Welcome to Riparian Book Club

Coalitions & Collaboratives (COCO) & Colorado Riparian Association (CRA) are teaming up with special co-host **Water Education Colorado (WEco)** to "book club" the:

Process-Based Restoration (PBR) Umbrella

We will explore on-the-ground projects from opposite ends of the PBR spectrum and why different approaches are appropriate in different scenarios

Riparian Book Club helps bridge the gap between academic research on stream and wetland systems and applied restoration design in Colorado

Welcome | Riparian Book Club Hosts

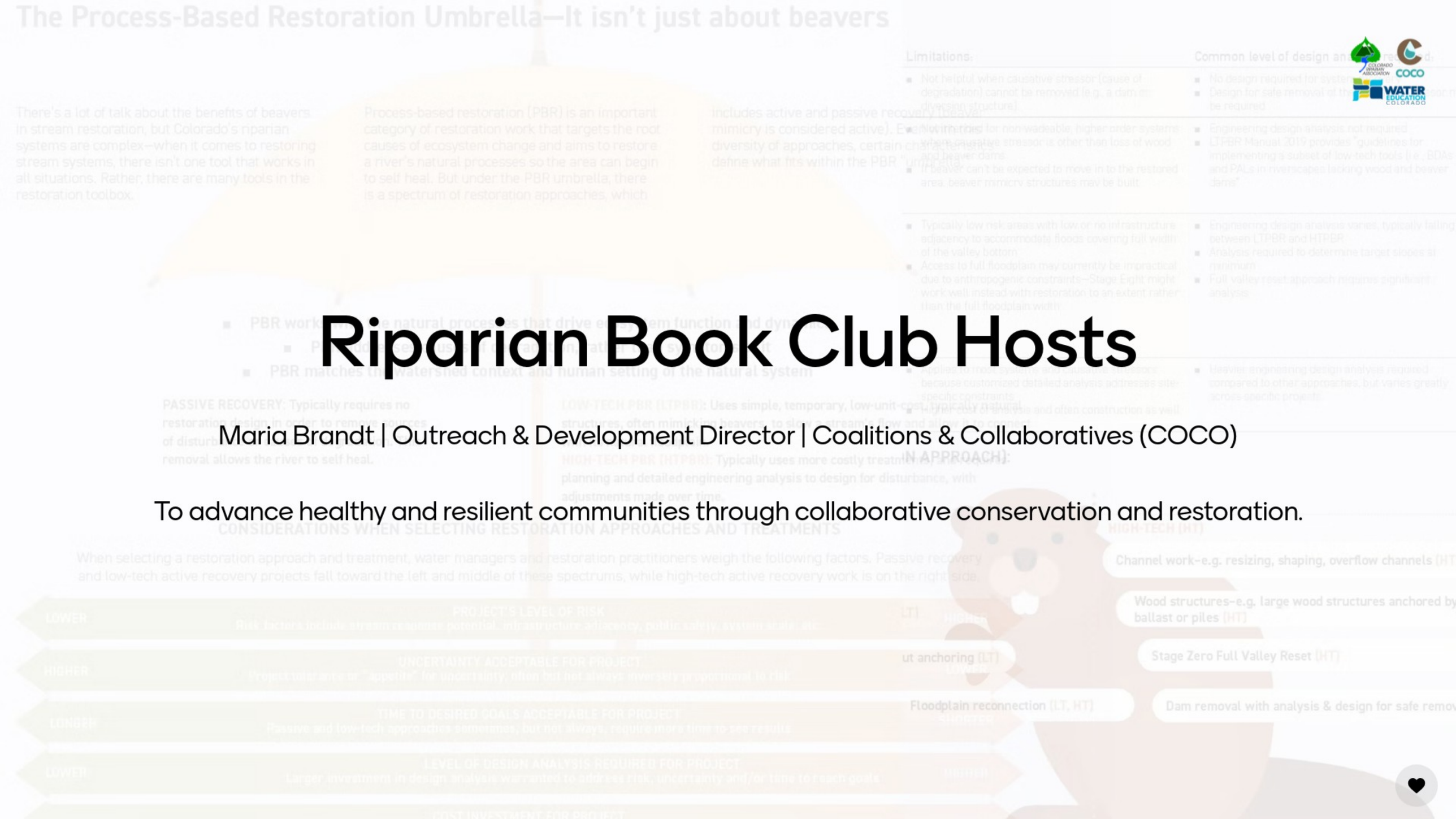
Julie Ash, PE | Education & Outreach Committee Lead | Colorado Riparian Association (CRA)

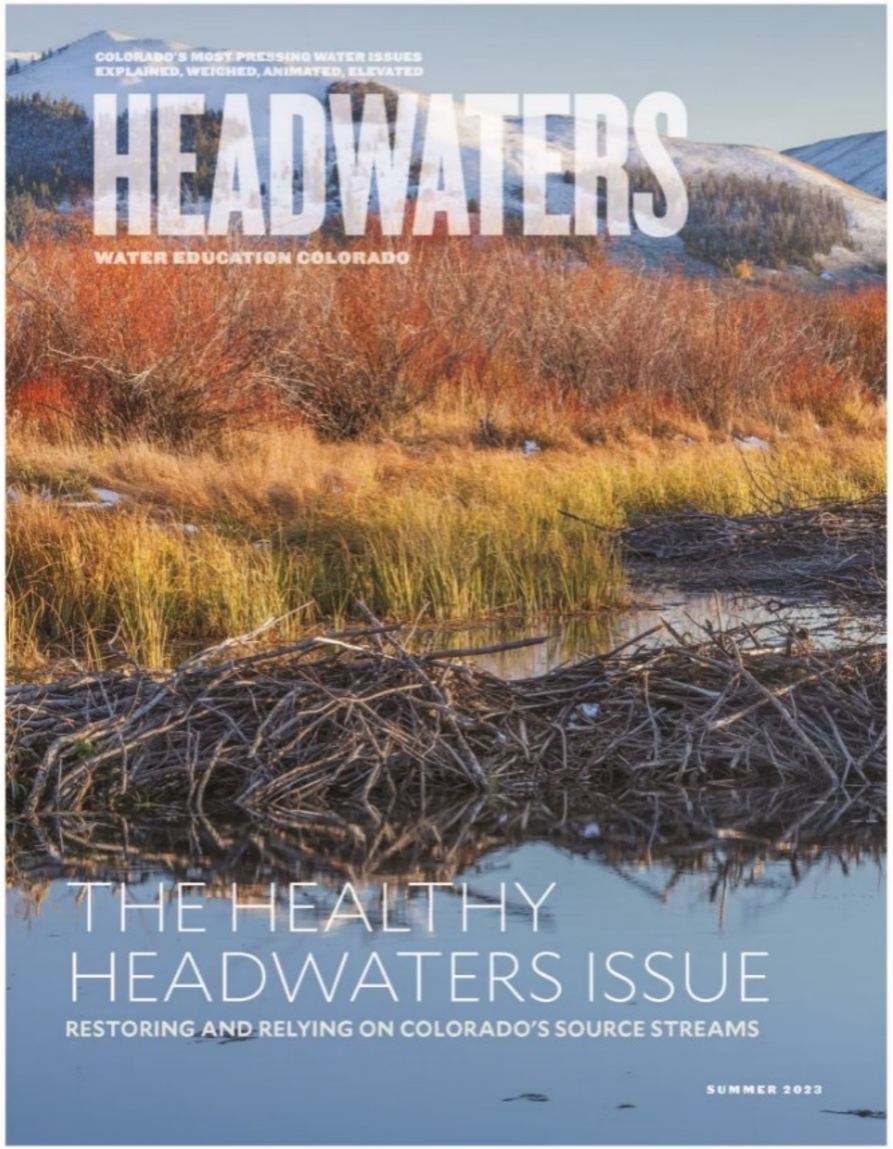
To promote the conservation, restoration, and preservation of Colorado's riparian areas and wetlands.

Riparian Book Club Hosts

Maria Brandt | Outreach & Development Director | Coalitions & Collaboratives (COCO)

To advance healthy and resilient communities through collaborative conservation and restoration.





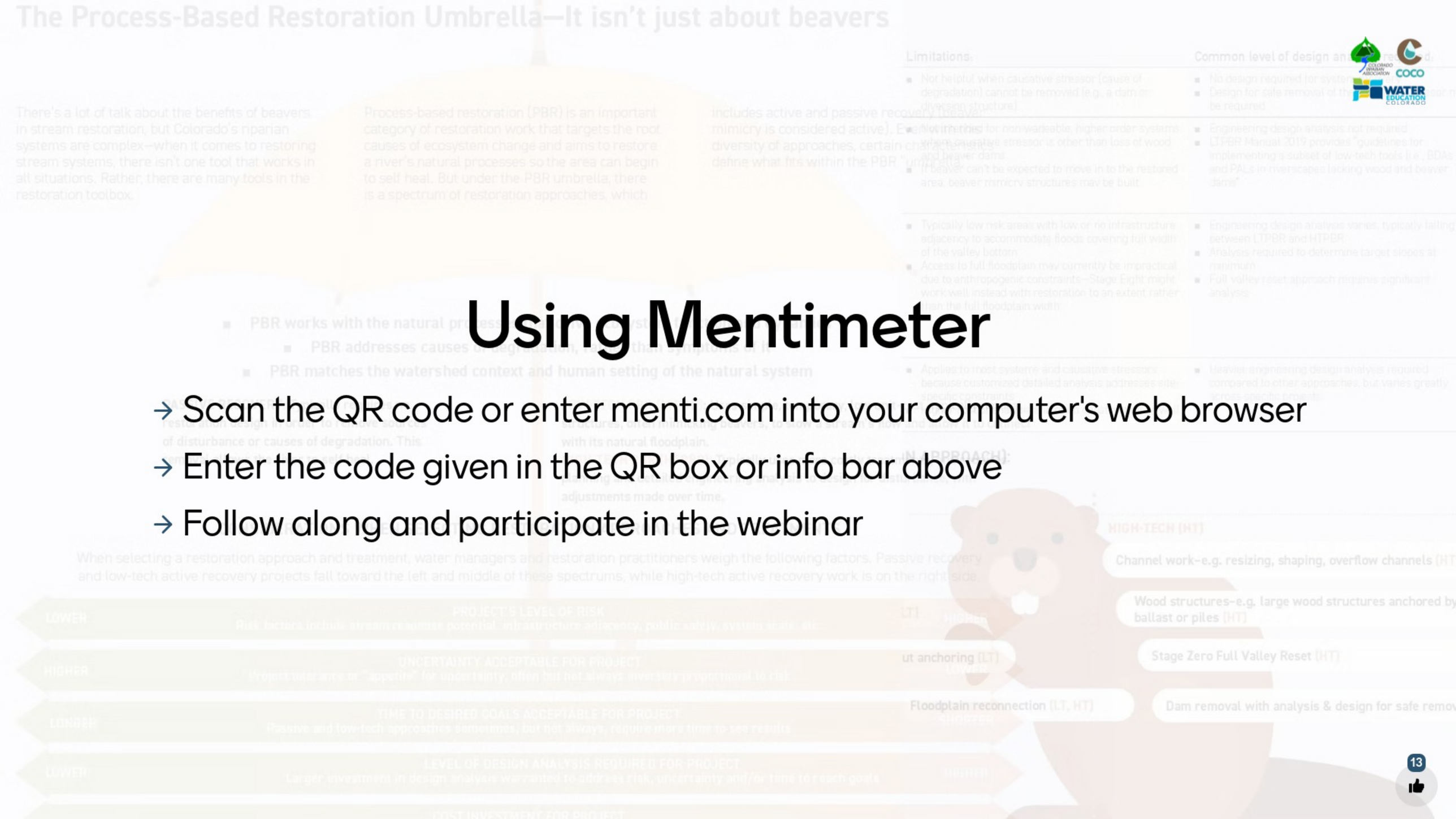
Riparian Book Club Hosts

Caitlin Coleman | Publications and Digital Resources Managing Editor | Water Education Colorado (WEco)

To ensure Coloradans are informed on water issues and equipped to make smart decisions that guide our state to a sustainable water future.

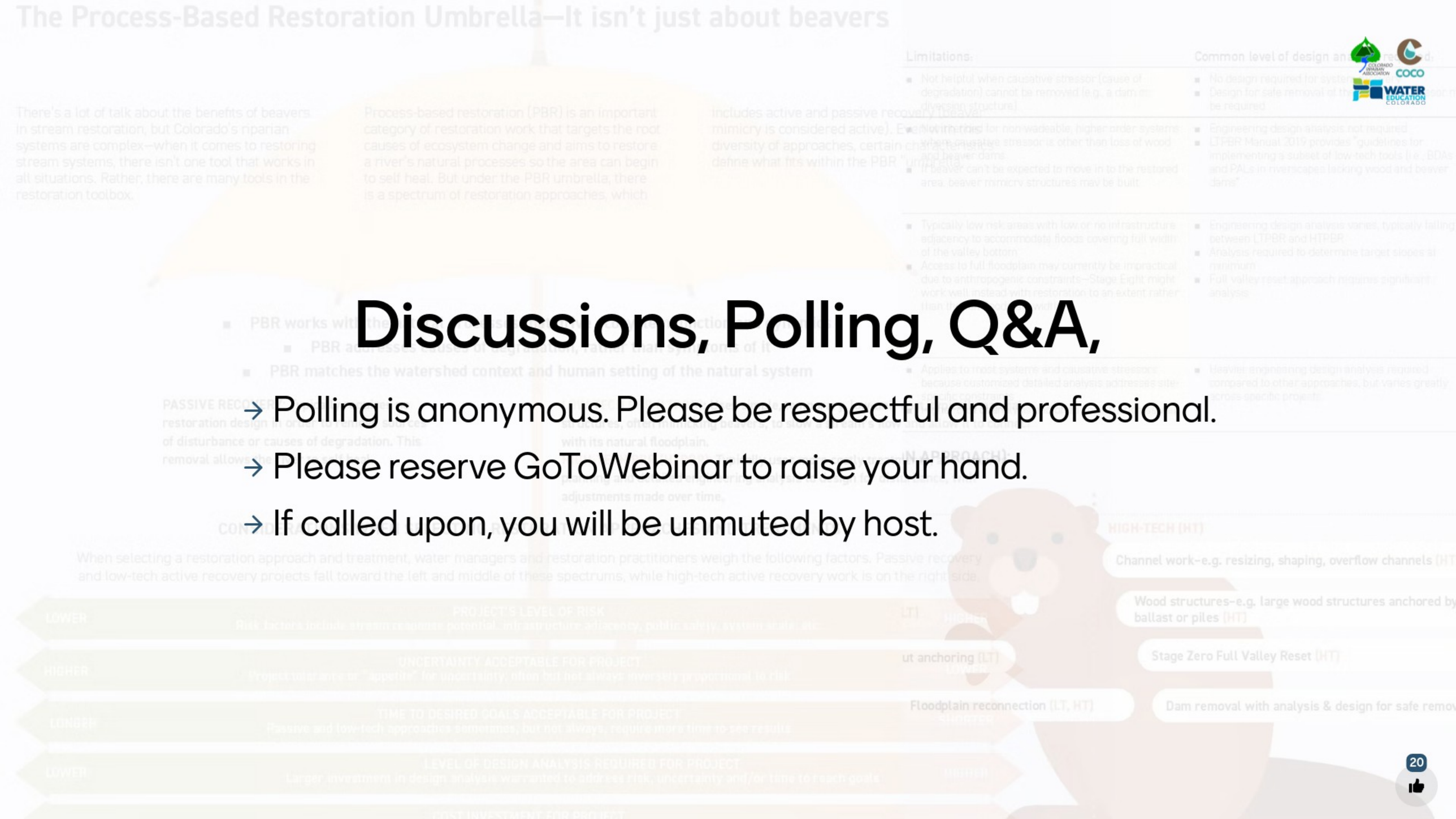
Using Mentimeter

- Scan the QR code or enter menti.com into your computer's web browser
- Enter the code given in the QR box or info bar above
- Follow along and participate in the webinar



Discussions, Polling, Q&A,

- Polling is anonymous. Please be respectful and professional.
- Please reserve GoToWebinar to raise your hand.
- If called upon, you will be unmuted by host.



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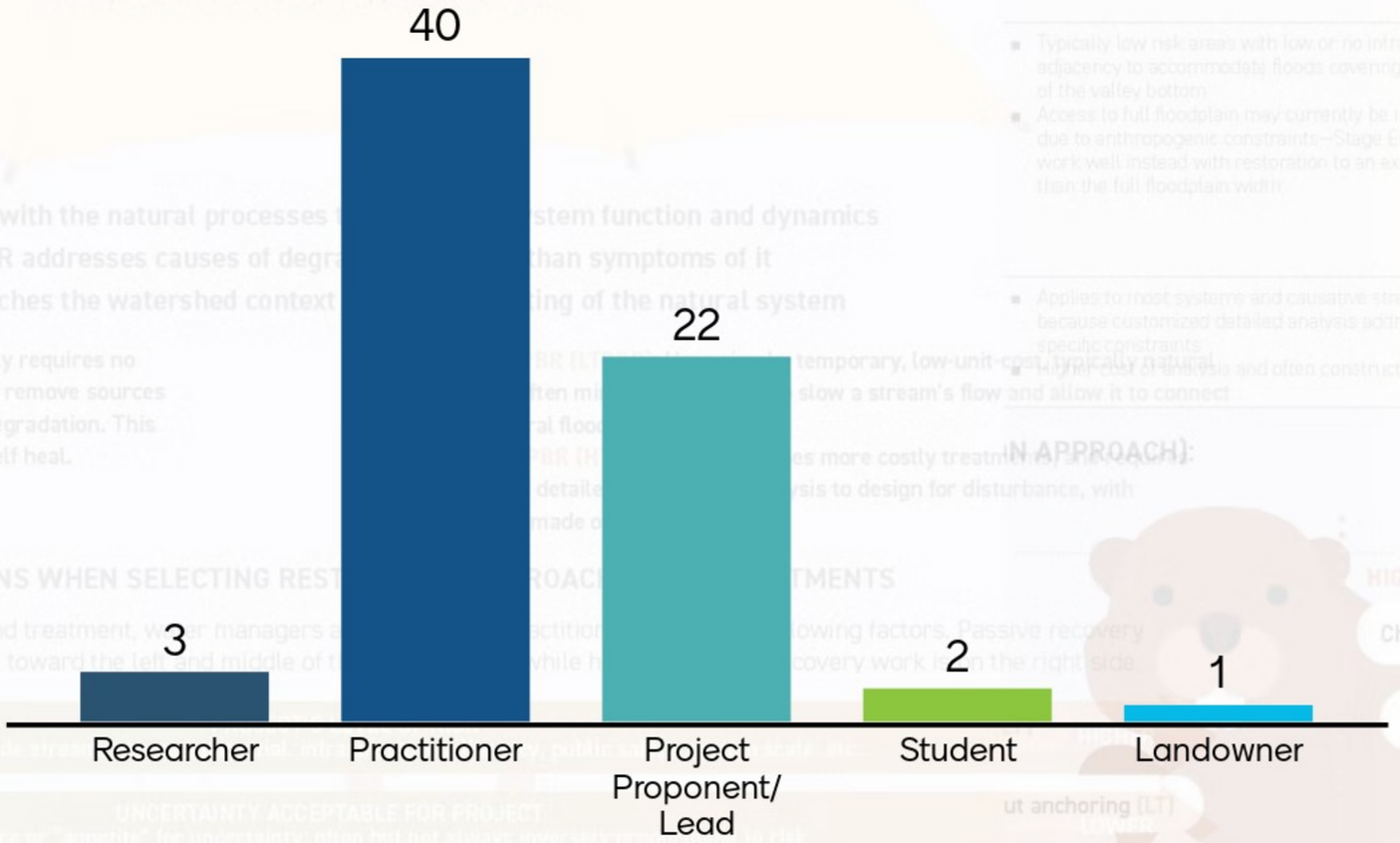
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22
3
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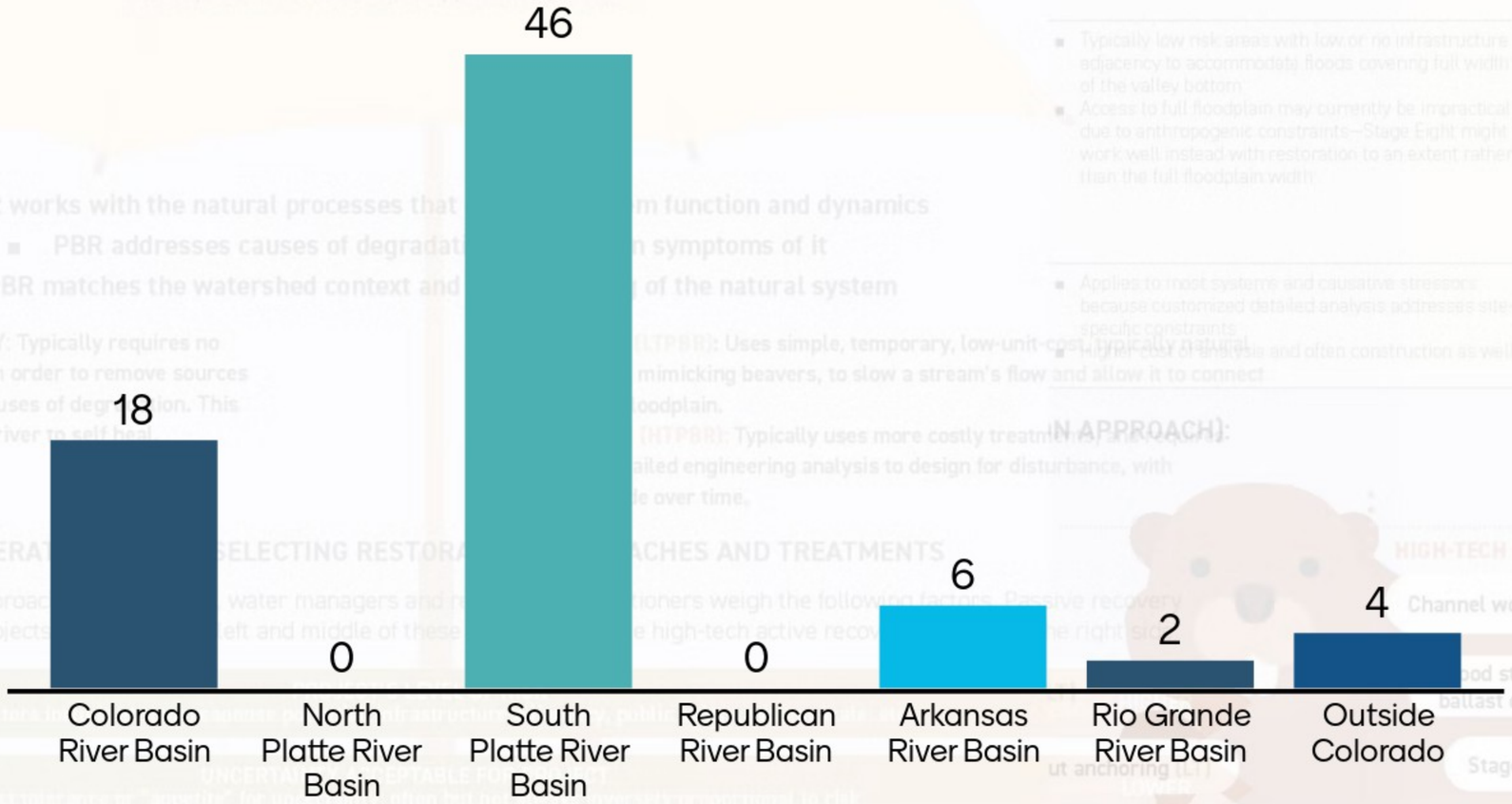
Researcher
Practitioner
Project Proponent/ Lead
Student
Landowner

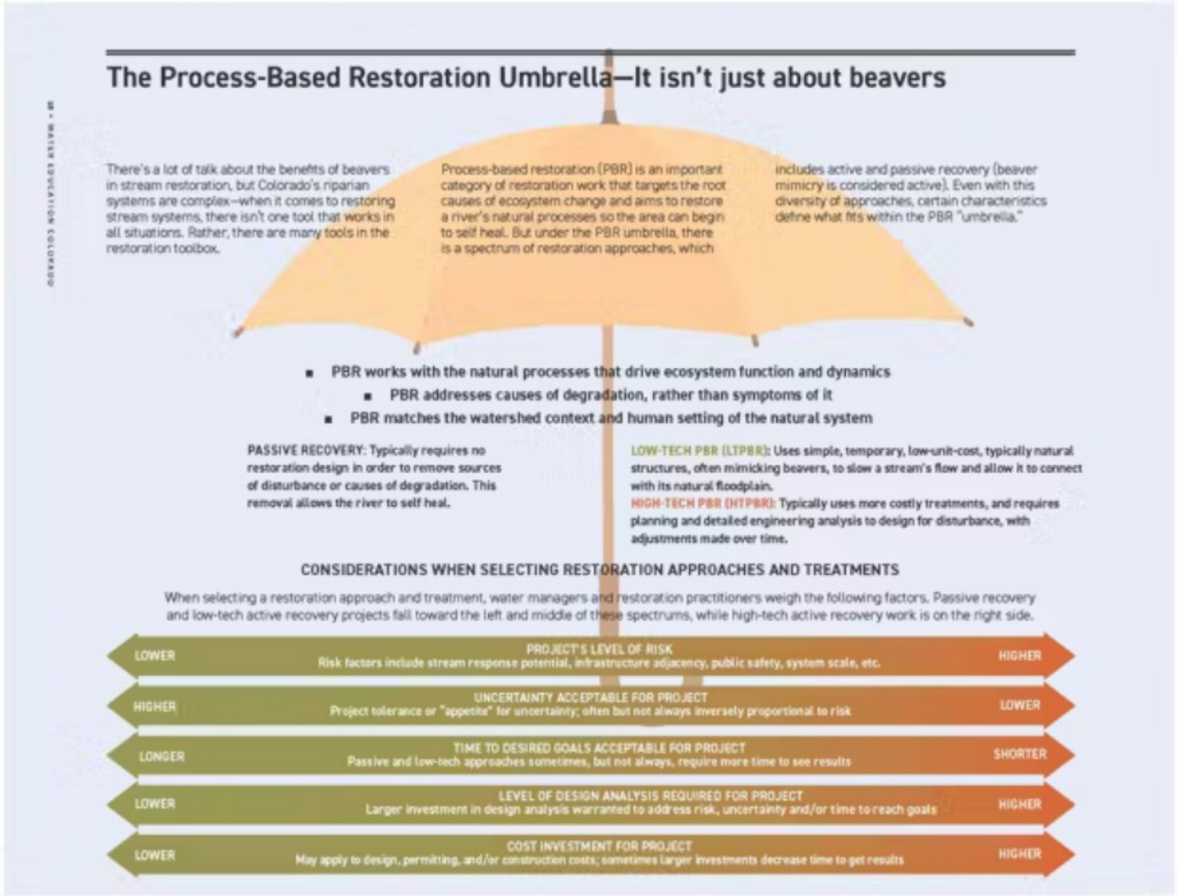
What geographic location are you joining us from?



September 12, 2023 Riparian Book Club:

Process-Based Restoration (PBR) Umbrella

Building from the 1st Book Club on pivotal scientific papers on PBR, we will "book club" the PBR Umbrella graphic included in the Summer 2023 issue of WEco's Headwaters publication



The Process-Based Restoration Umbrella—It isn't just about beavers

There's a lot of talk about the benefits of beavers in stream restoration, but Colorado's riparian systems are complex—when it comes to restoring stream systems, there isn't one tool that works in all situations. Rather, there are many tools in the restoration toolbox.

Process-based restoration (PBR) is an important category of restoration work that targets the root causes of ecosystem change and aims to restore a river's natural processes so the area can begin to self heal. But under the PBR umbrella, there is a spectrum of restoration approaches, which includes active and passive recovery (beaver mimicry is considered active). Even with this diversity of approaches, certain characteristics define what fits within the PBR "umbrella."

- PBR works with the natural processes that drive ecosystem function and dynamics
- PBR addresses causes of degradation, rather than symptoms of it
- PBR matches the watershed context and human setting of the natural system

PASSIVE RECOVERY: Typically requires no restoration design in order to remove sources of disturbance or causes of degradation. This removal allows the river to self heal.

LOW-TECH PBR (LTPBR): Uses simple, temporary, low-unit-cost, typically natural structures, often mimicking beavers, to slow a stream's flow and allow it to connect with its natural floodplain.

HIGH-TECH PBR (HTPBR): Typically uses more costly treatments, and requires planning and detailed engineering analysis to design for disturbance, with adjustments made over time.

CONSIDERATIONS WHEN SELECTING RESTORATION APPROACHES AND TREATMENTS

When selecting a restoration approach and treatment, water managers and restoration practitioners weigh the following factors. Passive recovery and low-tech active recovery projects fall toward the left and middle of these spectrums, while high-tech active recovery work is on the right side.

LOWER	**PROJECT'S LEVEL OF RISK** Risk factors include stream response potential, infrastructure adjacency, public safety, system scale, etc.	HIGHER
HIGHER	**UNCERTAINTY ACCEPTABLE FOR PROJECT** Project tolerance or "appetite" for uncertainty; often but not always inversely proportional to risk	LOWER
LONGER	**TIME TO DESIRED GOALS ACCEPTABLE FOR PROJECT** Passive and low-tech approaches sometimes, but not always, require more time to see results	SHORTER
LOWER	**LEVEL OF DESIGN ANALYSIS REQUIRED FOR PROJECT** Larger investment in design analysis warranted to address risk, uncertainty and/or time to reach goals	HIGHER
LOWER	**COST INVESTMENT FOR PROJECT** May apply to design, permitting, and/or construction costs; sometimes larger investments decrease time to get results	HIGHER

DETAILS & APPLICABILITY FOR PBR APPROACHES:

Approach	Developed for or applicable to	Limitations	Common level of design analysis required
Passive Recovery (P)	▪ Any system	▪ Not helpful when causative stressor (cause of degradation) cannot be removed (e.g., a dam or diversion structure)	▪ No design required for system recovery ▪ Design for safe removal of the causative stressor may be required
LTPBR & other beaver mimicry (LT), including Beaver Dam Analogs (BDAs), Post-Assisted Log Structures (PALs), Simulated Beaver Structures (SBS)	▪ Wadeable streams (aka low-order, often headwaters streams) ▪ Systems where degradation is caused by structural starvation of wood and beaver dams ▪ Targeted where beavers existed historically ▪ Typically requires adaptive management	▪ Not intended for non-wadeable, higher order systems where causative stressor is other than loss of wood and beaver dams ▪ If beaver can't be expected to move in to the restored area, beaver mimicry structures may be built	▪ Engineering design analysis not required ▪ LTPBR Manual 2019 provides "guidelines for implementing a subset of low-tech tools (i.e., BDAs and PALs in riverscapes lacking wood and beaver dams"
Stage Zero Design (LT or HT) Stage Zero falls between LT & HT in required analysis and construction cost. Smaller Stage Zero efforts may have LT characteristics, but a larger project such as work covering a full valley, is closer to HT.	▪ Most successful in depositional areas with wide valleys and mild slopes to promote deposition ▪ Often in small, incised streams in wet meadows headwaters, but can be up-scaled to larger rivers ▪ Promote processes that will nudge the system back toward a Stage Zero condition ▪ May need sediment supply from upstream to fill incised channels over time ▪ Works best with adaptive management, but not required	▪ Typically low risk areas with low or no infrastructure adjacency to accommodate floods covering full width of the valley bottom ▪ Access to full floodplain may currently be impractical due to anthropogenic constraints—Stage Eight might work well instead with restoration to an extent rather than the full floodplain width	▪ Engineering design analysis varies, typically falling between LTPBR and HTPBR ▪ Analysis required to determine target slopes at minimum ▪ Full valley reset approach requires significant analysis
HTPBR (HT)	▪ Detailed analysis allows PBR application on a case-by-case basis to any system ▪ Works best with adaptive management	▪ Applies to most systems and causative stressors because customized detailed analysis addresses site-specific constraints ▪ Higher cost of analysis and often construction as well	▪ Heavier engineering design analysis required compared to other approaches, but varies greatly across specific projects

EXAMPLES OF TREATMENTS (NOTING OVERLAP ACROSS RESTORATION APPROACH):

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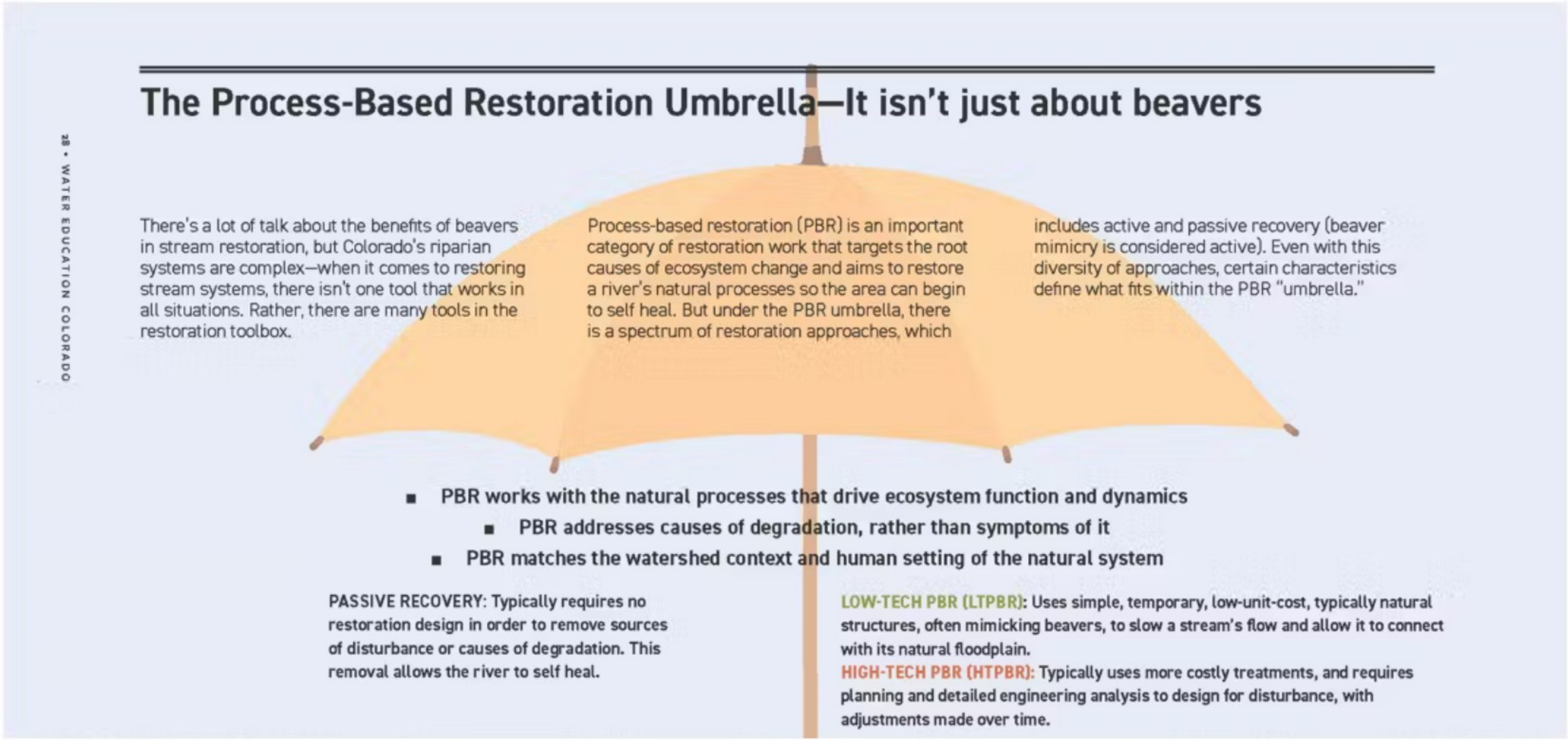
September 12, 2023 Riparian Book Club:

Process-Based Restoration (PBR) Umbrella



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Process-Based Restoration (PBR) Umbrella

LTPBR & HTPBR case studies shared by project proponents & lead designers:

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LTPBR:

Hally Strevey, Coalition for the Poudre River Watershed (CPRW)
Colin Barry, Ayres Associates
&

HTPBR:

Eric Richer, Colorado Parks & Wildlife (CPW)
Johannes Beeby, Stillwater Sciences

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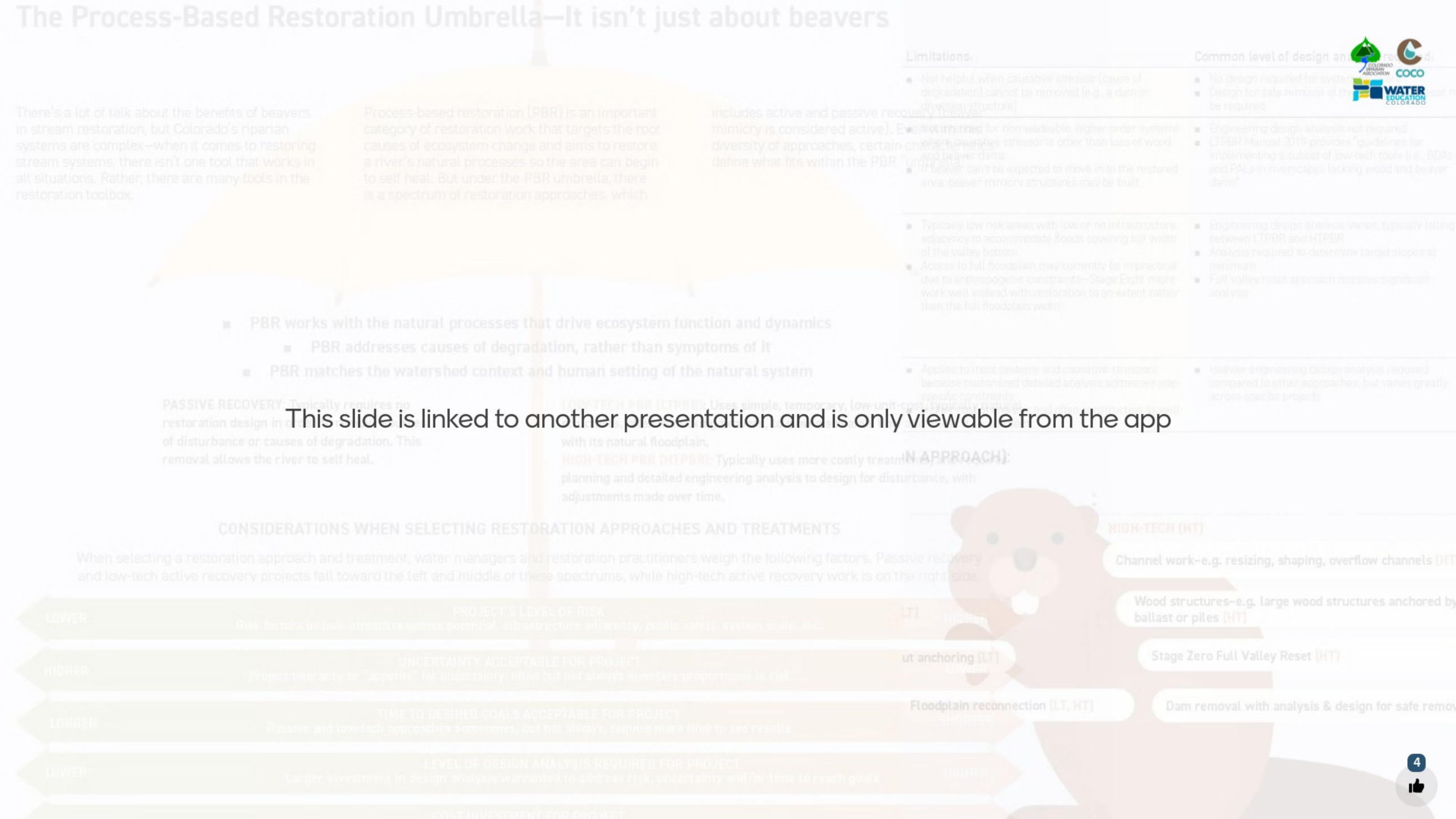


Riparian Book Club Discussion

20 responses

Outside Colorado

If water rights weren't a concern, would you have included BDAs in your project design?

How are you measuring aggregation at the sites?

Have you made any predictive calculations on sediment capture? Or any plans to do so with monitoring?

R you seeing same increases in run-off across burn areas for snowmelt & rain? Comes from experience in recent years of run-off from snow melt being much lower in relation to snowpack. Correlation?

Has anyone studied the long term impacts of beaver structures in a watershed vs. watersheds without beaver structures? Does CWCB consider beaver structures to be consumptive or non-consumptive uses?

Where do you decide to place large Woody material? Can it be placed incorrectly causing more degradation

I know you said you didn't expect any change in fish/macro numbers at Kemp -Breeze until 5 or so years, but have you seen any changes this year?

How much did the first phase of construction cost?

Riparian Book Club Discussion

20 responses

How long did it take to get the permits from ACOE and state to do the inchannel and connected physical system work?

Have you considered making permeable BDA structures?

Is Adaptive Management integrated into the project plans and if so does it have appropriate authorities and administrative support to implement?

Are you measuring changes in ground water levels?

Which factors primarily determine which structure is ideal?

What is the difference between the wood structures you use and those that imitate beaver dams?

For the low-tech project, who installed the structures? Volunteers, Forest Service crews, etc?

Current beaver work being done
https://www.e3ecologic.org/restoring-beaver-habitat

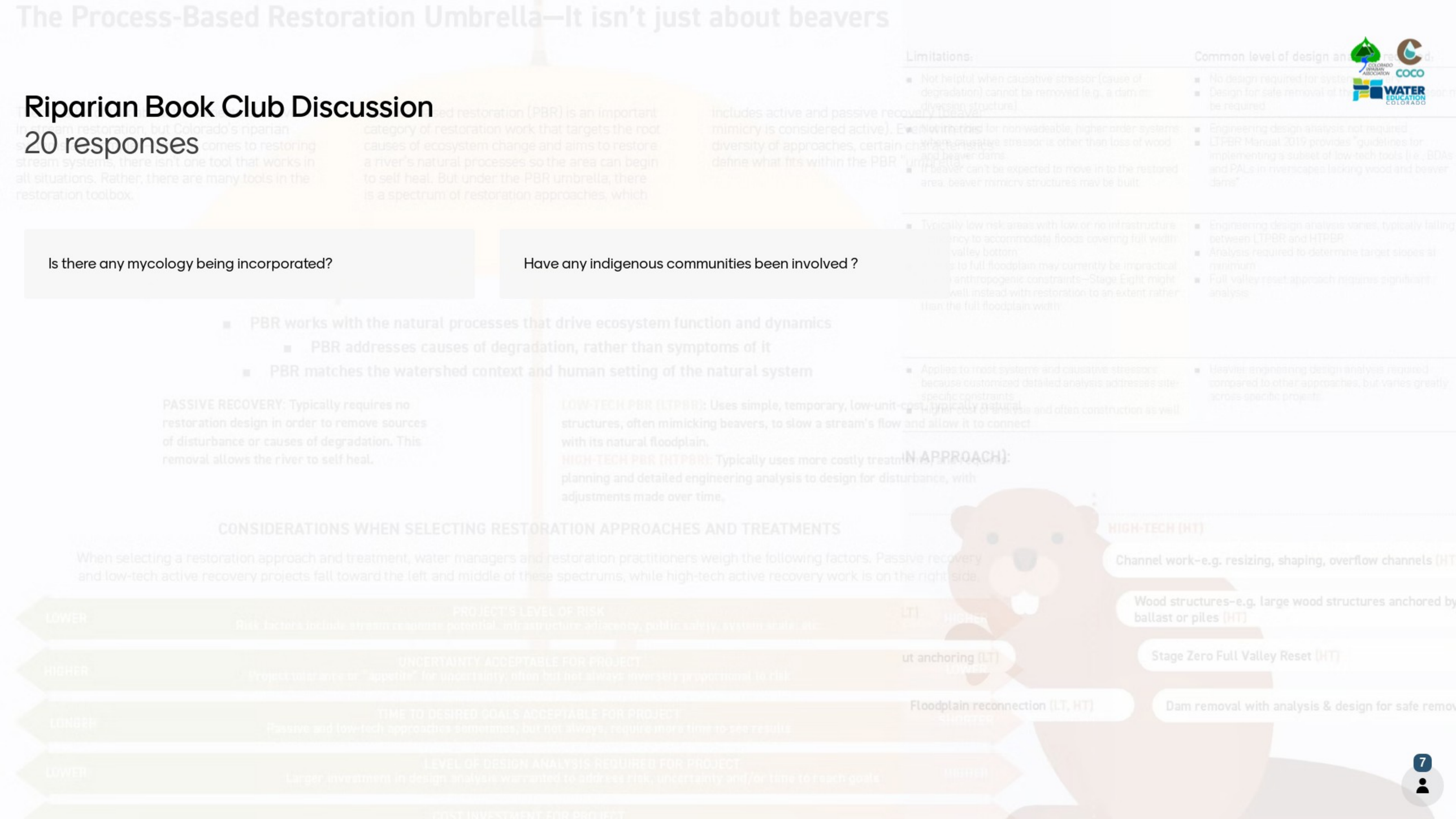
I recommend talking with Peter May in Crestone he is doing research on beavers and can offer some great insights

Riparian Book Club Discussion

20 responses

Is there any mycology being incorporated?

Have any indigenous communities been involved ?



Thank You

A recording of this webinar will be available at https://coloradoriparian.org/education-and-outreach-colorado-stream-restoration-network/ and https://co-co.org/cra-csrn-riparian-book-club/ You will also receive a follow-up email of the recording with links to any resources shared.

Please stay tuned for future Riparian Book Clubs!