

Science Brief

Photo: Hunter Pehrson

Process-Based Restoration of Riverscapes

Healthy, functioning riverscapes provide critical ecosystem services such as clean drinking water, habitat, and resilience to floods, fires, and droughts. Millions of miles of American riverscapes are ecologically degraded and in need of restoration.

➤ **What constitutes a healthy riverscape?**

- A riverscape is the part of a landscape that can plausibly flood by rivers and streams.
- Structural forcing by obstructions like wood, beaver dams, root mats, and boulders are crucial for riverscape health.
- **Historic management of rivers has systematically starved riverscapes of structure** by removing these obstructions.

➤ **In the US, many rivers are ecologically degraded.**

- **Human activity has degraded at least 79% of riverscapes** in the United States to unacceptable conditions.¹
- Symptoms of degraded rivers include deep trenches, low water tables, little floodplain connectivity, and a stationary riverbed.^{2,3}
- Drivers include overgrazing, beaver removal, deforestation, hard engineering, population growth, and climate change.³

➤ **Process-based restoration can improve riparian health by 'promoting' natural processes using low-tech, cost-effective methods.**

- Techniques include building beaver dam analogs (BDAs) to promote the key process of beaver dam activity and post-assisted log structures (PALS) to promote the key process of wood accumulation.
- After initial encouragement, beaver dam activity and wood accumulation can self-sustain and extend well beyond the original footprint of restoration, resulting in a multiplier effect.
- **Process-based approaches are scalable and applicable to the majority of rivers in the US.**
- **BDAs and PALS improve climate resiliency, restore perennial flows, recharge groundwater, and provide natural firebreaks and refuge for wildlife.**

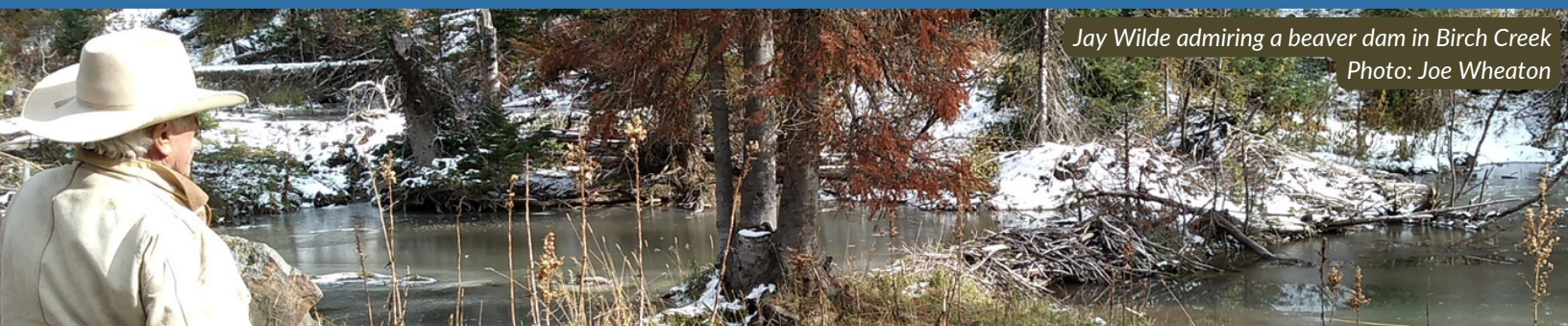
➤ **BDAs mimic beaver-made dams in material, technique, and structure.**

- Unlike many structures built to last, BDAs are built to initially mimic a beaver pond, quickly attract beavers to the area or support translocated beavers, and eventually fall into disrepair.
- Like real beaver dams, BDAs create deep, slow-moving water, recharge groundwater, widen the river channel and raise the streambed, and rebuild a connection to the floodplain.³



CASE STUDY: Process-Based Restoration in Birch Creek, Idaho⁴

- Years of overgrazing, conifer encroachment, and beaver removal degraded Birch Creek. This resulted in stream incision, a low water table, and a dry creek by early summer.
- Local rancher Jay Wilde introduced a grazing management program that dramatically improved riparian conditions but didn't attract beavers over the long term. Wilde contacted Anabran Solutions co-founder Joe Wheaton about implementing process-based restoration.
- By 2015, 29 BDAs were installed along Birch Creek and by 2016, 9 beavers were released. **The beavers improved and expanded the BDAs and by 2022 built ~ 200 additional dams** expanding from an initial footprint of 0.5 miles to over 4 miles.
- Downstream, Wilde has seen **flows persisting into September** each year as opposed to drying up in June or July. **Native Bonneville cutthroat trout densities have increased from pre-beaver conditions of <4 fish per 100m to >150 fish per 100m in the ponds.**



Low-tech process-based restoration can benefit diverse landscapes.

Reach out to learn about the benefits for a specific watershed at
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