



# Passive Restoration 101: Low-impact Restoration Techniques

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We call this “good potential”

**Planting can be minimized: Remove grazing/browse pressure and raise water table to allow shrub regeneration first**

# Beaver Mimicry Dams are an inexpensive fix

## IDEAL MIMICRY DAMS:

- Built with site-sourced materials
- Deformable over time but last long enough for willows to establish
- Provide as-built stability for bankfull flow events
- Do not obstruct fish passage
- Create more aquatic habitat complexity
- Immediately effective in raising water table

(modified from Gillilan Assoc.)

# Willow Brush Dams



# Small leaky brush structures work in succession to stack up water



**Post and brush lines at breaches in historic beaver dams reverse conversion of ponds to uplands**



Willow and conifer post and brush lines in severely degraded stream



Year 1 following installation:  
Sediment trapped behind each  
brush line elevated streambed  
and water table. Best as iterative  
process, multiple years.

Raising streambed elevation



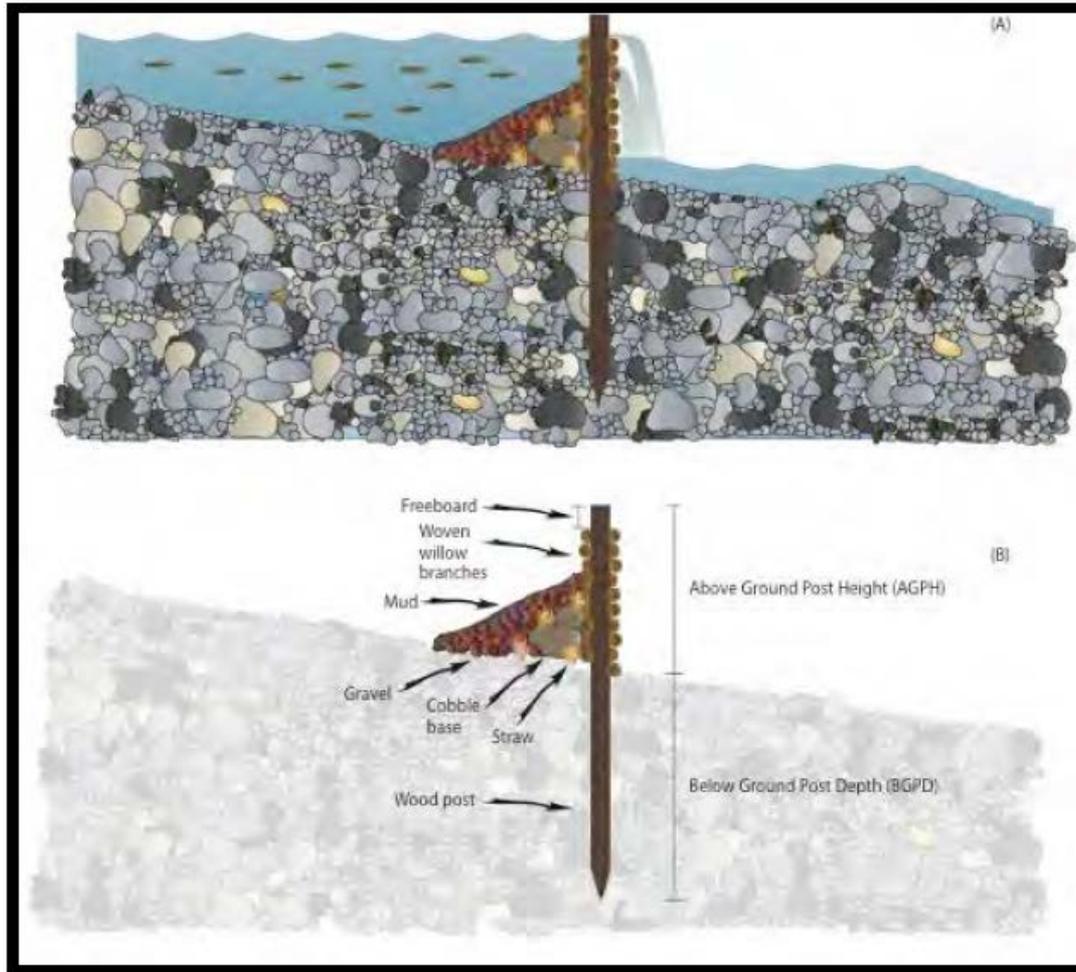
Photo Credit: Pedro Marques

# Beaver Dam Analogs, Larger Stream



**Elijah Portugal, Joseph Wheaton, and Nick  
Bouwes 2015**

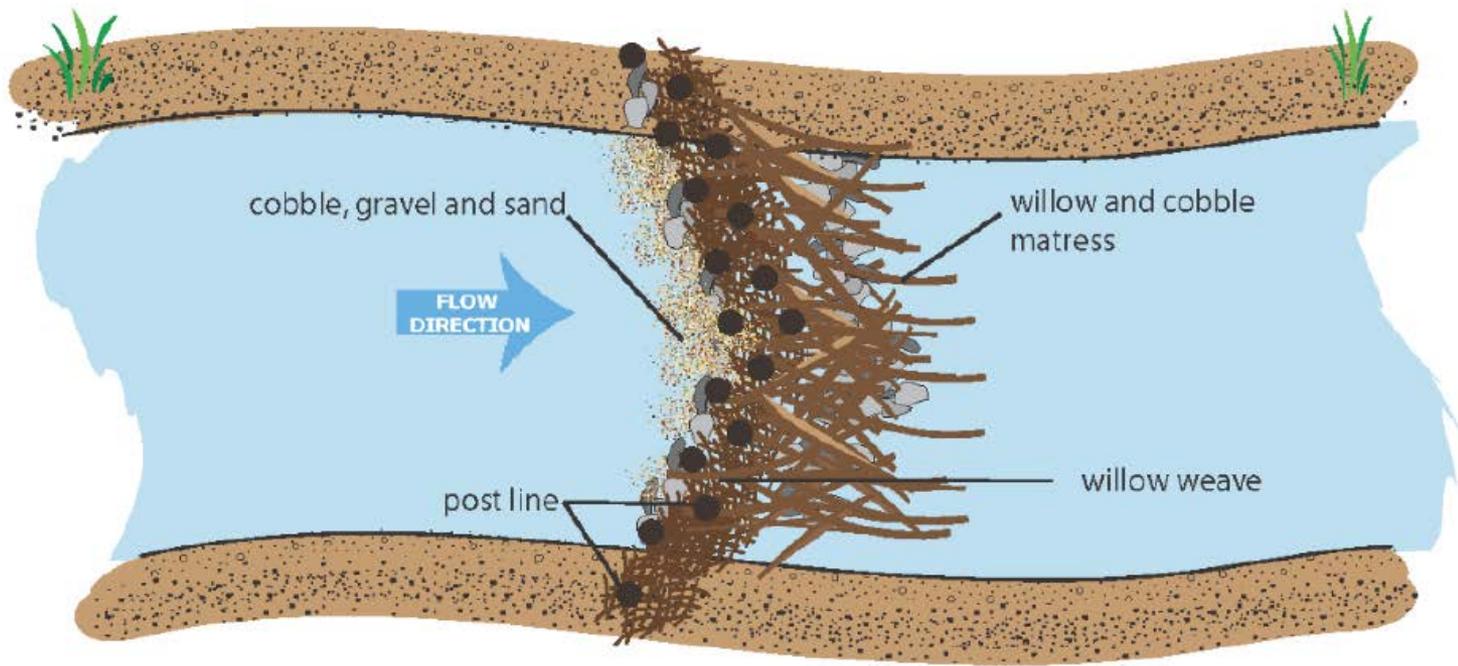
# Beaver Dam Analog Design



Source: Castro et al 2015, Beaver Restoration Guidebook

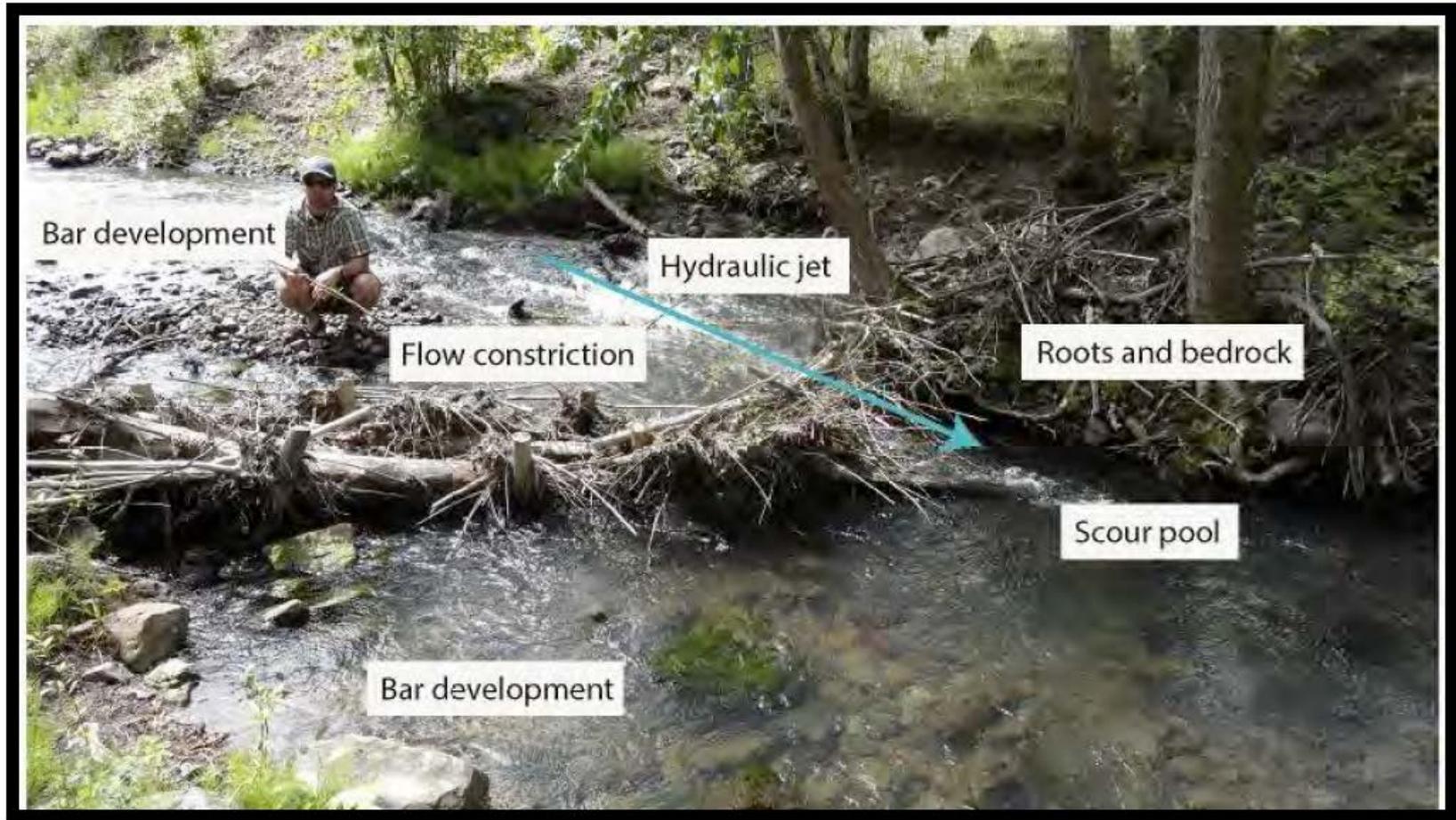
# Beaver Dam Analog Design

Plan View  
(Convex Primary Dam)



Source: Portugal, EP., Wheaton, JM., Bouwes, N. 2015. Pine Creek Design Report for Pilot Restoration. Prepared for the Confederated Tribes of Warm Springs. Logan, UT, 35 pp.

# Constriction Dam



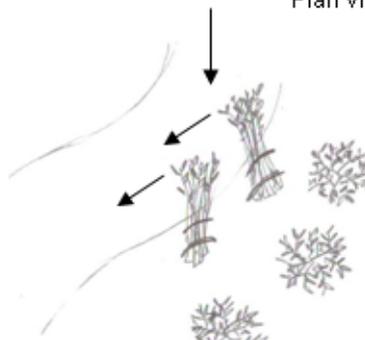
Castro et al 2015

## Brushy Barb



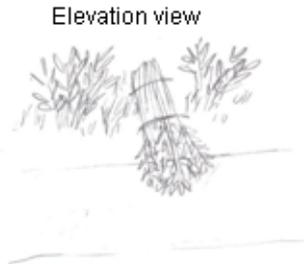
Barbs are anchored to the eroding bank. The underwater tip creates a directed eddy during high flows

Plan View

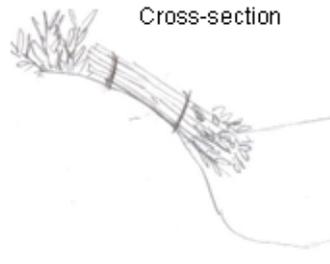


Barbs are angled upstream to redirect flow away from vulnerable banks

Elevation view

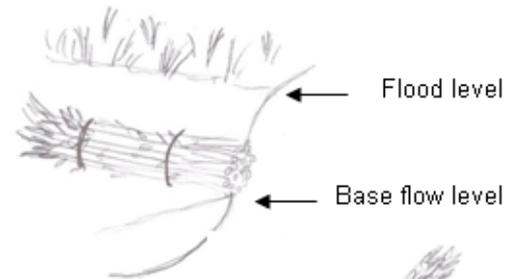


Cross-section



## Anchored Brush Bundle

New Brush Bundle on eroded slope



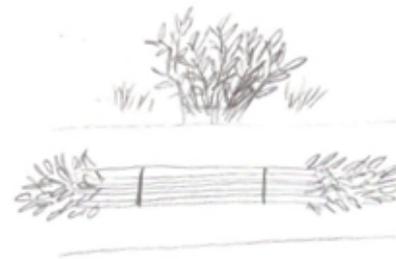
Flood level

Base flow level

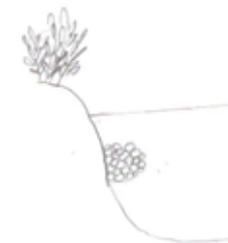
Plan View



Elevation view



Cross-section





# 'Almost-Passive' Restoration Techniques

# Deformable Riffles- Gillilan Assoc. and TNC



Photo Credit: Scott Gillilan



Photo Credit: Scott Gillilan

# Larger wood and brush-based check structures with geofabric for highly degraded site



Photo Credit: Pedro Marques

## Other passive restoration techniques can support beaver mimicry work

- Browse exclosures
- Small scale conifer-cutting where encroaching on low floodplain
  - good source of materials
- Willow stake installation

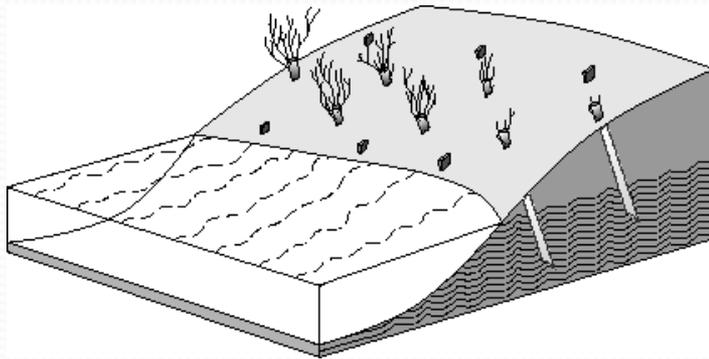


Browse Exclosures to Promote Natural Regeneration

# Live Staking



- Willow and Dogwood
- Cut when dormant
- Soak before planting
- 2-3' must be able to access water table in mid-summer



# Increase tolerance for beaver activity: Non-lethal management techniques



# Flow Devices to Protect Culverts and Headgates



# Tree fencing



# Live-trapping: Moving problem beaver



Remember: Habitat First!

Must be led by FWP; EA Process, Outreach to neighbors

# Resources

Beaver Restoration Guidebook

<http://www.fws.gov/oregonfwo/ToolsForLandowners/RiverScience/Beaver.asp>

Let Water do the Work (most applicable to arid areas-  
not all passive restoration)

<http://quiviracoalition.org/Detailed/1113.html>

Living with Wildlife web page for Beavers

<http://fwp.mt.gov/fishAndWildlife/livingWithWildlife/beavers/>

# Your turn: Questions or Comments?



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Image Credit: Beaver with Messenger,  
Ayla Bouvette <http://www.nativevillage.org>