# YOUR remarkable RIPARIAN

## Assessing Riparian Function

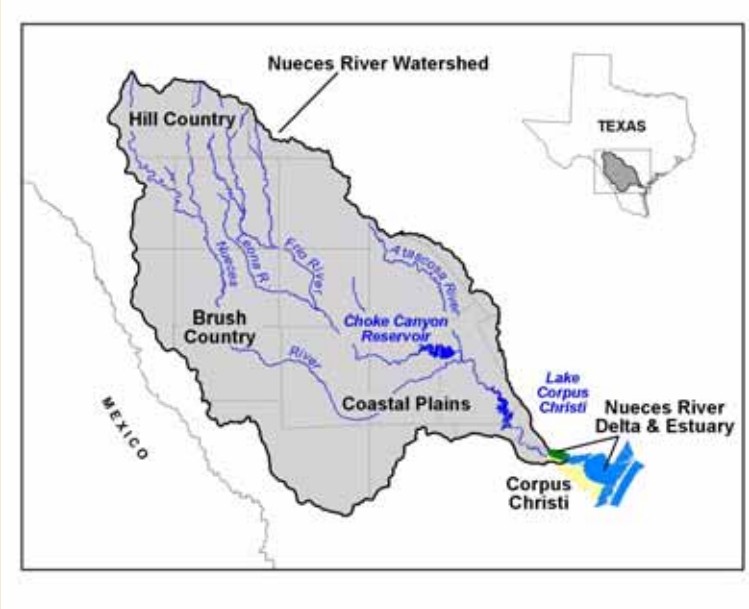
# What is possible?

1981


2000

Burro Creek AZ

# What is possible?




Nueces River TX

# What is possible?

Find out by bringing people together to listen to each other concerning the attributes and processes of riparian function

# Objectives:

- ✓ Present an overview of riparian-wetland function using PFC assessment approach and checklist
- ✓ Define terms
- ✓ Introduce hydrology attributes and processes

# Riparian-wetland function creates what we all value





## Function is our common interest even if our values differ







# Lesson we are all trying to learn – work with physical function, and not against it

# Manage with physical processes in mind, and many riparian areas will heal themselves

San Geronimo Cr TX
May 2009

# PFC Assessment

- Focus initially on the physical function
- Build understanding of the attributes & processes that help produce desired benefits and values

- Identify attribute or process that is not in a working order
- Develop management that allows physical processes to function

# RIPARIAN AREA MANAGEMENT

TR 1737-15 1998

*A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas*

U.S. Department of the Interior
Bureau of Land Management

U.S. Department of Agriculture
Forest Service

USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

# PFC Assessment Development

- ✓ ID Team from the BLM, the FWS, and the NRCS with expertise in vegetation, hydrology, soils, and biology
- ✓ Four year study period in the Western States (1988-92)
- ✓ Collected soil, hydrology, and vegetation information at field sites
- ✓ **Identified common and important attributes/ processes that could be visually assessed**

# Proper Functioning Condition (PFC)

- ✓ Term is used in two ways
  - Assessment process
  - Defined on the ground condition
    - How well the area's physical processes are functioning
    - State of resiliency that will allow an area to hold together during moderately high flows, such as 5-, 10-, and 20-year events

# PFC On-The-Ground Condition

Adequate vegetation, landform or large woody material to:

- ✓ Dissipate stream energy
- ✓ Reduce erosion
- ✓ Filter sediment
- ✓ Capture bedload
- ✓ Aid floodplain development
- ✓ Improve floodwater retention and groundwater recharge
- ✓ Develop root masses that stabilize stream banks

**To Provide**

- ✓ Increased water quality and quantity
- ✓ Diverse ponding and channel characteristics
- ✓ Habitat for fish and wildlife
- ✓ Greater biodiversity

Physical Function → Values

Adequate vegetation, landform or large woody material

# Potential

The

- ✓ Natural vegetation
- ✓ Channel shape given little influence my humans

# Capability

The

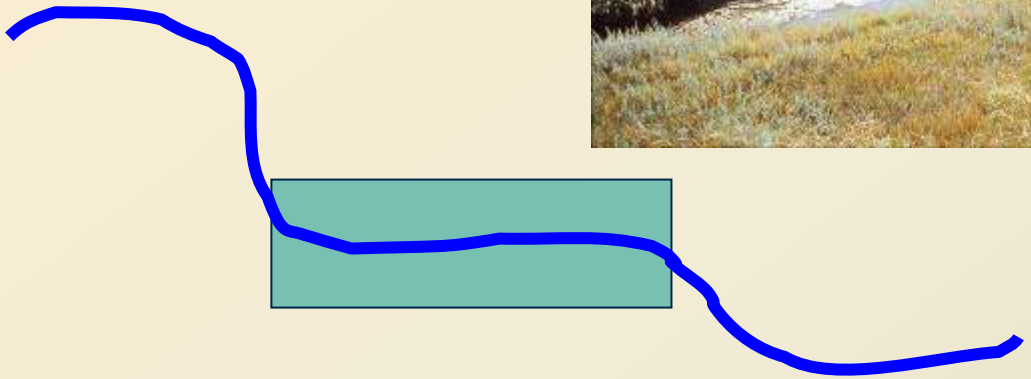
- ✓Vegetation
- ✓Channel shape

with major influence by humans.

# Potential

Perennial

Intermittent



Interrupted Stream

Ephemeral

# Determining Potential

- ✓ Relic areas (preserves, exclosures etc.)
- ✓ Major landform(s)
- ✓ Ecological site descriptions or classifications
- ✓ Historic photos, survey notes, documents,and species lists
- ✓ Hydrology information
- ✓ Soil survey information
- ✓ Expert knowledge (old timers, brilliant ecologists, experienced interdisciplinary team)

# Functional - At Risk

Riparian-Wetland Areas in Functional Condition (partially)

However an existing attribute

- ✓ Soil
- ✓ Water
- ✓ Vegetation

Makes them susceptible to degradation during high-flow events like the 5-, 10-and 20- year events

# Nonfunctioning

Areas that are *clearly* not providing adequate vegetation, landform, or large woody material

To:

- ✓ Dissipate stream energy
- ✓ Improve floodwater retention & groundwater recharge
- ✓ Stabilize streambanks
- ✓ *And other characteristics common to PFC*

Texas Creek, CO

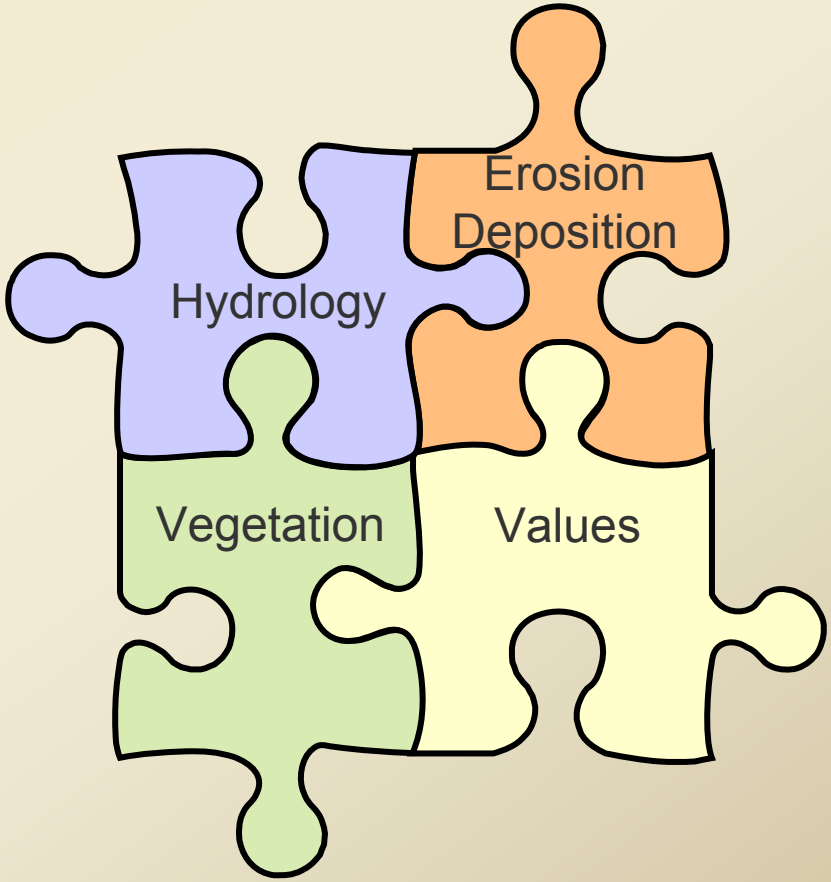
# YOUR remarkable RIPARIAN

## Proper Functioning Condition

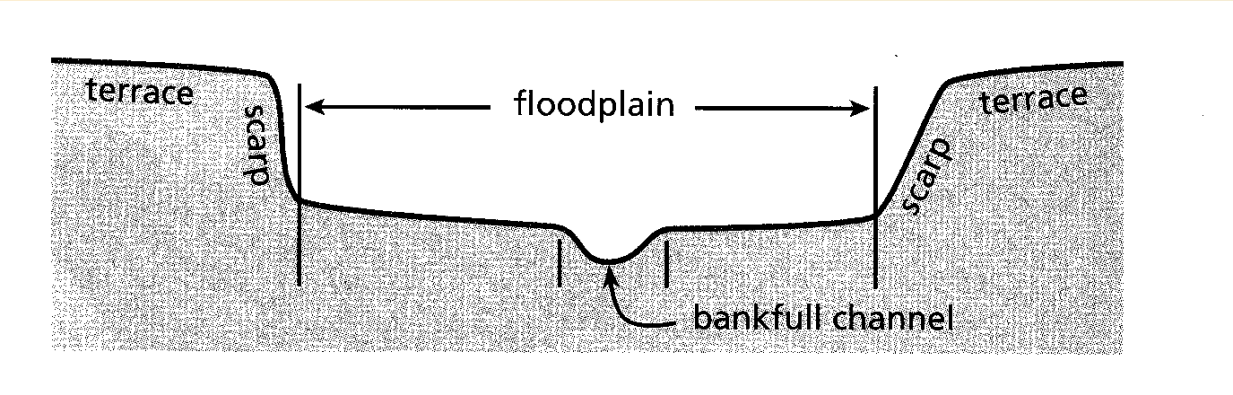
## Lotic Checklist

# Hydrology Items

- ✓ Floodplain
- ✓ Beaver Dams
- ✓ Channel Characteristics
- ✓ Riparian Area Expanding
- ✓ Watershed Influence



# Item 1. Floodplain




- ✓ Level area near a stream channel
- ✓ Constructed by the stream
- ✓ In the present climate
- ✓ Flooded during moderate & high flow events
- ✓ Should not be confused with terraces (abandoned floodplains)

(adapted from Leopold 1994)

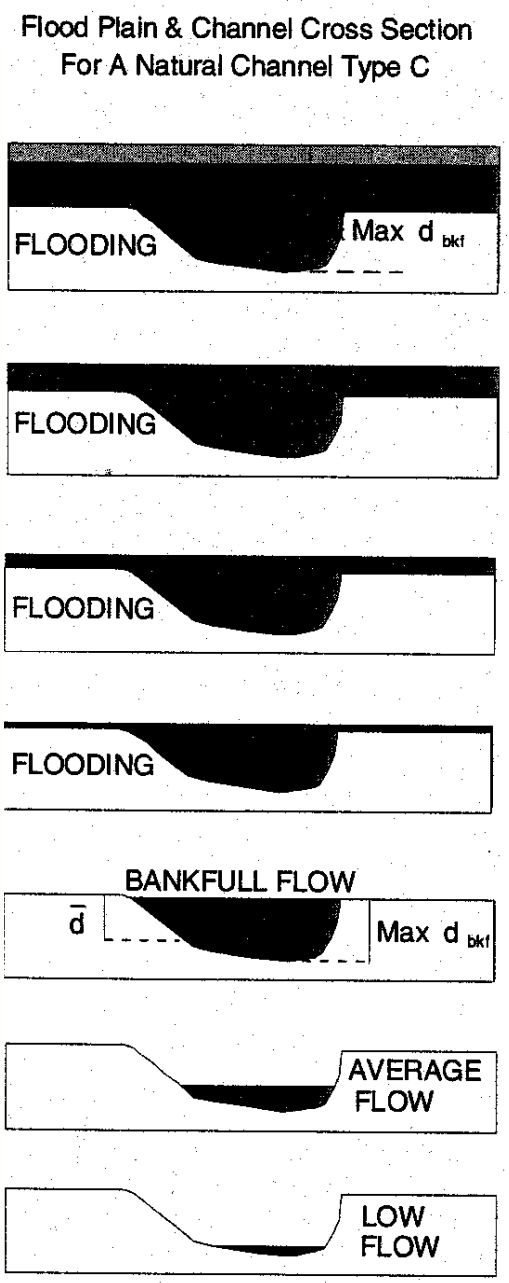
# Item 1. Floodplain

## Why floodplain is important

- ✓ Adjustment mechanism - additional capacity for the stream system to transport and store water and sediment
- ✓ Provides energy dissipation
- ✓ Periodic flooding to promote and sustain riparian vegetation
- ✓ Periodic infiltration of floodwaters

# Definition: Bankfull

- ✓ Flow that just fills the channel
- ✓ Point where water just begins to overflow onto a floodplain
- ✓ 1.5 yr return interval is considered a reasonable average

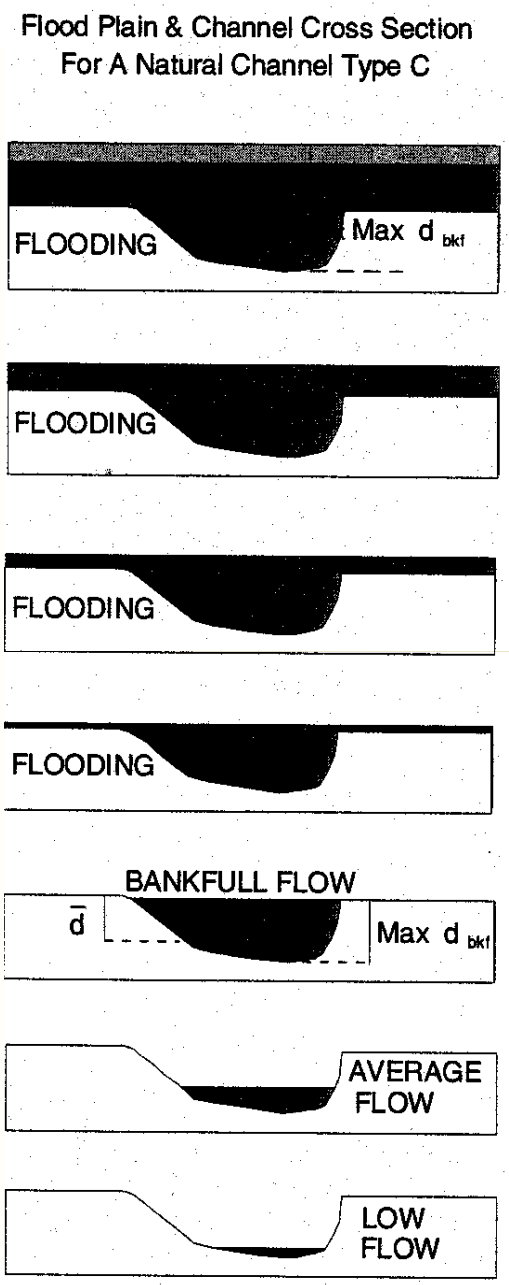



Verry et al. 2000

# Why Bankfull is Important

Discharge at/near bankfull stage is the discharge at which channel maintenance is most effective

- Moving sediment
- Forming or removing bars
- Forming bends
- Doing work that results in the average morphologic characteristics (shape) of channels

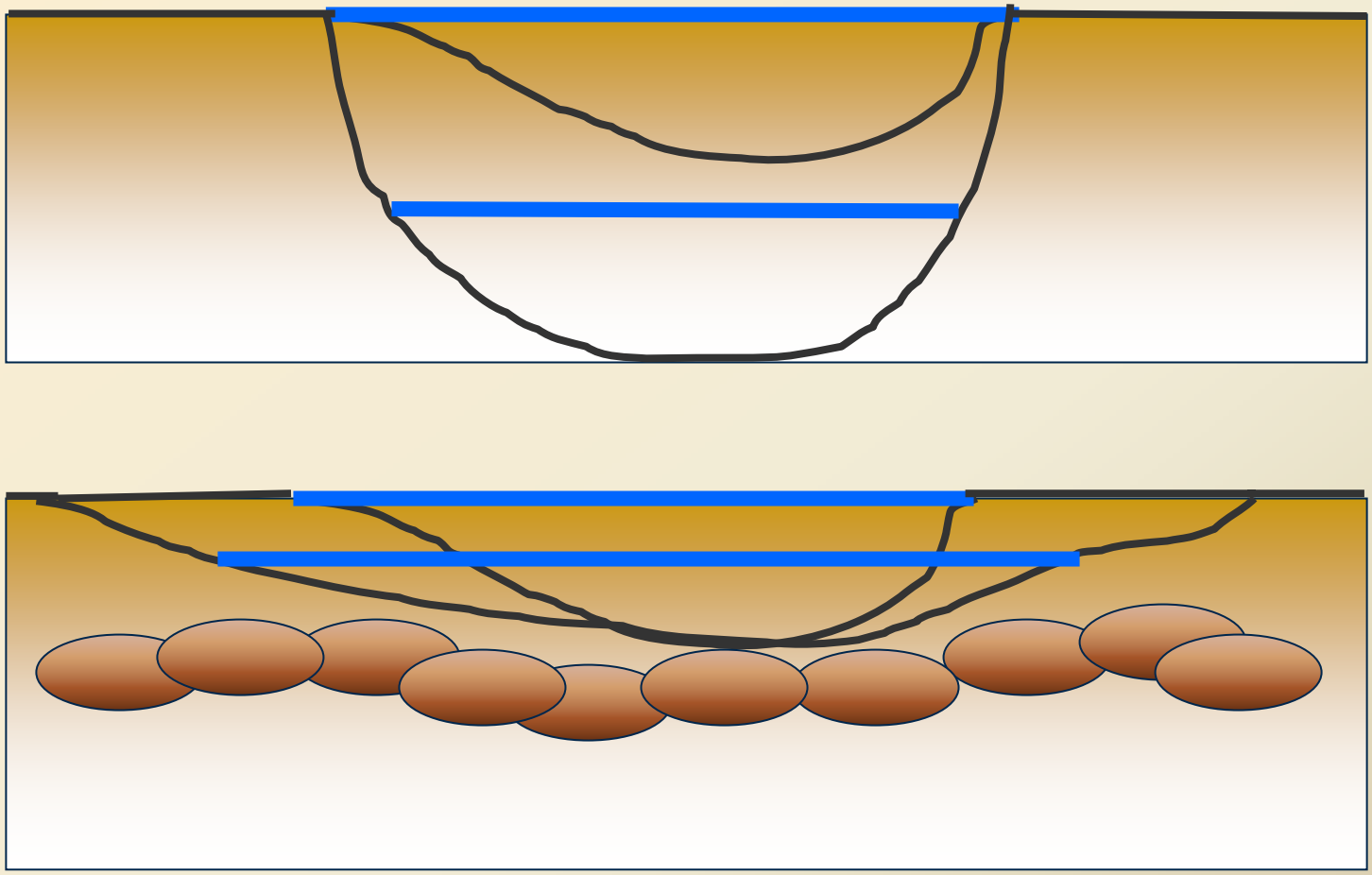



Verry et al. 2000

# Channel at Base Flow

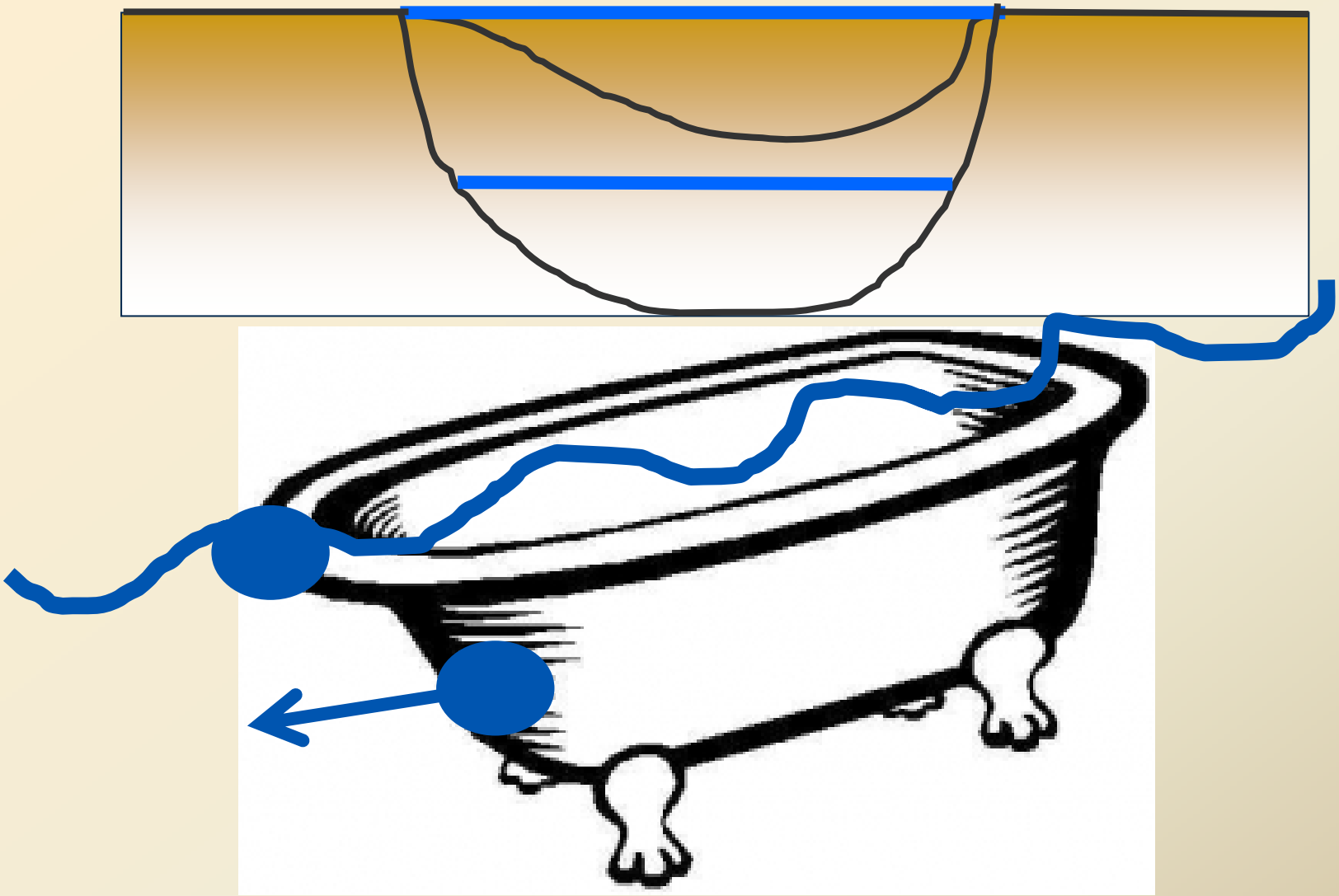
# Channel at Bankfull

# Item 1. Floodplain inundated



What is the effect on water table?

# Item 1. Floodplain inundated



What is the effect on water table?

# Item 1. Floodplain inundated

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1) Floodplain inundated

# Item 2. Beaver Dams active and stable

# Item 3. Channel Characteristics in balance

- ✓ Sinuosity and Gradient

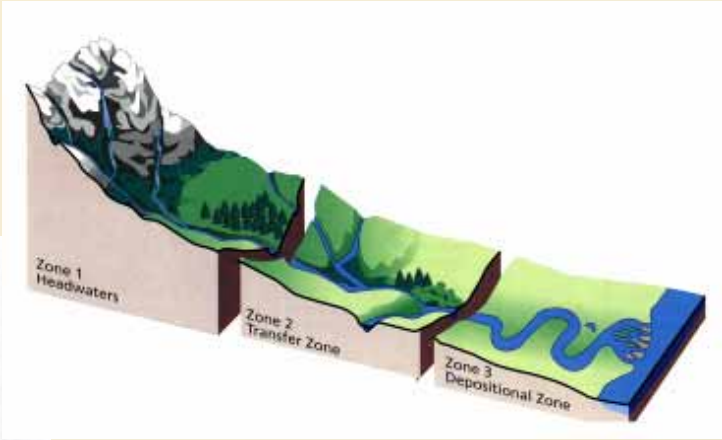



*Figure 11. Walla Walla River (1964 flood showing meanders in a channelized section near Milton-Freewater). (OSU Archives)*

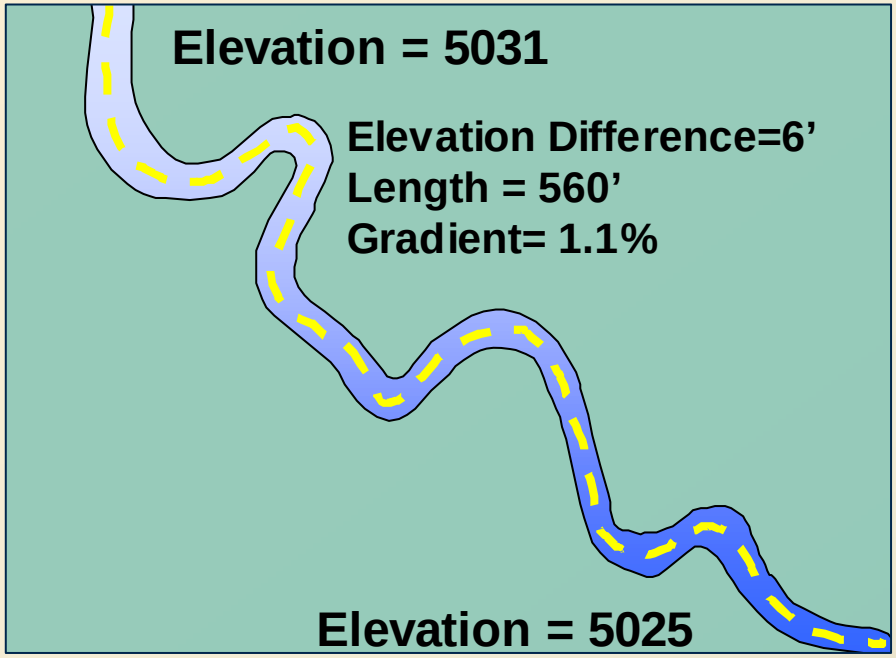
# Sinuosity

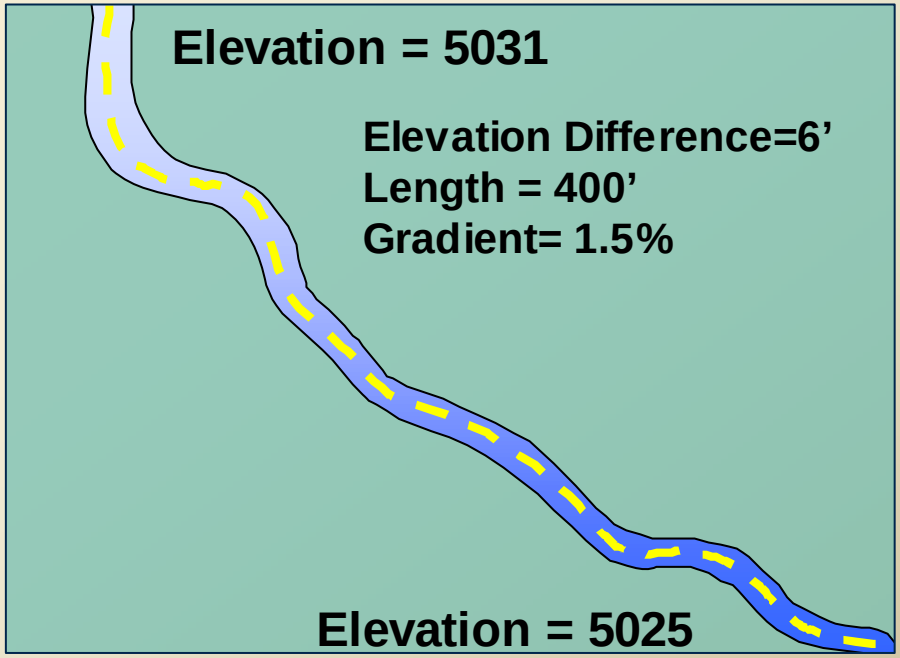
Sinuosity = Stream Length/ Valley Length

1.9 370’ 195’

# Slope or Gradient

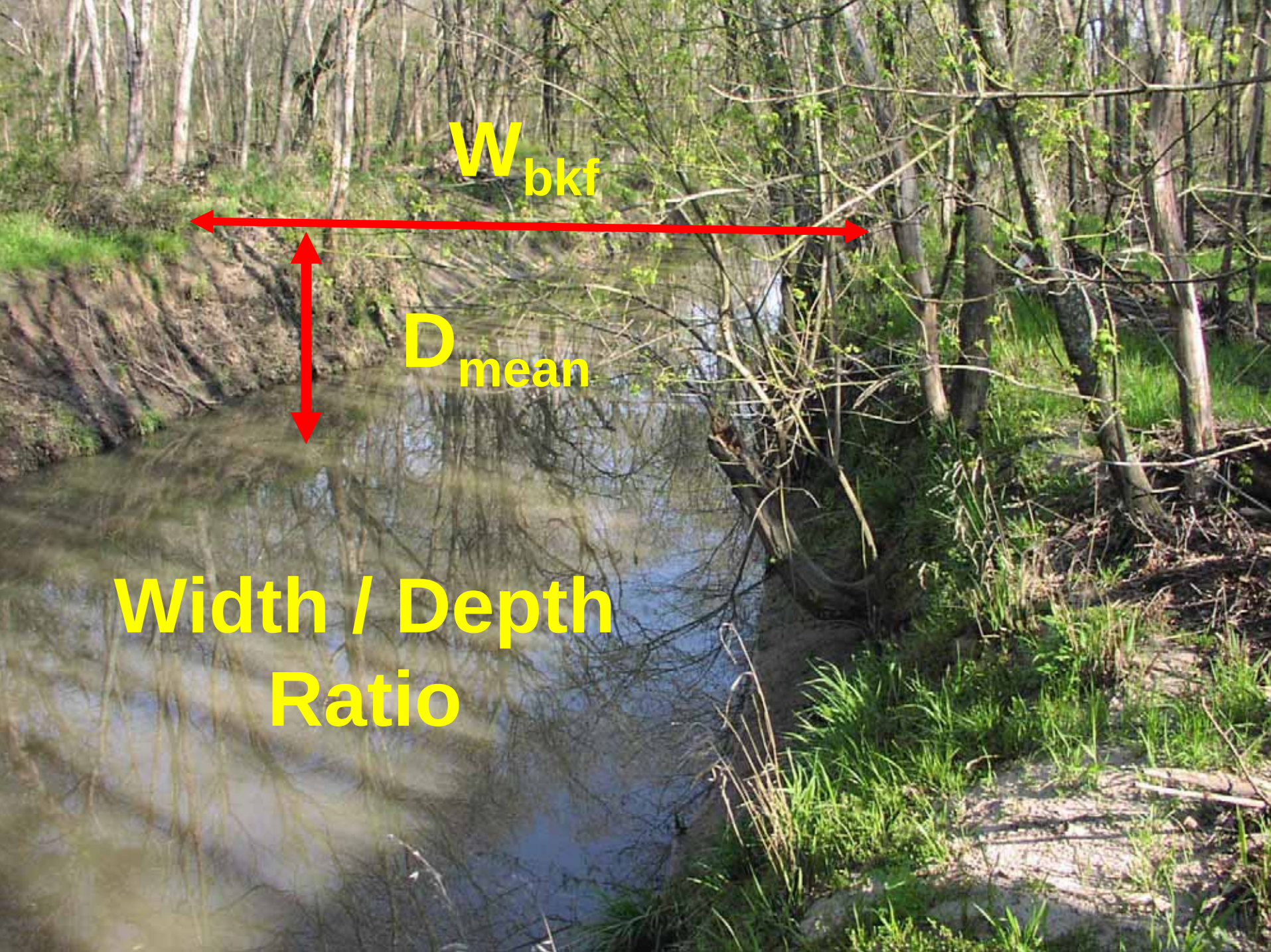
$$\% \text{ Mean Slope} = \frac{\text{Elevation at upper end} - \text{Elevation at lower end}}{\text{Stream channel length}} * 100$$



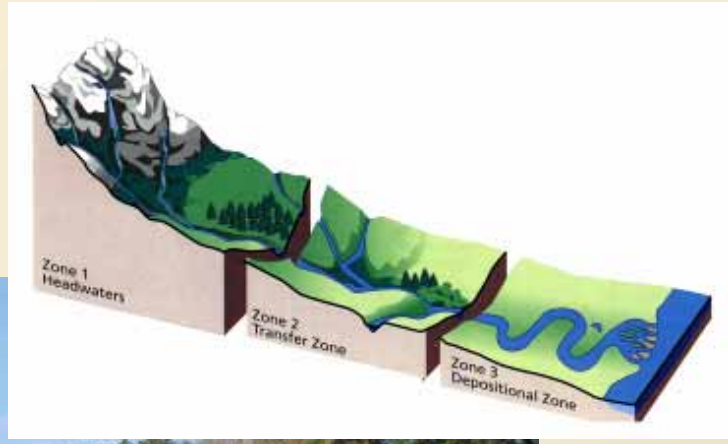
# Item 3. Channel Characteristics in balance

## Width/Depth Ratio



$W_{bkf}$
$D_{mean}$
Width / Depth Ratio

# Item 3. Channel Characteristics in balance

## Width/Depth Ratio




# Item 4. Riparian Area Expanding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Nueces River, TX Oct 2009

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Nueces River, TX Oct 2009

# Item 5. Watershed Influence

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## Energy Use & Transformation Variables

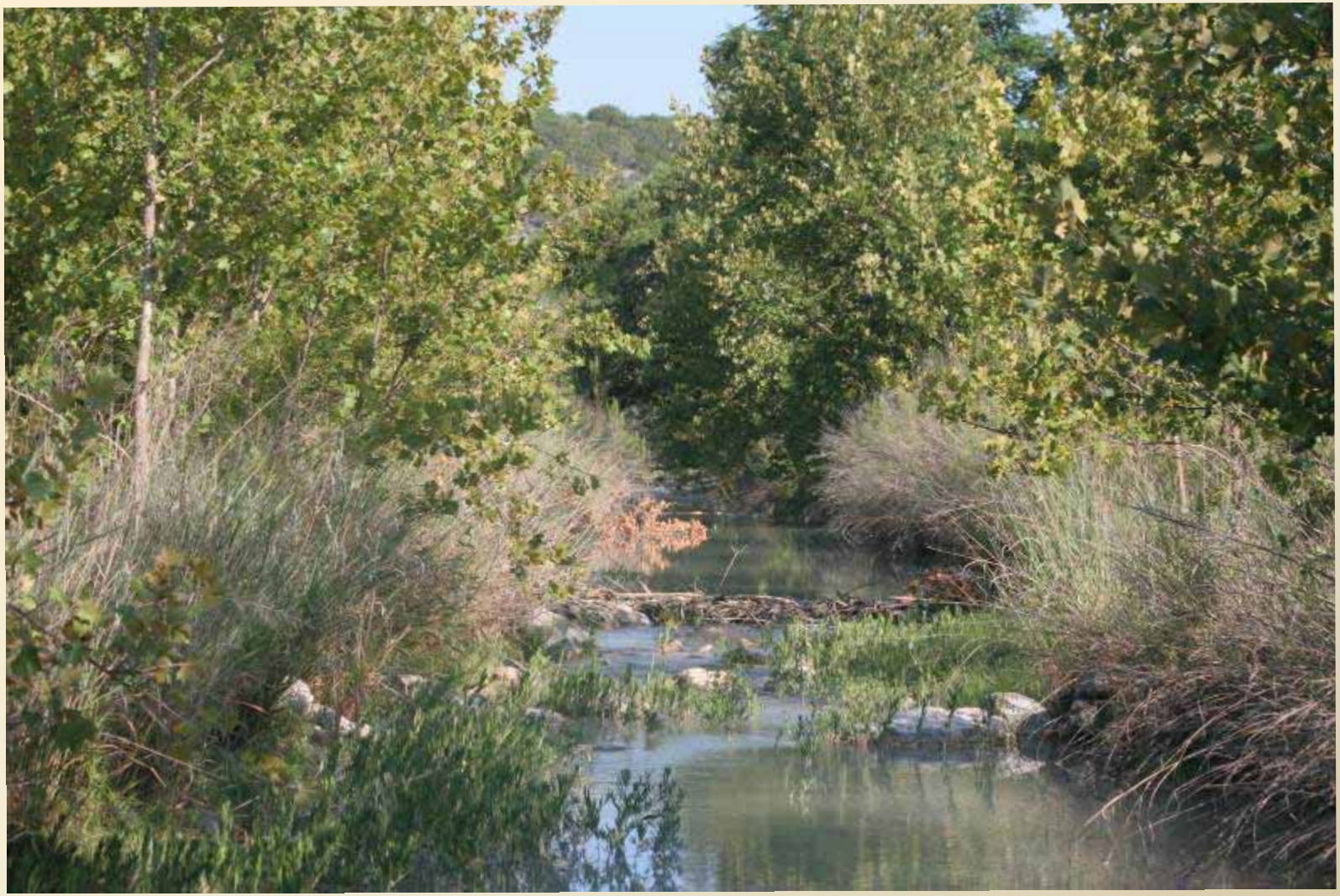
- Discharge
- Sediment Quantity
- Velocity
- Depth
- Roughness
- Width
- Particle Size
- Slope

*Interaction results in transportation and deposition of sediment, channel properties, in-channel features such as bars, pattern, etc.,*

# Item 5. Watershed Influence

Mimbres R NM

# Item 5. Watershed Influence



TX

# Hydrology Items

- ✓ Floodplain
- ✓ Beaver Dams
- ✓ Channel Characteristics
- ✓ Riparian Area Expanding
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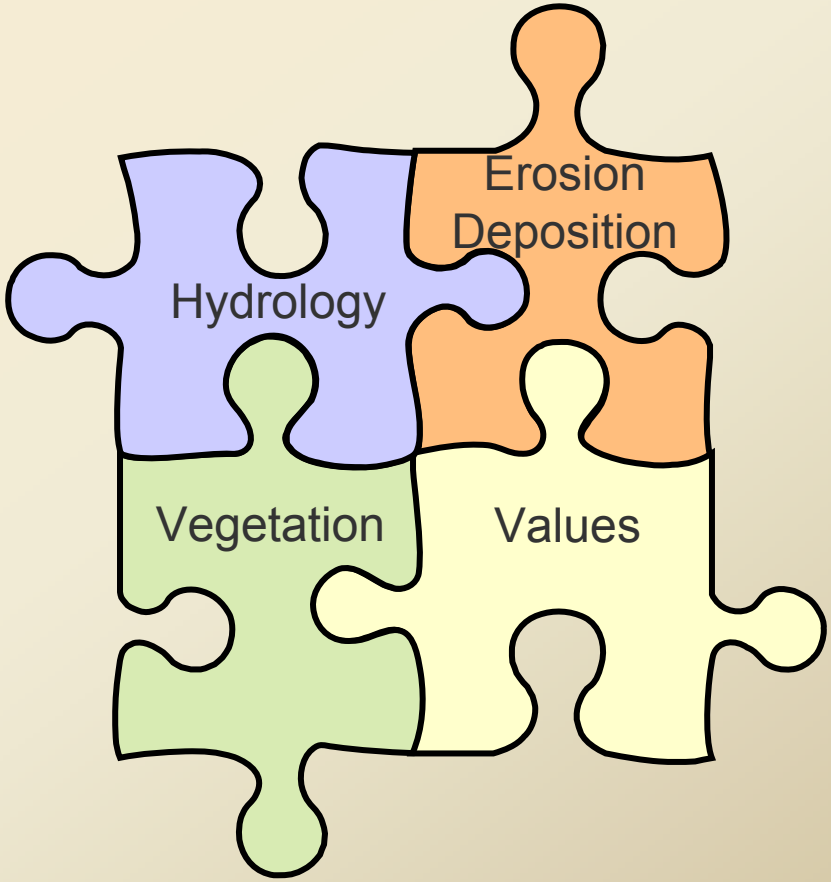


Next Up =

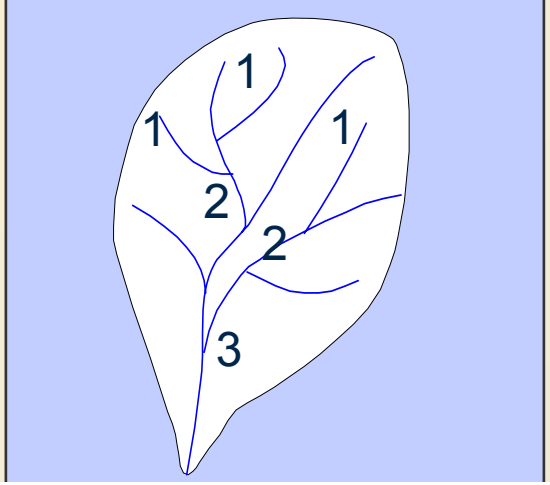
Riparian-wetland vegetation information

# Wetland Area

- ✓ **Inundated or saturated by surface or ground water**
- ✓ **Frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions**
- ✓ **Marshes, swamps, bogs are examples**

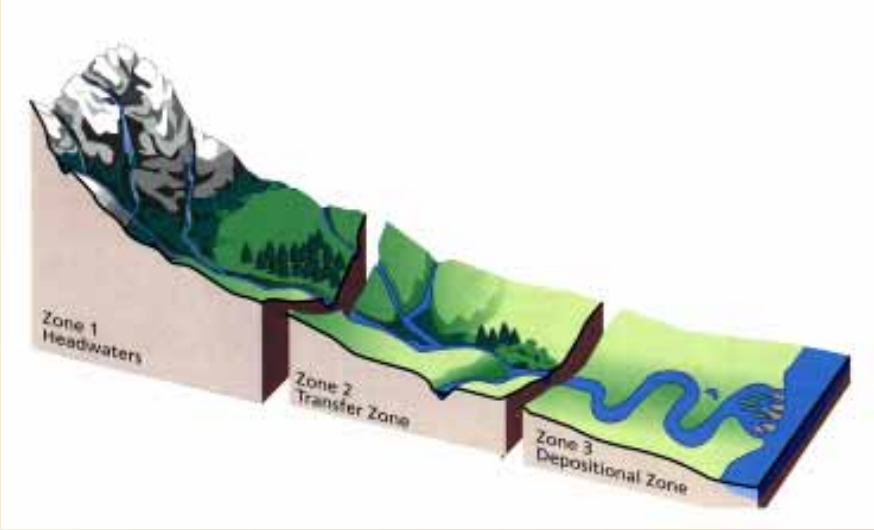
Lentic = standing water systems

Preparing to do a Riparian PFC Assessment




# Stratification

Identify reach to be assessed




- ✓ Stream order
- ✓ Valley bottom type
- ✓ Stream type
- ✓ Management/ landowner change

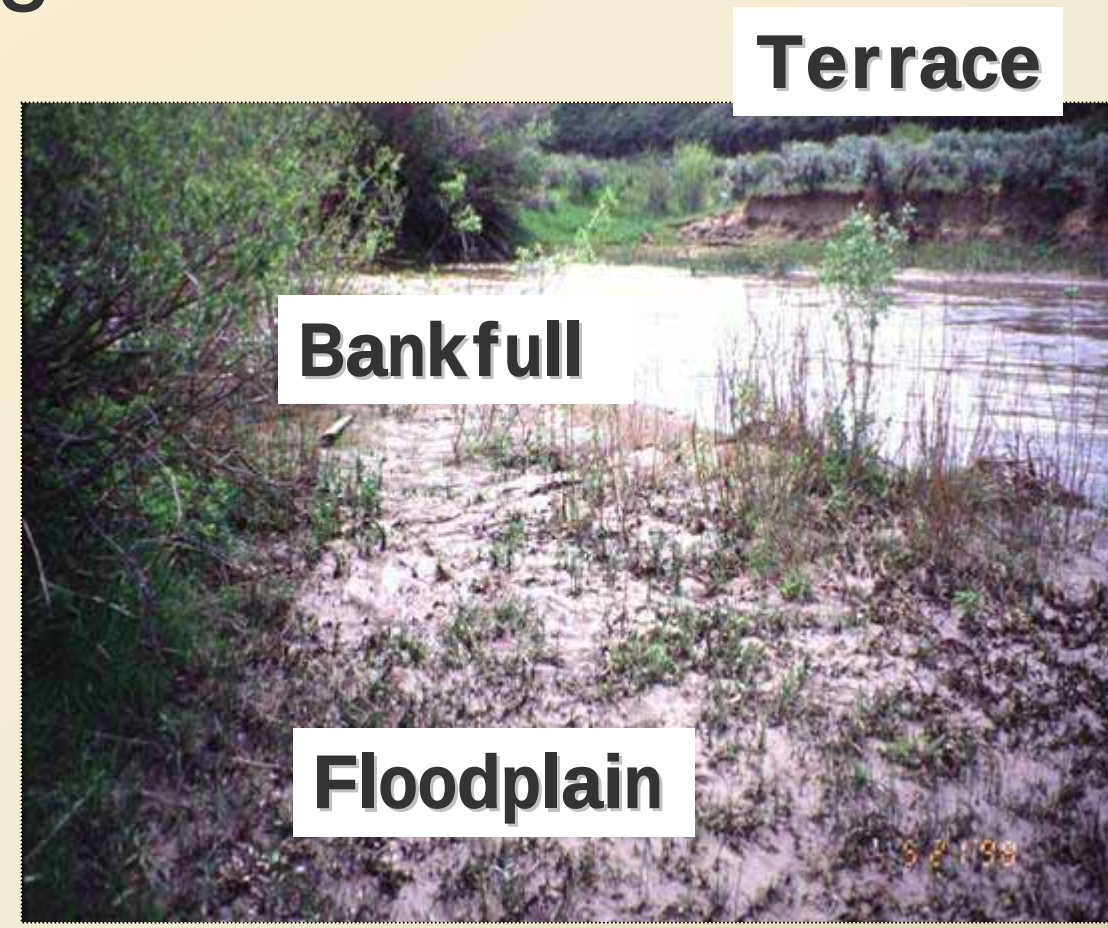
Reference or comparison sites

# Bankfull Stage Indicators

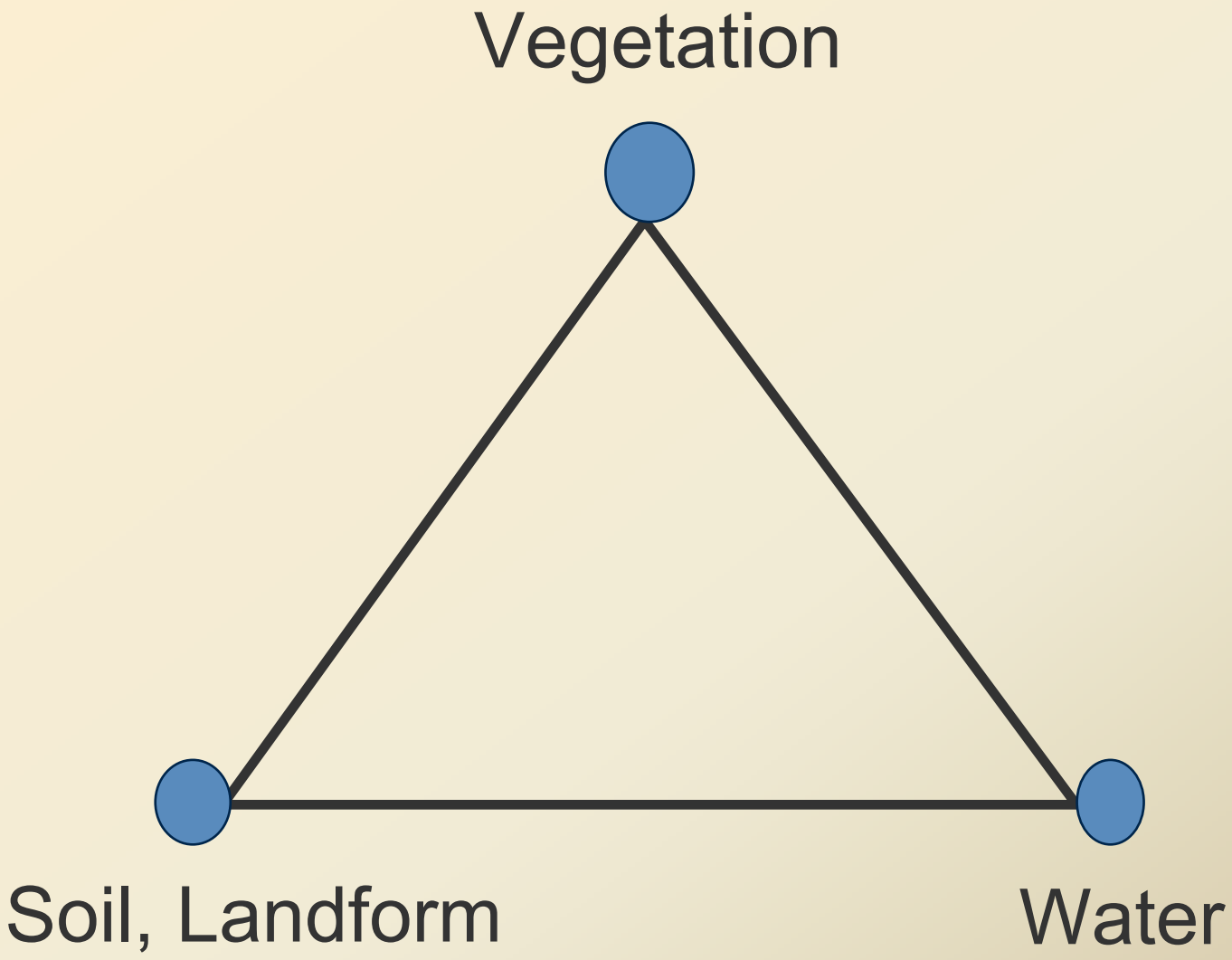
**Gaging station data**

- ✓ **Deposition Features – Floodplain/Point bars**
- ✓ **Changes in vegetation**
- ✓ **Topographic break in slope**
- ✓ **Change in size, staining, or color of substrate materials**
- ✓ **Change in nature and amount of debris deposits**

**(Leopold 1994)**



# Riparian-Wetland Areas



# Item 1. Floodplain inundated

# PFC Assessment

- It is applied by people with strong technical skills and experience
- All members of the community can participate and understand