

BEAVER BENEFITS

1. BEAVERS MITIGATE CLIMATE WARMING.

- Beaver wetlands sequester carbon and consequently act as net carbon stores.

2. BEAVERS MITIGATE DROUGHT.

- Beaver wetlands hold and distribute water more evenly through drought and rainy seasons,
- 10 acre-feet (ca. 3.26 million gallons) of water storage can be attributed to a single beaver family due to its dam-building prowess.

3. BEAVERS IMPROVE WATER QUALITY BY SEQUESTERING & FILTERING TOXINS.

- Beaver ponds help reduce nutrients such as nitrogen, in streams and river by sequestering excess nutrients in pond bottom sediment thus aiding the removal of nutrient pollutants from water.
- Beaver ponds sequester heavy metals

4. BEAVER ACTIVITY MITIGATES WILDLAND FIRES & PROTECTS WATERSHEDS FROM FIRE.

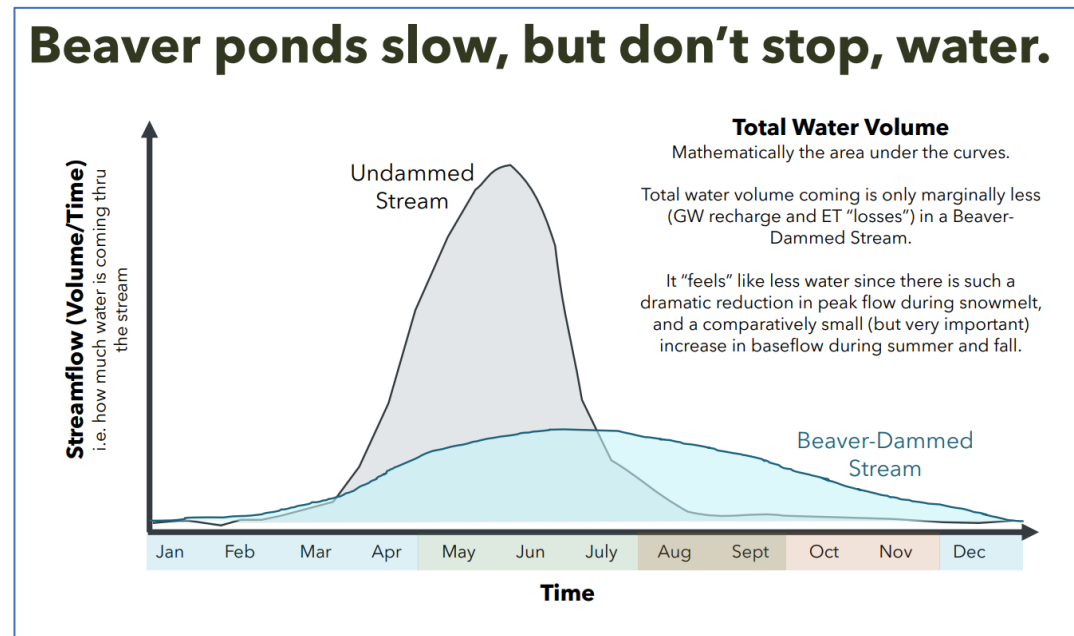
<https://www.sciencefriday.com/segments/beaver-wetland-wildfires/>



WATER DOESN'T BURN!

MOUNTAINS: TOWERS OF WATER

1. Beaver activity mitigates the impacts of a warming climate.
 - Water in the west comes primarily from winter precipitation and is stored in the mountains as snow to be slowly released into our streams and rivers which then becomes available for human and wildlife use.
 - climate change is driving warmer temperatures and less snowfall precipitation
 - **To have more water in our rivers for longer the best way is to slow it down and keep it stored in the mountains.**
 - But, as snow but melts quicker other natural ways for water to be stored in the mountains becomes essential
 - **Like snow, beaver wetlands hold water for gradual release.**



BEAVER ACTIVITY MITIGATES DROUGHT

2. Drought mitigation.

- Beavers build dams, dig channels, and change small streams into broad wetland areas.
- **Their ponds and channels slow down water and spread it out in the landscape.**
- Water has more time to soak into the soil, which ultimately keeps plants green and lush even during periods of drought.
- The channels the beavers dig almost act like a little drip irrigation system running throughout the entire riparian zone.

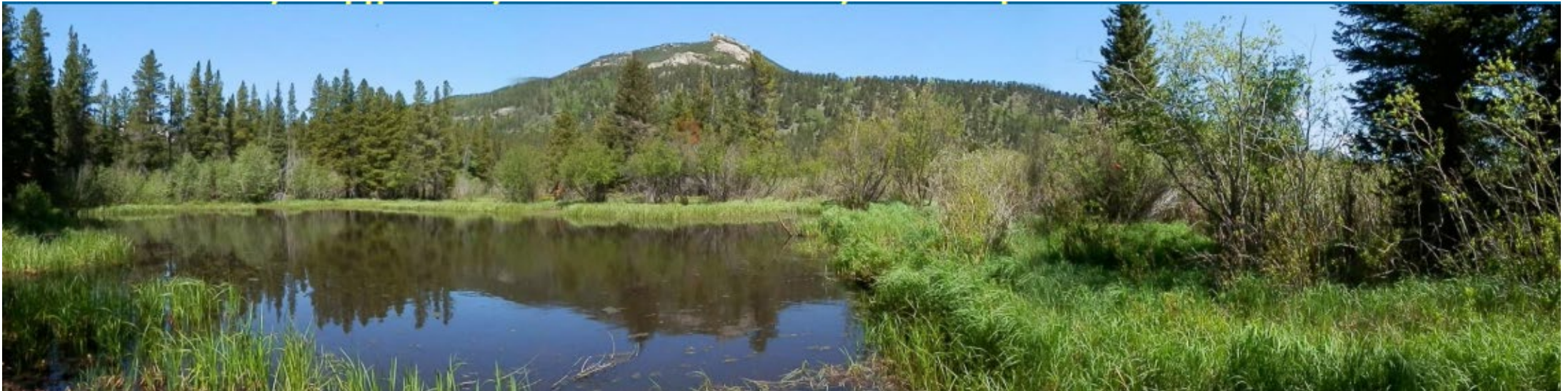


A beaver pond in Atascadero, CA in August 2020. Green vegetation is abundant and full of moisture, despite 3 months of no rain and temperatures routinely >100 degrees F. Photograph by Emily Fairfax.

WATER QUALITY

3. Beaver damming activity improves water quality.

- Flow downstream from beaver ponds contains **50-75% fewer suspended solids** than that of equivalent stream reaches without these ponds.
- When beavers were reestablished along Wyoming's Carrant Creek during the 1980s, daily sediment transport **decreased from 30 to 4 metric tons**. Downstream channel slope decreased, as did bank erosion during spring high flows, which was the main source of sediment to the river.



CAMERON PEAK FIRE



4. Fire mitigation. Beaver dam streams to make ponds and a sprawling network of channels that spreads out and stores water.

The infrastructure that gives beavers safety from predators also helps shield them from wildfire.

Their work saturates the ground, creating an abnormally wet patch in the middle of an otherwise dry area.

Dams allow the water to pool, and the channels spread it out over a wide swath of valley floor.

REFUGIA FROM FIRE





RESTORATION IMPLEMENTATION

STRATEGY: COLLABORATION.

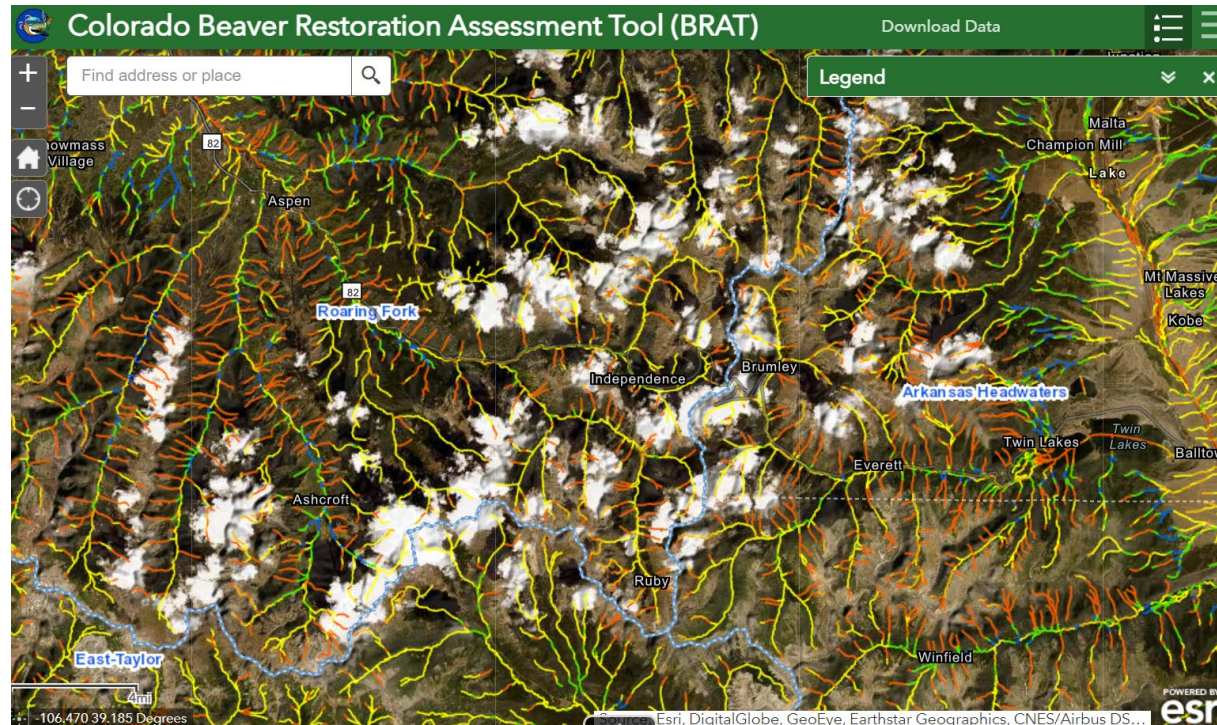
Sierra Club, Roaring Fork Audubon, Independence Pass Foundation, EcoFlight.

1. **APPLICATION OF THE BEAVER RESTORATION ASSESSMENT TOOL** (This model predicts the capacity of beaver dam building activity (beaver dams per mile) that the landscape can support in the current condition and identifies missing components required for beaver habitation. Perennial water source; Availability of riparian vegetation for initial dam building material and foraging; Sufficient riparian vegetation to allow for future beaver complex maintenance and expansion; Ability for beavers to build dams at baseflow ; Likelihood of dams to withstand a typical flood ; Optimal stream gradient for dam construction and persistence; Stream or river size that is small enough to support dam construction and maintenance
2. **ECOFLIGHT** – finer filter
3. **MAPPING OF CURRENT BEAVER ACTIVITY.** Both aerial photo interpretation and field surveys will be used to quantify existing beaver activity within our study area based on the number of dams and/or area of beaver ponds per mile.
 1. We will use current aerial photos available through the National Agricultural Imagery Program (NAIP) to map existing beaver activity based on pond area per mile
 2. Mapping results will be compiled into GIS layers to show existing beaver activity and recent trends
4. **FIELD SURVEYS – ASSESS AND DOCUMENT.**
5. **PRIORITIZATION OF BEAVER RESTORATION SITES.**
6. **PRELIMINARY MONITORING, SITE ASSESSMENT**
7. **SITE ENHANCEMENT - BEAVER DAM ANALOGS.**



BRAT & CONFLICT MODEL

- The Beaver Restoration Assessment Tool (BRAT) assesses the potential for beaver as a stream conservation and restoration agent
- Conflict model: potential interaction between dam building and anthropogenic land use



Ecoflights to Identify Potential Restoration Sites in 2022



NEXT STEPS

- 1. GROUND TRUTH – ASSESS AND DOCUMENT.**
- 2. PRIORITIZATION OF BEAVER RESTORATION SITES.**
- 3. PRELIMINARY MONITORING, SITE ASSESSMENT**
- 4. SITE ENHANCEMENT - BEAVER DAM ANALOGS.**

ONGOING:

- 1. COORDINATE WITH PUBLIC AGENCIES**
- 2. COORDINATE WITH PRIVATE LANDOWNERS**
- 3. FUNDING**

CONTRADICTIONS and RESOLUTION

Contradictions occur between management and value of American beaver to ecosystem functions.

1. The beaver population of North America was estimated at 6-12-million and currently “is probably 10 percent, or less, of the original number” (Brown and Fouty, 2011.)
2. CPW regulations allow beaver trapping from October 1st – April 30th with no limits on the numbers of beaver trapped.
3. State laws across the West (and Colorado) classify beavers as a nuisance that causes problems like dammed culverts and downed trees.
4. Trapping beaver isn’t regulated like other game species - if a beaver is up to no good on your property you can kill it, no questions asked.
5. Wild Services ...” In FY03 the Colorado WS Program entered into a Cooperative agreement with the Colorado Department of Transportation to provide assistance in controlling beaver damage statewide. WS routinely uses explosives to remove beaver dams that are flooding property. “
6. **CPW recently elevated the status of American Beaver to a Tier 1 SWAP Species**

COLORADO WATER PLAN

“The State will safeguard Colorado’s water by proactively protecting our interstate water interests. We will also continue to apply and strengthen the doctrine of prior appropriation. This requires us to recognize that **water rights are property rights whose owners are free to respond to the economics of the marketplace and to continue to work within our local control structure.** Moreover, we strengthen the doctrine of prior appropriation when we evaluate and improve upon the water law and policy we have built on its foundation.

The State will continue to stress that every water conversation begins with conservation and **must include water storage.** When we lower demand (conservation) and increase supply (storage), we close the supply-demand gap.”

However, the beaver is largely absent from Colorado’s discussion on water issues.

Data show that beavers should be central to the state’s plans going forward.



In Colorado, 16,895 total miles of streams provide water for surface water intakes supplying public drinking water systems; of this, 10,510 miles, or **62%**, are **intermittent, ephemeral, or headwater streams**. Over 3.7 million people in Colorado receive drinking water from public drinking water systems that rely at least in part on intermittent, ephemeral, or headwater streams

