

Converting Badger Creek From a Watershed to a Water *Catchment*



Buffy Lenth, Central Colorado Conservancy

Natalie Allio, Badger Creek Ranch



BADGER CREEK RANCH

www.badgercreekranch.com



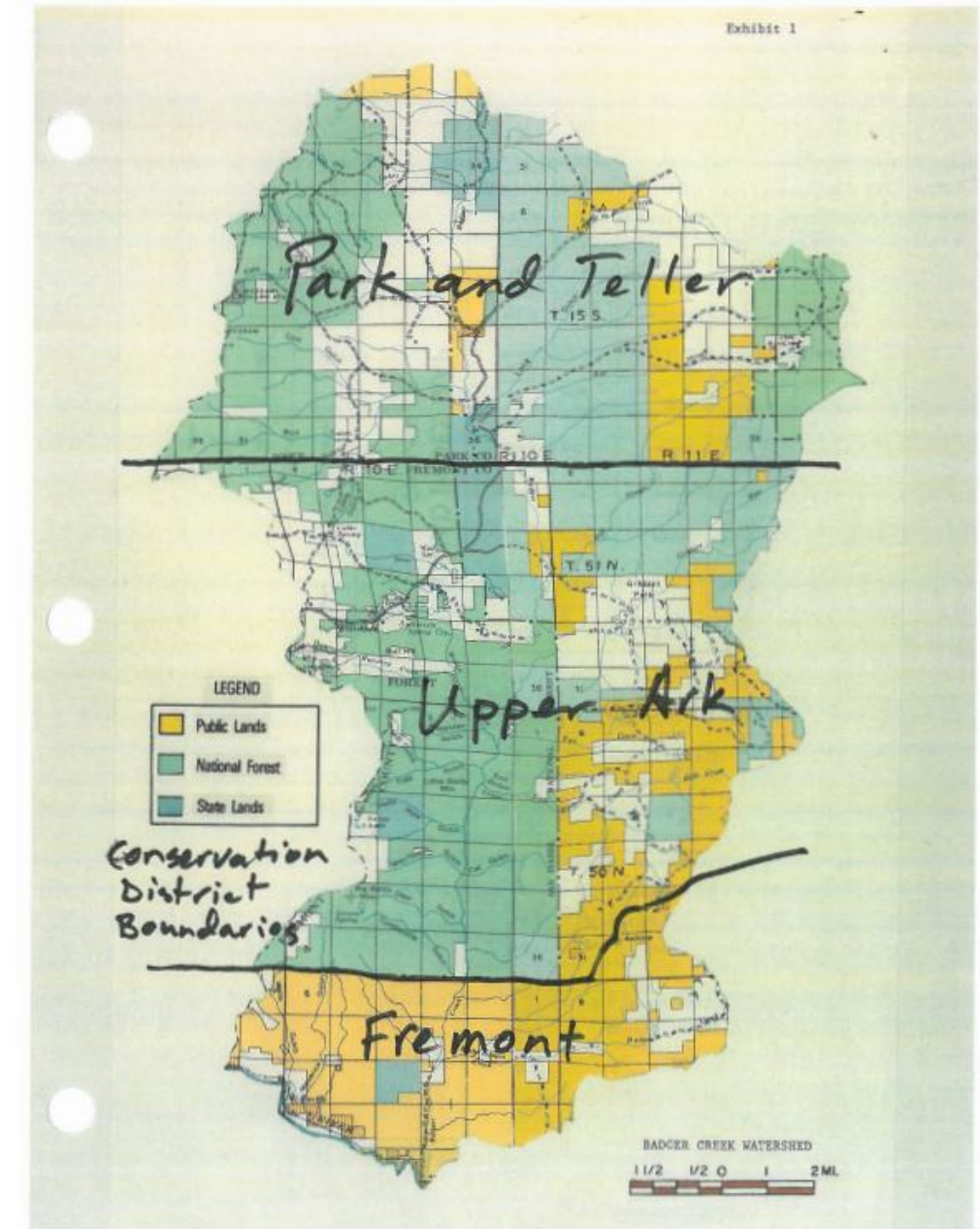
A conversation about...

- History of Badger Creek Watershed
- Past restoration efforts
- Current collaborative
- Pasture Walk
- Land Health Workshop
- Riparian restoration demonstration projects
- Your feedback



Badger Creek Watershed

- 100-square mile watershed
- Located in southern Park County and northern Fremont County
- Drains into the Arkansas River at Rincon
- Climate is arid with 10-15 inches of rain/year, making it borderline desert
- Elevation approximately 9,000 ft
- Land ownership is a mix of USFS, BLM, SLB and private



History

- Plant community evolved with grazing which is still essential for plant vigor
- Massive cattle drives traversed the region in the late 1800s and early 1900s.
- Settlers brought land use practices from wetter regions that did not sit well in this fragile environment
- Range still hasn't completely recovered



Loss of wetlands



- Broad fluvial wetlands several hundred feet wide once flowed over this landscape
- Wagon tracks and trails likely captured the creek
- Badger Creek became channelized, and cut down 4-12 feet.
- The incision trench widened to more than 200 feet in places
- An estimated 64% of wetlands have been lost primarily due to this process

Head cuts and gullies

- Upland erosion and sediment supply is a major ecological stressor
- More than 100 miles of eroding upland gullies add thousands of tons to sediment to Badger Creek, and ultimately to the Arkansas River, during thunderstorms
- Low vegetative cover, with bare ground covering up to 75% of surface area in places, results in poor infiltration and increased runoff.



Paradigm shift: livestock are tools.



Images Republished Courtesy of the Savory Institute

Photo of Stream in Wyoming, USA - Taken on Same Day
*Left: Upstream Land - Properly managed using Holistic Management
(150% increase in livestock numbers)*
Right: Downstream Land - Managed conventionally

TOOLS: Rest (No Grazing or Over-rest)



Dying, overrested plant in a brittle environment

Over-rest

when a perennial grass plant is rested so long that accumulating dead material prevents new growth and eventually killing the plant.

Don't bare naked soil!

Importance of Soil Cover

The most important thing that you can do to protect your soil and get the water in, is to keep it covered with either living plants or decomposing litter.



The effectiveness of managing riparian grazing: Observations on managed BLM parcels



Time series aerials show vegetation recovery on this BLM Riparian Demonstration Area. Managed riparian grazing was instituted about 15 years ago.

Pasture Walk with Steve and Nancy Oswald







Badger Creek Land Health Workshop

















Ecological Monitoring











Focus on the Filter

- Restoring a healthy riparian system is a good way to minimize the effects of upland erosion
- When functioning these areas are physical and biological filters that accumulate and store sediment.
- Stream power is reduced by spreading water, rather than it being concentrated in high-energy channels



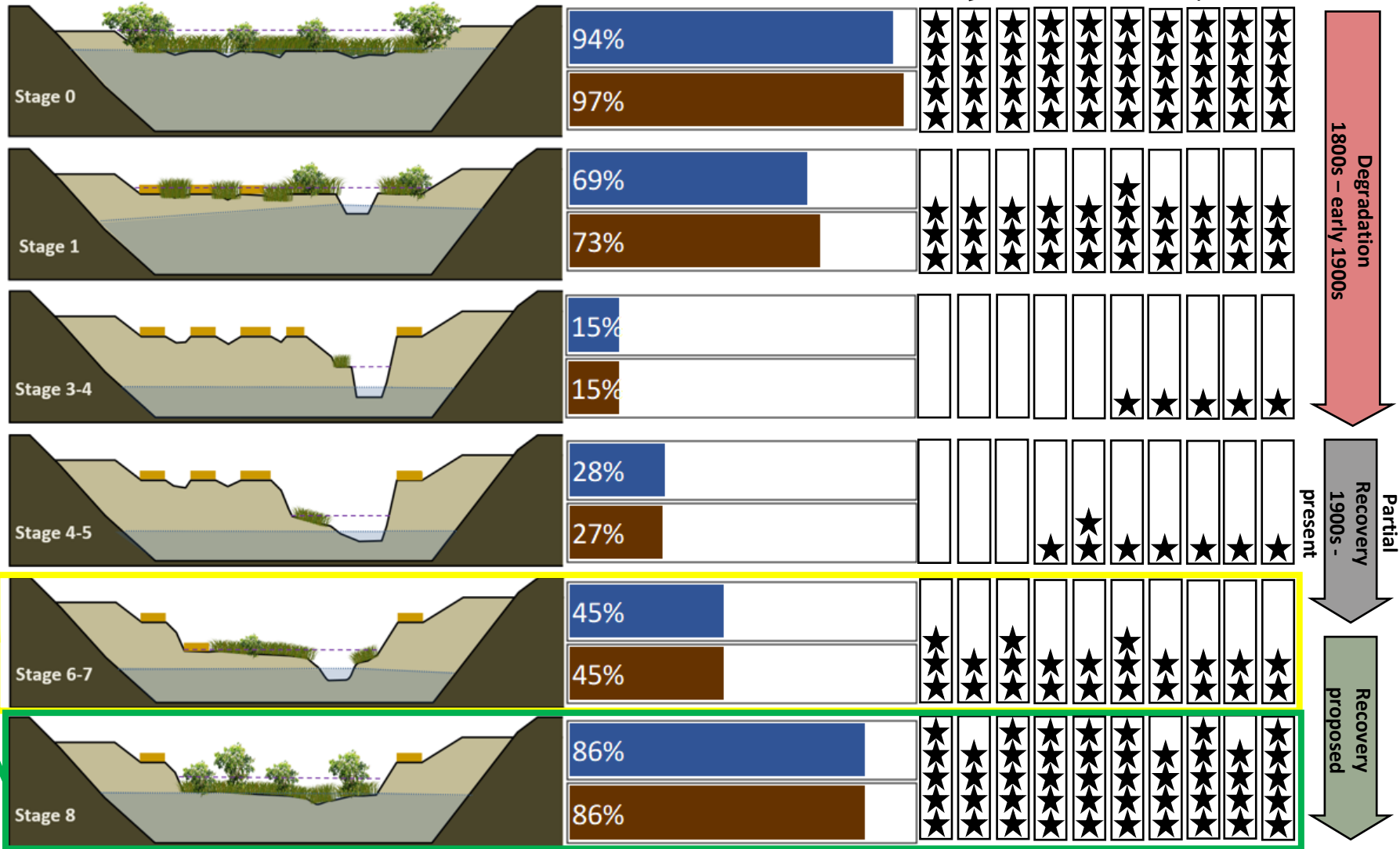
Hydrogeomorphic attributes, habitat, and ecosystem services: Loss and recovery on Badger Creek

Finishing the job: Proposed restoration to complete Badger Creek recovery

Badger Creek is most of the way through a stream evolutionary process of degradation and partial recovery. The degradation phase caused severe losses in hydrogeomorphic attributes, habitat, and ecosystem benefits that have only partially recovered. The greatest gains, which are yet to be fulfilled, are associated with full recovery to Stage 8. But the system has been stuck in Stage 6-7 since the mid 1900s, and it cannot advance without huge improvements to riparian vegetation. Vegetation and water distribution are the primary factors that maintain floodplain hydrology, geomorphic processes, and habitat complexity attributes that characterize the shift from the channelized form (Stage 6-7) to the complex anastomosed form (Stage 8). Restoring these factors is the key to realizing the full habitat and ecosystem service potential on Badger Creek.

Our restoration approach aims to get the system “unstuck” by actively planting diverse riparian vegetation (especially willows which would take centuries to recover on their own), managing riparian areas to promote vegetation recovery (through protection and livestock management, and improving water distribution and sediment capture via simple inexpensive channel treatments that use only native materials and natural processes.

■ Hydrogeomorphic attributes
■ Habitat and ecosystem benefits
 (from Cluer and Thorne 2014)



Badger Creek stream health and restoration opportunities

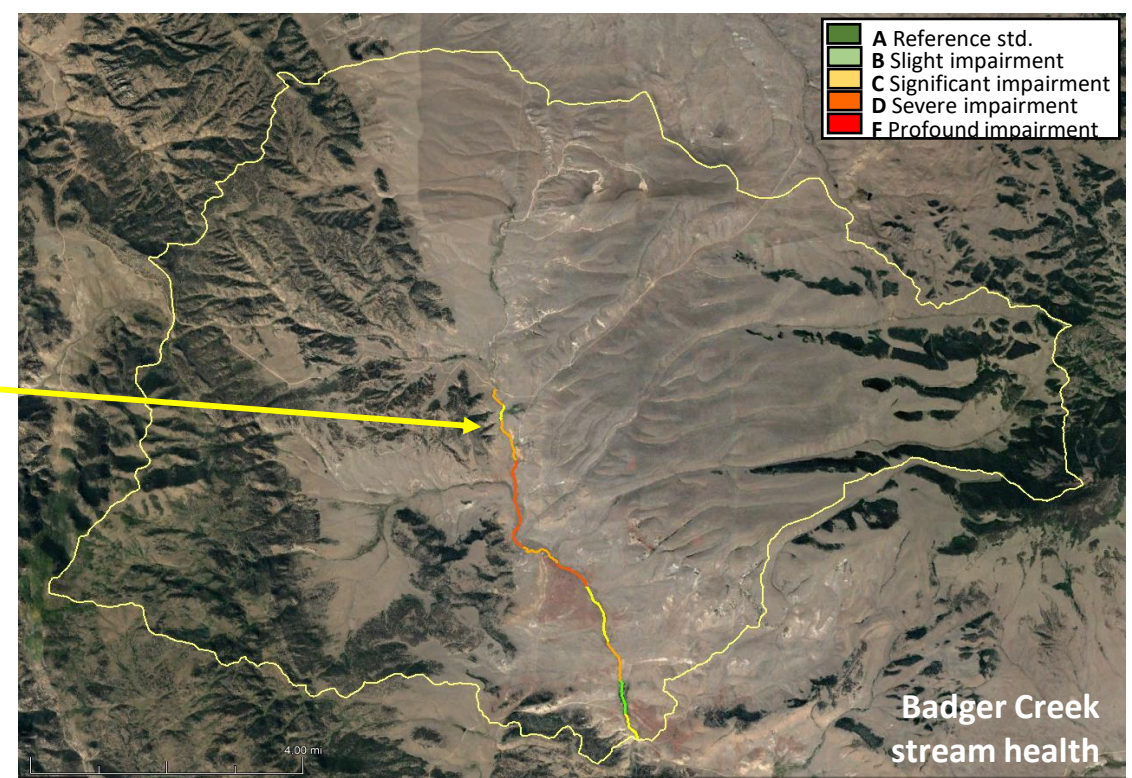


Restoration demonstration site

Our first demonstration project site is on federal land managed by BLM. We evaluated this site in detail to determine the nature of impairment, feasibility of restoration, and potential for ecological lift. Restoration strategies aim to improve water distribution and floodplain hydrology with simple channel treatments that mimic small beaver dams, and to accelerate riparian vegetation recovery by managing livestock grazing, aggressively planting native willow shrubs, and maintenance (including weed control and possibly wildlife fencing) to assure they take. These approaches will catalyze the development of a stable Stage-8 fluvial wetland system with massive potential for hydrogeomorphic, habitat, and ecological benefits.

Ripe for recovery

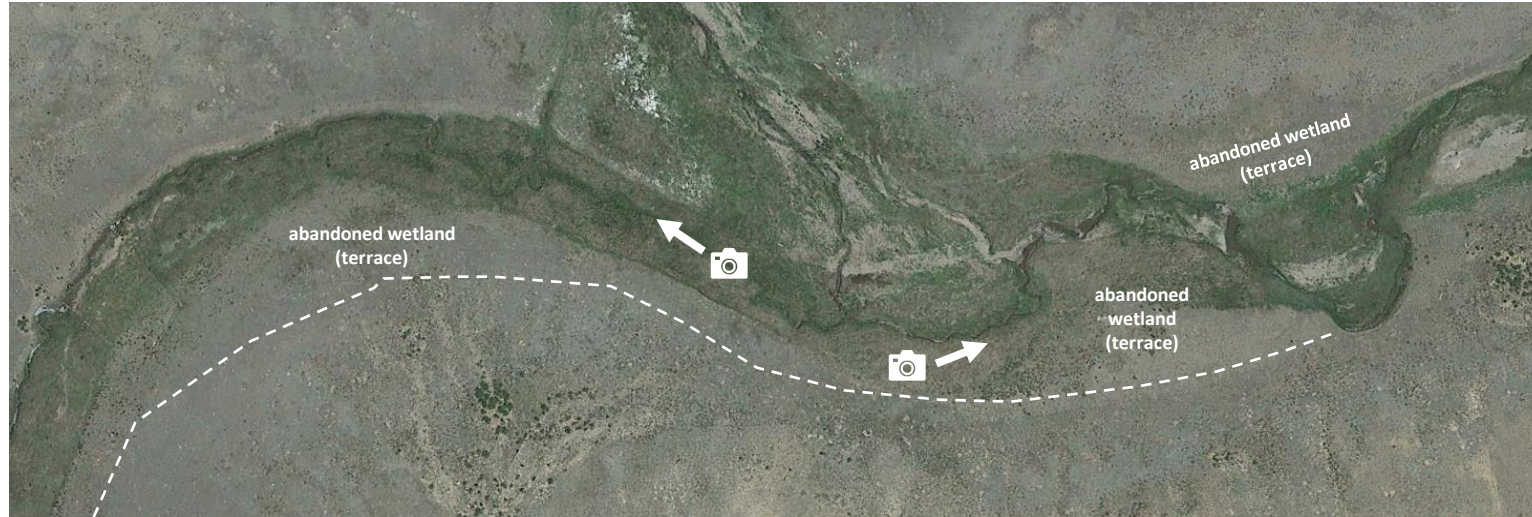
Badger Creek is ripe for restoration. The era of incision and extreme erosion is almost a century in the past and the system is well into stages of recovery. Removing the pressure of season-long riparian livestock use allows these systems to evolve and recover naturally. Simple interventions (minimal channel treatments and riparian planting) can speed the process. The best way to demonstrate this potential and the feasibility of restoration is to just start doing it and monitoring the effects. Monitoring effectiveness on this shovel-ready demonstration project is an ideal first step towards watershed-scale stream and riparian restoration.



Badger Creek stream health: Assessment and restoration

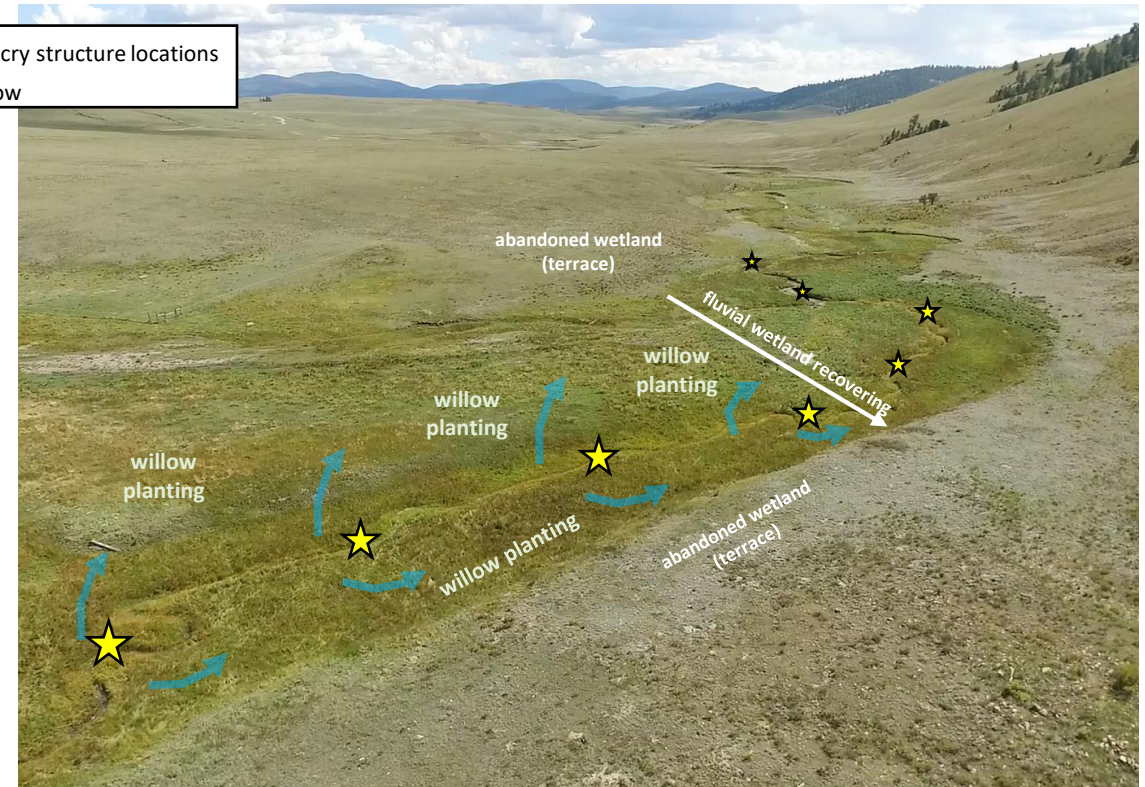
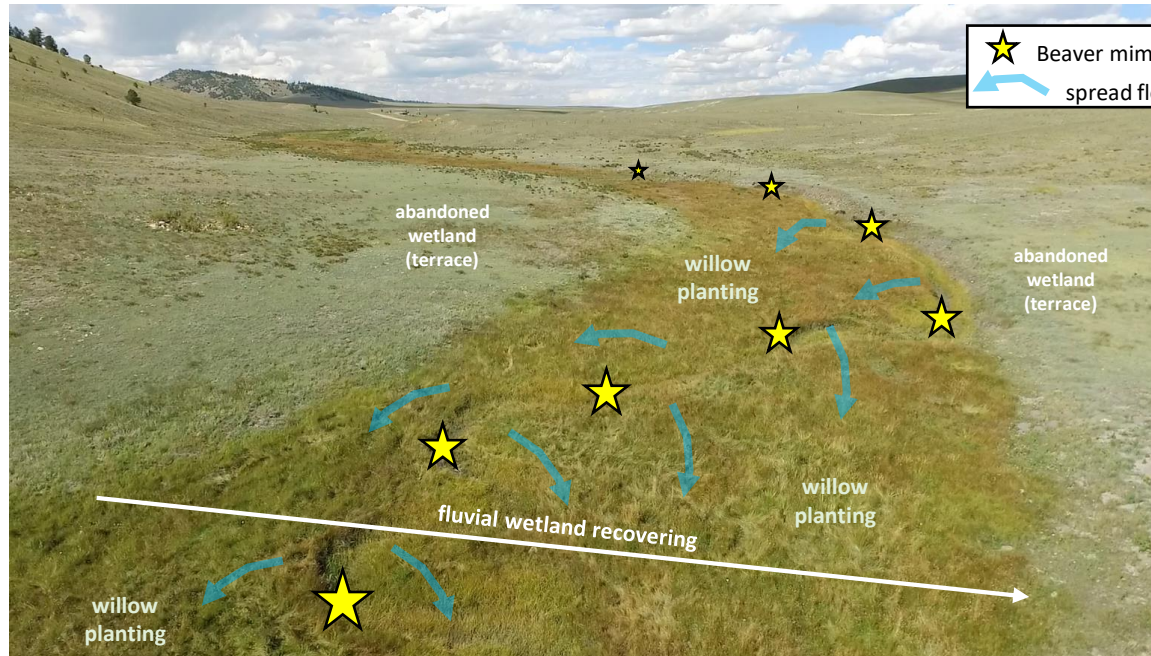
Badger Creek is a perennial stream from about the confluence of Cat's Gulch down. We evaluated stream and riparian health on these reaches remotely, and field-checked areas on public land where we had access. The entire segment has stabilized since the era of incision and widening, and ecological condition ranges from B- to D depending on the degree of recovery.

Stream-Riparian Restoration: BLM Demonstration Project



Restoration plan

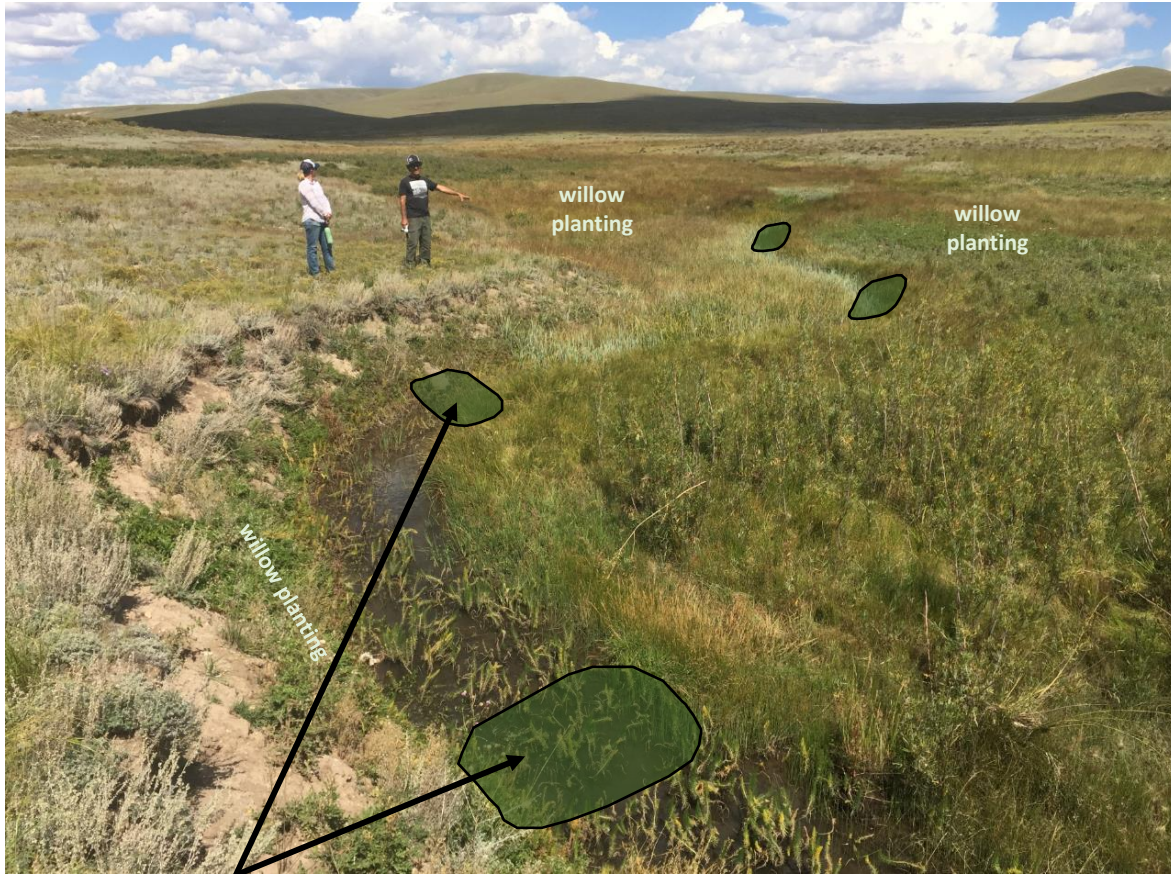
1. Continue managing livestock access and vegetation monitoring to inform grazing strategies.
2. Use native sod to create small beaver mimicry structures to spread flows across the wetland surface and induce sediment deposition. These very small beaver dams analogs are quick, simple, and easy to install. They naturalize quickly, incorporating into the wetland within one season.
3. Plant native willow. Plants can be sourced locally and grown in a greenhouse for one season so that they have sufficient root mass at planting. Monitor plant establishment and provide for adaptive management.
4. Maintain beaver mimicry structures and adapt management strategy based on monitoring. Deploy protective fencing if needed.



Speeding up recovery

The BLM site is recovering nicely in response to grazing management. Riparian vegetation is expanding and developing dense herbaceous cover and sod with strong root mass. The channel is shrinking with accumulating sediment and encroaching vegetation, raising the water table and improving water distribution. The restoration plan aims to speed these natural processes. Willow planting is necessary since these plants were eradicated.

Stream-Riparian Restoration: BLM Demonstration Project

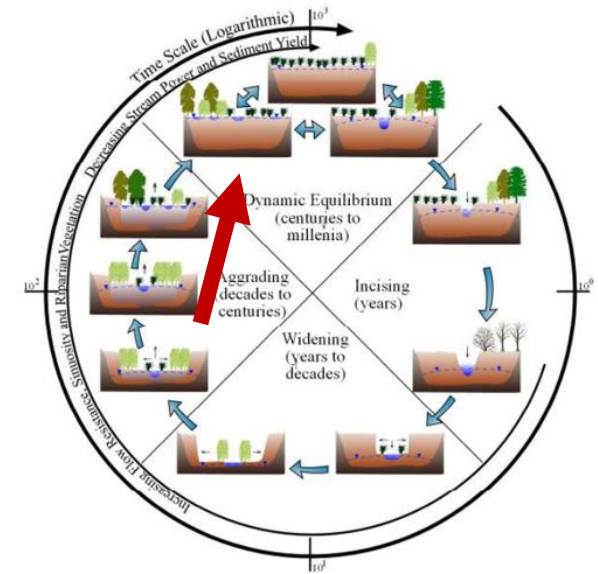


Beaver mimicry structures and de-channelizing

On this BLM reach, the channel is already naturally recovering via vegetation encroachment, sediment deposition, and a proliferation of aquatic macrophytes. The process would be accelerated if beaver were present, but even in the best circumstances, it will be years before shrub densities are high enough to support these keystone species. The next best thing, beaver mimicry, uses the same principles and processes to enhance water distribution and to induce fine sediment deposition the way a small beaver dam would. Beaver mimicry structures are small sod plugs, about 1 foot tall and a few feet wide, planted across the small channel. Sediment deposited at the structures is rapidly colonized by aquatic macrophytes, sedges, and willows. If beaver eventually do reoccupy the site they will take over long-term maintenance and continue inducing deposition, enhancing the filtering property of this fluvial wetland system. This long-term goal may be realized if habitat suitability and willow density is improved over the next 5-15 years.

Beaver mimicry and the incision-aggradation cycle

Beaver dams short-circuit the incision-aggradation cycle, accelerating aggradation and decreasing the time of recovery from decades/centuries to years (red arrow). Mimicking this process with small natural sod structures is a natural low-cost, low-risk restoration strategy applicable on this BLM demonstration project. (Figure from Pollock, et. al. 2014)



Monitoring, maintenance and adaptive management

Riparian revegetation is a multi-year process involving monitoring, maintenance, and adaptive management. These activities are built into the restoration plan. Weed control is necessary to prevent the spread of noxious weeds. Observations of existing willows on other revegetation sites suggests little to no damage from wildlife, protection against from livestock and wildlife may be necessary, as determined by monitoring.

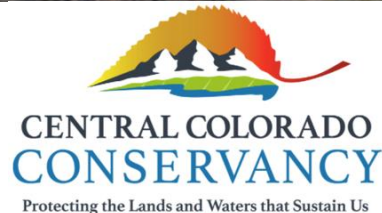


Many thanks!
We'd love your feedback, suggestions, and
ideas!



BADGER CREEK RANCH

www.badgercreekranch.com



**CENTRAL COLORADO
CONSERVANCY**

Protecting the Lands and Waters that Sustain Us



Stream & Riparian Monitoring, Assessment & Restoration