LIVING & WORKING WITH BEAVER

Klamath Watershed Partnership Workshop:

October 14-15, 2014
2. MANAGEMENT, CONSERVATION & RESTORATION PLANNING

Joe Wheaton

LIVING & WORKING WITH BEAVER WORKSHOP
October 14-15, 2014
I. Let’s not forget, they are pests!
II. Living with Beaver?
III. Adaptively Managing Beaver
IV. Restoration by Rodents?
V. Where? Meet the BRAT
VI. Future Needs
VII. Take Homes...
IN SOME PLACES... THEY ARE A NUISANCE

- In residential areas they can cause flooding...
- They often block culverts, which can flood roads
- They can chop down our ornamental landscape trees
- They can make a mess of irrigation diversions
DYNAMITE DOESN’T WORK

- A common response to nuisance beaver dam building is to blow the dam up.
- The dynamite is effective at breaching dam....
- But, the beaver are persistent, they can rebuild a dam in a night or two.
LETHAL TRAPPING

• Lethal trapping is very common (and legal)
• Sometimes effective at temporarily alleviating problems IF all beaver are trapped out
• However, very hard to actually trap ALL beaver
I. Let’s not forget, they are pests!

II. Living with Beaver?

III. Adaptively Managing Beaver

IV. Restoration by Rodents?

V. Where? Meet the BRAT

VI. Future Needs

VII. Take Homes...
LIVING WITH BEAVER STRATEGIES...

• Is problem real or perceived?
• If real:
  – ‘Beaver Deceivers’
  – ‘Pond Levelers’
  – ‘Caging’ trees
  – All require maintenance
• If those don’t work, live trap and relocation
Some guidelines for ‘living with beaver’

- Provides basic examples
- Emphasizes in ‘live trapping’ translocation trapping entire family unit
UDWR – BEAVER MANAGEMENT PLAN

• One of most progressive plans in US
• Specifically relies on beaver as a restoration tool

UTAH BEAVER MANAGEMENT PLAN
2010 - 2020

Plan Goal
Maintain healthy, functional beaver populations in ecological balance with available habitat, human needs, and associated species.

INTRODUCTION
The purpose of the Utah Beaver Management Plan is to provide direction for management of American beaver (Castor canadensis) in Utah and where appropriate expand the current distribution to historic range. This purpose is in accordance with the mission statement of the Utah Division of Wildlife Resources (UDWR). The mission of UDWR is:

To serve the people of Utah as trustee and guardian of the state’s wildlife.
UDWR BEAVER MANAGEMENT PLAN

Damage Management

Objective 1:

Increase consistency in the response options (lethal and non-lethal) currently in use and increase the frequency of use of non-traditional options (e.g. beaver deceivers, live-trapping) used by UDWR, governmental and non-governmental agencies and landowners for managing beaver causing property damage through 2020.

• Awareness of non-traditional options is already increasing...
• Non-lethal options are being used throughout state
TRANSLOCATION

• In Utah, translocation is already allowed under UDWR’s Beaver Management Plan

Kent Sorenson (UDWR)

Nuisance beavers being translocated from Henry’s Fork to High Unitah’s (Courtesy of Sorenson)
SOME EVEN BUILD LODGES FOR BEAVER

• Building a starter lodge for translocated beaver to settle into their new surroundings can increase the chances they do work where you want them to.

Photo courtesy of William Meyer (WDFW)

http://wdfw.wa.gov/living/beavers.html#preventingconflicts
I. Let’s not forget, they are pests!

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PARK CITY STORY

- Good old days of traditional, undocumented beaver management
- Change of mgmt...
- Beaver come back
- Beaver cause flooding problems
- City removes (traditional mgmt.)
- But people liked the beaver... and complained
- CONFLICT!
EXAMPLE OF HOW TO DO THIS...

Lays out an adaptive management response to the beaver problem...
PCMC BEAVER ADAPTIVE MANAGEMENT PLAN

IDENTIFY PROBLEM
Nuisance Beaver Activity
- Flooding of Infrastructure
- Undesirable Harvest of Landscape Trees

PCMC GOALS & OBJECTIVES
(Established in 2013)
Address damages caused by beaver activity
Balance habitat needs of beaver and ecosystem services provided by beaver with need to protect public and private property and infrastructure.

DEVELOP LIVING WITH BEAVER STRATEGIES & RELOCATION OR RESTORATION STRATEGIES
(Review Every 5 Years)
Consider funding sources required to implement plan

IMPLEMENT MONITORING PROGRAM
Basic Annual and Responsive Monitoring

DOCUMENT MONITORING & ACTIONS
Potential adjustment to monitoring and/or management actions based on annual evaluations

PERIODICALLY REVIEW EFFECTIVENESS OF BEAVER MANAGEMENT PLAN
(Every 5 Years)

EVALUATE & LEARN

DO

IMPLEMENT LIVING WITH BEAVER STRATEGIES & RELOCATION OR RESTORATION STRATEGIES
Primarily Responsive to Problems

1. EVALUATION OF REACHES & DAMS
   Annually at reaches in spring (prior to spring runoff) & in Fall (after peak of dam building and caching)
   OR
   At individual dams as triggered by nuisance complaints

2. ADJUST

2
• Cheaper and more effective than just lethal treatment everywhere...
EVALUATION OF INDIVIDUAL POTENTIAL PROBLEM DAMS

Always consider dam in context of surrounding dams and/or dam complexes prior to removal of any dams

1. LEAVE IT ALONE

2. START OR RE-EVALUATE AS PROBLEMS IDENTIFIED

- Is dam actually causing harm?
  - NO
  - YES

- Can dam impacts be mitigated?
  - NO or REPEATED EFFORTS NOT WORKING
  - YES

- Are beaver active in the area?
  - NO
  - POTENTIALLY

- BREACH DAM TO NON-PROBLEM LEVELS
  - POTENTIAL

- What type of impact?
  - FLOODING
  - UNDESIRABLE HARVEST OF TREES

- Is it practical to protect trees?
  - NO (e.g., too many)
  - POTENTIAL

- BDSS IS IRRELEVANT OR COUNTERPRODUCTIVE
  - INSTALL TREE PROTECTION

- INSTALL OR MAINTAIN POND LEVELER

- INSTALL OR MAINTAIN BEAVER DECEIVER

- EXPLORING TRAPPING & RELLOCATION OPTIONS

- MONITOR EFFECTIVENESS OF ADAPTIVE ACTIONS
ADAPTIVE BEAVER MANAGEMENT PLAN

Beaver Conservation Zone
Living with Beaver Zone
Nuisance Beaver Zone
Non-Beaver Bearing
Culvert or Bridge

PCMC BEAVER ADAPTIVE MANAGEMENT PLAN

PERIODICALLY REVIEW EFFECTIVENESS OF BEAVER MANAGEMENT PLAN
(Every 5 Years)

DO

1. EVALUATE & LEARN
   Potential adjustments to monitoring and/or management actions based on annual evaluations

2. ADJUST

PLAN

DEVELOP LIVING WITH BEAVER STRATEGIES & RELOCATION OR RESTORATION STRATEGIES
(2013)
(Review Every 5 Years)

IMPLEMENT MONITORING PROGRAM
Basic Annual and Responsive Monitoring

IMPLEMENT LIVING WITH BEAVER STRATEGIES & RELOCATION OR RESTORATION STRATEGIES
Primarily Responsive to Problems

At individual dams as triggered by nuisance complaints

PCMC GOALS & OBJECTIVES
(Established in 2013)

- Address damages caused by beaver activity
- Balance habitat needs of beaver and ecosystem services provided by beaver with need to protect public and private property and infrastructure.

Legend
- Park City - City Limits
- Potential Areas of Management Concern
- PCMC Adaptive Management Categories
  - Beaver Conservation Zone
  - Living with Beaver Zone
  - Nuisance Beaver Zone
  - Non-Beaver Bearing
  - Culvert or Bridge
HMMMM. WHAT IS WRONG HERE?
I. Let’s not forget, they are pests!
II. Living with Beaver?
III. Adaptively Managing Beaver
IV. Restoration by Rodents?
V. Where? Meet the BRAT
VI. Future Needs
VII. Take Homes...
LETTER BEAVER
DO RESTORATION
NOT NEW!!!

• As early as 1930s, beaver used as conservation tool
• Logic is simple... just take nuisance beaver and relocate them where we want their ecosystem engineering expertise
Over half of streams in the west are in fair or poor condition.

3.5 Million miles of streams and rivers

700K miles of wadeable, perennial

190K are in poor condition

Table 1. Typical restoration costs

<table>
<thead>
<tr>
<th>Item</th>
<th>High end (cost/river mile)</th>
<th>Low end (cost/river mile)</th>
<th>Reasonable mean (cost/river mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan, design &amp; NEPA</td>
<td>$110,040</td>
<td>$21,833</td>
<td>$68,880</td>
</tr>
<tr>
<td>Materials (trees)</td>
<td>$64,900</td>
<td>$14,747</td>
<td>$20,566</td>
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<tr>
<td>Mobilization</td>
<td>$8,200</td>
<td>$1,333</td>
<td>$2,777</td>
</tr>
<tr>
<td>Equipment</td>
<td>$122,000</td>
<td>$17,333</td>
<td>$20,800</td>
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<tr>
<td>Labor</td>
<td>$17,167</td>
<td>$112</td>
<td>$5,000</td>
</tr>
<tr>
<td>Riparian planting/maintenance</td>
<td>$7,646</td>
<td>$3,893</td>
<td>$5,512</td>
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<tr>
<td>Instream structure maintenance</td>
<td>$24,640</td>
<td>$4,760</td>
<td>$5,600</td>
</tr>
<tr>
<td>Total</td>
<td>$354,593</td>
<td>$64,011</td>
<td>$129,135</td>
</tr>
</tbody>
</table>


- Nationwide (lower 48), Over 130,900 mi are Poor condition
  - (i.e. @ $130K/ mile... over $17 Billion)
CAN WE CONTINUE TO AFFORD THIS?

- The over-cited Bernhardt et al. (2005) paper
  - 38,000 projects
  - At least $15 billion spent since 1990-2003
- Gross Under-Estimate
  - 42,000 projects alone in PNW
With Trouble on the Range, Ranchers Wish They Could Leave It to Beavers

Critters, Once Reviled, Gain Popularity With ‘Believers’; a Good Rodent Is Hard to Find

So the 64-year-old rancher put himself on a waiting list this year hoping state officials would bring him a beaver or two. Wyoming's Game and Fish Commission periodically plucks the rodents from drainage culverts.

It's a bit of a turnaround in these parts, when beavers have long been considered something of a nuisance—blamed for

Beavers Offer Solution to Climate Change

In the Southwest U.S., biologists are talking about returning beavers to rivers they once inhabited in order to fight droughts—which are expected to get worse as the globe warms. Beaver dams create great sponges that store lots of water.
AT LEAST 6 TYPES OF ‘BEAVER’ RESTORATION

1. ‘Allow’ beaver to stay & promote/protect them (i.e. living with beaver / conservation)

2. Accidental Beaver Restoration

3. Transplant beaver from one area to an area where they are not currently & let them have at it

4. Riparian restoration & land use changes followed by transplanting beaver

5. In areas where beaver alone are not enough, help out with beaver dam analogues (BDAs), then hope beaver take over maintenance

6. Mimic beaver dam impacts with BDAs and artificially maintain...
(5) e.g. INCISED STREAMS ARE UBIQUITOUS
WE DON'T HAVE A MAP OF INCISED STREAMS IN WEST

- Back in Utah, we have a lot of:
THE INCISION-AGGRADATION CYCLE

Figure from Pollock et al. (2014) Bioscience. DOI: 10.1093/biosci/biu036
THE INCISION-AGGRADATION CYCLE

Figure from Pollock et al. (Accepted) Bioscience

Adapted from Cluer and Thorne 2013
THE INCISION-AGGREGATION CYCLE WITH BEAVER DAMS & BEAVER DAM ANALOGUES

Figure from Pollock et al. (Accepted) Bioscience
USING BEAVER TO RESTORE INCISED STREAMS

Figure from Pollock et al. (Accepted) Bioscience
SO HELP ‘EM OUT... BUY THEM POSTS TIME

[Images of people working in a muddy environment and a flowing stream with debris]
FOUR STRUCTURE TYPES

1. Starter Dam

Figure 10. A typical starter dam (ST-17 at Sunflower) with willow branches woven between vertical posts and the back side sealed with rock and clay. Note the dam height is sufficient to divert flow into the F2 terraces, mimicking a stable beaver dam.

2. Post Line Only

Figure 12. The purpose of a post line is to provide a site where beaver can build a stable dam. They generally create little or no geomorphic changes unless utilized by beavers.

3. Post Line w/ Willow Weave

Figure 11. A post line with wicker weave is similar to a starter dam, but acts more like a weir as water is allowed to flow through the willow branches such that low flows are not overtopping the structure and the woven branches may not extend to the top of the posts. These may naturally seal up by trapping sediment and organic material moving downstream or they may be utilized by beavers. Note that beaver have started to colonize this P-LWW as evidenced by the chewed stems on the right of the photo and the isolated tailFE to the flow.

4. Reinforce Existing

Figure 13. Any active dams within the treatment areas were strengthened with posts to lengthen their functional life, since most dams along the studied Bridge Creek have been shown to last less than a year (Drenner and Beidler, 2008). This structure was one of four dams built in sequence in Lower Owens to form a new colony. Within one year, all four dams had backfilled with sediment, which improved floodplain connectivity and habitat complexity, but made the site unsuitable for beaver. However, because we had installed additional post lines just downstream the beaver were able to use them to build new dams which allowed the colony to persist.
CAN BEAVER DAMS AGGRADE INCISED STREAMS TO THE POINT OF FLOODPLAIN RECONNECTION AND RECOVERY?

Joe Wheaton
Florie Consolati
Kenny DeMeurichy
Nick Bouwes

Michael Pollock
Chris Jordan
Carol Volk
Nick Webber

Utah State University
Northwest Fisheries Science Center
I. Let’s not forget, they are pests!

II. Living with Beaver?

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V. **Where? Meet the BRAT**

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WHERE COULD WE USE BEAVER?

- This is not a very useful map...
- What about in my watershed, on my stream?

Beavers in excess of estimated carrying capacity (Blackwell and Pederson 1993). The predicted beaver habitat in Utah was mapped as part of the 1995 Utah GAP Analysis (Figure 1). Current beaver distribution and abundance is not fully understood, however they are considered common and most of the suitable habitat believed to be occupied.
TRADITIONAL HABITAT SUITABILITY MODELS DON’T WORK FOR BEAVER

- With sufficient water & food, beaver **can survive almost everywhere** - deserts to alpine meadows
  - As such beaver defy traditional habitat suitability models.
  - Correlations between suitability & beaver occurrence tend to be weak or non-existent.
• **Beaver dams**, not beaver themselves, provide the positive feedbacks we seek

• While beaver can survive in a wide range of conditions, **where they build dams is more limited**

• Dam building activity varies dramatically according to flow regime & availability of dam building materials
Welcome to the BRAT website. The Beaver Restoration Assessment Tool will be a decision support and planning tool intended to help researchers and resource managers assess the potential for beaver as a stream conservation and restoration agent over large regions and watersheds.

The BRAT models can be run with widely available existing data sets, and used to identify opportunities, potential conflicts and constraints through a mix of assessment of existing resources and scenario-based assessment of potential futures. The primary backbone to BRAT are some spatial models that predict the capacity of riverscapes to support dam-building activity by beaver. These models have been tested in a pilot project in Utah and are ready for broader implementation. The rest of the decision support tool is under development (read Vision here).

See Wally MacFarlane’s Talk
@ 2:00 PM on Oct 22\textsuperscript{nd}, 2014

- Wally MacFarlane
- Martha Jensen
- Jordan Gilbert
- Jordan Burningham

http://brat.joewheaton.org
LINES OF EVIDENCE TO ESTIMATE BEAVER DAM DENSITIES AT FULL CAPACITY

• Evidence of a perennial water source
• Evidence of riparian vegetation to support dam building activity
• Evidence of adjacent vegetation (on riparian/upland fringe) that could support expansion and establishment of larger colonies
• Evidence that a beaver dam could physically be built across the channel during low flows
• Evidence that a beaver dam is likely to withstand typical floods
1. Veg FIS
2. Baseflow (can they build a dam?)
3. 2 Year Flood (does dam blow out)

= Resulting Capacity

Figure from Wheaton & MacFarlane (In Review)
RUN FOR 27,000 km OF PERRENIAL RIVERS & STREAMS
VERIFICATION

What you look for...

- No beaver dams where None predicted
- Low densities in ‘occasional’ zones
- Stable long-term dam complexes in ‘frequent’ or ‘pervasive’
- High quality (‘frequent’/‘pervasive’) areas as likely locations of new colonies

Figure from Wheaton & MacFarlane (In Review)
WATERSHED VALIDATION

LEGEND
- Active Beaver Dam
- Relic Beaver Dam

Existing Capacity Model
Maximum Number of Beaver Dams
- 0 - None
- 1 - 4 Occasional
- 5 - 15 Frequent
- 16 - 40 Pervasive

Beaver Dam Locations
n = 625

Franklin Basin - Logan River

Bear Hollow
Max: n = 2003

Note: Earlier Version Shown Here.....
LOGAN-BLACKSMITH VALIDATION

- Identify existing beaver dams (e.g. 1055 in Logan-Blacksmith)
- Compare with capacity estimates
• Electivity Index suggests good agreement....
## EXISTING VS. HISTORIC CAPACITY - UTAH

### WHAT IT IS...

![Map showing existing dam density in Utah with categories: 0- None, 0-1 Rare, 1-4 Occasional, 5-15 Frequent, 16-40 Pervasive.]

<table>
<thead>
<tr>
<th>Category</th>
<th>Stream Length (km)</th>
<th>Existing Capacity %</th>
<th>Estimated Dam Capacity</th>
<th>Stream Length (km)</th>
<th>% of Stream Network</th>
<th>Estimated Dam Capacity</th>
<th>Historic Capacity</th>
<th>% Capacity of Historic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive</td>
<td>3,502</td>
<td>13%</td>
<td>81,811</td>
<td>7,830</td>
<td>29%</td>
<td>184,890</td>
<td></td>
<td>44%</td>
</tr>
<tr>
<td>Frequent</td>
<td>12,584</td>
<td>46%</td>
<td>129,224</td>
<td>12,377</td>
<td>45%</td>
<td>127,705</td>
<td></td>
<td>101%</td>
</tr>
<tr>
<td>Occasional</td>
<td>5,799</td>
<td>21%</td>
<td>15,256</td>
<td>2,939</td>
<td>11%</td>
<td>7,721</td>
<td></td>
<td>198%</td>
</tr>
<tr>
<td>Rare</td>
<td>2,323</td>
<td>8%</td>
<td>648</td>
<td>1,158</td>
<td>4%</td>
<td>342</td>
<td></td>
<td>189%</td>
</tr>
<tr>
<td>None</td>
<td>3,137</td>
<td>11%</td>
<td>-</td>
<td>3,040</td>
<td>11%</td>
<td>-</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>27,345</td>
<td>226,939</td>
<td>27,344</td>
<td>320,658</td>
<td>71%</td>
<td></td>
<td></td>
<td></td>
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</table>

### WHAT IT WAS...

![Map showing historic dam density in Utah with similar categories as above.]

The tables above compare the existing and historic dam capacity across different categories in Utah. The maps visually represent the density of dams across the state, with colors indicating the frequency of dam occurrence. The data shows a significant difference in the capacity, with the total historic capacity being 320,658, which is 71% higher compared to the existing capacity of 226,939.
WHAT ABOUT CONFLICT POTENTIAL?
RESTORATION POTENTIAL

- Classify the drainage network in terms of ‘where could they be’:
  - Low-hanging fruit streams
  - Quick return streams
  - Long-term possibility streams
  - Unsuitable, Naturally Limited Streams
  - Unsuitable, Anthropogenically Limited Streams
A FIRST CUT

- Simple management zones by stream reach...
WITHIN EACH UDWR REGION

For example, Northern Region

- **Southern**: 47,049 E, 71,270 P; Stream Length 6223 km
- **Southeastern**: 31,716 E, 46,216 P; Stream Length 5220 km
- **Central**: 40,276 E, 55,627 P; Stream Length 4051 km
- **Northeastern**: 45,774 E, 59,922 P; Stream Length 5546 km
- **Northern**: 62,557 E, 88,241 P; Stream Length 6503 km
- **Statewide**: 226,939 E, 326,659 P; Stream Length 27,345 km

**EXISTING**
- **Maximum Dam Density (dams/km)**
  - 0 - None
  - 5 - 15 Frequent
  - 10 - 15 Rare
  - 16 - 40 Pervasive
  - 1 - 4 Occasional

**HISTORIC**
- **Probability of Conflict**
  - 0 - 10%
  - 10 - 25%
  - > 75%
  - 25 - 50%

**CONFLICT?**

**RESTORATION TOOL?**

- **Beaver Management Zones**
  - Unsuitable: Naturally Limited
  - Unsuitable: Anthropogenically Limited
  - Quick Return Restoration Zone
  - Low Hanging Fruit
  - Long-Term Restoration Zone
  - Living with Beaver (Low Source)
  - Living with Beaver (High Source)
RESOLUTION OF BRAT

• At a scale that is still meaningful on the ground (250 m reaches)
• Just because BRAT predicts high capacity, does not mean it will be realized... but it does define a plausible upper limit
• In many places, at some point in time this upper limit is reached... just never all at once
WHAT WE DID FOR UDWR...

- Built a decision support system
- Ran for whole state
- Made recommendations for updating plan

2. Identify zones on the map to illustrate appropriate beaver management strategies for given geographic areas, i.e. existing populations (including source populations), unoccupied historical range and areas where the potential for conflict is high.
SOME NUMBER GAMES...

• Don’t believe this... but Estimated Existing:

<table>
<thead>
<tr>
<th>Category</th>
<th>Stream Length (km)</th>
<th>Estimated Dam Capacity</th>
<th>Extrapolated Dam Counts Average</th>
<th>High</th>
<th>Low</th>
<th>Estimated Colonies Average (Assuming 6 dams/colony)</th>
<th>High (Assuming 4 dams/colony)</th>
<th>Low (Assuming 10 dams/colony)</th>
<th>Population Estimate Average (Assuming 6 beaver/colony)</th>
<th>High (Assuming 4 beaver/colony)</th>
<th>Low (Assuming 2 beaver/colony)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive</td>
<td>3,502</td>
<td>81,811</td>
<td>5,186</td>
<td>11,060</td>
<td>836</td>
<td>864</td>
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<td>86</td>
<td>-</td>
<td>105</td>
<td>518</td>
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<tr>
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<td>19,315</td>
<td>39,120</td>
<td>1,558</td>
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<td>0.5</td>
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• Estimated Historic:

<table>
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<th>Estimated Dam Capacity</th>
<th>Extrapolated Dam Estimate Average</th>
<th>High</th>
<th>Low</th>
<th>Estimated Colonies Average (Assuming 6 dams/colony)</th>
<th>High (Assuming 4 dams/colony)</th>
<th>Low (Assuming 10 dams/colony)</th>
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<th>High (Assuming 4 beaver/colony)</th>
<th>Low (Assuming 2 beaver/colony)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive</td>
<td>7,830</td>
<td>184,890</td>
<td>73,956</td>
<td>92,445</td>
<td>29,582</td>
<td>12,326</td>
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<td>20,433</td>
<td>8,514</td>
<td>15,953</td>
<td>2,043</td>
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<td>27,344</td>
<td>320,658</td>
<td>128,263</td>
<td>160,329</td>
<td>51,305</td>
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<td>4.7</td>
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<td>1.5</td>
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UTAH-Wide BRAT Project Completed!
posted Oct 12, 2014, 11:06 AM by Joe Wheaton [ updated 19 hours ago ]

Utah State University researchers Wally MacFarlane, Martha Jensen and Joe Wheaton recently completed the extension of the BRAT (Beaver Restoration Assessment Tool) Across the entire state of Utah. The model is truly ready to be run now for all western states. The decision support system and capacity model have been dramatically improved and expanded and the methods are well documented. The research was prepared for the Utah Division of Wildlife Resources and is intended to help them implement the Utah Beaver Management Plan. The work is summarized in:


and fully reported in:


All the data is available [here](http://brat.joewheaton.org) and will soon be available on the Utah Automated Geographic Reference Center.
RECALL PARK CITY.... WE USED BRAT TO ASSESS CAPACITY

To Get:
- ~~~ Beaver Conservation Zone
- ~~~ Living with Beaver Zone
- ~~~ Nuisance Beaver Zone
- ~~~ Non-Beaver Bearing
- ~~~ Culvert or Bridge

Used:

Legend
- Park City - City Limits
- Existing Capacity to Support Dam Building Beaver Dams / km
  - None (0 dams)
  - Occasional (1-4 dams/km)
  - Frequent (5-15 dams/km)
  - Pervasive (16-40 dams/km)
I. Let’s not forget, they are pests!
II. Living with Beaver?
III. Adaptively Managing Beaver
IV. Restoration by Rodents?
V. Where? Meet the BRAT
VI. Future Needs
VII. Take Homes...
LIMITING FACTORS AFFECTING CAPACITY

- Overgrazing of riparian zone
- Trapping or predation
- Roads/development
- Timber harvesting
- Natural disturbance (flooding, fire)
Fuzzy Model Based on:
- Slope
- Distance from Water
- Vegetation

Probability of Ungulate Utilization

- High : 1
- Low : 0
WHAT ABOUT SAGE GROUSE?

- Restoring beaver, could restore riparian zones, that could act as important **brood rearing** habitat
- Fringe between sage brush and riparian is critical

- Kent Sorenson (UDWR)
- Nate Hough-Snee (USU)
WHAT ABOUT PJ – JUNIPER REMOVAL?

- Many upland restoration efforts focused on removing PJ
- Can we use the juniper for posts or fill material?
WHAT ABOUT ASPEN REGENERATION?

• Healthy aspen need disturbance
  – Can be fire, can be coppicing, can be disease or....
BEAVER MONITORING APP!

• Simple enough 2nd graders can use it
• Sophisticated enough that researchers get useful data streams
• Going to launch statewide monitoring campaign with USU Extension & DWR
EVEN SECOND GRADERS GET IT

- They use the App
- They build their own dams in beaver side channels
- They learn how beaver modify the landscape

Utah State University
COOPERATIVE EXTENSION

UTAH WATER WATCH
WHAT ABOUT DECLINING SNOWPACK?

- Could we get enough beaver dams back on landscape to mitigate this?

- We desperately need research to better quantify hydrologic impacts of beaver dams and how they scale up
I. Let’s not forget, they are pests!
II. Living with Beaver?
III. Adaptively Managing Beaver
IV. Restoration by Rodents?
V. Where? Meet the BRAT
VI. Future Needs
VII. Take Homes...
TAKE AWAYs

• Dam building activity of benefit not just to aquatic and riparian species, but upland species too

• Beaver are a disturbance agent – sometimes disturbance is key ingredient for process-based restoration

• The wadeable streams beaver can impact intersect many of systems you are trying to restore

• BRAT mapping can help building realistic expectations

For more information, visit: http://beaver.joewheaton.org
ACKNOWLEDGEMENTS

Countless Field Crews & Collaborators

- Nick Bouws (ELR/USU)
- Michael Pollock (NOAA)
- Wally MacFarlane (USU/ETAL)
- Nate Hough-Snee (USU/ETAL)
- Martha Jensen (USU/ETAL)
- Elijah Portugal (USU/ETAL)
- Kenny DeMeurichy (USU/ETAL)
- Ian Tottenahm (ODFW)
- Brett Roper (USFS/USU)
- John Shivick (USFS/UDWR)
- Kent Sorenson (UDWR)
- Chris Jordan (NOAA)
- Carol Volk (SFR)
- Nick Weber (ELR)
- Ryan Lokteff (USU/ETAL)
- CHaMP Field Crews
- Tim Beechie (NOAA)
- Mary O’Brien (GCT)
- And many others...
TWO FUN READS...

IN BEAVER WORLD
ENOS A. MILLS

1913 vs. 2011

Glynnis Hood
The Beaver Manifesto
WANT TO LEARN MORE?

• Visit http://beaver.joewheaton.org

For more information on BRAT, visit: http://brat.joewheaton.org