



OBJECTIVES

- Basic stream processes
- Watershed and stream relationships
- Stream, floodplain & riparian management

What do creeks and rivers want to do?

Functions of a Stream

- Transport water
- Transport and deposit sediment
- Transport and replenish nutrients
- Biological functions (food, shelter, shading, movement, etc.)

Stream, Floodplain and Riparian Areas are One

- Erosion Control
- Water Quality Improvement
- Wildlife Habitat
- Aquatic Habitat
- Recreation
- Water Storage
- Flood Protection

Stream Facts

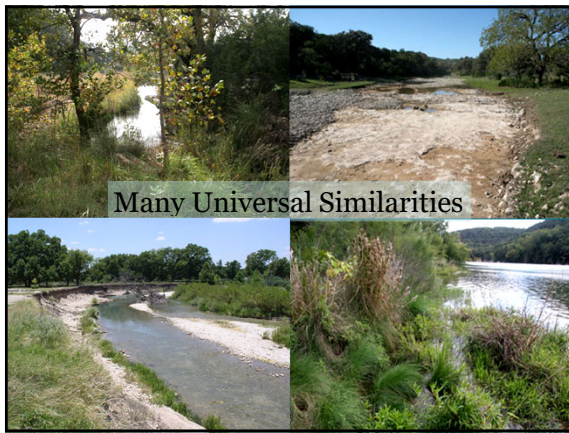
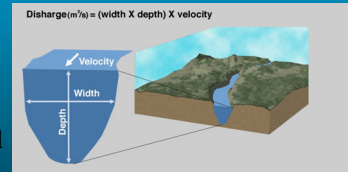
- Streambank and watershed erosion are natural processes
- A dynamic equilibrium exists in stable stream channels
- Floods have beneficial functions
- When changes are made in the watershed or stream, the stream will adjust to fix itself.

Stable Stream

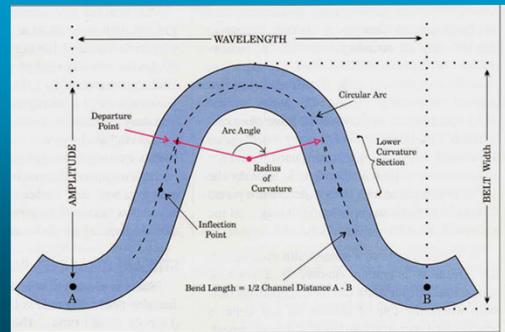
- A stable stream is one that has a stable dimension, pattern, and profile such that, over time, channel features are maintained and the stream system neither aggrades (deposits excess sediment) nor degrades (erodes excess sediment).
- Lateral migration and erosion do not necessarily indicate instability. Stable streams are also dynamic.

Major Variables Influencing Stream Pattern Morphology

- Channel Width
- Channel Depth
- Velocity
- Discharge
- Channel Slope
- Channel Material & Roughness
- Sediment Load
- Sediment Size

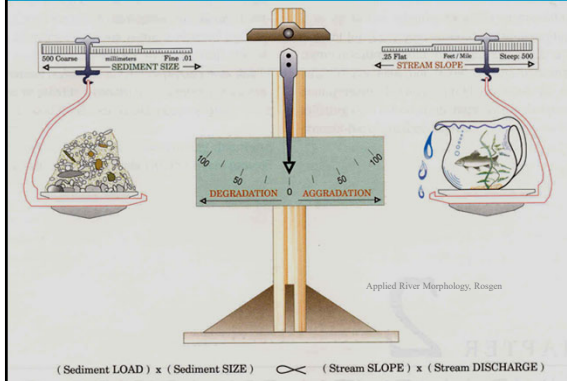


Channel Geometry



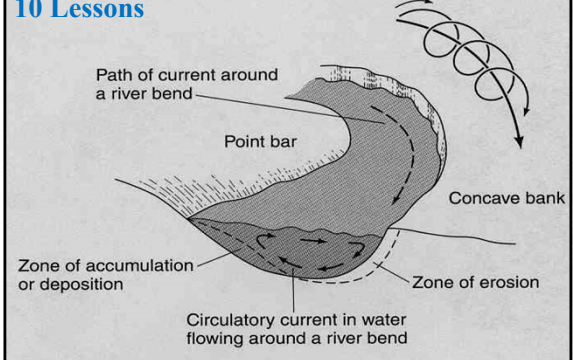
Applied River Morphology, Rozen

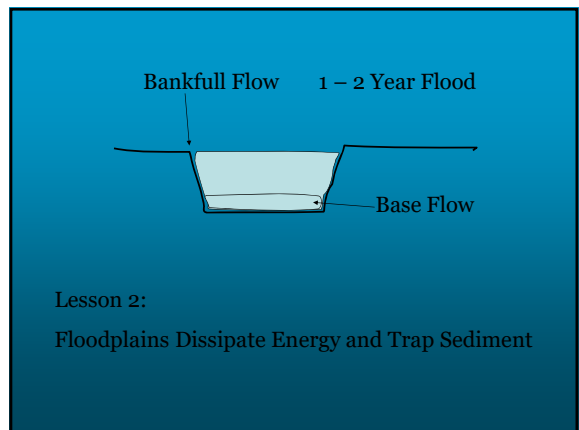
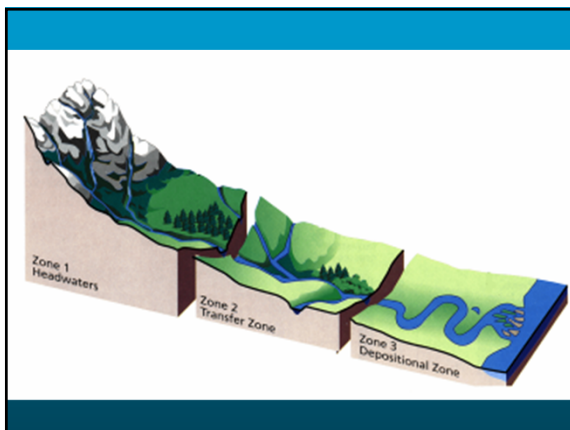
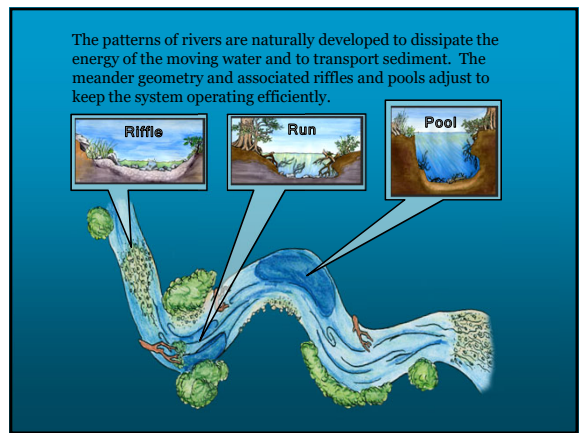
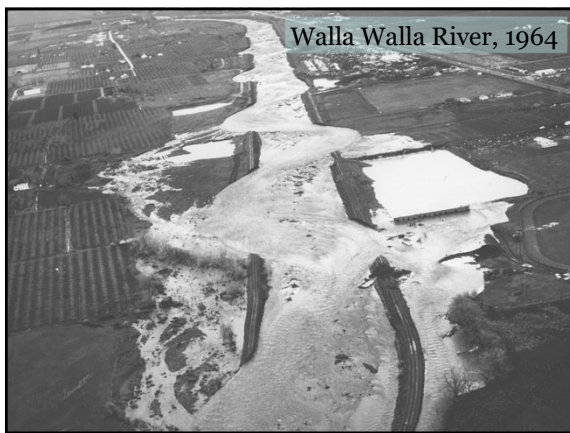
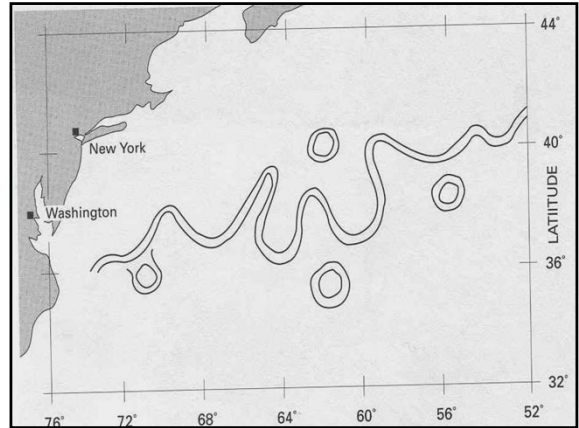
Lane's Relationship (1955)

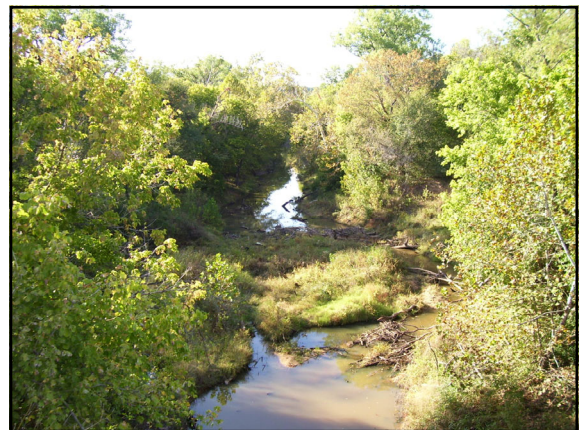
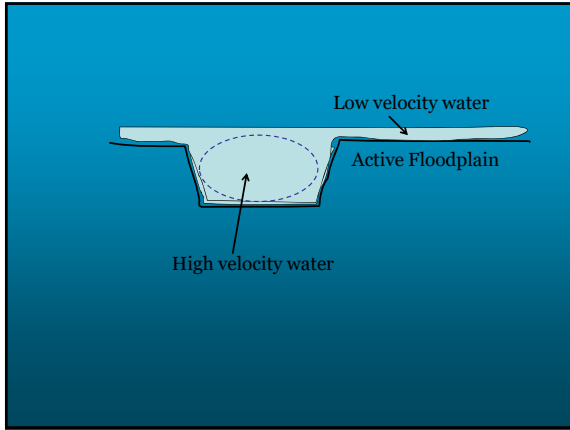


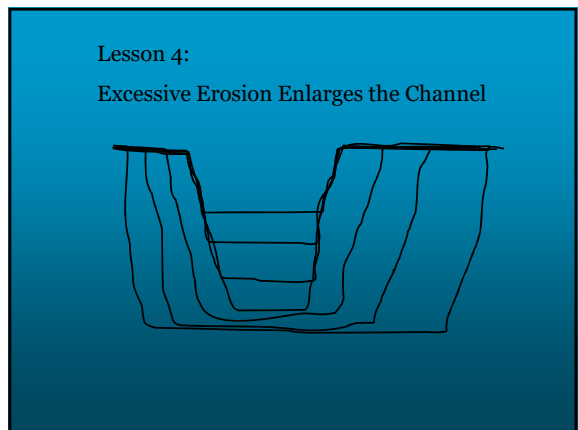
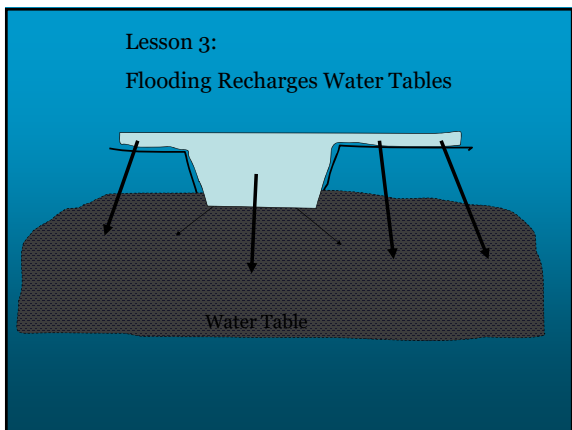
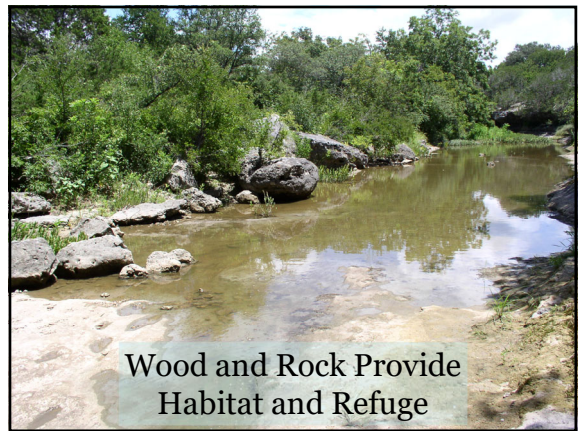
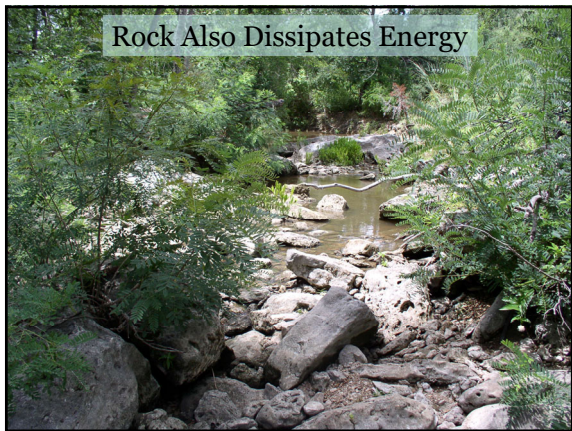
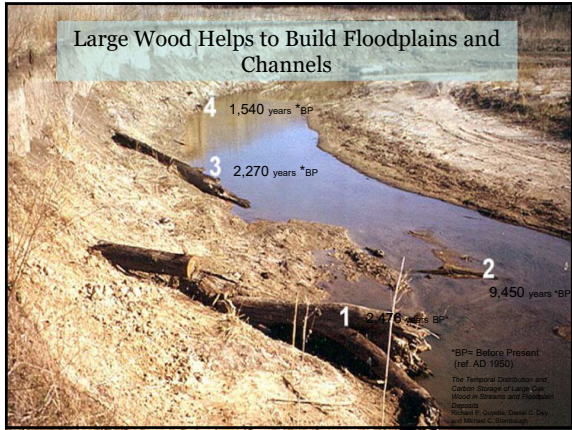
How Streams Work: 10 Lessons

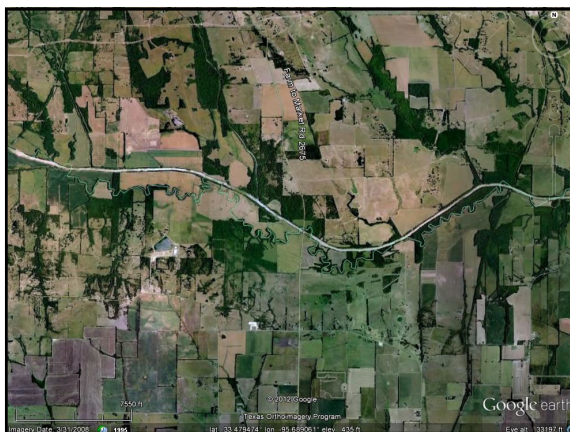
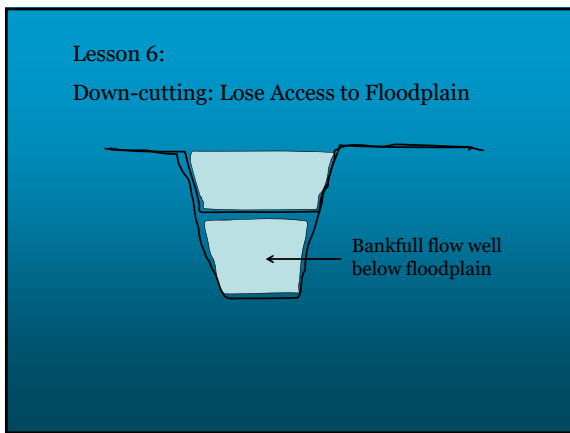
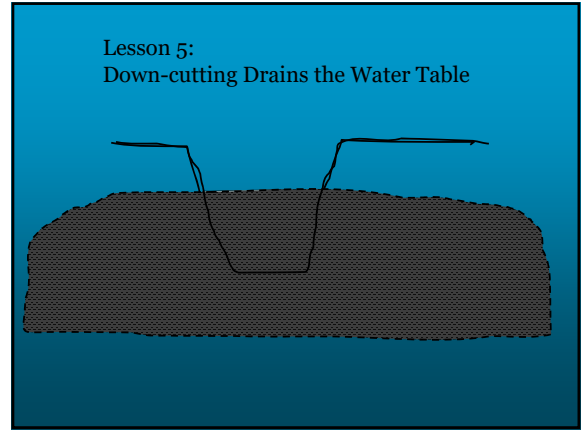
Exaggerated sketch of the screwlike path of a particle of water around a river bend

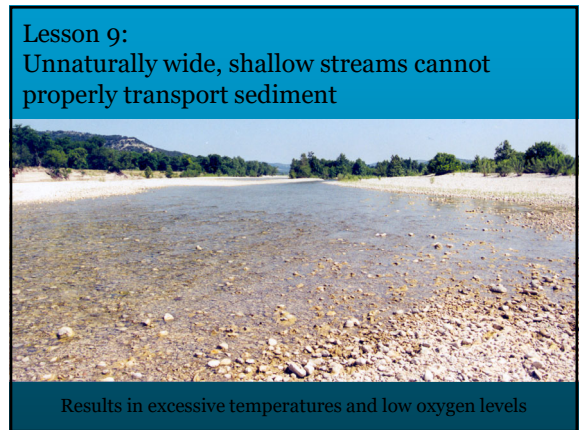
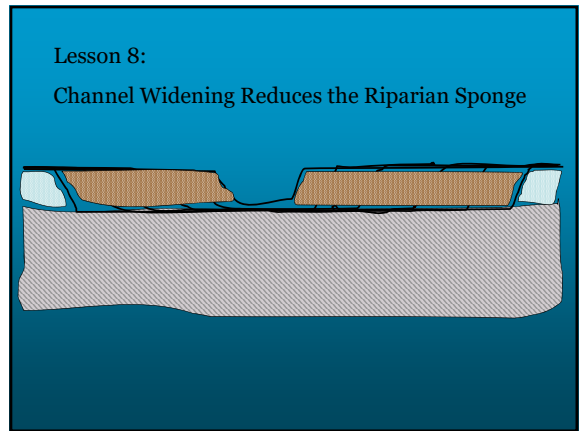
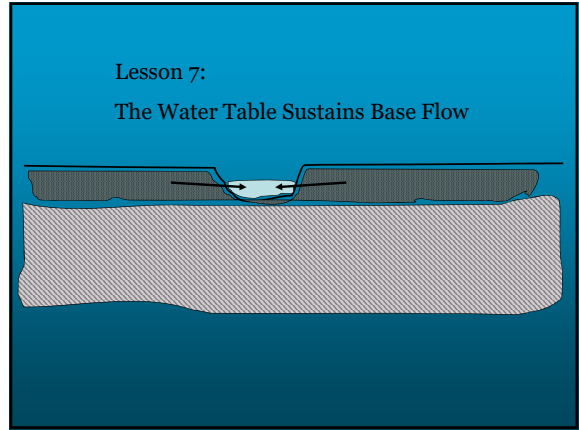
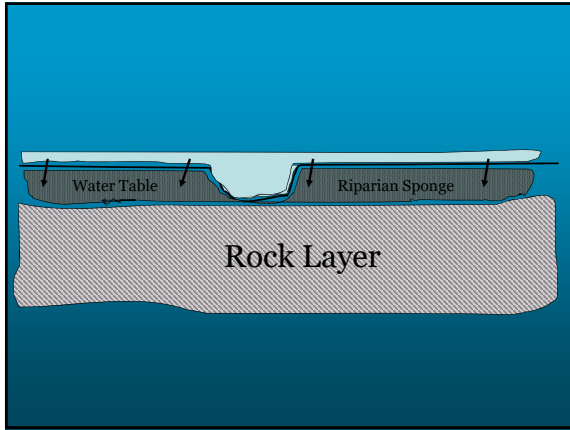




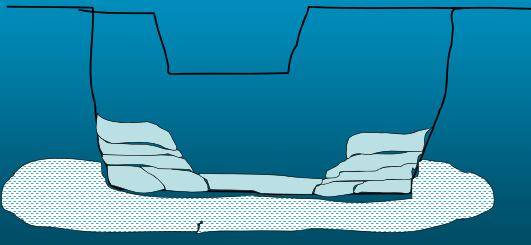









Lesson 10:
Degraded and eroded channels can be restored



Channel Evolution



River Mountain Ranch Community Park
April 2016



River Mountain Ranch Community Park
September 2016





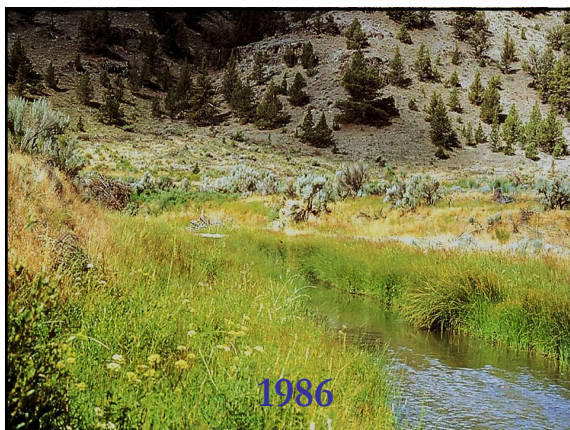
Intermittent flow – No fish
Accelerated erosion - Sediment loss
Poor vegetation
Wet riparian area (sponge) = 4 acres / mile
Water storage = 1.5 ac ft / mile
Bank erosion = 12,500 feet

A smaller version of the 1977 photograph, showing the same dry riverbed and eroded bank. The year "1977" is printed in blue text in the lower right corner of the image.

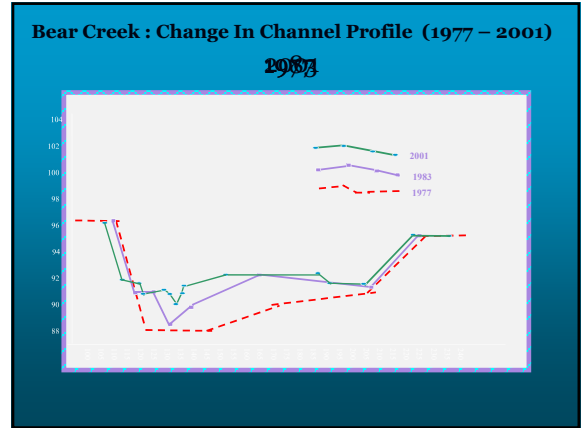
A Change in Grazing Management

1977 – 1984: No grazing / Reduced grazing
to jump-start recovery

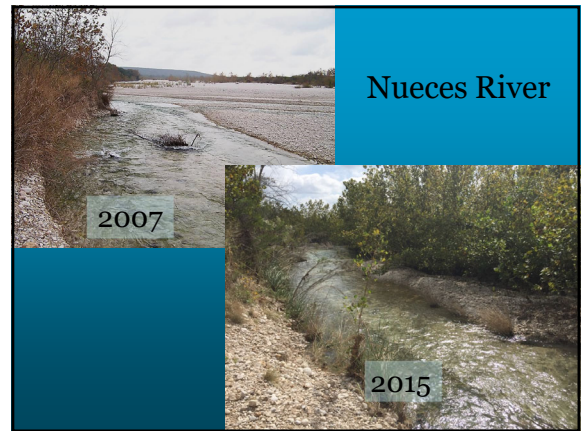
1985 – Present: Short term grazing during
late winter to improve
riparian vegetation







- Sediment Captured = 7400 CY/Mile
- Riparian "Sponge" Increased to 12 Ac/Mile
- Water Storage : Net gain of 4.9 ac ft /mile
- Perennial flow; prime fish habitat
- 10x Increase in livestock forage
- Bank erosion reduced to 100 feet



Instream Structures and Stream Restoration

- J-hooks, x-vanes, sloping banks, weirs, bioengineering, etc.
- These may be expensive and unnecessary where improved riparian management is adequate.

Summary

- Streams are dynamic. Their main function is to transport water and sediment.
- A stream's morphology is predictable and measurable. A change in one variable will cause an adjustment in another.
- The stream, floodplain, and riparian area are one system (think watershed!).
- Floods have beneficial functions.
- Lateral and vertical stability maintain base flows, the water table, and the "riparian sponge."



Thank you

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