Working with People and Beaver to Restore Mid-Willamette Watersheds and Improve Climate Resiliency

An interview with Kathleen Westly, Education and Restoration Project Manager at the Marys River Watershed Council and Jean-Paul Zagarola, Senior Project Manager at the BEF Watersheds Program

What is the mission and purpose of the Mid-Willamette Beaver Partnership?

The Mid-Willamette Beaver Partnership (MWBP) is made up of seven core member entities and engages with a diversity of stakeholders. We want to tap into the huge potential of beaver based restoration to generate a cascade of ecosystem benefits (see more below). The MWBP was recently funded to conduct fine-scale habitat analysis across five Willamette subwatersheds to identify the best places to target beaver based restoration and/or conservation activities and to conduct in-depth stakeholder engagement to better understand concerns and address social barriers to promoting beavers across the landscape. The MWBP is promoting the implementation of beaver dam analogs, revegetation with plant species highly desired by beaver; non-lethal options for mitigating impacts of beaver; and beaver translocation as a final course of action when the conditions are perfect.

Our work is rooted in subwatersheds of the middle Willamette, however, we are working with others such as the Oregon Beaver Coalition to mainstream beaver based restoration and conservation across Oregon, the Beaver State. Beavers tend to move and the same behaviors that benefit ecosystems and society can negatively impact infrastructure, crop and timber production. Therefore, we aim to be strategic and deliberate in discovering where the opportunities lay to implement this work.

What are the major ecosystem benefits to beaver based restoration practices?

1. Improve fish and wildlife habitat for a variety of sensitive species especially salmon and steelhead by creating a rearing habitats in beaver dam ponds
   - Beaver habitats also greatly enhance bird and wildlife diversity (diversity hotspots), by providing habitat and abundant food resources
2. Increased water retention improves the quality and quantity of water resources:
   - Flooding recharges groundwater through hyporheic exchange
   - Raising the water table and increased stream complexity enhances plant diversity
   - Water quality improves because of cold sub-surface releases during warm summer months (benefit to aquatic organisms) and retention of fine sediment
3. Reduce downstream flooding and improve the water quality for communities downstream by attenuating high velocity flows that essentially slow moving water while recharging floodplains.
   - Stream channels remain connected to their floodplains rather than the streams incising
   - Improved sinuosity and habitat complexity of stream systems
   - Bedrock stays covered by bedload that is retained in the system rather than washed out; this provides spawning gravel retention and keeps the bedrock from becoming a solar sink when exposed
4. Improved climate adaptation and resilience of watershed ecosystems and human communities as a result of water retention and improved summer base flows

Core members of the MWBP:

MARYS RIVER WATERSHED COUNCIL

Luckiamute WATERSHED COUNCIL

Confederated Tribes of Grand Ronde

NORTH SANTIAM WATERSHED COUNCIL

South Santiam Watershed Council

CALAPOOIA WATERSHED COUNCIL

Education ★ Habitat Restoration ★ Community

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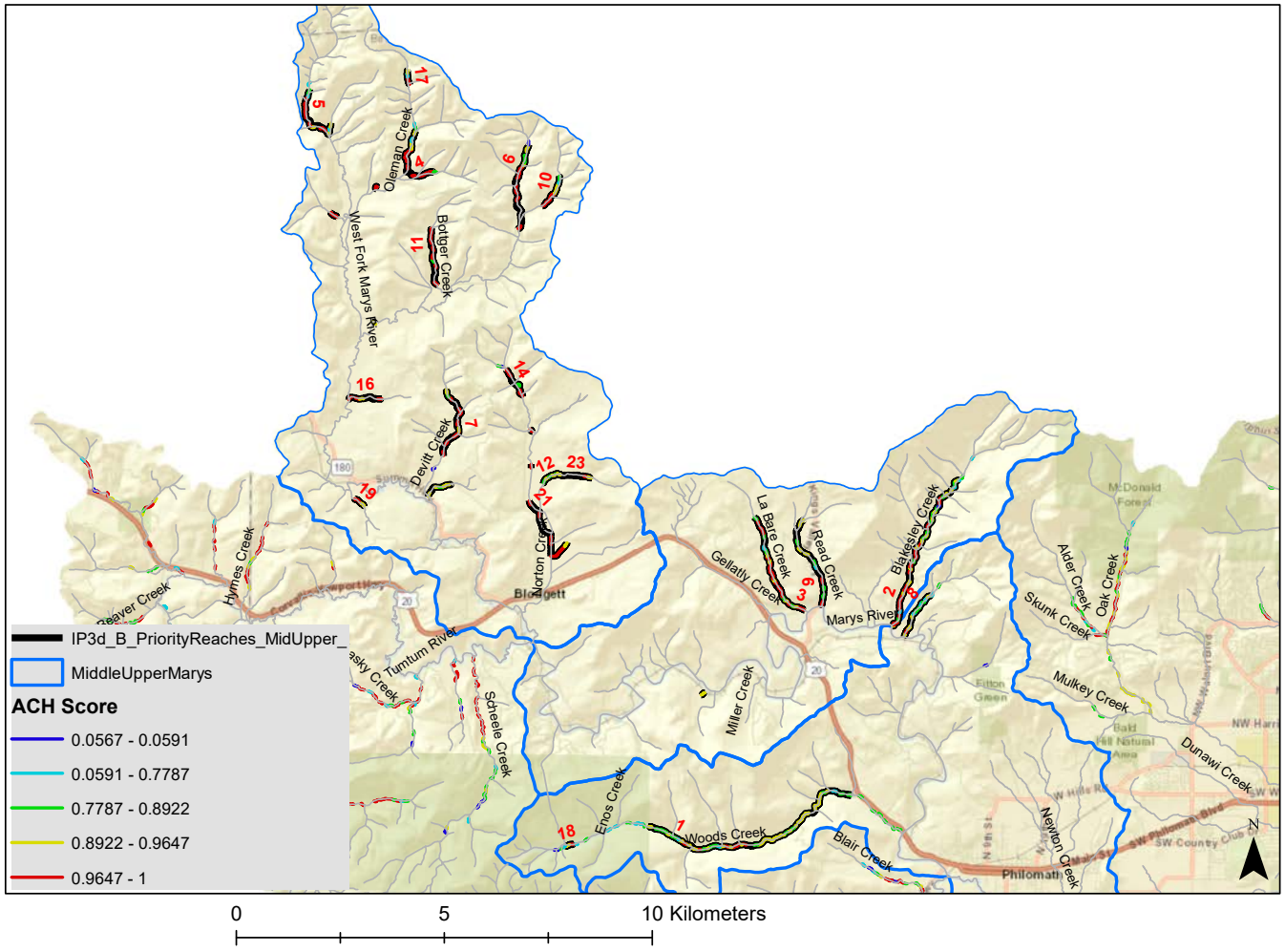
How were the locations that the BDA's will be implemented selected? Please describe this process and all of the contributing factors (landowners, wildlife habitat, river/creek morphology, etc.).

MRWC had worked extensively in other headwater tributaries within the Meyer Memorial Trust-funded "Model Watershed Program". All of those tributaries had been assessed using the Rapid Bio-Assessment methodology which involved walking the extent of the stream, snorkel surveys of salmonids and full limiting factors analysis. We had originally scoped our assessment of the Upper and Middle Marys sub-watersheds to follow a similar protocol, but elected to use TerrainWorks LiDAR-based NetMap model instead. Working with J.P. Zagarola of BEF, the partnership refined the model using a combination of cutthroat trout and beaver intrinsic potential attributes. Modeling identified and ranked key tributaries in which to focus our ground verification efforts. MRWC then contacted the landowners to obtain access permission to survey these streams; Kathleen Westly and consulting fish biologist Steve Trask surveyed the 11 top-ranked streams. **Of these 11 streams, MRWC selected four with the highest potential for beaver-centric restoration, based on the historical legacy of beaver dams, forage and construction material available or possible to establish, anchor habitat criteria for cutthroat trout and of course - and critically important, willing landowners.** Westly and Trask worked to develop project designs, recruit landowners and secure funding. One of those streams, Devitt Creek, will be the site of 2021 BDA installations. All landowners in a .9 mile reach from the confluence with the Marys River are participating in the project, with fish passage barrier mitigations and/or BDA installations. All are supportive of encouraging beaver and beaver dam building activities, and exhibit a historical legacy of beaver dam presence. Project activities will:

- Place vertical posts across the floodplain (2' on-center) by an excavator (3 sites). Hand install using a backpack post pounder to keep equipment out of a functional interactive floodplain (1 site).
- Posts provide a platform for beaver to build upon and will be woven with Douglas fir boughs or willow to provide floodplain linkage even if not colonized by beaver.



Map of the Mid Upper Marys River demonstrating the anchor habitat research and modeling to select the sites for BDA installation.

Are there any human or institutional barriers that stand in the way of installing more BDA's?

While some landowners believe that beaver dams negatively impact water quality and act as a barrier for migrating fish, overwhelming research shows that the opposite is usually true. Beaver typically improve water quality and are a boon for migratory fish. Concerns about conflicts such as flooding or vegetation browse are often raised by landowners and infrastructure managers. Thus stakeholder engagement is essential to gaining a more complete understanding of what the social barriers are to promoting beaver so that we can address those barriers and identify opportunities for beaver based restoration.

Education is key to helping people to understand the critical role that beavers have played in the health and function of stream systems and the loss that their reduced numbers and reduced dam building has meant for salmonid populations and other aquatic organisms. It is also important to concurrently educate on the importance of persistent large woody debris in the stream as a foundation upon which beavers can build dams. Because of historical logging conducted in stream corridors by settlers, large conifer contributions to stream systems have been limited in the past 100 years. This, combined with pressure from development, nearby infrastructure and agriculture practices has caused streams to become disconnected from their floodplains, simplified,straightened and incised, sometimes cutting down to bedrock. These conditions make winter stable beaver dam persistence much more difficult to achieve.

We are fortunate in Benton County to have a novel approach in the Agriculture and Wildlife Protection Program, which provides funding support to landowners to implement non-lethal means of coexisting with beavers. It helps to cover the costs of installing things like "beaver deceivers" (flow device that prevents blockage of culverts), pond levelers that allow flooding only to a specified extent, and tree protection that prevents beavers from eating prized trees or crops.

Constructed BDA with vegetation weave

Permitting is required for the installation of BDAs, through the Oregon Department of Fish and Wildlife. This permitting process is designed to avoid creating fish passage barriers. While relatively new in ODFW's fish passage permitting, best management practices and protocols for permitting are now in place.

Are there any ecological/ natural barriers that stand in the way of the implementation of BDA's?

As indicated above, lack of large wood in the streams is a critical factor in beavers' ability to build dams, and especially for them to persist through high winter flows. Equally critical is available forage and construction material. Many legacy beaver flats have been colonized by reed canary grass, choking out native vegetation. In some cases, the first approach is to establish these species in the floodplain terraces and riparian corridors prior to the installation of BDAs or PALS (post-assisted log structures). If the geomorphological conditions are right vegetation management may be the only activity needed to encourage beavers to build dams. In some cases, streams have been abandoned by beavers because of these factors; the best scenario is to make the conditions such that beavers return to these systems. Relocation of beaver is currently seen as a less preferable means of colonizing habitat.

Pre-commercial thinned logs for BDA construction

Inundation behind recently constructed BDA

How do BDA's help address the issues that climate change has posed to floodplain environments?

BDAs provide important floodplain linkage. Even if not colonized by beavers, the posts and vegetative weave (usually willow or fir boughs) retain water on the floodplain during winter flow regimes. This inundation of the floodplain provides low velocity rearing habitat for salmonids, enhances the proliferation of "Stage 0" channel forms (multiple channels and a high frequency of lateral connectivity) and recharges groundwater for slow hyporheic release during the warm summer months (providing a source of cold water to the system longer, improving water quality).

In the Marys River watershed, retention of water higher in the system for longer in the year addresses the top salmonid limiting factor: elevated summer stream temperatures. Increased riparian water table keeps vegetation alive and green during the dry months, helping to mitigate drought conditions and wildfire impacts along stream corridors. Increased floodplain linkage and retention of water higher in the system during high winter flow regimes reduces flood impacts downstream. In forests impacted by high intensity wildfire, beaver complexes can provide refuge for plants and animals during and after the fire, provide a seed source to regenerate the plant community in the surrounding scorched forest and where there are very large beaver ponds, even act as a firebreak aiding in reducing the severity of the fire.

How does the implementation of BDA's in floodplain environments work in tandem or complement the work of the assisted migration of woody plants and shrubs in the Pacific Northwest?

As indicated above, elevating the water table by retaining water in the riparian corridor for longer enables plants to establish and thrive more easily, mitigating drought conditions. It's another form of climate adaptation and a way of creating climate resilience. By increasing the "wettedness" of forests, beaver habitats or mimicked beaver habitats (created via beaver based restoration) allow some species to exist and for plants to take refuge in these areas. If we have networks of these beaver ponds across the landscape, we can help prevent the extinction of vulnerable species while providing a lot of the ecosystem services we hope to retain through assisted migration.