



Riverscapes
Consortium



Low-Tech, High Impact: Process-Based Tools for Salmon Recovery

Low-Tech Approaches for Salmon
Habitat Restoration
Knowledge Exchange Workshop



Joe Wheaton

Professor of Riverscapes
3/12/2026

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College of Agriculture & Natural Resources
UtahStateUniversity.



PACIFIC SALMON
FOUNDATION




FOUNDATION






Low-Tech, High Impact?: PB tools

Outline:

- LTPBR Background
- Riverscapes Consortium 
- Highlight two tools
 - **PBR Explorer** - *for sharing effort (actions)* 
 - **Riverscapes Studio** - *for planning, design, as-builts & action-effectiveness monitoring (assessing impact)* 




Purpose:

To share a couple of high-tech, but tractable free tools for capturing & assessing impact

- Impact of effort
- If efforts have desired impacts:
 - Affects - (v) process
 - Effects - (n) outcomes 



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Low-Tech is not New & encompasses a lot of simple techniques

Table 5 – A list of typical low-tech approaches to promoting specific process-based restoration outcomes.

Name	Helpful Reference(s)
Promoting and/or Mimicking Wood Accumulation	
Seeding of Wood – Direct Recruitment of Unanchored Wood	
Direct Felling	Carah et al. (2014)
Grip-Hoisting	Micelston (2014)
Structural Placement of Wood Accumulations	
Post-Assisted Log Structures	Chapter 4 (Shahverdian et al., 2019a)
Improving Supply of Woody Material	
Riparian Plantings	Hall et al. (2011)
Grazing Management	Swanson et al. (2015)
Promoting and/or Mimicking Beaver Dam Activity	
Beaver Translocation	Woodruff and Pollock (2015)
Beaver Dam Analogues	Chapter 4 (Shahverdian et al., 2019a)
Trapping Closures	Figure 9; (Valachovic)
Erosion Control (often for intermittent & ephemeral channels)	
Baffles	Zeedyk and Clothier (2009)
One Rock Dams	Maestas et al. (2018); Zeedyk and Clothier (2009)
Post and Brush Plugs	Kraebel and Pillsbury (1934)
Tree Dam	Kraebel and Pillsbury (1934)
Tree Plug	Kraebel and Pillsbury (1934)
Vanes	Zeedyk and Clothier (2009)
Wicker Weirs	Kraebel and Pillsbury (1934)
Zuni Bowls	Maestas et al. (2018); Zeedyk and Clothier (2009)

From Shahverdian et al. (2019) – Chapter 1 LTPBR Manual

DOI: [10.13140/RG.2.2.14138.03529](https://doi.org/10.13140/RG.2.2.14138.03529)



FBR vs. PBR

- Notice riverscape width



Meal Preparers:

Ranchers, farmers, volunteer groups, kids and then hand off to beaver...



LT is Hand-Built



CONSTRUIRE UNE STRUCTURE BOIS

► Suivez le guide, étape par étape...

Quel enfonce-pieux choisir ?

Les enfonce-pieux permettent de planter les pieux en profondeur dans le lit du cours d'eau pour assurer l'ancrage et la stabilité temporaires des structures low-tech.

Ils existent sous plusieurs formes, chacune d'entre elles présentant un compromis en termes de coût d'équipement, d'expertise requise par l'opérateur, de diamètre maximal des pieux pouvant être plantés (variable selon le substrat), d'efficacité globale et bien sûr d'adaptabilité lorsqu'il s'agit de construire des dizaines ou des centaines de structures de natures diverses sur des kilomètres de cours d'eau.



	€	€	€€	€€€
Coût				
Expertise	Début.	Débutant	Initié	Confirmé
Diamètre	1-5 cm	1-6.5 cm	2.5-6.5 cm	2.5-10,5 cm
Efficacité	Faible	Faible	Moyenne	Forte
Adapt.	Basse	Basse	Modérée	Élevée



VARIANTE 2 : STRUCTURE BOIS - TYPE ÉPI

► LE MANGE-BERGE



Good intentions do not ensure high impact or effectiveness

- Low-Tech alone is not enough
- Real solution are sustained PROCESSES
- High-Tech tools don't ensure impact
- But, they position us to learn and objectively evaluate



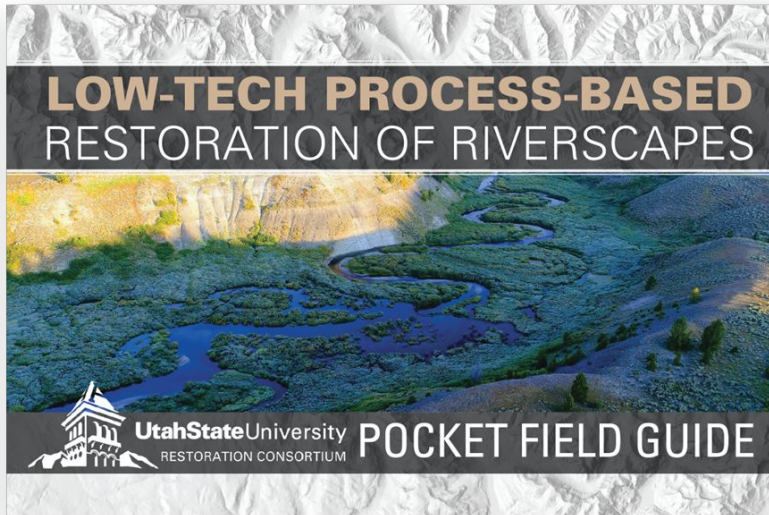
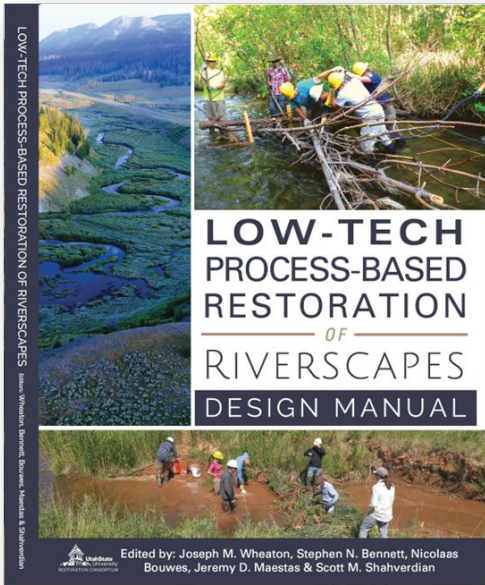
The “P” in Process-Based Restoration (PBR)?

Just a brand or some science?



CC BY Stephen Bennett

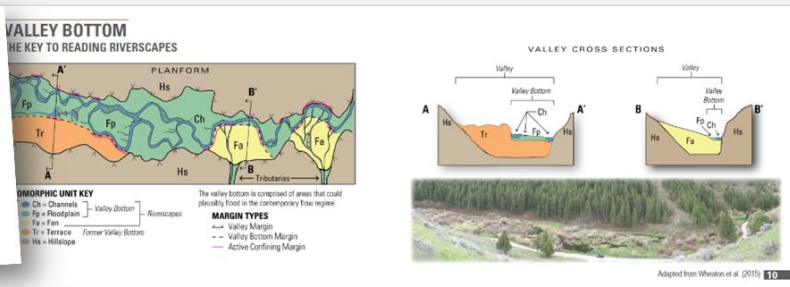
Edited by: Joseph M. Wheaton, Stephen N. Bennett, Nicolaas Bouwes, Jeremy D. Maestas & Scott M. Shahverdian



- Manual defines LTPBR Standard of Practice
- Print version available for \$60 on Amazon

“What is your history in the LTR world?”

- My interest is in **innovation**, not invention
- With natural process, nothing needs to be invented, just understood enough to work with
- We popularized the latest iterations of these practices into Standards of Practice
- We standardized training
- We did some of the early science to build confidence



Free Digitally @: <http://lowtechpbr.restoration.usu.edu>



LTPBR Website

<http://lowtechpbr.restoration.usu.edu>

Low-Tech Process-Based Restoration of Riverscapes

Home

Design Manual

Acknowledgements

Contributors

Front Matter

1. Background & Purpose

Appendix A

Appendix E

2. Principles

3. Planning

4. PALS and BDAs

5. Design

6. Implementation

7. Conclusions

PBR Resources

Low-Tech PBR Workshops

Manual

The purpose of this design manual is to provide restoration practitioners with guidelines for implementing a subset of low-tech tools — namely beaver dam analogues (BDAs) and post-assisted log structures (PALS)—for initiating process-based restoration in structurally-starved riverscapes. While the concept of process-based restoration in riverscapes has been advocated for at least two decades, details and specific examples on how to implement it remain sparse. Here, we describe **low-tech process-based restoration** (LT-PBR) as a practice of using simple, low unit-cost, structural additions (e.g. wood and beaver dams) to riverscapes to mimic functions and initiate specific processes. Hallmarks of this approach include:

- An explicit focus on the processes that a low-tech restoration intervention is meant to promote
- A conscious effort to use cost-effective, low-tech treatments (e.g. hand-built, natural materials, non-engineered, short-term design life-spans) because of the need to efficiently scale-up application.
- 'Letting the system do the work' which defers critical decision making to riverscapes and nature's ecosystem engineers

Pocket Guide

Free Resources

Training

Find:

- Design Manual
- Pocket Guide (better French one now)
- Other Resources
- Workshop Slides
- Links/Videos/ Literature



Module 1 - Intro

Slides, Recorded Lectures, and Exercises

Module 2 - Science

Slides, Recorded Lectures, and Exercises

Module 3 - Planning

Slides, Recorded Lectures, and Exercises

Module 4 - Design

Slides, Recorded Lectures, and Exercises

Module 5 - Implementation

Slides, Recorded Lectures, and Exercises

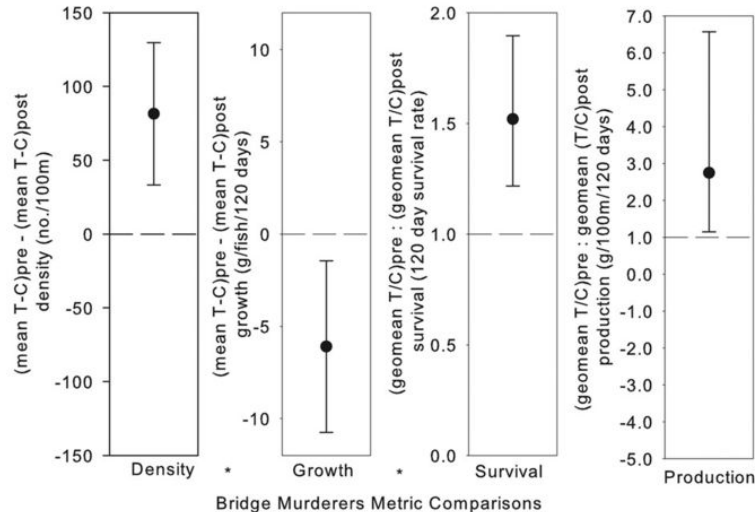
Module 6 - Adaptive Management

Slides, Recorded Lectures, and Exercises

Why it really got attention...



- Restoration using beaver as restoration agent actually produced a population level increase in density, survival and production of ESA listed salmon



SCIENTIFIC REPORTS

OPEN

Ecosystem experiment reveals benefits of natural and simulated beaver dams to a threatened population of steelhead (*Oncorhynchus mykiss*)

Accepted: 16 December 2015
Accepted: 07 June 2016
Published: 04 July 2016

Nicolaas Bouwes^{1,2}, Nicholas Weber¹, Chris E. Jordan³, W. Carl Saunders^{3,4}, Ian A. Tattam¹, Carol Volk⁵, Joseph M. Wheaton⁶ & Michael M. Pollock²

Beaver have been referred to as ecosystem engineers because of the large impacts their dam building activities have on the landscape; however, the benefits they may provide to fluvial fish species has been debated. We conducted a watershed-scale experiment to test how increasing beaver dam and colony persistence in a highly degraded incised stream affects the freshwater production of steelhead (*Oncorhynchus mykiss*). Following the installation of beaver dam analogs (BDAs), we observed significant increases in the density, survival, and production of juvenile steelhead without impacting upstream and downstream migrations. The steelhead response occurred as the quantity and complexity of their habitat increased. This study is the first large-scale experiment to quantify the benefits of beavers and BDAs to a fish population and its habitat. Beaver mediated restoration may be a viable and efficient strategy to recover ecosystem function of previously incised streams and to increase the production of imperiled fish populations.

Beaver in Eurasia and North America were once abundant and ubiquitous¹. Their dense and barbed fur has great felting properties, and as early as the 1500s, intense trapping to provide pelts mainly for making hats occurred throughout Eurasia². By the early 1700s, beaver were nearly extirpated in Eurasia, and North America became the new source of pelts for international commerce. The exploration, settlement, and many territorial claims of North America by several European countries were driven mainly by the search for beaver trapping opportunities³.

When Lewis and Clark explored the Pacific Northwest in 1805, salmon and steelhead coexisted with beavers in very high densities⁴. Fur trade in this region began around 1810, attracting pioneers to settle the area. When the British and United States jointly occupied the Oregon Territories (which included the Columbia River Basin), the Hudson Bay Company implemented their "scorched earth" or "far desert" policy to eliminate all fur-bearing animals. In an attempt to discourage American settlement⁵. As a result, beaver were nearly extirpated from the region by 1900. Around this time, a decrease in the great harvests of Pacific salmon and steelhead was first perceived. Anadromous salmon and steelhead populations have since declined precipitously in the Columbia River Basin, leading to their listing under the U.S. Endangered Species Act (ESA)^{6,7}. Agriculture, timber harvest, mining, grazing, urban development, and water storage and hydroelectric dam construction are commonly cited as the causes for salmonid habitat degradation and population declines⁸, with rare mention of the loss of beaver and their ability to alter aquatic ecosystems with their dam-building activities⁹.

Human activities, including the removal of beaver, have exacerbated the occurrence of stream channel incision, where a rapid down-cutting of the stream bed disconnects the channel from its floodplains^{8,9}. Channel incision is a ubiquitous environmental problem in the Columbia River Basin and throughout the world^{10,11}.




¹Eco Logical Research, Inc., PO BOX 706, Providence, Utah, 84332, USA. ²Watershed Sciences Department, Utah State University, 5210 Old Main Hill, Logan, Utah 84322, USA. ³Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, Washington 98112, USA. ⁴Oregon Department of Fish and Wildlife, Eastern Oregon University, 203 Badgley Hall, One University Boulevard, LaGrande, Oregon 97850, USA. ⁵South Fork Research, Inc. 4424 SE 145th Street, North Bend, Washington, 98045, USA. Correspondence and requests for materials should be addressed to N.B. (email: nbouwes@ecologicalresearch.net)

From:
Bouwes et al. (2016)

DOI: [10.1038/srep28581](https://doi.org/10.1038/srep28581)



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Welcome to the Riverscapes Consortium!

The Riverscapes Consortium community includes all those who care about their riverscapes and the idea of sustaining healthy, vibrant riverscapes for all..

Our mission

Promoting vibrant, healthy riverscapes for all where thriving ecosystems and human societies can coexist and benefit one another for a more resilient future.

Vision



Explore

Discover data, project and applications to inform river management questions



Share

Join the community and contribute your own riverscapes compliant models and data



Solve

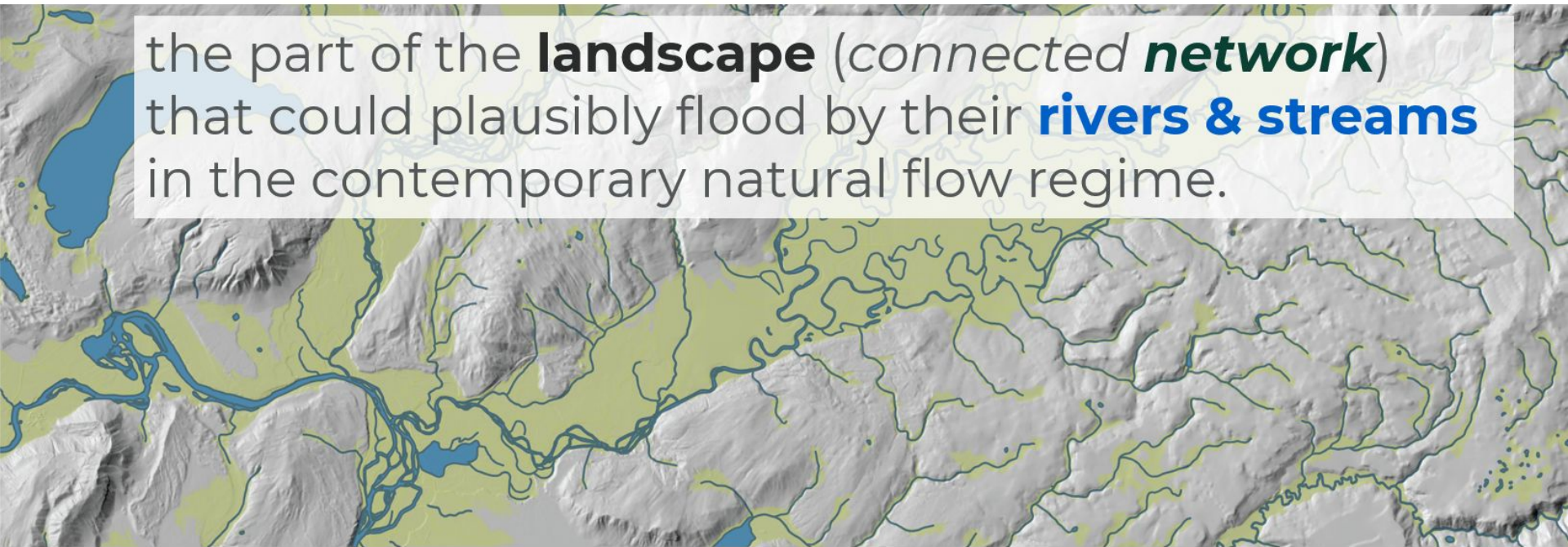
Connect with the partners and data needed to support riverscape health



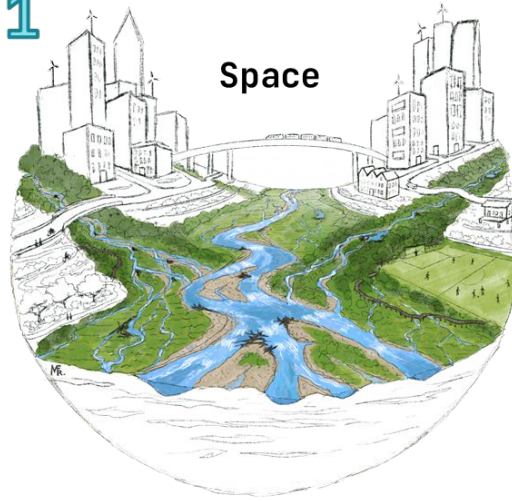
Riverscapes are 20% of the lower 48

We define a **Riverscape** as

the part of the **landscape** (*connected network*) that could plausibly flood by their **rivers & streams** in the contemporary natural flow regime.



1



Space

Principles of Healthy Riverscapes ...

2

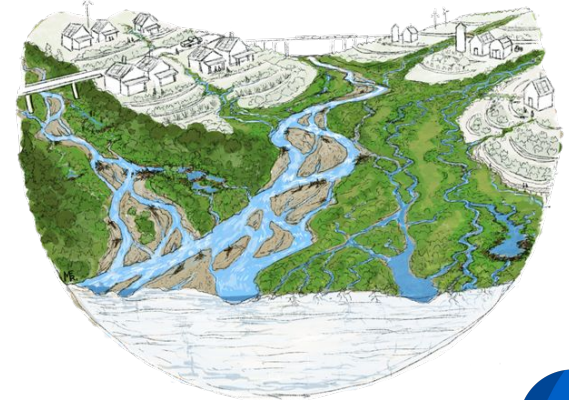
Structure
Forces
complexity...



... builds
resilience

3

Inefficient
conveyance



Healthy riverscapes:

- Support greater **biodiversity**
- Self-sustaining **natural infrastructure**
- Easier **co-existence** & adaptation

How important are these principles in each riverscape?

It depends... f(?) - Context matters!



Emerging Consensus on what a healthy riverscape is

- 37 Co-Authors
- Many of the major contributors to Riverscapes Consortium
- NGOs, Government Agencies, Universities, Consultancies

DOI: [10.1002/wat2.70028](https://doi.org/10.1002/wat2.70028)

OVERVIEW **OPEN ACCESS**

Principles of Riverscape Health

Hayley Corrine Classic¹ | Robert Al-Chokhachy¹ | Joseph Wheaton² | William W. Macfarlane² | Chris E. Jordan³ | Brian Murphy⁴ | Scott Shahverdian² | Stephen Bennett² | Nicolaas Bouwes² | Kirstie Fryirs⁵ | Gary Brierley⁶ | Damion Ciotti⁷ | Philip Bailey⁸ | Karen Bartelt⁹ | Barbara Belletti¹⁰ | Simone Bizzi¹¹ | James Brasington¹² | Reid Camp¹³ | Emily Fairfax¹⁴ | Jordan Gilbert² | Justin Jimenez¹⁵ | Jeremy Maestas¹⁶ | Timmie Mandish¹⁷ | Amy McNamara¹⁸ | Scott Miller¹⁹ | Baptiste Morizot²⁰ | Mathias Perle²¹ | Hervé Piégay²² | Helen Reid²³ | Lindsay V. Reynolds¹⁹ | W. Carl Saunders²⁴ | Alden Shallcross¹⁹ | Peter Skidmore²⁵ | Rose Smith²⁶ | Benoît Terrier²⁷ | Gus Wathen²⁸ | Nick Weber²⁸

¹U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, Montana, USA | ²Department of Watershed Science, Utah State University, Logan, Utah, USA | ³Conservation Biology Division, Northwest Fisheries Science Center, National Marine Fisheries Service, NOAA, Newport, Oregon, USA | ⁴River Network, Boulder, Colorado, USA | ⁵School of Natural Sciences, Macquarie University, Sydney, Australia | ⁶School of Environment, the University of Auckland (Waipapa Taumata Rau), Auckland, New Zealand | ⁷Pacific Southwest Region, U.S. Fish and Wildlife Service, Auburn, California, USA | ⁸North Arrow Research Ltd., Vancouver, British Columbia, Canada | ⁹U.S. Geological Survey, Oregon Water Science Center, Portland, Oregon, USA | ¹⁰CNRS-EVS, University Jean-Monnet, University of Lyon, Saint-Etienne, France | ¹¹University of Padova, Padova, Italy | ¹²Waterways Centre, University of Canterbury, Christchurch, New Zealand | ¹³Snake River Salmon Recovery Board, Dayton, Washington, USA | ¹⁴Department of Geography, Environment, and Society and the Saint Anthony Falls Laboratory, University of Minnesota Twin Cities, Minneapolis, Minnesota, USA | ¹⁵USDA Forest Service Northern Region, Missoula, Montana, USA | ¹⁶USDA Natural Resources Conservation Service, West National Technology Support Center, Portland, Oregon, USA | ¹⁷USDA Natural Resources Conservation Service, Western Region, Portland, Oregon, USA | ¹⁸Natural Resources Defense Council, New York, New York, USA | ¹⁹Bureau of Land Management, Denver, Colorado, USA | ²⁰Aix-Marseille Université, Marseille, France | ²¹Upper Deschutes Watershed Council, Bend, Oregon, USA | ²²CNRS, University of Lyon, Ecole Normale Supérieure de Lyon, Lyon, France | ²³Scottish Environment Protection Agency, Stirling, UK | ²⁴USDA Forest Service, PacFish/InFish Biological Opinion Effectiveness Monitoring Program, Ogden, Utah, USA | ²⁵Dipper Consulting, LLC, Bozeman, Montana, USA | ²⁶Sageland Collaborative, Salt Lake City, Utah, USA | ²⁷Agence de l'eau Rhône Méditerranée Corse, Lyon, France | ²⁸Anabran Solutions, Logan, Utah, USA



Explore → Share → **Solve**



Riverscapes
Consortium

Solve

Models

Apply or contribute RC-Compliant Models to contextualize, analyze, interpret and make predictions in your riverscapes.

[Explore Riverscapes Models](#)

Applications

Create, visualize, explore, and share riverscapes data with RC Applications

[Explore Riverscapes Applic...](#)

Learning

Connect and learn about riverscapes models, applications, and their utilizations for improving riverscape health

[Find Training Opportunities](#)

<https://tools.riverscapes.net>

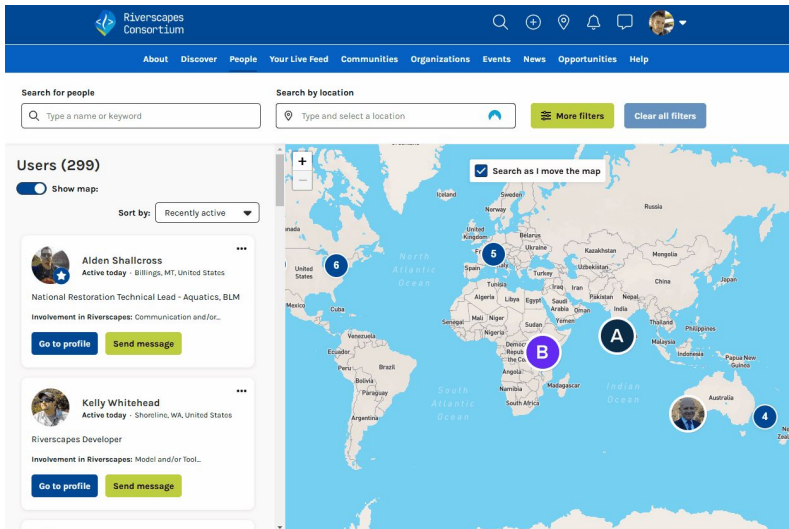
<https://lowtechpbr.restoration.usu.edu>





Riverscapes
Consortium

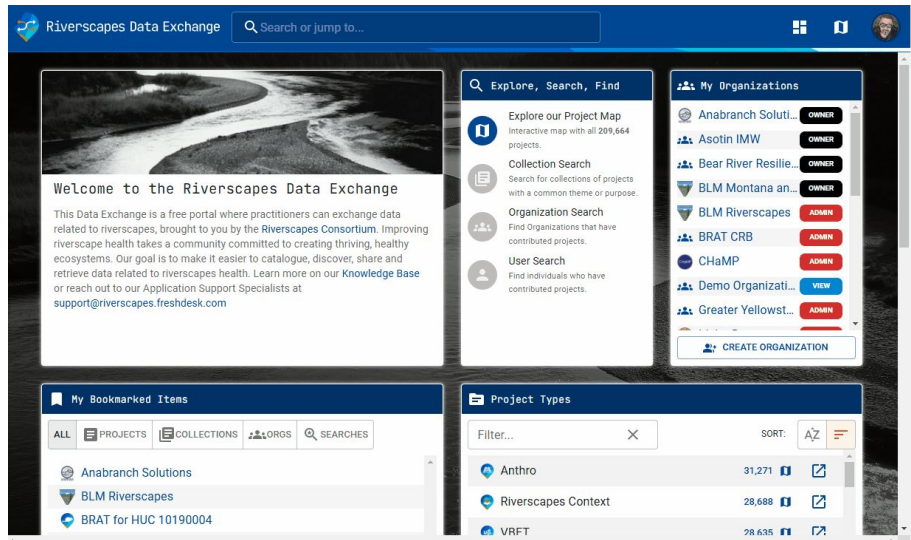
Community Platform



- > 850 users
- 74 organizations
- > 20 communities

<https://riverscapes.net>

& Data Exchange

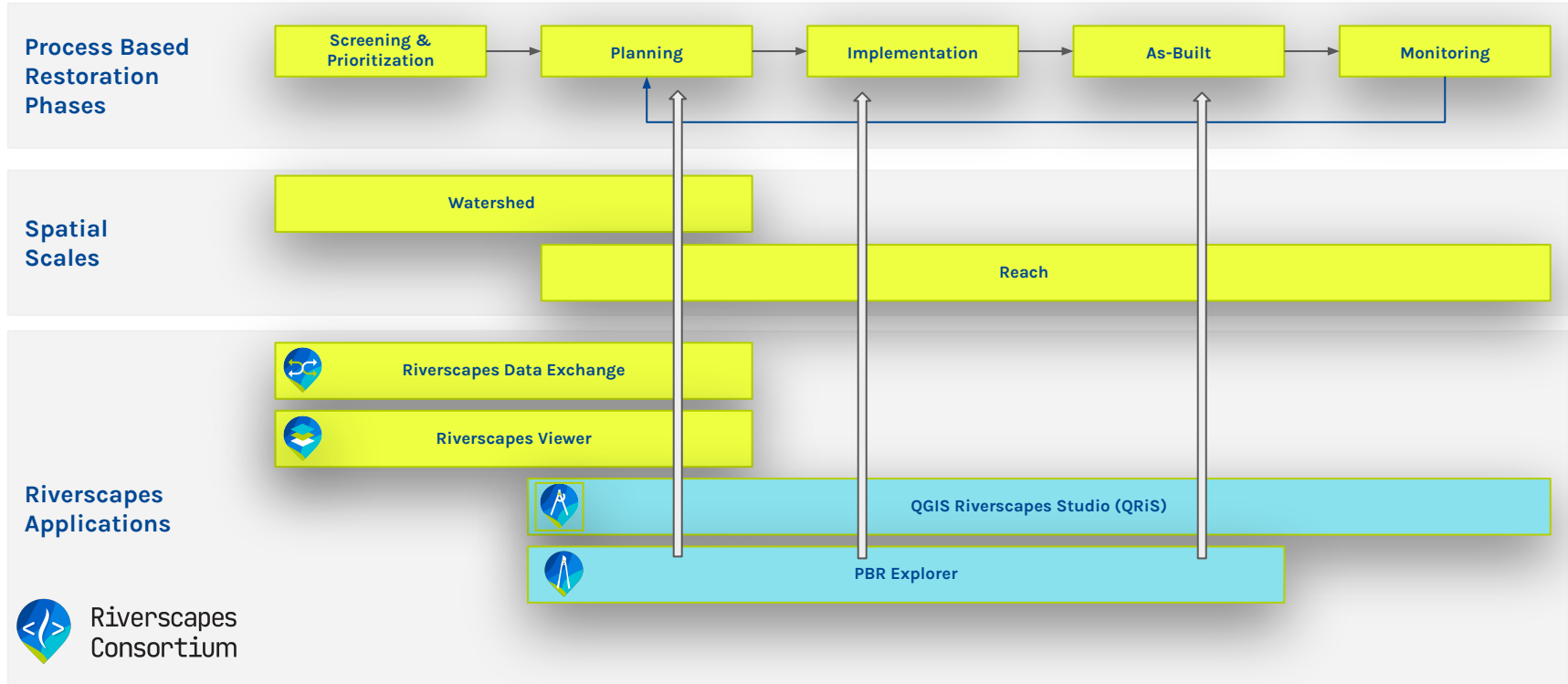


- > 1600 users
- > 215 organizations
- > 400,000 projects

<https://data.riverscapes.net>



PBR Phases, Scales & Apps



Relationship between different communities

Many Overlapping Communities



Vancouver Island Low-Tech Community of Practice
27 members · BC, Canada

[Join](#)
[Go to Community](#)

Participants and partners
Tech Process-Based Resto
[See more](#)



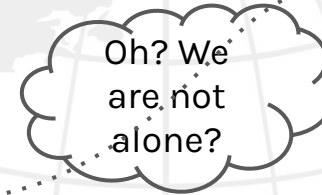
Riverscape Restoration Network - RRN
3 members · United States

[Joined](#)
[Go to Community](#)

The Riverscape Restoration Network (RRN) is a network established in 2020 to bring...
[See more](#)






Riverscapes Consortium





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PBR Explorer



A voluntary, always incomplete (maybe 10-15%), look at effort

Projects

504

Process-based riverscape restoration projects



Organizations

161

Organizations contributing to the PBR Explorer



Length

656 mi

Total channel length of riverscape restoration implementation



Structures

32,014

Beaver dam analog (BDA) and post-assisted log structures (PALS)



Continents

2

Continents where restoration projects have been implemented



Countries

5

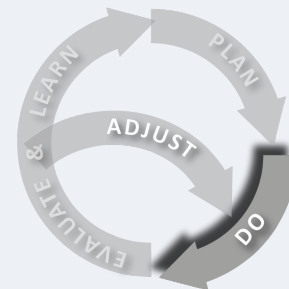
Countries participating in restoration efforts



Provinces / States

22

Provinces and states involved in restoration



<https://pbr.riverscapes.net>



What PBR Explorer IS and What it is NOT

- Let me show off my project (as-built)
- Who is building PBR Projects where?
- What have I (we) built?
- Mileage & Calories (effort)
- Give credit where credit is due (organizations)
- This is about effort (actions), not effectiveness (see [QRiS](#) for that)



Discover & Share

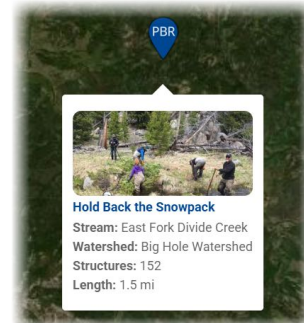
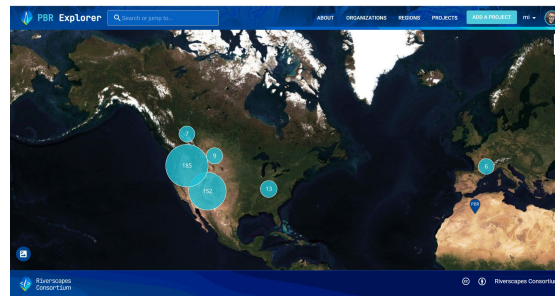


ADD A PROJECT

km

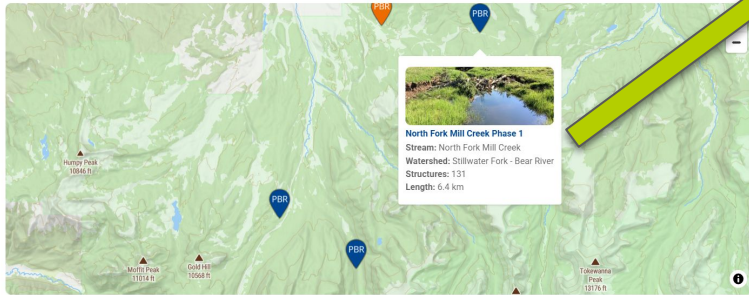


<https://pbr.riverscapes.net>



What is a “project”

- A phase of discrete restoration effort and actions at a site
- Not the site



- Who did (orgs and roles)?
- What (project actions)
- When (timelines)
- Where (map)

PBR Explorer Search or jump to. ABOUT ORGANIZATIONS REGIONS PROJECTS ADD A PROJECT km

PROJECT LAST UPDATED: 2025-08-03

North Fork Mill Creek Phase 1

Project URL:
https://drive.google.com/file/d/1pBj9UzKxK6L6PZBgOxTxPN_tD4mKctY0/view?usp=sharing

Treatment Length: 6.4 km

Project Progress:

Proposed	2023-10-05
Funded	2023-11-01
Designed	2024-04-01
Permitted	2024-05-10
Shovel-Ready	--
Anticipated Implementation	--
Implemented	2024-06-20

Project Actions:

Structures Built	131
------------------	-----

Project Administrator:

Anabranch Solutions

Project Partners:

Anabranch Solutions
Field Implementation Crew, Project Designer, Project Manager

US Forest Service
Project Funder, Project Owner

Trout Unlimited



Project

Who? Administrator (in Explorer) & Partners & Their Roles

Project Administrator:



Anabranch Solutions

Project Partners:



Anabranch Solutions

Field Implementation Crew, Project Designer, Project Manager



US Forest Service

Project Funder, Project Owner



Trout Unlimited

Partner

- An individual or an organization can administer a project in PBR Explorer
- Any organization can be given credit
- If org is in Data Exchange, Stats start accumulating for org



Project What & When

Treatment Length: 6.4 km

Project Progress:

Proposed	2023-10-05
Funded	2023-11-01
Designed	2024-04-01
Permitted	2024-05-10
Shovel-Ready	--
Anticipated Implementation	--
Implemented	2024-06-20

Project Actions:

Structures Built	131
------------------	-----

- What Action: Length of riverscape treated
- Milestones of *when* (only one date required - can post proposed, non-implemented projects)

The screenshot shows a web interface for project management. At the top, there is a section titled 'Project Actions *' with a question mark icon. Below this, there is a text input field containing 'Structures Built'. To the right of this field is a dropdown menu with a blue header 'ADD PROJECT ACTION'. The dropdown menu lists several options: 'Area of Floodplain Treatment', 'Area Planted', 'Beavers Translocated/Introduced', 'Impoundments Removed', 'Levees or Bank Protections Removed', 'Structures Built', 'Structures Removed', 'Trees Felled', and 'Wood Added'. Below the dropdown, there is another text input field labeled 'Treatment Length *'. At the bottom of the form, there is a section titled 'Restoration Goals Narrative *' with a text area containing the following text: 'The overall goal of restoration implementation in the Upper Bear River are to improve riverscape health for the b... Cutthroat Trout as well as other native fish species, beaver, and other species of management concern. Indicato... health are increases in channel and floodplain complexity, floodplain connection, and expansion of riparian areas.'

- **NEW** What Actions:
 - Lots of PBR activities can be reported



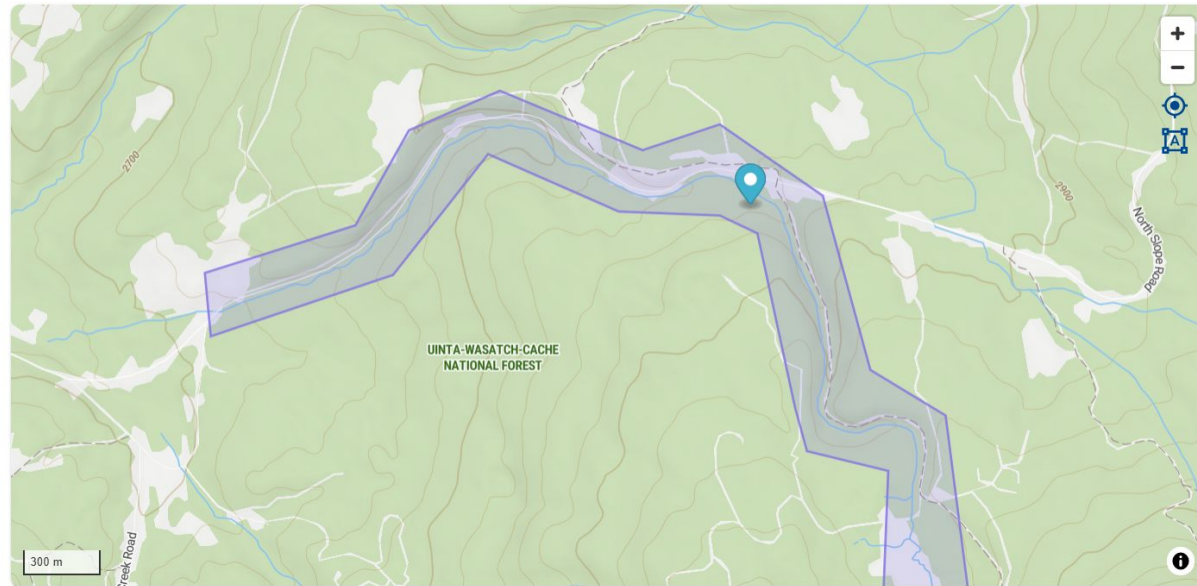
Project Where

Project Location

Stream Name: North Fork Mill Creek

Watershed: Stillwater Fork - Bear River

North America | United States | Utah



- All that is required is a lat/long
- Optional:
 - Stream Name & Watershed
 - Upload a polygon of project bounds

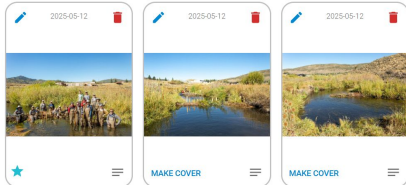


Project Pictures & Budgets

Project Photos



Photos



ADD PHOTO

NEW! Add descriptions, dates, and make cover

Project Budget

PRE PROJECT

Permitting	\$2,900
Planning / Feasibility	\$15,200
Design	\$19,000

IMPLEMENTATION

Labor / Services	\$85,700
------------------	----------

Total **\$122,800**

- **NEW!** Self reporting of budgets in different stages of project and categories

Budget

Specify the budget breakdown for the project. Add categories and their respective amounts in USD.

PRE PROJECT

Permitting Amount* \$ 2900

Planning / Feasibility Amount* \$ 15200

Design Amount* \$ 19000

IMPLEMENTATION

Labor / Services Amount* \$ 85700

Total

ADD BUDGET ITEM

- Pre Project
 - Permitting
 - Planning / Feasibility
 - Design
- Pre-project Monitoring
- Implementation
 - Materials
 - Labor / Services
 - As-Built Monitoring
- Post Project
 - Post-Project Monitoring
 - Maintenance

Photos

Project Related Projects

Related Projects



Mill Creek Phase 1

Stream: Mill Creek

Watershed: Stillwater Fork - Bear River

Total Length: 6.4 km

Structure Count: 106

ORGANIZATION:



Anabranch Solutions
Field Implementation Crew, Project Designer,
Project Manager



US Forest Service
Project Funder, Project Owner



Trout Unlimited
Partner

[VIEW PROJECT](#)



East Fork Bear Phase 1

Stream: East Fork Bear River

Watershed: Stillwater Fork - Bear River

Total Length: 6.4 km

Structure Count: 117

ORGANIZATION:



Anabranch Solutions
Field Implementation Crew, Project Designer,
Project Manager



US Forest Service
Project Funder, Project Owner



Trout Unlimited
Partner

[VIEW PROJECT](#)



Hayden Fork Phase 1

Stream: Hayden Fork

Watershed: Stillwater Fork - Bear River

Total Length: 7.2 km

Structure Count: 87

ORGANIZATION:



Anabranch Solutions
Field Implementation Crew, Project Designer,
Project Manager



US Forest Service
Project Funder, Project Owner



Trout Unlimited
Partner

[VIEW PROJECT](#)

- You can make a reference to any other project in PBR Explorer
- Good way to list related projects:
 - Multiple phases at same site
 - Same local efforts or collection of projects, but at different locations



Project Private & Draft

Publishing & Accessibility

This project is a **Draft** [?](#) This project is **Private** [?](#)

[← BACK TO PROJECT](#) [UPDATE PUBLIC PROJECT](#)

Show stats for: **Only Private Projects** [?](#) Calculated for **Joe Wheaton** as of **2025-08-21**.

Projects 1 Process-based riverscape res	Organizations 0 Organizations contributing to the PBR Explorer
---	--

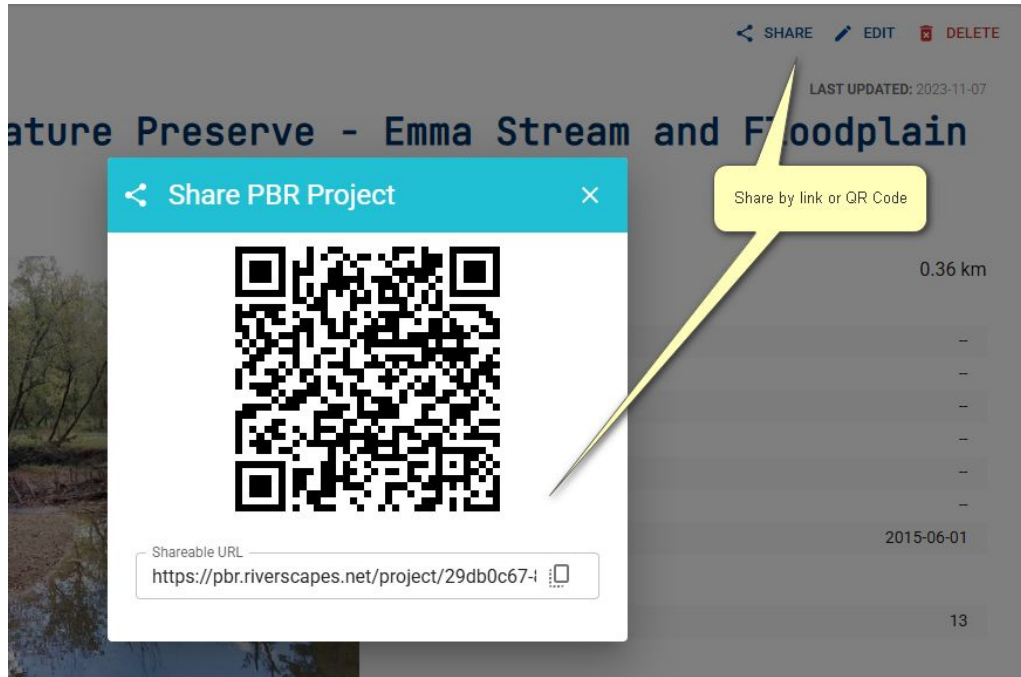
[All Projects](#)
[Only Public Projects](#)
[Only Private Projects](#)
[Only Private Projects I Can See](#)

- “I want to keep track of project progress, and collective organization stats, but for private property owners we can’t make information publicly available or identifiable”
- Users can only see private projects if they are a member of the administering organization
- But private projects count towards org and region statistics



Project


Share with others






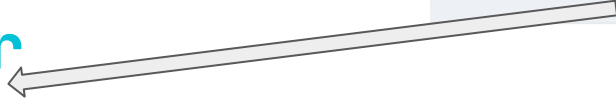
- Easy to share link or QR Code with Share button



It's all about me My Stuff in PBR Explorer


PROJECTS ADD A PROJECT km 

-  My Profile
-  My Projects
-  Sign Out



- Manage my projects and see organizations I belong to

PBR PROFILE



Joe Wheaton

DATA EXCHANGE PROFILE [🔗](#)


USER ID: AFDE56ED-928D-4CA0-9A12-376ECEED4722

Admin Permissions



You are logged in as a system admin. This means you can edit/delete any project and have **Admin** privileges to all organizations.

[+ CREATE A NEW PROJECT](#)

MY PROJECTS ?

 [View / Manage your PBR projects](#) 2

MY DATA EXCHANGE ORGANIZATIONS ?



-  **AECOM**
Riverscapes Data Exchange organization 0
-  **American River Conservancy**
Diverscapes Data Exchange organization 0

PBR PROFILE > MY PROJECTS [← BACK TO PROFILE](#)

My Projects

[+ CREATE A NEW PROJECT](#)

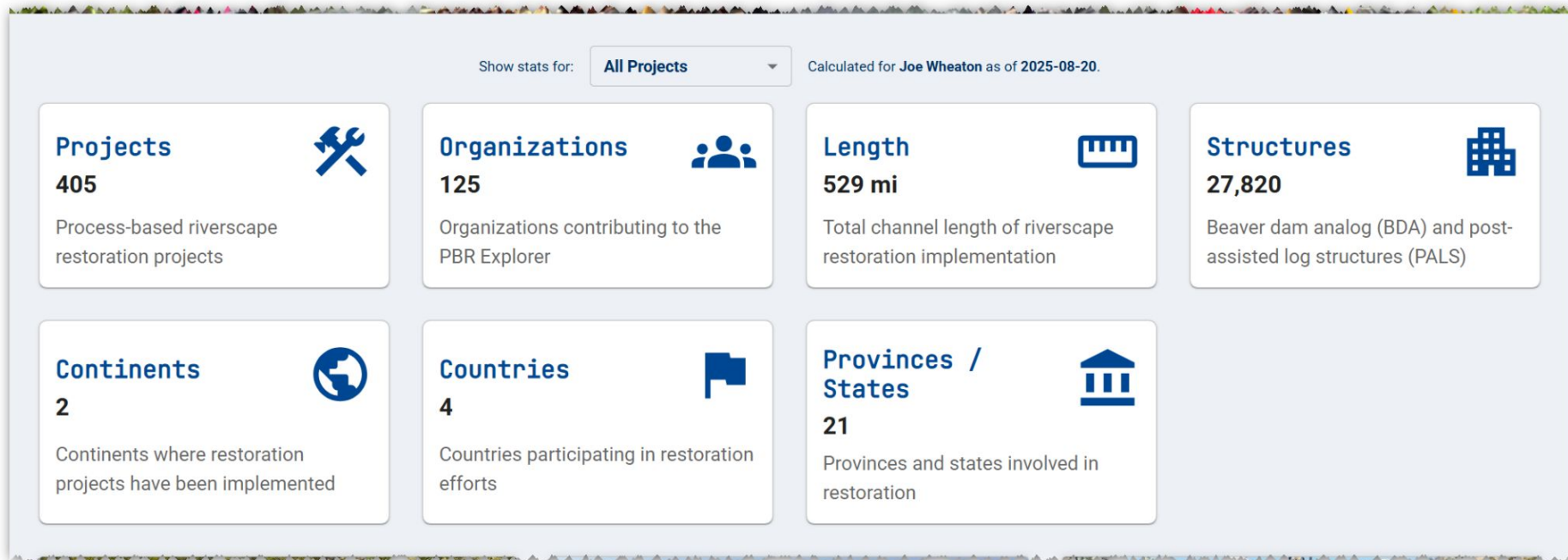
Page 1 of 1 Displaying 1 to 2 of 2

-  **Summit Creek Capstone Upper**
Implemented: 2024-04-13 [VIEW](#) [EDIT](#) [DELETE](#)
-  **Something**
Implemented: 2025-06-10 Draft [VIEW](#) [EDIT](#) [DELETE](#)

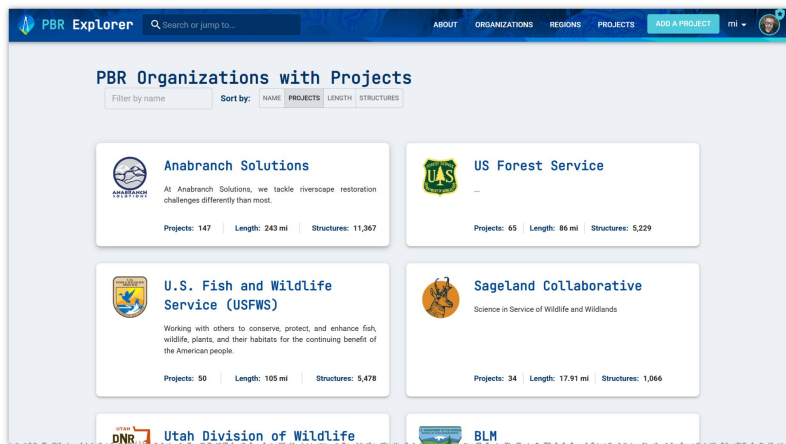


Dashboards - Community Measures of Effort

How much is being done?



Effort by Organization & Region



The screenshot shows the 'PBR Explorer' interface. At the top, there is a search bar and navigation tabs for 'ABOUT', 'ORGANIZATIONS', 'REGIONS', 'PROJECTS', and 'ADD A PROJECT'. The main heading is 'PBR Organizations with Projects'. Below this, there are filters for 'Filter by name' and 'Sort by' options: 'NAME', 'PROJECTS', 'LENGTH', and 'STRUCTURES'. The page displays a grid of organization cards, each with a logo, name, description, and statistics for projects, length, and structures.

Organization	Projects	Length (mi)	Structures
Anabranch Solutions	147	243	11,367
US Forest Service	65	86	5,229
U.S. Fish and Wildlife Service (USFWS)	50	105	5,478
Sageland Collaborative	34	17.91	1,066
Utah Division of Wildlife	-	-	-
BLM	-	-	-

Explore Regions

REGION NAME	# PROJECTS	REGION NAME	# PROJECTS
Europe	5	North America	400
France	4	Canada	8
Auvergne-Rhône-Alpes	3	Alberta	8
Nouvelle-Aquitaine	1	United States	392
Schweiz/Suisse/Svizzera/Svizra	1	Arizona	8
Bern/Berne	1	California	72
		Colorado	19
		Georgia	1


- Search
- Sort alphabetically, or by number of projects, length of riverscape treated or number of structures



The Region & Org Summaries By Map

ORGANIZATION

RIVERSCAPES DATA EXCHANGE

 **Symbiotic Restoration**

Promoting innovative, holistic approaches to ecological restoration that encourage balance and harmony.

MapLibre | © MapTiler | OpenStreetMap contributors

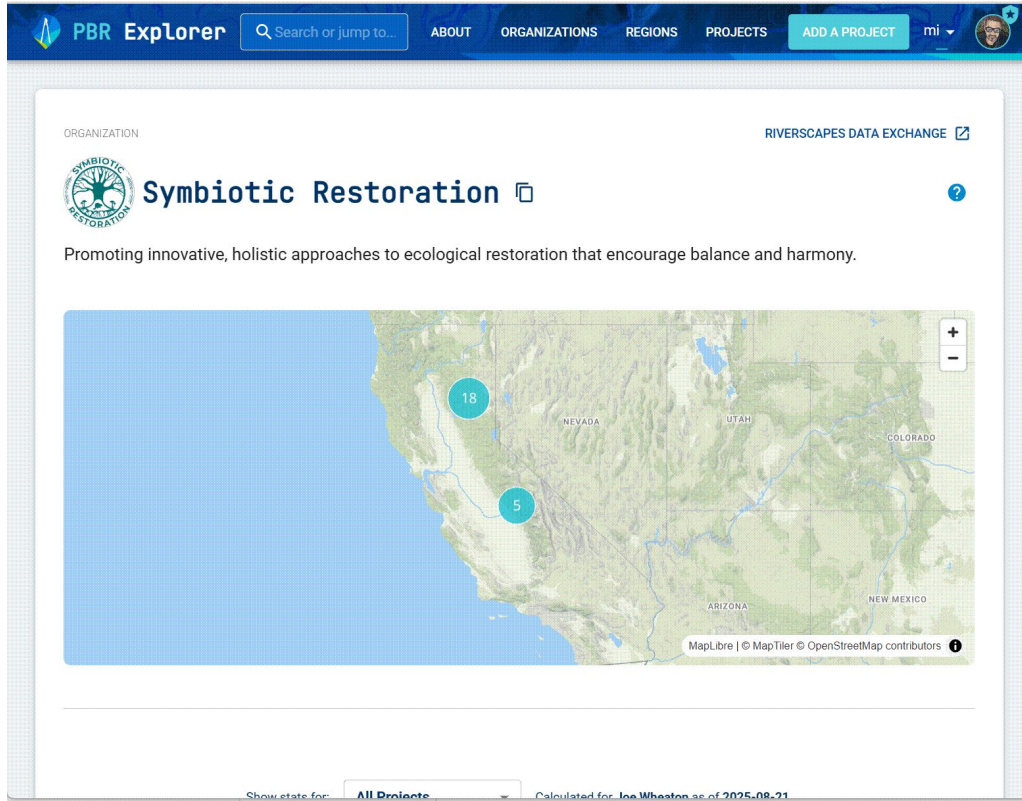
View Org in
the Data
Exchange



Same interactive map,
see extent and zoom to
click on individual
projects for this Org



The Region & Org Summaries Stats



- In this release, just the old LT-PBR stats
 - Project count
 - Length of riverscape treated (note toggle)
 - Structure Count (just LTPBR for now)
- More Stats coming
 - PBR stats
 - Cost where provided



The Region & Org Summaries Projects


Card View

or List View

Projects

ORGANIZATION PROJECTS (23) OWNED PROJECTS (22)

Page Size 100




Canyon Creek

Stream: Canyon Creek
Watershed: Canyon Creek HUC10
Total Length: 0.14 km
Structure Count: 4

ORGANIZATION:
Symbiotic Restoration
NRCS

[VIEW PROJECT](#)



English Meadow

Stream: Un-named
Watershed: Jackson Meadows Reservoir-Middle Yuba River
Total Length: 0.26 km
Structure Count: 29

ORGANIZATION:
Symbiotic Restoration

[VIEW PROJECT](#)

Projects

ORGANIZATION PROJECTS (23) OWNED PROJECTS (22)

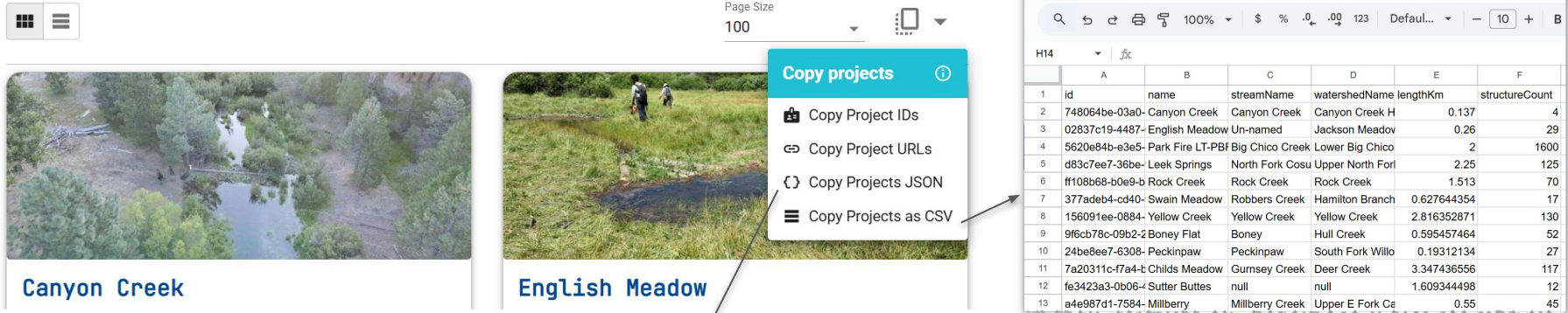
Page Size 100

NAME	STREAM	WATERSHED	LENGTH	STRUCTURES	ADMINISTRATOR
Canyon Creek	Canyon Creek	Canyon Creek HUC10	0.14 km	4	Symbiotic Restoration
English Meadow	Un-named	Jackson Meadows Reservoir-Middle Yuba River	0.26 km	29	Symbiotic Restoration
Park Fire LT-PBR Rapid Response	Big Chico Creek	Lower Big Chico Creek	2 km	1,600	Symbiotic Restoration
Leek Springs	North Fork Cosumnes River	Upper North Fork Cosumnes River	2.3 km	125	Symbiotic Restoration
Rock Creek	Rock Creek	Rock Creek	1.5 km	70	Symbiotic Restoration



The Region & Org Summaries

Project Summary Data



Page Size 100

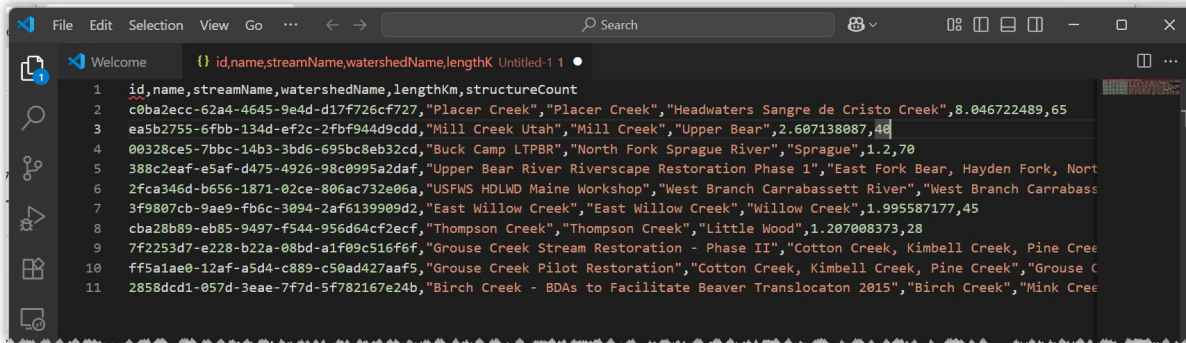
Canyon Creek

English Meadow

Copy projects

- Copy Project IDs
- Copy Project URLs
- Copy Projects JSON
- Copy Projects as CSV

	A	B	C	D	E	F
1	id	name	streamName	watershedName	lengthKm	structureCount
2	748064be-03a0-	Canyon Creek	Canyon Creek	Canyon Creek H	0.137	4
3	02837c19-4487-	English Meadow	Un-named	Jackson Meadow	0.26	29
4	5620e84b-e3e5-	Park Fire LT-PBf	Big Chico Creek	Lower Big Chico	2	1600
5	d83c7ee7-36be-	Leek Springs	North Fork Cosu	Upper North Forl	2.25	125
6	ff108b68-b0e9-b	Rock Creek	Rock Creek	Rock Creek	1.513	70
7	377adeb4-cd40-	Swain Meadow	Robbers Creek	Hamilton Branch	0.627644354	17
8	156091ee-0884-	Yellow Creek	Yellow Creek	Yellow Creek	2.816352871	130
9	9f6cb78c-09b2-2	Boney Flat	Boney	Hull Creek	0.595457464	52
10	24be8ee7-6308-	Peckinpaw	Peckinpaw	South Fork Willa	0.19312134	27
11	7a20311c-f7a4-t	Childs Meadow	Gurnsey Creek	Deer Creek	3.347436556	117
12	fe3423a3-0b06-4	Sutter Buttes	null	null	1.609344498	12
13	a4e987d1-7584-	Millberry	Millberry Creek	Upper E Fork Co	0.55	45



```
1 id,name,streamName,watershedName,lengthKm,structureCount
2 c0ba2ecc-62a4-4645-9e4d-d17f726cf727,"Placer Creek","Headwaters Sangre de Cristo Creek",8.046722489,65
3 ea5b2755-6fbb-134d-ef2c-2fbf944d9cdd,"Mill Creek Utah","Mill Creek","Upper Bear",2.607138087,40
4 00328ce5-7bbc-14b3-3bd6-695bc8eb32cd,"Buck Camp LTPBR","North Fork Sprague River","Sprague",1.2,70
5 388c2eaf-e5af-d475-4926-98c0995a2daf,"Upper Bear River Riverscape Restoration Phase 1","East Fork Bear, Hayden Fork, Nort
6 2fca346d-b656-1871-02ce-806ac732e06a,"USFWS HDLWD Maine Workshop","West Branch Carrabassett River","West Branch Carrabass
7 3f9807cb-9ae9-fb6c-3094-2af6139909d2,"East Willow Creek","East Willow Creek","Willow Creek",1.995587177,45
8 cba28b89-eb85-9497-f544-956d64cf2ecf,"Thompson Creek","Thompson Creek","Little Wood",1.207008373,28
9 7f2253d7-e228-b22a-08bd-a1f09c516f6f,"Grouse Creek Stream Restoration - Phase II","Cotton Creek, Kimbell Creek, Pine Cree
10 ff5a1ae0-12af-a5d4-c889-c50ad427aaf5,"Grouse Creek Pilot Restoration","Cotton Creek, Kimbell Creek, Pine Creek","Grouse C
11 2858dcd1-057d-3eae-7f7d-5f782167e24b,"Birch Creek - BDAs to Facilitate Beaver Translocaton 2015","Birch Creek","Mink Cree
```

- Get summary data out by org or region
- Run your own stats



PBR Explorer User Community on



Riverscapes
Consortium

Riverscapes Consortium

About Discover Welcome People Your Live Feed Communities Organizations Events News Opportunities Support

PBR Explorer Search or jump to...

ABOUT ORGANIZATIONS REGIONS PROJECTS ADD A PROJECT mi

217 168 8 3 7

United States Atlantic Ocean

PBR Explorer Users 4 members

Live feed Members Events News Media center Forums

Write a post

Post

About

Connect with other PBR Explorer users and contributors. Share projects, interesting ways to use the platform, and follow news and updates.

PBR Explorer supports reporting on all types and phases of process based restoration work.

- Make posts and alert people to your cool PBR Project!
- Post questions in Forums
- Connect with other users
- Track PBR Explorer Events like this one

Join for free at: <https://www.riverscapes.net/topics/44339/feed>



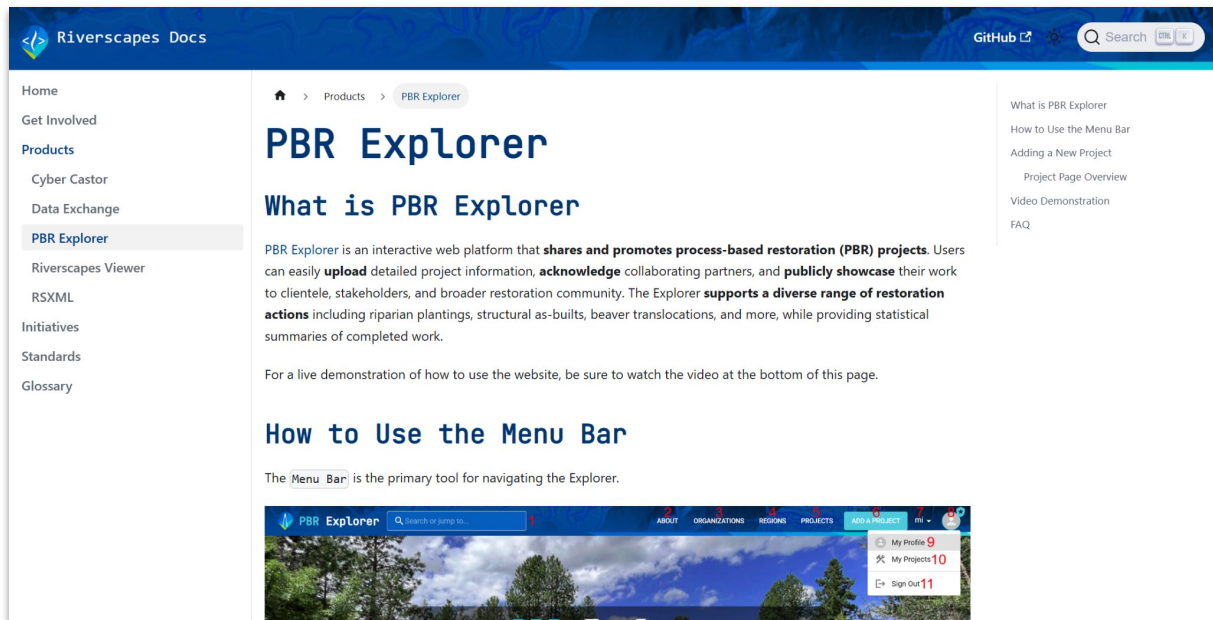
Help Documentation

Basic documentation on how to use PBR Explorer at:

<https://docs.riverscapes.net/products/pbr-explorer>

Including these slides and this webinar recording:

https://docs.riverscapes.net/products/pbr-explorer/BLM_webinar/






The screenshot displays the 'Riverscapes Docs' website. The main content area is titled 'PBR Explorer' and includes a sub-heading 'What is PBR Explorer'. The text describes PBR Explorer as an interactive web platform for sharing and promoting process-based restoration (PBR) projects. It lists key features: users can easily upload project information, acknowledge collaborators, and publicly showcase their work to stakeholders and the broader restoration community. The platform supports a diverse range of restoration actions, such as riparian plantings, structural as-builts, and beaver translocations, while providing statistical summaries of completed work. A note mentions a live demonstration video at the bottom of the page. Below this, there is a section titled 'How to Use the Menu Bar' which states that the Menu Bar is the primary tool for navigating the Explorer. At the bottom of the page, a preview of the PBR Explorer interface is shown, featuring a navigation menu with options like 'ABOUT', 'ORGANIZATIONS', 'REGIONS', 'PROJECTS', and 'ADD A PROJECT', along with a search bar and user account information.





Outline:

- LTPBR Background
- Riverscapes Consortium 
- Highlight two tools
 - PBR Explorer - *for sharing effort (actions)* 
 - **Riverscapes Studio** - *for planning, design, as-builts & action-effectiveness monitoring (assessing impact)* 

Purpose:

To share a couple of high-tech, but tractable free tools for capturing impact

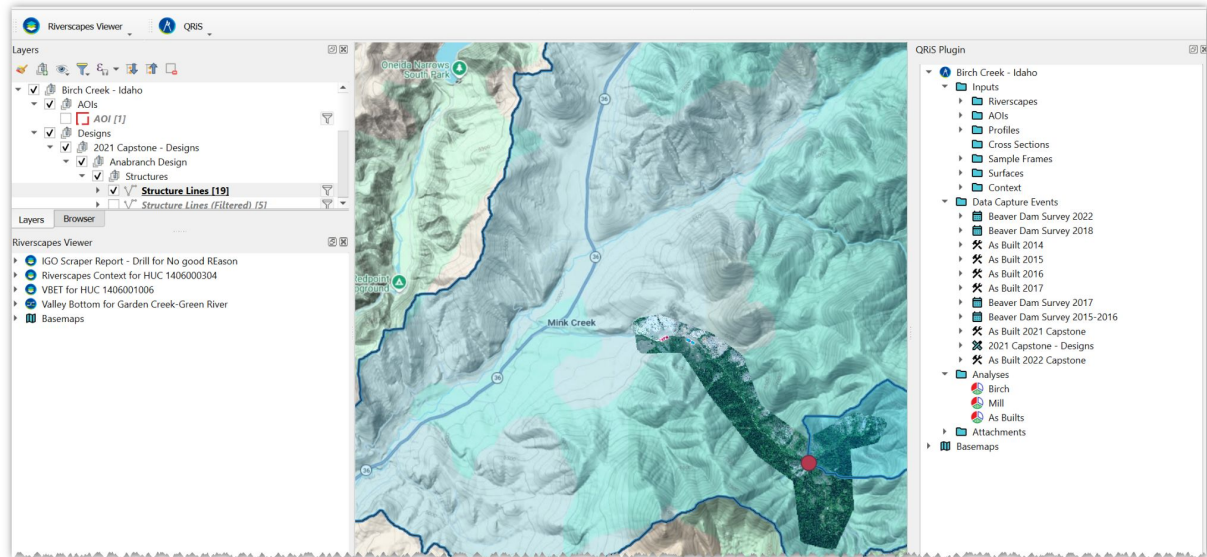
- Impact of effort
- If efforts have desired impacts:
 - Affects - (v) process
 - Effects - (n) outcomes



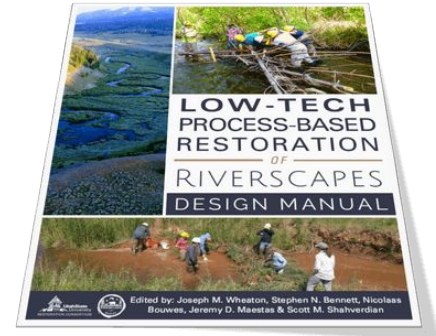
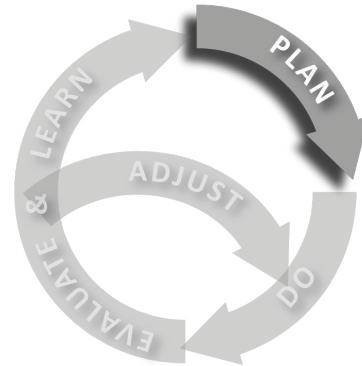
Riverscapes Studio - QRiS

- Free plugin to free QGIS
- Pronounced “curious”

<https://gris.riverscapes.net>



Intro to LTPBR & Chapter 3 of Manual



QRiS operationalizes standards of practice defined in Chapters 3 & 4 of Design Manual:

<https://lowtechpbr.restoration.usu.edu/manual/>



NRCS Conservation Planning Process & LTPBR Project Process

PLANNING FOR LOW-TECH RESTORATION As extension of NRCS Conservation Planning Process

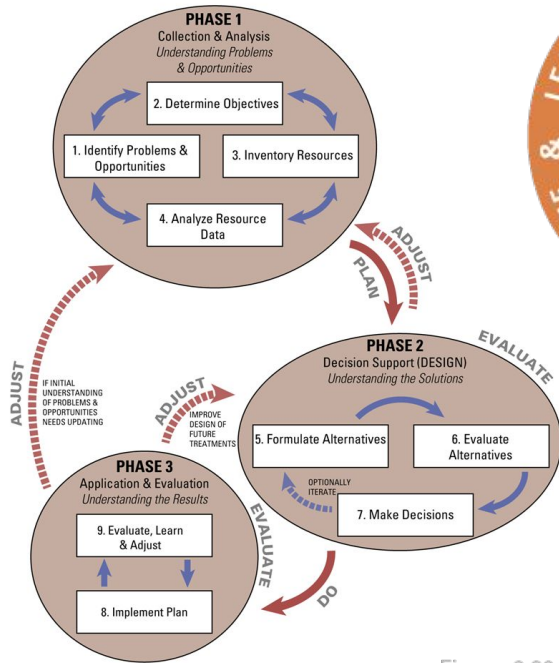


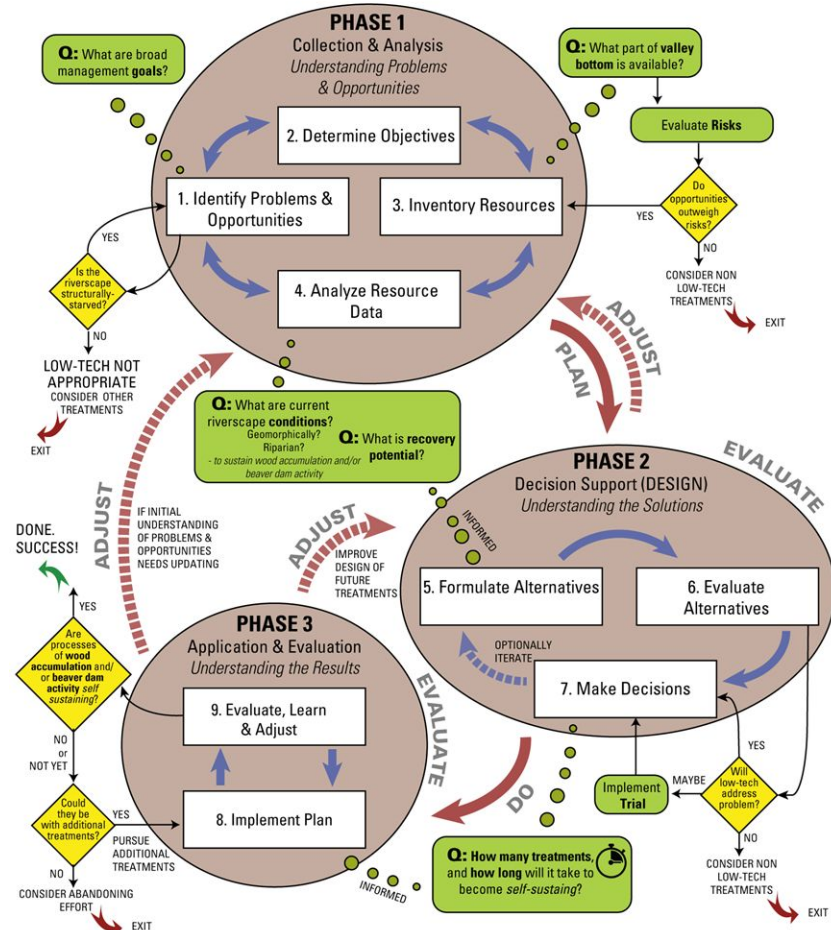
Figure 3.20 from Bennett et al. (2019, p 115)



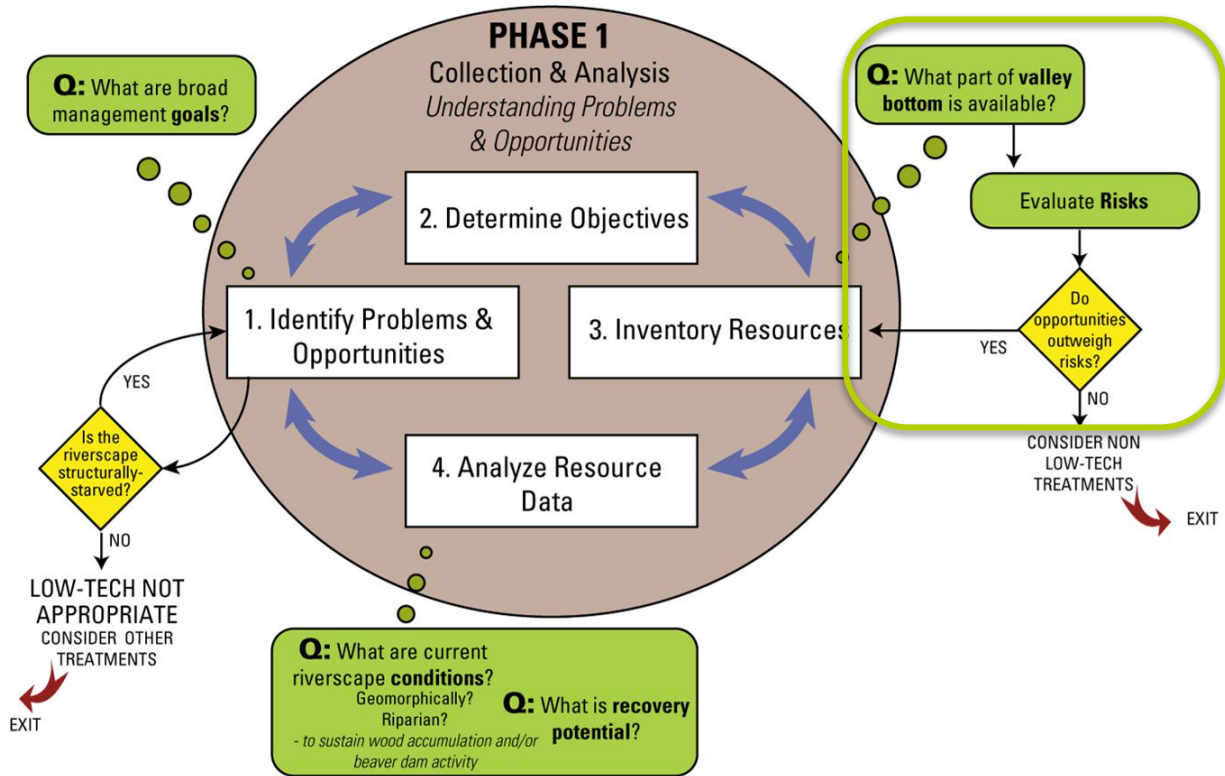
Chapter 3 LTPBR Manual

DOI: [10.13140/RG.2.2.15815.75680](https://doi.org/10.13140/RG.2.2.15815.75680)

PLANNING FOR LOW-TECH RESTORATION As extension of NRCS Conservation Planning Process



Phase 1 of LTPBR (Chap 3) - But in QRiS what is this?



Lots of ways to do things... Like LTPBR
We want room for flexibility, creativity & curiosity (QRiS)



CC Jeremy Maestas





BUT, Standards Matter

Protocols & Riverscapes Studio is really all about standards, repeatability, F-A-I-R principles and extensibility

Share

Our platforms lower the barriers to creating, contributing, and sharing riverscape analysis products. We have developed tools to automate the collection of disparate public datasets, making it easier for researchers, restoration practitioners, scientists, and students to find and share riverscapes-compliant data. All datasets available in the Riverscapes Data Exchange meet the data standards for organizing and visualizing common river datasets.

Standards and Compliance



<https://docs.riverscapes.net/standards>



Value Proposition - Do your work in QRiS &



Riverscapes Consortium



NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Getting Data into QRiS & upto Data Exchange

BLM Riverscapes Webinar Series



12.02.2024



https://qris.riverscapes.net/tutorials/Webinars/data_exchange

QRiS offers :

- Takes care of housekeeping
- Contribution over time at a site
- Supports analysis
- Allows you to share individual projects in Data Exchange
- Meta-Analysis across projects
- Flexibility



The way we deliver
that 'flexibility',
but with necessary
consistency is
protocols



Riverscapes
Studio

QRiS offers :

- Takes care of housekeeping
- Contribution over time at a site
- Supports analysis
- Allows you to share individual projects in Data Exchange
- Meta-Analysis across projects
- **Flexibility**



What is a protocol?

Many examples in riverscape world are field protocols

A protocol is often associated with a monitoring program

3 a : a code prescribing strict adherence to correct [etiquette](#) and [precedence](#) (as in diplomatic exchange and in the military services)

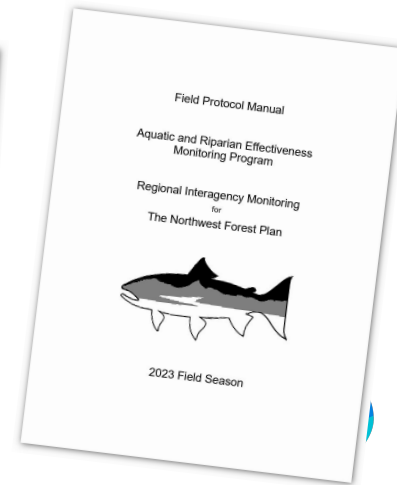
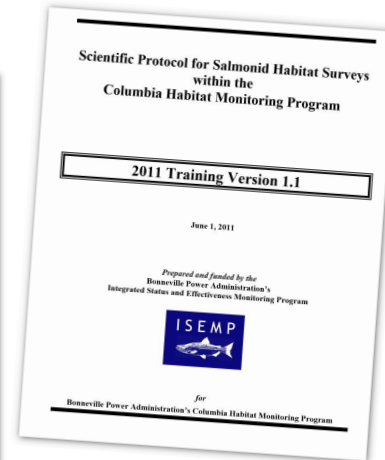
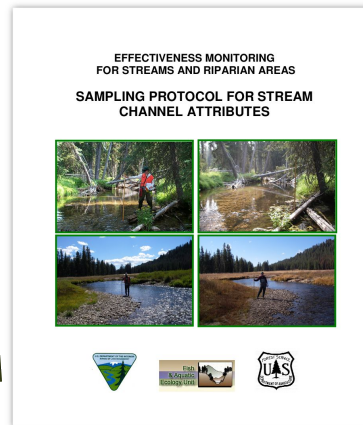
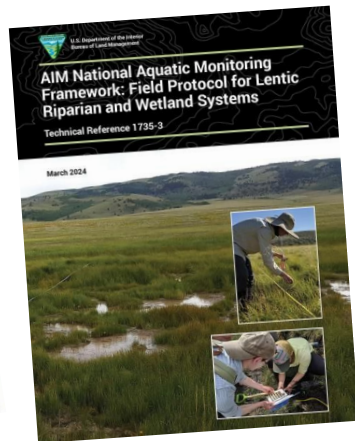
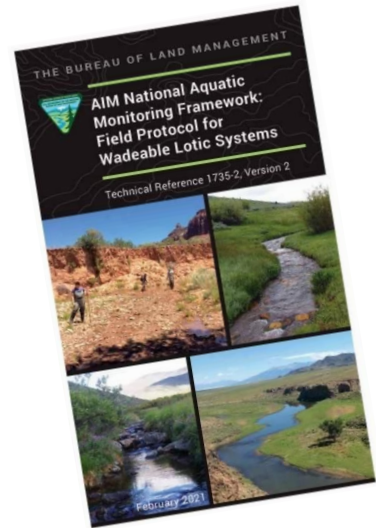
| a breach of *protocol*

b : a set of conventions governing the treatment and especially the formatting of data in an electronic communications system

| *network protocols*

c : **CONVENTION** sense 3a,b

4 : a detailed plan of a scientific or medical experiment, treatment, or procedure



We want protocols that speak to whole riverscape!
Not just channel or remnant riparian.

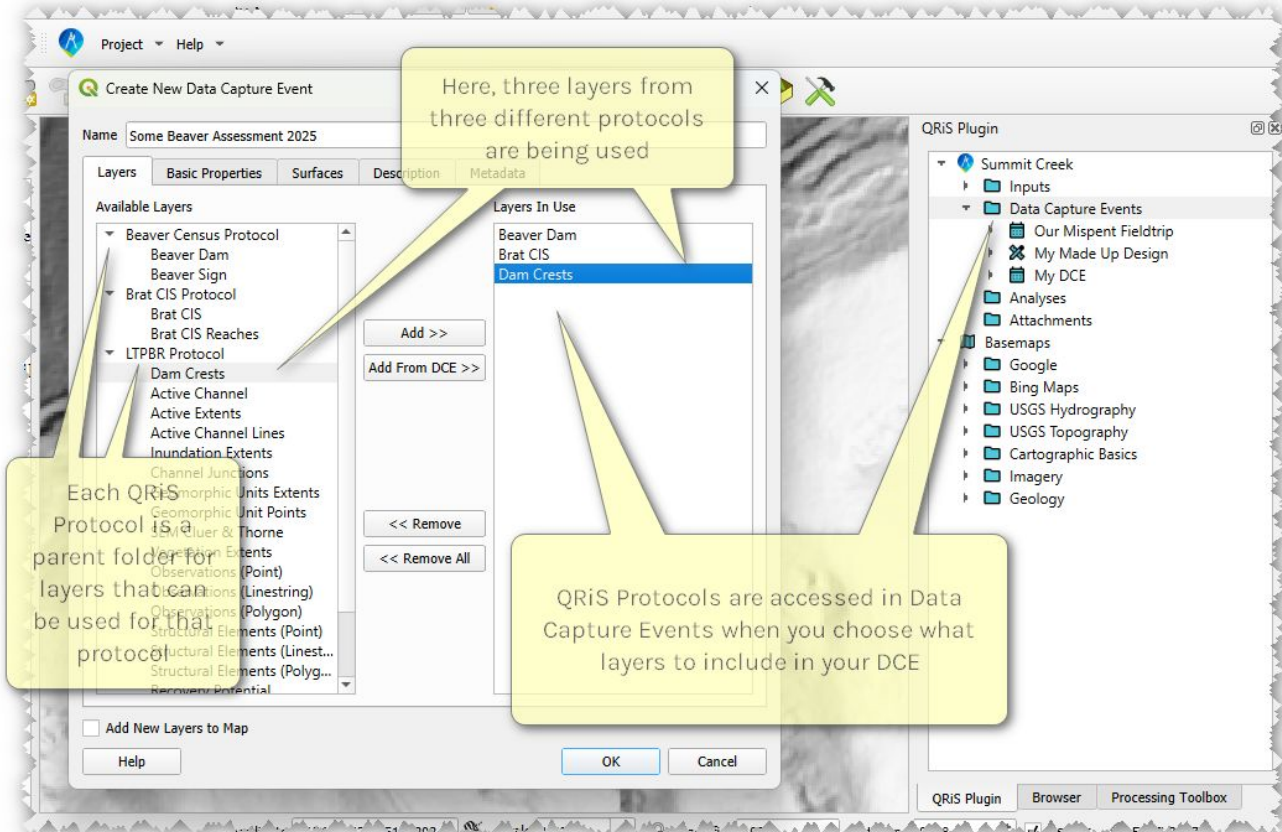
We define a **Riverscape** as

the part of the **landscape** (*connected network*)
that could plausibly flood by their **rivers & streams**
in the contemporary natural flow regime.

What is a QRiS Protocol?

Accessed in Data Capture Events (DCEs)

- Layer Definitions
 - Type (point, line, polygon)
 - Symbology
 - Attributes
- Metric Definitions
- Supporting Documentation



e.g., LTPBR V2 Protocol

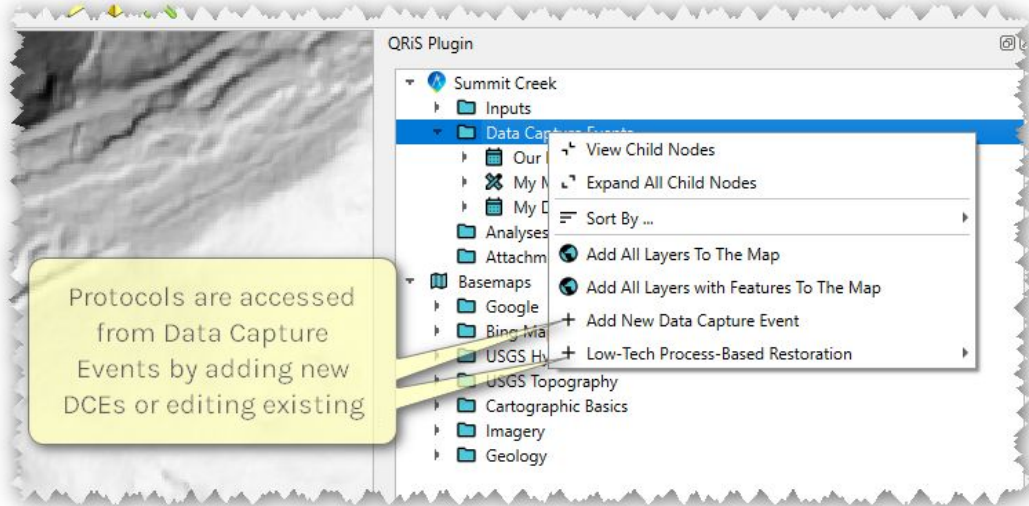
- Protocol for tying LTPBR to riverscape health
- Action Effectiveness Protocol
- Covers
 - Planning
 - Design
 - As-Built (phases)
 - DCEs - monitoring riverscape health
- First protocol plumbed into QRiS

<https://zenodo.org/records/13769899>
<https://qris.riverscapes.net/technical-reference/protocols/protocol-library/dce-protocols/ltpbr-dce-protocol>

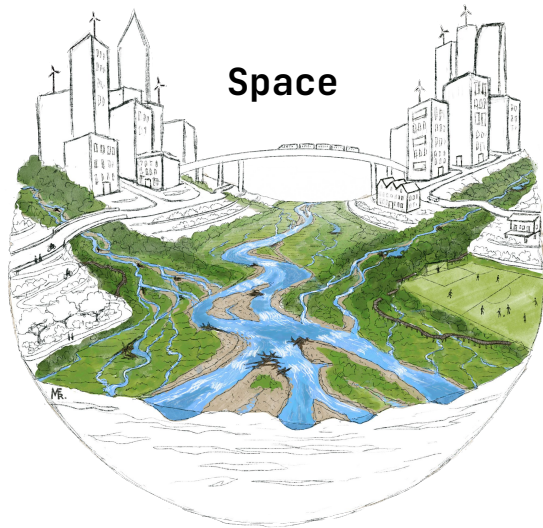
The screenshot shows the homepage of the Riverscapes Consortium. At the top, there is a navigation bar with the logo and name 'Riverscapes Consortium' on the left, and search, home, location, notifications, and user profile icons on the right. Below the navigation bar is a secondary menu with links for 'About', 'Discover', 'People', 'Your Live Feed', 'Communities', 'Organizations', 'Events', 'News', 'Opportunities', and 'Help'. The main content area features a large aerial photograph of a river flowing through a lush green landscape. Overlaid on this image is the text: 'Welcome to the Riverscapes Consortium!' followed by 'The Riverscapes Consortium community includes all those who care about their riverscapes and the idea of sustaining healthy, vibrant riverscapes for all.' Below the main image, there is a 'Write a post' section with a user profile picture and a text input field. To the right of this is a 'Recently active users' section displaying a grid of user profile pictures and names: Rodrigo Gomez Fell, Wally Macfarlane, Philip Bailey, Nora Livingstone, Alden Shallcross, and Kelly Whitehead. At the bottom, there is a 'Pinned event' section with buttons for 'Training', 'Virtual', and 'Workshop', and a 'Filter by:' dropdown menu currently set to 'All'.

How do I access protocols in QRiS?

Protocols control how regular Data Capture Events, as well as LTPBR Designs & As-Builts



Overused Example of Motivation

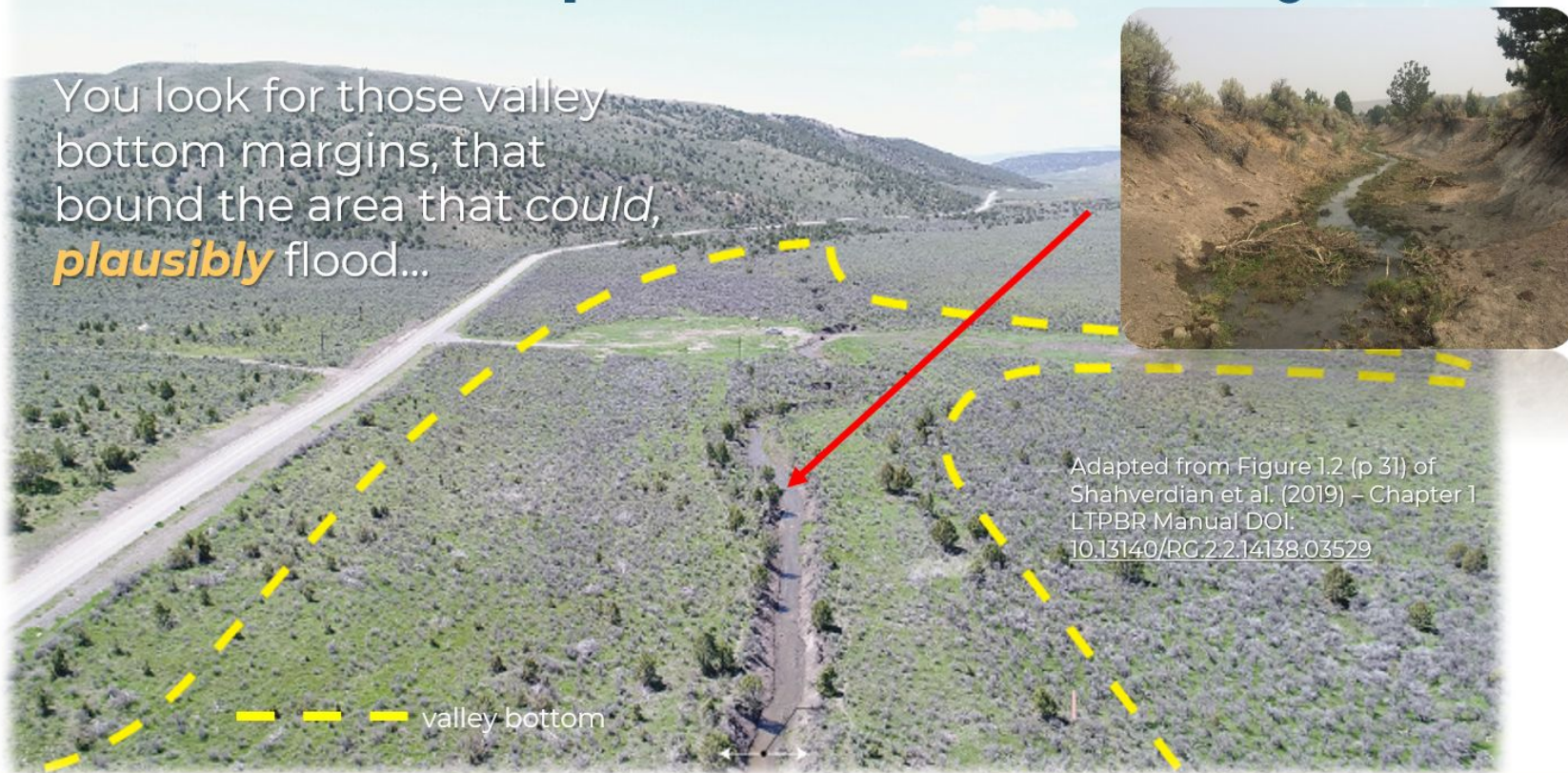


Riverscapes need space...



That same riverscape that is not so easy to read

You look for those valley bottom margins, that bound the area that could, *plausibly* flood...

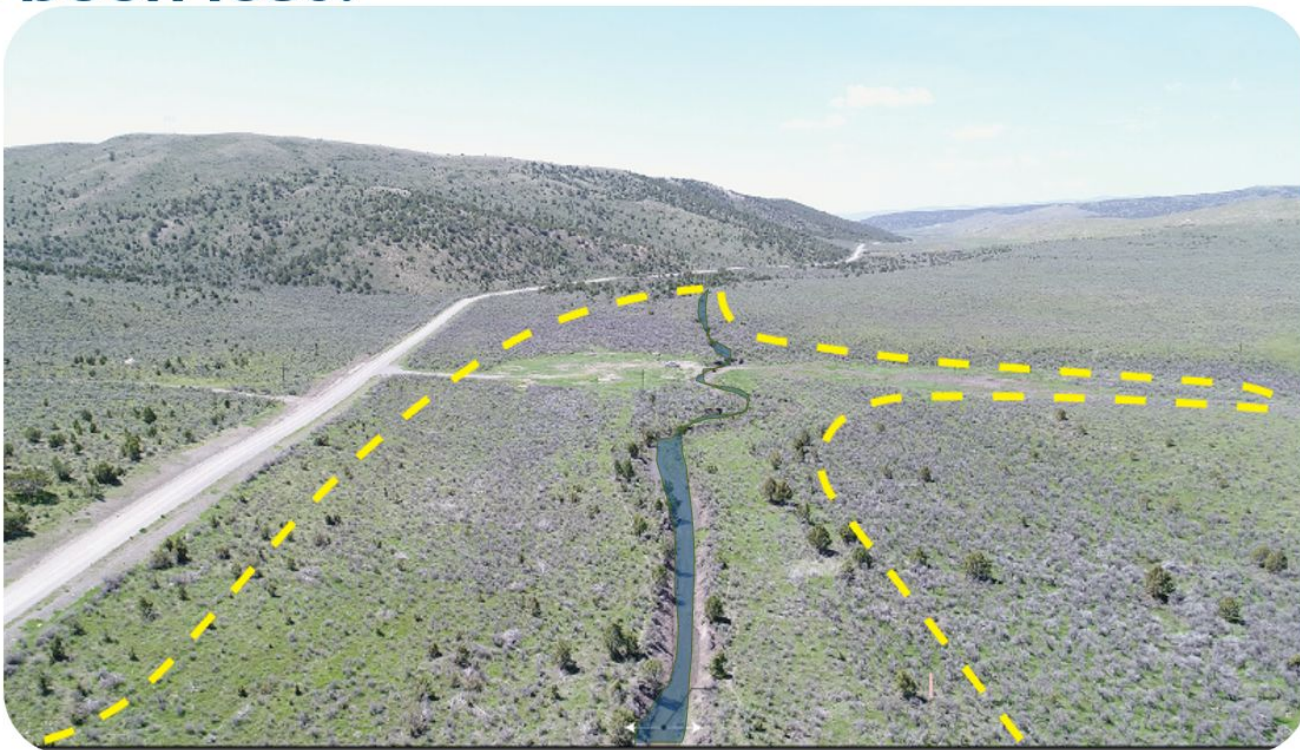


Adapted from Figure 1.2 (p 31) of
Shahverdian et al. (2019) – Chapter 1
LTPBR Manual DOI:
[10.13140/RG.2.2.14138.03529](https://doi.org/10.13140/RG.2.2.14138.03529)

valley bottom



What's been lost?



valley bottom

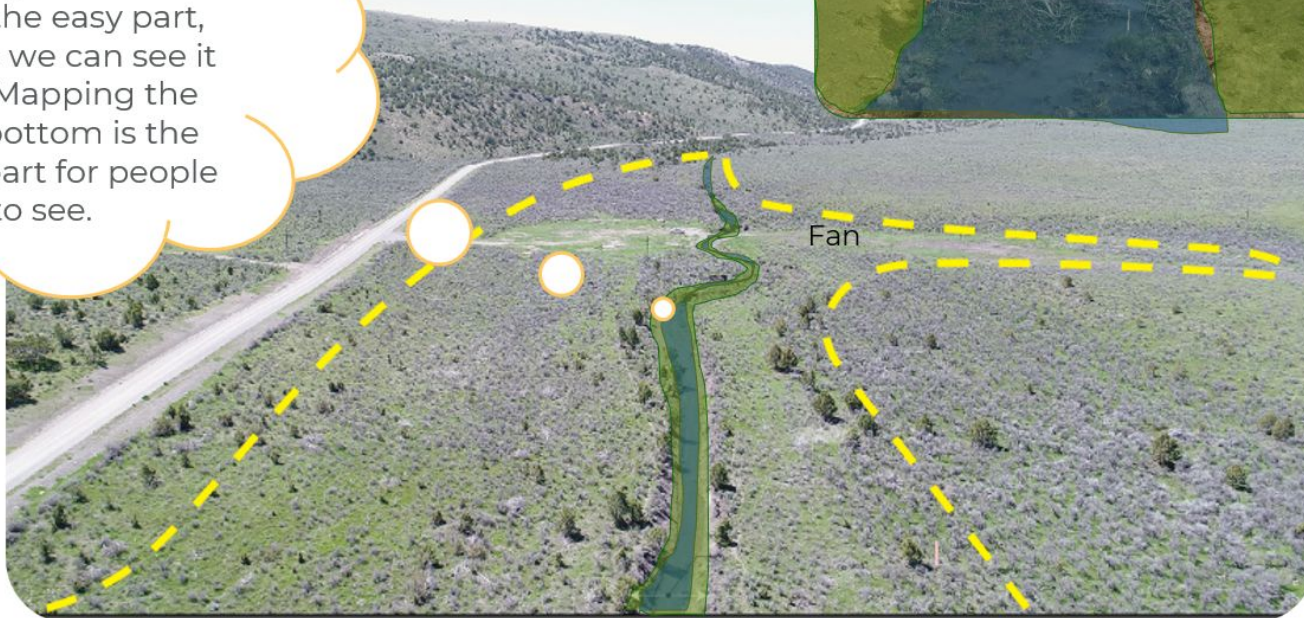


Active channel



Map what's there (or left over)

Mapping what's left over is the easy part, because we can see it today. Mapping the valley bottom is the harder part for people to see.



Valley bottom



Active channel



Active floodplain

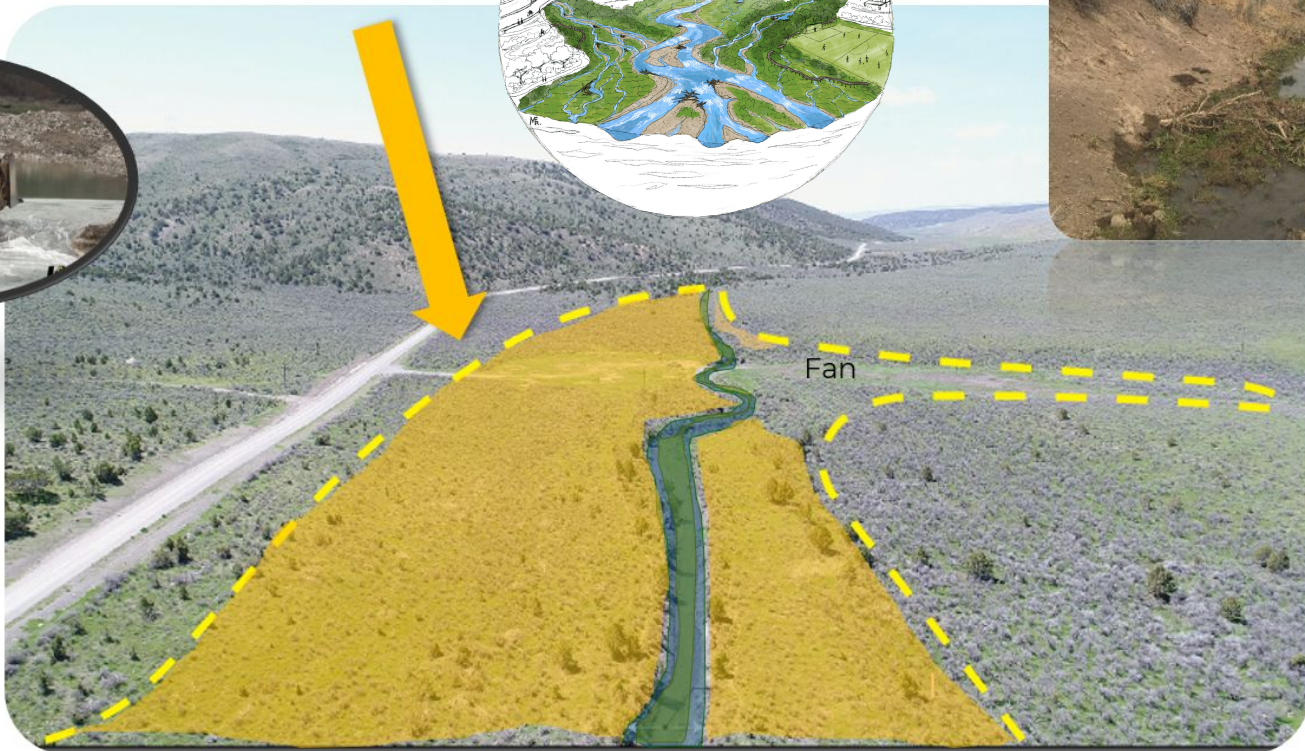




What's been lost?



Some context helps...



Valley bottom



Active channel



Active floodplain



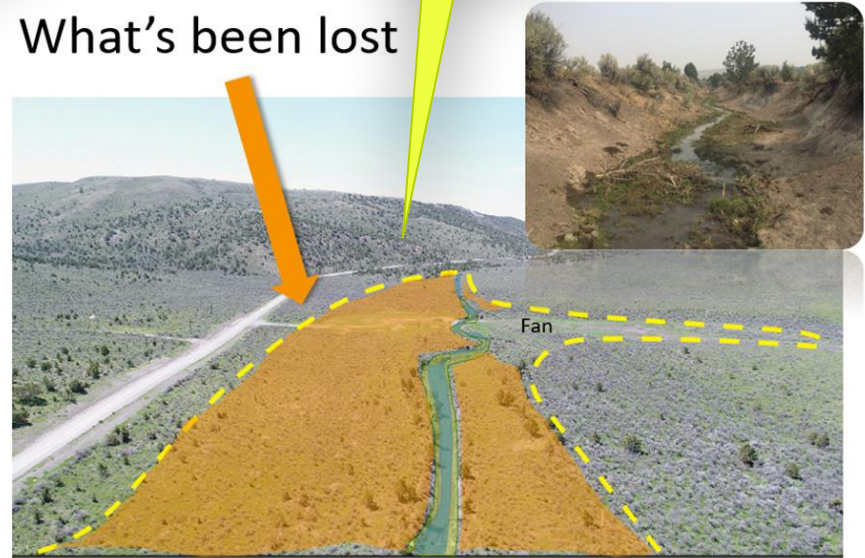
Inactive floodplain



Goal is to help BLM get **MORE** of this and **LESS** of this!
How to quantify and map that?



What's been lost

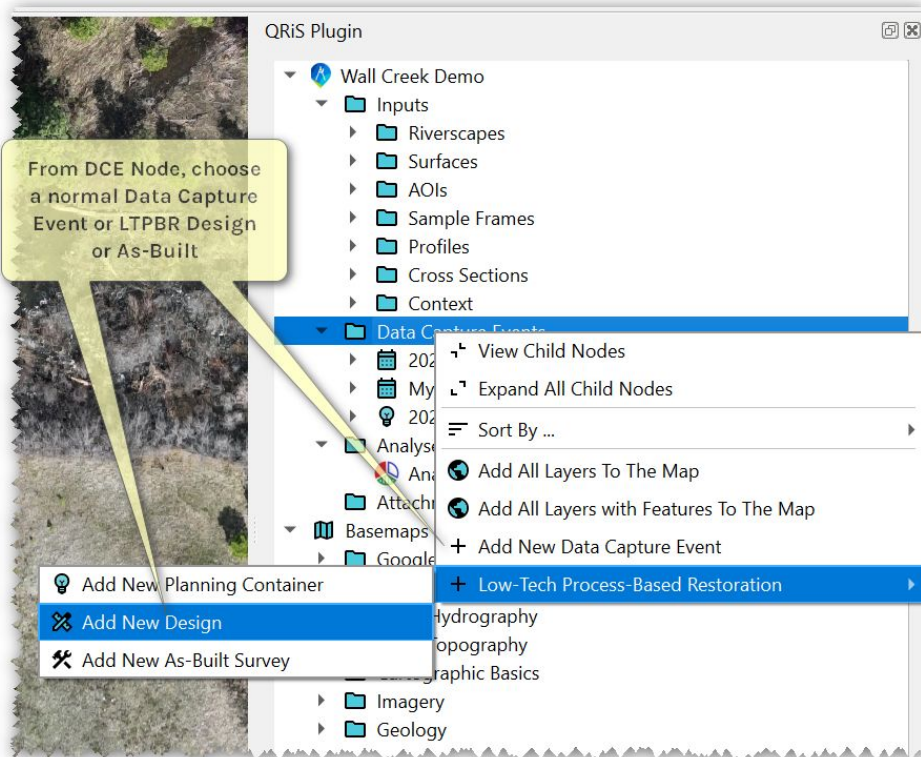


- Hydrologically inefficient – high storage
- Riparian area – Entire Valley Bottom!
- High Resource Values

- Hydrologically efficient (100% free flow)
- Desiccated sponge VS Riparian
- Low Resource Values



Step 1 - Get your Container DCE (Data Capture Event)



- A snap shot or a window of time
- Place to store observations (of a geospatial nature)

Note: Difference between more temporally frequent at-a-station observations (e.g. deploying a stage or depth sensor) as well as say satellite imagery (e.g. bi-weekly; Climate Engine)



Step 2: Contextualize DCE- What Evidence, When, Who?

Context Matters!

Create New Data Capture Event

Name: 2020 to 2025 Observations

Layers Basic Properties Surfaces Description Metadata

Associated Valley Bottom: Wall Creek Valley Bottom

Single Point in Time
 Date Range

Start Date: Year: 2020, Month: None, Day: None

End Date: Year: 2025, Month: Apr, Day: 22

Date Label: My 2 Days in September 2025

Event completed at: Desktop

Add New Layers to Map

Help OK Cancel

Create New Data Capture Event

Name: 2020 to 2025 Observations

Layers Basic Properties Surfaces Description Metadata

	Name	Date	Type
<input type="checkbox"/>	DEM (10 m NED)		Digital Elevation Model (DEM)
<input type="checkbox"/>	DEM Hillshade_NED10m		Hillshade
<input checked="" type="checkbox"/>	Ortho_WallCrk_04_11_2025_5cm	2025-04-11	Orthomosaic
<input checked="" type="checkbox"/>	WallCrk LiDAR 2020	2020	Digital Elevation Model (DEM)
<input checked="" type="checkbox"/>	WallCrk LiDAR 2020 hillshade	2020	Hillshade

Select All Select None

Add New Layers to Map

Help OK Cancel



Step 3: Pick and Choose What to Capture

Mix & Match from Protocols

Create New Data Capture Event

Name: 2020 to 2025 Observations

Layers | Basic Properties | Surfaces | Description | Metadata

Available Layers

- Riverscape Inundation
 - Dam Crests (L)
 - Thalwegs
 - Inundation
- Risk Assessment
 - Stream Asses
 - Land Use Ass
 - Buildings
 - Roads
 - Bridges
 - Canals
 - Diversions
 - Culverts
 - Other (Point)
 - Other (Linestr
 - Other (Polygc
 - Property Ass
 - Adjacent Lan
- Geomorphic Map
 - Geomorphic
- Rapid Riverscape Health Prot...
 - Rapid Riverscape Health ...

Layers

- Wall Creek Demo
 - Valley Bottoms
 - Wall Creek Valley Bottom [1]
 - Data Capture Events
 - 2020 to 2025 Observations
 - Observations
 - Hydraulic Mapping
 - Inundation [0]
 - Geomorphic Mapping
 - Channel
 - Thalwegs [0]
 - Assessments
 - Beaver Dam Building
 - Dam Crests [0]
 - Geomorphic Units [0]
 - 2025 Assessment
 - Geomorphic Units [9]
 - Context
 - WallCrk LiDAR 2020
 - WallCrk LiDAR 2020 hillshade
 - Surfaces
 - Ortho_WallCrk_04_11_2025_5cm

Now you have empty layer containers

What was added to DCE in QRIS Project, can be added to Layer Tree (e.g. Geomorphic Units)

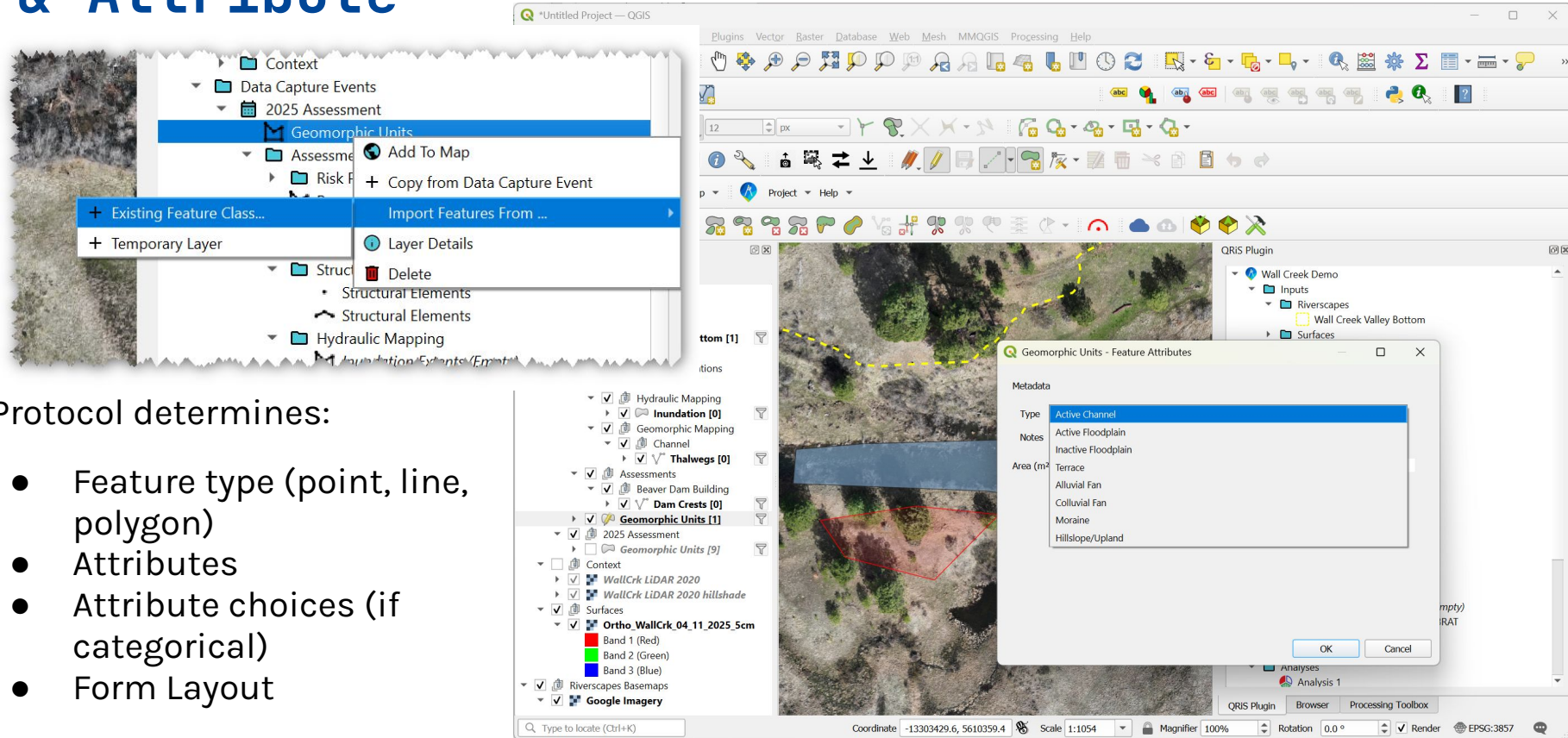
QRIS Plugin

- Wall Creek Demo
 - Inputs
 - Riverscapes
 - Wall Creek Valley Bottom
 - Surfaces
 - AOIs
 - Sample Frames
 - Profiles
 - Cross Sections
 - Context
 - Data Capture Events
 - 2025 Assessment
 - Geomorphic Units
 - Assessments
 - Risk Potential
 - Recovery Potential
 - Active Confining Margins
 - Observations
 - Structural Elements
 - Structural Elements
 - Structural Elements
 - Hydraulic Mapping
 - Inundation Extents (Empty)
 - My Brilliant Observation about RBAT

Help OK Cancel



Step 4: Import Features or Edit & Draw & Attribute



The screenshot displays the QGIS software interface. On the left, a context menu is open over a layer named 'Geomorphic Units', with the 'Import Features From...' option selected. The layer tree on the left shows a project structure including 'Context', 'Data Capture Events', '2025 Assessment', 'Geomorphic Units', 'Assessments', 'Risk', 'Structural Elements', 'Hydraulic Mapping', and 'Inundation Extents (Empty)'. The main map area shows an aerial view with a red polygon and a yellow dashed line. A 'Geomorphic Units - Feature Attributes' dialog is open, showing a list of feature types: Active Channel, Active Floodplain, Inactive Floodplain, Terrace, Alluvial Fan, Colluvial Fan, Moraine, and Hillslope/Upland. The 'Active Channel' type is selected. The bottom status bar shows the coordinate system as EPSG:3857.

Protocol determines:

- Feature type (point, line, polygon)
- Attributes
- Attribute choices (if categorical)
- Form Layout

Importing with Attribute Field “Mapping”

The screenshot displays the QGIS interface with two dialog boxes open. The 'Import DCE Layer From Existing Feature Class' dialog is in the foreground, showing the 'Import Fields' tab. It lists several input fields and their corresponding data types and metadata. The 'Assign Field Values' dialog is also open, showing a mapping of input values to output field values.

Input Field	Data Type	Retain Values	Transfer Values	Copy Values
fid	int8	<input checked="" type="checkbox"/> fid (metadata)	<input type="checkbox"/> Assign...	- No Target Fields for Input Data Type -
event_id	int8	<input checked="" type="checkbox"/> event_id (metadata)	<input type="checkbox"/> Assign...	- No Target Fields for Input Data Type -
event_layer_id	int8	<input checked="" type="checkbox"/> event_layer_id (metadata)	<input type="checkbox"/> Assign...	- No Target Fields for Input Data Type -
metadata	string	<input checked="" type="checkbox"/> metadata (metadata)	<input type="checkbox"/> Assign...	
Type	string	<input checked="" type="checkbox"/> Type (metadata)	<input checked="" type="checkbox"/> Assign...	
Notes	string	<input checked="" type="checkbox"/> Notes (metadata)	<input type="checkbox"/> Assign...	
vrt_area	double	<input checked="" type="checkbox"/> vrt_area (metadata)	<input type="checkbox"/> Assign...	

Input Values	geo_unit_type
Active Channel	Active Channel
Alluvial Fan	Alluvial Fan
Active Floodplain	- NULL -
	Active Channel
	Active Floodplain
	Inactive Floodplain
	Terrace
	Alluvial Fan
	Colluvial Fan
	Moraine
	Hillslope/Upland

- Allows import from existing feature classes of features (or selection)
- Allows retention of all original data
- Allows “mapping” or conversion of attribute types into protocol’s convention
- Allows mixing & matching of imported & digitized



Motivation: Track change in indicators of Riverscape Health through time

SMART INDICATOR TABLES

INDICATOR	GOAL	TIME HORIZON				
		HISTORIC	EXISTING (Current)	AS-BUILT (0 Years)	MEDIUM (3 – 5 Years)	LONG (5 – 10 Years)
VALLEY BOTTOM ACTIVE (% of Valley Bottom Area)	GOAL 1: ACTIVE FLOODPLAIN	90% ± 10	20%	25 ± 5%	40 ± 10 %	90% ± 10
CEM STAGE (% of Valley Bottom Length)	GOAL 1: CEM STAGE COMPOSITION	S0: 80% ± 20 S8: 15% ± 10 S7: 5% ± 5 S5: 0% S2: 0%	S0: 0% S8: 25% S7: 35% S5: 10% S2: 20%	S0: 0% S8: 25% S7: 35% S5: 10% S2: 20%	S0: 0% S8: 75% ± 10 S7: 15% ± 10 S5: <5% S2: <5%	S0: 80% ± 20 S8: 15% ± 10 S7: 5% ± 5 S5: 0% S2: 0%
LWD ACCUMULATIONS (Jams / mile)	GOAL 2: LTPBR PRINCIPLES	300 ± 50 (Natural)	2 / mi.	100 (PALS)	200 ± 25 (PALS + Natural)	250 ± 50 (Natural > PALS)
BEAVER DAM DENSITY (Dams / mile)	GOAL 2: LTPBR PRINCIPLE	75 ± 20 (Natural)	0 / mi.	50 (BDAs)	60 ± 10 (BDAs + Natural)	75 ± 20 (Natural > BDAs)
WETTED CHANNEL LENGTH (miles)	GOAL 3: FISH HABITAT QUANTITY AND QUALITY	4.0 ± 0.5	1.8	2 ± 0.2	3 ± 0.5	3.5 ± 0.5
SPAWNING HABITAT QUANTITY (Riffles / mi.)	GOAL 3: FISH HABITAT QUANTITY AND QUALITY	30 ± 10	10	10	20 ± 5	25 ± 10

See if:

- Good conditions are maintaining
- Conditions recovering
- Restoration actions leading to improvement

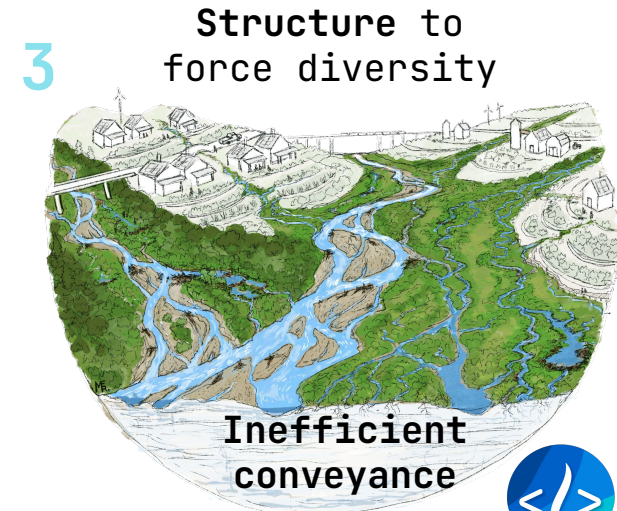
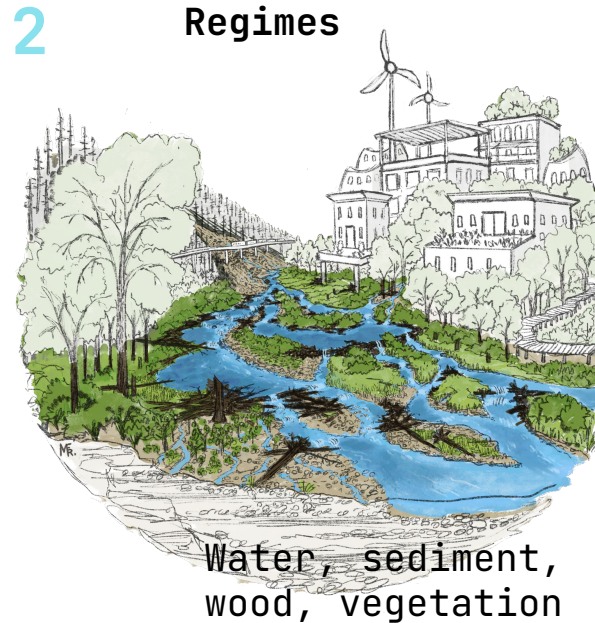
Rows are metrics calculated from layers in DCEs

Columns are time (i.e. DCEs)



Principles of Healthy Riverscapes ...

"Riverscapes need:



Healthy riverscapes:

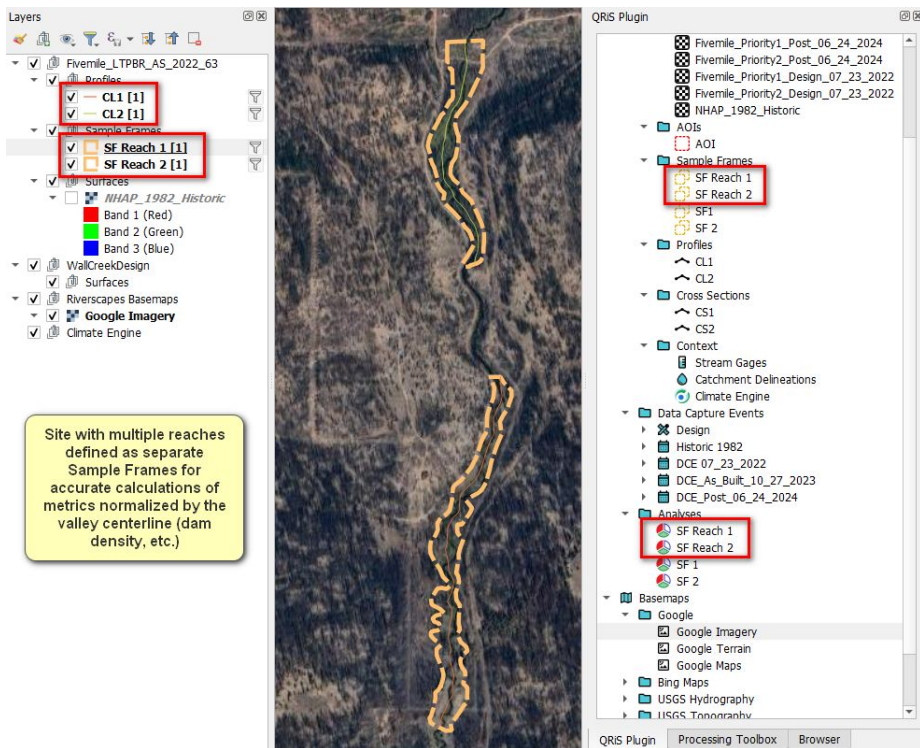
- Support greater **biodiversity**
- Self-sustaining **natural infrastructure**
- Easier **co-existence & adaptation**

How important are these principles in each riverscape?

It depends... f(?) - Context matters!

Analyses

The calculation of metrics from DCEs within Sample Frame(s)



- Needs at least one DCE
 - Multiple DCEs allow looking at changes through time
- And Sample Frame(s)



Documentation: <https://gris.riverscapes.net/software-help/analyses>



Analyses

1. Set up Analysis

Q Edit Analysis Properties

Name: My Analysis

Analysis Masks (Sample Frame): Sample Frame 1

Valley Bottom: Valley Bottom

Riverscape Centerline: Centerline 1

DEM: Digital Elevation Model

Metric	Status
Riverscape Area	Metric
Riverscape Length	Metric
Valley Gradient	Metric
Channel Gradient	Indicator
Integrated Valley Width	Indicator
Dam Count	Indicator
Dam Density	None
Intact Dam Count	None
Intact Dam Density	None
Channel Length	None
Breached Dam Count	None
Breached Dam Density	None
Blown Out Dam Count	None
Blown Out Dam Density	None

Set All to: Metric Indicator None

Help OK Cancel

Q Calculate All Metrics

Data Capture Events

Just the currently active DCE

All Data Capture Events

Sample Frames

Just the currently active SF

All Sample Frames

Metric Values

Overwrite any existing automated values

Force automated values to be the active values

Help OK Cancel

2. Calculate

3. Interrogate

- Needs at least one DCE
 - Multiple DCEs allow looking at changes through time
- And a Sample Frame

QRIS Analysis

Analysis: test

Data Capture Event: test

Mask Polygon: Feature 5

Display Values: Metrics and Indicators Indicators Only

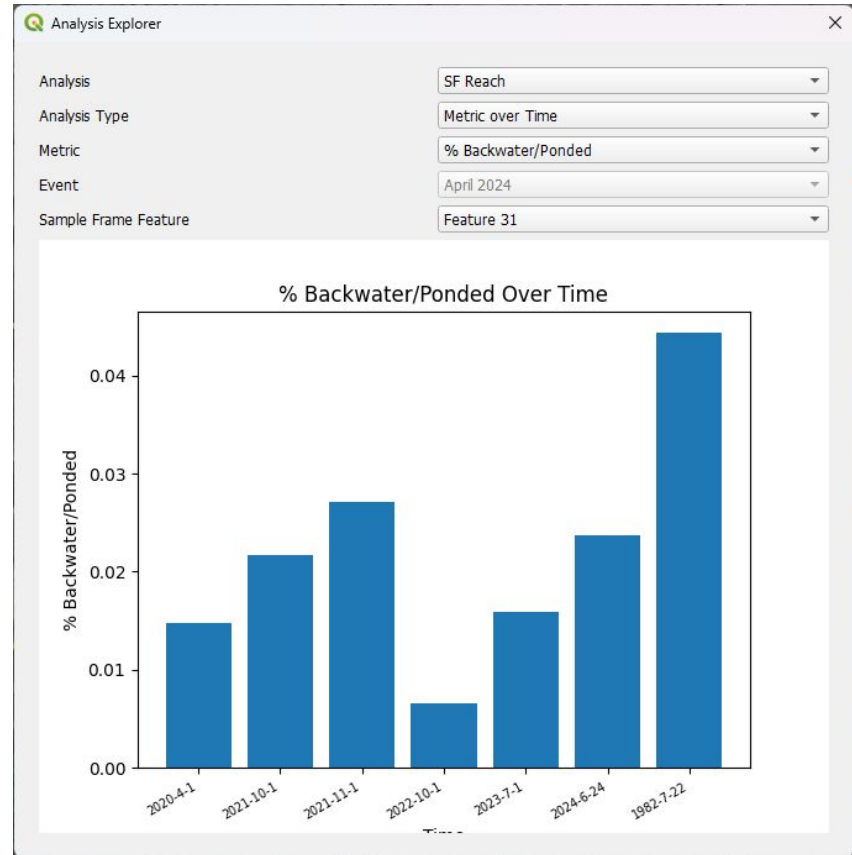
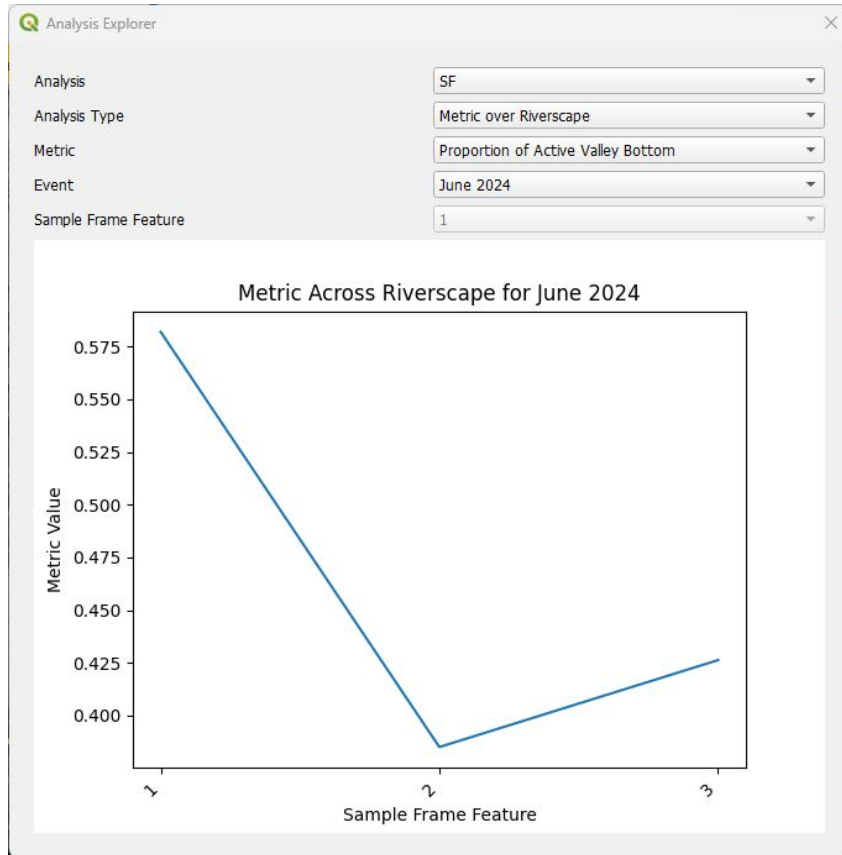
	Metric	Units	Value	Uncertainty	Status
✎	Riverscape Area	m ²	null		○ ○
✎	Riverscape Length	m	null		○ ○
✎	Channel Gradient	ratio	null		○ ○
✎	Integrated Valley Width	m ²	422700.543		○ □
✎	Dam Count	#	null		○ ○

Help Icon Legend Export Metrics Table

Documentation: <https://gris.riverscapes.net/software-help/analyses>



Visualize through Space (single DCE) or Time



Always Evolving Protocol Library Docs

The image displays two screenshots of the Riverscapes Studio (QRiS) website, illustrating the structure of the Protocol Library documentation.

Left Screenshot: Protocol Library Overview

- Header: Riverscapes Studio (QRiS) with GitHub link and search bar.
- Navigation: Home > Technical Reference > Protocols > Protocol Library
- Section: **Protocol Library**
- Text: List of QRiS protocols
- Categories:
 - As-Built Protocols**: 1 item
 - Design Protocols**: 1 item
 - DCE Protocols**: 7 items
- Footer: Previous << Protocol Technical Reference

Right Screenshot: DCE Protocols Detail

- Header: Riverscapes Studio (QRiS) with GitHub link and search bar.
- Navigation: Home > Technical Reference > Protocols > Protocol Library > DCE Protocols
- Section: **DCE Protocols**
- Text: List of DCE protocols in QRiS
- Protocols:
 - Geomorphic Mapping of Ri...**: Geomorphic Unit Assessment of Valley Bottom.
 - Perennial Flow Protocol**: A protocol for documenting beaver habitat and ecology.
 - LTPBR V2 DCE Protocol**: Protocol to capture riverscape feature observations and ...
 - Risk Assessment Protocol**: Protocol to evaluate infrastructure risks and recovery po...
 - Beaver Census Protocol**: A protocol for documenting beaver habitat and ecology.
 - Beaver Translocation Pro...**: A protocol for beaver translocations.
 - Barrier Assessment Proto...**

A blue arrow labeled "Built" points from the "As-Built Protocols" category in the left screenshot to the "DCE Protocols" sub-page in the right screenshot.

Protocol LibraryRef: <https://gris.riverscapes.net/protocols/protocol-library>



Each protocol *should* have full documentation page

The screenshot displays the Riverscapes Studio (QRIS) website interface. The top navigation bar includes the logo, 'Riverscapes Studio (QRIS)', a GitHub link, and a search bar. The left sidebar contains a menu with categories like 'Data Exchange', 'Technical Reference', 'Protocols', and 'Protocol Library'. The main content area features the title 'Geomorphic Mapping of Riverscapes Protocol' and a detailed description of the protocol's purpose and application. A right sidebar lists various document sections such as 'Protocol Summary', 'How to Use', and 'References'. At the bottom, a diagram illustrates different geomorphic unit types: 'Laterally Confined', 'Partly Confined', and 'Laterally Unconfined', with a note about 'confining margin terraces, fans, structures, or valley bottom'.

Data Exchange - Dec 2024

Introduction to Protocols in QRIS - Sept 2025

Site Scale Planning with Riverscapes Studio - Sept 2025

Intro to Metrics & Climate Engine in QRIS - June 2024

Intro to QRIS for LTPBR - Feb 2024

Trainings and Workshops

Example Datasets

FAQs & IAQs

Technical Reference

Database Schema

Metric Calculations

Protocols

Protocol Technical Reference

Protocol Library

As-Built Protocols

DCE Protocols

Geomorphic Mapping of Riverscapes Protocol

Perennial Flow Protocol

Technical Reference > Protocols > Protocol Library > DCE Protocols >

Geomorphic Mapping of Riverscapes Protocol

Geomorphic Mapping of Riverscapes Protocol

The *Geomorphic Mapping of Riverscapes* Protocol is the preliminary assessment of a valley bottom. This protocol helps identify and categorize Tier 1 geomorphic units, or 'building blocks', of a riverscape, as well as define the lateral boundaries (i.e., margins) of the valley bottom.

The main purpose of this protocol is to **inventory the resources that define a riverscape's setting**. This provides crucial insights into the natural and human-caused processes that shape a valley bottom. From this, a deeper understanding of channel form & function, geomorphic condition, and riparian health can be understood (Bennet et al. 2019). Furthermore, this protocol identifies sources of current or past human development or natural disturbances that influence or have altered the riverscape.

The Tier 1 protocol should be completed before digitization of pre-project monitoring, design, or as-built implementation. Within QRIS, you can add this protocol to your project by right clicking on the **Data Capture Events** container, selecting **Add New Data Capture Event** and finding the protocol in the list provided.

Protocol Summary

How to Use

Layers

Video Demonstration

Layer Attributes

Tier 1 Geomorphic Units

Margins

Metric Attributes

References

Laterally Confined

Partly Confined

Laterally Unconfined

confining margin
terraces, fans, structures, or valley bottom



We have lots of step by step tutorials as well as classes

The screenshot shows the Riverscapes Studio (QRIS) website. The main content area features a 'Step-By-Step Tutorial' section with the following text: 'The step-by-step tutorial has two parts. The written portion is a simple form of the tutorial meant as a way to guide you through the steps in a brief and concise way. The video component is much more in depth and has more discussion about concepts and nuances that are not mentioned in the written portion.' Below this is an 'Install and Open Project' section with a list of four steps: 1. In the QGIS menubar at the top of the page, Plugins > Manage and Install Plugins. 2. Install the Riverscapes Viewer plugin first. Search for Riverscapes Viewer and click the Install button. This is a required dependency for QRIS. 3. Install the QRIS plugin next. Follow the same steps to Plugins > Manage and Install Plugins and search for QRIS. Click the Install button. 4. Create a new project, or open the one provided after downloading. Below the text is a video player titled 'Intro, Install, and Open a Project (Part 1)'. The right sidebar contains 'Webinar Details' with links for Description, Resources, Data Used in Webinar, Webinar Slides, Video Recording of Webinar, Step-By-Step Tutorial, Install and Open Project, Download Riverscapes Projects and Explore Context layers, Populate Project with Context layers, Create a Data Capture Event, Map Geomorphic Units, Map Valley Bottom and Compare to VBET, Map Active Confining Margins, Map Risk, Map Recovery Potential, Carol vs Pops, Differing Ideas on Recovery Potential, Create a Planning Container, Generating Sample Frames, and Analyses.

<https://gris.riverscapes.net/tutorials/>








Low-Tech, High Impact: PB tools



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Outline:

- LTPBR Background
- Riverscapes Consortium 
- Highlight two tools
 - PBR Explorer - *for sharing effort (actions)* 
 - **Riverscapes Studio** - *for planning, design, as-builts & action-effectiveness monitoring (assessing impact)* 

Purpose:

To share a couple of high-tech, but tractable free tools for capturing impact

- Impact of effort
- If efforts have desired impacts:
 - Affects - (v) process
 - Effects - (n) outcomes



When we
working
at our
best

we *learn*
from the
ecosystem
engineer





Riverscapes Consortium



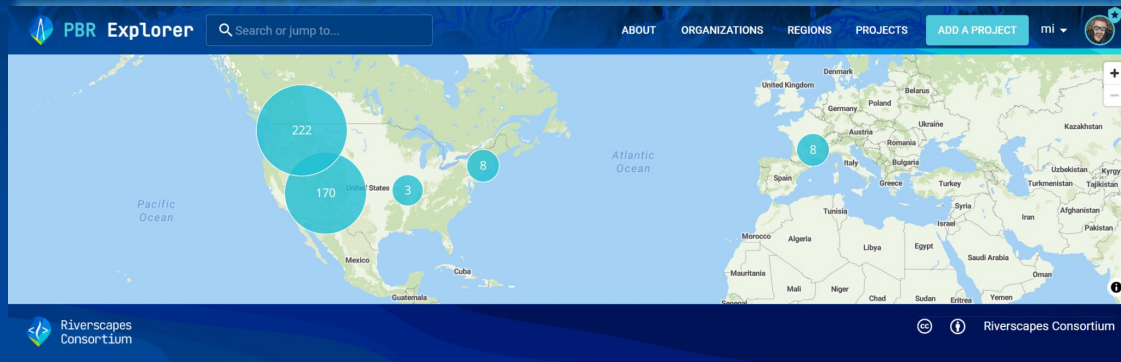
PACIFIC SALMON FOUNDATION

FOUNDATION



Thank you!

Keep Exploring & Sharing PBR Efforts!



Some Questions from Laura & Greer

What excites you about LTR? Why should we care?

What is your history in the LTR world?

What's the big deal with LTR?? cost/benefit, footprint of possibility, etc.

How can low-tech achieve watershed goals?

What about risk? Don't these projects just wash out??? How do we redefine success and failure?

What roles do geomorphology and engineering play in the low-tech space?

How can we translate broad goals (eg, reconnecting floodplain, arresting incision...) into specific project objectives and actions.

What tools do we have now to inform our LTR work?

