OVERVIEW OF IMPAIRMENTS ADDRESSED BY BEAVER-ASSISTED RESTORATION

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HOW LONG HAVE BEAVER BEEN HERE?

From Ray Toll

Jurassic ‘Beaver’ found in China (est. 164 MYA; Mid Jurassic) – *Castorocauda lutrasimils*

Genus *Castor* originated in Eurasia – Earliest true beaver (est 10-12 MYA; Late Miocene)

John Day Fossil find of *Castor californicus* (7-7.5 MYA)

UBIQUIOUS WITHIN NORTHERN HEMISPHERE IN TEMPERATE ECOSYSTEMS

- Castor fiber (Eurasian beaver)
- Limited current distribution, but expanding back to parts of its historical range.

**Castor canadensis**

- Spatial distribution approaches its historical range
- Historically, 55–400 million pre-European settlement (Seton 1929, Pollock et al. 2003)
- Currently, 6-12 million (Naiman et al. 1988)

Lewallen et al. 2015.
TIMING OF BEAVER TRAPPING IN THE LOWER 48 STATES

1600-1700
1700-1800
1800-1850
1850-1900

Recreated from Jim Sedell, USFS 2001
IMPAIEMENTS TREATED BY BEAVERS

• Channel incision/disconnected floodplains
• Water storage (during high water)
• Augmented low flows
• Higher surface water levels
• Riparian expansion
• Aspen Recruitment
• Habitat complexity for fish
• Habitat complexity for amphibians
• Habitat complexity for birds (e.g. sage grouse)
• Increase forage and water for cattle or wild ungulates
• Sediment storage
• Nutrient recycling
IMPAIRMENTS TREATED BY BEAVERS
(Case projects- Bridge Creek)

- Channel incision/ disconnected floodplains
- Water storage (during high water)
- Augmented low flows
- Higher surface water levels
- Riparian expansion
- Aspen Recruitment

**Habitat complexity for fish**
- Habitat complexity for amphibians
- Habitat complexity for birds (e.g. sage grouse)
- Increase forage and water for cattle or wild ungulates

**Sediment storage**
- Nutrient recycling
BI RCH CREEK, I D - RESTORING PERENNIAL FLOW

Restoration Goal
• Restore perennial flow

Setting
• Abundant forage for beaver
• Shallow water depth – high risk of predation

Strategy
• Build BDAs to provide immediate habitat/refuge for beaver
IMPAIRMENTS TREATED BY BEAVERS (Case projects- Bear Creek)

- Channel incision/disconnected floodplains
- **Water storage**
- **Low flows (bump up surface water)**
- Riparian expansion
- Aspen Recruitment
- **Habitat complexity for fish**
- Habitat complexity for amphibians
- Habitat complexity for birds (e.g. sage grouse)
- Increase forage and water for cattle or wild ungulates
- Sediment storage
- Nutrient recycling
BDA RESPONSE

August 3rd, 2017

- No groundwater floodplain interaction
- Low mid-summer flow

August 9th, 2017

- Evidence of groundwater elevation increase
- Increased surface water storage
HOW FAR CAN WE TAKE THIS APPROACH?
PARRISH CREEK
IMPAIRMENTS TREATED BY BEAVERS
(Case projects- Grouse Creek)

- Channel incision/disconnected floodplains
- **Water storage (during high water)**
- **Augmented low flows**
- Higher surface water levels
- **Riparian expansion**
- Aspen Recruitment
- Habitat complexity for fish
- Habitat complexity for amphibians
- **Habitat complexity for birds (e.g. sage grouse)**
- Increase forage and water for cattle or wild ungulates
- Sediment storage
- Nutrient recycling
BELLWETHER FOR
HEALTH OF SAGEBRUSH
ECOSYSTEM
Partnership:
- WRI/SGI Funding
- Tanner Family
- Kent Sorenson (UDWR)
- USU
  - Eric Thacker, Randy Dahlgren, Terry Mesmer, Joe Wheaton
- Anabanch Solutions

Leaving It To Beavers
With Their Extended Ranching History on Utah’s Dry Rangelands, the Tanner Family is Returning to USU for Lively Expertise in Holding Water Longer
Managing Livestock Grazing on Streams on the Elko District and the Need to be Adaptive

Bureau of Land Management, Elko, Nevada
Susie Creek

1991

Annual hot season grazing

2011

20 yrs of mostly spring and fall grazing by cow-calf pairs;
Extensive beaver dam complexes
Susie Creek

SUSIE CREEK 1992

SUSIE CREEK 1999
Susie Creek, Photo Pt. 4

UPSTREAM, 1991

UPSTREAM 1999
Susie Creek, Photo Pt. 4

UPSTREAM, 2007

UPSTREAM 2012
South Fork Salmon Falls Creek

Little Quakey Riparian Pasture, ONeil Allotment. S-42, down.

Since at least 1988: a mixture of use by both cow-calf pairs and yearlings as well as rest, early use, hot season use and fall use.
Maggie Creek, S-9, upstream, 2012. Adjacent terraces show presence of western aster (*Aster occidentalis*), a mesic forb important for sage grouse broods. Presence of this species in this setting may indicate an elevated water table in the Maggie Creek valley bottom.
Maggie Creek, April 2012.

Shows how beaver dams are capturing and storing water on a landscape scale with the effect of rehydrating the valley bottom.
Also shows effect of good condition riparian areas stopping fire (fire was here in 2007).
Opportunities exist to treat heavy brush fuel load to the right of the stream, increasing the fuel break efficiency of the stream corridor.
READING THE LANDSCAPE...
EXPANDING THE EMERALD RIBBON
BDA TREATMENTS

Beaver Dam Analog Complex Goals
- Pond creation for beaver translocation
- Increase lateral connectivity
- Incision recovery

Beaver Dam Analog Structure Type
- Primary
- Secondary
- Constriction
- Channel spanning (non-ponding)

Complex Goal
- Pond habitat for beaver translocation
- Increase lateral connectivity
- Incision recovery

Figures from Scott Shahverdian (Anabranch Solutions, 2017)
A PILOT STRUCTURE IN HIGH FLOW

No scientific results yet... just built pilots years ago (16 structures in 3 creeks) & implemented 114 structures last June, 7 beavers released in the past month
ROLE OF BEAVER IN ASPEN RECRUITMENT IN RIPARIAN AREAS
Beaver effects on aspen stem density (McColley et al. 2012 Restoration Ecology)
SAN RAFAEL- IMPROVING FISH HABITAT
(Bluehead & Flannelmouth suckers, Roundtail chub)

- Sand bed, flashy desert river
- Highly altered flow regime
- Invaded by tamarisk

Goal
- Improve habitat for three native species
SAN RAFAEL- IMPROVING FISH HABITAT

Large-scale collaborative pilot
- Restore incised stream, floodplain connectivity ->
- What replaces the tamarisk?
- Increase habitat quality for endangered fish
SAN RAFAEL- IMPROVING FISH HABITAT

- Breached dams provided most complex habitat