



US Army Corps
of Engineers
Omaha District



Wyoming Stream Quantification Tool Beta Version

August 14, 2017
Public Notice Webinar

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WY Stream Quantification Tool



Download WYSQT and Supporting Material From:
<https://stream-mechanics.com/>. Go to Pyramid Framework Tab.

Webinar Agenda

- Overview of User Manual and Spreadsheet
- Overview of Stream Functions Pyramid Framework
- **Tour of WY SQT Spreadsheet**
- **Field Data Collection**



Overview of User Manual

If you want to learn about...

Background of the Stream Functions Pyramid Framework and Wyoming Stream Quantification Tool (WSQT)

read Chapter 1.1

How to enter data into the WSQT spreadsheet

read Chapter 1.2

How to use the WSQT for restoration and mitigation projects

read Chapter 2

How to use the WSQT for permitted impacts

read Chapter 3

How to collect field data for the WSQT

read Chapter 4

The rapid methods and obtain field forms

read Appendix A

Also, be sure to see the Frequently Asked Questions in Appendix B



WY SQT: Excel Workbook (For One Reach)

Seven Worksheets:

- Project Assessment
- Catchment Assessment
- **Quantification Tool**
- Performance Standards
- Debit Tool
- Monitoring Data
- Monitoring Summary

A Function-Based Framework for Stream Assessment and Restoration Projects

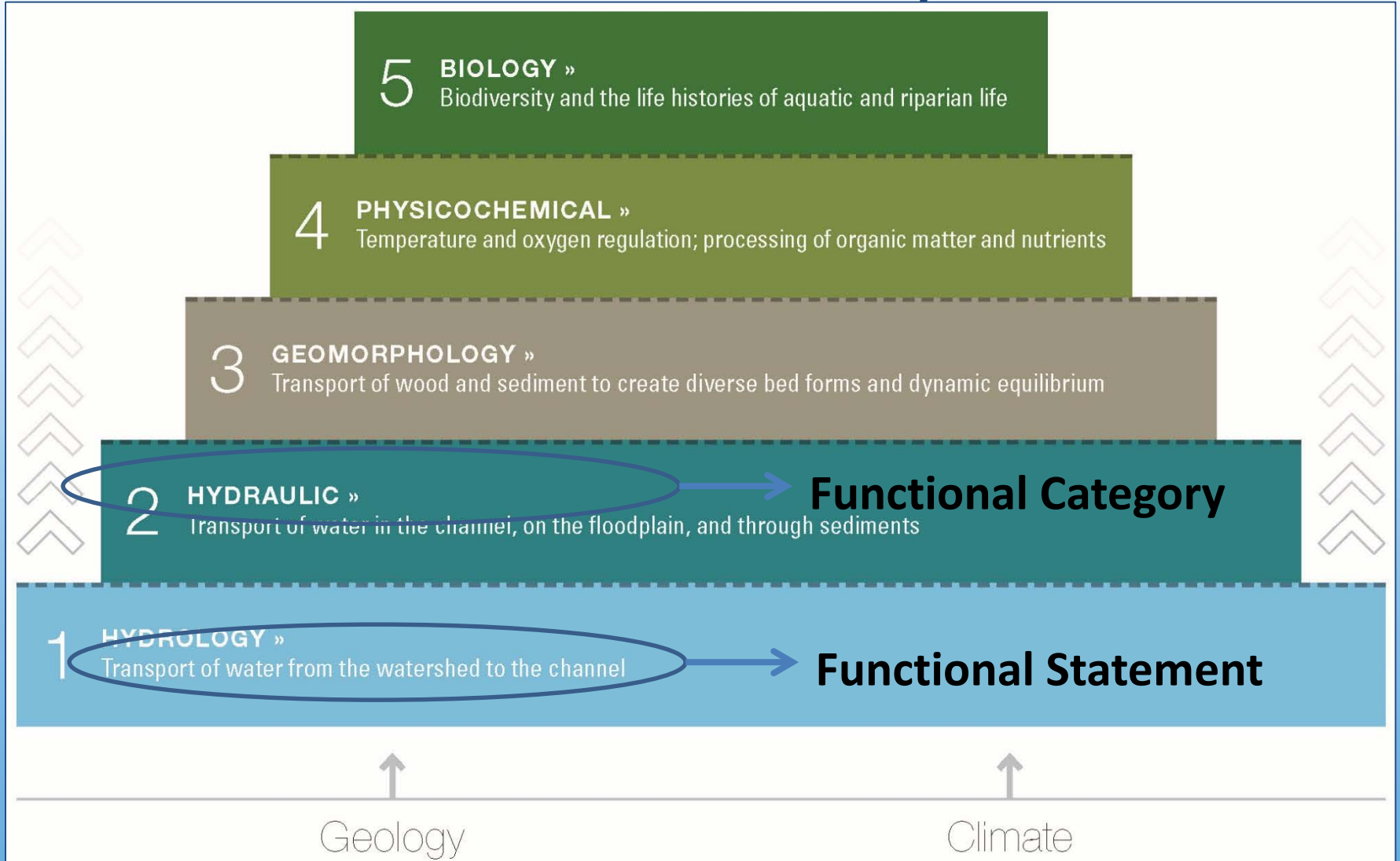
AKA

Stream Functions Pyramid Framework (SFPPF)





Stream Functions Pyramid



Stream Functions Pyramid Framework (SFPF)

Broad Level View (Stream Functions Pyramid)

Functional Categories
Functional Statements

Function-Based Parameters

Describes/Supports
Functional Statement

Measurement Methods

Quantifies Function-Based Parameter

Performance Standards

Functioning
Functioning-At-Risk
Not Functioning

Reference Condition

- Measurement method is fully functioning.
- Unaltered
 - Minimally Impacted
- May be more than best attainable!





WY SQT Scale

Not Functioning	Functioning-At-Risk	Functioning
0.0 - 0.29	0.3 – 0.69	0.7 – 1.0



Restoration Potential

Highest level of restoration that can be achieved based on watershed conditions, results of the function-based assessment and project constraints.





Catchment Assessment Form

Categories		Description of Catchment Condition			Rating (L/M/H)
		Low	Medium	High	
1	Concentrated Flow (Hydrology)	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	No potential for concentrated flow/impairments from adjacent land use	H
2	Impervious cover (Hydrology)	Greater than 15%	7% - 15%	Less than 6%	M
3	Land Use Change (Hydrology)	Rapidly urbanizing/urban	Single family homes/suburban	Rural communities/slow growth or primarily forested	M
4	<p style="text-align: center; font-size: 2em; font-weight: bold;">Includes questions about watershed conditions/stressors that could limit functional lift and therefore restoration potential.</p>				L
5					L
6					M
7					H
8					M
9					H
10					L
11	L				
12	Specific Conductance (uS/cm at 25oC) (Physicochemical)	Piedmont = >229; Blue Ridge = >66	Piedmont = 78-229; Blue Ridge = 41-66	Piedmont = <78; Blue Ridge = <41	H
13	Watershed impoundments (Biology)	Impoundment(s) located within 1 mile upstream or downstream of project area and/or has a negative effect on project area and fish passage	No impoundment within 1 mile upstream or downstream of project area OR impoundment does not adversely affect project area but a blockage could exist outside of 1 mile and impact and fish passage	No impoundment upstream or downstream of project area OR impoundment provides beneficial effect on project area and allows for fish passage	M
14	Organism Recruitment (Biology)	Channel immediately upstream or downstream of project reach is concrete, piped, or hardened.	Channel immediately upstream or downstream of project reach has native bed and bank material, but is impaired.	Channel immediately upstream or downstream of project reach has native bed and bank material.	H
15	Other				H

Constraints Versus Natural Condition

- Human caused.
 - Sewer lines
 - Easement boundary
 - Roads
 - Cropland
- Natural Condition.
 - Bedrock
 - Waterfall
 - Forest Fire



Restoration Potential Results

Level 5 – Biology

(Aquatic Life)



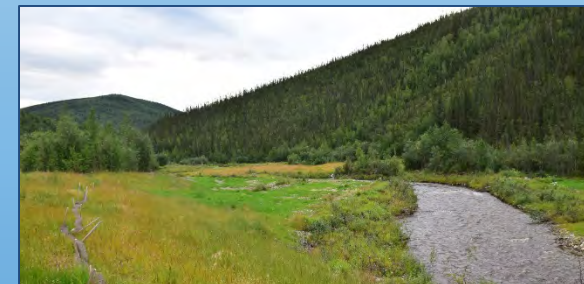
Level 4 – Physicochemical

(Water Quality)



Level 3 – Geomorphology

(Stability / Habitat)



Level 3 can improve biology, but not back to a reference condition.

Tour of WY SQT Spreadsheet

Worksheets	Relevant Sections
Project Assessment (Section 1.2.a)	<ul style="list-style-type: none"> ○ Programmatic Goals ○ Reach Description ○ Aerial Photograph of Project Reach ○ Restoration Potential
Catchment Assessment (Section 1.2.b)	<ul style="list-style-type: none"> ○ Complete entire form ○ Determine restoration potential
Quantification Tool (Section 1.2.c)	<ul style="list-style-type: none"> ○ Site Information and Performance Standards Stratification ○ Existing Condition field values* ○ Proposed Condition field values*
Monitoring Data (Section 1.2.e)	<ul style="list-style-type: none"> ○ As-Built Condition field values* ○ field values for up to 10 monitoring events*
Data Summary	No data entry in this worksheet
Debit Tool	Not applicable for functional lift
Performance Standards	No data entry in this worksheet

Parameter Selection

Always recommended:

- Reach Runoff
- Floodplain Connectivity
- Bedform Diversity
- Riparian Vegetation
- Lateral Stability
- Sinuosity



Common List if Assessing through Level 5

- **Catchment Hydrology**
- **Reach Runoff**
- **Floodplain Connectivity**
- **Bedform Diversity**
- **Lateral Stability**
- **Sinuosity**
- **Riparian Vegetation**
- Nutrients
- Macros
- Fish

Added based on Scenario:

- **LWD for forested regions**
- Bed material for projects that might change the grain-size distribution.
- Temperature for cold and cool water streams.
- Flow alteration for projects that can change baseflow.

Bold Parameters Included in Rapid Method



Field Data Collection Highlights

- Reach Selection
- Weighted Bank Height and Entrenchment Ratios
- Bedform Diversity
- Riparian Width and Vegetation
- See Appendix A for Rapid Method Forms



Reach Selection

- Read Section 4.2 in the user manual
- Reach Delineation
 - Landscape and approach driven
- Sub-Reach Delineation
 - Metric requirement driven



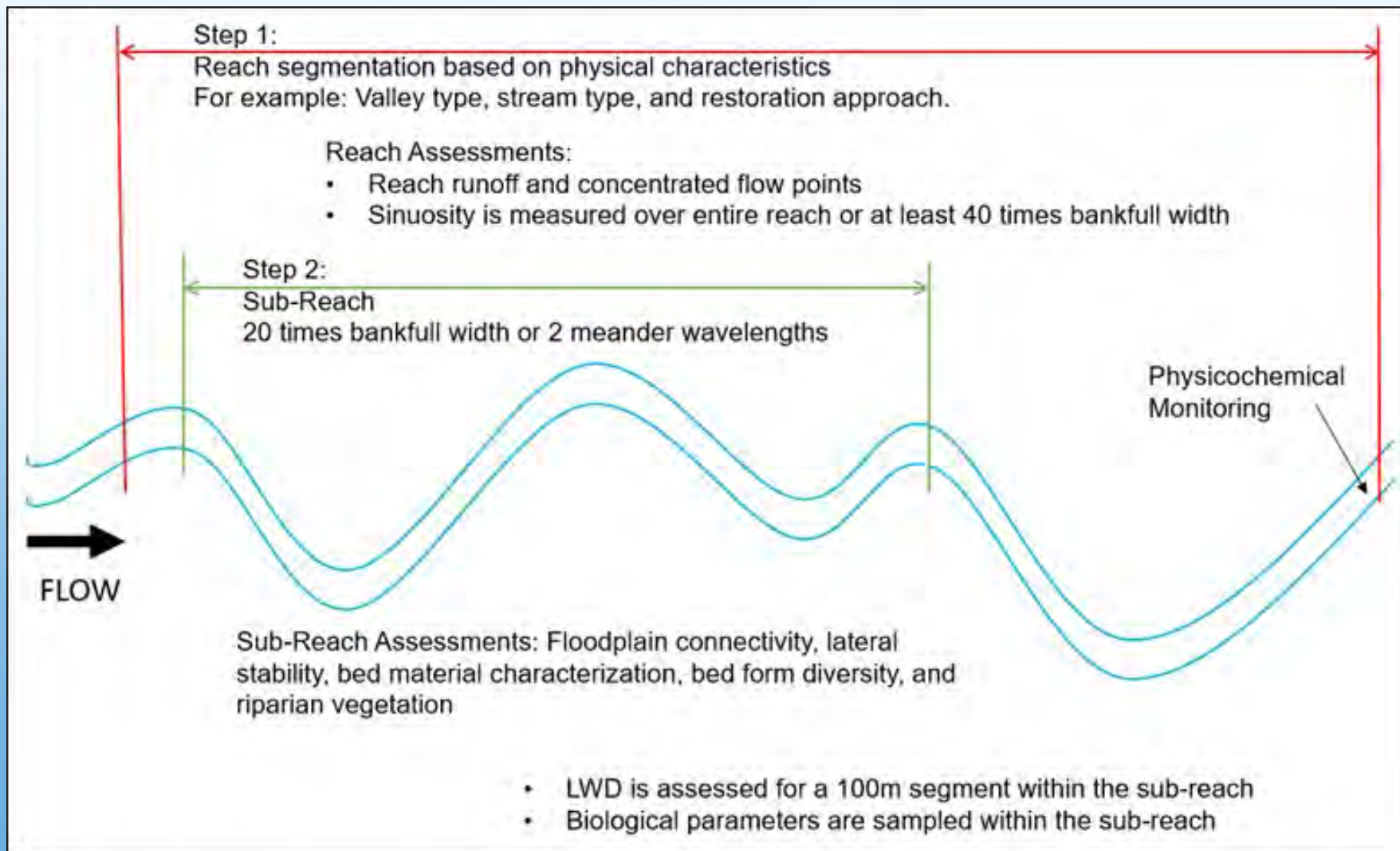
Reach Delineation

- Similar valley and stream type.
- Breaks at confluences.
- Similar stability and functional condition.
- Similar influence of riparian vegetation.
- Similar bed material.
- Breaks by restoration potential and approach.





Sub-Reach Delineation







Weighted Bank Height (BHR) and Entrenchment Ratios (ER)

- See Section 4.7
- Measure at mid-point of riffle.
- Weights by riffle length.
- Prevents cherry picking.
- Provides an overall reach assessment.
- Shows floodplain contraction and expansion (ER)

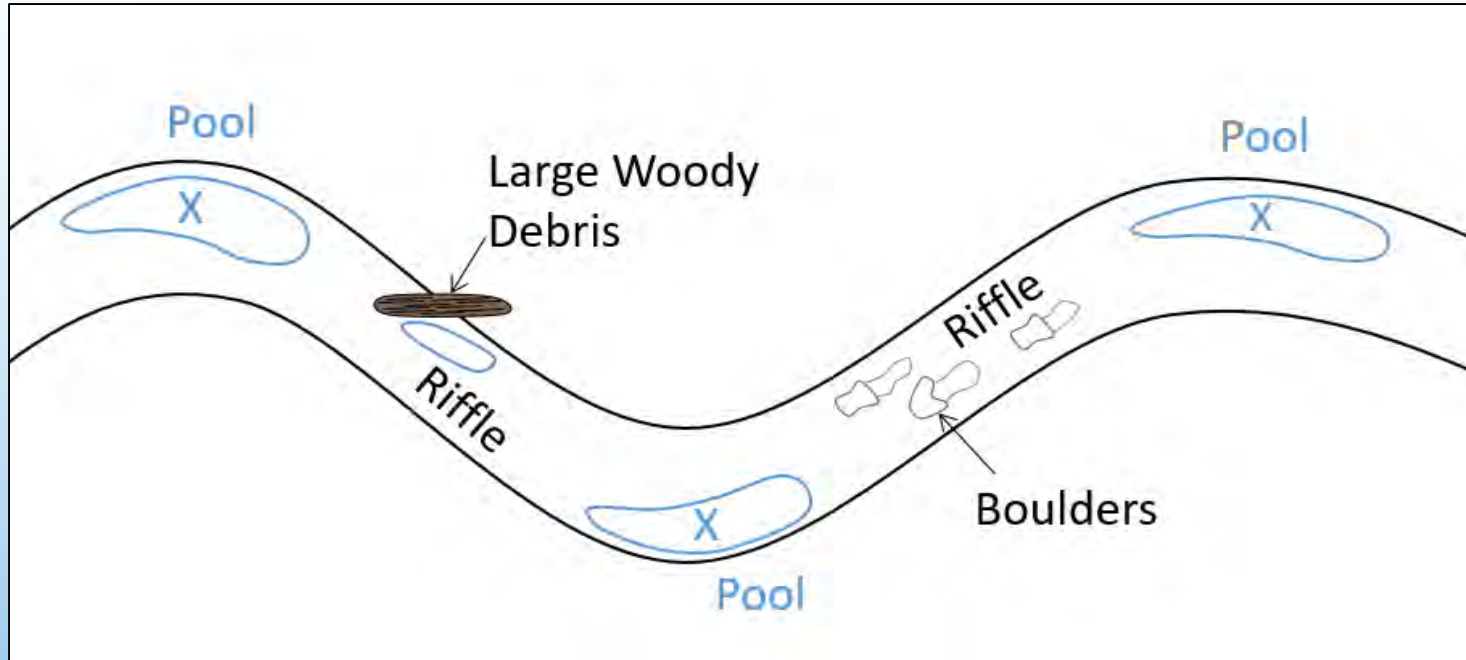


Bedform Diversity

- See Section 4.8e in user manual.
- Measurement Methods
 - **Pool Spacing Ratio**
 - Pool Depth Ratio
 - Percent Riffle
 - Aggradation Ratio
- No performance standards for braided, anastomosed, or ephemeral systems.

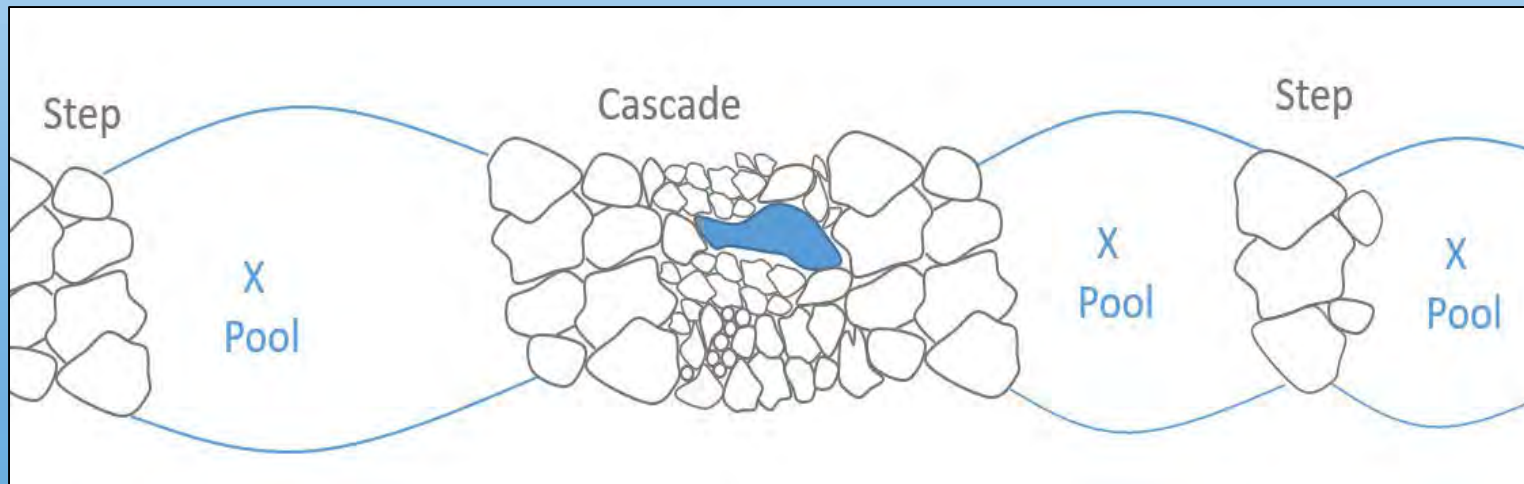
Pool Spacing Ratio

- Meandering Streams
 - Lateral pools in meander bends
 - Does not include micro-pools in riffles
- Step-Pool Streams
 - Includes cascade-pool and step-pools; formed at downstream end of geomorphic structure.
 - Does not include micro-pools in cascade/riffle.



Meandering

Step-Pool



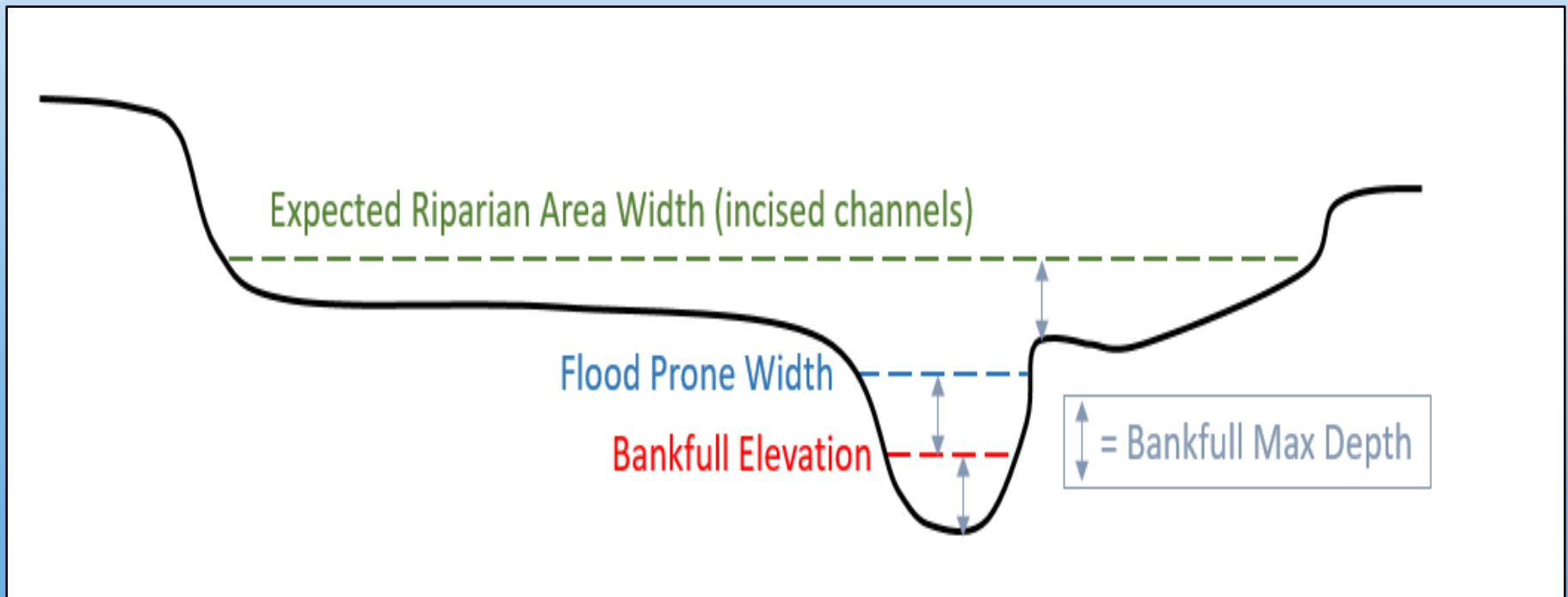


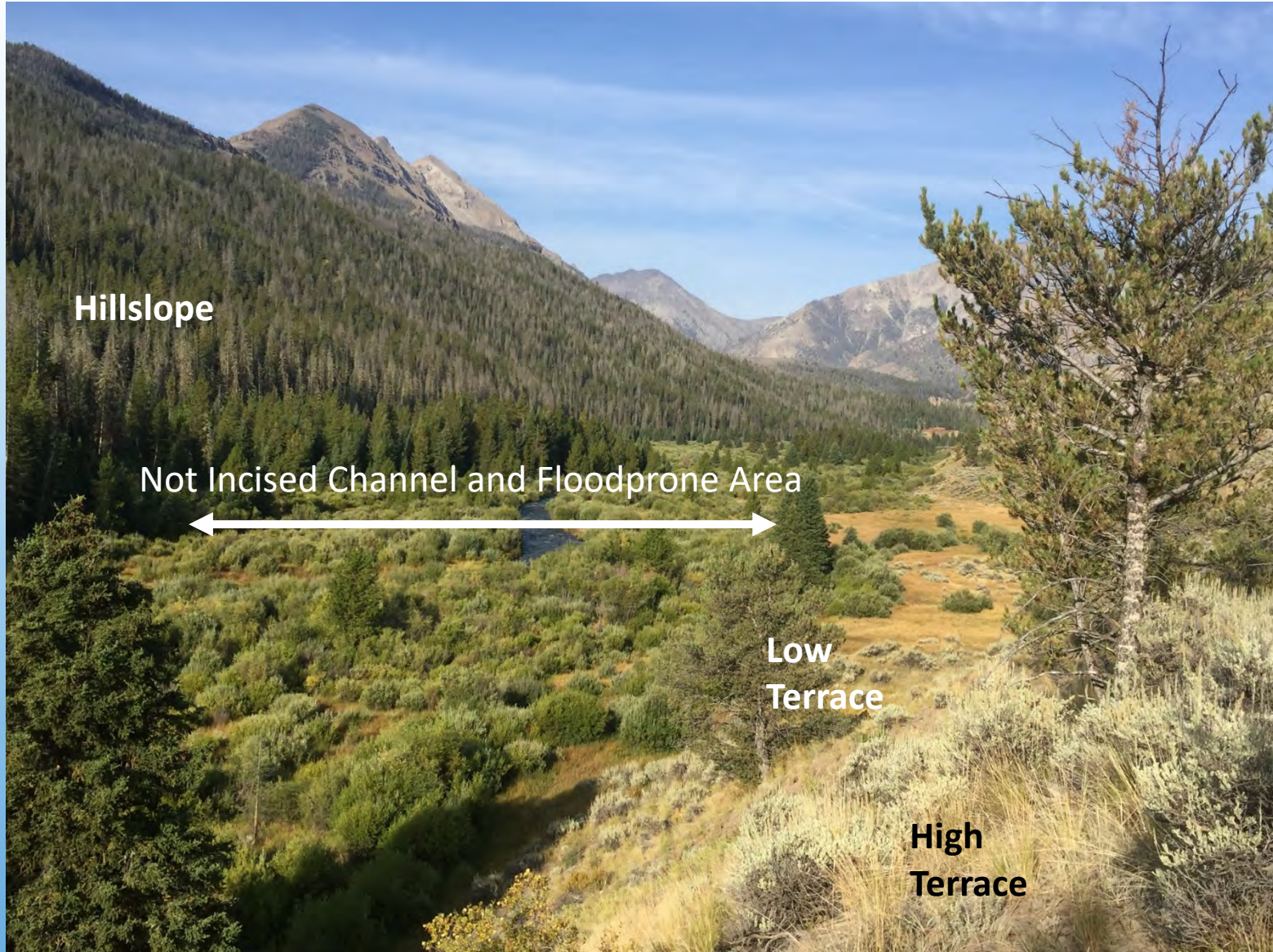
Riparian Width Ratio

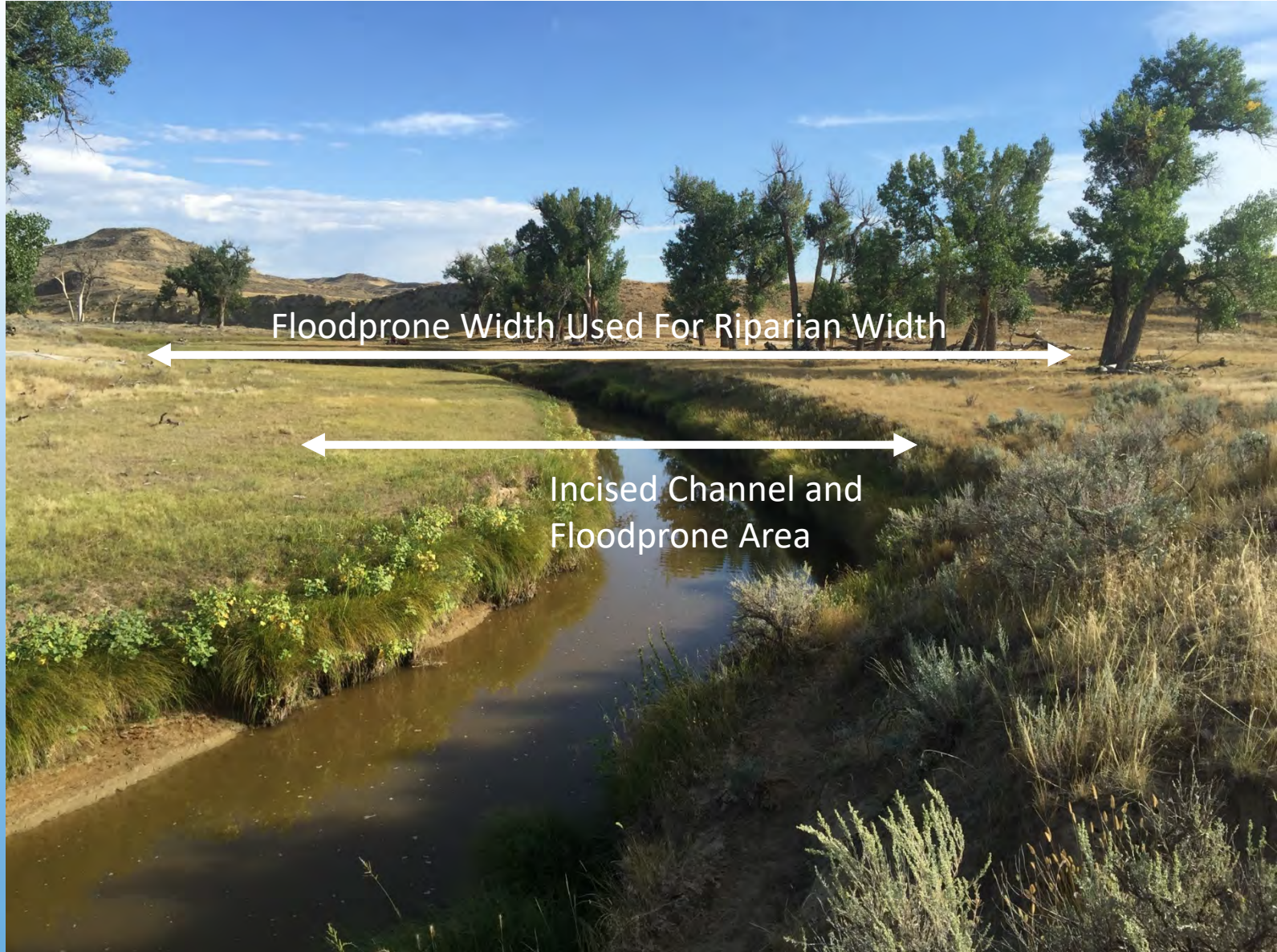
- A new idea for tying the riparian width to geomorphology rather than water quality.
- Uses Observed Over Expected for ratio
- Observed = Width of natural vegetation free from human activity.
- Expected = Width appropriate for valley type.
 - Two Methods: Floodprone and Meander Width Ratios.

Entrenchment Ratio

- Standard method for non-incised streams.
- Modified for incised.





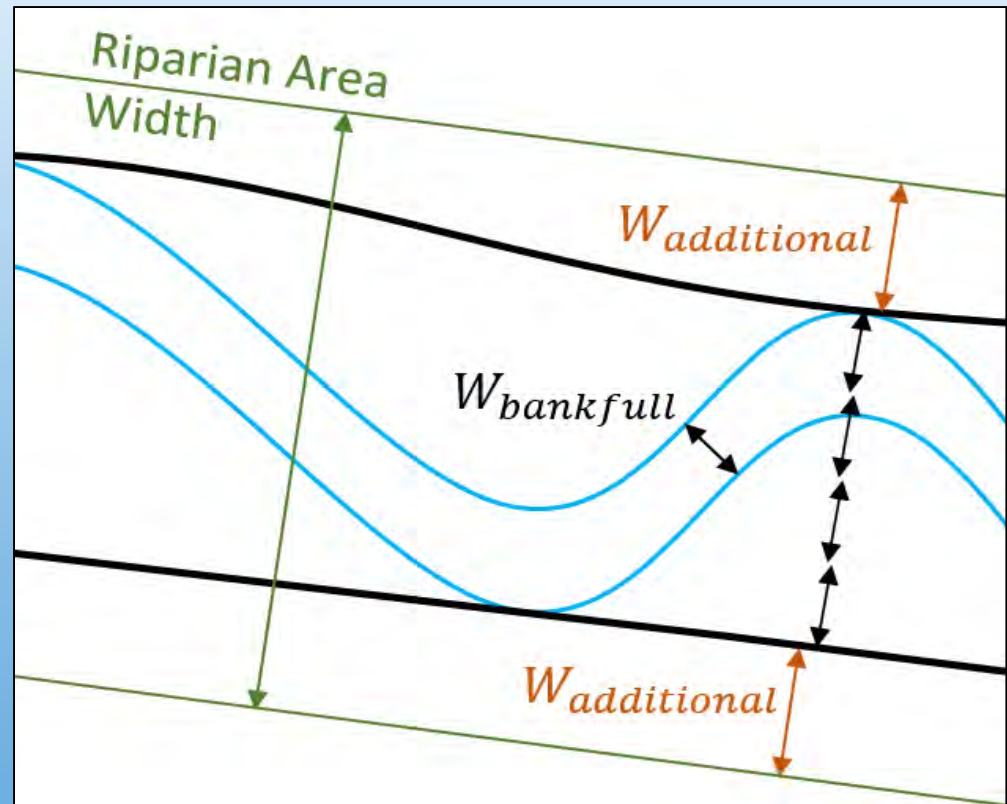


Floodprone Width Used For Riparian Width

Incised Channel and
Floodprone Area

Meander Width Ratio Method

- Used for sites with huge floodplains.
- Used less often than ER method.





Questions?

