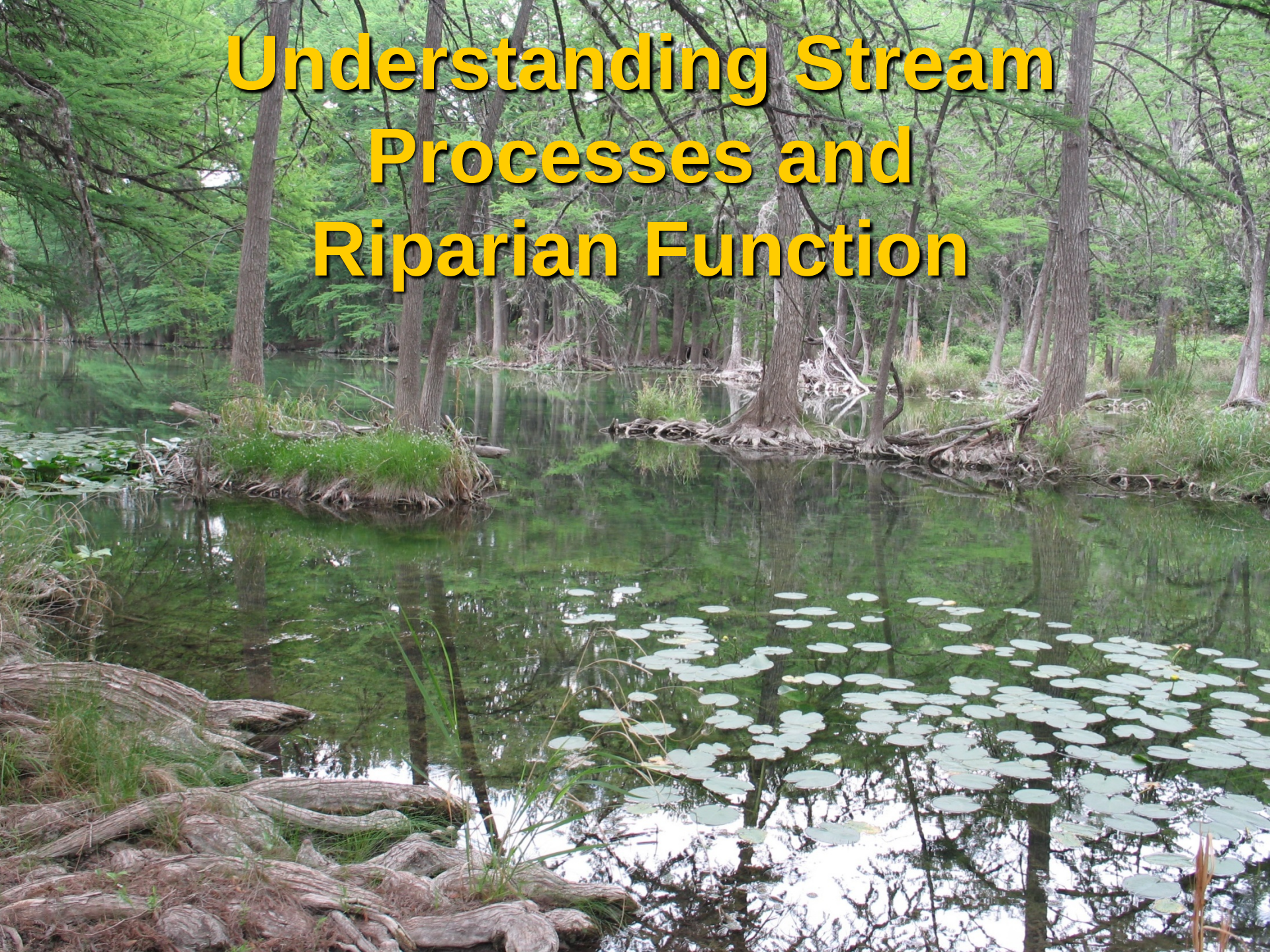

Understanding Stream
Processes and
Riparian Function

OBJECTIVES

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

What do rivers want to do?

Functions of a Stream

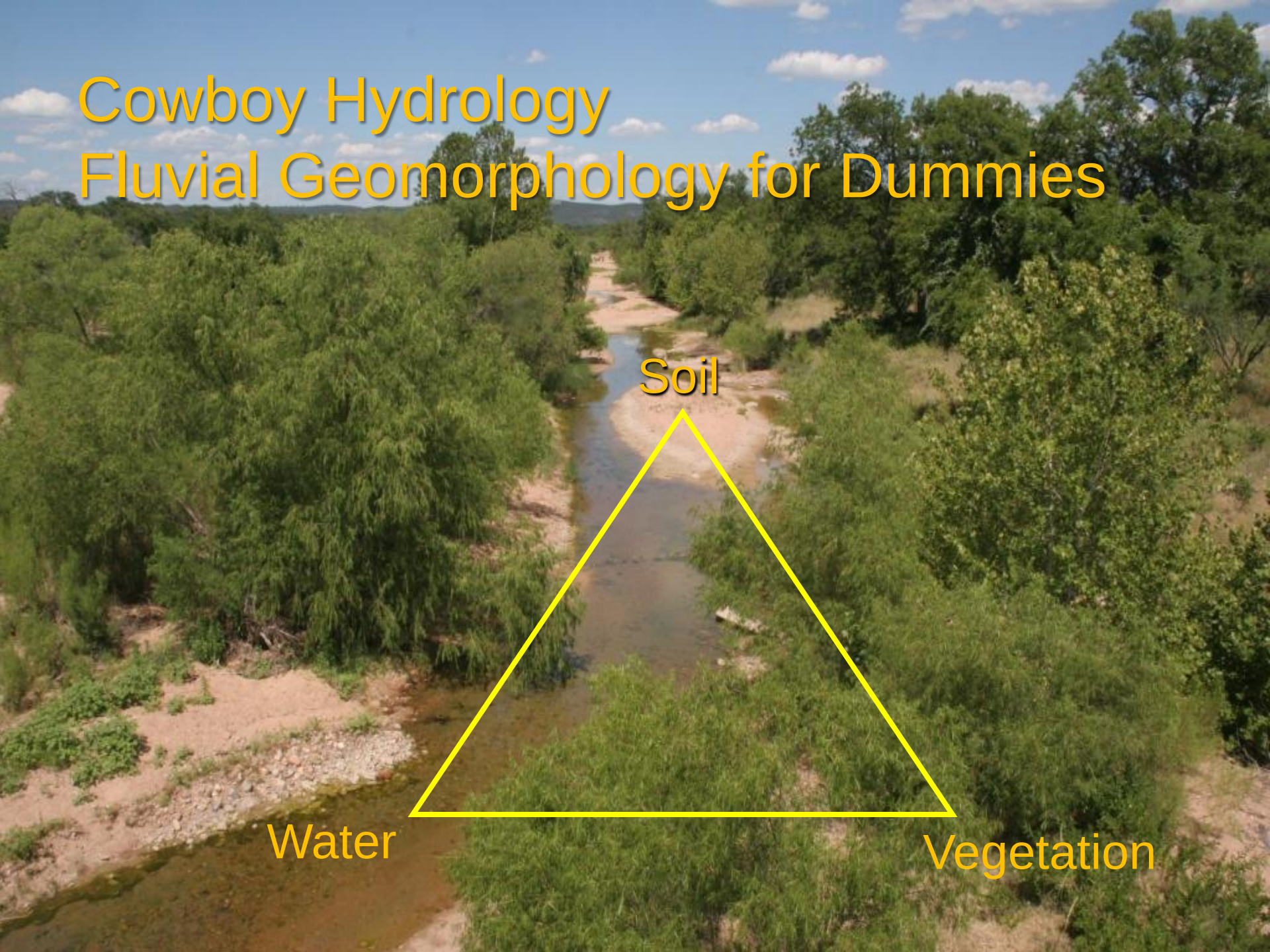
- Transport water
- Transport & deposit sediment
- Transport & replenish nutrients
- Biological functions(food, shelter, shading, movement, etc.)


Many Universal Similarities

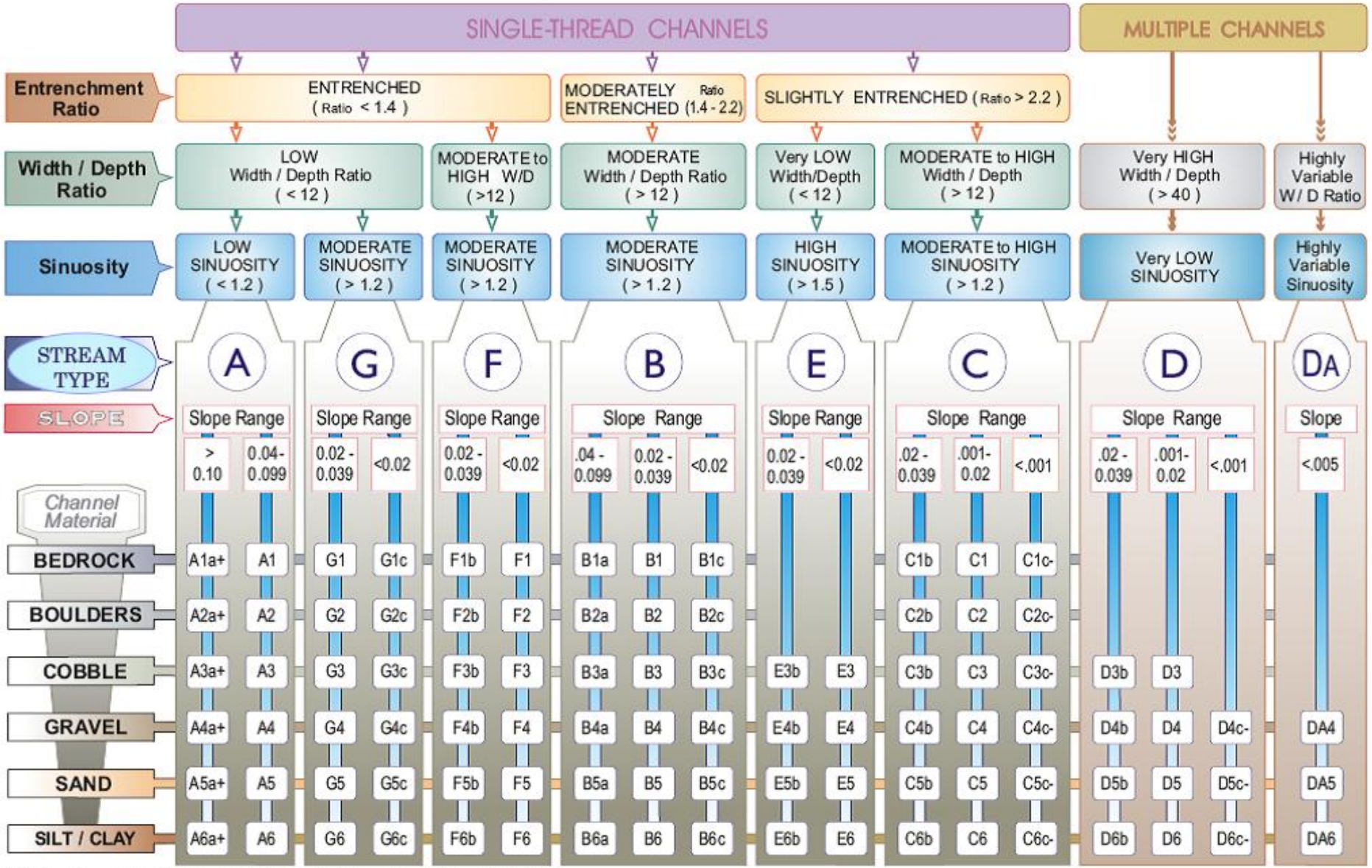


1. Carry Water
(Generate Energy)
2. Respond to Energy
(Erosion and Deposition)
3. Kinds and Amounts
of Vegetation

Cowboy Hydrology
Fluvial Geomorphology for Dummies



The Key to the Rosgen Classification of Natural Rivers



KEY to the ROSGEN CLASSIFICATION of NATURAL RIVERS.

As a function of the "*continuum of physical variables*" within stream reaches, values of ***Entrenchment*** and ***Sinuosity*** ratios can vary by +/- 0.2 units; while values for ***Width / Depth*** ratios can vary by +/- 2.0 units.

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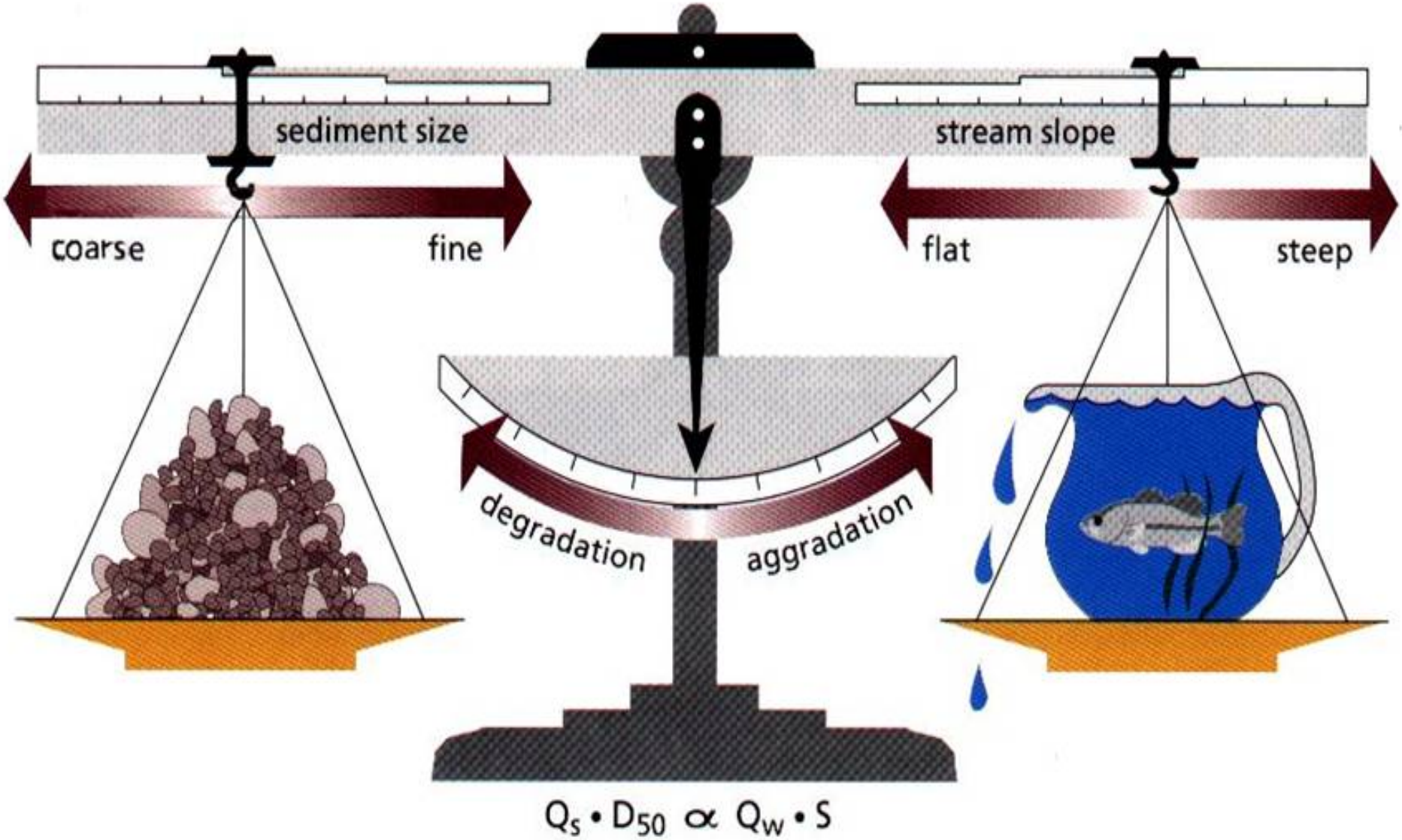
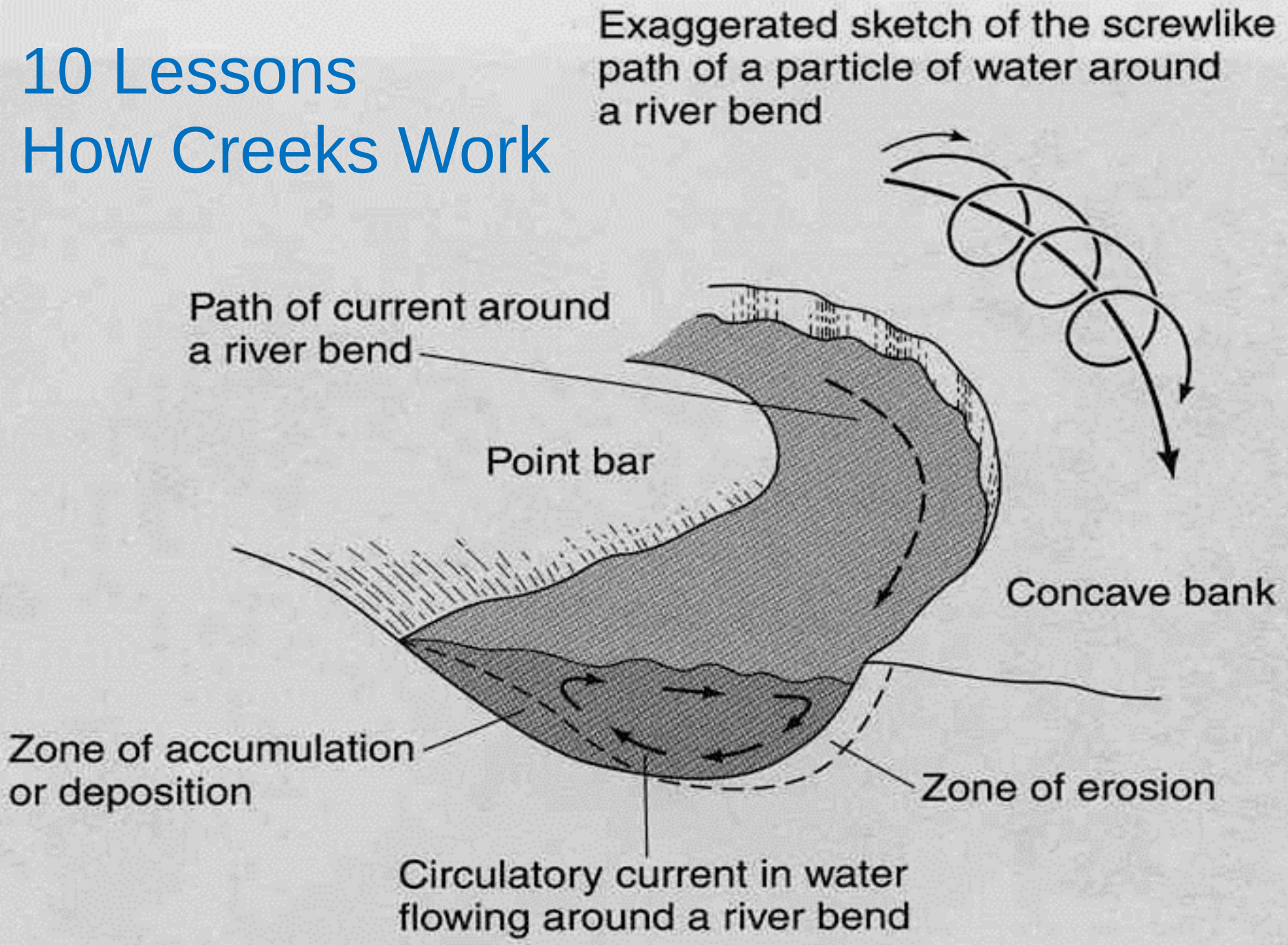
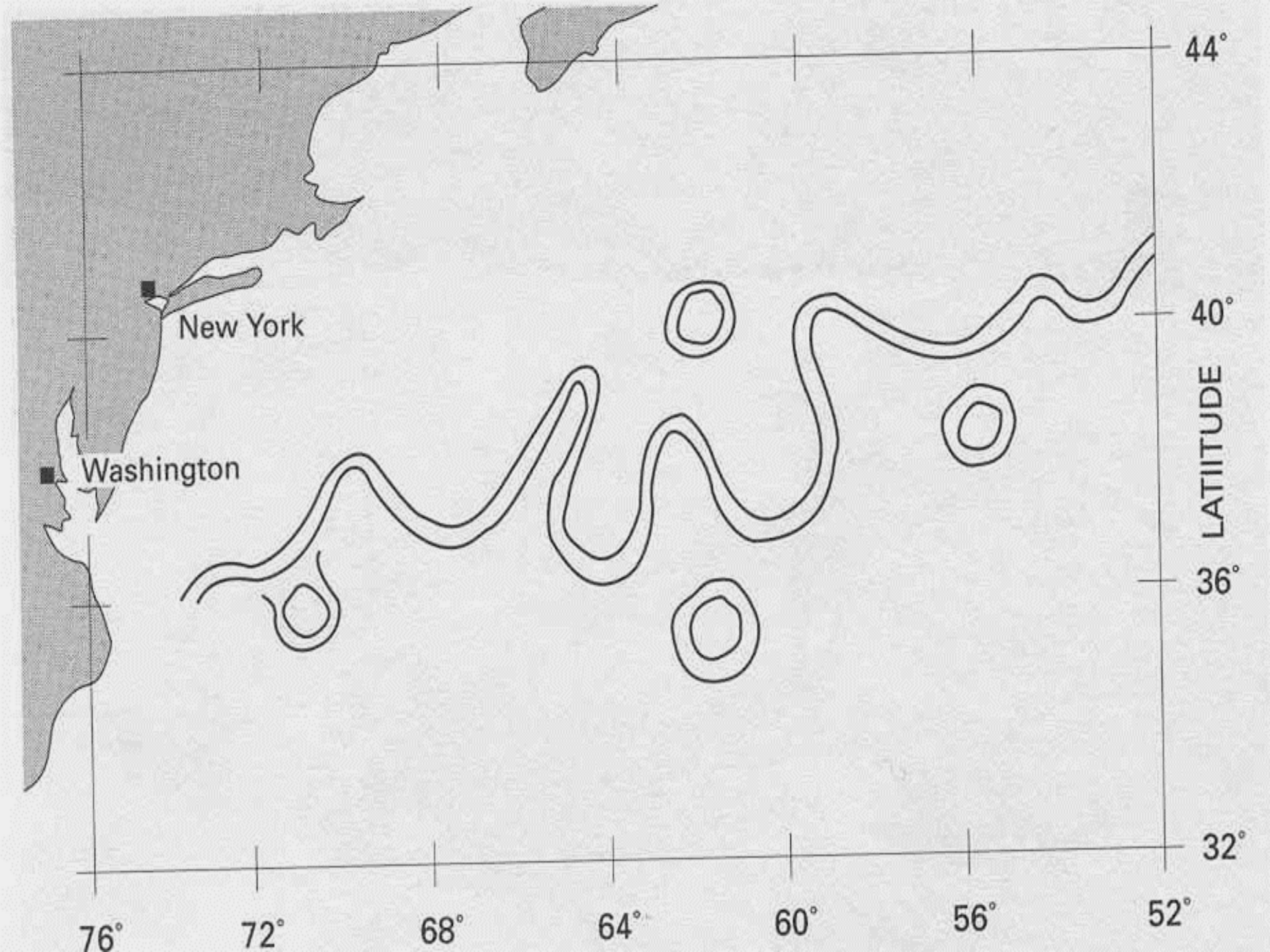
Lane's Relationship, 1950



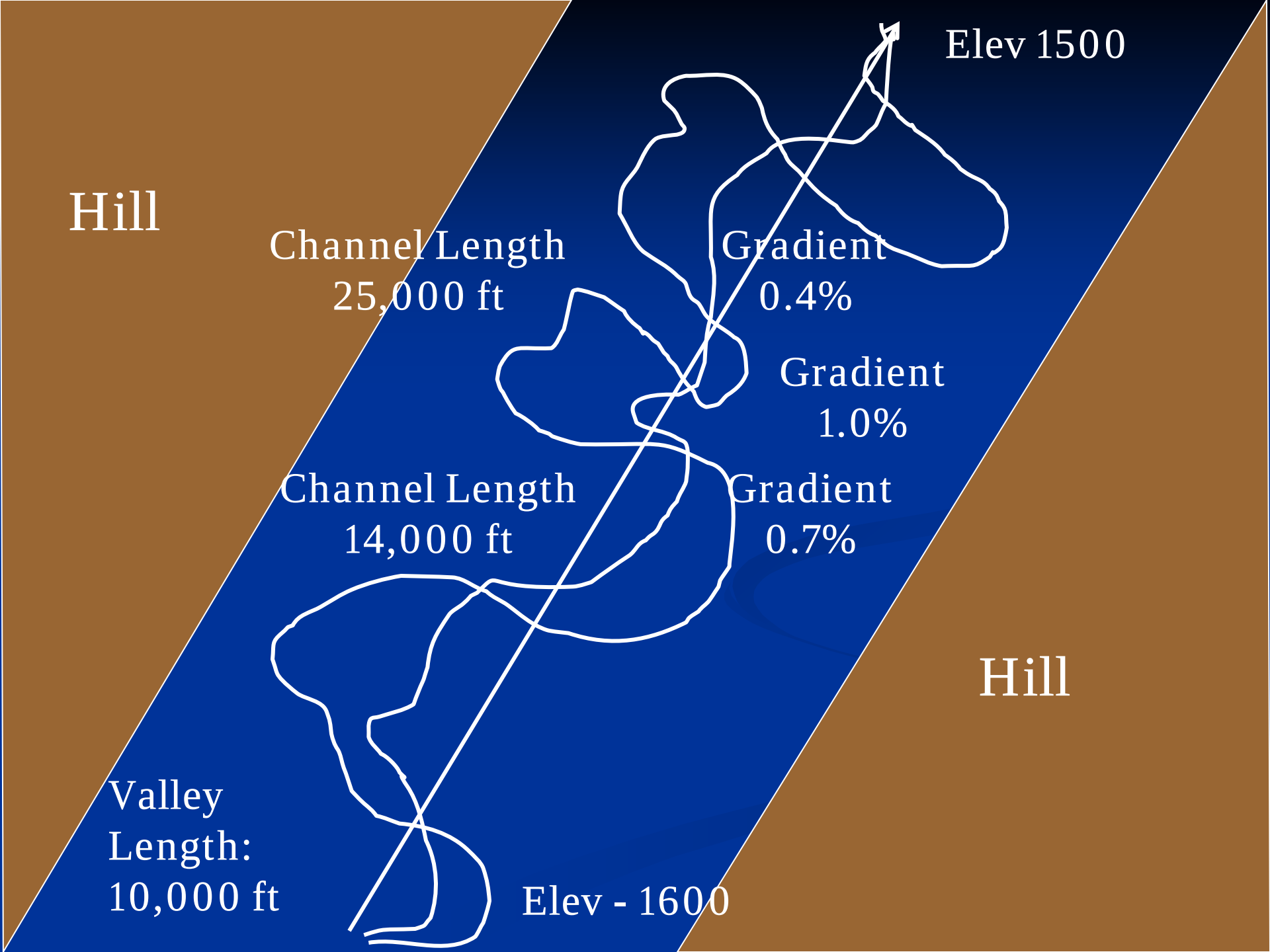
10 Lessons
How Creeks Work



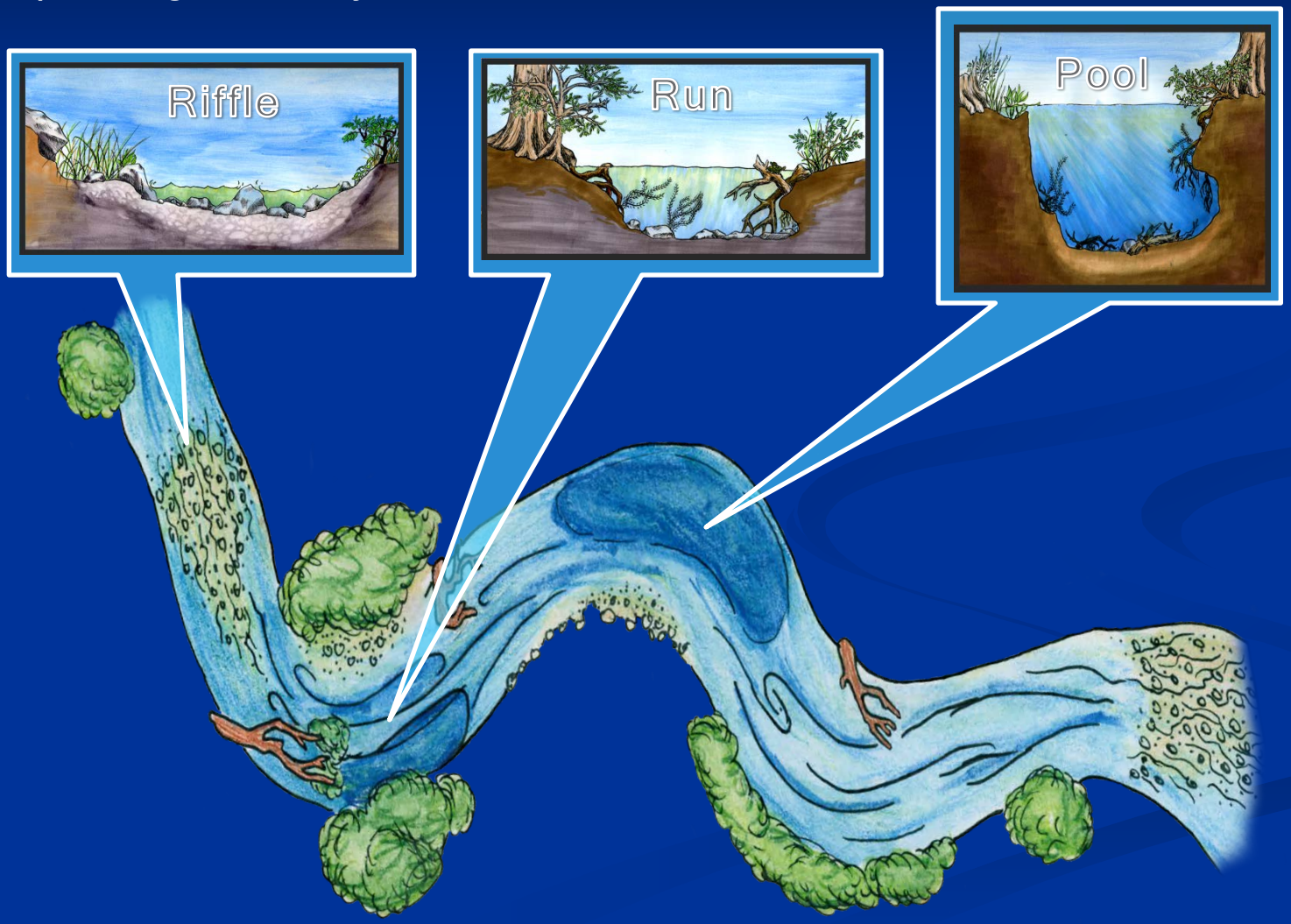

New York
Washington
44°
40°
36°
32°
LATIITUDE
76°
72°
68°
64°
60°
56°
52°


Walla Walla River, 1964


Lesson 1:
Creeks do not want to
be wide and straight

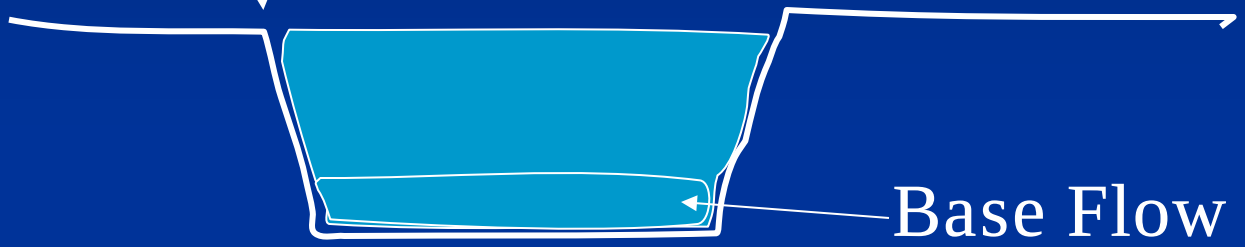

Elev 1500
Hill
Channel Length
25,000 ft
Gradient
0.4%
Gradient
1.0%
Channel Length
14,000 ft
Gradient
0.7%
Hill
Valley
Length:
10,000 ft
Elev - 1600

The patterns of rivers are naturally developed to dissipate the energy of the moving water and to transport sediment. The meander geometry and associated riffles and pools adjust to keep the system operating efficiently.



Bankfull Flow

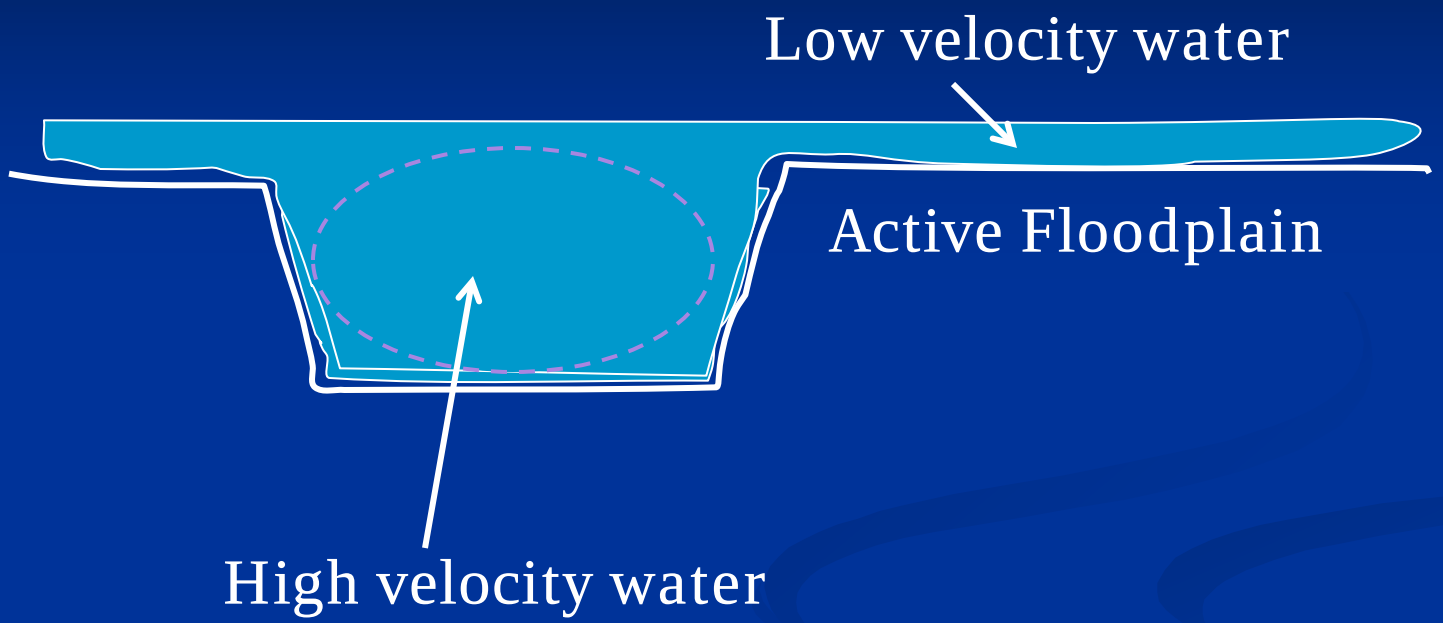
1 – 2 Year Flood

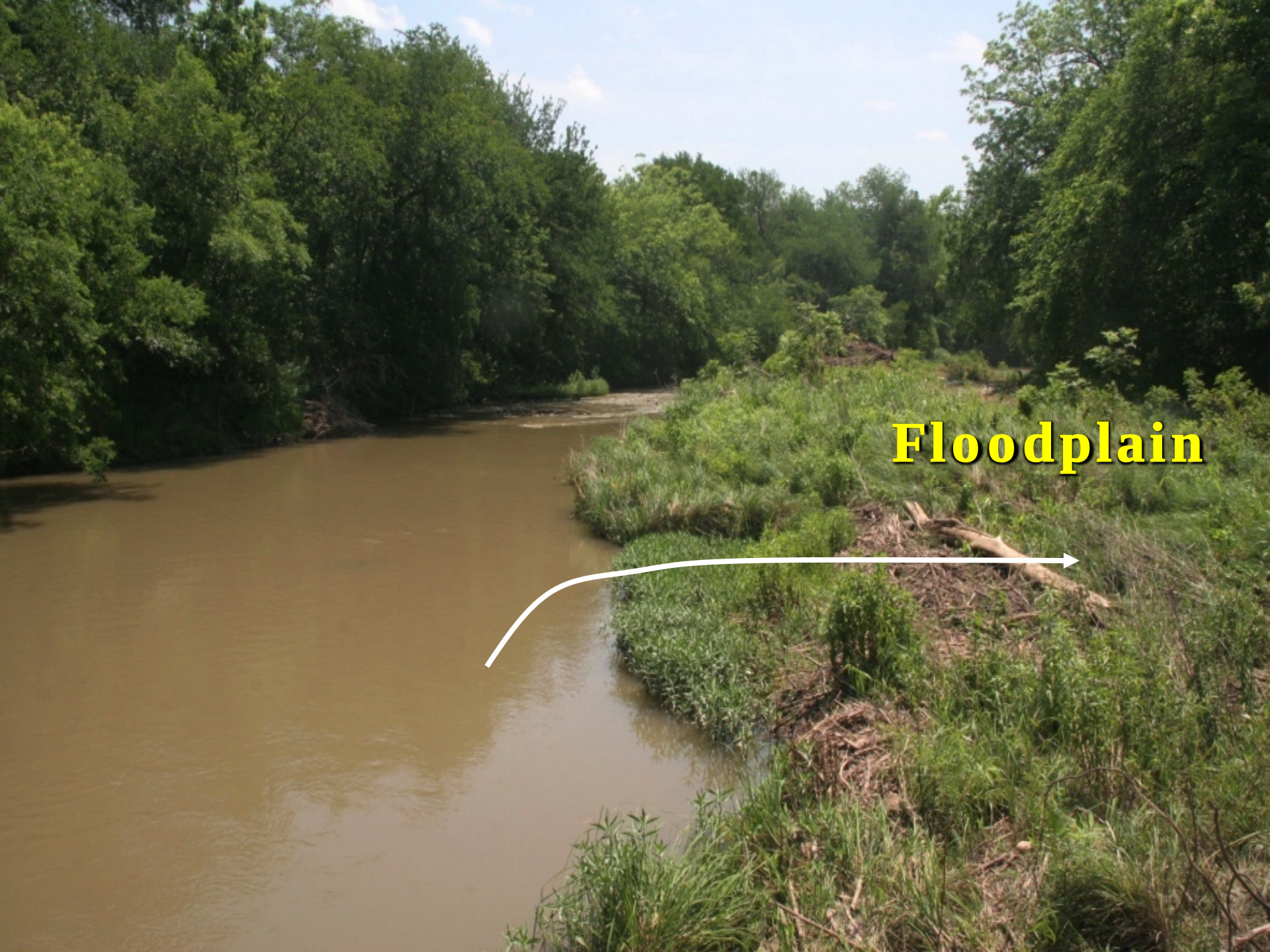


Base Flow

Lesson 2:

Floodplains Dissipate Energy and Trap Sediment

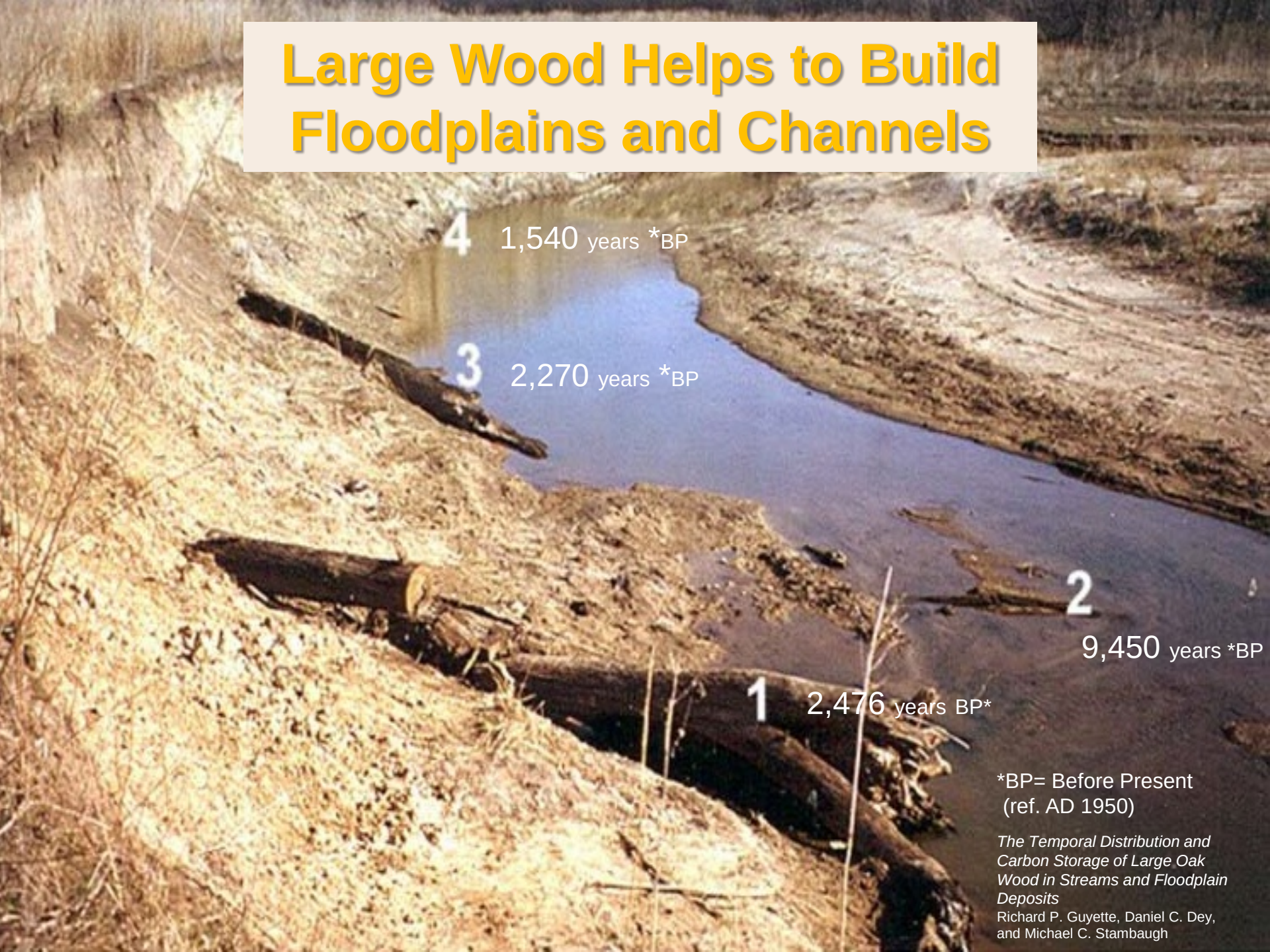



Floodplain

Large Wood Dissipates Energy


Wood Catches Sediment

Large Wood Helps to Build Floodplains and Channels

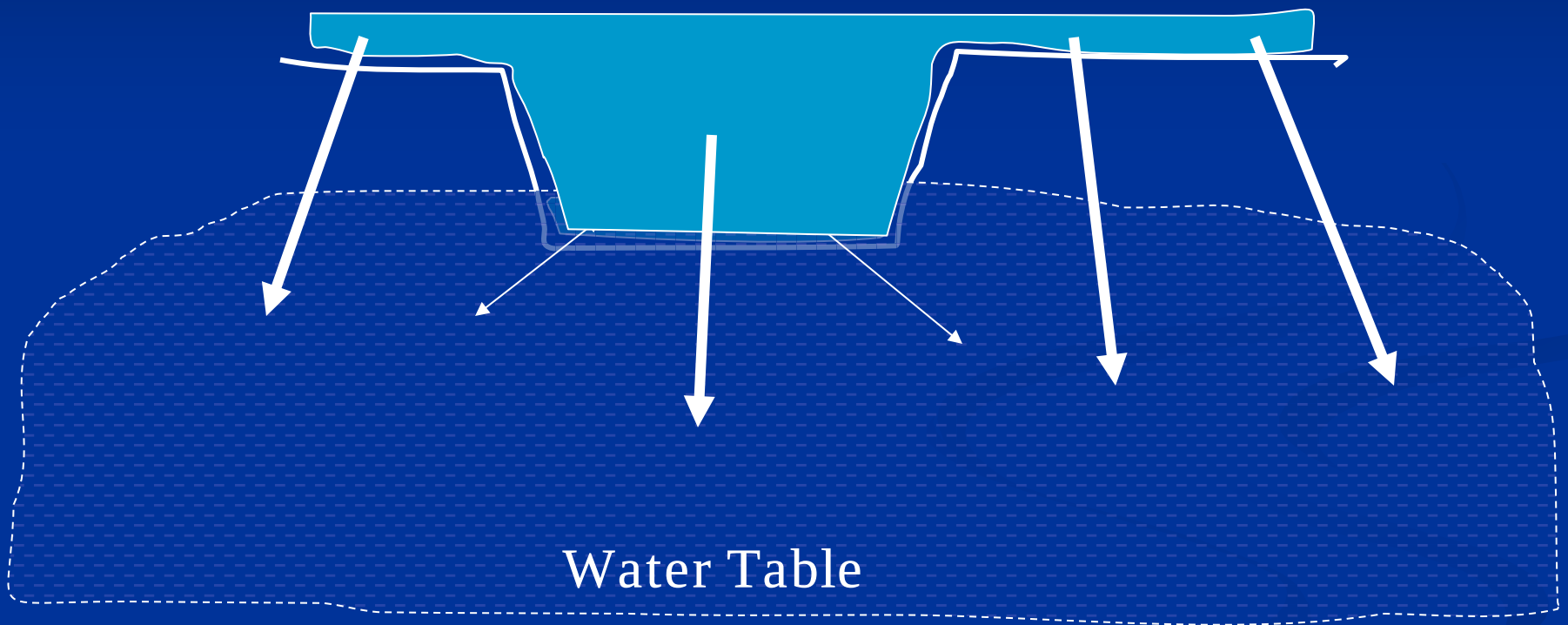


*BP= Before Present
(ref. AD 1950)

The Temporal Distribution and Carbon Storage of Large Oak Wood in Streams and Floodplain Deposits
Richard P. Guyette, Daniel C. Dey, and Michael C. Stambaugh

Lesson 3:

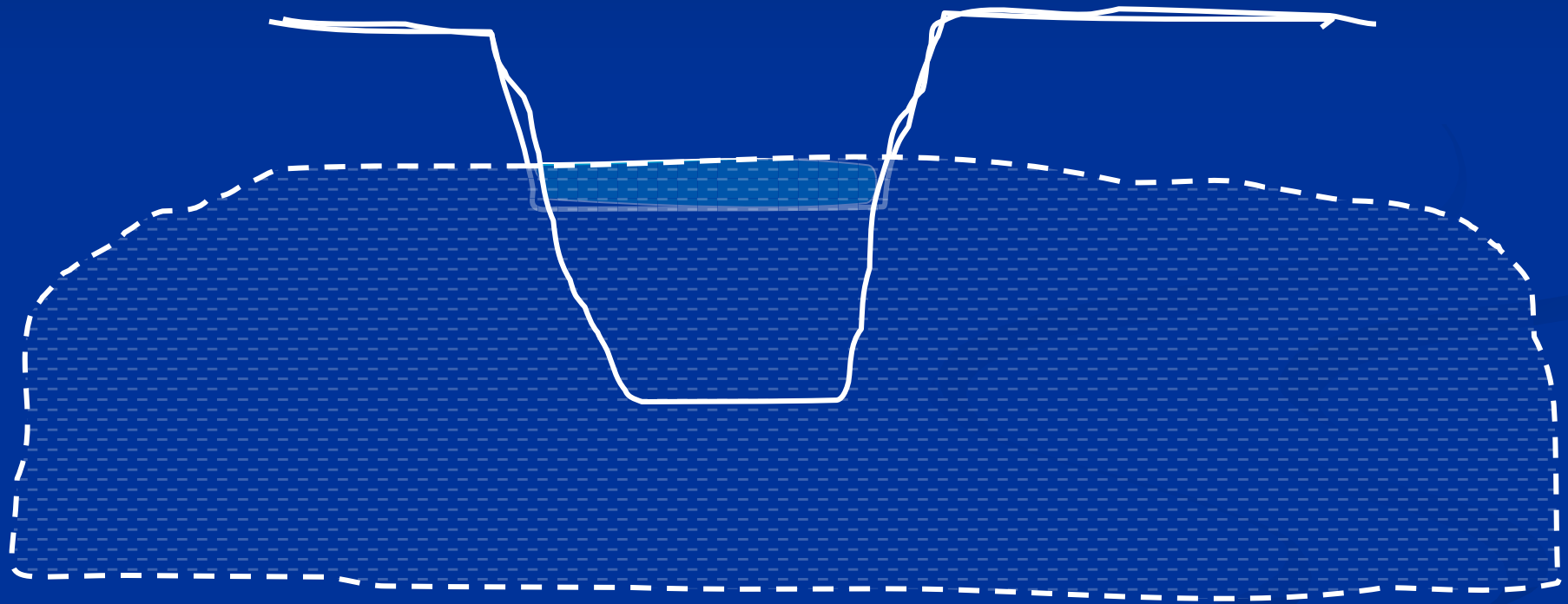
Flooding Recharges Water Tables



Lesson 4:

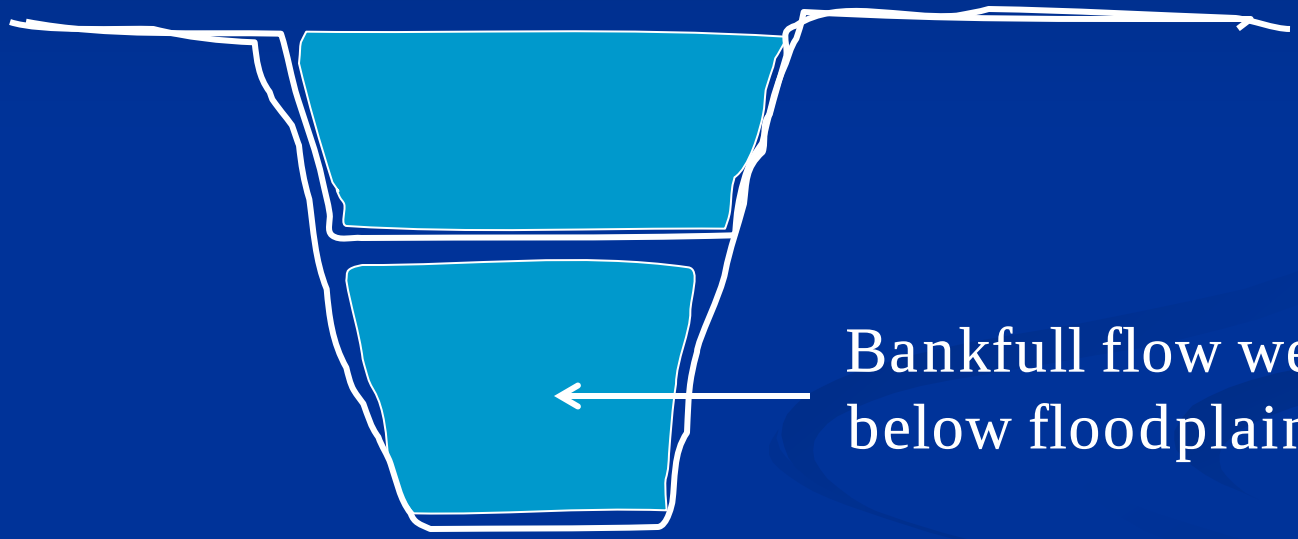
Excessive Erosion Enlarges the Channel

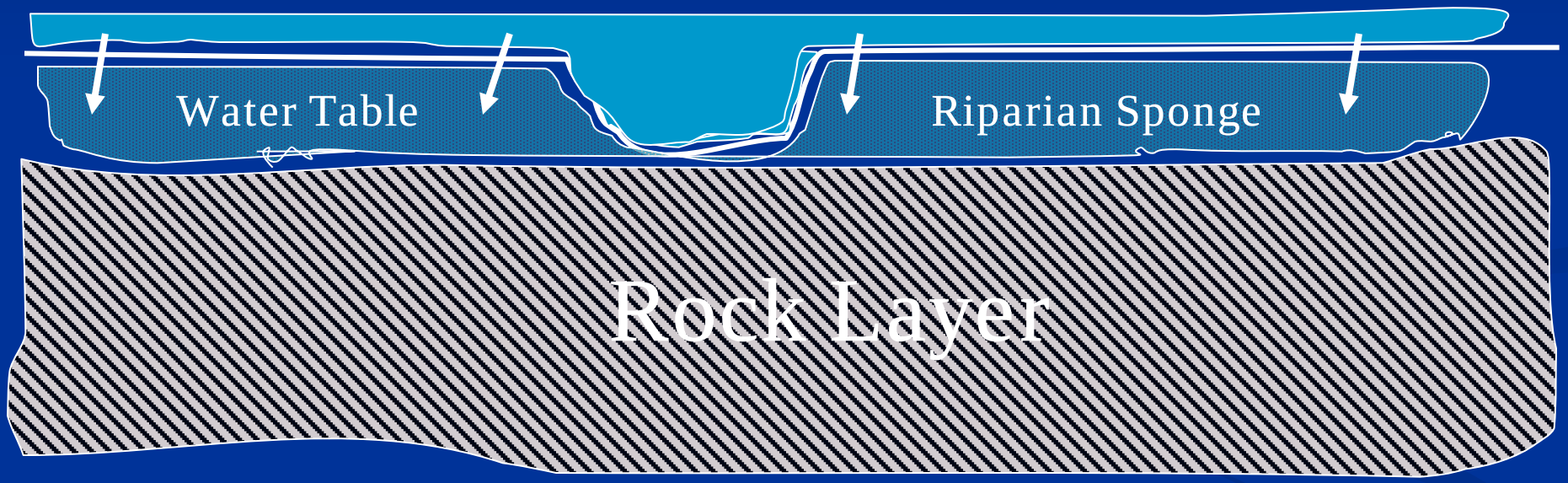
Lesson 5:
Down-cutting Drains the Water Table



Lesson 6:

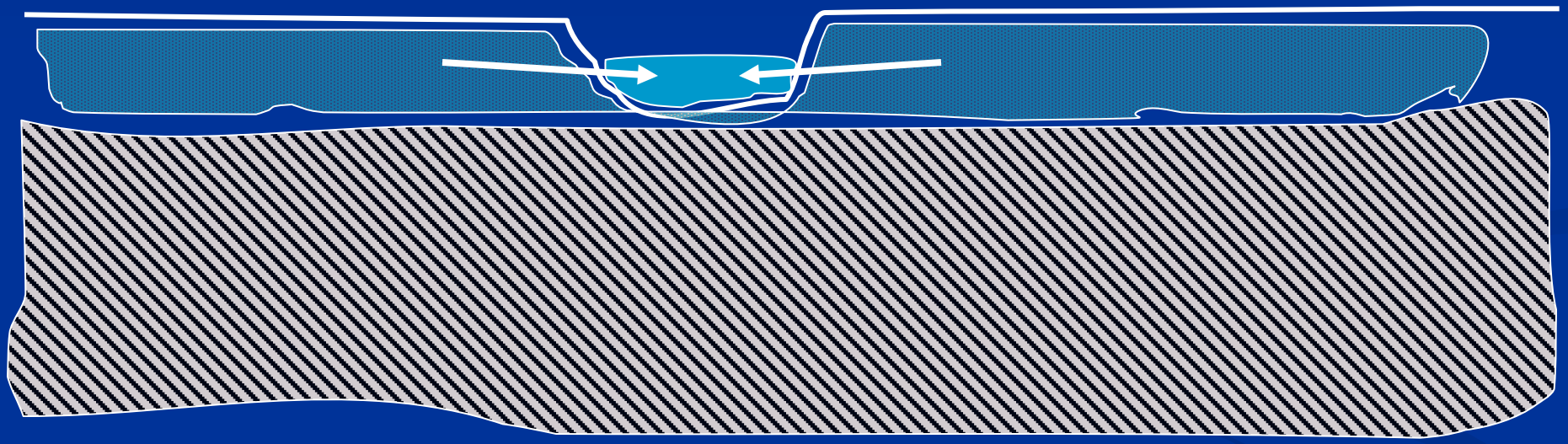
Down-cutting: Lose Access to Floodplain




Water Table
Riparian Sponge
Rock Layer

Lesson 7:

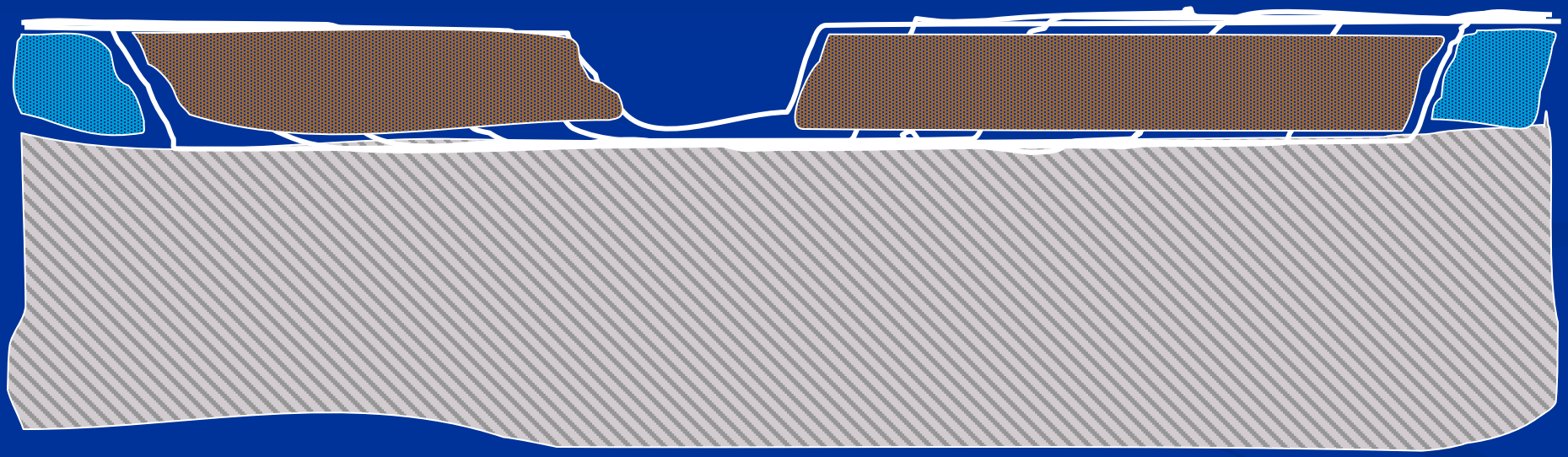
The Water Table Sustains Base Flow




Riparian Sponge

Lesson 8:

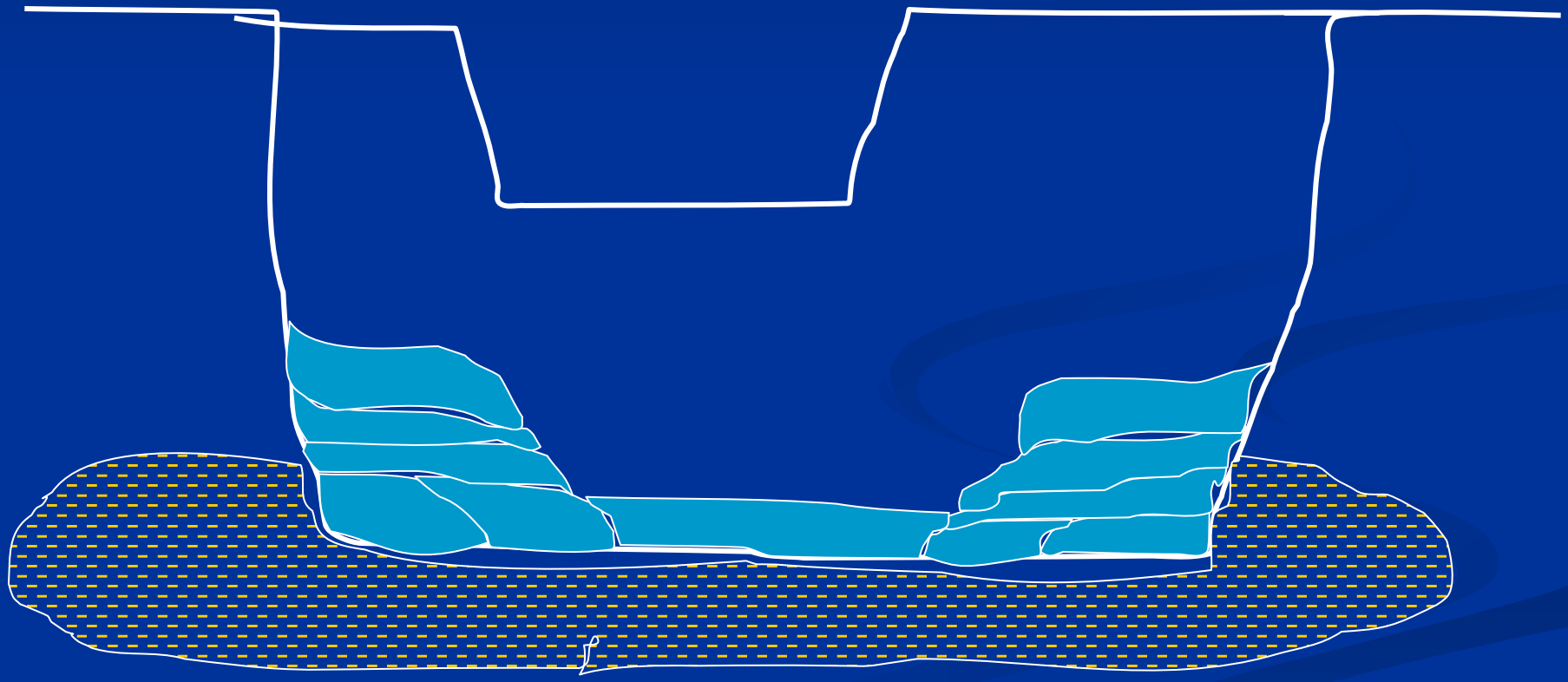
Channel Widening Reduces the Riparian Sponge



Lesson 9:

Overly Wide Channels Reduce Sediment Transport Ability

Lesson 10:
Degraded and eroded channels can be restored



Natural Channel Restoration

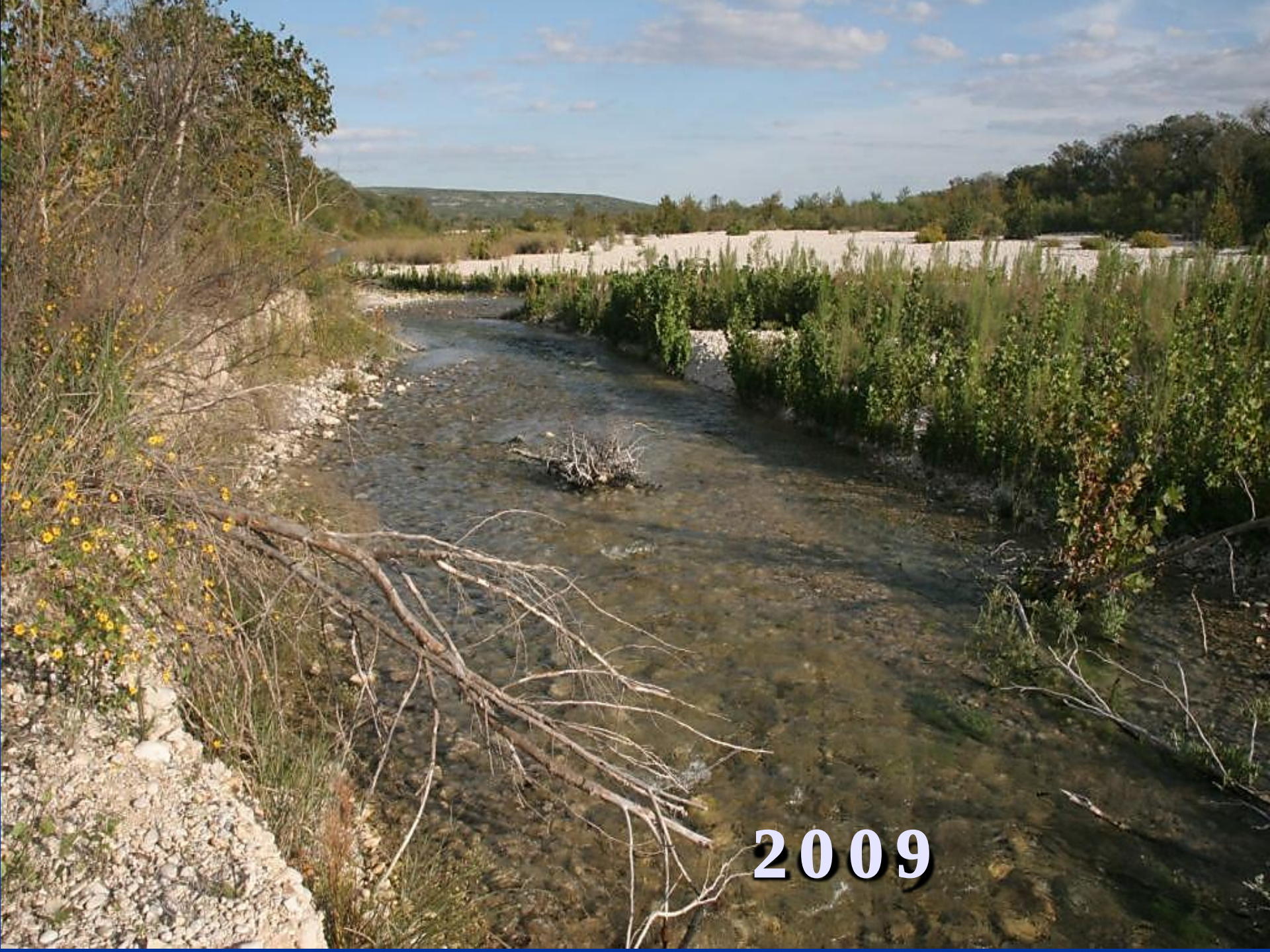
Bear Creek

1977

1986


Nueces River 2007


2008


2009


2010


2011


2012
2012 04 08


2007


2012
2012 04 08