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Colorado Watershed Assembly

Business as (Un)Usual

Oct. 6-8, 2020

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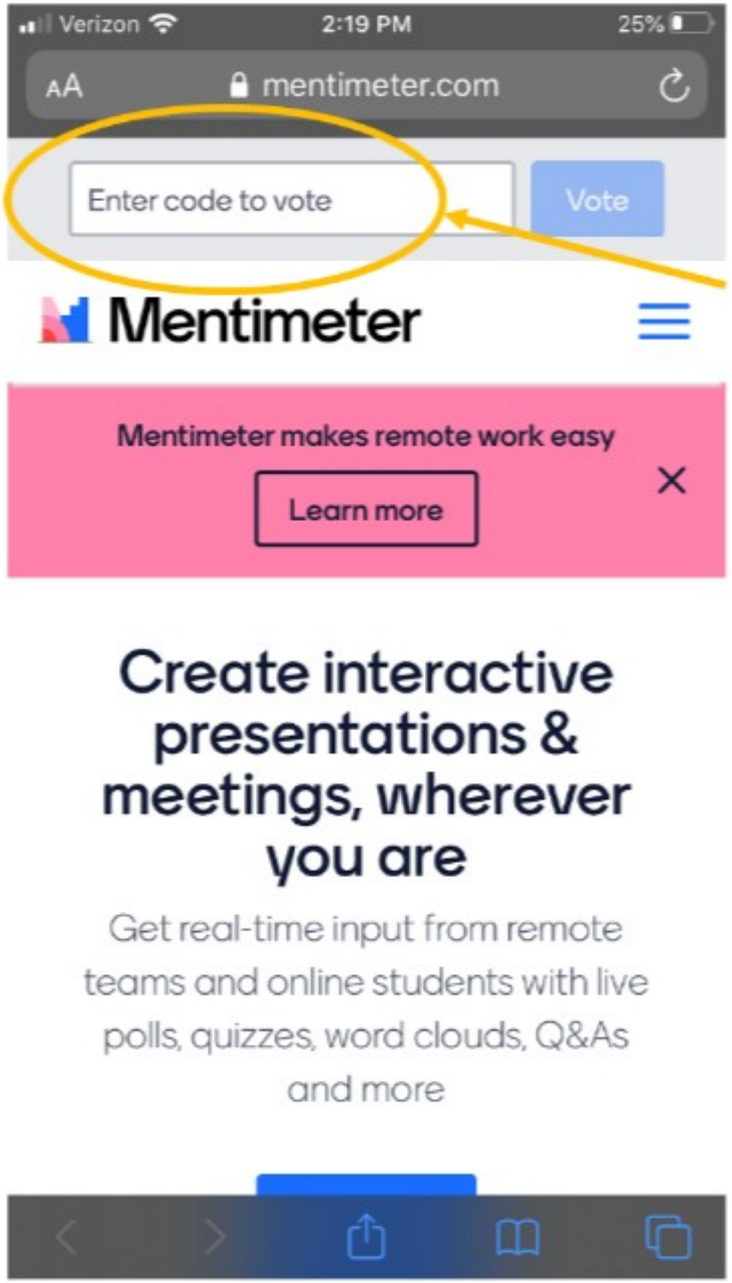

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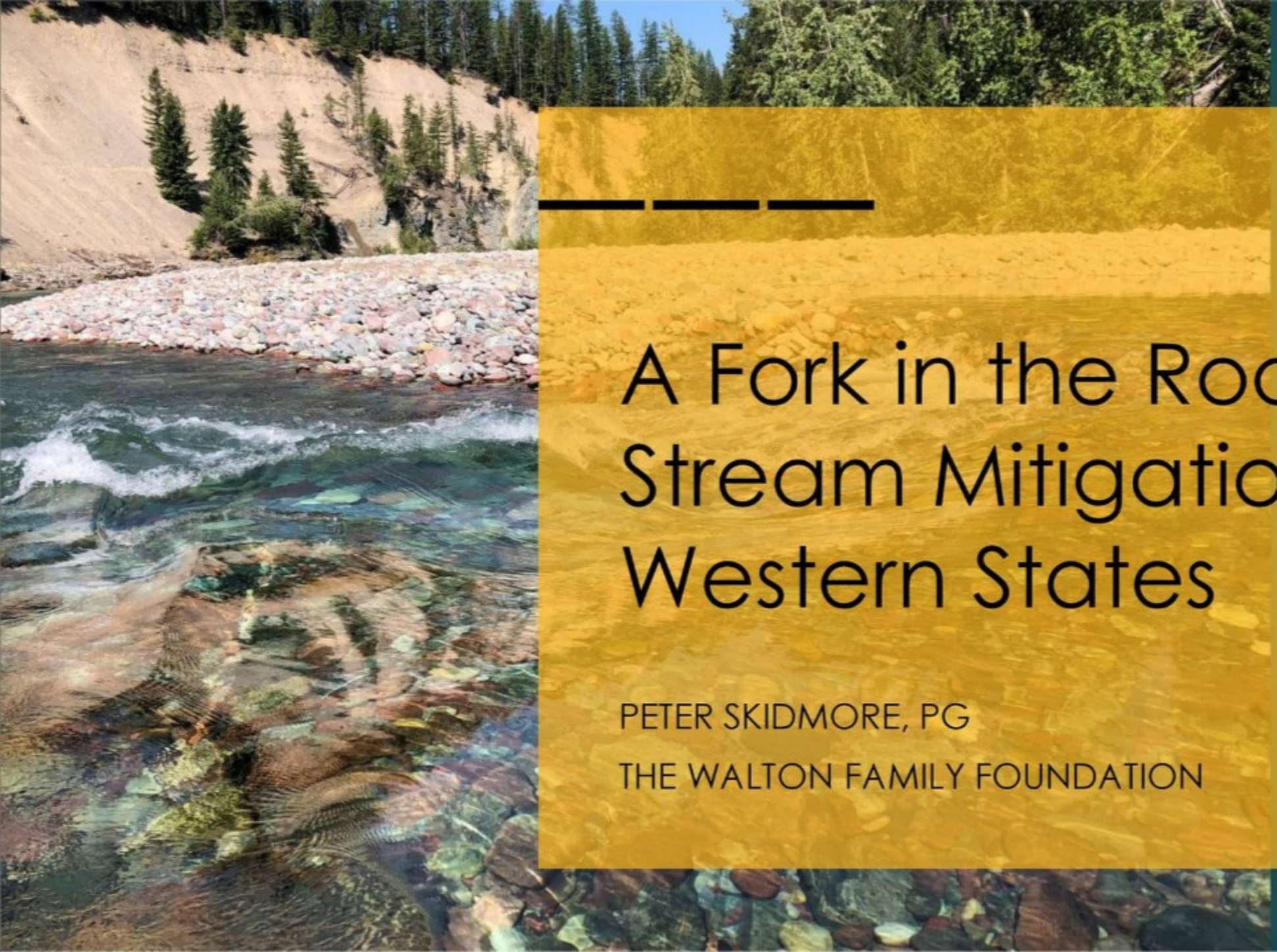
- We have a fixed time for questions. Please contact individual presenters for unanswered questions. Speaker info can be found in Expo.

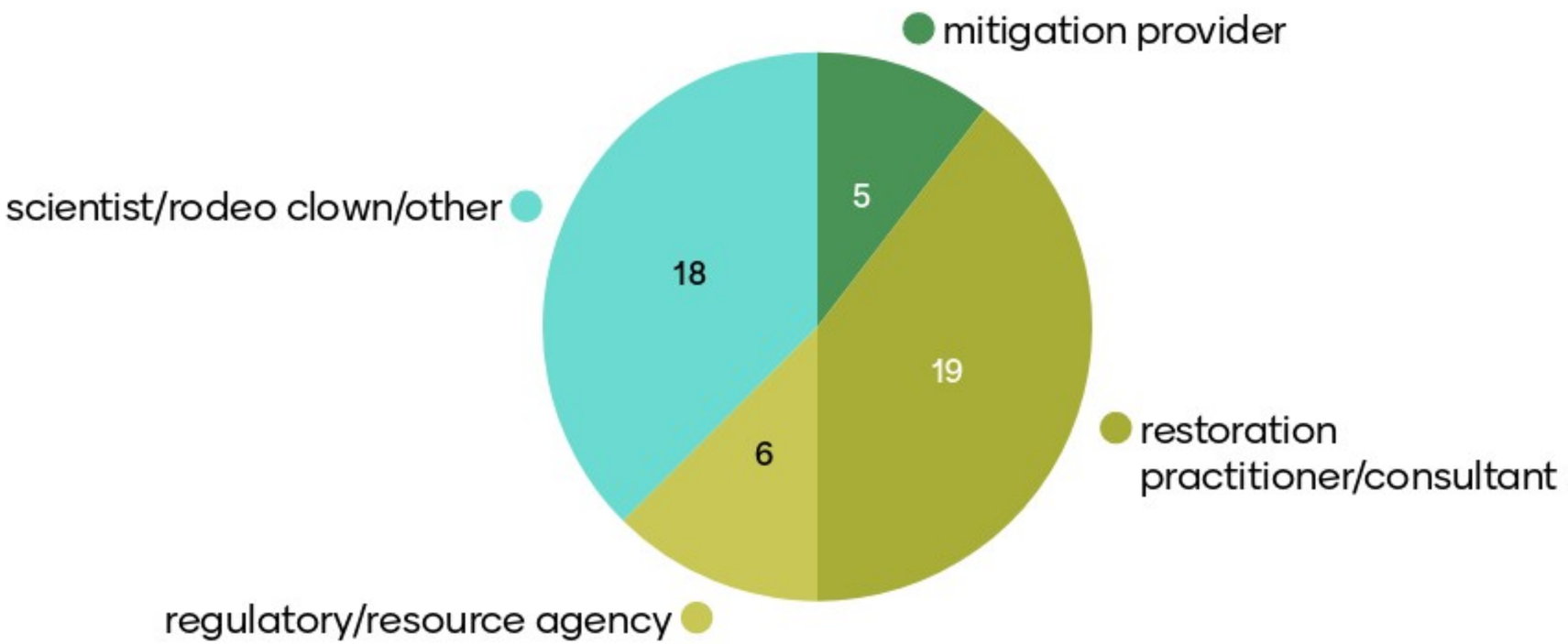


A Fork in the Road: Stream Mitigation in Western States

PETER SKIDMORE, PG

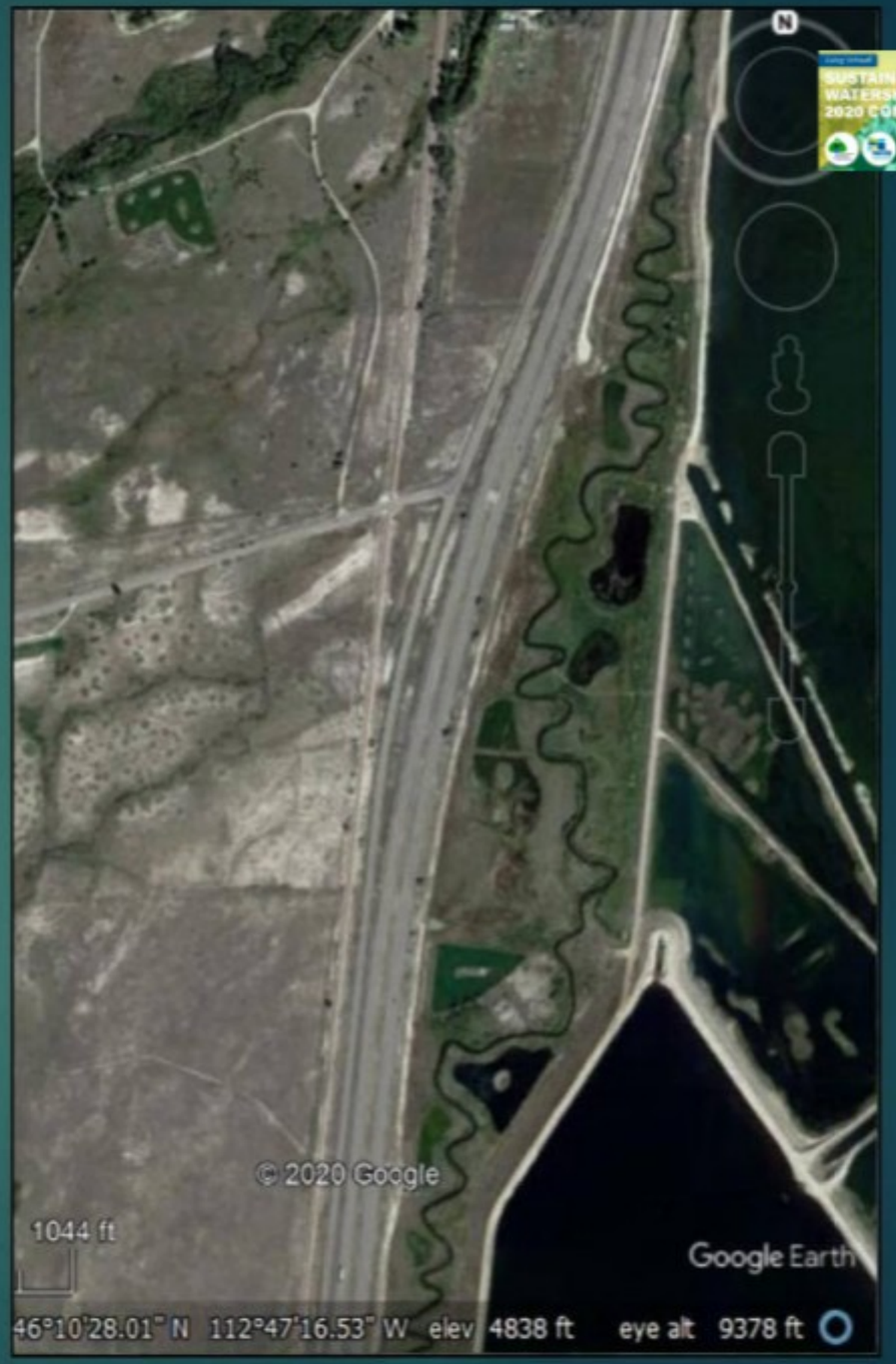
THE WALTON FAMILY FOUNDATION

Please let me know which of these is the best fit for your interest in mitigation:



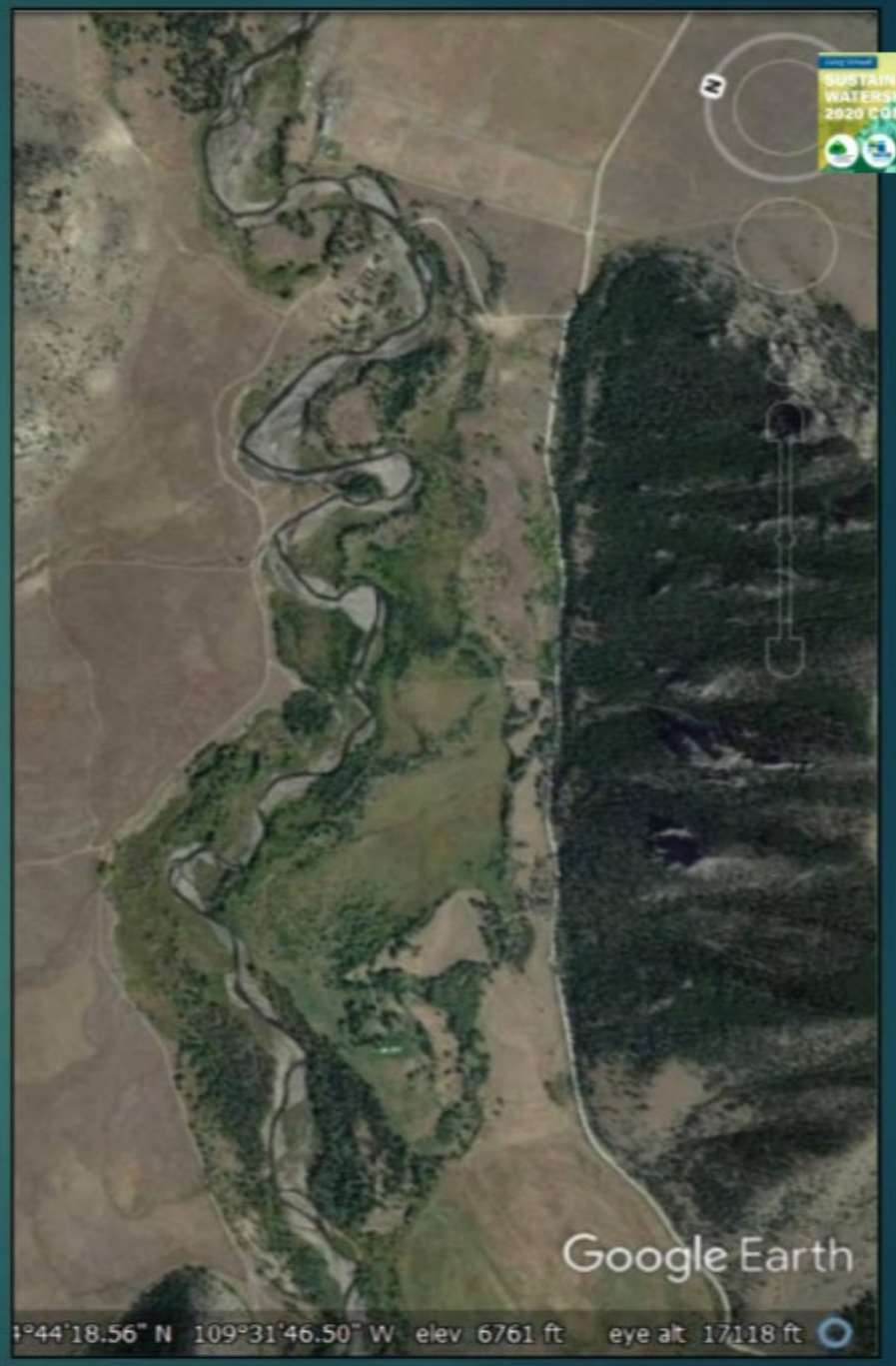
Situation Analysis

- CWA 404 Stream Mitigation = opportunity to protect and restore
- Stream mitigation *markets* robust where they exist
  - Reduced risk to providers
  - Limited benefit to resource
- Western states markets emerging
  - Business as usual



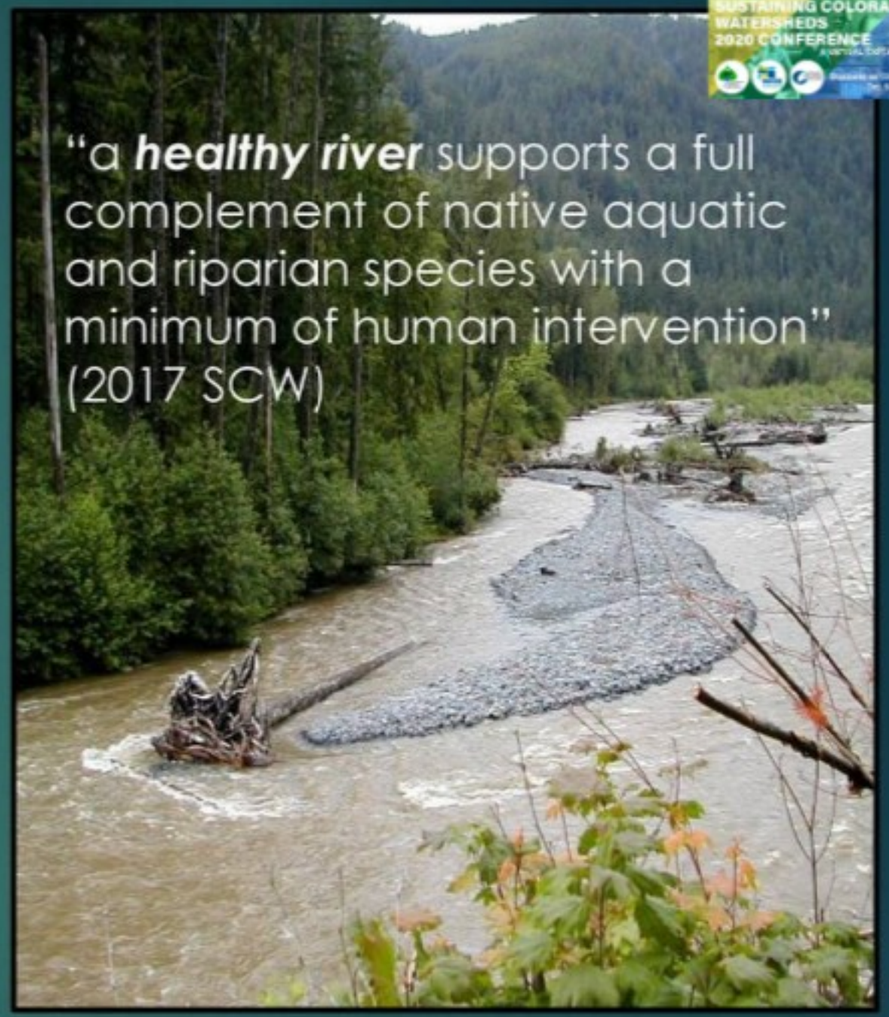
In this talk…

- Healthy Rivers
  - Character and Science
- Mitigation Paradigm
  - Market essentials
  - Standards and Outcomes
- Moving forward
  - Marrying science and mitigation



Prologue – Healthy Rivers

- State of science:
  - Shifting baseline – loss of reference
  - Dynamic, disturbance: "messy rivers"
  - Channel Evolution Models
  - Process Domains



Prologue – Healthy Rivers

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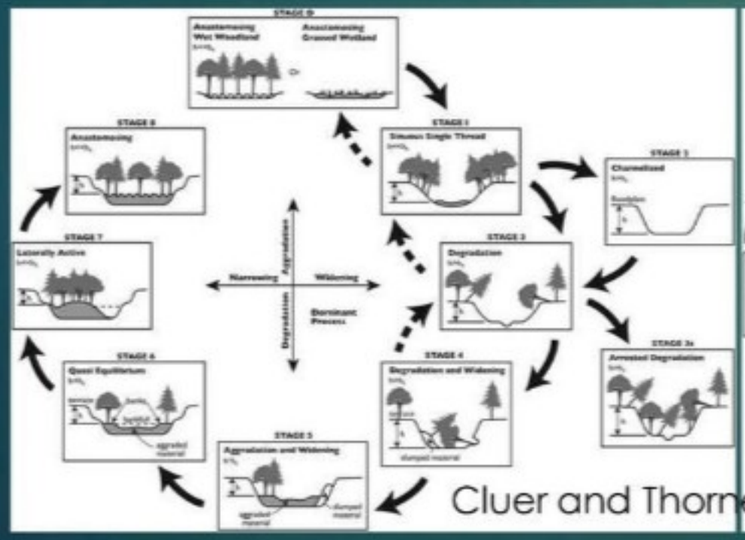
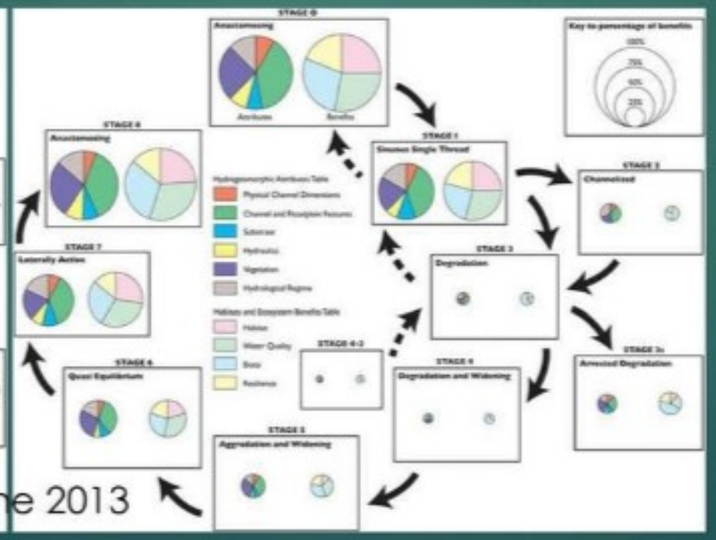
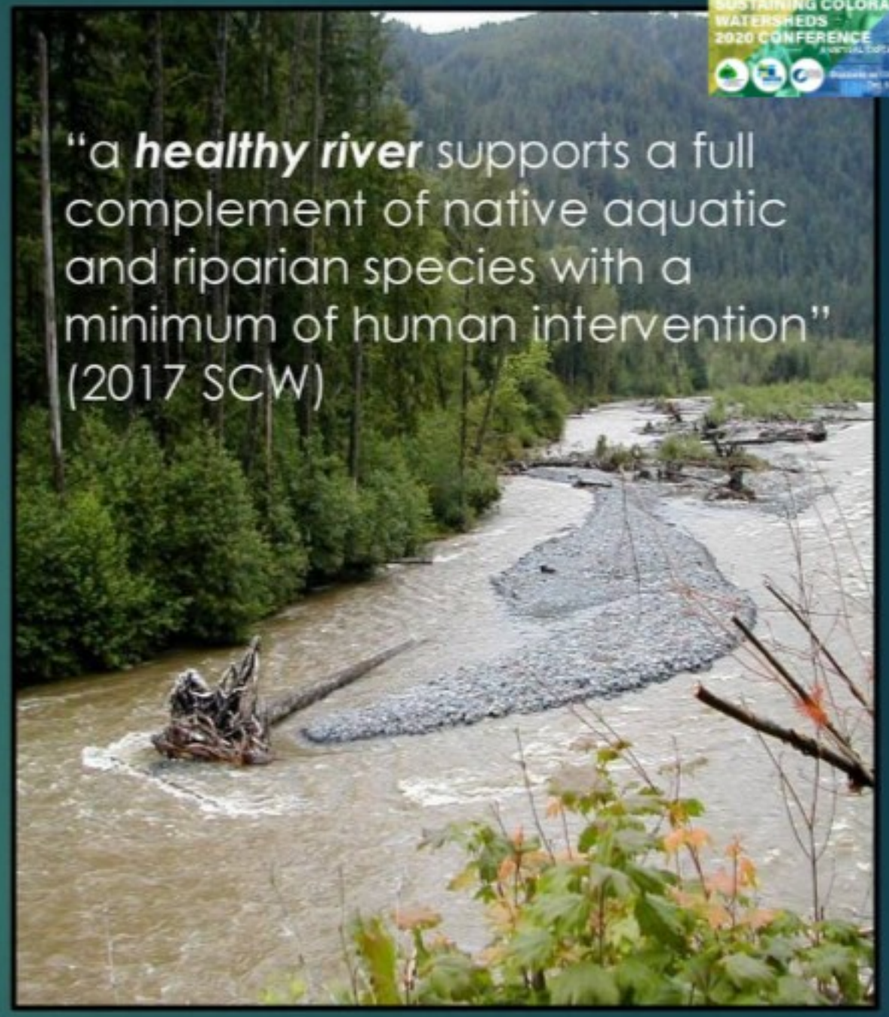
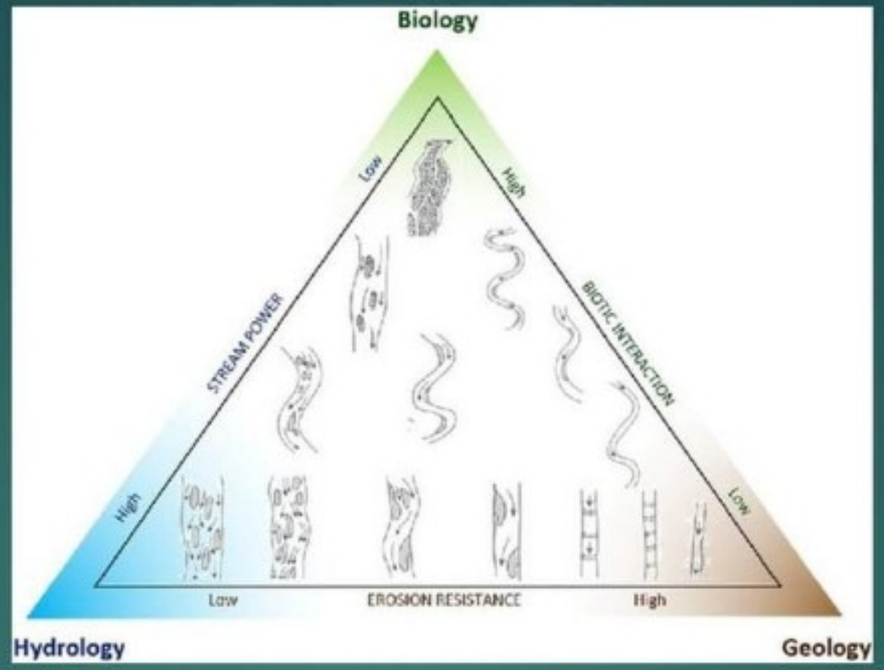


Cluer and Thorne 2013



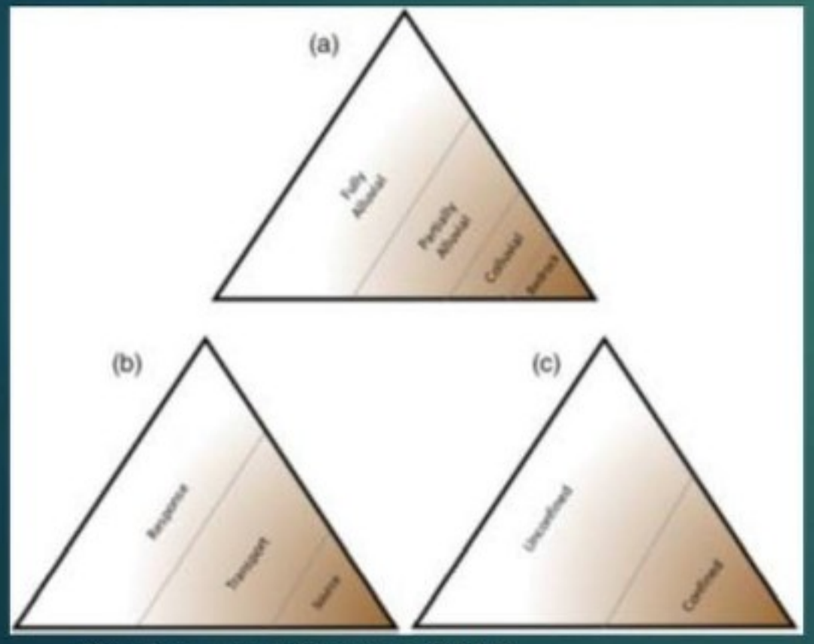


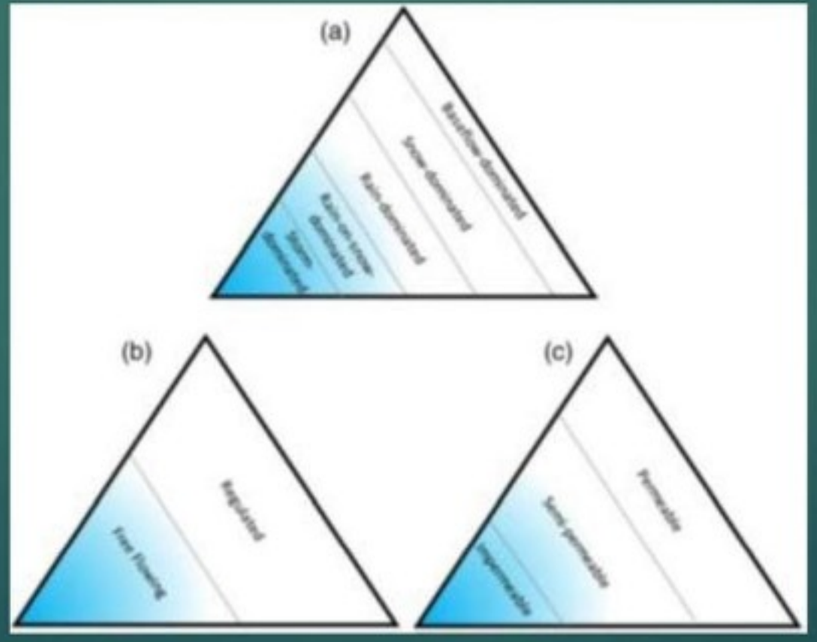
Process domains determine stream *functions*

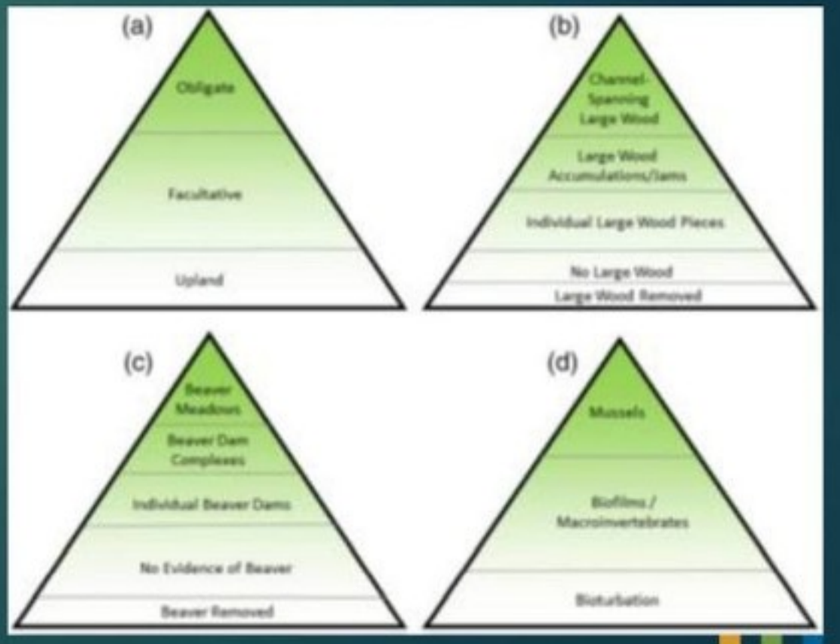


Functions are "the physical, chemical and biological processes that occur in aquatic resources"

2008 Final Rule



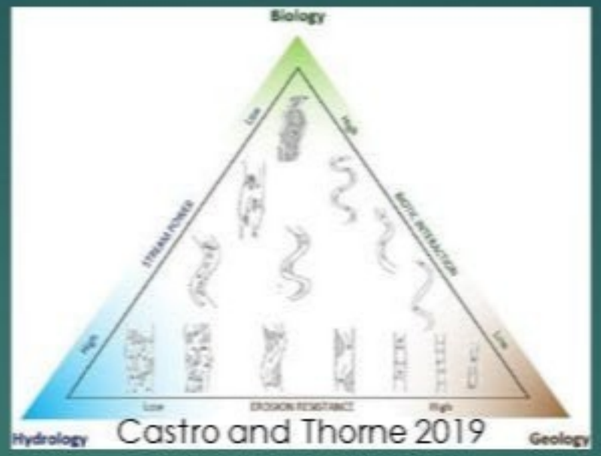




Castro and Thorne 2019

Attributes of a healthy river

- Complexity - of interactions
- Dynamic - through time
- Heterogeneity - of character



Castro and Thorne 2019

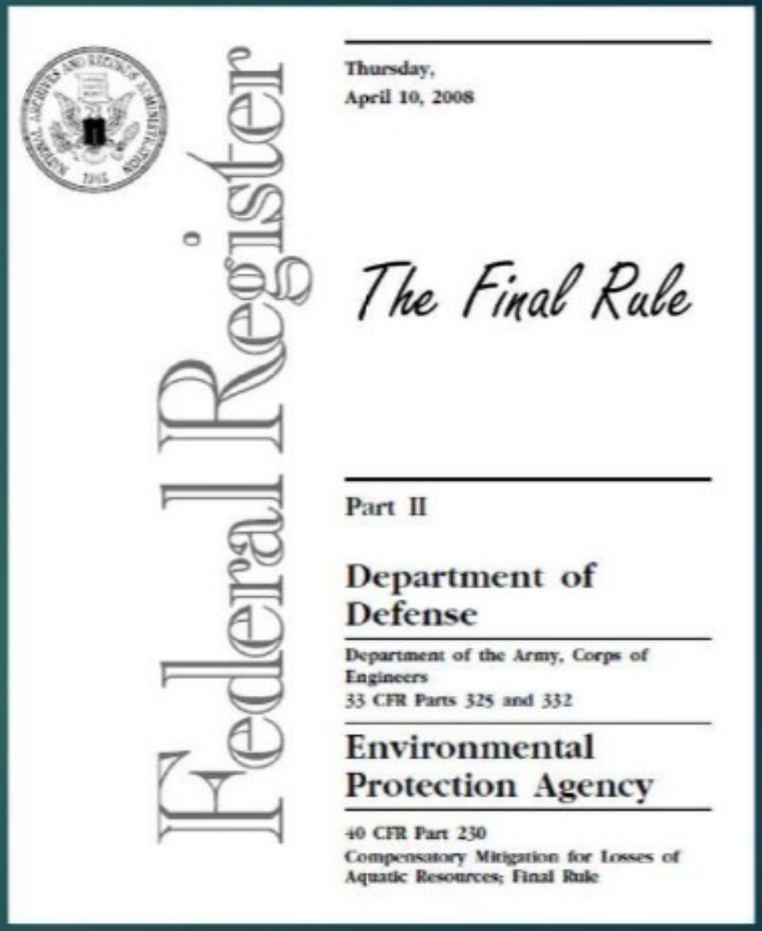
Management for river health

- Space without constraint
- Normative flow and sediment
- Connectivity

Skidmore et al 2011

Stream Mitigation Fundamentals

- Stream mitigation market basics
  - Regulatory market: compulsory, offsets for impacts
  - Commodity: improved ecosystem function
  - Currency: credits (mitigation banks)
- Two fundamental requirements for a mitigation market:
  - **Equivalence**: "functional lift" equivalent to impact
    - complexity/variability are confounding
  - **Certainty**: ensuring predictable outcomes
    - Dynamic system character is confounding


Federal Register

Thursday,
April 10, 2008

The Final Rule

Part II

Department of Defense

Department of the Army, Corps of Engineers
33 CFR Parts 325 and 332

Environmental Protection Agency

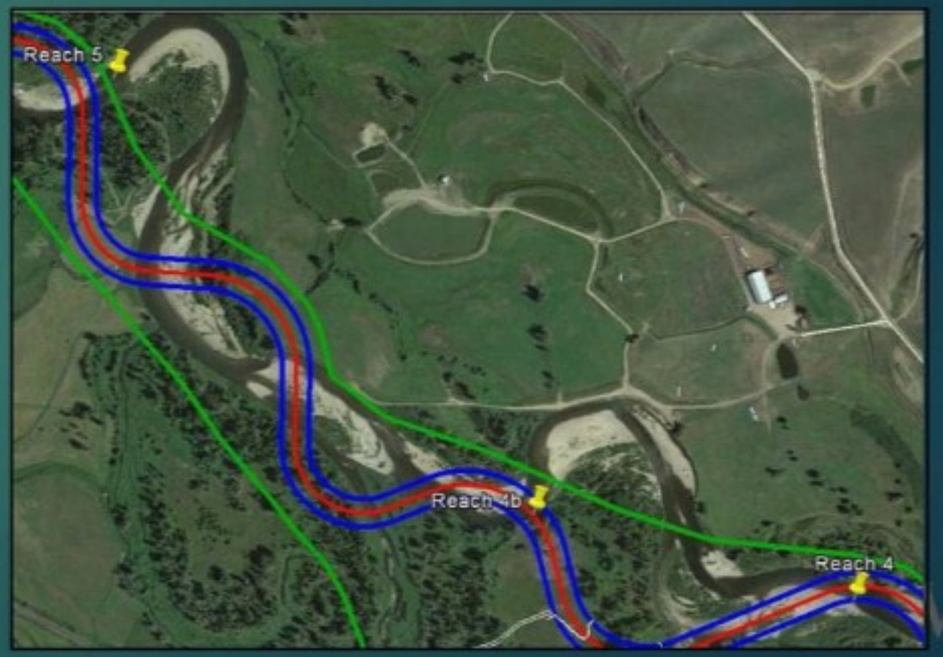
40 CFR Part 230
Compensatory Mitigation for Losses of Aquatic Resources; Final Rule

Mitigation Paradigm

- **Simplification** to address Equivalency
  - Channel reconfiguration mandate
  - Channel form performance measures
- **Stabilization** to address Uncertainty
  - Stabilized channel features

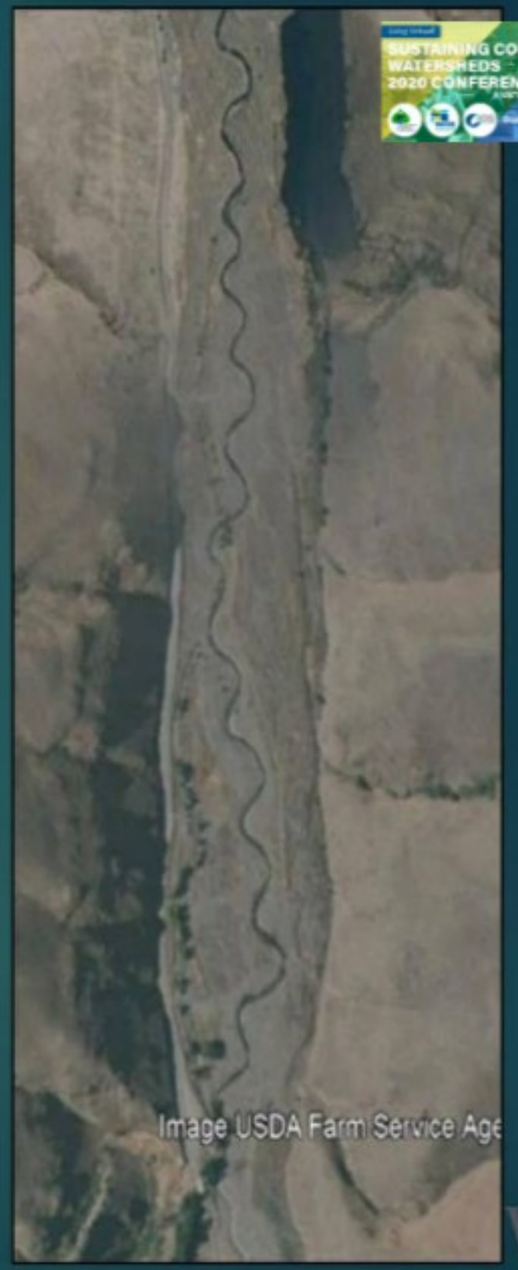
Stream Channel Restoration Work

Factors	Options				
Net Benefit	All proposals must include at least a 25' riparian buffer on both banks Buffers ≥50' +2'/%slope also may generate riparian credit (use see buffer worksheet)				
	Streambank Stabilization	Structure Removal	Stream Channel Restoration and Stream Relocation		
	2.0	4.0 to 8.0	Priority 4 1.0	Priority 3 4.0	Priority 1 or 2 8.0
Monitoring/ Contingency	Minimal (Required) 0	Moderate 0.3	Substantial 0.4	Excellent 1.0	
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 1.0		
Control	RC on restored channel and 25' buffer (Required) 0.1	Required RC + CE or GPP 0.3	Required RC + CE + GPP 0.5		
Mitigation Timing	Schedule 3 0	Schedule 2 (Use for all banks) 0.1	Schedule 1 0.5		



Coincidence or Convenience?

- *Natural Channel Design* predominates in mitigation
  - Streamlined design approach
  - Universally accepted
  - Simplified, easily measured features
  - Stabilization integrated for protection/certainty



Consensus opinion

"It is often assumed that restoration projects are beneficial, but many well-intentioned projects are actually ineffective or detrimental" (Kondolf 1998)

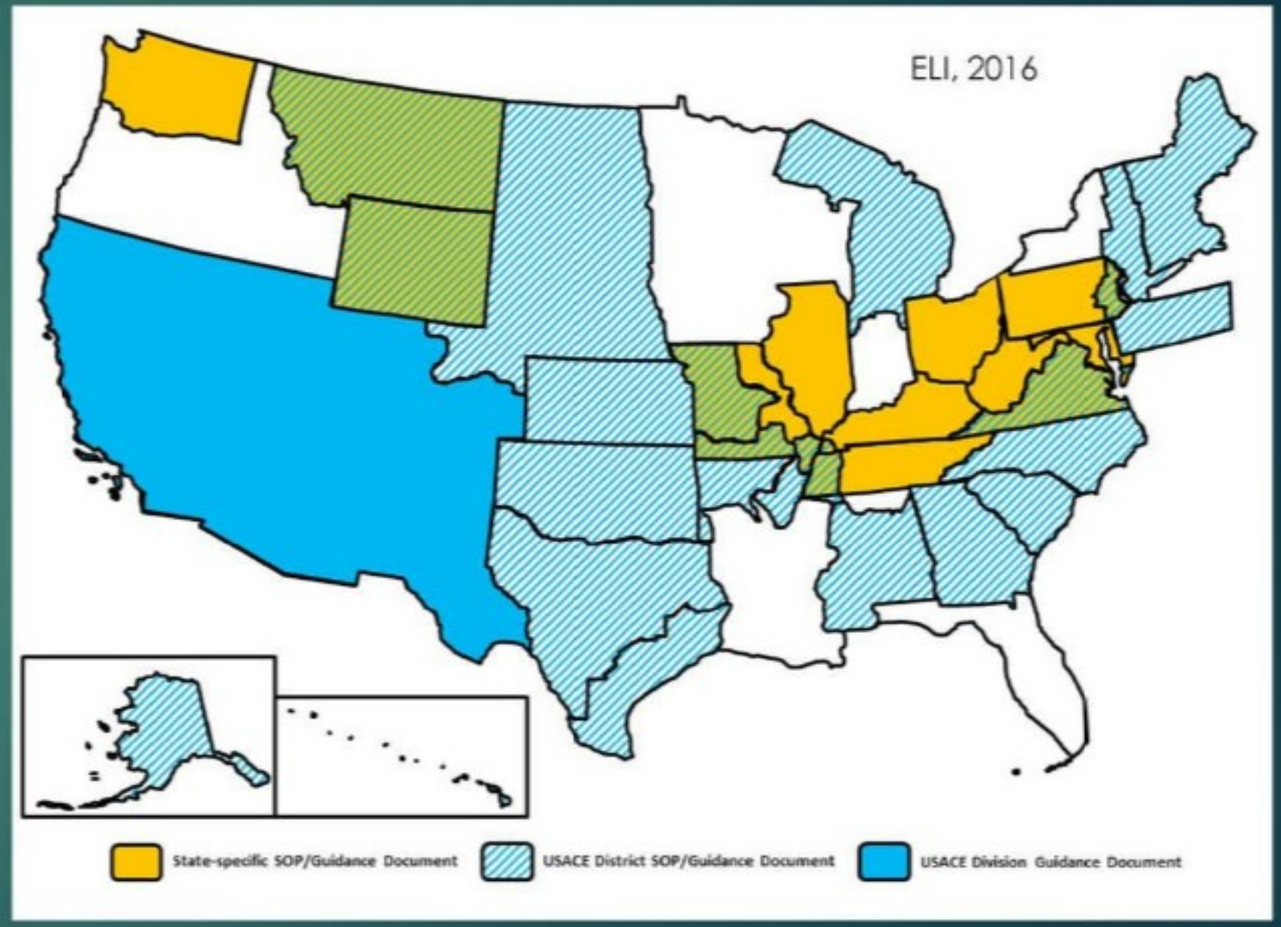
"Empirical evaluation of channel restoration projects documented little evidence of ecologically successful outcomes…. And, in some cases, even found evidence of increased degradation." (Bernhardt and Palmer, 2011)

"…the balance of published evidence suggests that current practices of stream restoration – in terms of scale and technique – cannot be assumed to provide demonstrable physical, chemical, or biological functional improvements." (Doyle and Shields, 2012)

"This contradiction between the goals of restoration practitioners and the most accepted principles of river science ….. have shaped the development of stream mitigation banking..." (Lave and Doyle, in press, *Streams of Revenue*)

State of mitigation paradigm…

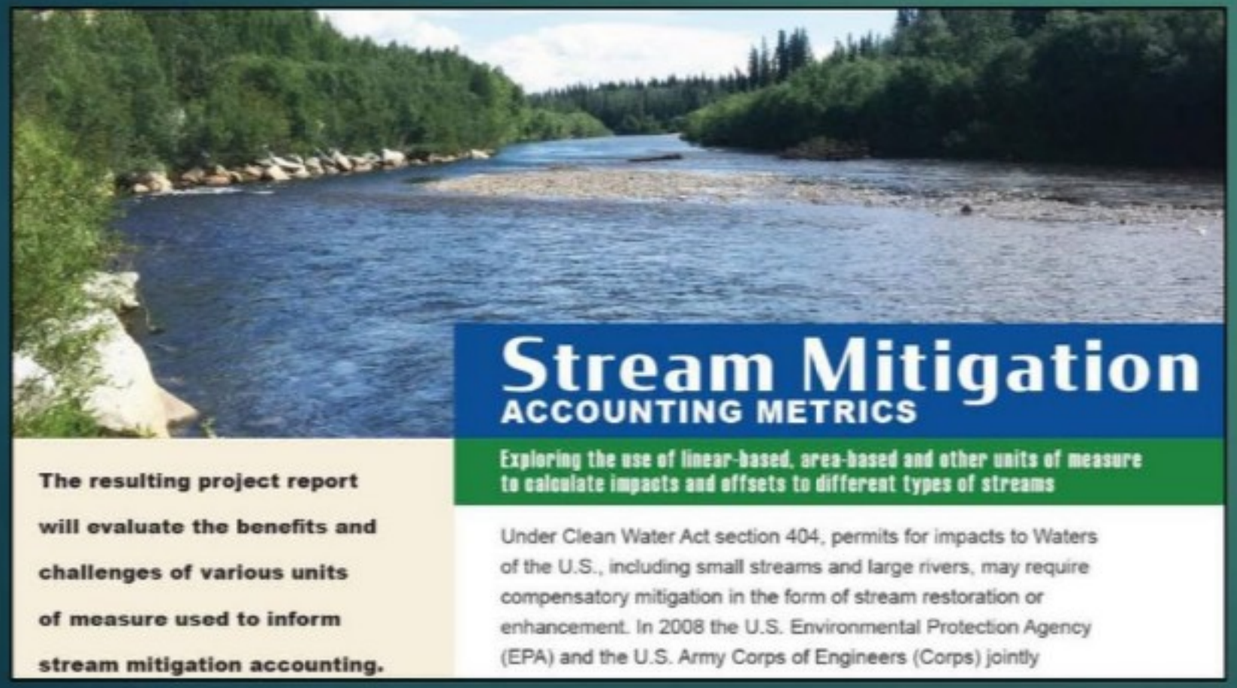
- Markets are functioning…
  - Simplification and stabilization enable market efficiency
- … but limiting functional lift
  - Simplification and stabilization reduce function
- West - the next frontier
  - Opportunity to improve



Rethinking stream mitigation metrics

Management for river health

- Space without constraint
- Normative flow regime
- Sediment continuity



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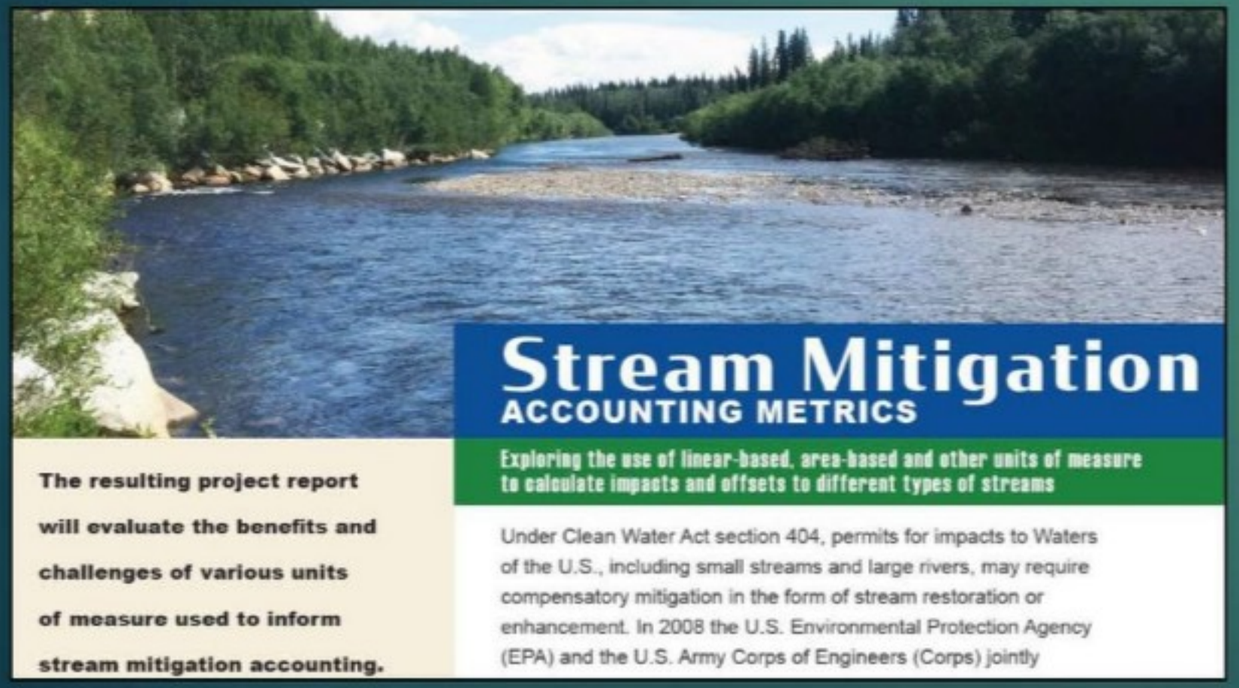
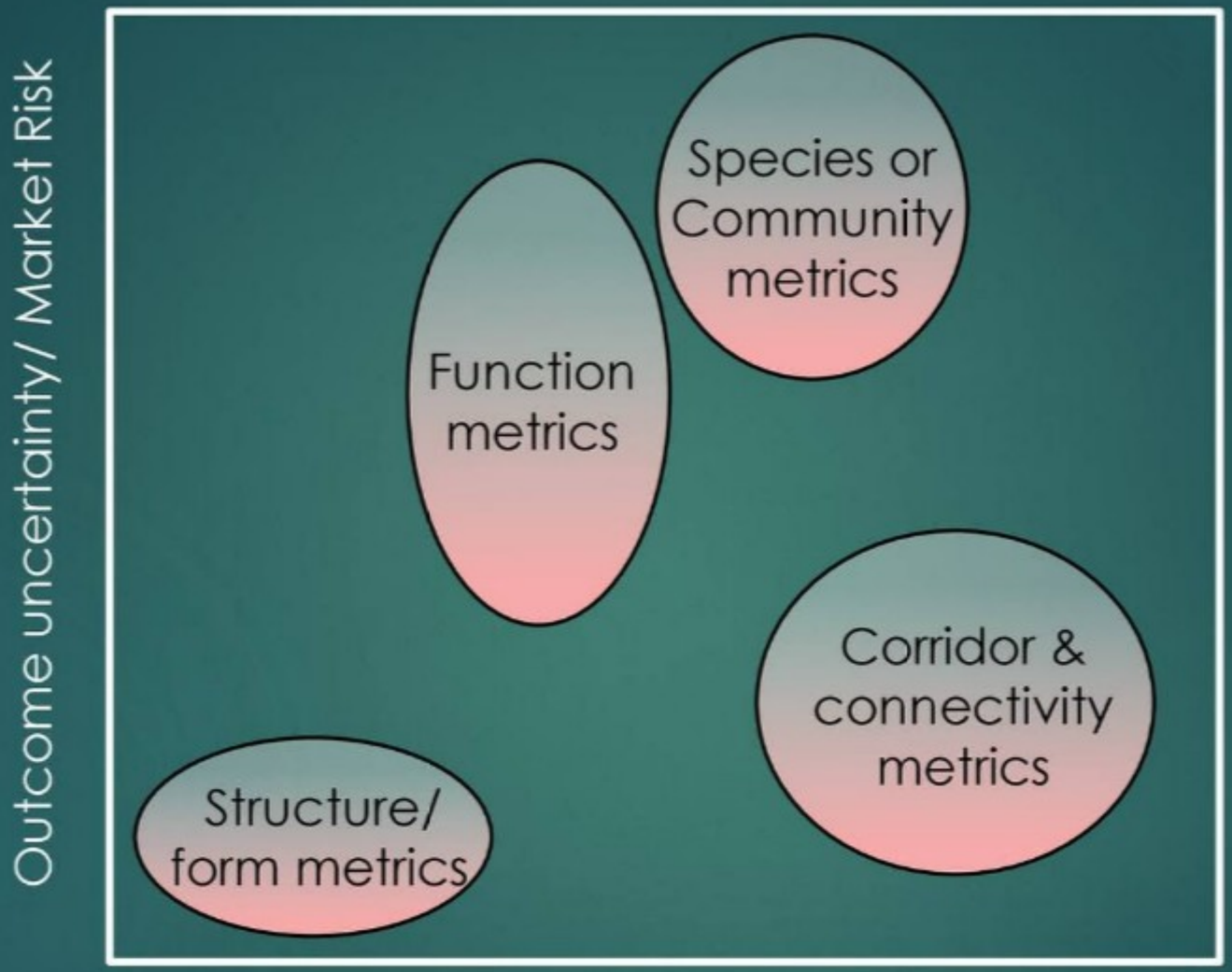
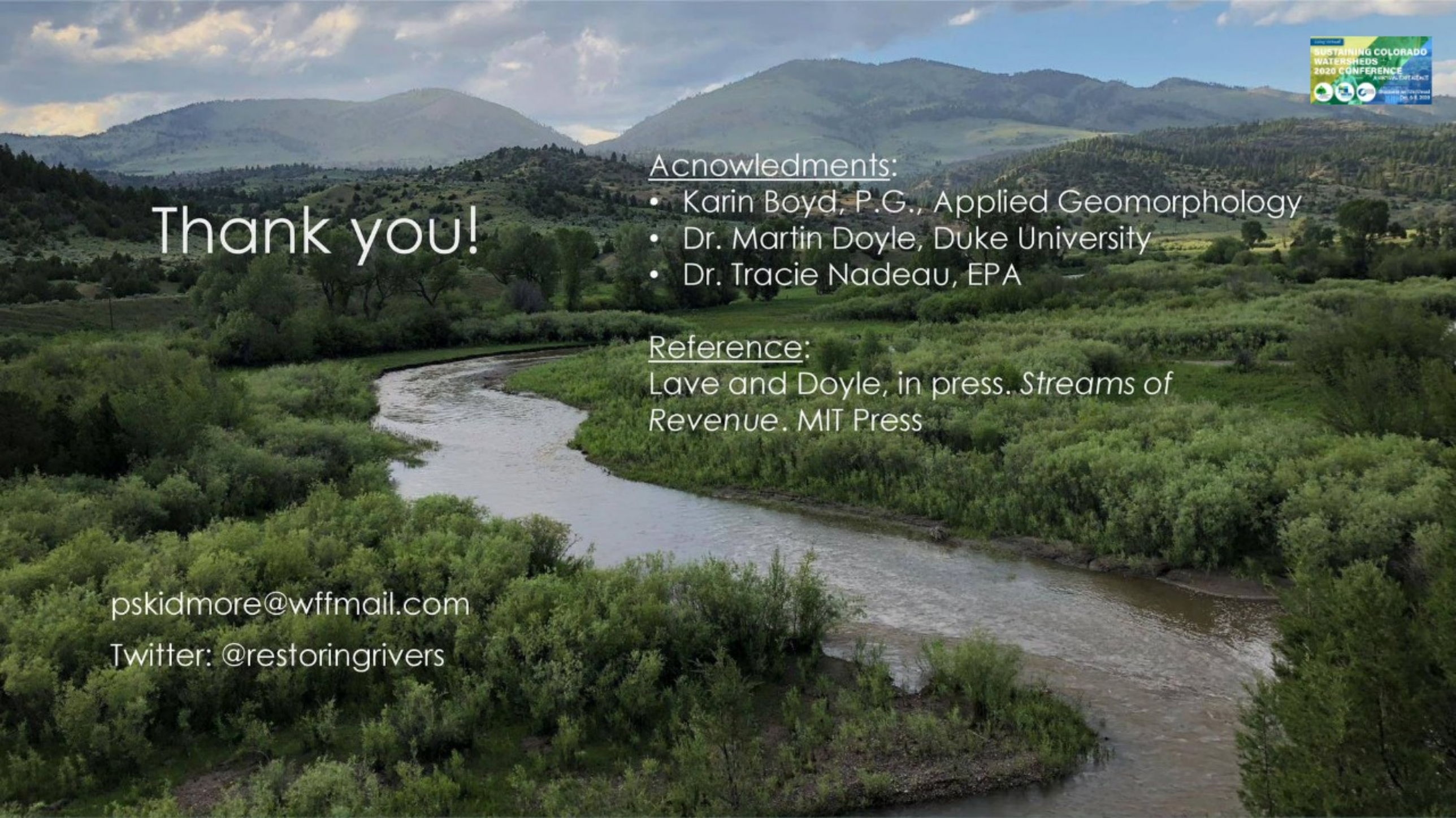


- **Equivalency** – focus on process and space
  - Riverscape area credit metrics
  - Watershed stratification
    - by process domains
    - by degree of hydrologic alteration
- **Certainty** – promote change tolerance
  - Acceptable ranges of performance
  - Complexity metrics, over time
  - Evolution tolerance



Skidmore and Doyle 2020



Thank you!

Acnowledments:

- Karin Boyd, P.G., Applied Geomorphology
- Dr. Martin Doyle, Duke University
- Dr. Tracie Nadeau, EPA

Reference:

Lave and Doyle, in press. *Streams of Revenue*. MIT Press

pskidmore@wffmail.com

Twitter: @restoringrivers

Q&A: Enter your questions for our presenters!

Do you think that is a way to translate these items to established, static monitoring protocols back East?

Can you expand on "consensus opinion"?

Is it partially a shift needed from USACE to implement more holistic mitigation?

How can mitigation requirements do a better job of including floodplains?

Are there models from other states that we can emulate? You briefly mentioned Oregon/PNW.

Who makes up the Market?

Any recommendations on how best to engage in the discussion with EPA and Corps in the West to shape the mitigation market?

Thoughts on passive restoration that achieves dynamic equilibrium by establishing easements and allowing rivers to adjust over time- possibly generations.

Do you think that the current [imperfect] policy is better than none and/or pre 2008 mitigation rule guidance?

Q&A: Enter your questions for our presenters!

Is it the states or federal govt that determines the rules of a mitigation program?

What about the changes needed in policy and legislation in conjunction with a paradigm shift in restoration practices and design to aid in better mitigation efforts?

Offsets are needed for permit fulfillment; if you are not convinced that mitigation is a successful offset- what do you, alternatively, suggest?

What are your thoughts on in-lieu fees vs. traditional mitigation banking for enabling more innovative approaches to mitigation and restoration?

Is it the states or federal govt that determine mitigation banking program requirements?

Thanks, Peter. What has the mitigation markets gotten right? In other words, what are the benefits as you see them?

Sounds a lot like the challenge of parenting human offspring and giving them freedom and autonomy

A key challenge I'm finding in a proposed mitigation bank on a California river that is still dynamic is that protecting existing function is valued significantly less for crediting than restoring function to historical floodplain etc.

Mitigation Banking: The Confluence of Policy, Business and Restoration

Lucy Harrington
Westervelt Ecological Services
Tom Smrdel
Headwaters Corporation

Who is Westervelt?

Our History

- Privately Held Company
- Founded in 1884
- 4th Generation Family Leadership
- WES Established in 2006

Our Mission

To provide enduring ecological solutions for the benefit of our stakeholders and the lands we conserve.

"We are Stewards of the Land"

Westervelt
ECOLOGICAL SERVICES

WESTERN REGION
600 North Market Blvd., Suite 3
Sacramento, CA 95834
916.646.3644

ROCKY MOUNTAIN REGION
7348 South Alton Way, Suite 9D
Centennial, Colorado 80112
303.927.0037

THE WESTERVELT COMPANY
1400 Jack Warner Parkway NE
Tuscaloosa, Alabama 35404
205.562.5000

SOUTHEAST REGION
2128 Moores Mill Road, Suite B
Auburn, Alabama 36830
334.821.1999

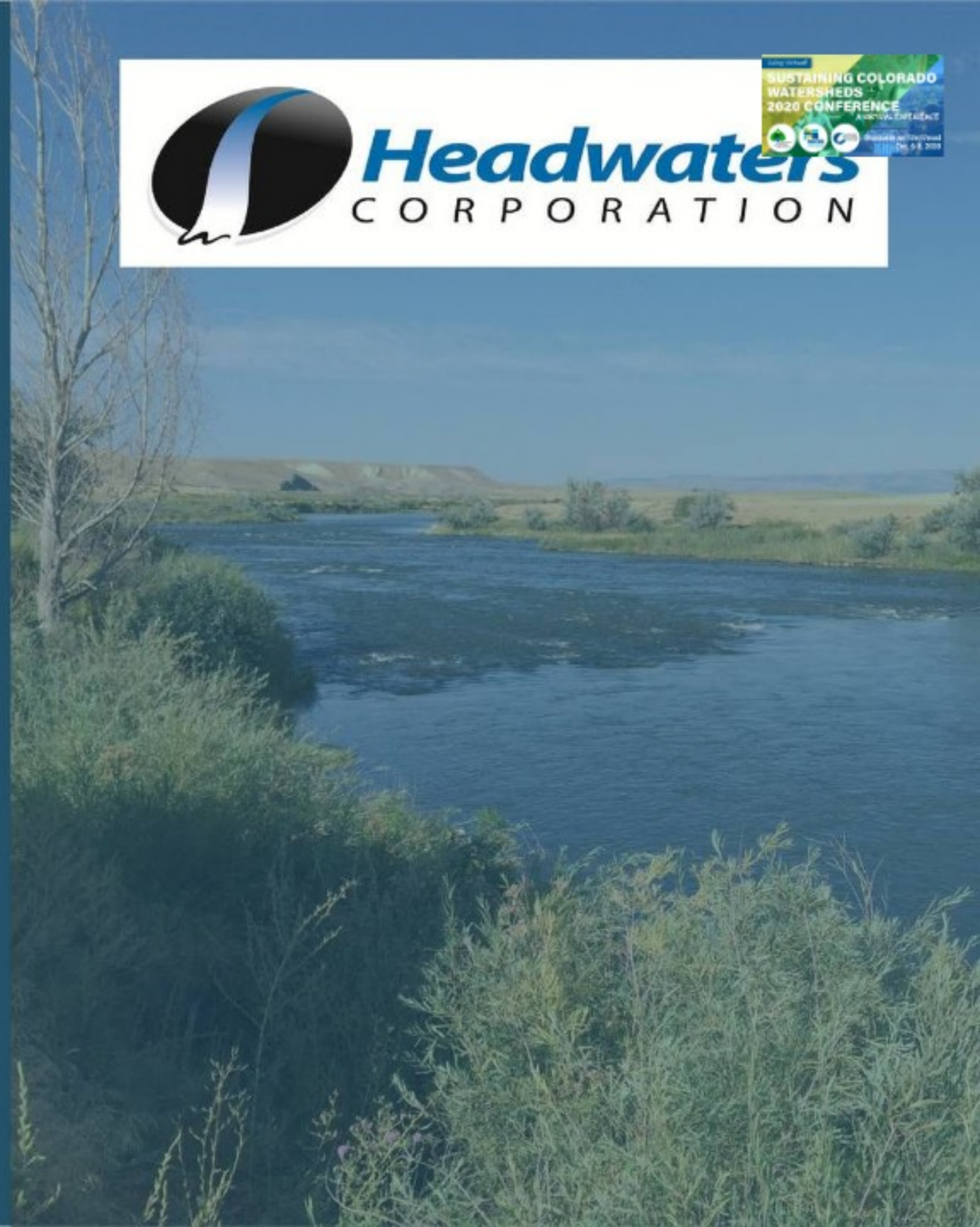
About Headwaters

- Founded in 2007
- Engineers, geomorphologists, biologists, land managers, environmental policy and administration specialists
- Provides Executive Director & Staff for Platte River Recovery Implementation Program

Our Mission

Bringing common sense solutions and systems thinking to emergent, complex, and large-scale natural resources challenges.

"Where Ideas Flow"



Presentation Overview

- Intro to Mitigation Banking
- Big Thompson Confluence Project
- Stream Quantification Tool Integration
- Lessons Learned

Intro to Mitigation Banking

Mitigation Overview:
Clean Water Act (Section 404)

Types of Compensatory Mitigation

- Mitigation Banking (wetlands)
- In-lieu Fee Mitigation ($$$)
- Project Specific Mitigation (also known as permittee responsible mitigation or PRM)

Big Thompson Confluence Project

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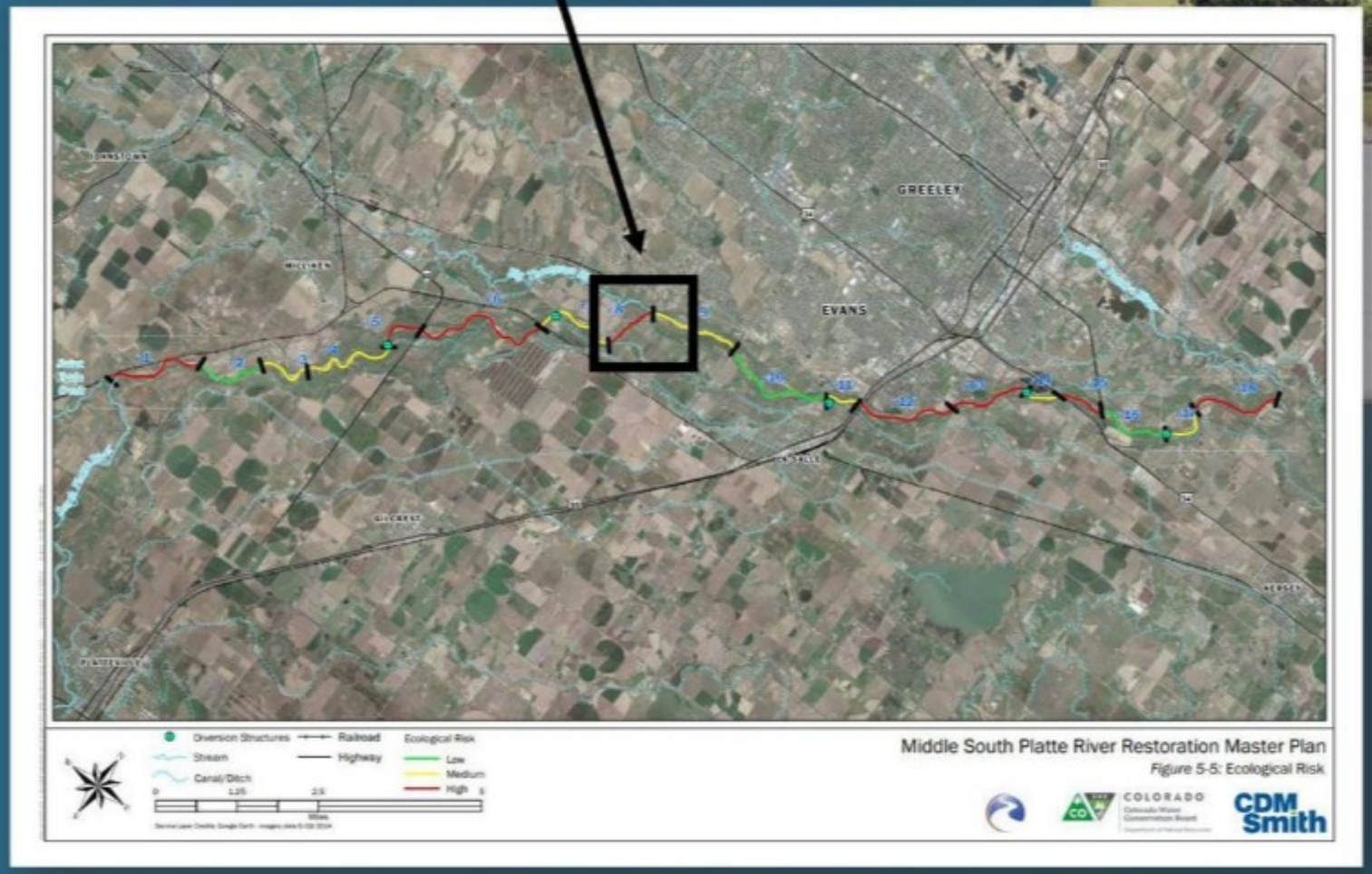
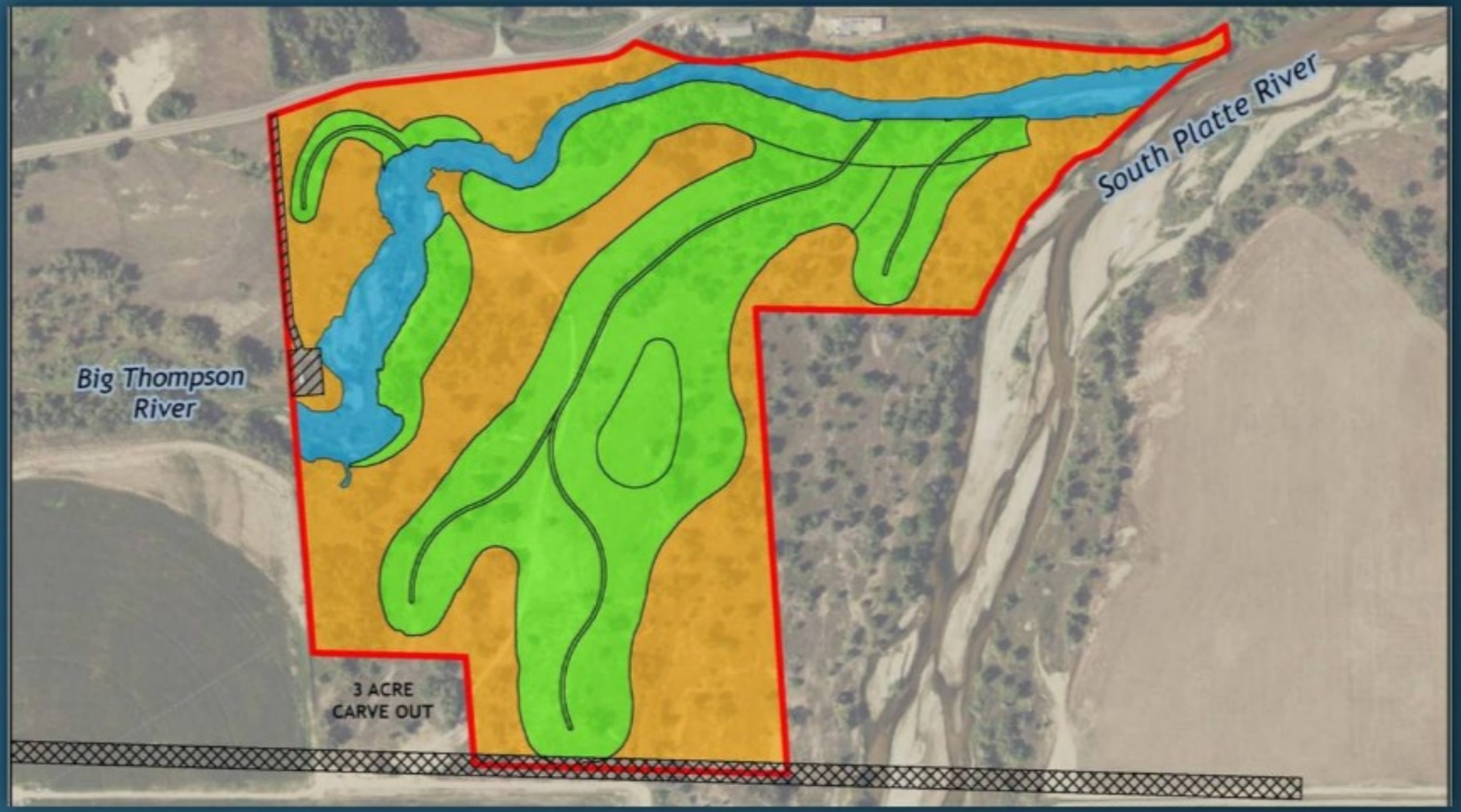
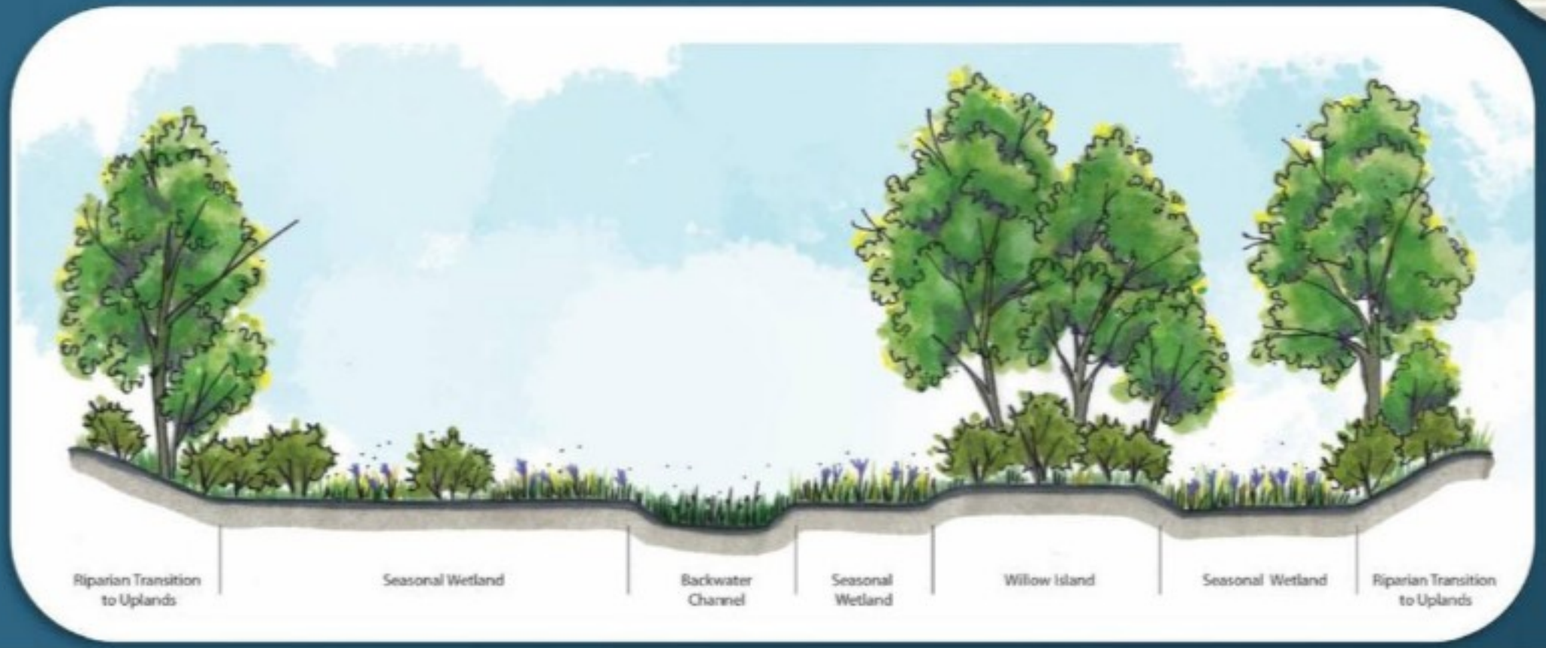
Big Thompson Confluence Mitigation Bank Site: Approximate Location



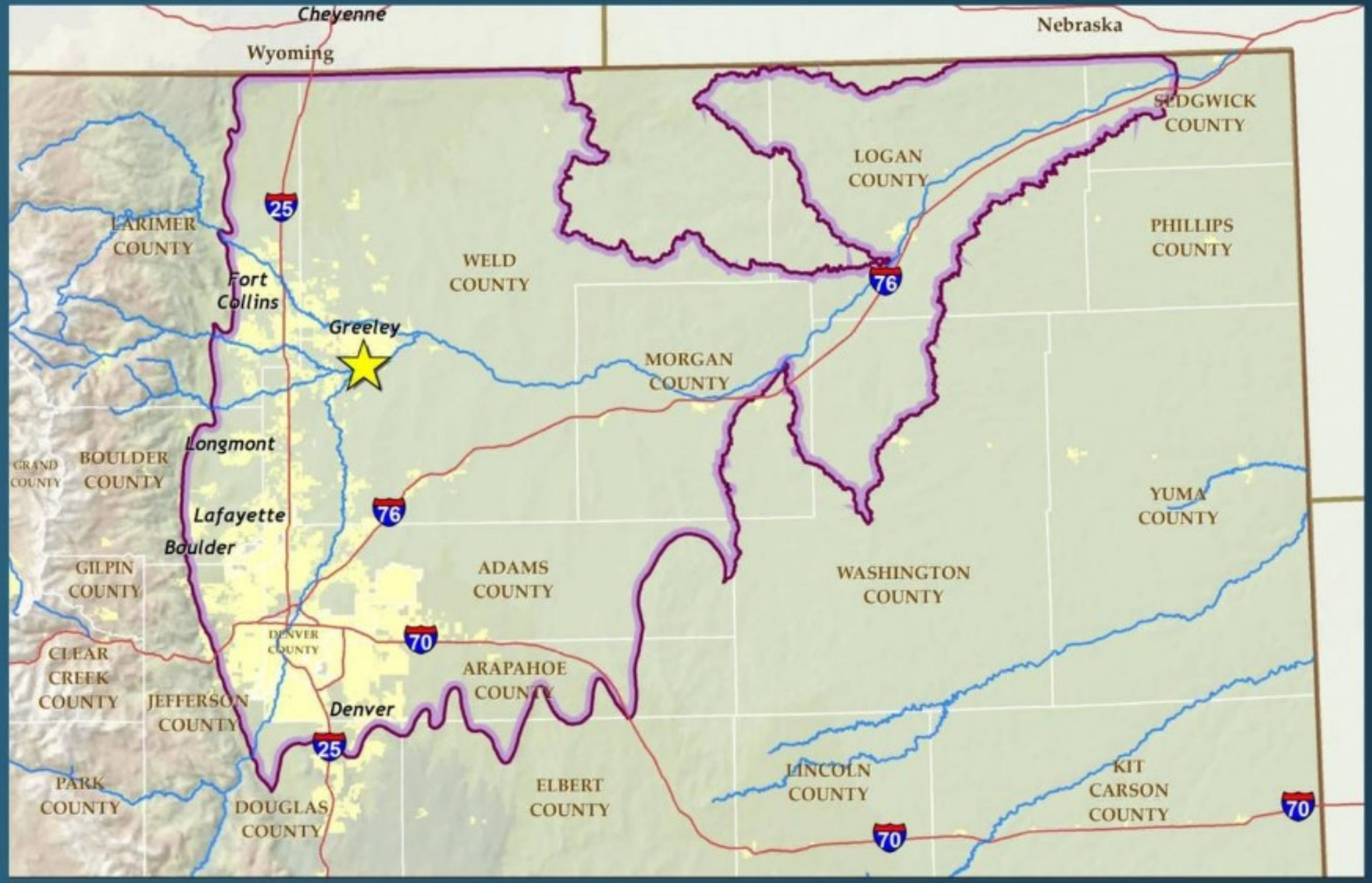


Credit Type	Credit Quantity
Stream Credits	460 Functional Feet
Wetland Credits	34.76 Acres
Total Acreage Permanently Protected	**~75 Acres**

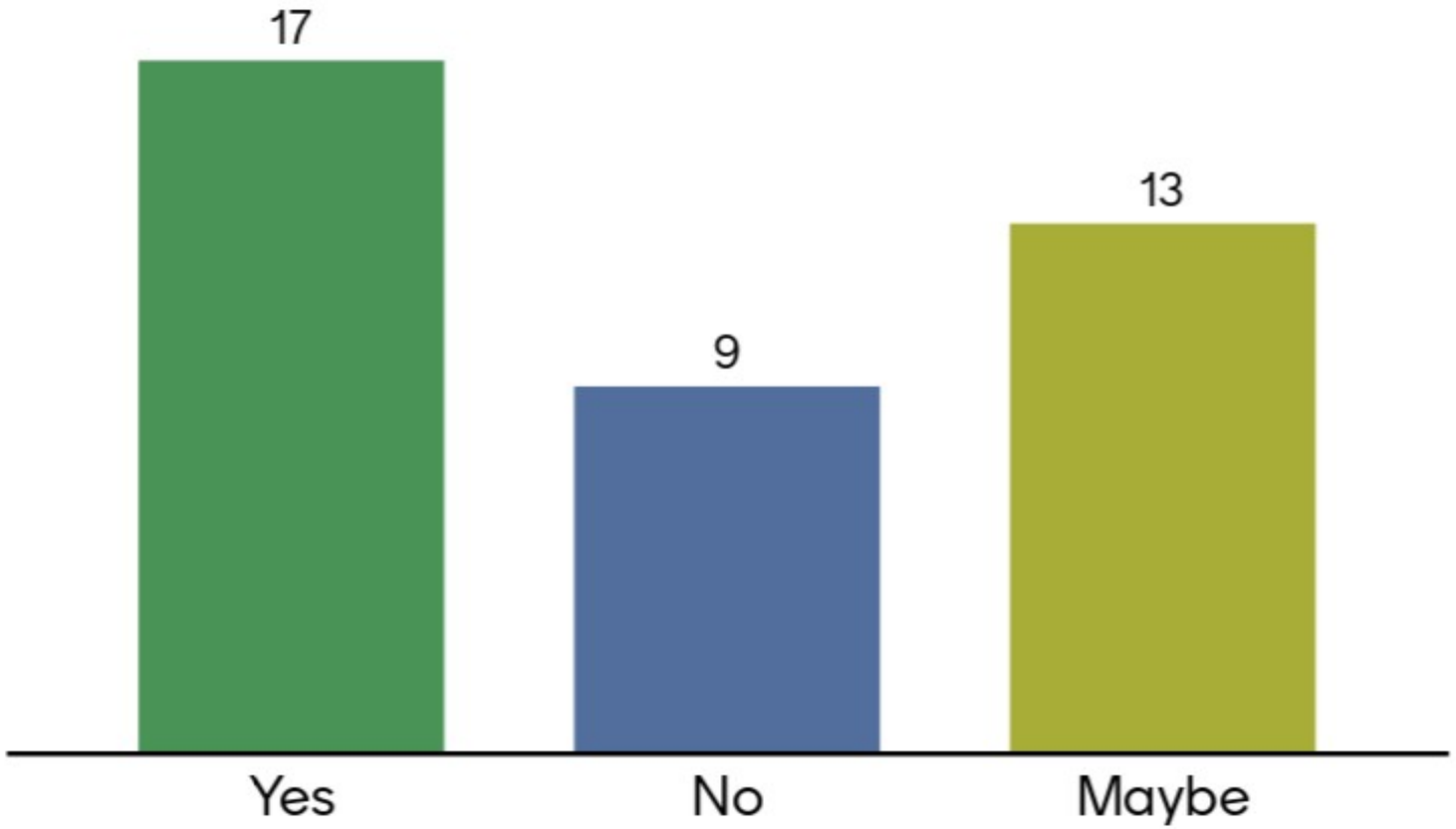
- 2008 Mitigation Rule
- SQT & COMP Compliant
- Permanent Conservation Easement
- Long-term Stewardship Fund
- EXPENSIVE NECESSITIES



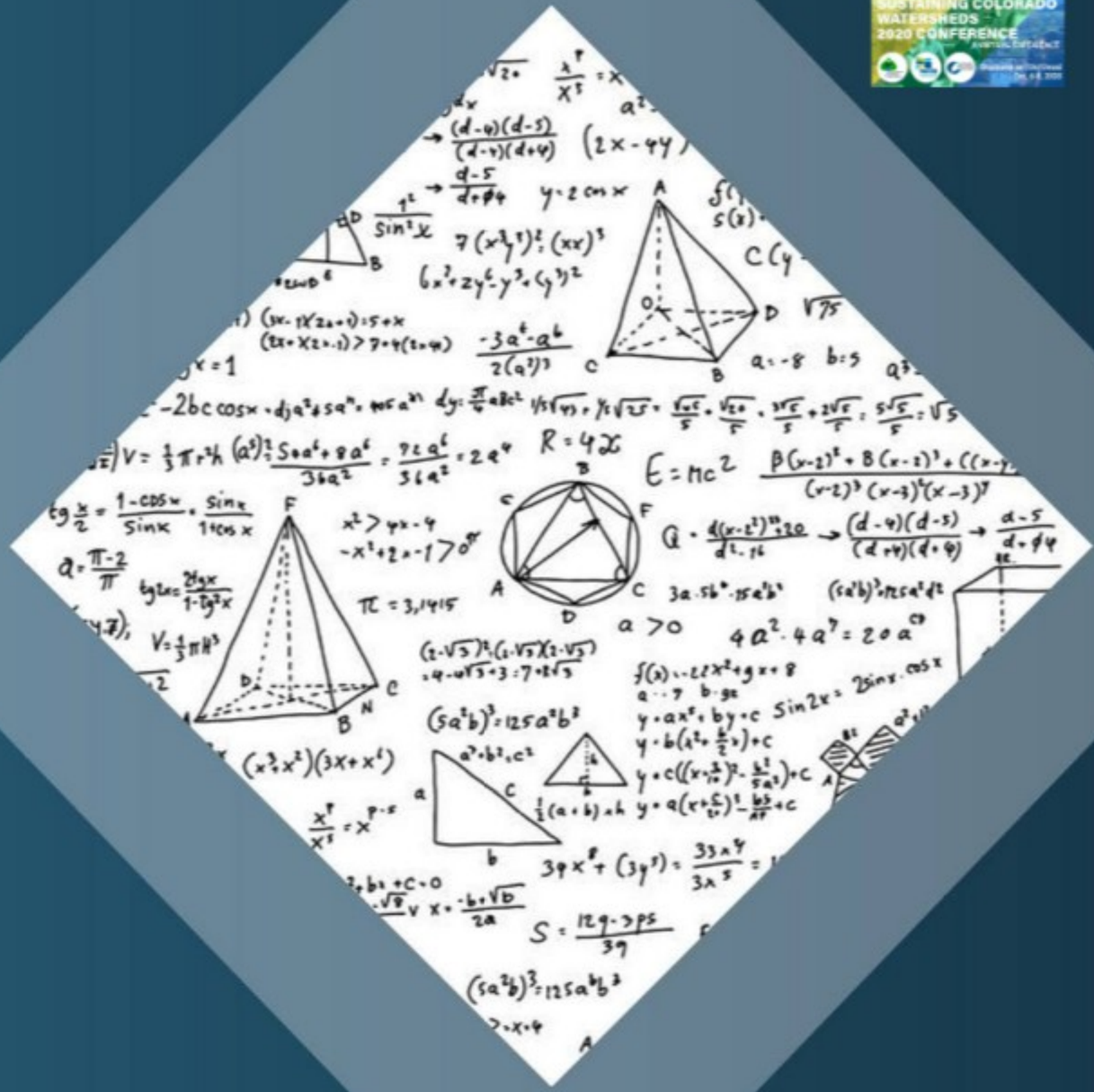
General Service Area



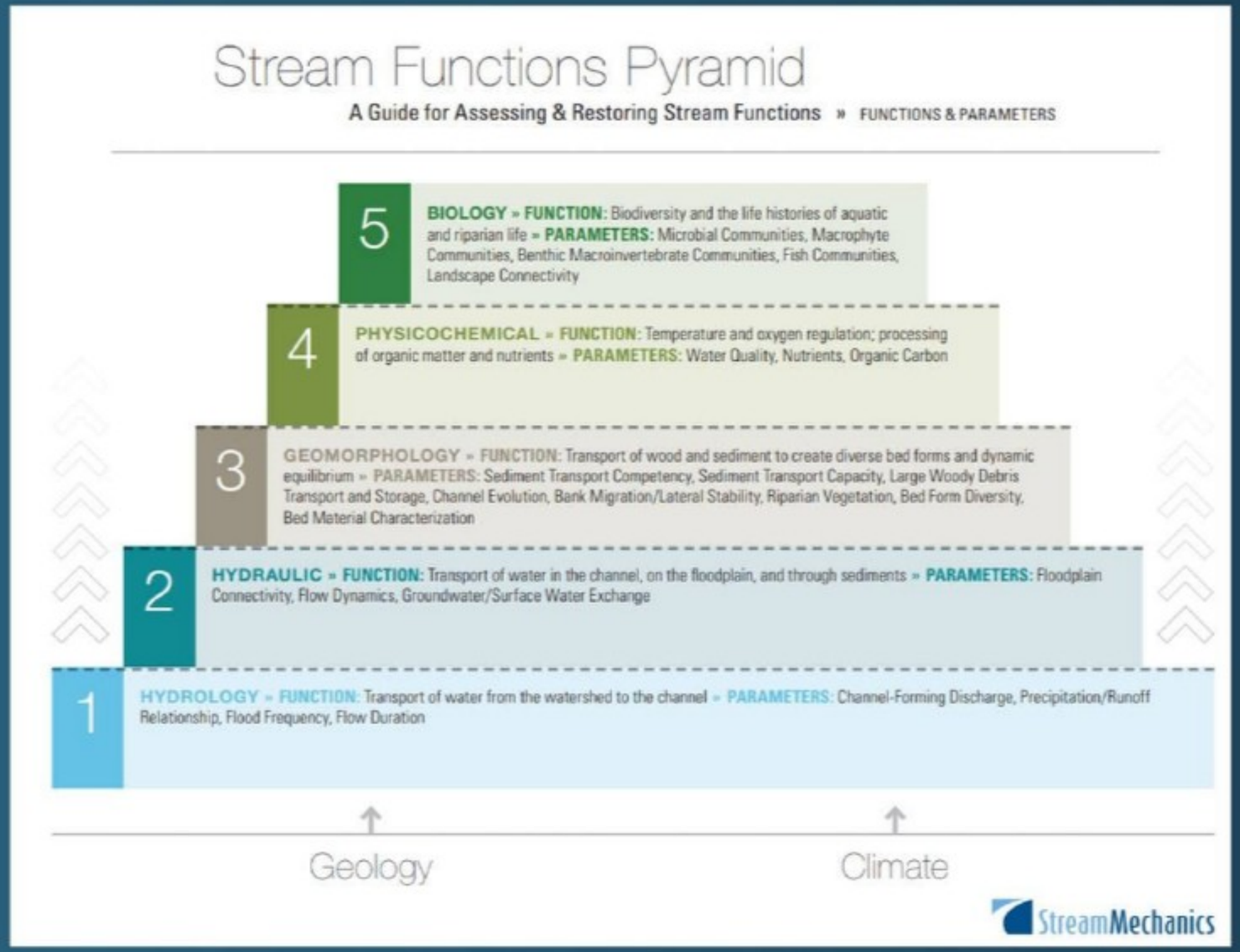
Do you anticipate either needing or implementing stream mitigation within the next 5 years?



SQT Integration



Use of the SQT



**Stream Function Pyramid (Will Harman et al)

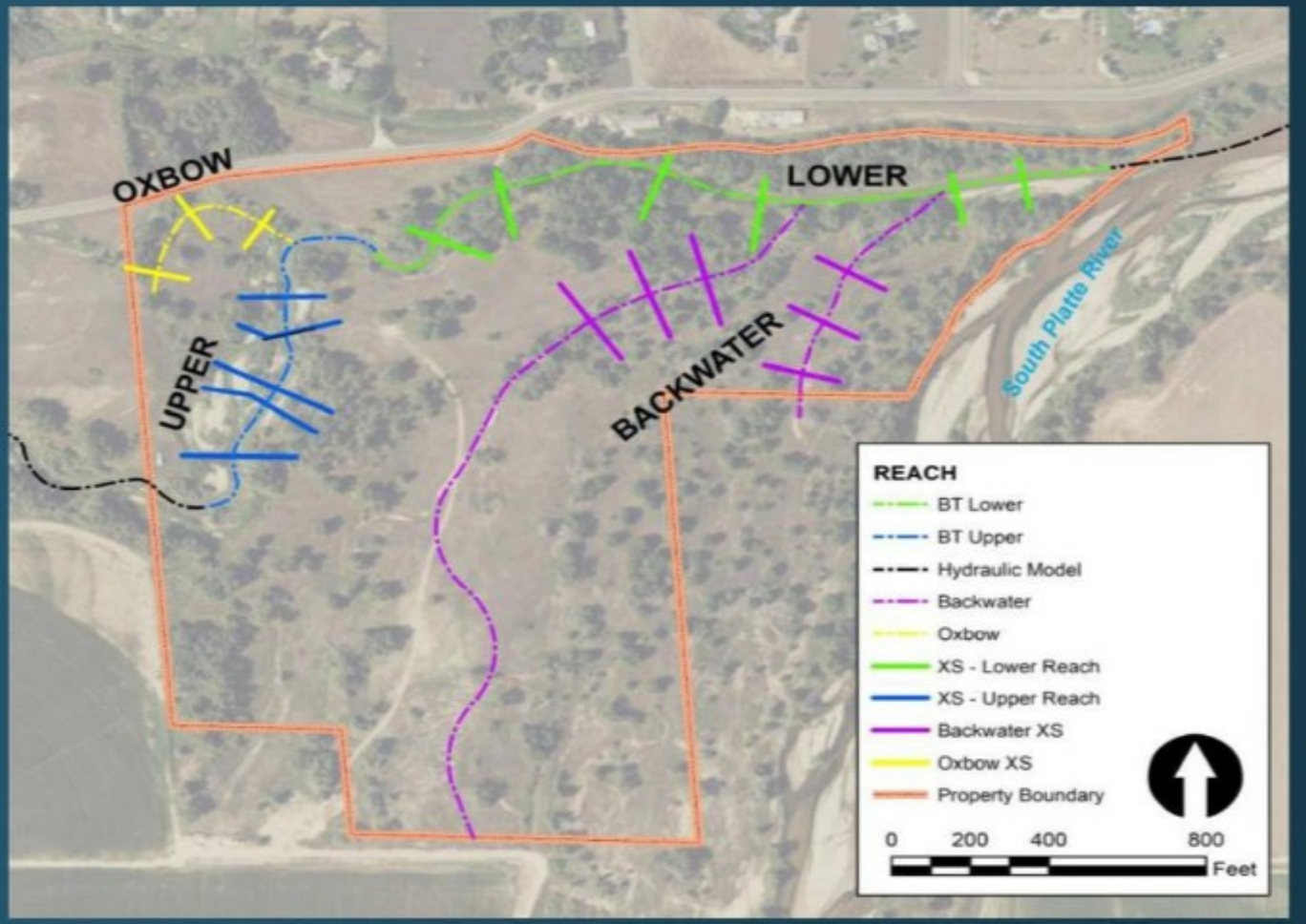
Use of the SQT

Colorado Stream Quantification Tool
and Debit Calculator
User Manual (Beta Version)

Army Corps of Engineers

StreamMechanics

Ecosystem Planning & Restoration



Use of the SQT

SQT Results

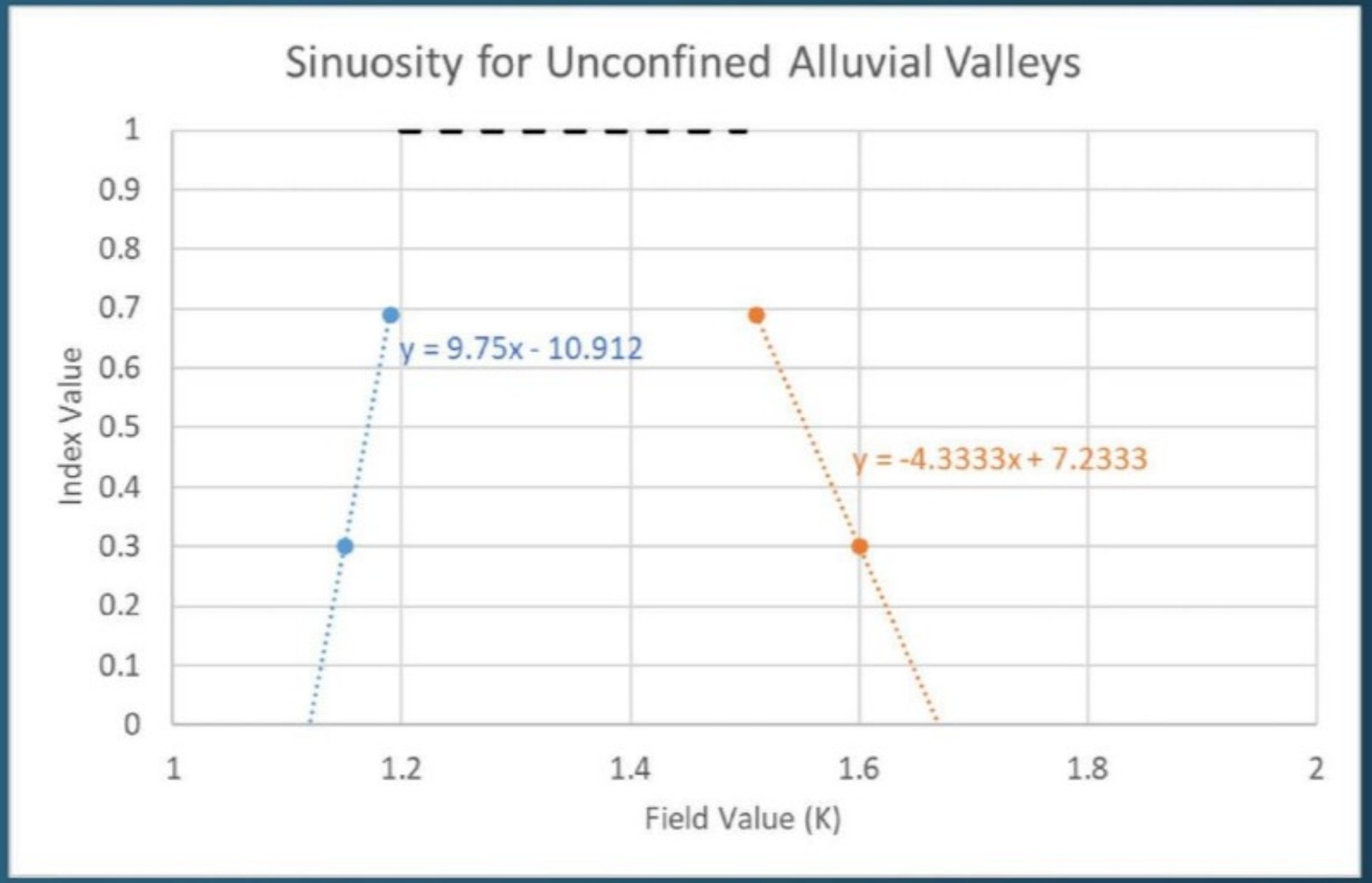
FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Reach Hydrology & Hydraulics	Reach Runoff	0.89	0.89
	Flow Alteration		
	Floodplain Connectivity	0.78	1.00
Geomorphology	Large Woody Debris	0.74	1.00
	Lateral Migration	0.56	0.87
	Bed Material Characterization		
	Bed Form Diversity	0.54	0.39
	Plan Form		
	Riparian Vegetation	0.31	0.81
Physicochemical	Temperature		
	Nutrients		
Biology	Macroinvertebrates		
	Fish		

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.41
Proposed Condition Score (PCS)	0.52
Change in Functional Condition (PCS - ECS)	0.11
Existing Stream Length (ft)	1100
Proposed Stream Length (ft)	1100
Change in Stream Length (ft)	0
Existing Functional Feet (FF)	451
Proposed Functional Feet (FF)	572
Proposed FF - Existing FF	121
Percent Change in FF (%)	27%

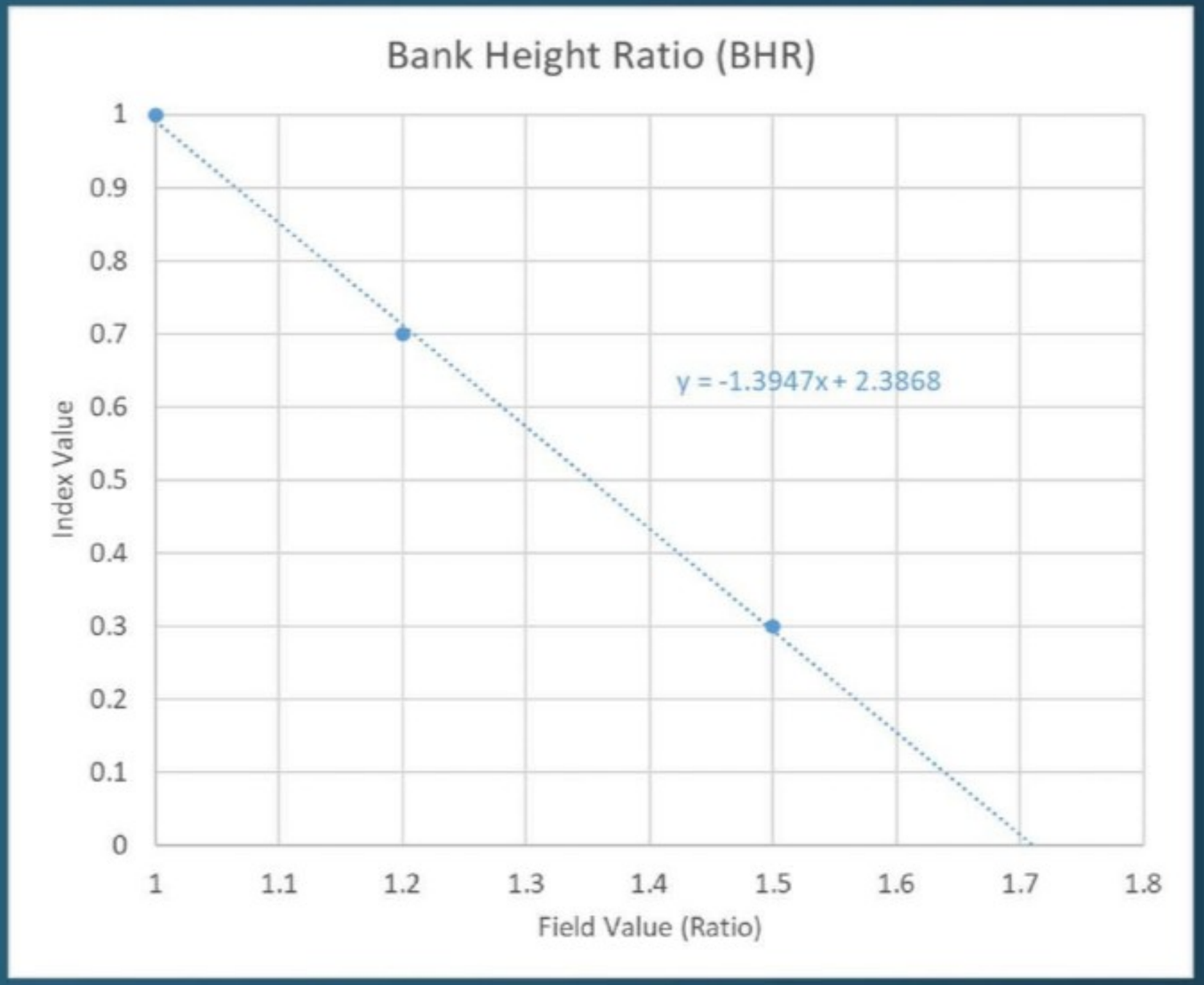
FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	**ECS**	**PCS**	**Functional Change**
Reach Hydrology & Hydraulics	0.84	0.95	0.11
Geomorphology	0.53	0.77	0.24
Physicochemical			
Biology			

MITIGATION SUMMARY		
121	**(FF)**	**Lift**

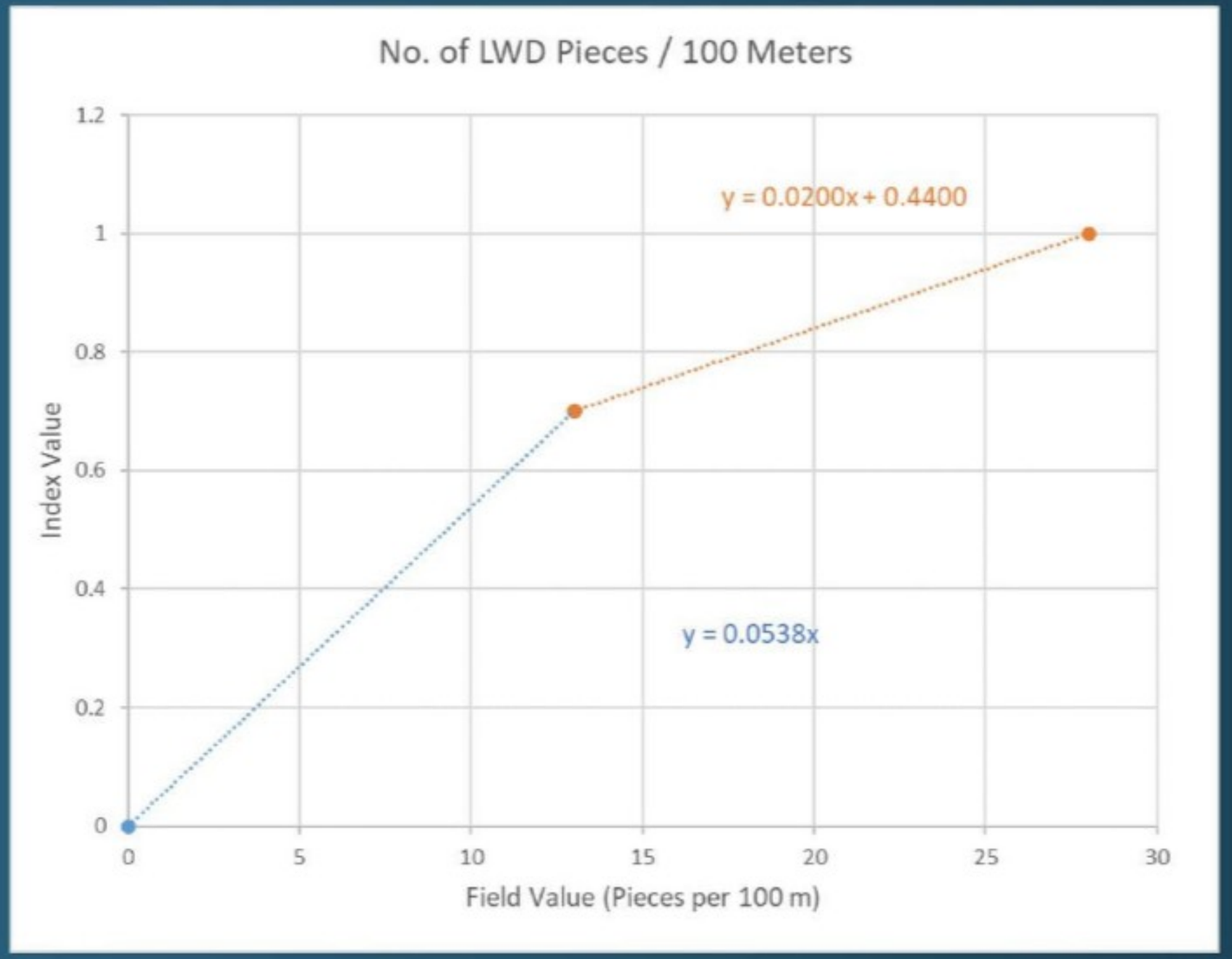
- Data collected for all categories; only pursuing lift in lower levels of pyramid due to limitations related to watershed position



Sinuosity for Unconfined Alluvial Valleys						
Field Value			1.15	1.19		1.2
			1.6	1.51		1.5
Index Value	0	0.29	0.3	0.69	0.7	1



Bank Height Ratio (BHR)						
Field Value			1.5		1.2	1
Index Value	0	0.2	0.3	0.69	0.7	1



Field Value	0				13	28
Index Value	0	0.29	0.3	0.69	0.7	1

Lessons Learned

- Nature is unstable and unpredictable; mitigation policy and business requires reliability, repeatability and consistency.

- Restoration high in the watershed is eas(ier); mitigation demand is often low in the watershed.

- A good practice at one place may be a bad practice at a different place.

Final Thoughts

Market is driven by regulation;

Sustainable and durable restoration is expensive;

Stream quantification is hard!

Thank You!


SUSTAINING COLORADO
WATERSHEDS
2020 CONFERENCE


COLORADO
PARKS • WILDLIFE


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


CDPHE


NATIONAL FISH AND WILDLIFE FOUNDATION
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Q&A: Enter your questions for our presenters!

THANK YOU!

Our next session begins right after this at 2:00pm!
Financial/Legal/Social Tools to Keep Water Flowing in Rivers

To get there….

Close out of this Webinar session, return to EXPO, and navigate to Session 2 on Oct. 6

Then open that session and click “Join” to enter the next Webinar session