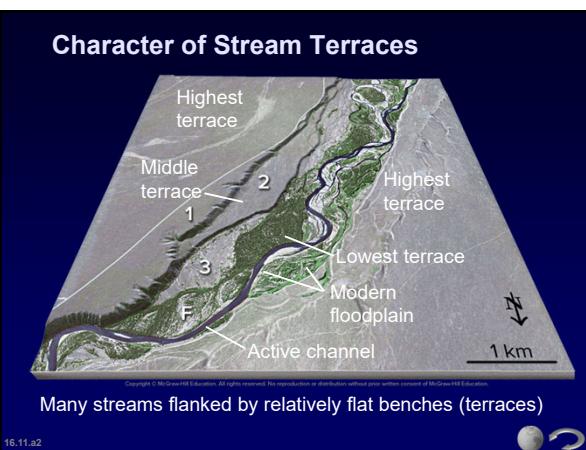


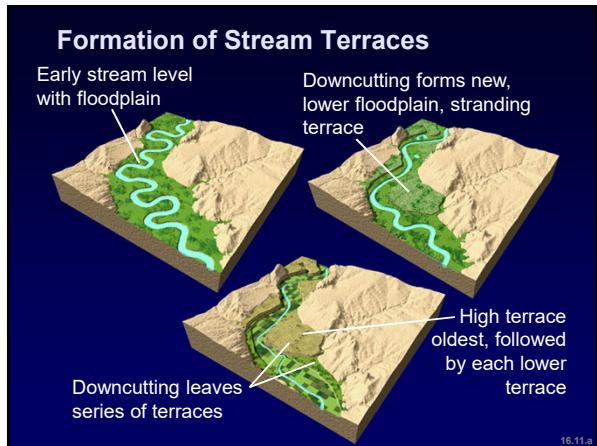


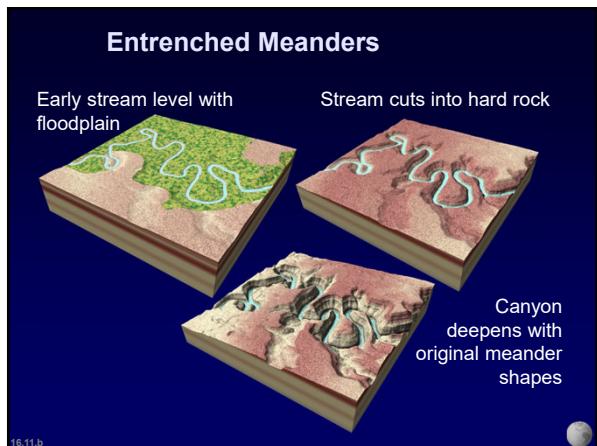


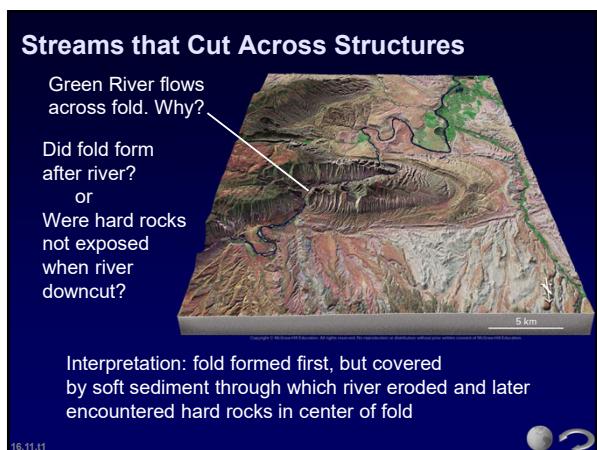






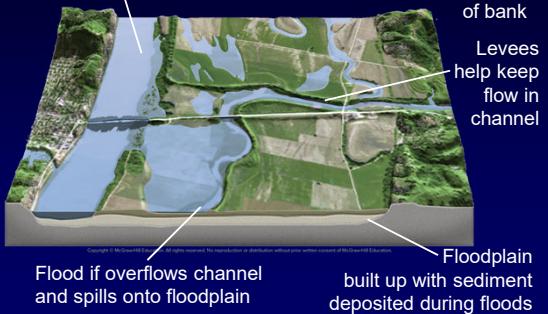






What Is and Is Not a Flood?

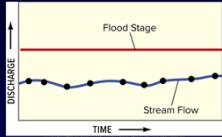
Not called a flood if water stays within channel, unless flow within channel causes much erosion (and destruction)



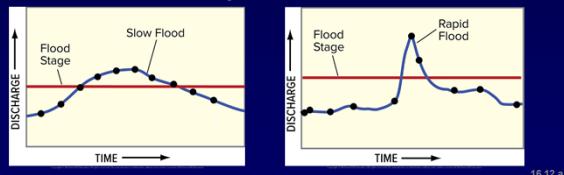
16.12.a1

Graphing Floods and Non-Flood Flows

A non-flood flow stays within the channel (below flood stage)



Flooding can be a slow or rapid increase in discharge that exceeds flood stage



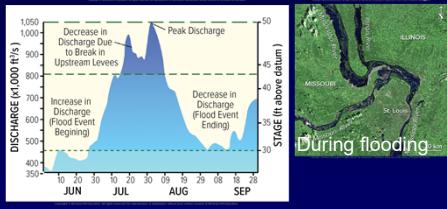
16.12.a

The 1993 Mississippi Flood

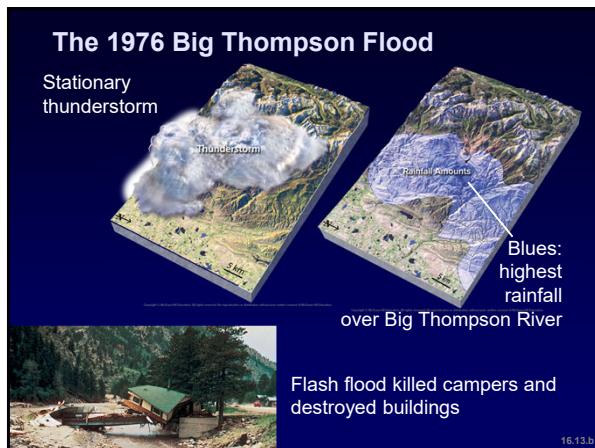
Cold air and warm air collide causing persistent thunderstorms

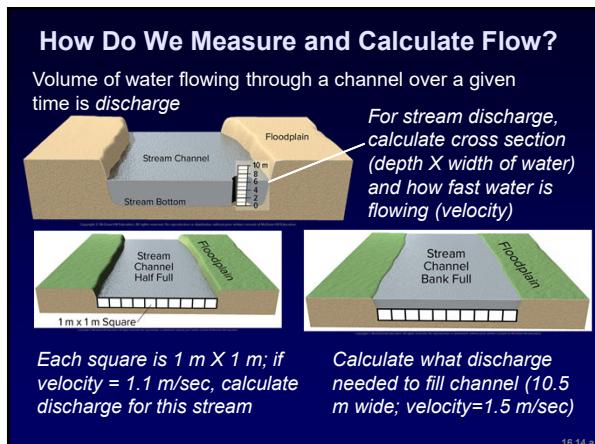


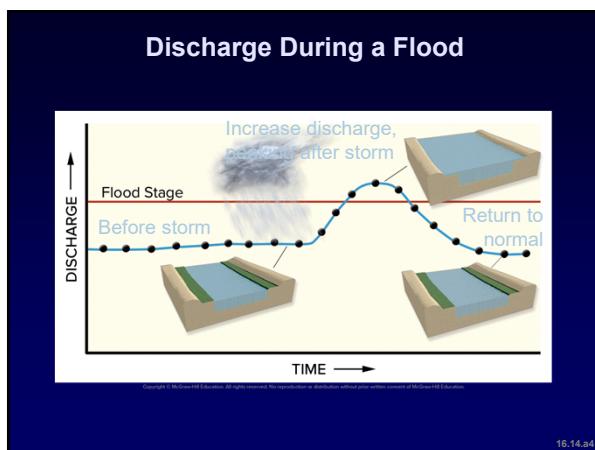
Discharge
higher
than
normal for
months



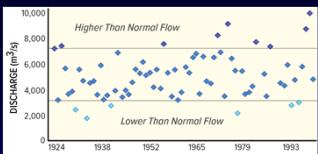
16.13.a





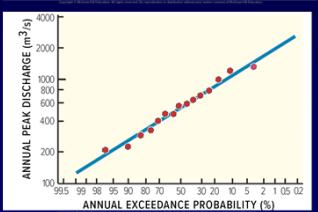


What Is the Probability that a Flood Will Occur?



Graph for Yellowstone River: What is the largest recorded flood on this stream?

What was the answer if you had asked this question in 1965?



Graph of flow probability for different stretch of river. What is the probability (%) each year that stream flow will reach 1,000 m^3/sec ?

16.14.b

