

Governor's Drought and Water Supply Advisory Committee Meeting

Improving Drought Resilience with Low Inputs and High Outcomes

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Water and Habitat Loss

Conversion of
wet floodplain
to uplands

Loss of
subirrigation



Subirrigation: Past and Present



Fire suppression also contributes to loss of headwaters



Beaver dam analogs (mimic dams)

Hand-built; use young conifers, willow, sod



Photos: Amy Chadwick, Great West Engineering

Before (April 2017)



After (May 2017)



Some sites require multiple years

Before (May 2017)



After (May 2017)





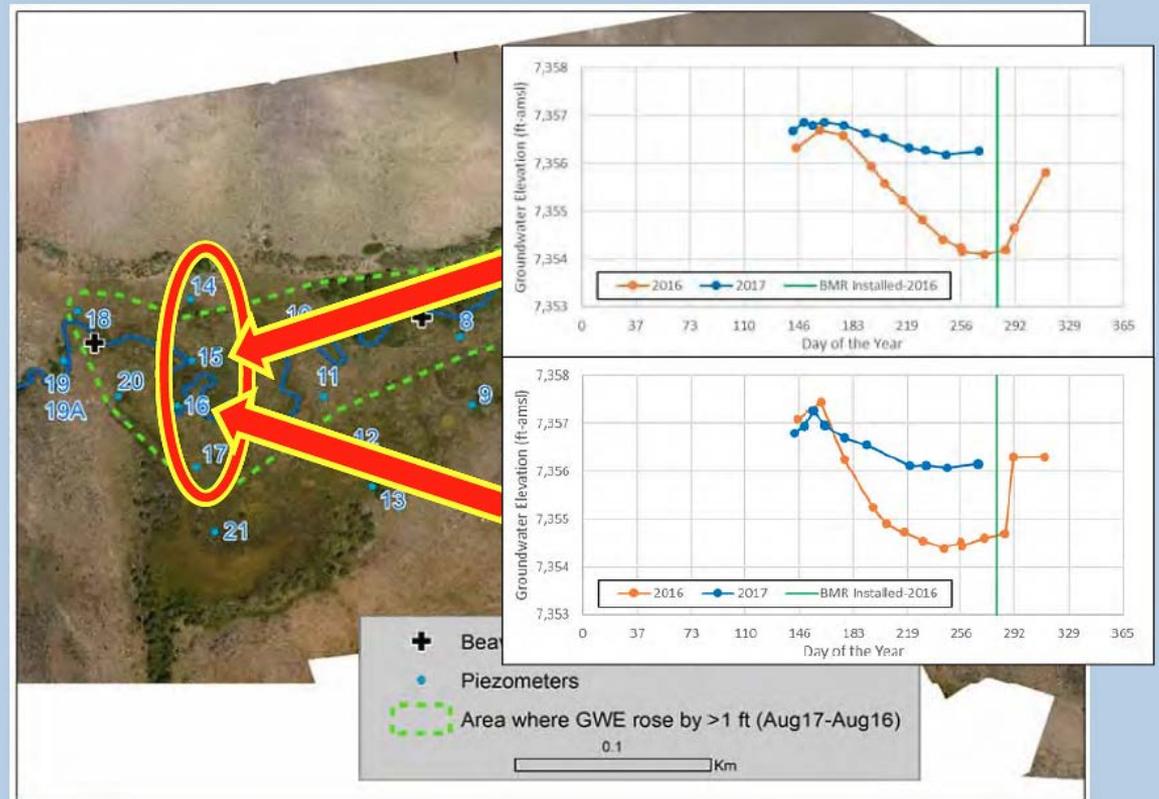
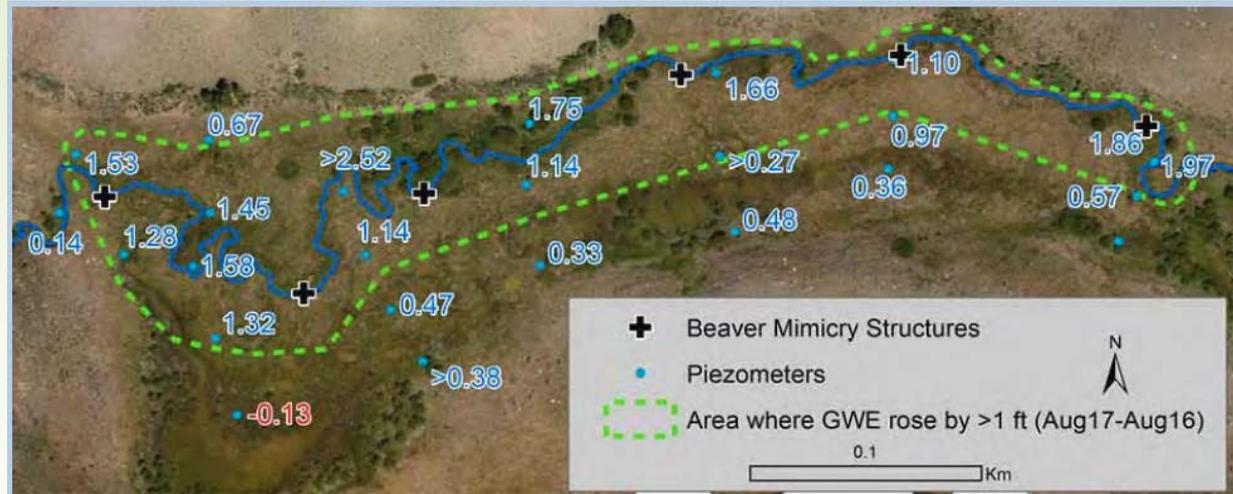
Traits of Successful Structures:

- Wetland sod and mud added to dams (or dams installed in high sediment systems)
- Channel “ramped” up to dam upstream, has brush skirt downstream
- Smaller/leakier dams installed in close series
- Design considers site limitations and mgt. objectives

Techniques can and should vary with what is natural to site



Groundwater Response (Larger structures, Alkali Creek)



Images and analysis
by Andy Bobst,
MBMG/MT Tech



Preliminary Results

(Multiple projects, Upper Clark Fork River Basin)

- **Groundwater:** GW near stream remains elevated where restoration completed; Most wells in control reaches dry in Aug
- **Surface Flow:** Trend not yet defined, but good anecdotal evidence of extended flow at drier sites
- **Floodplain connectivity:** Results vary among techniques
- **Fish response:** Often immediate; large (>2x) increase in fish numbers

Water persisted through last year's drought

(and 30-year storm)

May 2017



Raising Stream Elevation using Beaver Dam Analogs





So why not just Leave it to Beaver?

- Habitat loss limits successful beaver recolonization
 - Lack of shrubs/trees for winter food and building materials
 - Dams more likely to wash out in deeply incised channels ($> 1\text{m}$) – the “flume effect”
 - Beavers don't take requests- we can control time and place to achieve groundwater recharge and habitat restoration
 - Beavers sometimes come in once habitat is restored
 - Current FWP policy does not support beaver relocation
- 



How much water storage could we gain by restoring beaver habitat?

Upper CFR as an example:

Using results of modeled suitable beaver habitat in stream km(S) and literature values for beaver dams/km (D) and water volume (GW+SW) in generalized equation

Simple storage = $S * D * (GW + SW)$

Ballpark estimate **10,992 to 50,928 ac-ft**



Cost of restoration (UCFRB as example)

- General estimate for non-mechanized restoration on suitable reaches: \$1860 to \$14,900 per km (\$3,000 to \$24,000 per mile), or <\$1 to \$4.50 per linear ft of stream
- (Revised) ballpark cost estimates for UCFRB beaver habitat restoration on 124km to 380km of stream: \$236,600 to \$5,676,900





DNRC has supported natural water storage projects through recent policy. So now what?

- Policy to support beaver relocation and improve trapping mgt. (start with beaver mgt. plan?)
- Recognize natural water storage and stream resiliency as critical state needs
- Other ideas: Groundwater mitigation/banking? Payment for Ecosystem Services? State lands policy



Thank You.

**Water/Wastewater ▪ Transportation ▪ Grant Services ▪ Solid Waste ▪
Structural ▪ Bridges ▪ Natural Resources ▪ Planning**

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