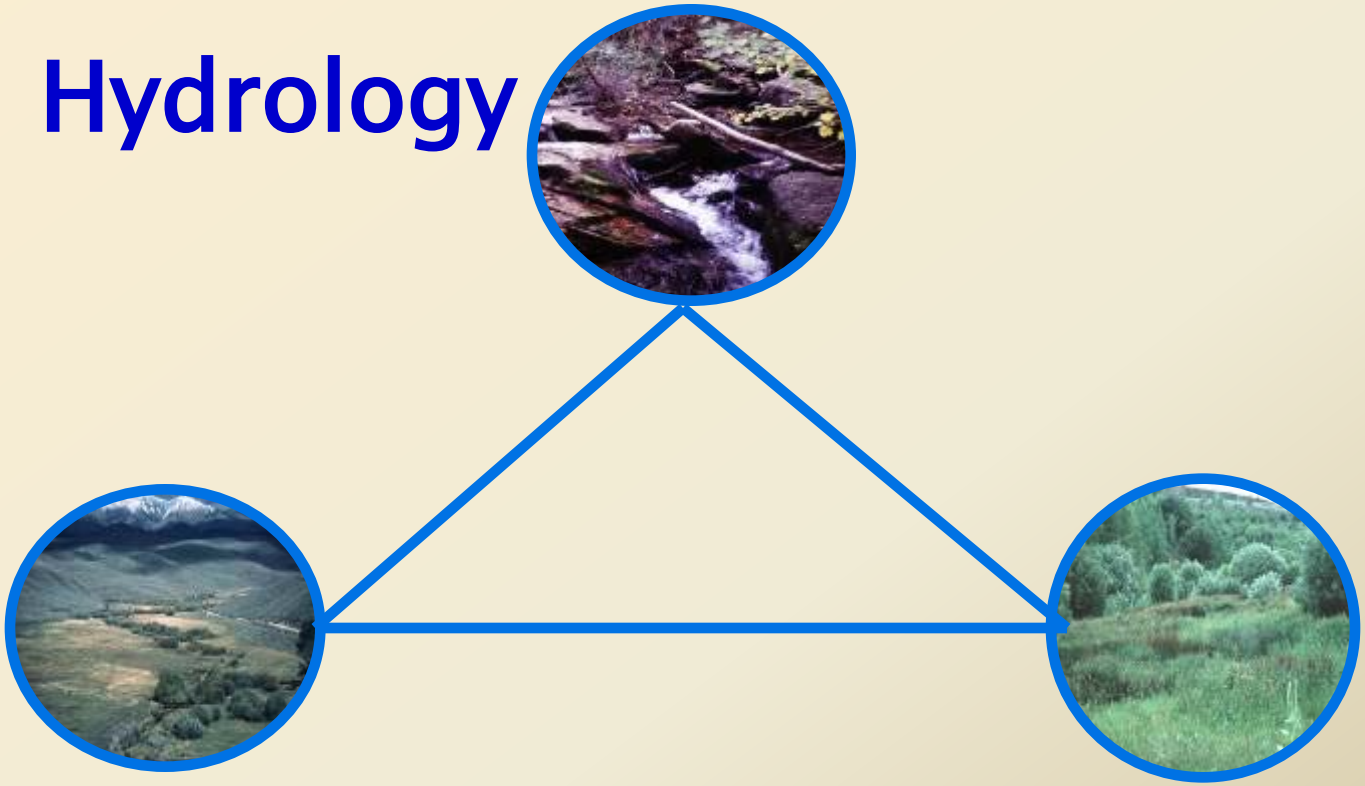
Process for Assessing Proper Functioning Condition Hydrology Items

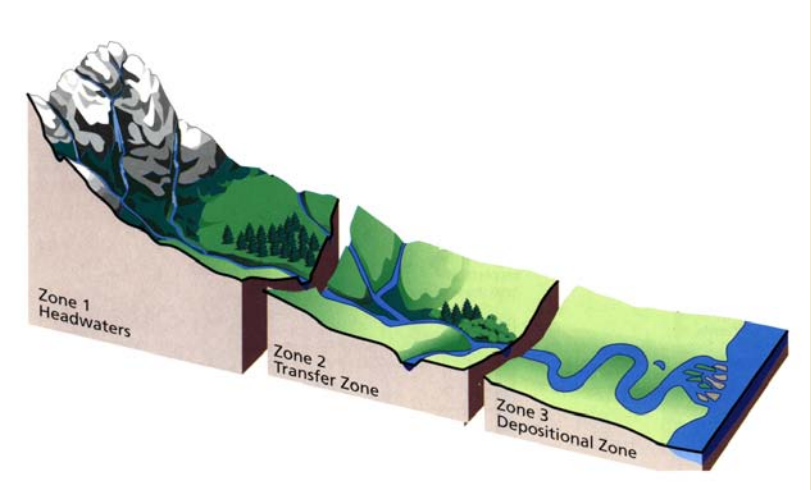


Stability

- ✓ Ability, over time, to transport water and sediment produced by the watershed
- ✓ maintaining dimension, pattern, and profile
- ✓ without aggrading or degrading

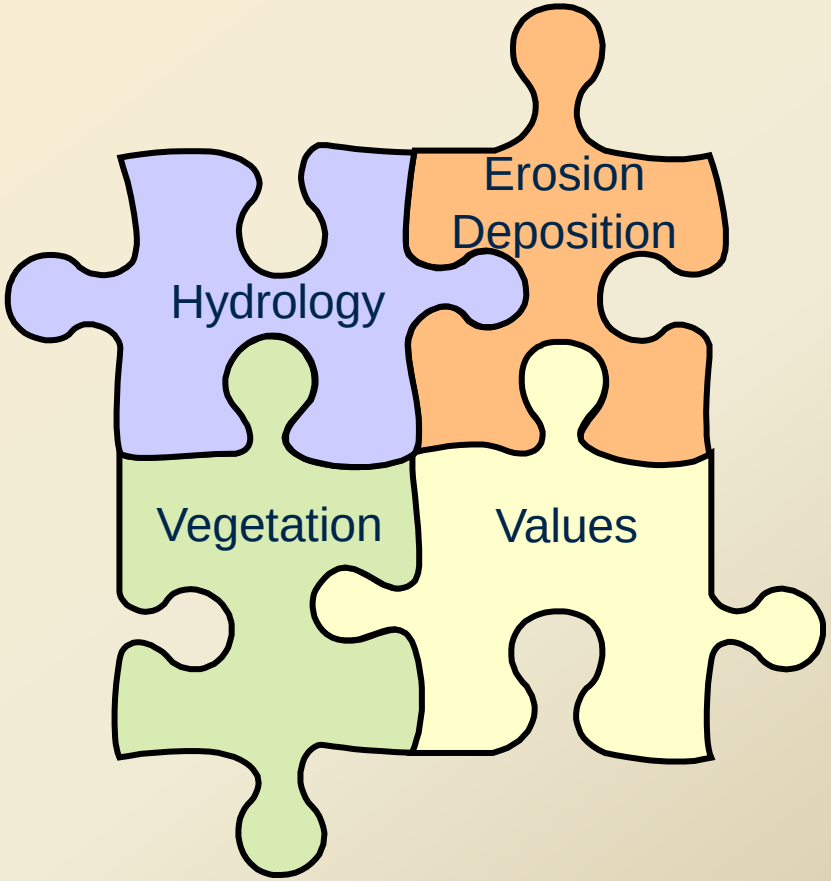
Stability ≠ Rigidity

maintaining dimension, pattern, and profile


Zone 1
Headwaters
Zone 2
Transfer Zone
Zone 3
Depositional Zone

Hydrology Items

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

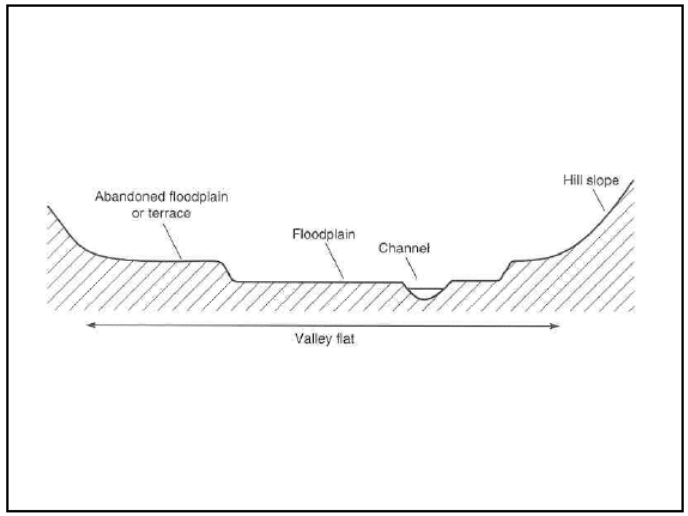


1) Floodplain above bankfull is inundated in “relatively frequent” events

Purpose – determine whether frequent flood flows are capable of spreading out on a low-lying area adjacent to the stream and thus provide for

- ✓ Energy dissipation
- ✓ Sediment deposition
- ✓ Periodic flooding of vegetation
- ✓ Periodic infiltration of floodwaters

Definition: 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)

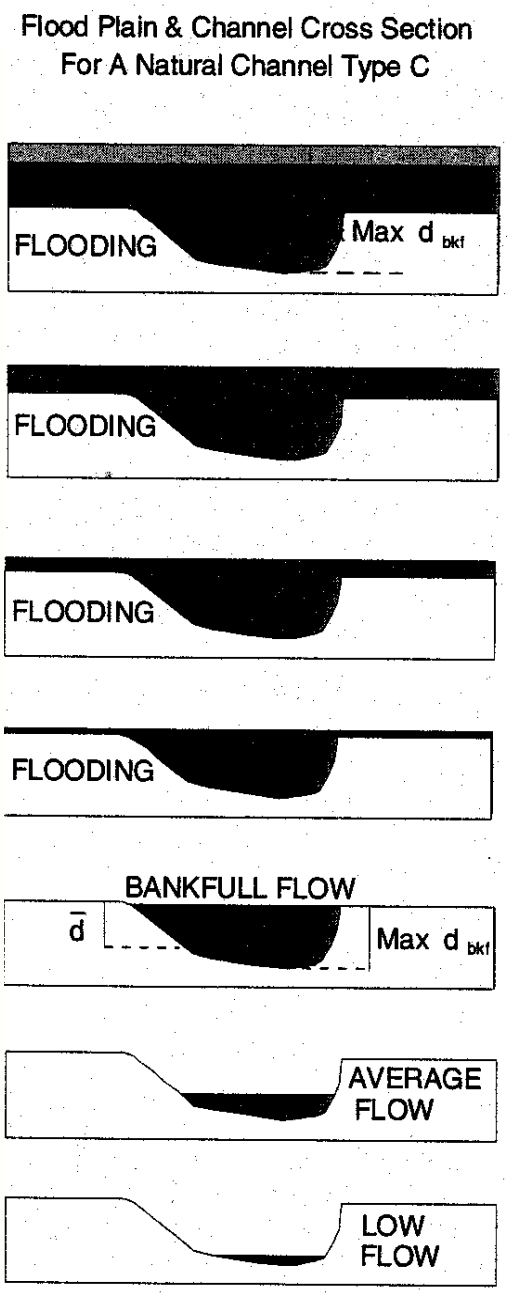
Floodplain

- ✓ How much room does flood water have to spread out & reduce energy?
- ✓ Temporary storage of water and sediments

Item #1: Floodplain inundation

Definition: Bankfull

- ✓ Flow that just fills the channel
- ✓ Point where water just begins to overflow onto a floodplain
- ✓ Recurrence interval of 1 to 3 years, 1.5 yr is considered a reasonable average



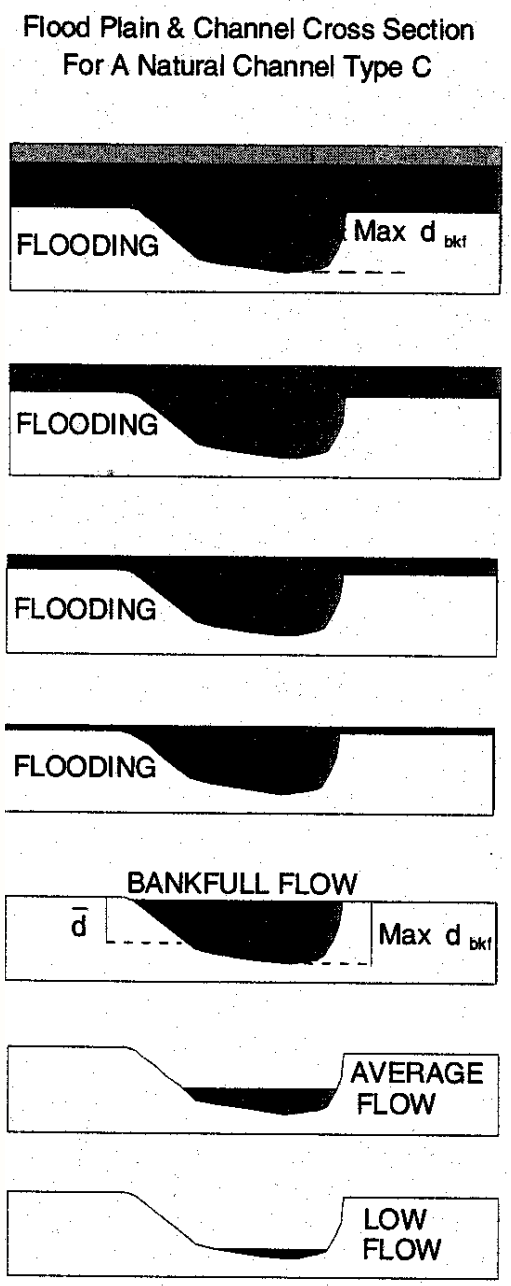
Item #1: Floodplain inundation

Verry et al. 2000

Why Bankfull is important

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

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



Item #1: Floodplain inundation

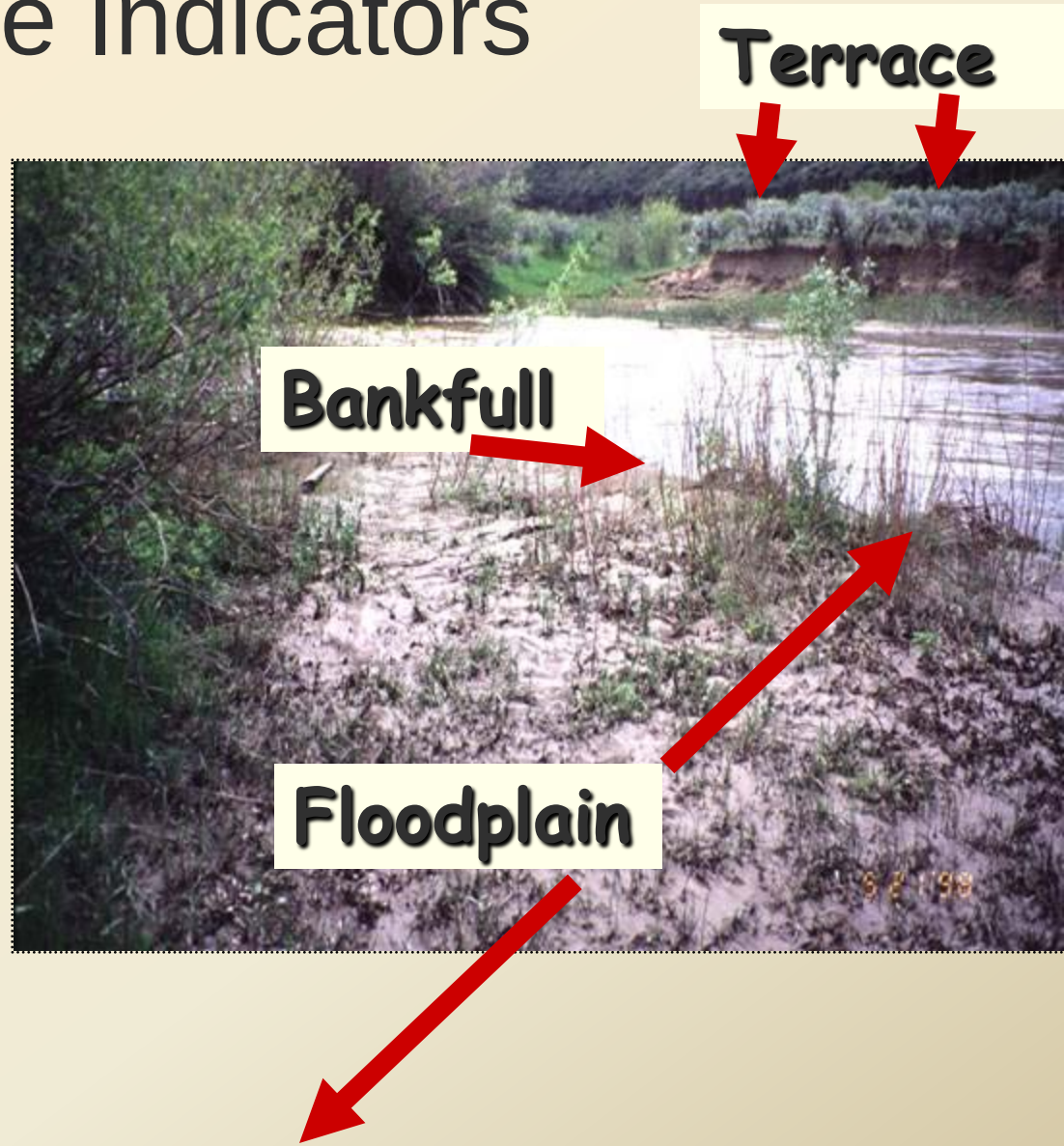
Verry et al. 2000

Bankfull Stage Indicators

Gaging station data

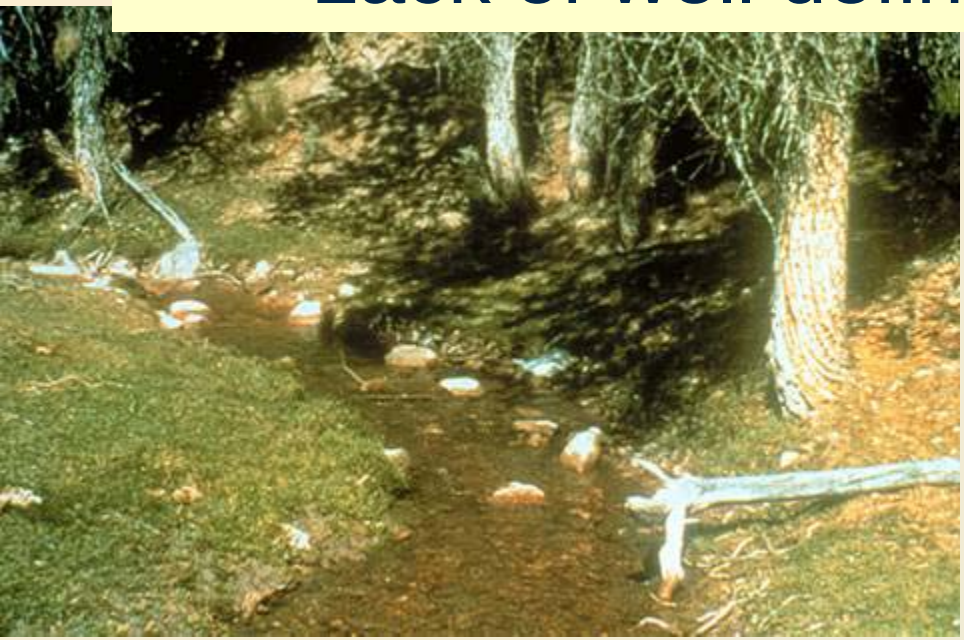
- ✓ Deposition Features – Floodplain/Point bars
- ✓ Changes in vegetation
- ✓ Topographic break in slope
- ✓ Change in size, staining, or color of substrate materials
- ✓ Change in nature and amount of debris deposits

(Leopold 1994)

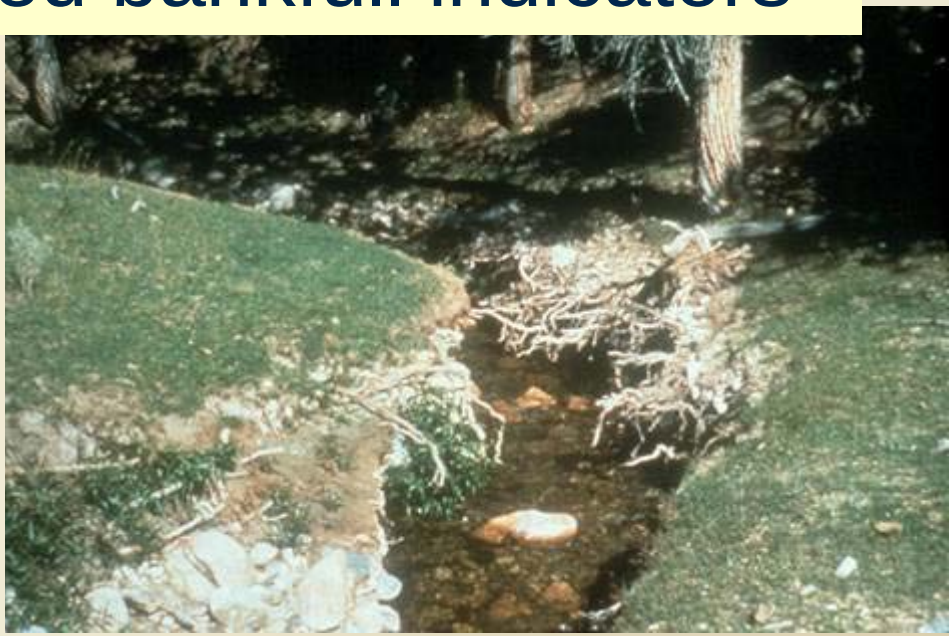


Item #1: Floodplain inundation

- Examples of visual indicators at this site
  - ✓ 1983: Channel shape does not reflect a naturally stable channel within the valley type
  - ✓ Lack of well defined bankfull indicators



Pearl Cr NV 1982



Pearl Cr NV 1983

Yes	No	NA
	✓	

Item #1 Floodplain inundation

1)Floodplain above bankfull is inundated in "relatively frequent" events

- ✓ Examples of visual indicators that water has accessed the frequent floodplain
  - Sediment or debris deposition
  - Vegetation laid down by flow
  - Healthy riparian-wetland vegetation

Yes	No	NA
✓		

2) Where beaver dams are present, they are active and stable

Purpose

- ✓ Document whether beaver dams are present, and if so, are being maintained
- ✓ If not maintained or captured by vegetation, breaching can unleash tremendous energies

2) Where beaver dams are present, they are active and stable

- ✓ Examples of visual indicators
  - Dam construction material
  - Dams keyed into streambanks
  - Breaches

Yes	No	NA
	✓	

2) Where beaver dams are present, they are active and stable

- Examples of visual indicators
  - ✓Riparian-wetland vegetation, especially shrubs growing on dam
  - ✓Mud placed on dam, sediment deposition in pond
  - ✓Organic matter accumulation in pond sediments
  - ✓Macrophytes growing in pond

Yes	No	NA
✓		

3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)

Purpose – document important roles in how well a stream dissipates energy

- ✓ Three parts
  - sinuosity
  - width/depth ratio
  - gradient
- ✓ all 3 must be “yes” for the answer to be “yes”
- ✓ Near the shape & size expected for its setting

Janes Meadow WY 1989

Janes Meadow WY 1997

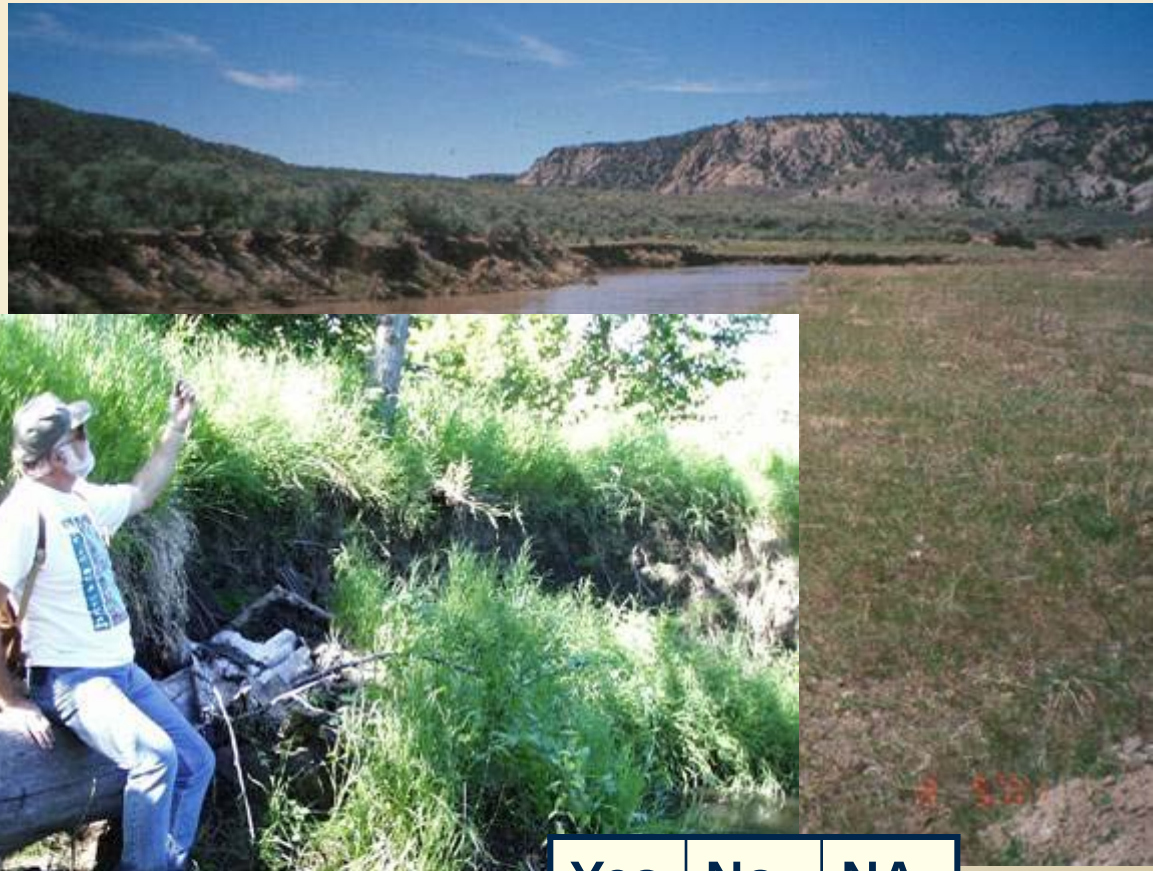
3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)

- ✓ Examples of visual indicators
  - Aerial photos help with sinuosity

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

3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)

- ✓ Examples of visual indicators
  - Bank cutting on straight stretches between meanders (width)
  - False banks that keep eroding away



Yes	No	NA
	✓	

3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)

- ✓ Examples of visual indicators:
  - Excessive bank sloughing
  - Lack of defined streambank in moderate to low gradient streams (plate shape)

Yes	No	NA
	✓	

3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)

- ✓ Examples of visual indicators:
  - Overhanging banks
  - Stabilizing false banks

Yes	No	NA
✓		

4) Riparian-wetland area is widening or has achieved potential extent

Purpose – document that a riparian-wetland area is recovering or has recovered, which is expressed by an increase in riparian-wetland vegetation.

- ✓ Sediment capture
- ✓ Floodplain development
- ✓ Flood-water retention
- ✓ Increase of riparian-wetland vegetation

4) Riparian-wetland area is widening or has achieved potential extent

- ✓ Widening, Enlarging = RIPARIAN AREA
- ✓ Question has 2 parts
  - As the water table rises, riparian-wetland area can expand outward ← →
  - As a stream channel narrows, riparian-wetland area expands toward the center of the channel → ←
- ✓ Or, has it reached potential extent?

4) Riparian-wetland area is widening or has achieved potential extent

Widening, Enlarging = RIPARIAN AREA

As the water table rises, riparian-wetland area can expand outward

Yes	No	NA
	✓	

Bully Creek OR 1982

Yes	No	NA
✓		

Bully Creek OR 1988

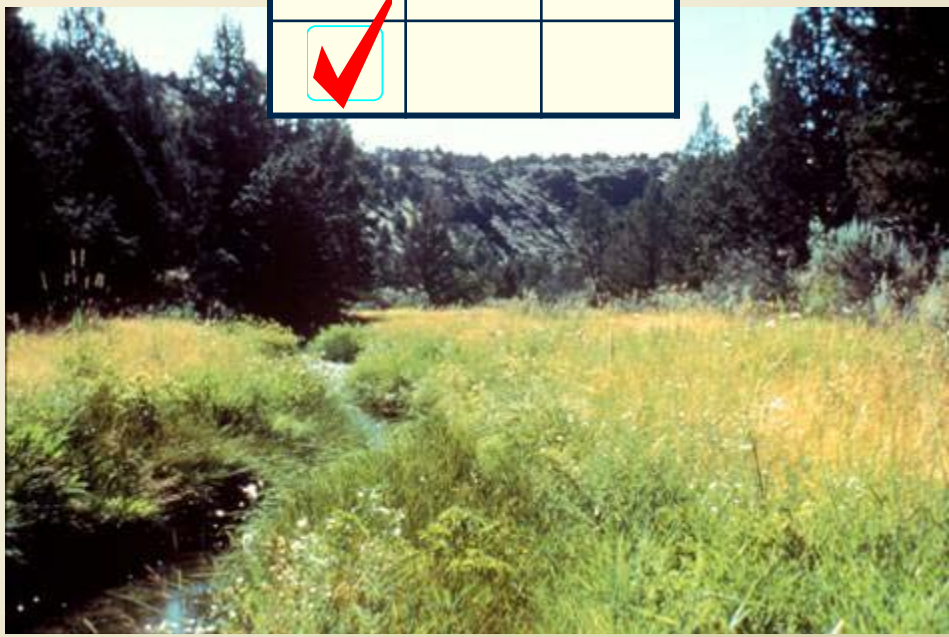
4) Riparian-wetland area is widening or has achieved potential extent

As a stream channel narrows, riparian-wetland area expands toward the center of the channel

Yes	No	NA
	✓	

Bear Creek OR 1981

Yes	No	NA
✓		



Bear Creek OR 1984

4) Riparian-wetland area is widening or has achieved potential extent

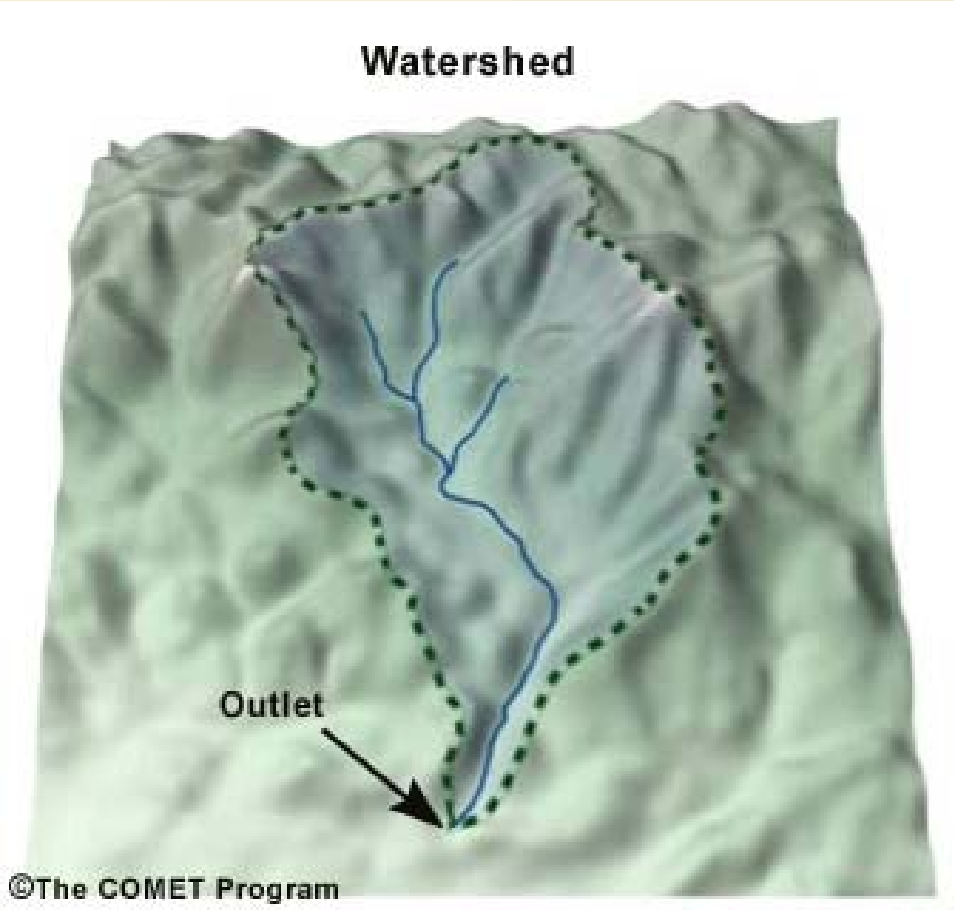
- ✓ Examples of visual indicators
  - Riparian-wetland community types expanding
  - Upland plants dying or dead
  - Depositions being captured

Yes	No	NA
✓		

Fowl Manna Grass (Glyceria striata)

5) Upland watershed is not contributing to riparian degradation

Purpose –
document whether there has been a change in the water or sediment being supplied, and whether it is resulting in degradation



5) Upland watershed is not contributing to riparian degradation

- ✓ Is there riparian-wetland degradation coming from the uplands
  - not contributing = “yes”
  - contributing = “no”

5) Upland watershed is not contributing to riparian degradation

- ✓ Assess whether uplands are contributing to the degradation of a riparian-wetland area; not the condition of the uplands

5) Upland watershed is not contributing to riparian degradation

Yes	No	NA
✓		

5) Upland watershed is not contributing to riparian degradation

Trapping Cr BC 1996

Belgo Cr BC 1996

Yes	No	NA
	✓	

Yes	No	NA
✓		

5) Upland watershed is not contributing to riparian degradation

- ✓ Examples of visual indicators
  - Evidence of too much water, not enough water, too much sediment, not enough sediment

Yes	No	NA
	✓	

5) Upland watershed is not contributing to riparian degradation

- ✓ Examples of visual indicators
  - Evidence of too much water, not enough water, too much sediment, not enough sediment

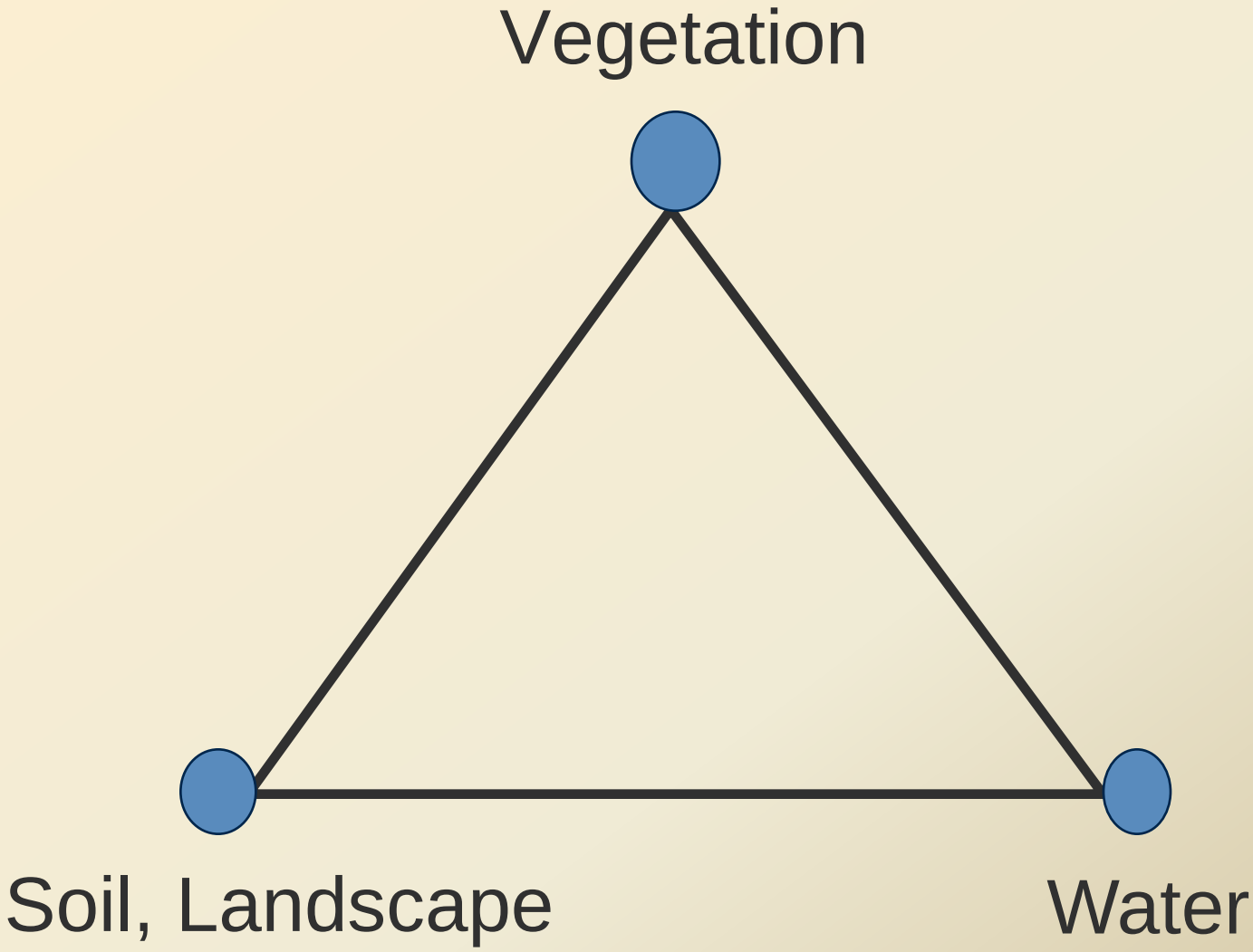
Yes	No	NA
	✓	

Badger Cr, CO

Yes	No	NA
✓		

Badger Cr, CO

5) Upland watershed is not contributing to riparian degradation

- ✓ Examples of visual indicators
  - Banks with healthy riparian-wetland vegetation with excessive cutting because of deposition
  - How main channel is handling tributary bedload inputs

Riparian-Wetland Attributes & Processes