

Reconnecting Riverscapes: Beaver Restoration Assessment Tool (BRAT) Lessons for a Resilient Watershed

By Austin Bernalles

On a scorching day in Winthrop Washington, watershed restoration practitioners, Tribal natural resource managers, scientists, and community partners gathered at the Winthrop public library with a shared goal: to learn, collaborate, and build capacity for one of the most transformative forces of nature in floodplain restoration—the beaver.

Hosted as one part of a series of Riverscape Network tools, this event centered on the Beaver Restoration Assessment Tool (BRAT), a powerful model designed to map, measure, and maximize the potential for beaver-driven ecosystem restoration. From cultural history to GIS mapping and field surveys, the gathering wove together diverse perspectives and practical skills,

offering participants both the “why” and the “how” of working with beavers in modern restoration projects.

Alexa Whipple, Director of the **Methow-Okanogan Beaver Project** began the workshop with a powerful reminder: beavers have been shaping North American riverscapes for millennia. Tribes have coexisted with and benefitted from these keystone species since time immemorial, yet by the mid 1800s, political and economic forces had nearly eradicated them. This “structural starvation”—the loss of dams, ponds, and wetlands they created had left vast watersheds degraded, disconnected, and less resilient to floods, fire, and drought. In healthy ecosystems, beaver dams slow water, store nutrient rich

sediment, recharge groundwater, and create a mosaic of wetland habitats. For restoration professionals, these processes are not luxuries; they are essential tools in the fight to rebuild ecological resilience in the face of degrading climates.

Alexa reinforced that beavers are not just wildlife. They are partners in restoration and partnerships require understanding, planning, and creative-problem solving. Utilizing tools like BRAT and deep place-based knowledge, we can facilitate that process.

Jean-Paul, Senior Watersheds Program Manager at BEF introduced the BRAT model as a “gateway” to beaver-based restoration. Developed through the



Winthrop Public Library BRAT Workshop.
Photo Credit: Kayla Seaforth

Riverscape Consortium, BRAT predicts the maximum amount of beaver dams that a given riverscape can successfully support. It integrates multiple data layers: vegetation, hydrology, slope, and potential risks to help practitioners identify where beaver activity can thrive and where it may be limited by landscape factors, or conflict with infrastructure or humans.

For the PNW Beaver Network, BRAT serves three purposes:

- Mapping Capacity: Where are the conditions right for beaver dam building?
- Where could dams potentially threaten infrastructure or land use?
- Through the BRAT localization process, practitioners gain a greater understanding of the unique beaver habitat needs and beaver activity in their region. Critical information for launching any beaver restoration or conservation program.

Wally Macfarlane, Research Assistant Professor, Dept. of Watershed Sciences at Utah State University, pioneered the BRAT and joined us for the days ahead. Before diving into the technicalities of BRAT, participants explored the bigger picture: riverscape health. Healthy floodplains and riparian zones are

inefficient in the best way possible. Water lingers, spreads out, and nourishes the land. This “inefficiency,” created by wood jams, beaver dams, and multi-threaded channels build resilience against climate extremes. In contrast, simplified, straightened, and incised channels lose their floodplain connectivity, drying out riparian vegetation and reducing overall habitat diversity. If your goal is a resilient floodplain, your strategy should include and consider beavers.

The BRAT model estimates capacity for beaver through three primary questions:

1. Is there enough water to maintain a pond?
2. Is there enough of the right woody vegetation for dam building?
3. Can dams be built and persist across flow extremes?

All BRAT data is housed in the **Riverscapes Data Exchange**, a robust online platform with web-based GIS tools. Users can search projects, view maps, and download datasets for deeper analysis. The system supports collections, bookmarks, and tagging for customized organization. The web viewer offers an intuitive way to explore results, check data quality, and share findings with partners.

Data to inform the three questions include the National Hydrography Dataset, LANDFIRE vegetation data, and USGS hydrology curves. The model also applies buffer zones to simulate beaver foraging ranges (typically within 100 meters of water). The outputs of BRAT in the Riverscapes Data Exchange is high in fidelity, mapping beaver activity of reaches, categorizing stream segments into capacity classes, and noting suitable vegetation. This data can be compared between historical and current conditions to assess change over time.

Data is only as good as its ground-truthing, and the BRAT survey protocol was designed and developed to localize model outputs. The field crew for the day grew excited to go from learning about the BRAT to surveying Bear Creek. Field crews assessed 300-meter reaches for:

- Beaver activity (dams, lodges, feeding signs, scent mounds, food caches, feeding benches)
- Vegetation composition in 30m and 100m buffers
- Hydrology conditions at base and peak flows

These random and opportunistic surveys are both valuable, with a baseline goal of 75 field surveys per watershed. Photos, geotagging, and consistent data



Workshop participants guided through Bear Creek, viewing beaver habitat.
Photo Credit: Austin Bernales

entry are critical for BRAT calibration, tuning the model towards real-world conditions.

Lessons from the workshop and subsequent field surveying underscored several key points:

- Beaver-based restoration is a high-impact, low-cost strategy for increasing watershed resilience.
- Data-driven tools like BRAT help target resources effectively, balancing ecological opportunity with risk.
- Collaboration across disciplines and jurisdictions from Tribal fisheries teams to GIS analysts to public/private landowners is essential for success.
- Ground-truthing is non-negotiable. Local expertise makes national datasets truly relevant.

Beavers had once defined the landscapes of the Pacific Northwest. With tools like BRAT, there is the opportunity to bring back their transformative influence, strategically, collaboratively, and in harmony with human needs.

As one participant put it, “Every time a new network connection sparks in the community, it’s like a beaver building a new dam—more resilience, more connectivity, more life.”

Watch the Workshop Recordings

Want to revisit the presentations or learn about BRAT? View the full video recordings [here](#).

Explore the Riverscapes Data Exchange BRAT Access Page

Ready to see where beaver restoration opportunities exist in your watershed? Visit the [BRAT Access Page](#) to explore maps, download datasets, and start planning your next restoration project.



*BRAT surveying at the beginning of a reach.
Photo Credit: Austin Bernales*