

# Beavers on the Landscape: Using Tribal Knowledge and Science to Restore Streams and Floodplains

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Columbia Gorge Fisheries  
and Watershed Science  
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# Project Goals

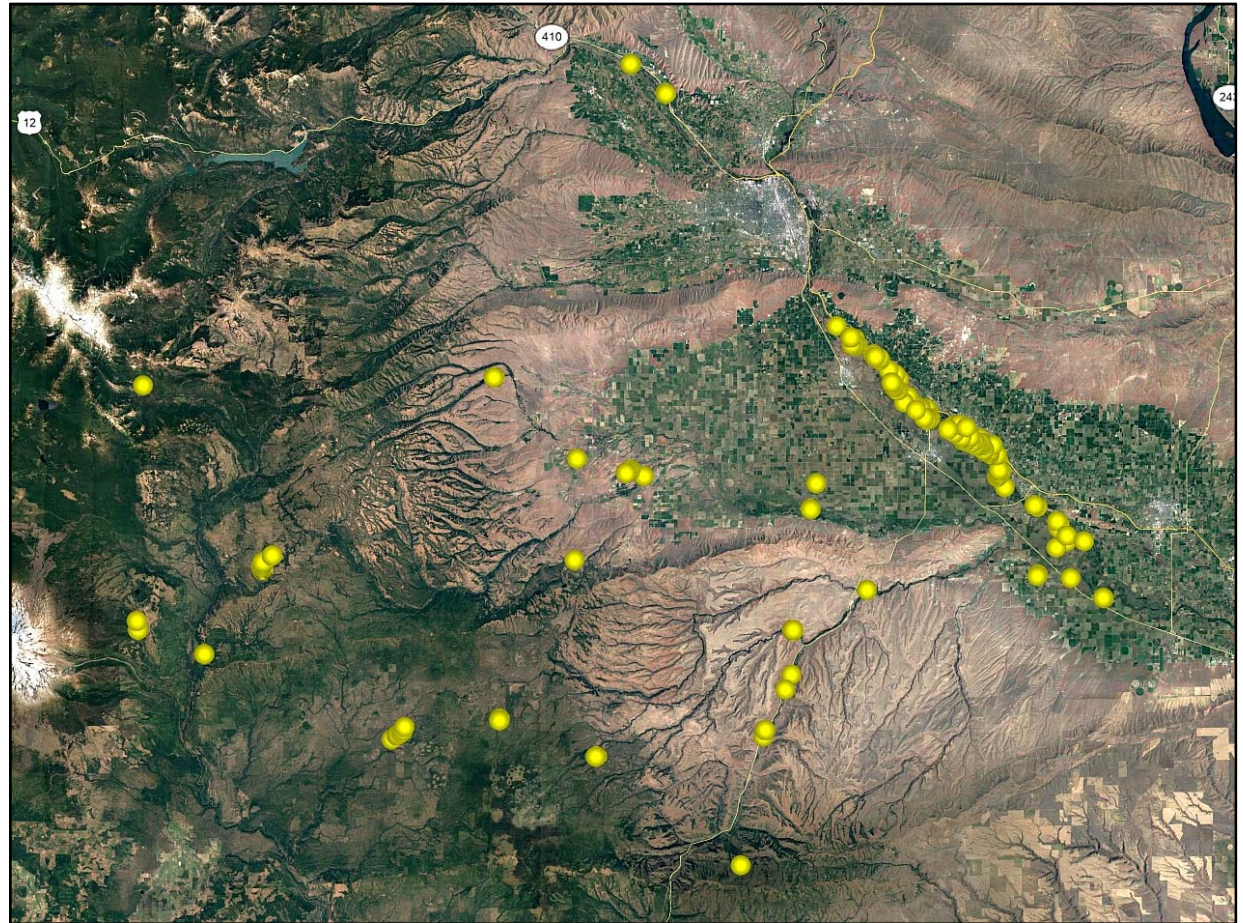
- Restore hydrological connection between channel and floodplain-inundation frequency and duration
- Increase area and quality of wetland and riparian habitat-ponding, complex habitat mosaic, meadows
- Increase beaver population in headwater streams
- Increase water quality and, potentially, quantity locally and downstream
- Develop low-cost restoration methods for smaller streams and meadows





# Benefits of Beaver Dams- Habitat

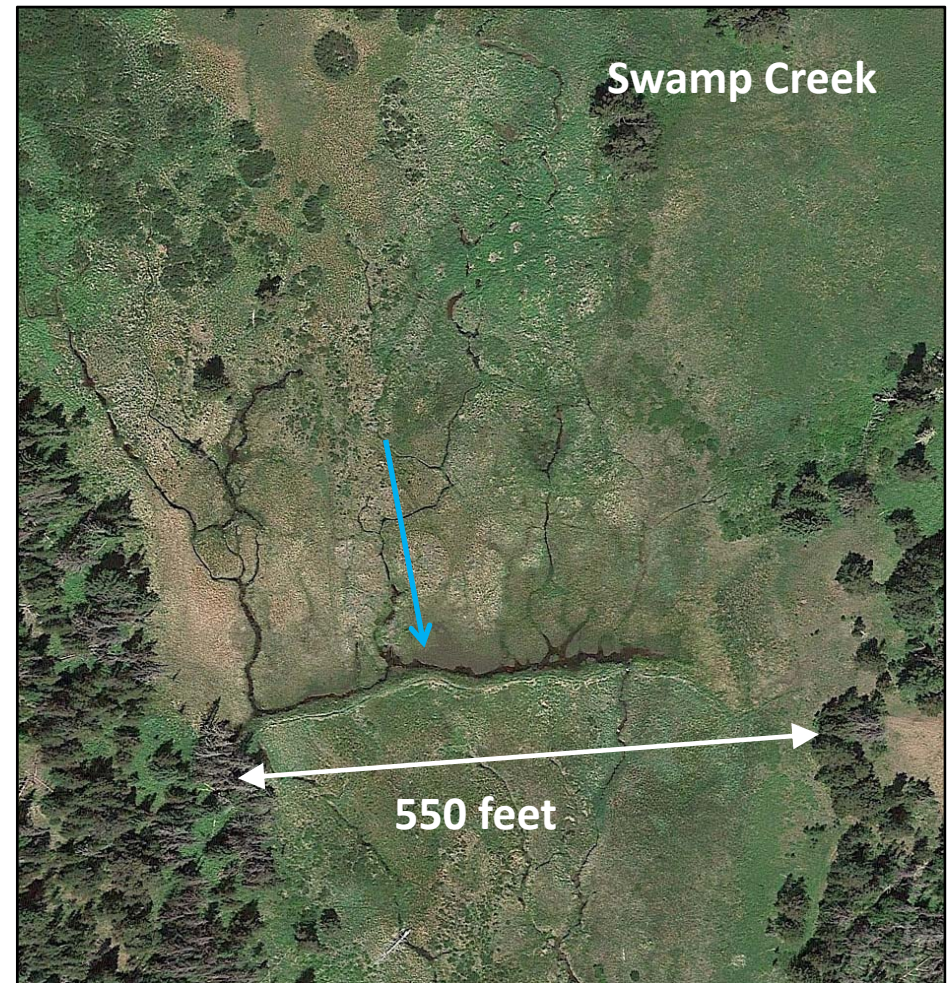
- Restore hydrological connection between channel and floodplain-inundation frequency and duration
- Increase area and quality of wetland and riparian habitat-ponding, complex habitat mosaic, meadows
- Increase beaver population in headwater streams
- In large rivers, increase side channel habitat quality and diversity





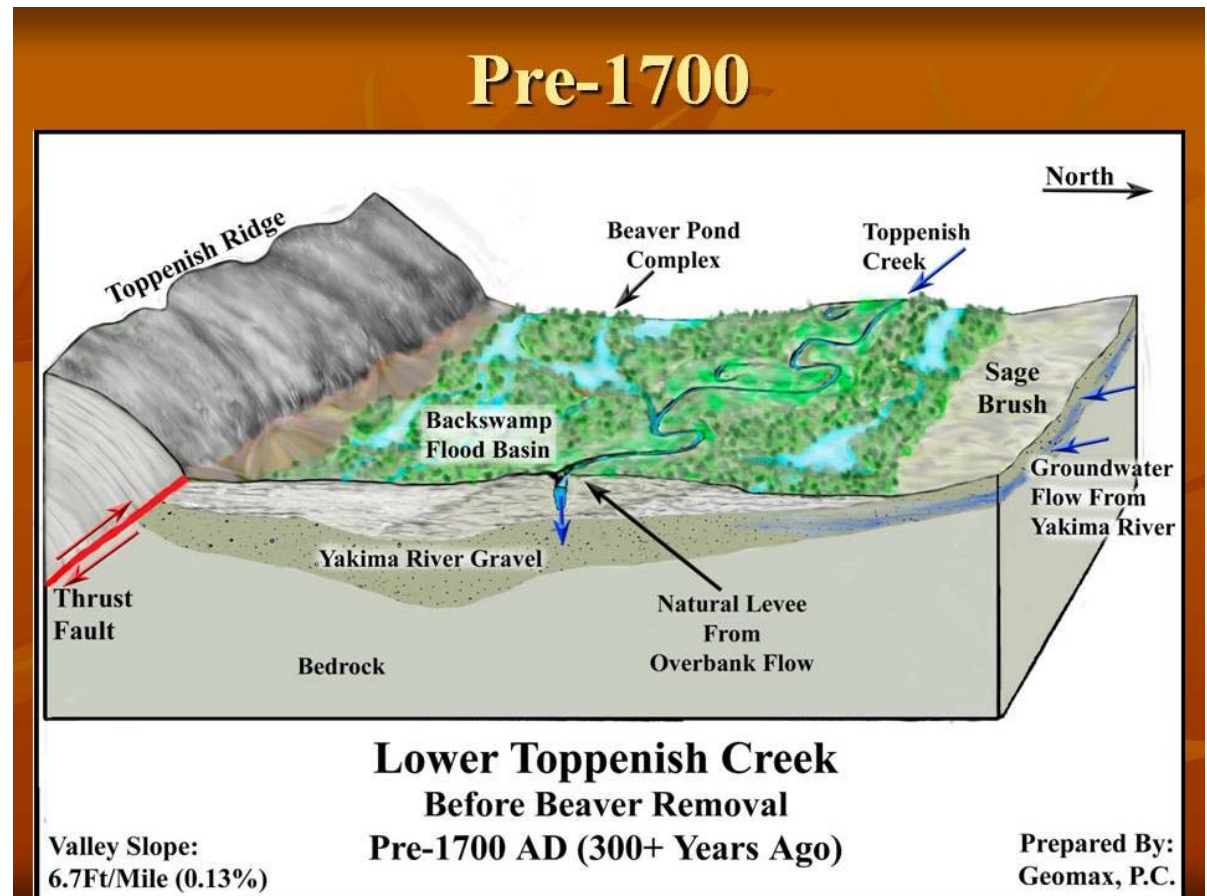
# Benefits of Beaver Dams- (Eco)Hydrology

- Reduce flood peaks by holding water in ponds and spreading onto floodplain
- Increase groundwater storage, raise water table supporting higher plant productivity (ET)
- Improve water quality-sediment, thermal complexity, contaminants
- Potentially increase summer low flows-still no high quality studies on this question



# Tribal Knowledge- Values and Ecosystem Function

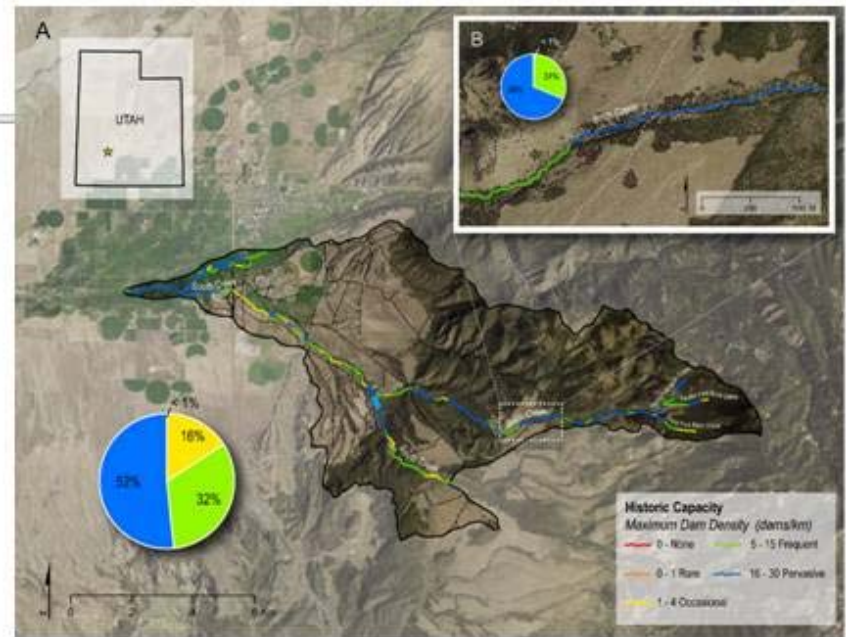
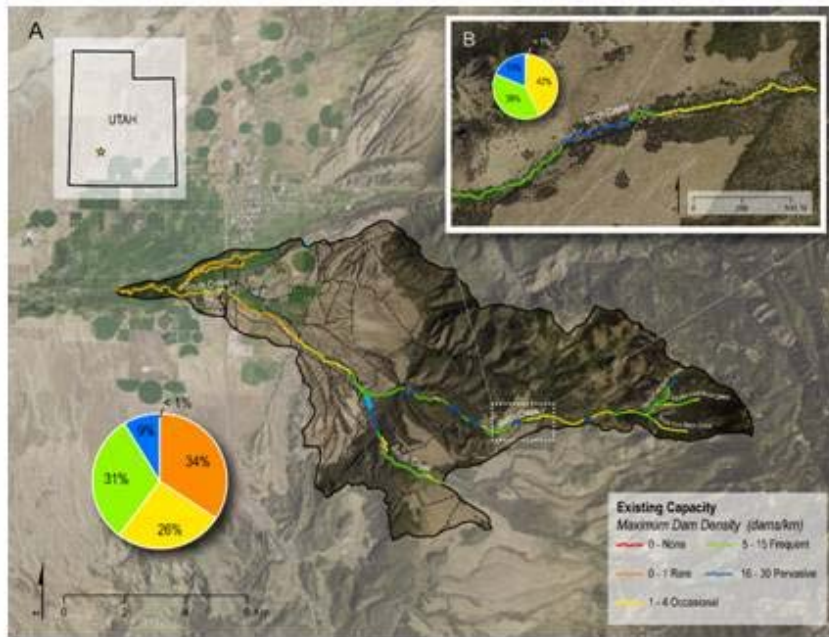
- Elders and other tribal members remember more dams and beavers on the landscape
- References to specific locals: “Beavers used to run Toppenish Creek”, beavers along Dry Creek before overgrazing
- Cultural plants in meadows being lost, perhaps because of reduced beaver dams
- Guide us in what to do (bring back beavers) and where



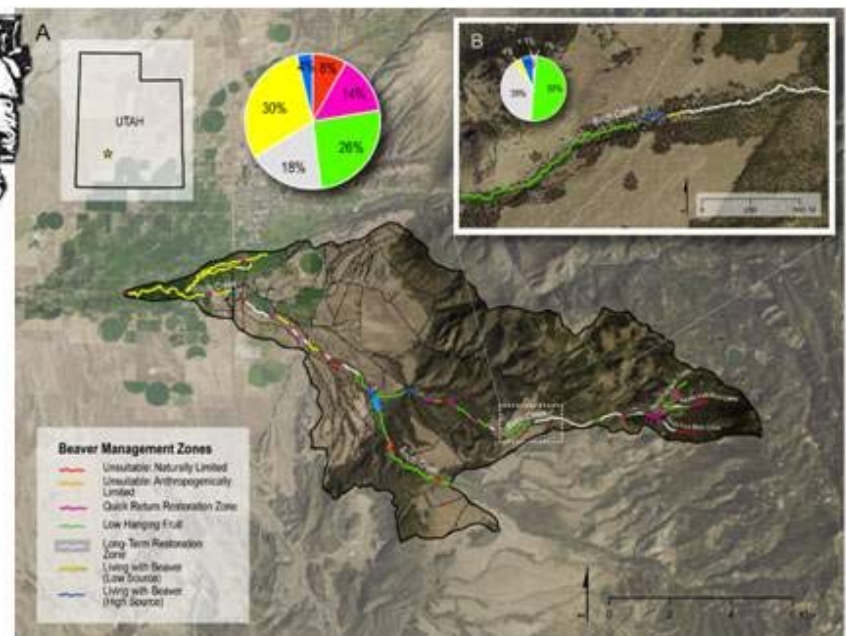
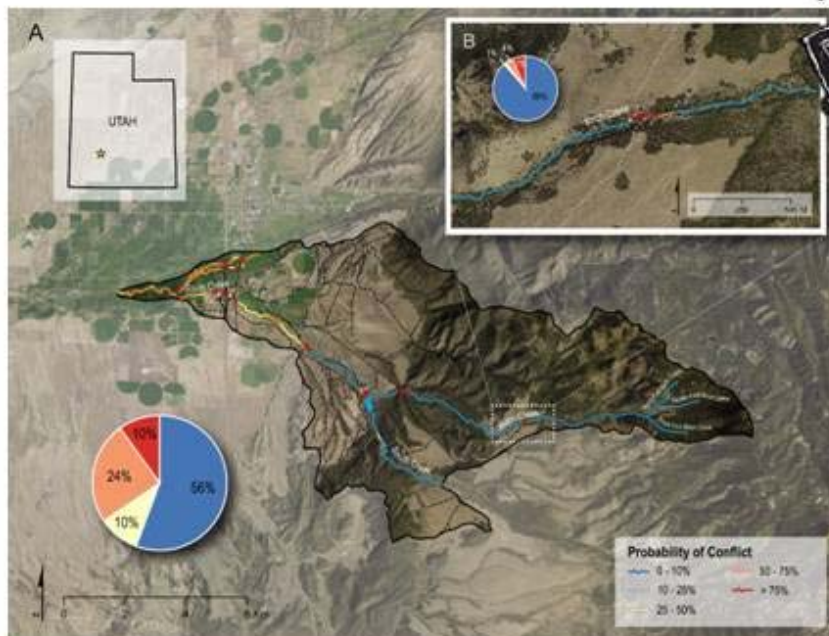
# Scientific Support- Modelling, Assessments, Monitoring

- BRAT (Beaver Restoration Assessment Tool)
- Mapping of beaver dams
- Meadow assessment in 2011
- Meadow Vulnerability Assessment in 2018
- Adaptive approach-need to monitor in cost-effective manner





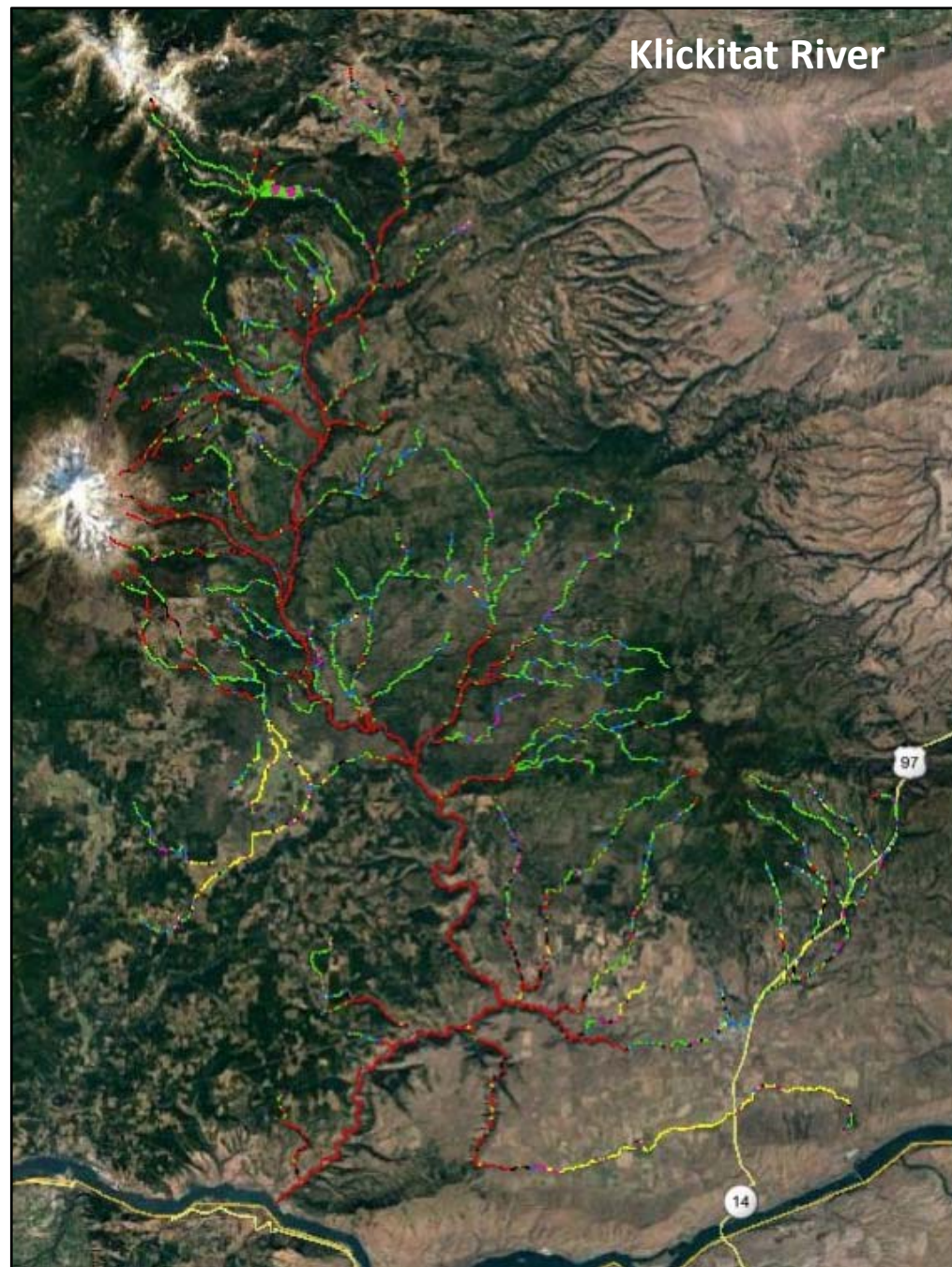
Collectively, this is the BRAT MacFarlane et al 2018





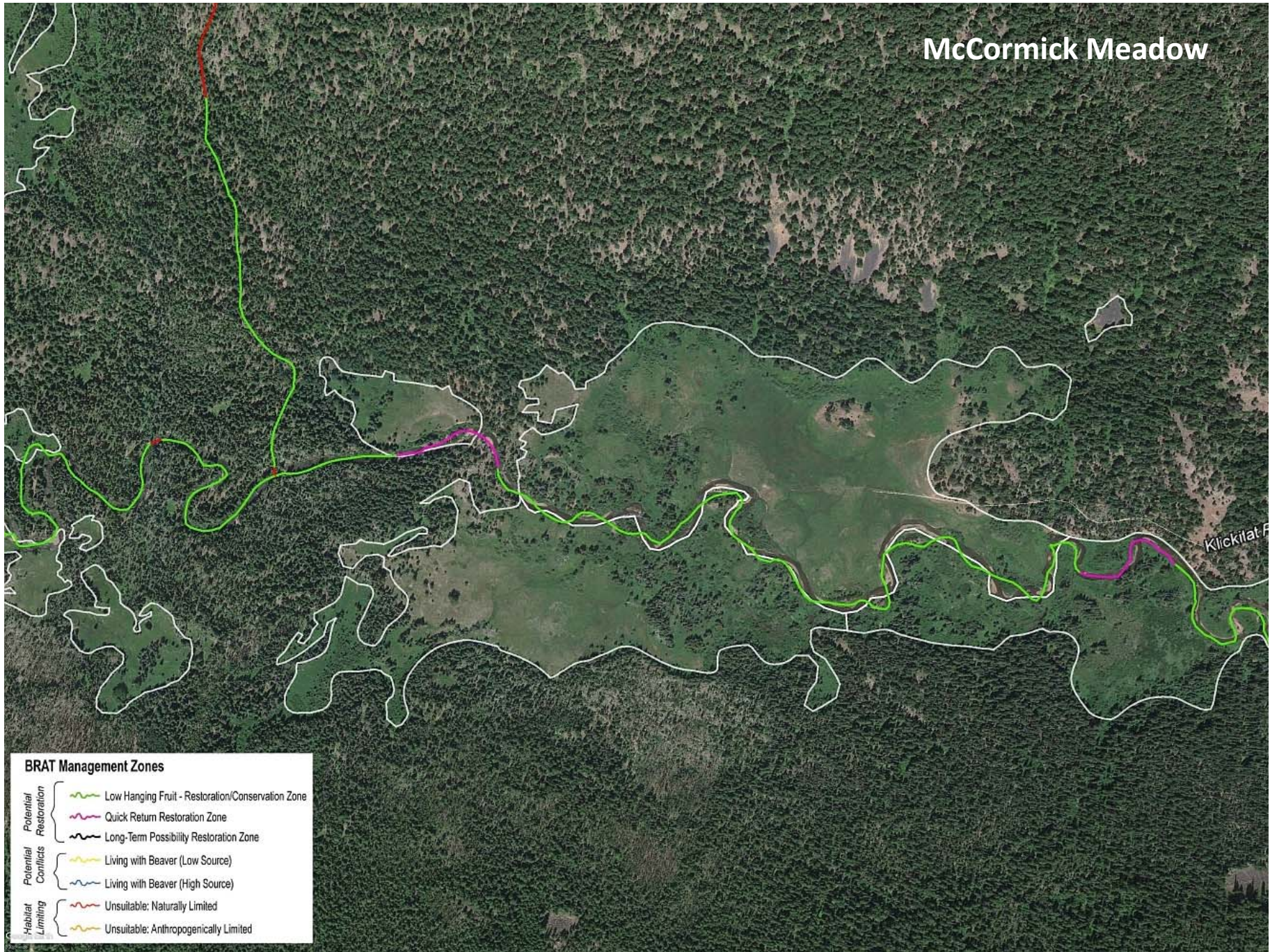
# Implementation

- Using Tribal knowledge and science assess general locations- Medicine Valley, Dry Creek, Upper Klickitat, etc
- Select sites using input from models, assessment, and staff knowledge-preference for focusing on watersheds
- Choose areas where restoration can be efficient and sustainable: low grazing pressure, suitable site conditions...
- Implement and monitor. Pre-monitor where possible.





# McCormick Meadow

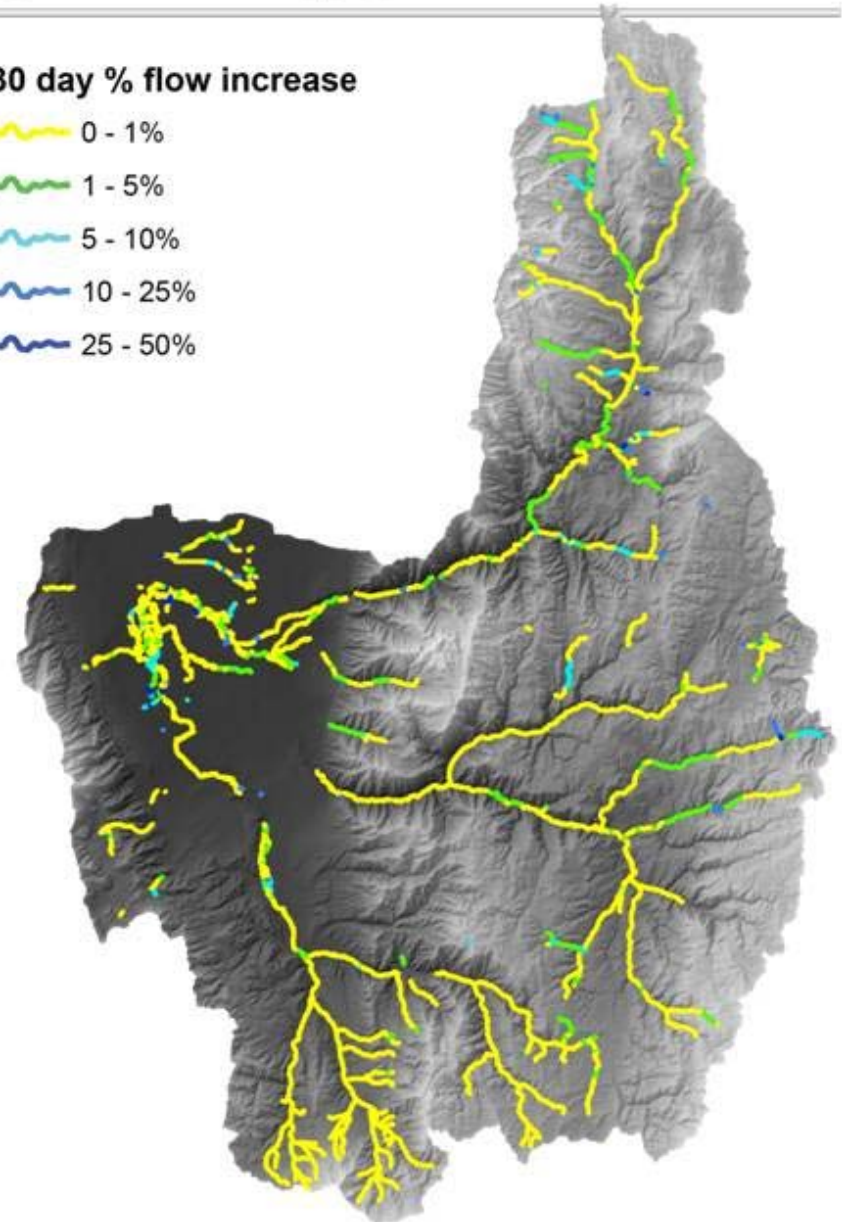
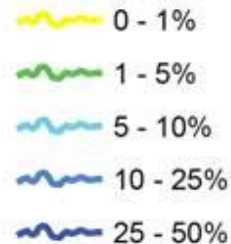




# SPATIAL ESTIMATES OF MEASUREABLE FLOW INCREASE

- Upstream Beaver Dam Storage  
*Volume of baseflow over 30 days*
- Relative to base flow
- Largest changes in headwater streams with high capacity
- Spatial differentiation on a reach-by reach basis of where beaver dams might make a *measurable* hydrologic difference

30 day % flow increase



From Hafen (2017)

MacFarlane et al 2018



# Categories of Beaver Restoration Approaches

- Passive actions that protect beaver
  - Moratorium
  - Increased regulation/lower limits
  - Grazing deferment
- Actively transplant beavers into areas with few or no beaver but high potential
- Active habitat manipulation to mimic beaver activity
  - Beaver Dam Analogs
  - Bank attached structures
  - Choke Structures, etc.

# Active Translocation

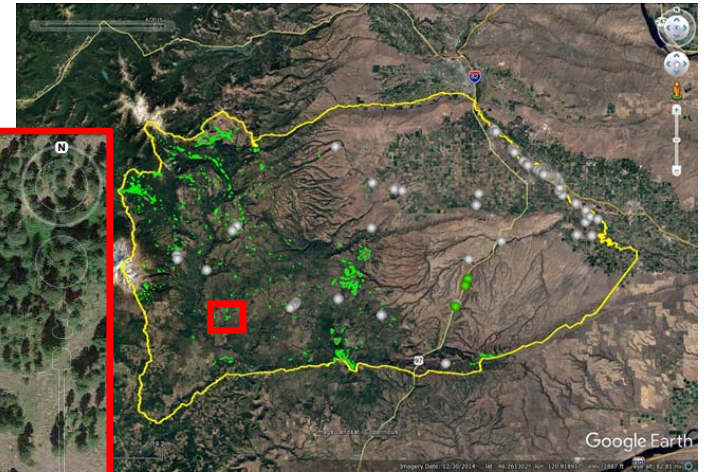
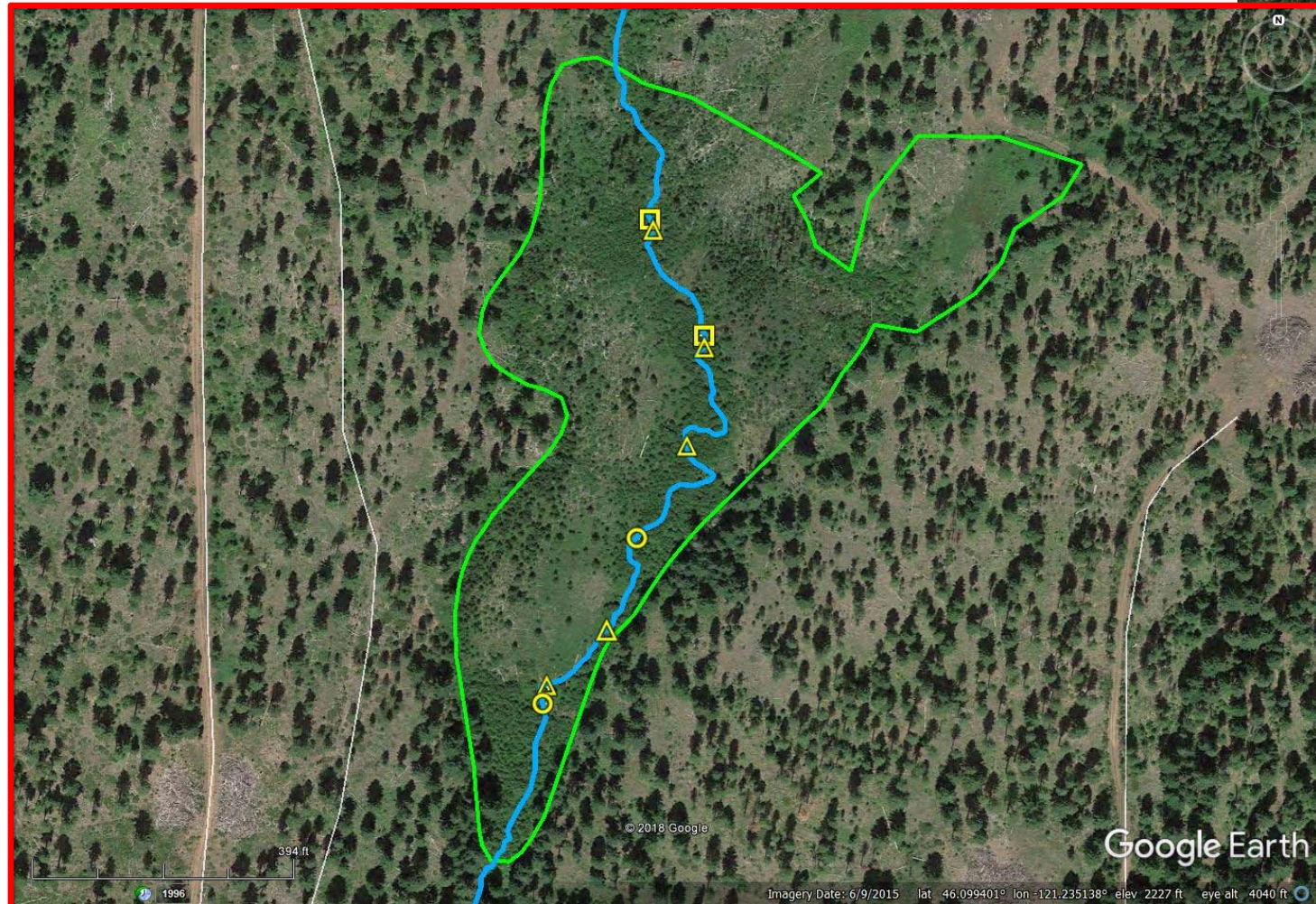
- Capture and “Hard” Release
  - Often “nuisance beavers” of the ages 1-2 years old
- Capture, Hold, and “Soft” Release
  - Often mature pairs and young
- Prepare site (BDAs) then begin translocation
  - Sites that have some limiting factors (e.g., lack of pools) but high potential
  - Example: Proposed South Fork Simcoe Creek Project



# Proposed Projects for 2018-19

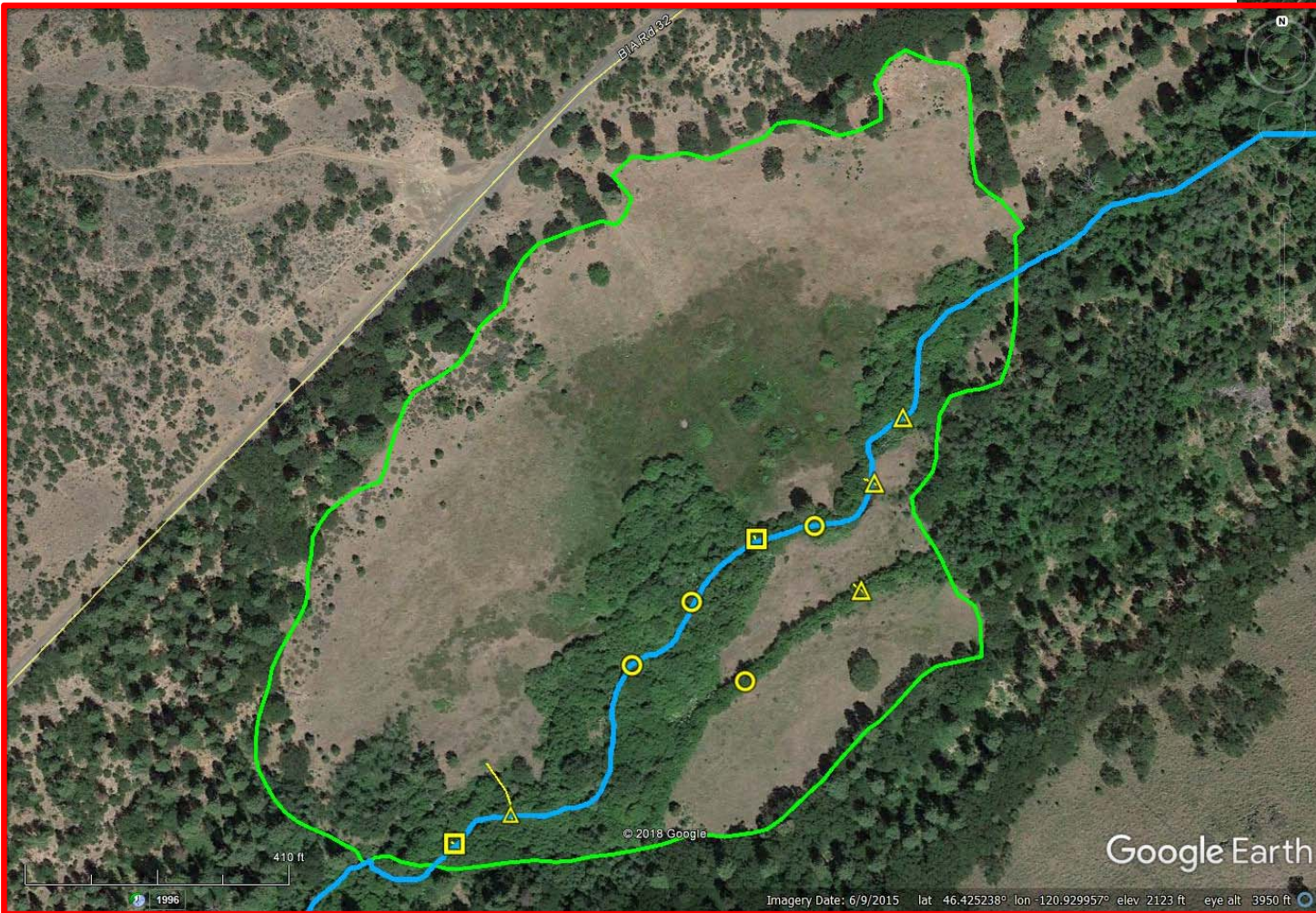
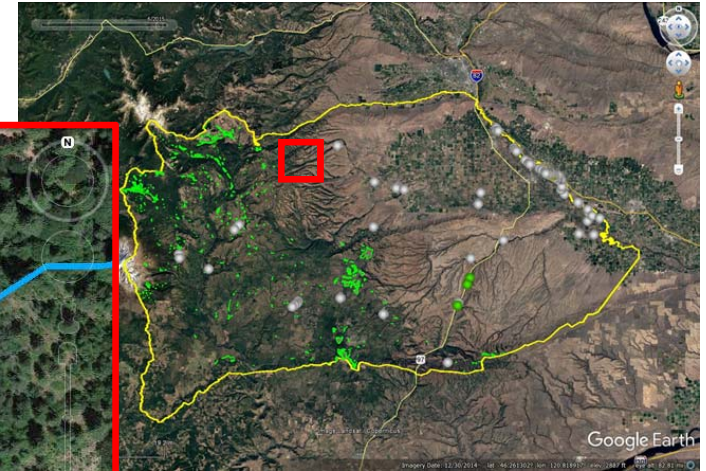
- Restore 2-3 sites in 2018
  - Bear Creek
  - South Fork Simcoe Creek
  - South Fork Dry Creek
- Funding is through the NRCS' Resource Conservation Partners Program (RCCP)

# Bear Creek



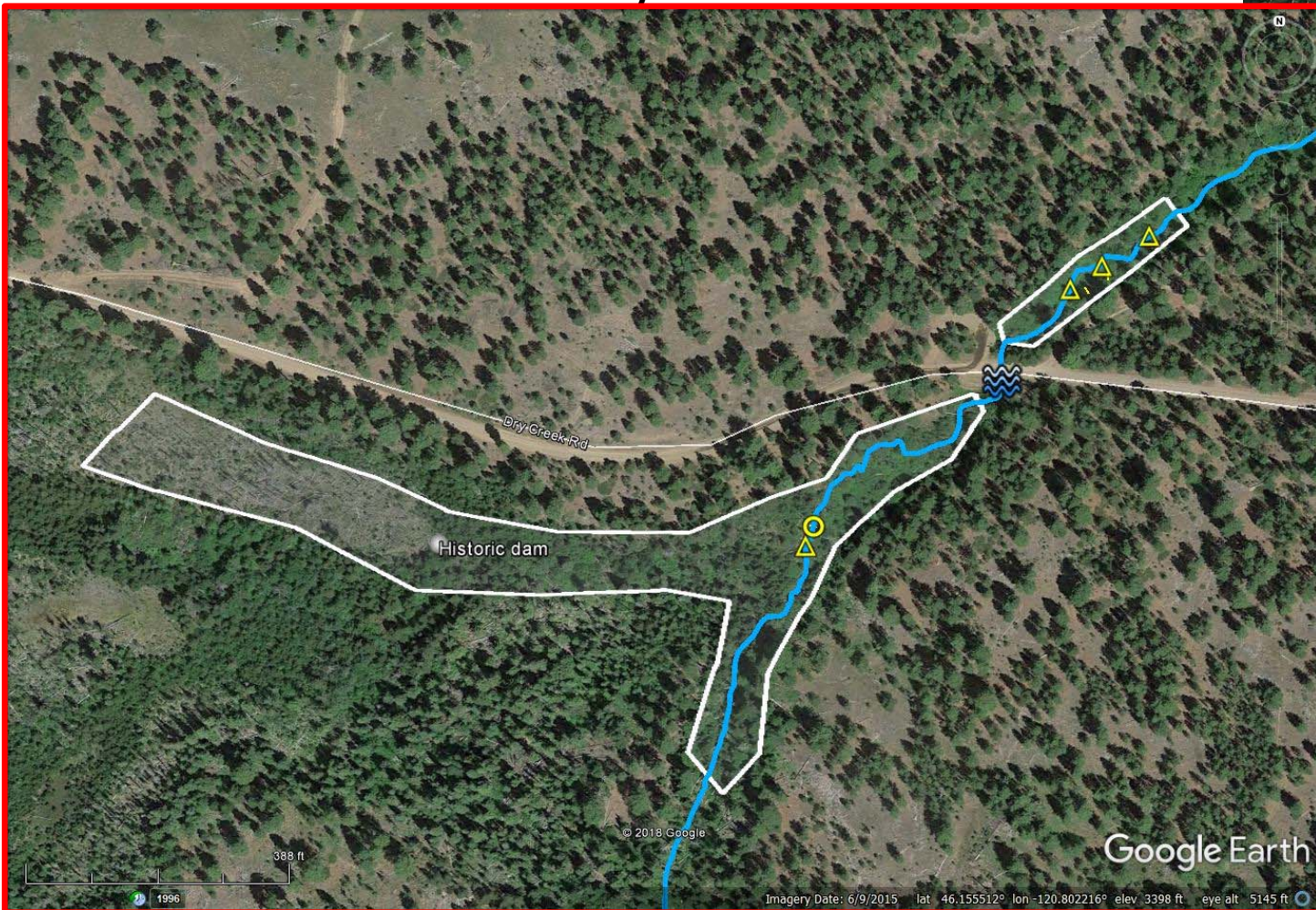
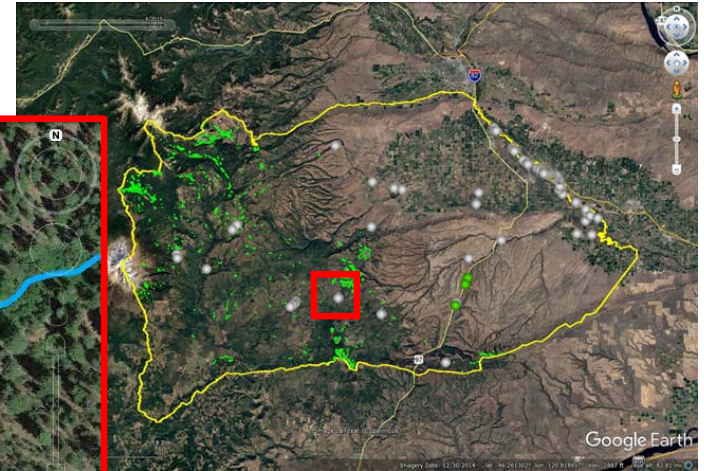


# South Fork Simcoe Creek





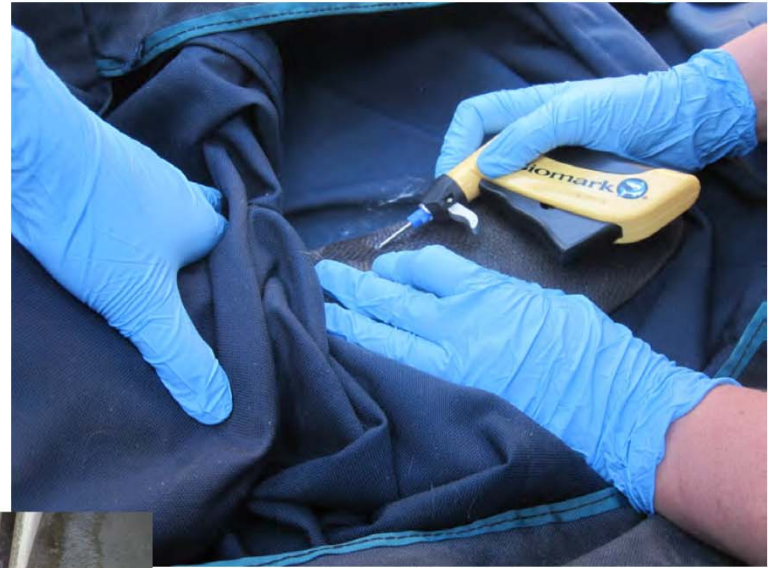
# South Fork Dry Creek







Step 1



Step 2

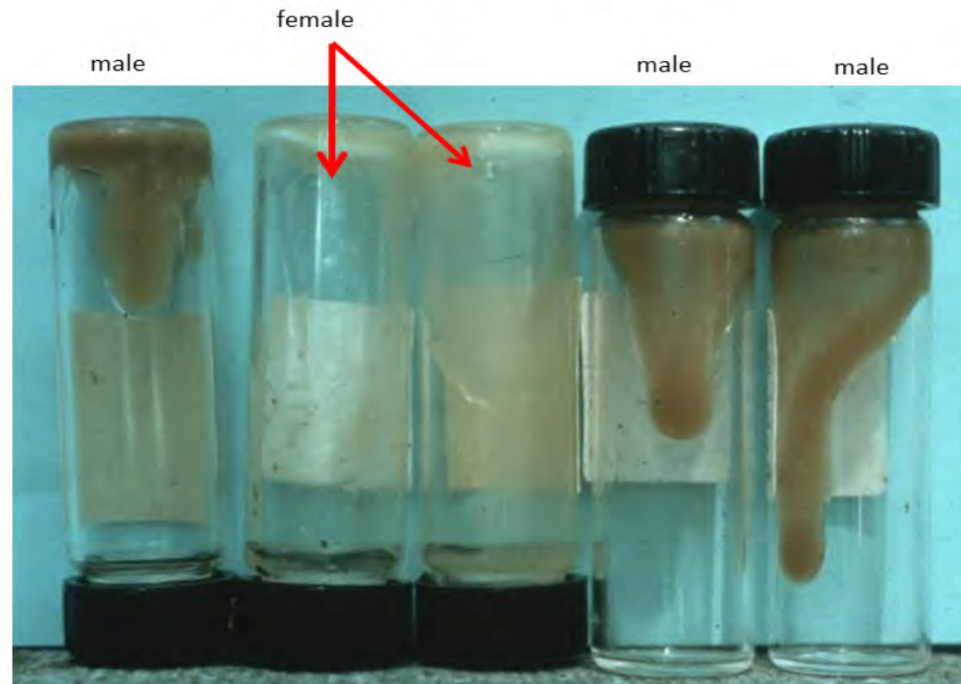


Step 3





## Beaver Oil Gland Secretions



Female:  
Viscosity is more runny  
Color is creamy tan  
Smells like bleu cheese

Males:  
Viscosity is more thick  
Color is caramel brown  
Smells like oil/diesel

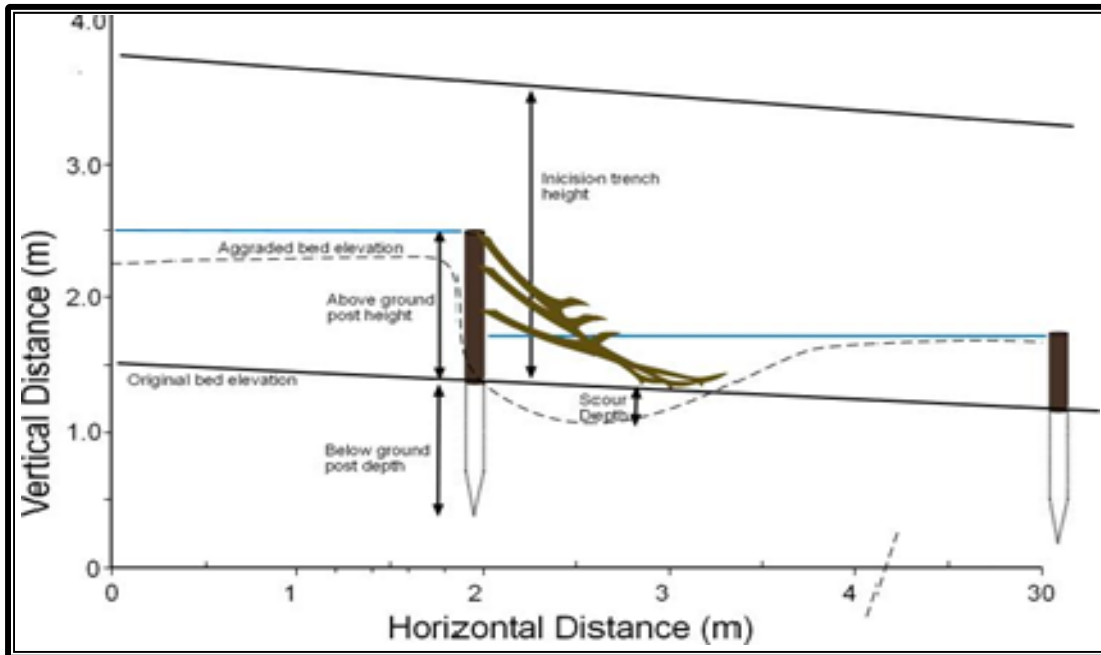


Holding Facilities

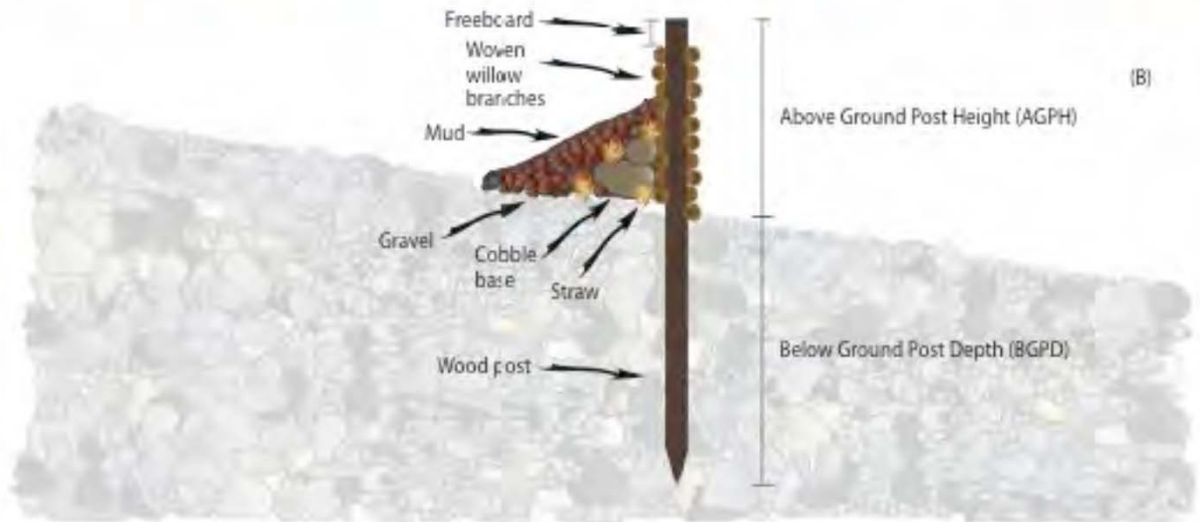
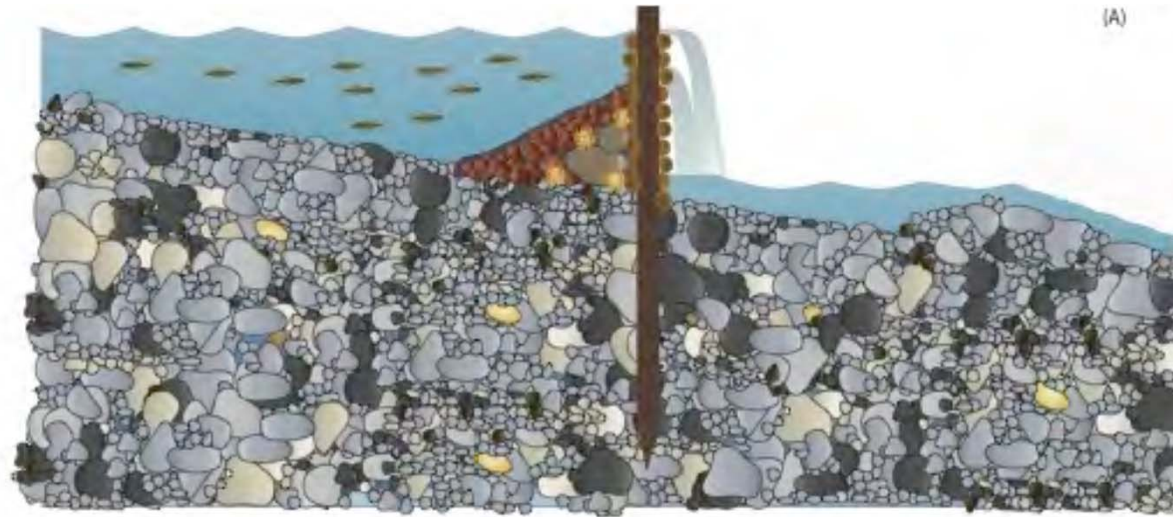
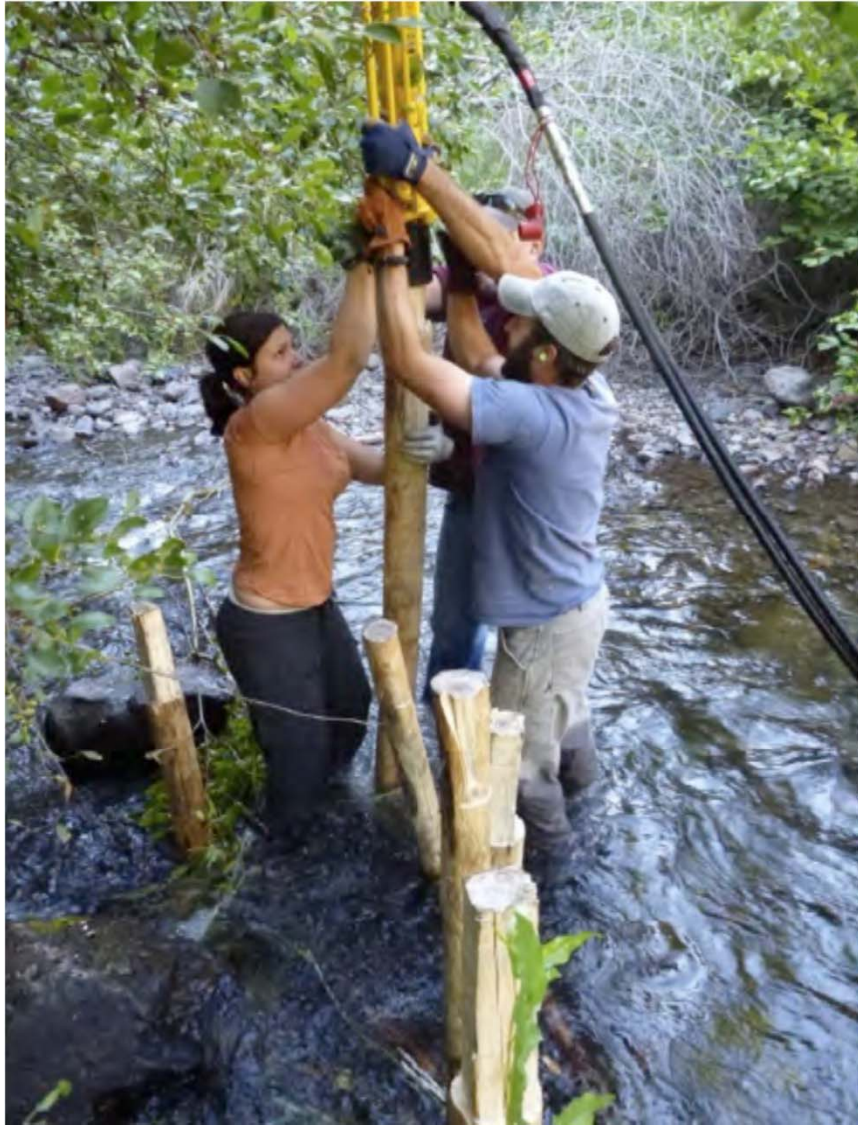




# Beaver Dam Analogues









For Official Use Only: Notes on Site Use

LOC: 46 11 73.8  
121° 15' 22.0"

Yakima Beaver Project

Release Site Score Card # \_\_\_\_\_ Date \_\_\_\_\_ Observer JB/YM

Site ID (Creek) Suswap Creek W&E Subwatershed 7

GPS Coordinates-UTM (NAD 83) 634556 5117290 2546 ELEV.

Location Description FLOOD PLOT IN SIDE POOL TREES FELLED BETWEEN MAIN CHANNEL & POOD CACHE POND. BEAVER(S) HAVE SIDE CHANNELS AND POOLS. LARGE WOODY DEBRIS IN CHANNELS.

- Please circle answers, then fill in the points
- Stream Gradient of the defined habitat unit  
 5. 5-9%     3. 4-6%     1. 7-9%     0. 2-3%  
 \* DOES NOT CHEW ON VINE MAPLE THAT IS PLENTIFUL BESIDE POOD CACHE POND. LARGE ALDER FELLED THEN CUT IN HALF AND LEFT LYING.
  - Stream Flow  
 5. Garden hose     5. Fire hose     -3. Unwadeable
  - Do you predict there will be year-round stream flow?  
 3. Yes     -5. No     0. Unsure
  - Average Stream Depth  
 1. Over sneaker     5. Over knee-high boots     -3. Over waist
  - Habitat Unit Size (stream length)  
 5. Extensive stretch of the stream     1. Small isolated pocket
  - Woody Food  
 a.  3. Aspen, Cottonwood, Willow     2. Alder     1. Other hardwoods  
 b.  3. Within 10 meters     2. Within 30 meters     1. Within 100 meters  
 c.  3. Large amount (thousands of stems)     2. Some (hundreds of stems)     1. Little (dozens)  
 Woody food score = multiply a x b x c
  - Herbaceous Food  
 3. Grass/Forbs Present     0. No Grass/Forbs Present
  - Floodplain Width  
 5. Adjacent floodplain     0. Narrow V Channel
  - Dominant Stream Substrate  
 5. Silt/Clay/Mud     2. Sand     1. Gravel     0. Cobble     -1. Boulders     -3. Bedrock  
 (Note: Flood plot is mostly sand/silt)
  - Historic Beaver use  
 5. Old structures present     3. Some old indications     0. No indication of previous occupancy
  - Lodge and dam building materials  
 5. Variety of 1-6" diameter woody vegetation avail.     -10. No building material present
  - Are there any roads, culverts, or other damage situations that may result from flooding? (if yes, please expound on below. i.e., how far away is a culvert)  
 -3. Yes     0. No  
 (Note: Culverts are marked in Suswap)

There are 7 big culverts on site channel (25') and a culvert on main channel (10')

