PARTNERING WITH BEAVER IN RESTORATION

Utah Division of Wildlife Resources Workshop:

Sponsored by Utah AFS

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UNDERSTANDING BRAT AS A DECISION SUPPORT PLANNING TOOL

Wally Macfarlane & Joe Wheaton

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BRAT OUTPUTS IN A NUTSHELL

- Existing & Historic Capacities → Potential Conflict → Management

**Existing Beaver Dam Capacity**

- Actual Beaver Dams
- Maximum Dam Density (dams/km)
  - 0 - None
  - 0 - 1 Rare
  - 1 - 4 Occasional
  - 5 - 15 Frequent
  - 16 - 40 Pervasive

**Potential for Human Beaver Conflict**

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

**Ecosystem Management**

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

Scale: 0 0.5 1 1.5 2 Kilometers
Two main components:

1. Beaver Dam Capacity Model
2. Decision Support and Planning Tools
CAPACITY MODEL ALONE NOT ENOUGH... IN SOME PLACES... BEAVER 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
HUMAN-BEAVER CONFLICT POTENTIAL MODEL

- Inference system that utilizes GIS data to characterize potential points of conflict:
  - canals, roads, culverts, railroads, and stream crossings
HUMAN-BEAVER CONFLICT POTENTIAL MODEL

START

NO

Is the beaver dam in a conservation area?

YES

Is the beaver dam < 50m from a culvert or road crossing?

NO

90% Probability

Leave it alone

Maximum Prob: each 250 m
WHAT ABOUT CONFLICT POTENTIAL?

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

Southern
- 35%
- 21%
- 15%
- 27%

Southeastern
- 51%
- 18%
- 10%
- 19%

Central
- 26%
- 21%
- 16%
- 35%

Northeastern
- 51%
- 20%
- 11%
- 16%

Northern
- 24%
- 34%
- 14%
- 27%

Statewide
- 37%
- 24%
- 13%
- 24%

Stream Length (km)
- 0
- 2000
- 4000
- 6000
- 8000
- 10,000

Probability of Conflict
- 0 - 10%
- 10 - 25%
- 25 - 50%
- 50 - 75%
- > 75%
Moab: Probability of human-beaver conflict potential
**EXISTING BEAVER DAM CAPACITY**

- Weber Basin
  - BRAT Model:
    - Max Capacity: ~ 23,477 dams
    - Over 2358 km of streams
  - Avg. Max Density: 10 dams/km

![Map showing maximum dam density](image)
HISTORIC BEAVER DAM CAPACITY

- Weber Basin
- BRAT Model:
  - Max Capacity: ~ 32,409 dams
  - Over 2358 km of streams
- Avg. Max
  - Density: 14 dams/km
• Very conservative estimate
• Probably far, far less...
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.

http://wdfw.wa.gov/living/beavers.html#preventingconflicts
A FIRST CUT

- Simple management zones by stream reach...
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
CLIP DOWN TO JUST AREAS WITH BEAVER RESTORATION POTENTIAL

Max Capacity:
~ 13,478 dams
Over 921 km of streams

Avg. Max Density: 14 dams/km
WHERE COULD WE GET THOSE GUYS?

Living with Beaver (Low Source)

Living with Beaver (High Source)
### Length of Stream

<table>
<thead>
<tr>
<th>Stream</th>
<th>iGeoLength</th>
<th>Existing Capacity (Density)</th>
<th>Historic Capacity (density)</th>
<th>Existing Count</th>
<th>Existing Dam Density</th>
<th>% of Existing Capacity</th>
<th>% of Historic Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logan River HUC8</td>
<td>731</td>
<td>10.1</td>
<td>15.1</td>
<td>7,402</td>
<td>1.8</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>Logan River HUC10</td>
<td>211</td>
<td>10.2</td>
<td>15.4</td>
<td>2,146</td>
<td>2.1</td>
<td>21%</td>
<td>14%</td>
</tr>
<tr>
<td>Temple Fork HUC12</td>
<td>14</td>
<td>7.7</td>
<td>11.3</td>
<td>108</td>
<td>3.0</td>
<td>39%</td>
<td>27%</td>
</tr>
<tr>
<td>Beaver Creek HUC12</td>
<td>25</td>
<td>11.2</td>
<td>16.2</td>
<td>281</td>
<td>5.7</td>
<td>51%</td>
<td>35%</td>
</tr>
<tr>
<td>Right Hand Fork HUC12</td>
<td>14</td>
<td>7.7</td>
<td>11.3</td>
<td>108</td>
<td>3.0</td>
<td>39%</td>
<td>27%</td>
</tr>
<tr>
<td>Franklin Basin HUC12</td>
<td>32.7</td>
<td>15.5</td>
<td>17.7</td>
<td>506</td>
<td>4.2</td>
<td>27%</td>
<td>24%</td>
</tr>
<tr>
<td>Red Banks Logan HUC12</td>
<td>43.2</td>
<td>11.3</td>
<td>13.8</td>
<td>488</td>
<td>1.3</td>
<td>12%</td>
<td>10%</td>
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<tr>
<td>Blacksmith Fork HUC10</td>
<td>205</td>
<td>9.6</td>
<td>13.8</td>
<td>1,968</td>
<td>2.1</td>
<td>22%</td>
<td>15%</td>
</tr>
<tr>
<td>Curtis Creek HUC12</td>
<td>13.5</td>
<td>8.2</td>
<td>13.8</td>
<td>111</td>
<td>1.2</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Rock Creek HUC12</td>
<td>26.4</td>
<td>10.3</td>
<td>14.7</td>
<td>272</td>
<td>2.2</td>
<td>21%</td>
<td>9%</td>
</tr>
<tr>
<td>City Logan</td>
<td>59</td>
<td>9.0</td>
<td>20.2</td>
<td>533</td>
<td>0.1</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Average Dam Density (Dams/Km)

- 0 - None
- 0 - 1 Rare
- 1 - 4 Occasional
- 5 - 15 Frequent
- 16 - 40 Frequent

- Maximum Dam Density
- 0 - None
- 0 - 1 Rare
- 1 - 4 Occasional
- 5 - 15 Frequent
- 16 - 40 Frequent
CONFLICT POTENTIAL...

- Not perfect
- Statewide inputs falling short around ranch
- Overall makes sense
MANAGEMENT ZONES

According to BRAT:

- 89% of Curtis Creek has Restoration Potential
- 94% of Rock Creek has Restoration Potential
• What more could beaver do?
  – 36 to 88 more dams in Curtis
  – 76 to 207 more dams in Rock Creek
WITHIN EACH UDWR REGION

For example, Northern Region

<table>
<thead>
<tr>
<th>Region</th>
<th>E</th>
<th>P</th>
<th>Stream Length</th>
<th>Dam Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern</td>
<td>47,049</td>
<td>71,270</td>
<td>6223 km</td>
<td>Stream Length 5220 km</td>
</tr>
<tr>
<td>Southeastern</td>
<td>31,716</td>
<td>46,216</td>
<td>5220 km</td>
<td>Stream Length 5201 km</td>
</tr>
<tr>
<td>Central</td>
<td>40,276</td>
<td>55,627</td>
<td>4051 km</td>
<td>Stream Length 5546 km</td>
</tr>
<tr>
<td>Northern</td>
<td>45,774</td>
<td>59,922</td>
<td>5546 km</td>
<td>Stream Length 5503 km</td>
</tr>
<tr>
<td>Statewide</td>
<td>62,557</td>
<td>88,241</td>
<td>27,345 km</td>
<td>Stream Length 226,939</td>
</tr>
</tbody>
</table>

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

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

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)
TAKE AWAYS...

- The impacts of their dam building are what have the biggest feedbacks on:
  - Hydrology (timing & magnitude)
  - Hydraulics (flow depth & velocity)
  - Water Quality (temp & chemistry)
  - Geomorphology (landforms left behind)
  - Habitat for a plethora of aquatic, riparian & upland biota (flora & fauna)
EXISTING BEAVER DAM CAPACITY

- Western Box Elder BRAT:
  - Max Capacity: \(~ 4644 \) dams
  - Over 642 km of streams

Avg. Max Density: 7.2 dams/km
HISTORIC BEAVER DAM CAPACITY

- Western Box Elder BRAT:
  Max Capacity: ~ 6305 dams
  Over 642 km of streams

  Avg. Max Density: 9.8 dams/km
• Very conservative estimate
• Probably far, far less...
POTENTIAL MANAGEMENT ZONES

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)
CLIP DOWN TO JUST AREAS WITH BEAVER RESTORATION POTENTIAL

Max Capacity:
~ 2,550 dams
Over 204 km of streams

Avg. Max Density: 12.5 dams/km
WHERE COULD WE GET THOSE GUYS?

Max Capacity:
~ 1717 dams
Over 244 km of streams

Avg. Max Density: 7 dams/km