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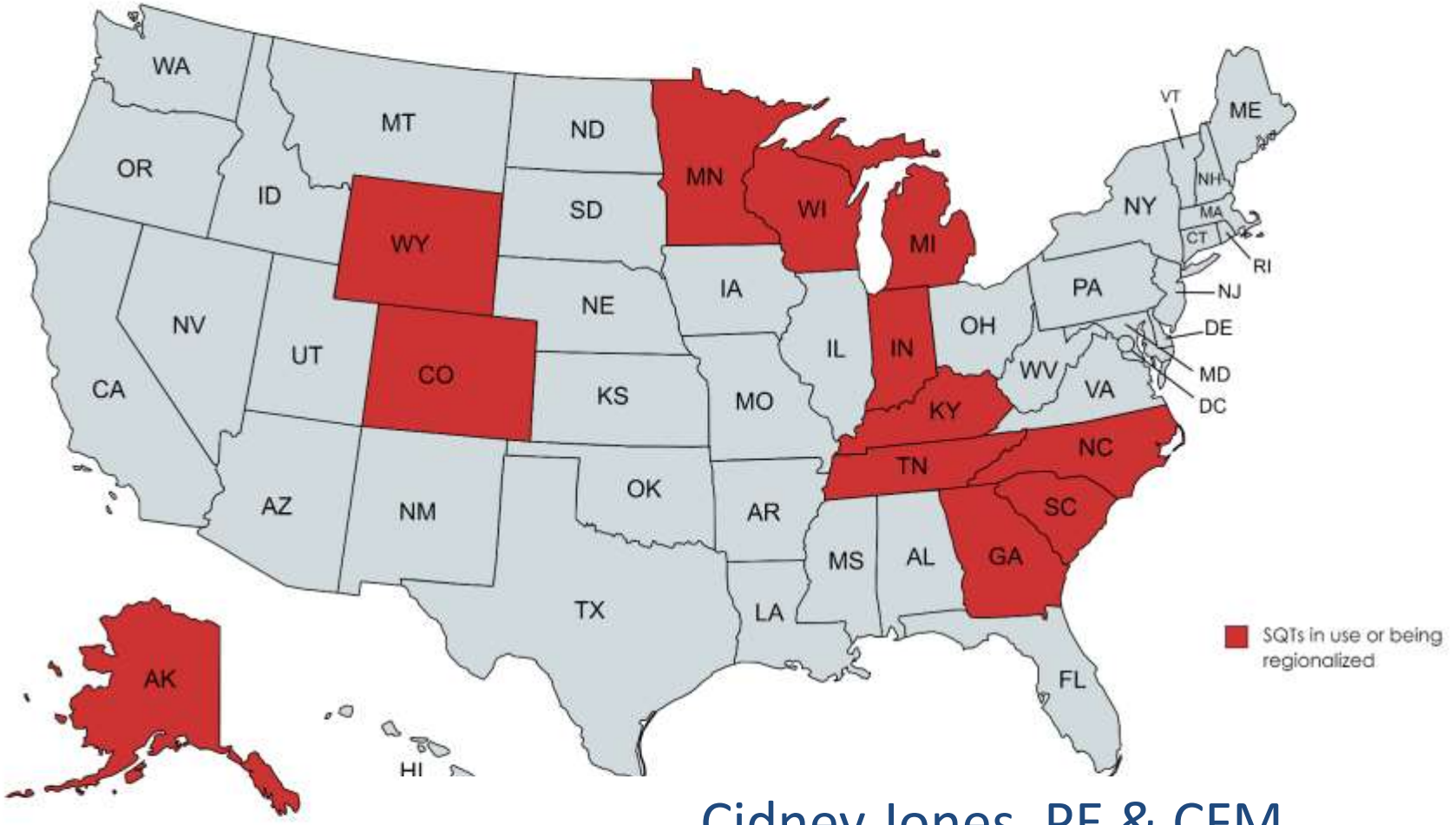
Lessons Learned from Regionalizing the SQT



Cidney Jones, PE & CFM

August 22, 2023

Ecosystem Planning & Restoration

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The SQT Quantifies Functional Uplift

Restoration Activities

Monitoring

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The SQT Quantifies Functional Loss

Impact Activities

A goal is to create better parity between credits and debits.

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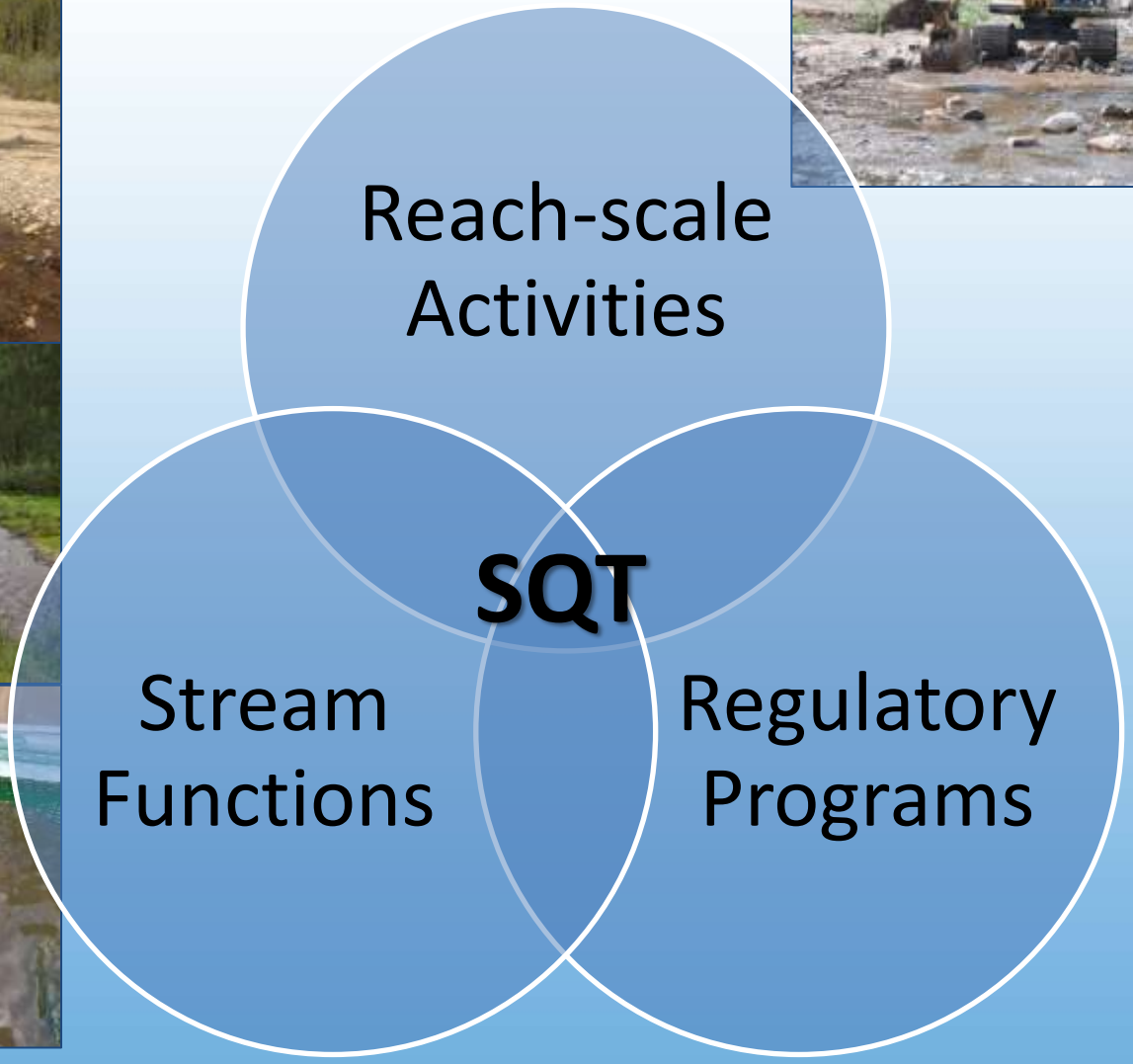

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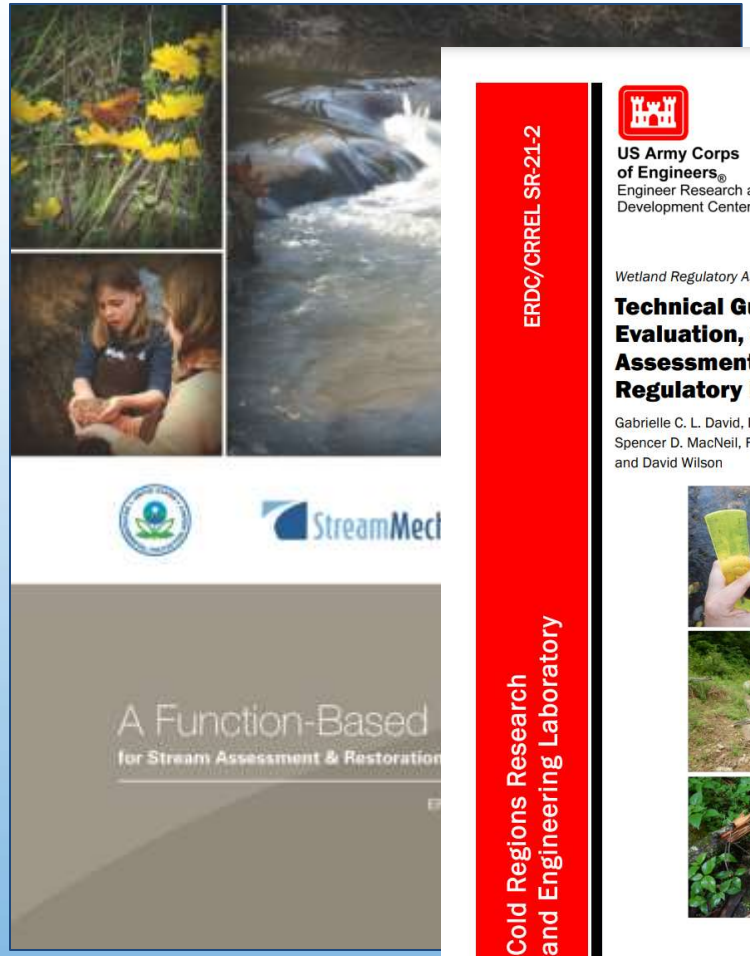
Related Works



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Wetland Regulatory Assistance Program (WRAP)

Technical Guide for the Development, Evaluation, and Modification of Stream Assessment Methods for the Corps Regulatory Program

Gabrielle C. L. David, D. Eric Somerville, Julia M. McCarthy, Spencer D. MacNeil, Faith Fitzpatrick, Ryan Evans, and David Wilson

Septem

Approved for public release; distribution is unlimited.

Stream Mitigation Accounting Metrics

Exploring the Use of Linear-based, Area-based, and Volume Units of Measure to Calculate Impacts and Offsets to Different Stream Archetypes

EPA 840-R-21-003

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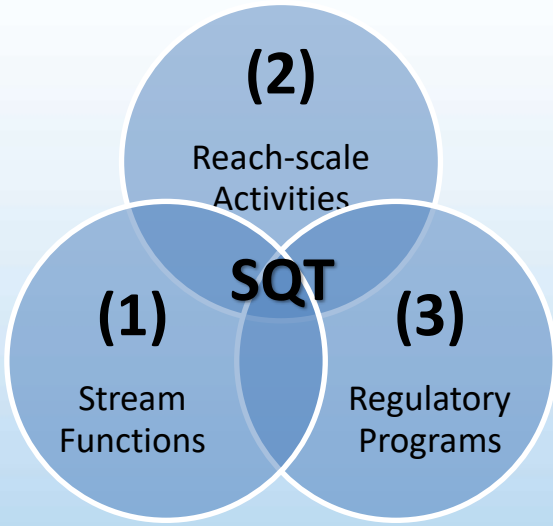

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Wetland Regulatory Assistance Program (WRAP)

Technical Guide for the Development, Evaluation, and Modification of Stream Assessment Methods for the Corps Regulatory Program

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September 2021

Therefore, the Regulatory Program needs function-based stream assessments (1) to characterize a stream's condition or function, (2) to improve understanding of the impact of a proposed action on an aquatic resource, and/or (3) to inform the development of stream compensatory mitigation tools rooted in stream condition and/or function. A function-based stream assessment can provide regulatory decision makers with the resources to objectively consider alternatives, minimize impacts, assess unavoidable impacts, determine mitigation requirements, and monitor the success of mitigation projects.

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Phases

1. Develop SOW
2. Gather team
3. Determine functions
4. Select regionally relevant metrics to quantify functions
5. Develop reference framework
6. Build assessment models and develop scoring procedure
7. Validation & intercalibration
8. Peer review, public comment, and beta-testing
9. Implementation!

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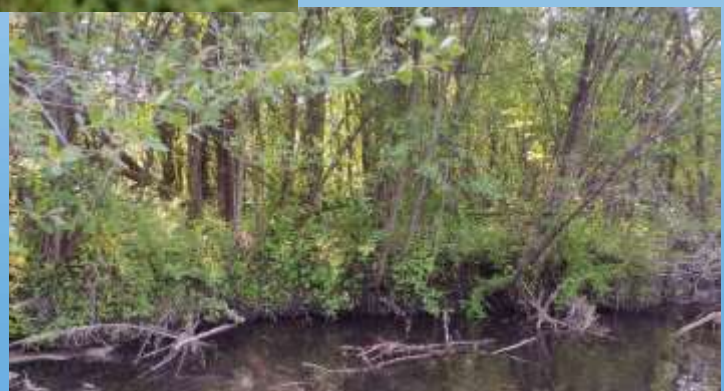
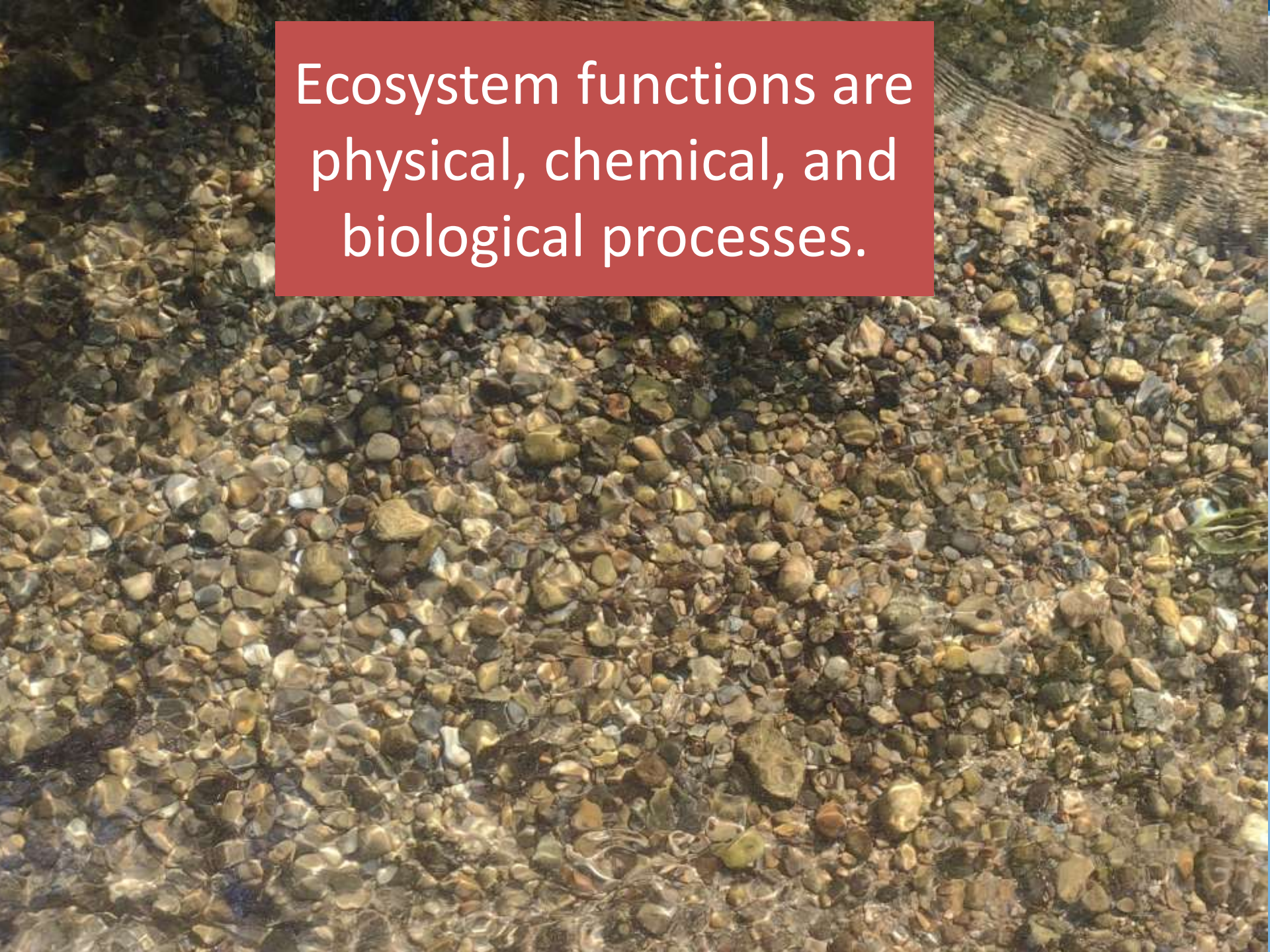
Experience requirements are required!

Teams need expertise in botany, aquatic ecology, hydrology, geomorphology.




Ecosystem functions are physical, chemical, and biological processes.

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Stream condition is the relative ability to maintain an aquatic community comparable to high-quality resources.

Not Functioning	Functioning-At-Risk	Functioning

0.00 ⟷ 0.30 ⟷ 0.70 ⟷ 1.00

Think Quality

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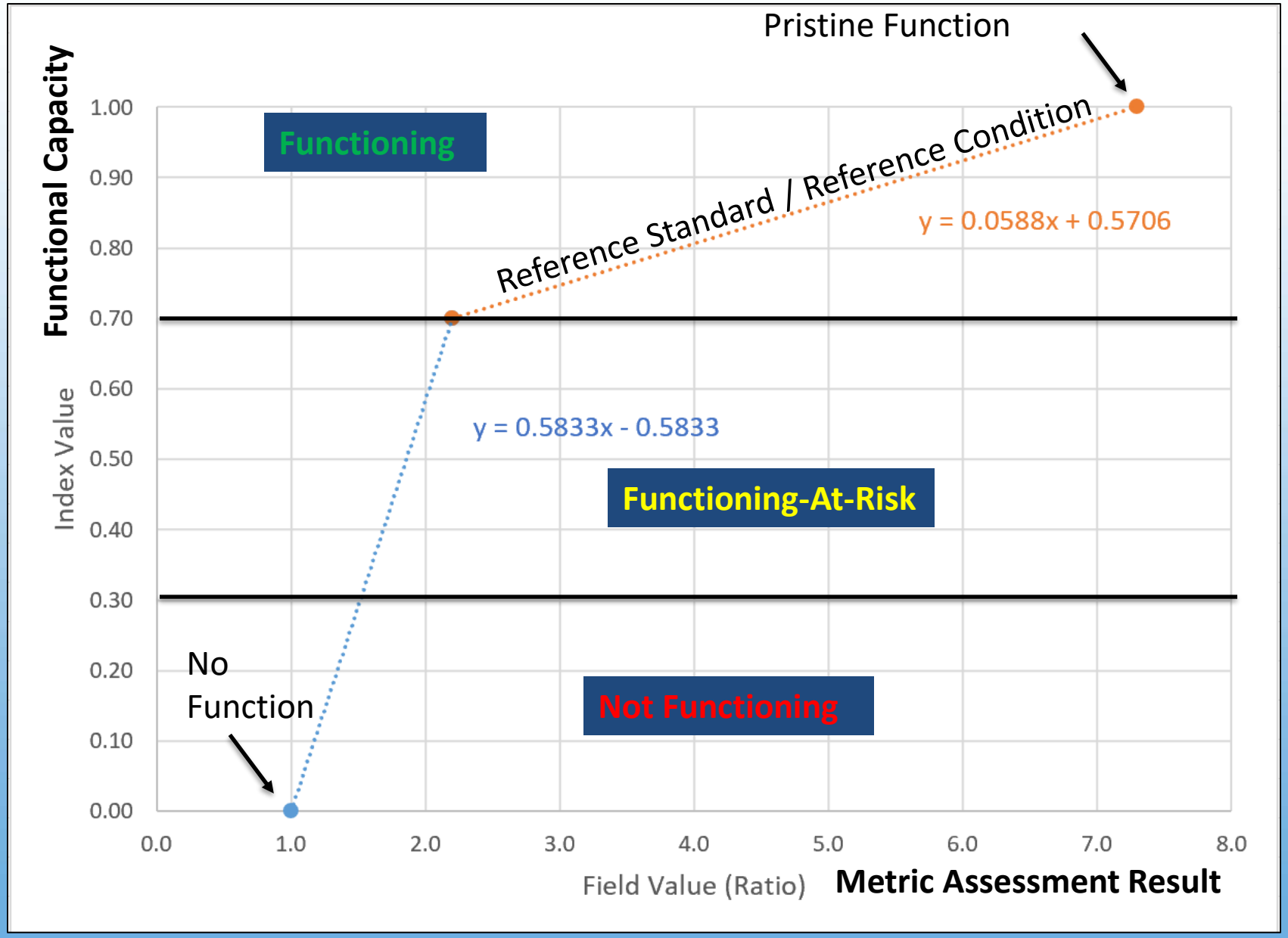

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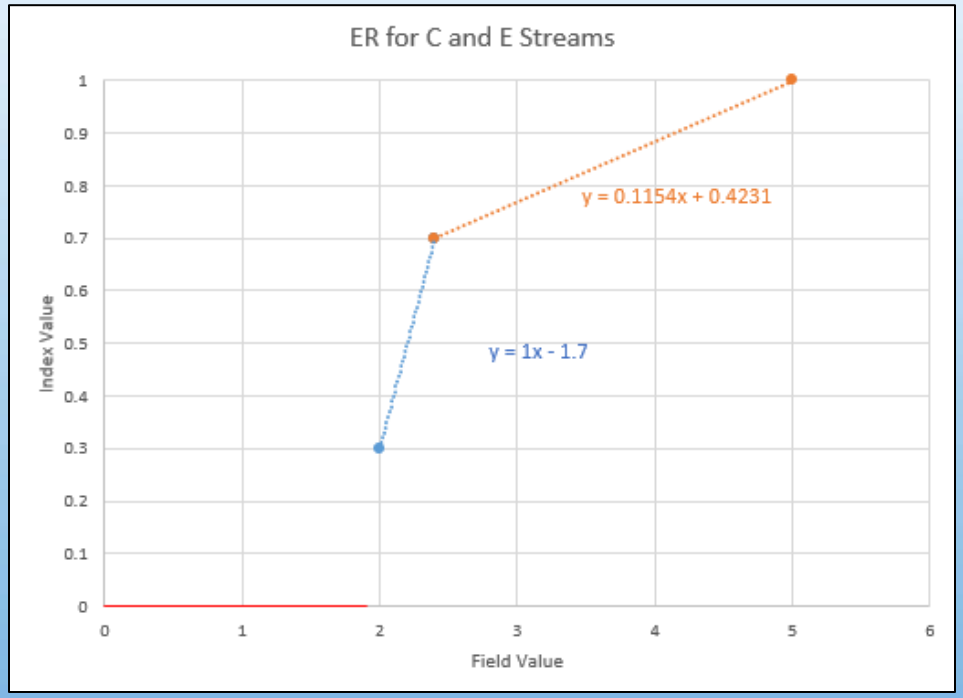
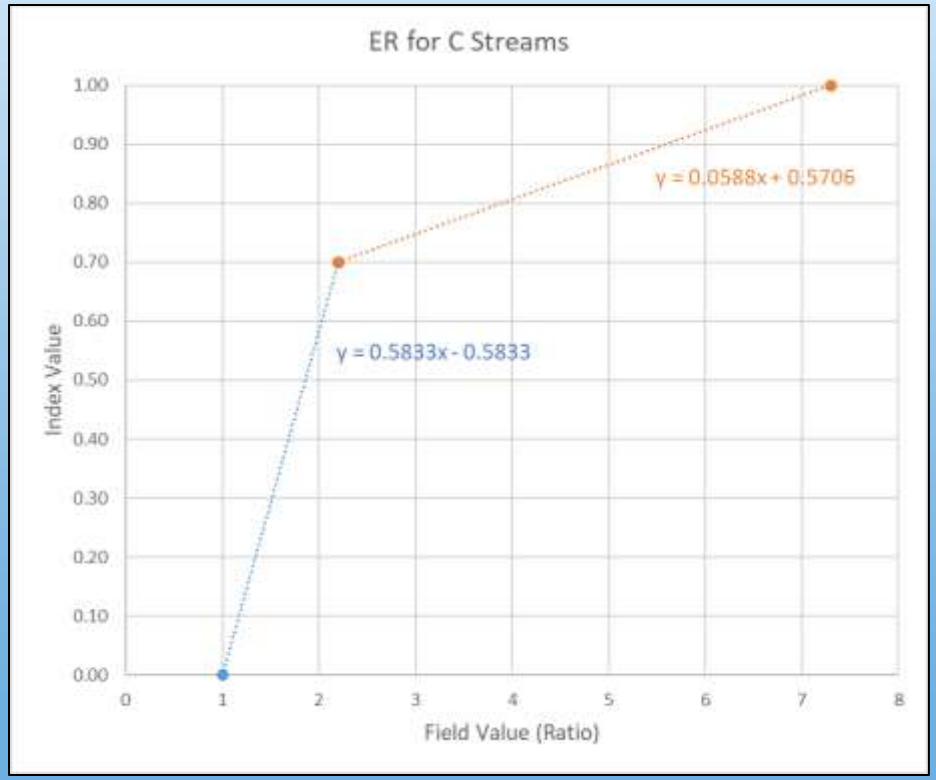
We've come a long way thanks to peer review and SQT implementation.





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Development of Reference Standards & Curves

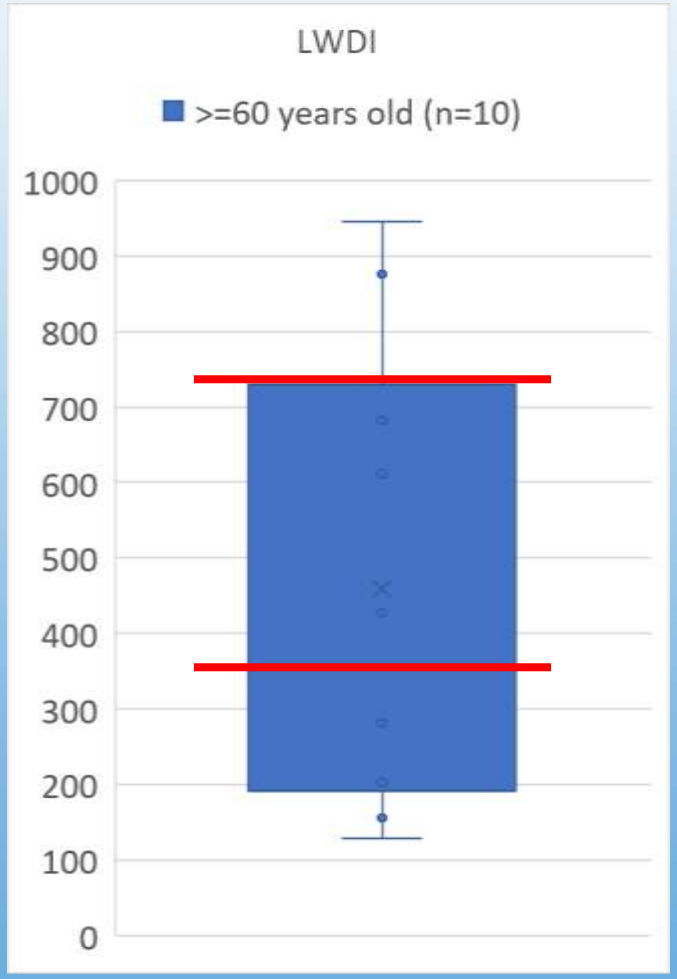
Define Reference thresholds using:

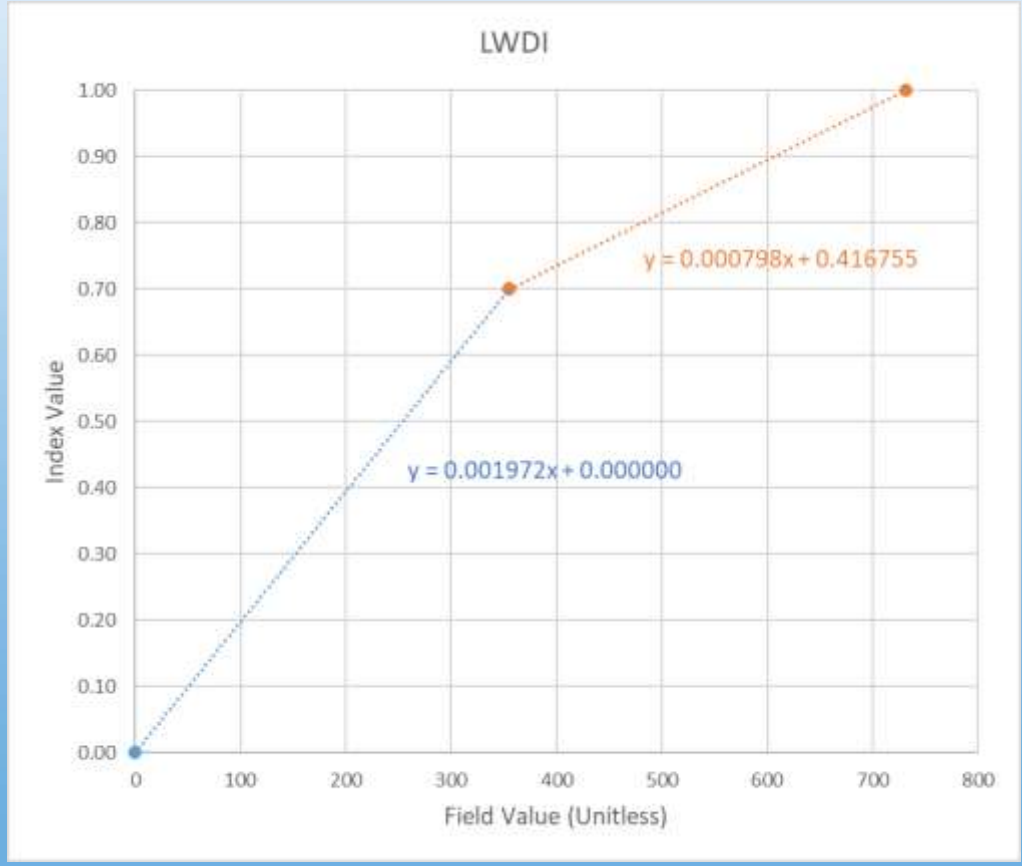
- New or existing data sets
  - BLM AIM dataset was used for Vegetative Complexity in the AKSQTint
- Literature
  - Peer reviewed, government docs, conferences
- Existing Indices
  - Usually from state water quality programs

- The above information is used by a team of subject-matter experts to develop the reference curves.

LWDI

Index Value	Field Value	Guidance
1.00	731	75th percentile value
0.70	355	Median value
0.00	0	Minimum value possible





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Select regionally relevant metrics to quantify functions.

- Must be able to develop a reasonable reference curve.
  - Some metrics are more suitable for design.
- Preference for physical and quantitative measures.
  - Aligns better with developing performance standards and monitoring.

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Data primarily available for single-thread, wadeable, perennial streams

Applicable Parameters	Perennial	Intermittent	Ephemeral	Multi-thread Channels
Reach Runoff	x	x	x	x
Flow Alteration	x	x		x
Baseflow Dynamics	x			
Floodplain Connectivity	x	x	x*	x (BHR only)
Large Wood*	x	x	x	x
Lateral Migration	x	x	x	x
Bed Form Diversity	x	x		
Riparian Vegetation	x	x	x	x
Temperature	x	Where baseflows extend through sampling period		x
Dissolved Oxygen	x			x
Nutrients	x			x
Macroinvertebrates	x			x (perennial only)
Fish	x	x		x

* *May not be applicable if large wood is not naturally present in the system.*

Floodplain Connectivity is not used for ephemeral channels in the TN SQT

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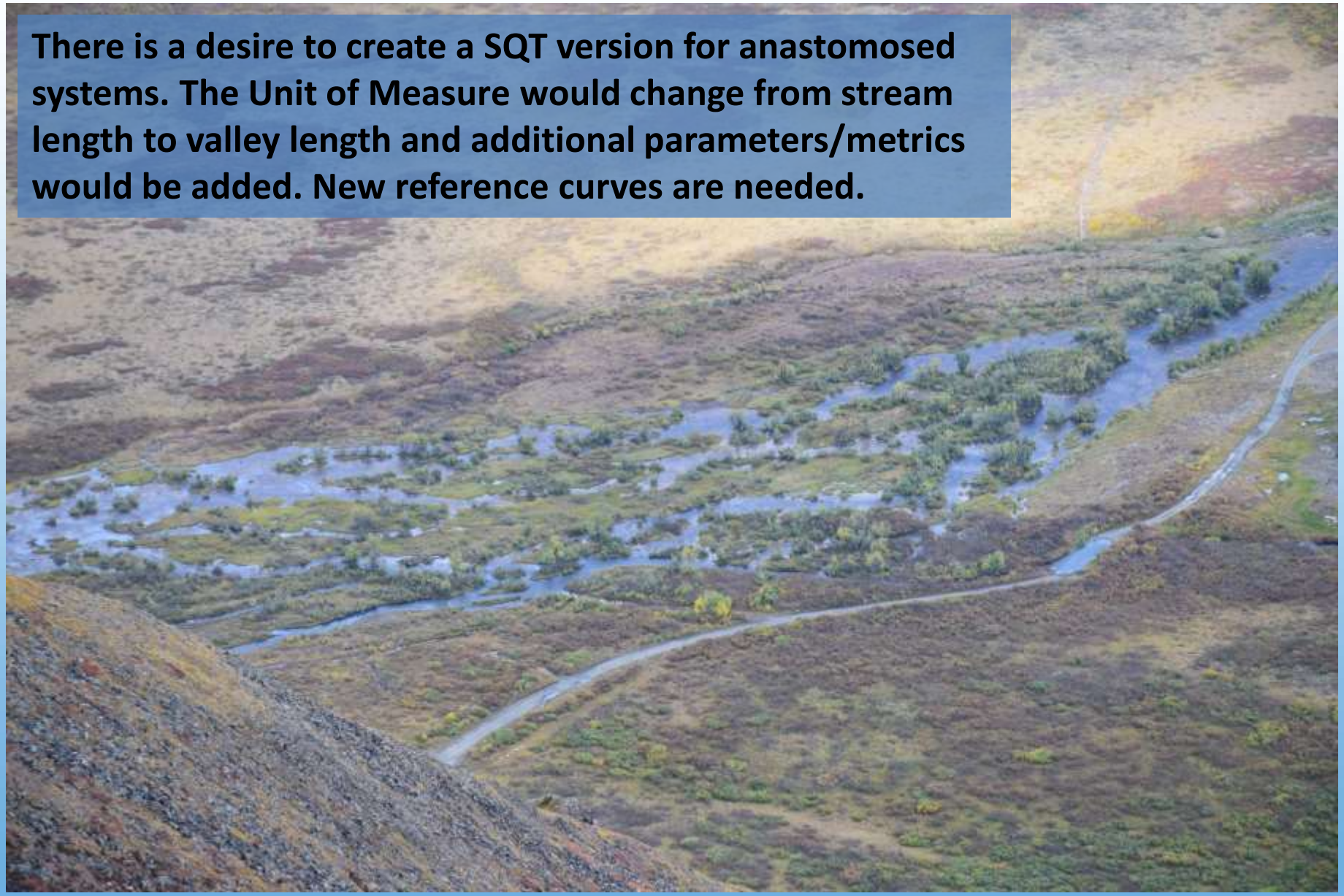

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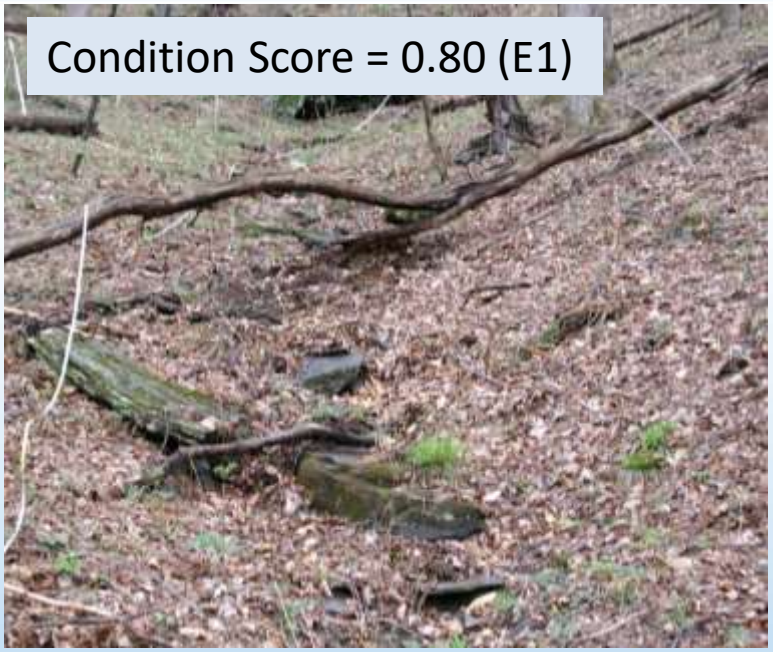
The overall scores should not be compared or contrasted between sites when parameters and metric selection varies between project sites.



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QT Output Summary

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Hydrology	Catchment Hydrology		
	Reach Runoff	0.33	0.48
Hydraulics	Floodplain Connectivity	0.47	0.86
	Flow Dynamics	0.00	1.00
Geomorphology	Large Woody Debris	0.15	0.53
	Lateral Migration	0.39	0.91
	Bed Material Characterization		
	Bed Form Diversity	0.60	0.86
	Riparian Vegetation	0.	
Physicochemical	Temperature		
	Turbidity		
	Diatoms		
Biology	Macroinvertebrates		
	Fish		

Goals and Objectives

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Monitoring Worksheet

Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter	As-Built	Monitoring Year					
					1	2	3	4	5	13
Hydrology	Reach Runoff	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hydraulics	Floodplain Connectivity	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Geomorphology	Large Woody Debris	0.25	0.71	0.71	0.71	0.71	0.71	0.71	0.73	0.79
	Lateral Migration	0.27	0.58	0.69	0.60	0.50	0.49	0.49	0.58	0.59
	Riparian Vegetation	0.49	0.56	0.38	0.43	0.44	0.46	0.48	0.59	0.60
	Bed Form Diversity	0.64	0.90	0.90	0.90	0.90	0.86	0.86	0.85	0.85
Physicochemical	Temperature									
	Bacteria									
	Nutrients									
	Dissolved Oxygen									
Biology	Macroinvertebrates									
	Fish									

FUNCTIONAL CATEGORY REPORT CARD

Functional Category	ECS	PCS	As-Built	Monitoring Year					
				1	2	3	4	5	13
Hydrology	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hydraulics	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Geomorphology	0.41	0.69	0.67	0.66	0.64	0.63	0.63	0.69	0.70
Physicochemical									
Biology									
Overall Score	**0.25**	**0.51**	**0.5**	**0.50**	**0.50**	**0.49**	**0.49**	**0.51**	**0.51**
Functional Feet	**250**	**561**	**550**	**550**	**550**	**539**	**539**	**561**	**561**

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QT Output Summaries

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.18
Proposed Condition Score (PCS)	0.43
PCS - ECS	0.25
Existing Stream Length (ft)	1020
Proposed Stream Length (ft)	1100
Change in Stream Length (ft)	80
Existing Functional Feet (FF)	183.6
Proposed Functional Feet (FF)	473.0
Proposed FF - Existing FF (ΔFF)	289.4 P3
FF Yield (FF/ft)	0.26

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Low Lift / High Quality

Existing Condition:

Existing Condition Score = 0.49
Existing Stream Length = 1600 Ft
Functional Foot = 784 Feet (P4)

Proposed Condition:

Proposed Condition Score = 0.55
Proposed Stream Length = 1600 Ft
Functional Foot = 880 Feet (P4)

Functional Uplift = 880 – 784 = **96 FF or 0.06 FF/LF**

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High Lift/Moderate Quality

Existing Condition:

Existing Condition Score = 0.19
Existing Stream Length = 972 Ft
Functional Foot (ft) = 185

Proposed Condition (End of monitoring; year 5):

Proposed Condition Score = 0.50
Proposed Stream Length = 1280 Ft
Functional Foot (ft) = 640

Proposed Lift = 640 – 185 **= 455 P2 (FF) or 0.36 FF/LF**

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Implementation

Need to have a plan for rollout.

Tech Support

Training