Overcoming Common Barriers to Beaver Restoration & Beaver Dam Analog Work on Public Lands

Wally Macfarlane
Justin Jimenez

DOI:
10.13140/RG.2.2.22244.40323

Beaver Restoration Webinar Series

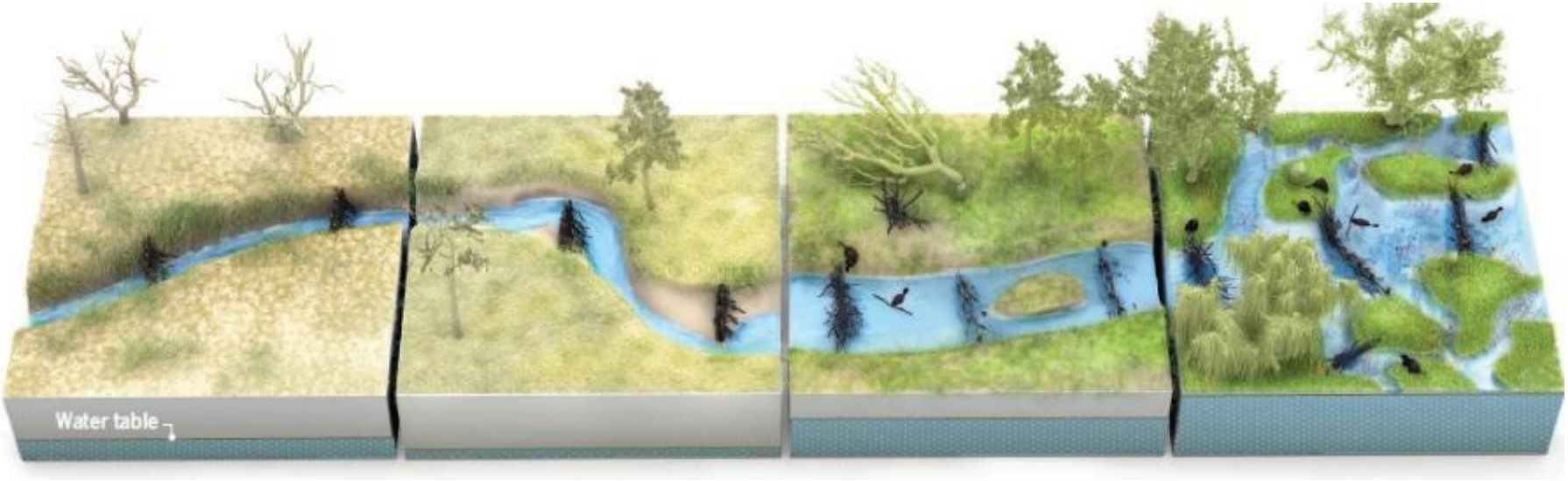
December 10, 2020

Utah State University
DEPARTMENT OF WATERSHED SCIENCES

Purpose of Webinar

Present common barriers to beaver restoration and beaver dam analog (BDA) work and provide insights on how these barriers can be overcome.

Mimic → Promote → Sustain



From Goldfarb (2018) Science:
http://science.sciencemag.org/content/360/6393/1058

- Support
- Motivation
- Partnership Development
- Project Development
- Assistance Agreement
- Program Officer
- Funding


- Opportunity exploration
-Information sharing

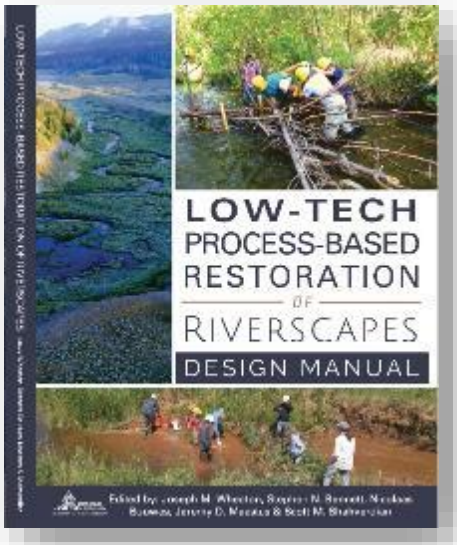
UtahStateUniversity
ECOGEOMORPHOLOGY & TOPOGRAPHIC ANALYSIS LABORATORY

FHC THE FLUVIAL HABITATS CENTER

EcoLogical Research Lab

UtahStateUniversity
RESTORATION CONSORTIUM

RIVERSCAPES CONSORTIUM



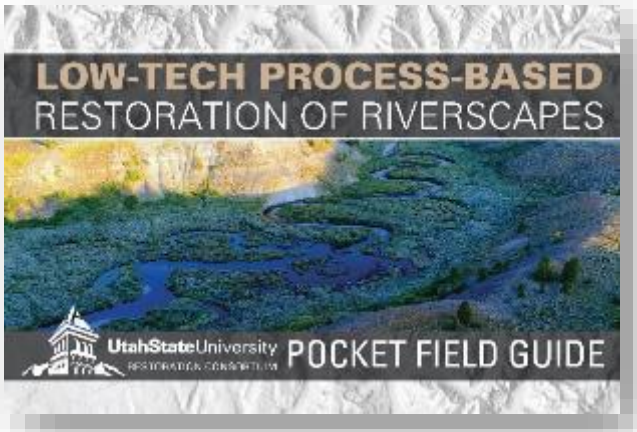
http://lowtechpbr.restoration.usu.edu

RCAT

http://rcat.riverscapes.xyz/

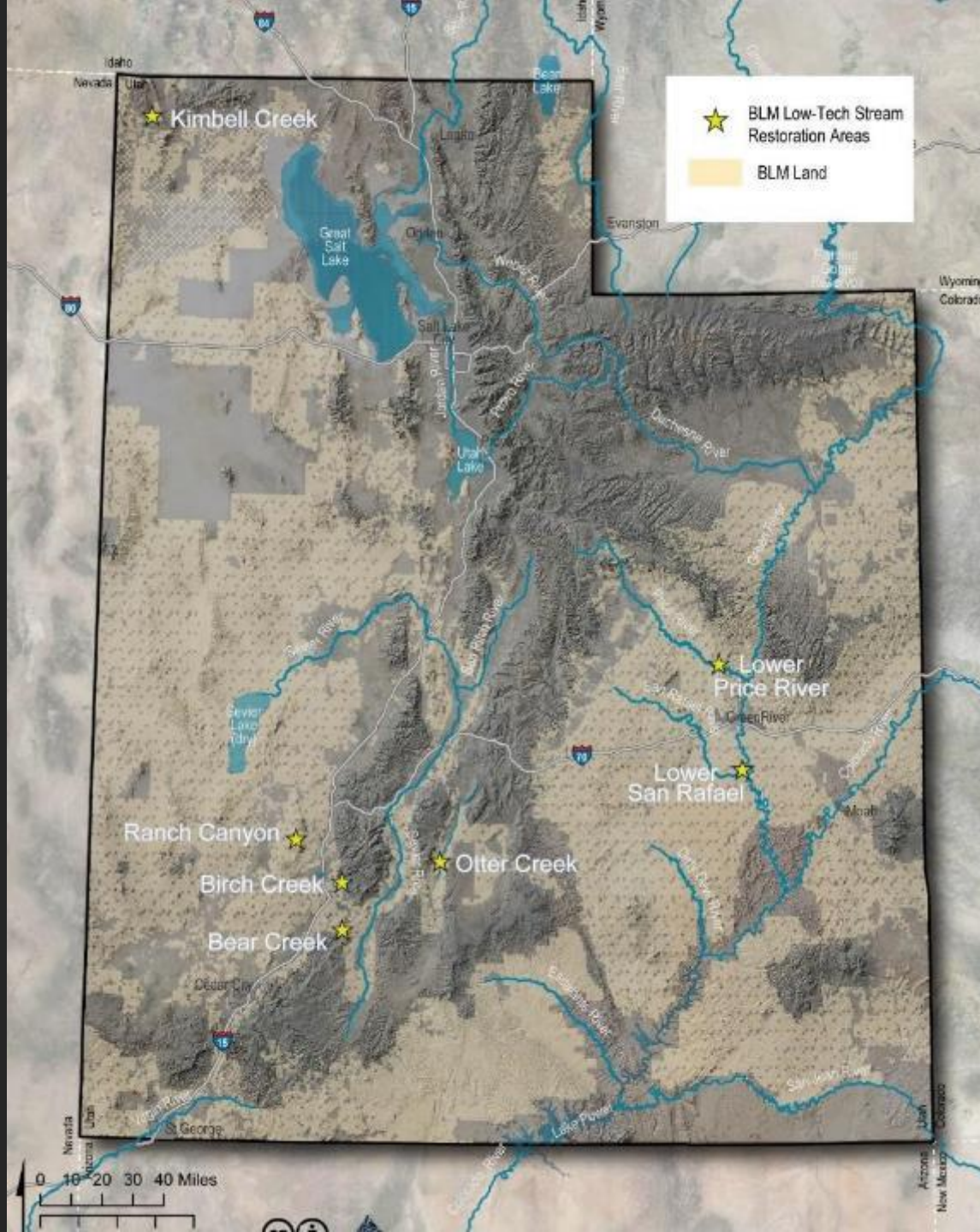
BRAT

http://brat.riverscapes.xyz/

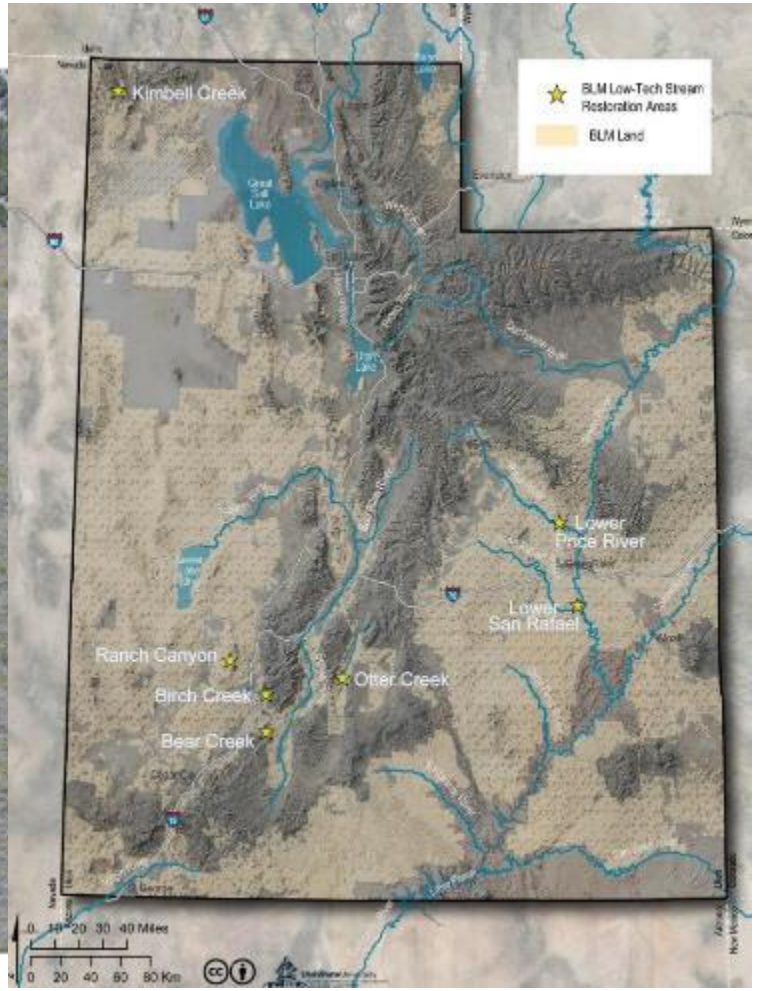


http://lowtechpbr.restoration.usu.edu

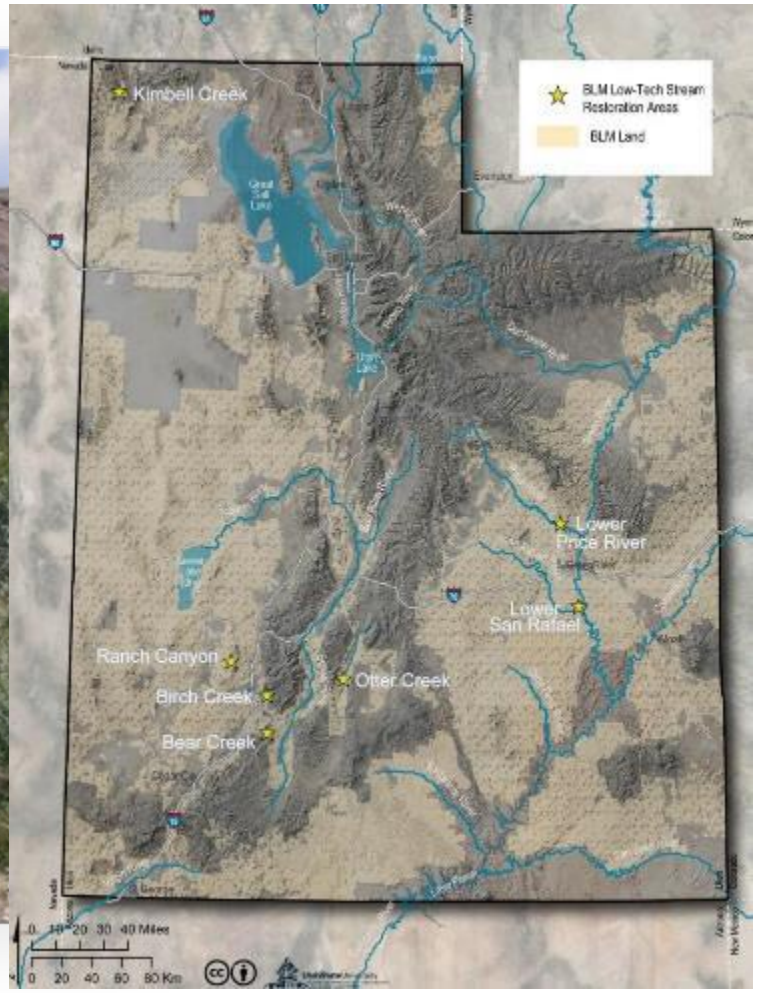
BLM Utah Partnership Restoration Projects



Kimbell Creek

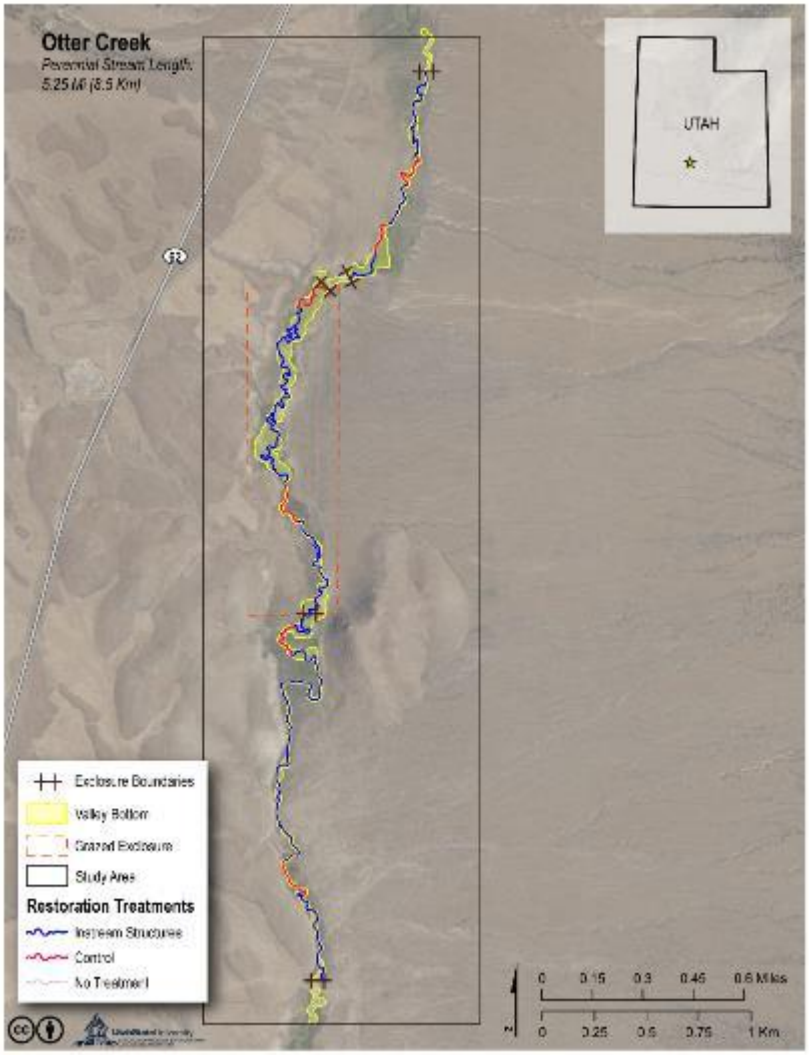


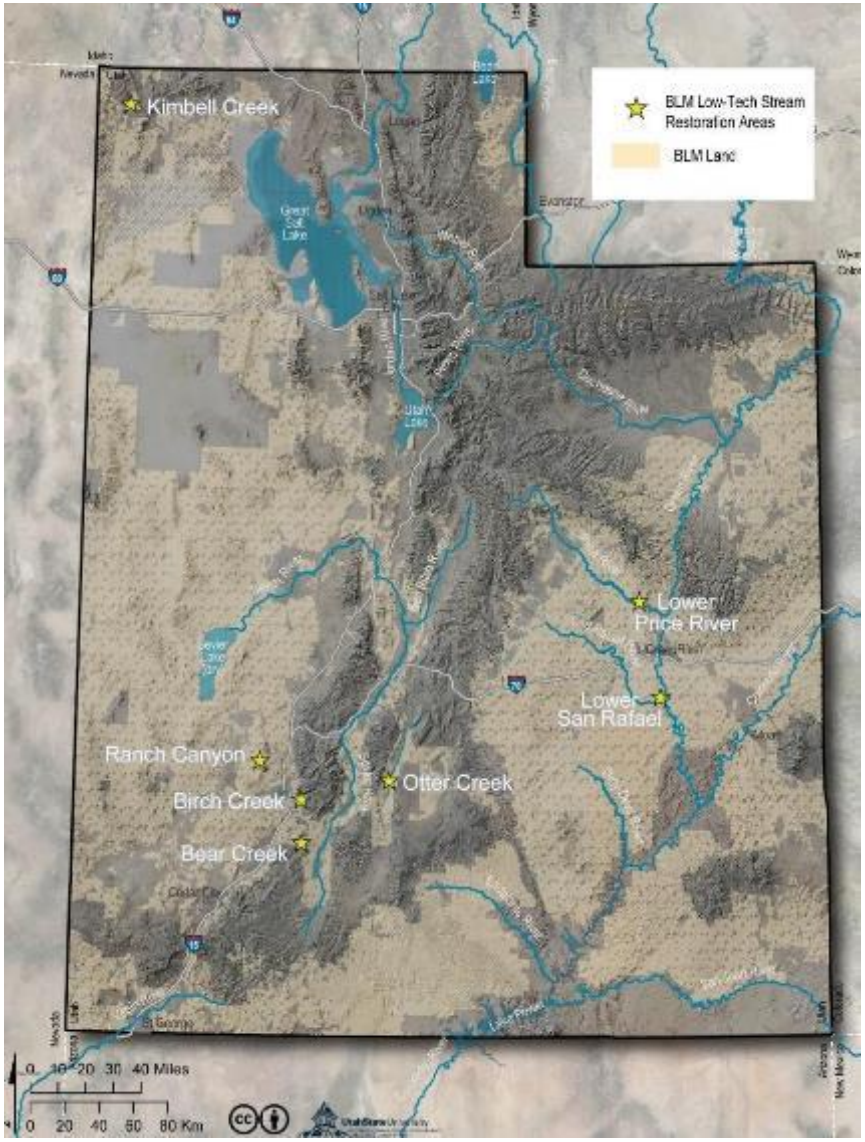
Price River


Kimbell Creek
BLM Low-Tech Stream Restoration Areas
BLM Land
Lower Price River
Lower San Rafael
Ranch Canyon
Otter Creek
Birch Creek
Bear Creek
0 10 20 30 40 Miles
0 20 40 60 80 Km

San Rafael River

Otter Creek


Otter Creek
Perennial Stream Length:
5.25 Mi (8.5 Km)
UTAH
Exclosure Boundaries
Valley Bottom
Grazed Exclosure
Study Area
Restoration Treatments
Instream Structures
Control
No Treatment
0 0.15 0.3 0.45 0.6 Miles
0 0.25 0.5 0.75 1 Km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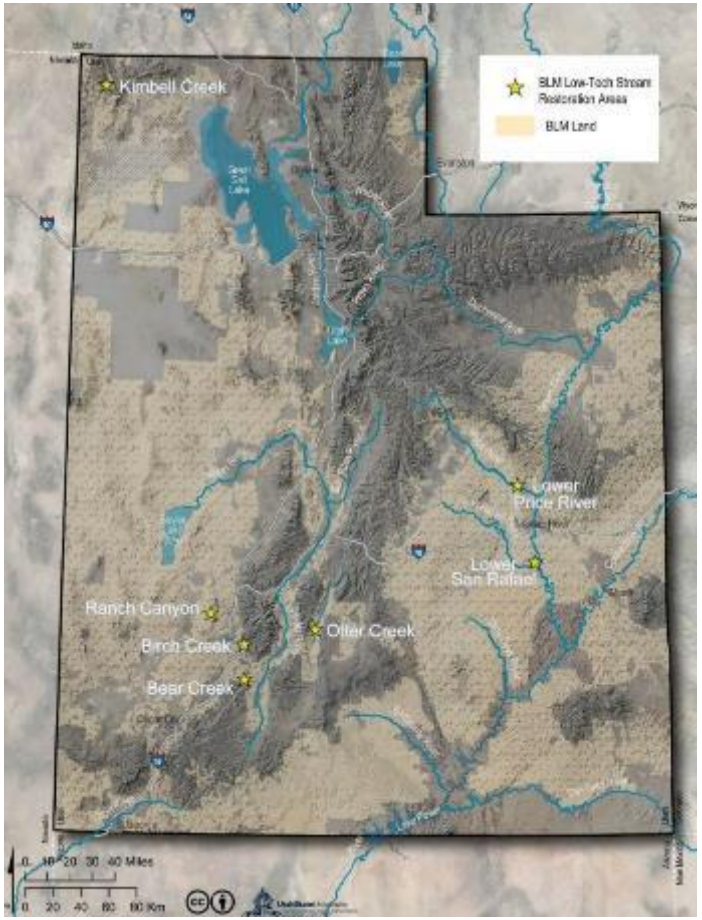
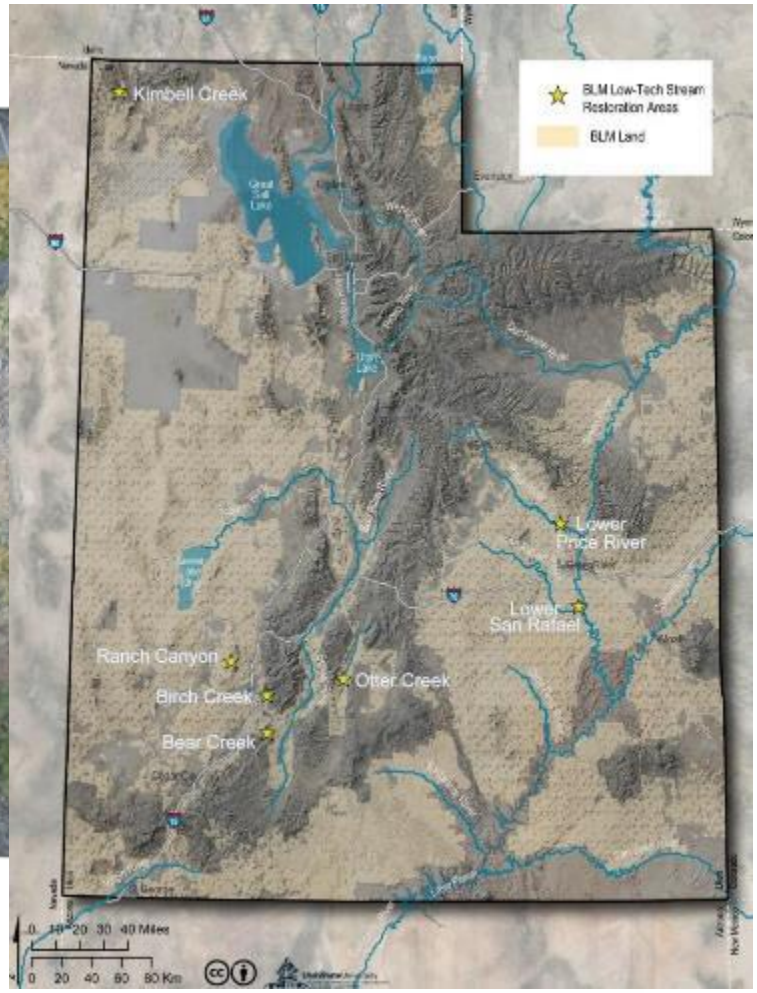
BLM Low-Tech Stream Restoration Areas
BLM Land
Lower Price River
Lower San Rafael
Ranch Canyon
Otter Creek
Birch Creek
Bear Creek
0 10 20 30 40 Miles
0 20 40 60 80 Km

Ranch Canyon Creek



Birch Creek


Flow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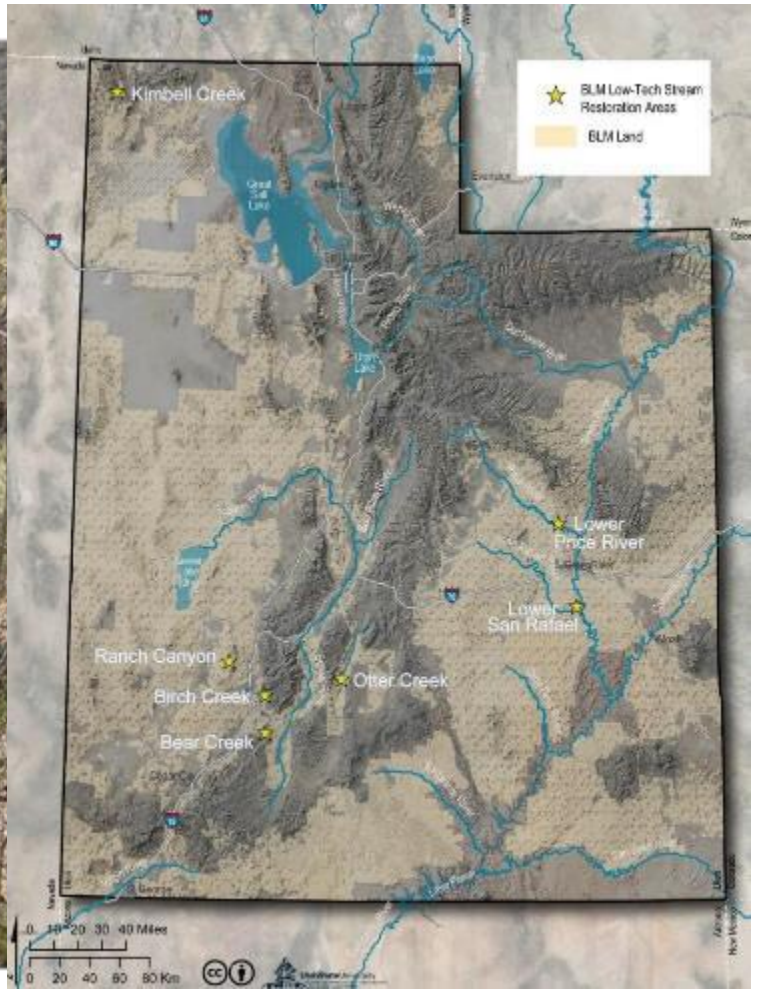
0 20 40 60 80 Km

Bear Creek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0 10 20 30 40 Miles
0 20 40 60 80 Km

Ten common barriers to beaver/BDA work

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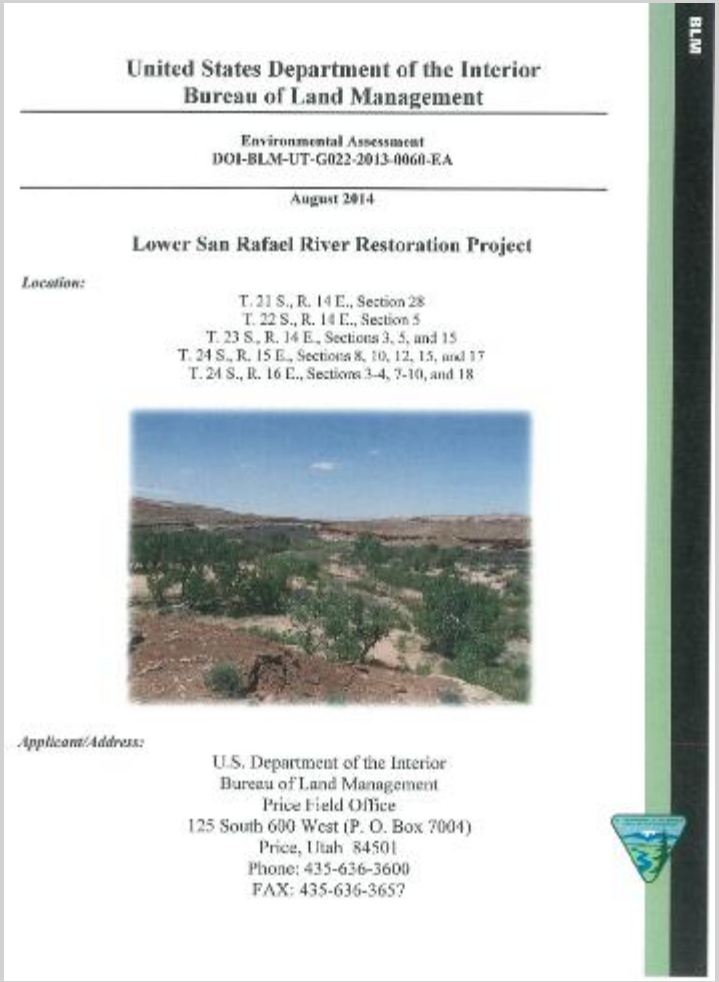
1. Regulatory Challenges: NEPA, T&E species, water rights, permits



United States Department of the Interior
Bureau of Land Management

Environmental Assessment
DOI-BLM-UT-G022-2013-0060-EA

August 2014

Lower San Rafael River Restoration Project

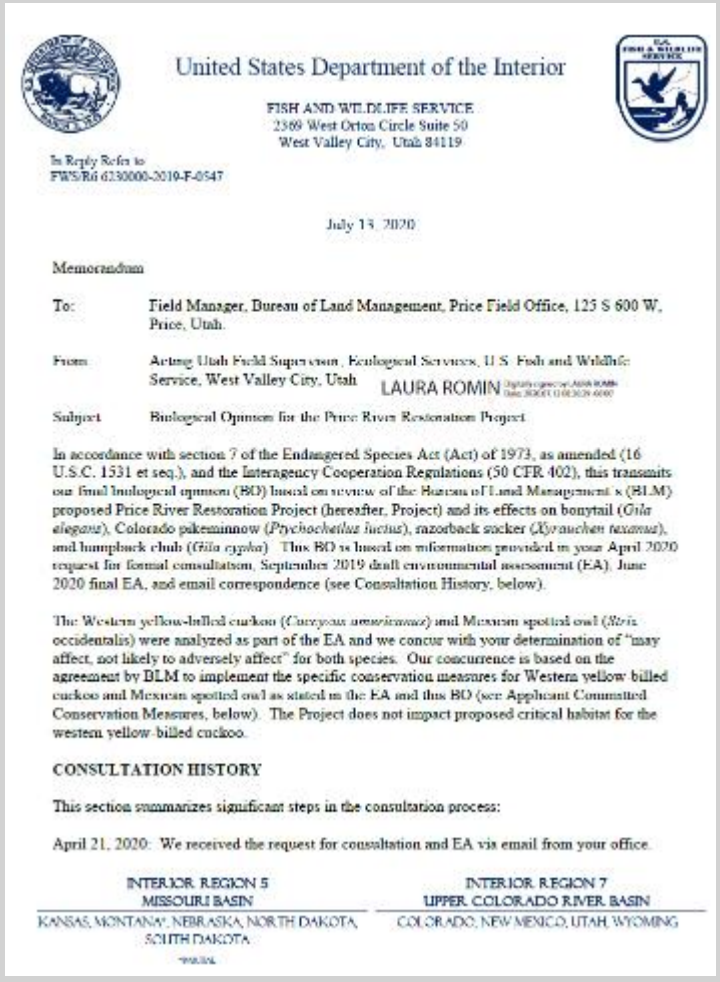
Location:

T. 21 S., R. 14 E., Section 28
T. 22 S., R. 14 E., Section 5
T. 23 S., R. 14 E., Sections 3, 5, and 15
T. 24 S., R. 15 E., Sections 8, 10, 12, 15, and 17
T. 24 S., R. 16 E., Sections 3-4, 7-10, and 18

Applicant/Address:

U.S. Department of the Interior
Bureau of Land Management
Price Field Office
125 South 600 West (P. O. Box 7004)
Price, Utah 84501
Phone: 435-636-3600
FAX: 435-636-3657

BLM



United States Department of the Interior

FISH AND WILDLIFE SERVICE
2369 West Orton Circle Suite 50
West Valley City, Utah 84119

In Reply Refer to
FWS/R6 6230000-2020-F-0547

July 13, 2020

Memorandum

To: Field Manager, Bureau of Land Management, Price Field Office, 125 S 600 W, Price, Utah.

From: Acting Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, West Valley City, Utah LAURA ROMIN

Subject: Biological Opinion for the Price River Restoration Project

In accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), this transmits our final biological opinion (BO) based on review of the Bureau of Land Management's (BLM) proposed Price River Restoration Project (hereafter, Project) and its effects on bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and humpback chub (*Gila cypha*). This BO is based on information provided in your April 2020 request for formal consultation, September 2019 draft environmental assessment (EA), June 2020 final EA, and email correspondence (see Consultation History, below).

The Western yellow-billed cuckoo (*Coccyzus americanus*) and Mexican spotted owl (*Strix occidentalis*) were analyzed as part of the EA and we concur with your determination of "may affect, not likely to adversely affect" for both species. Our concurrence is based on the agreement by BLM to implement the specific conservation measures for Western yellow billed cuckoo and Mexican spotted owl as stated in the EA and this BO (see Applicant Committed Conservation Measures, below). The Project does not impact proposed critical habitat for the western yellow-billed cuckoo.

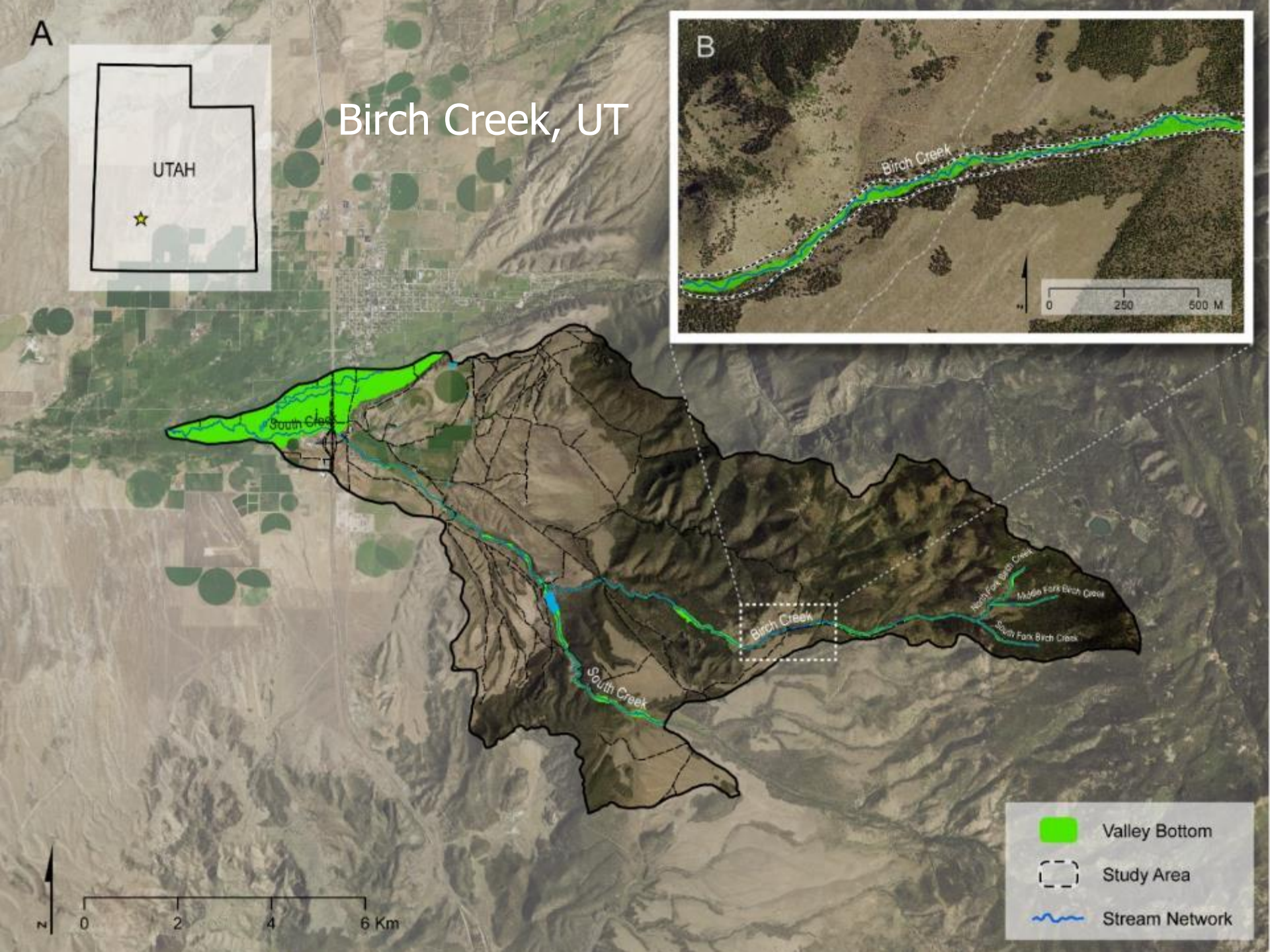
CONSULTATION HISTORY

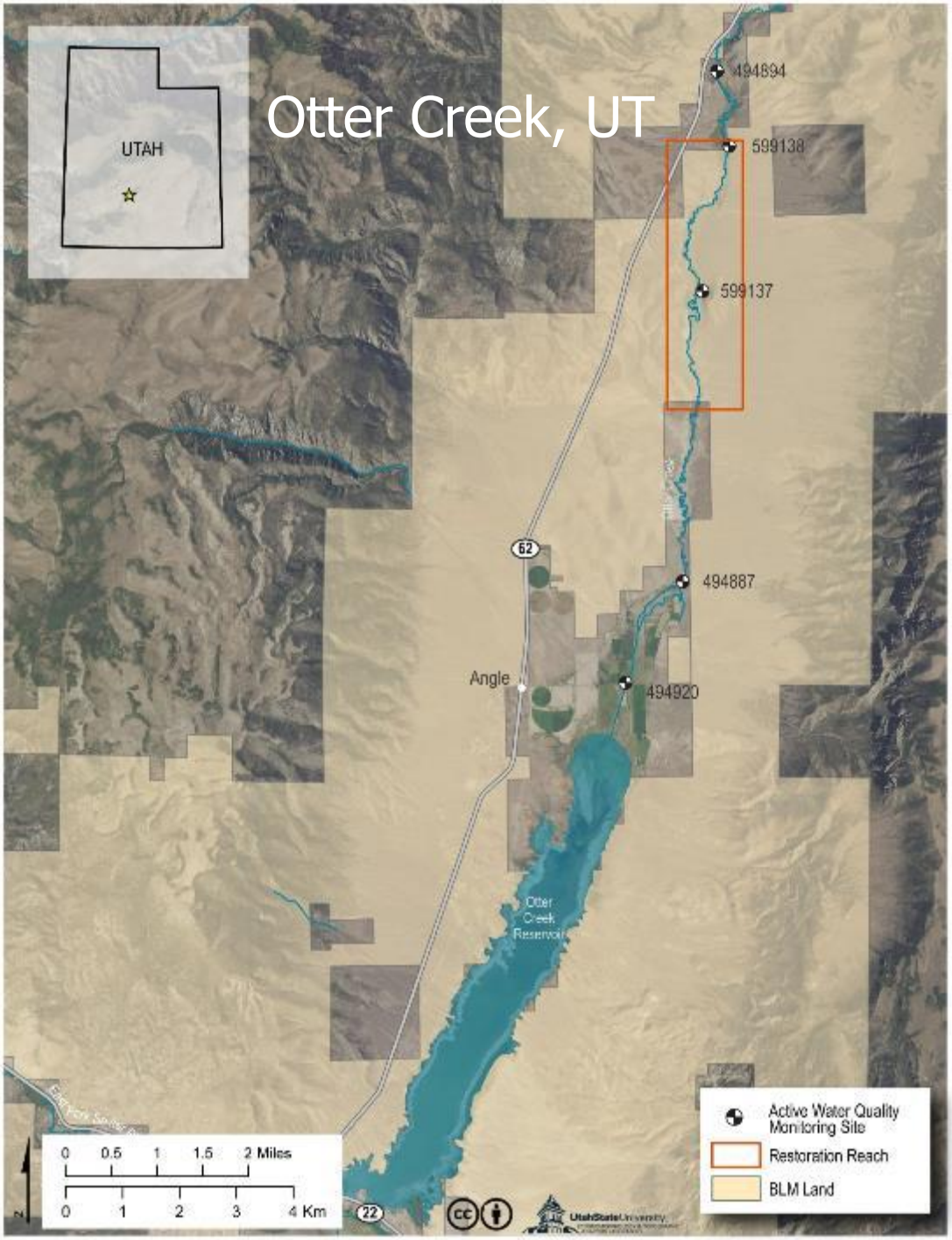
This section summarizes significant steps in the consultation process:

April 21, 2020: We received the request for consultation and EA via email from your office.

INTERIOR REGION 5
MISSOURI BASIN
KANSAS, MONTANA*, NEBRASKA, NORTH DAKOTA, SOUTH DAKOTA

INTERIOR REGION 7
UPPER COLORADO RIVER BASIN
COLORADO, NEW MEXICO, UTAH, WYOMING


A
UTAH
Birch Creek, UT
B
Birch Creek
0
250
500 M
South Creek
Birch Creek
South Creek
North Fork Birch Creek
Middle Fork Birch Creek
South Fork Birch Creek
N
0
2
4
6 Km
Valley Bottom
Study Area
Stream Network


Otter Creek, UT
UTAH
494894
599138
599137
62
494887
Angle
494920
Otter Creek Reservoir
0 0.5 1 1.5 2 Miles
0 1 2 3 4 Km
22
Active Water Quality Monitoring Site
Restoration Reach
BLM Land

Ten common barriers to beaver/BDA work

1. Regulatory Challenges: NEPA, T&E species, & water rights
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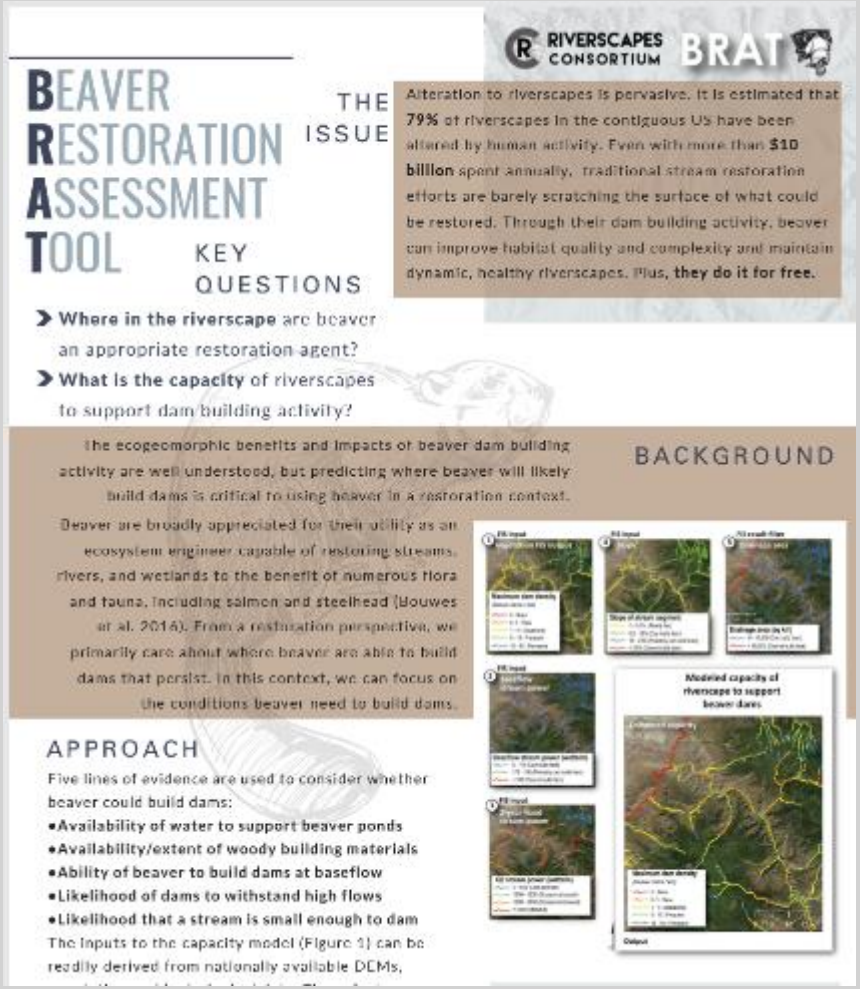
Identify and Communicate Project Goals and Objectives

Increase beaver populations and associated dam-building activity in the Price River in areas where potential conflicts are low

Increase native plant cover

Provide artificial starter dam structures

Utilize Strengths of Partners and Stakeholders



RIVERSCAPES CONSORTIUM BRAT

BEAVER RESTORATION ASSESSMENT TOOL

THE ISSUE

Alteration to riverscapes is pervasive. It is estimated that **79%** of riverscapes in the contiguous US have been altered by human activity. Even with more than **$1B billion** spent annually, traditional stream restoration efforts are barely scratching the surface of what could be restored. Through their dam building activity, beaver can improve habitat quality and complexity and maintain dynamic, healthy riverscapes. Plus, **they do it for free.**

KEY QUESTIONS

- **Where in the riverscape** are beaver an appropriate restoration agent?
- **What is the capacity** of riverscapes to support dam building activity?

BACKGROUND

The ecogeomorphic benefits and impacts of beaver dam building activity are well understood, but predicting where beaver will likely build dams is critical to using beaver in a restoration context.

Beaver are broadly appreciated for their utility as an ecosystem engineer capable of restoring streams, rivers, and wetlands to the benefit of numerous flora and fauna, including salmon and steelhead (Bouwes et al. 2016). From a restoration perspective, we primarily care about where beaver are able to build dams that persist. In this context, we can focus on the conditions beaver need to build dams.

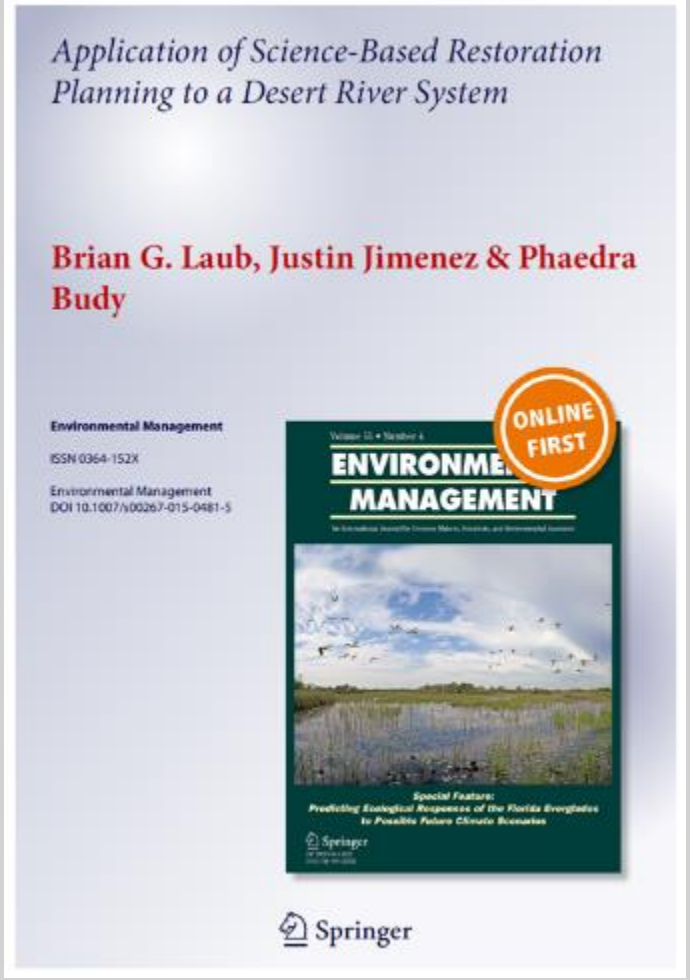
APPROACH

Five lines of evidence are used to consider whether beaver could build dams:

- Availability of water to support beaver ponds
- Availability/extent of woody building materials
- Ability of beaver to build dams at baseflow
- Likelihood of dams to withstand high flows
- Likelihood that a stream is small enough to dam

The inputs to the capacity model (Figure 1) can be readily derived from nationally available DEMs,

Modeled capacity of riverscape to support beaver dams



Application of Science-Based Restoration Planning to a Desert River System

Brian G. Laub, Justin Jimenez & Phaedra Budy

Environmental Management

ISSN 0364-152X

Environmental Management
DOI 10.1007/s00267-015-0481-5

ONLINE FIRST

ENVIRONMENTAL MANAGEMENT

Springer

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USGS Cooperative Research Unit Corner

Beavers in the Desert? The Potential for Translocated Beavers to Serve as Restoration Tools in Desert Rivers

The USGS Utah Cooperative Fish and Wildlife Research Unit at Utah State University (USU) is partnering with the Ecology Center (USU), the Bureau of Land Management, the Bureau of Reclamation, Utah Division of Wildlife Resources, and U.S. Department of Agriculture-National Wildlife Research Center to evaluate the efficacy of beaver translocation for desert river restoration by comparing the fates, space use, and dam building activity of naturally occurring and translocated beavers in the Price and San Rafael Rivers in eastern Utah.

Author: Emma Doden, Phaedra Budy, and Julie K. Young

Beaver translocation: It seems simple…but, beaver move and beaver get eaten

UTAH DNR WILDLIFE RESOURCES

See Kent & Amy's Webinar in this ASWM Series

From Wheaton et al. (2019) – LTPBR Manual

DOI: 10.13140/RG.2.2.19590.63049/1

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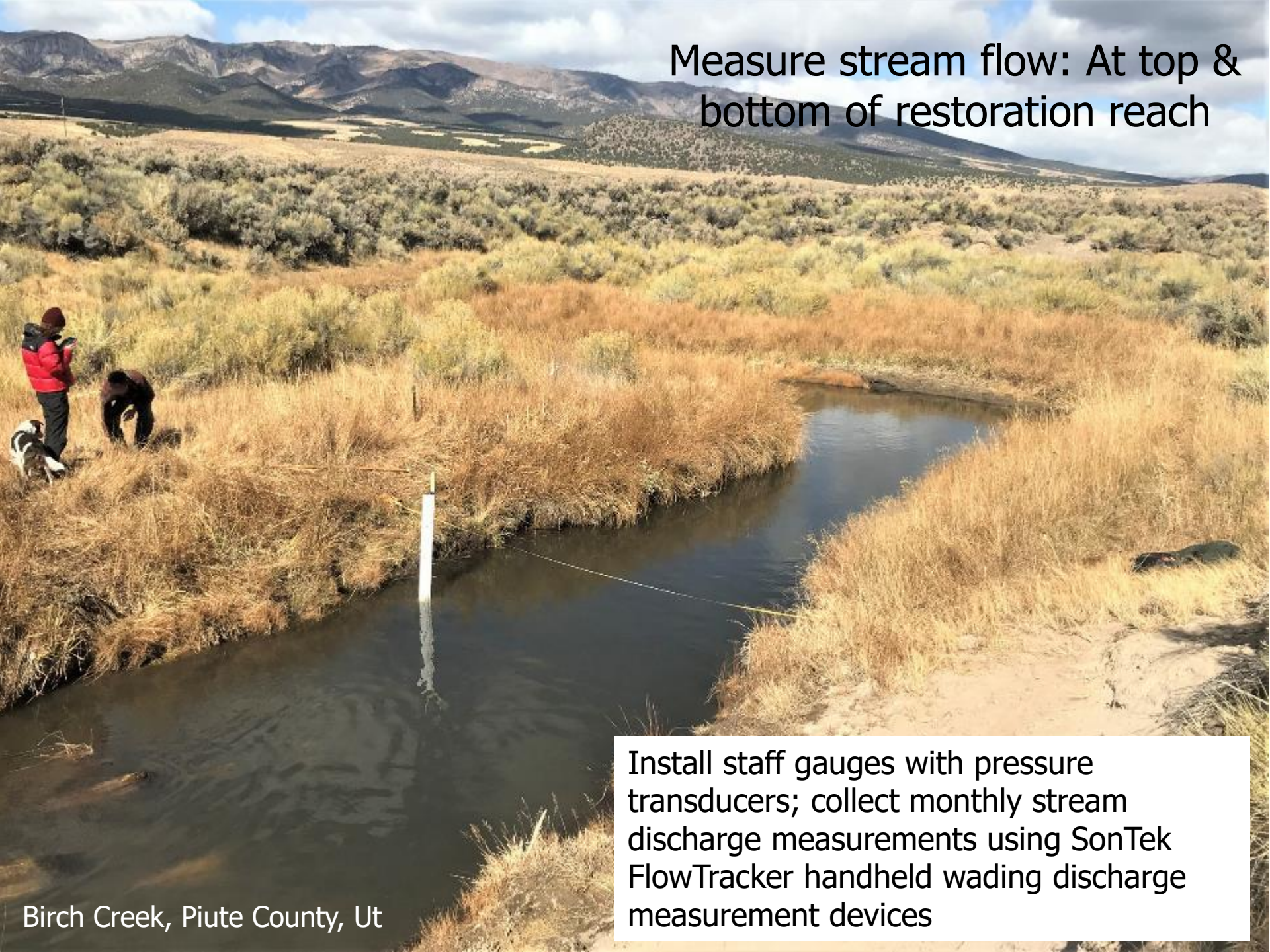
Measure stream flow: At top & bottom of restoration reach
90 degree V-notch weir, Birch Creek, Utah



Measure stream flow: At top & bottom of restoration reach

Install staff gauges with pressure transducers; collect monthly stream discharge measurements using SonTek FlowTracker handheld wading discharge measurement devices

Birch Creek, Piute County, Ut

Dan Fletcher

Acting Field Office Manager
Cedar City Field Office

- "Brokered a deal" with downstream water users on Birch Creek

Jay Wilde's story of restoring perennial flow to his creek using beaver…

BEEF

Animal Health | Market Reports | Management | BEEF Vet | Cow-Calf | Our Even

MIDDAY Midwest Digest, March 3, 2020

MAR 03, 2020

Farm Progress America, March 3, 2020

MAR 03, 2020

SPONSORED CONTENT

Autogenous vaccines: A targeted option for bovine enteric diseases

Beaver power provides year-long water to Idaho ranch

Beavers? You read that right. Here's how four-legged engineers helped restore an Idaho ranch.

By Brianna Randall | Feb 20, 2020

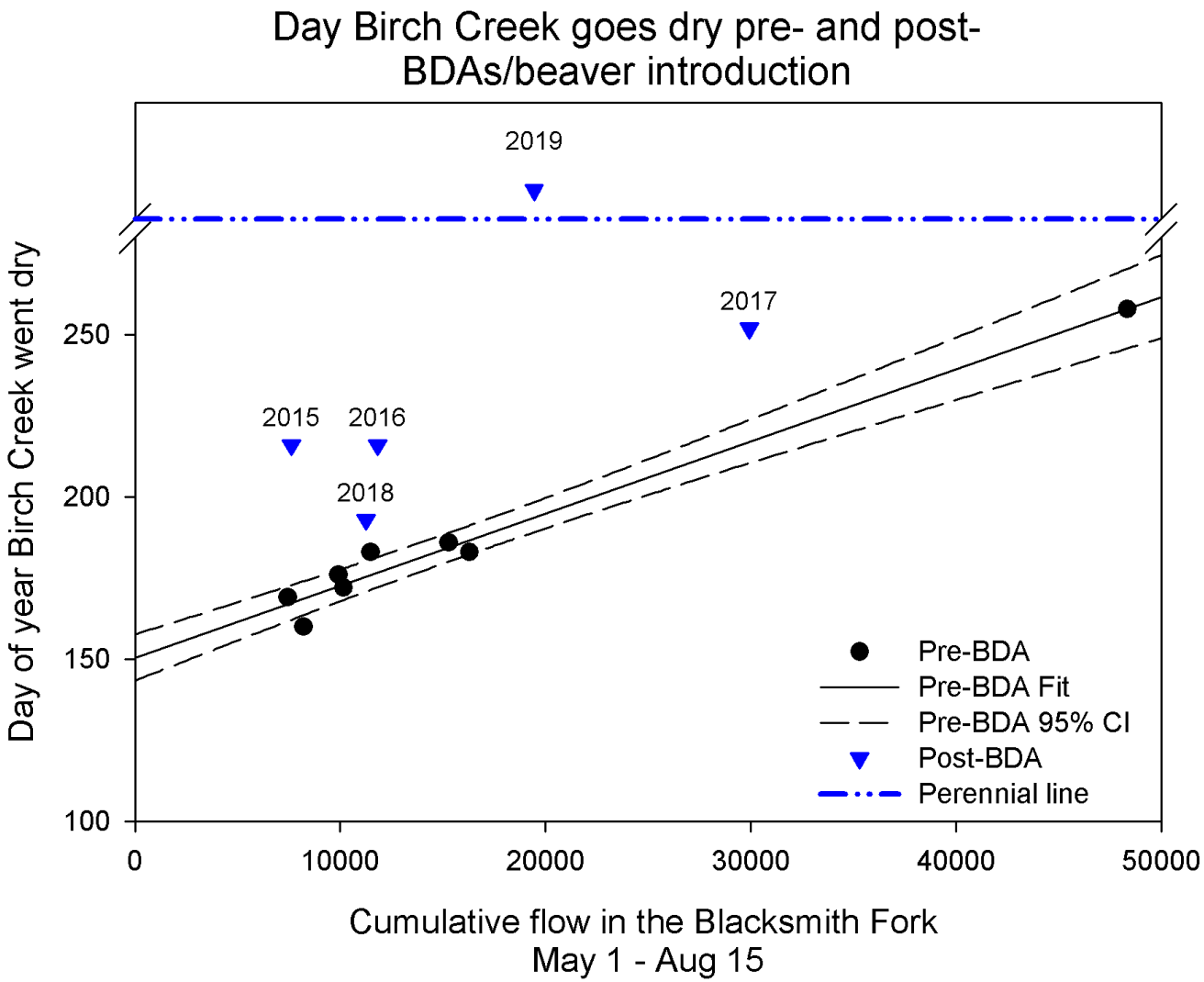
Beavers are some of nature's best engineers. They were key to improving the water supply to one Idaho rancher's pastures.

Birch Creek, ID – Restoring Perennial Flow

2020 >180 dams

Strategy

- Build BDAs to provide immediate habitat/refuge for beaver
- In 2015-16 introduced 9 beavers


Day Birch Creek goes dry pre- and post-BDAs/beaver introduction
2019
2017
2015
2016
2018
Day of year Birch Creek went dry
250
200
150
100
0
10000
20000
30000
40000
50000
Pre-BDA
Pre-BDA Fit
Pre-BDA 95% CI
Post-BDA
Perennial line
Cumulative flow in the Blacksmith Fork
May 1 - Aug 15

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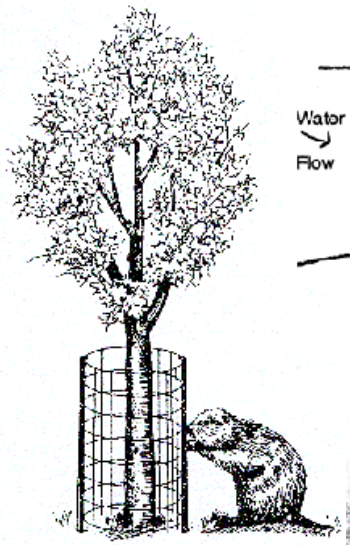
Recognizing beaver can cause damage, builds your credibility – empathize with the impacted

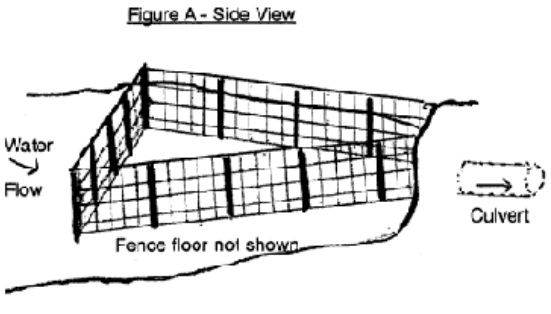
No denying, beaver can:

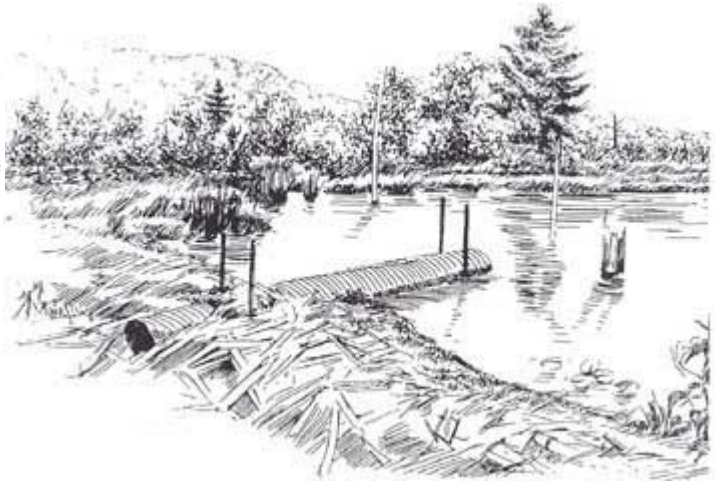
- cause flooding
- block culverts, which wash out roads
- chop down ornamental landscape trees
- impact irrigation diversions

Living With Beaver Strategies…

- Is problem real or perceived?
- If real:
  - 'Beaver Deceivers'
  - 'Pond Levelers'
  - 'Caging' or painting trees
  - All require maintenance
- If those don't work, live trap and relocation

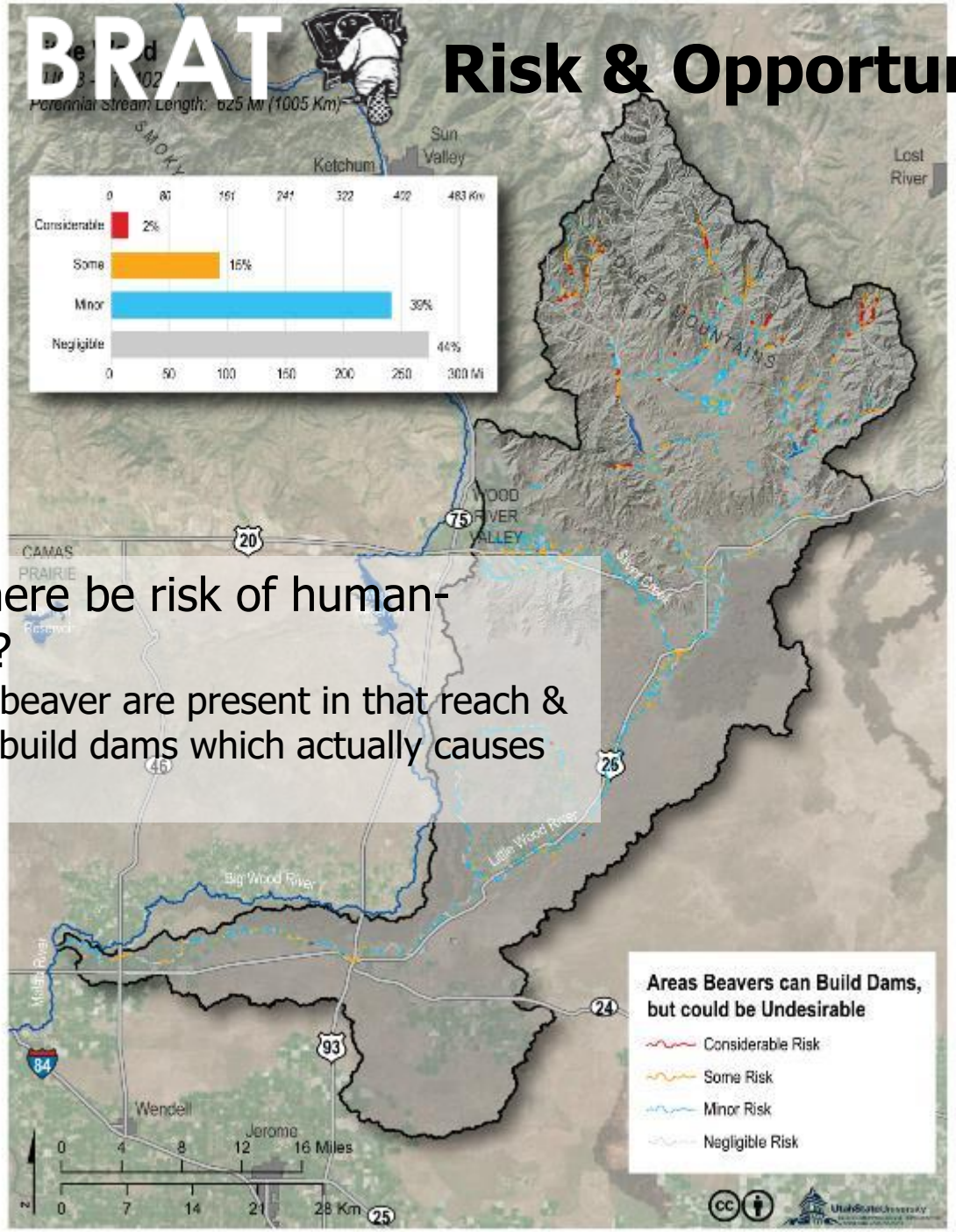






Risk & Opportunity Model

Beaver Restoration Assessment Tool



Where could there be risk of human-beaver conflict?

- Assuming that beaver are present in that reach & they decide to build dams which actually causes impact

http://brat.riverscapes.xyz/

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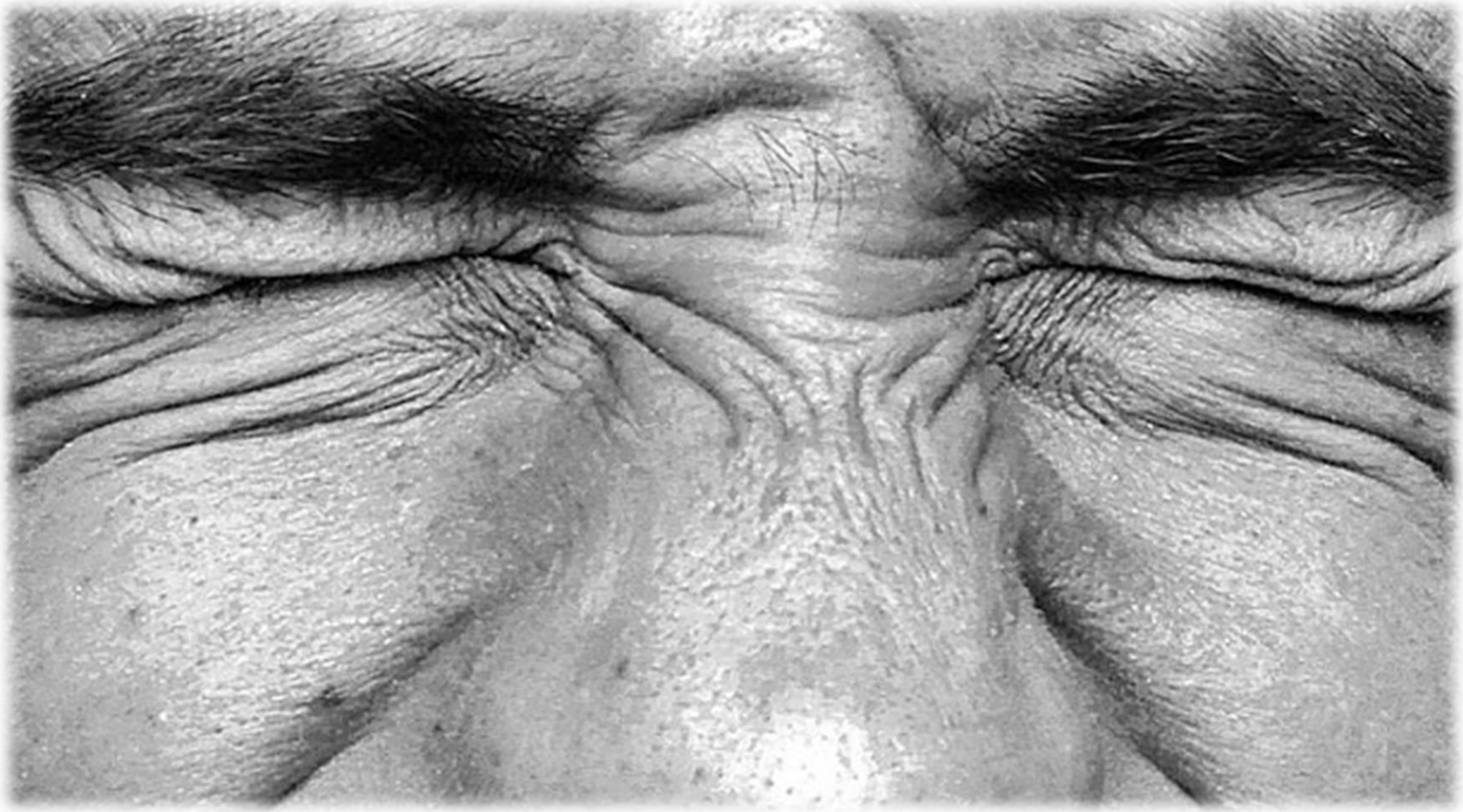
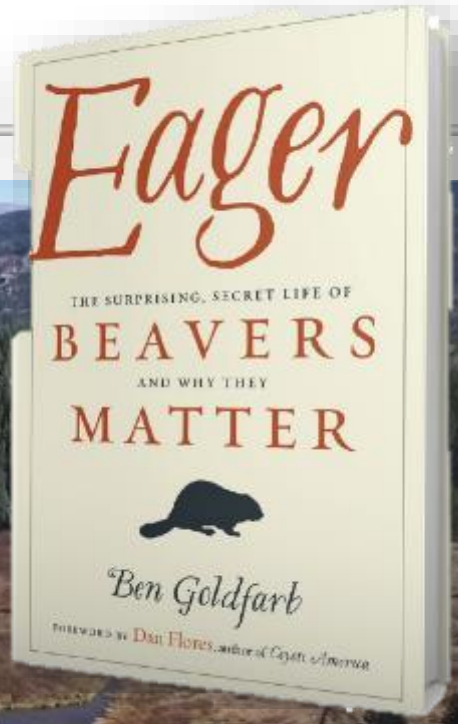
CLOSE YOUR EYES AND IMAGINE

- Imagine a river in pristine condition…

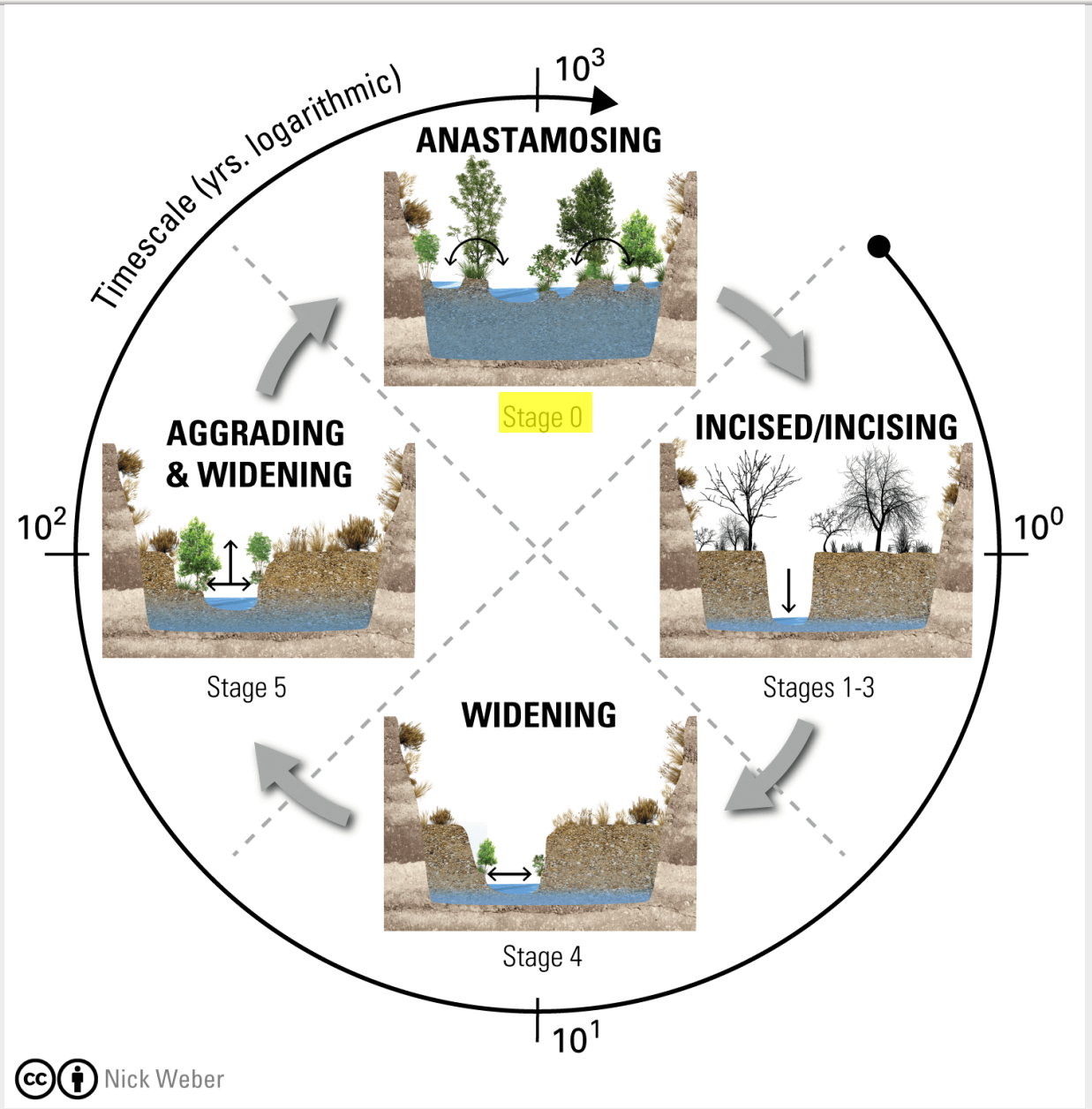


DID IT LOOK ANYTHING LIKE THESE?

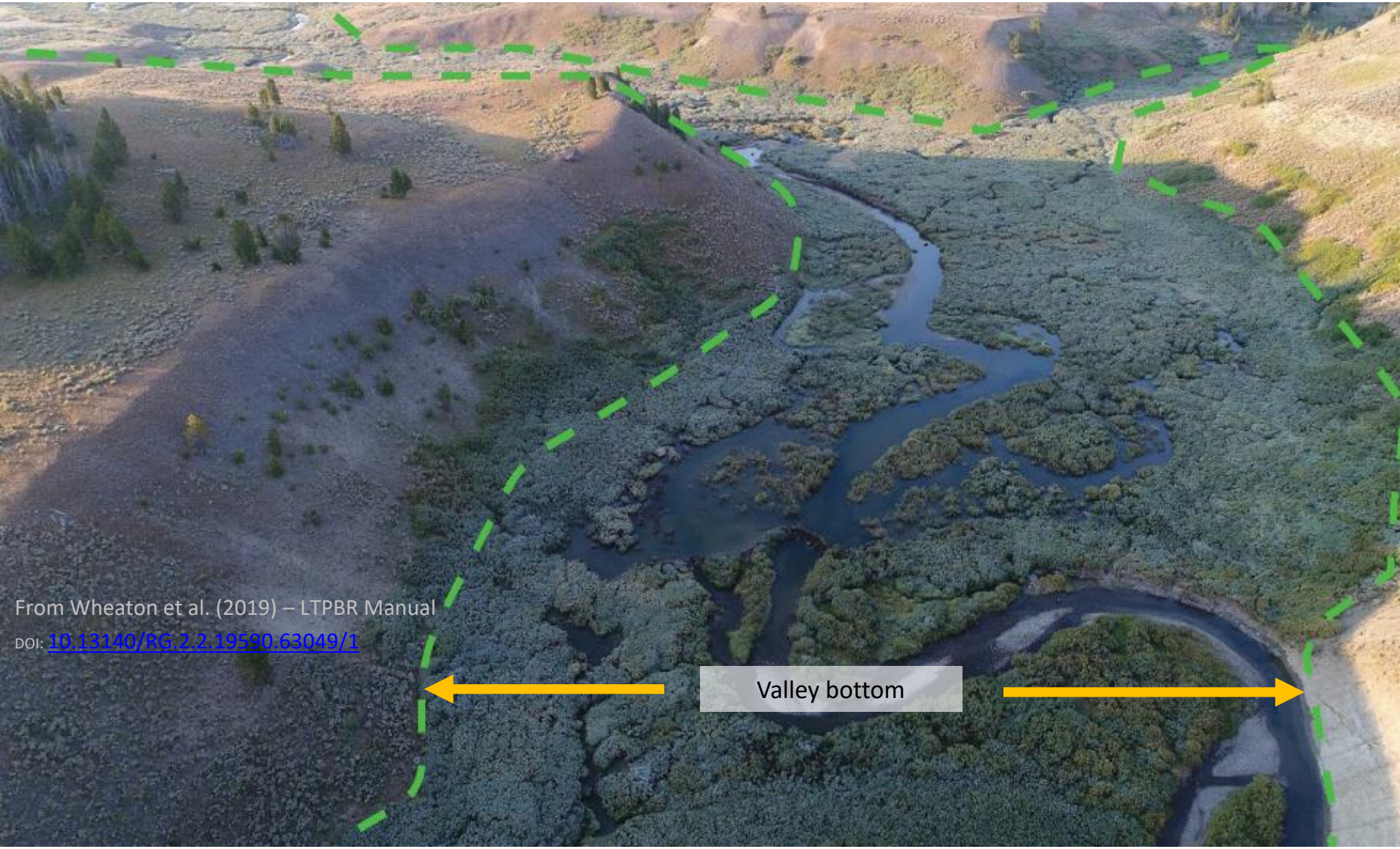
THESE ARE NOT ANOMOLIES



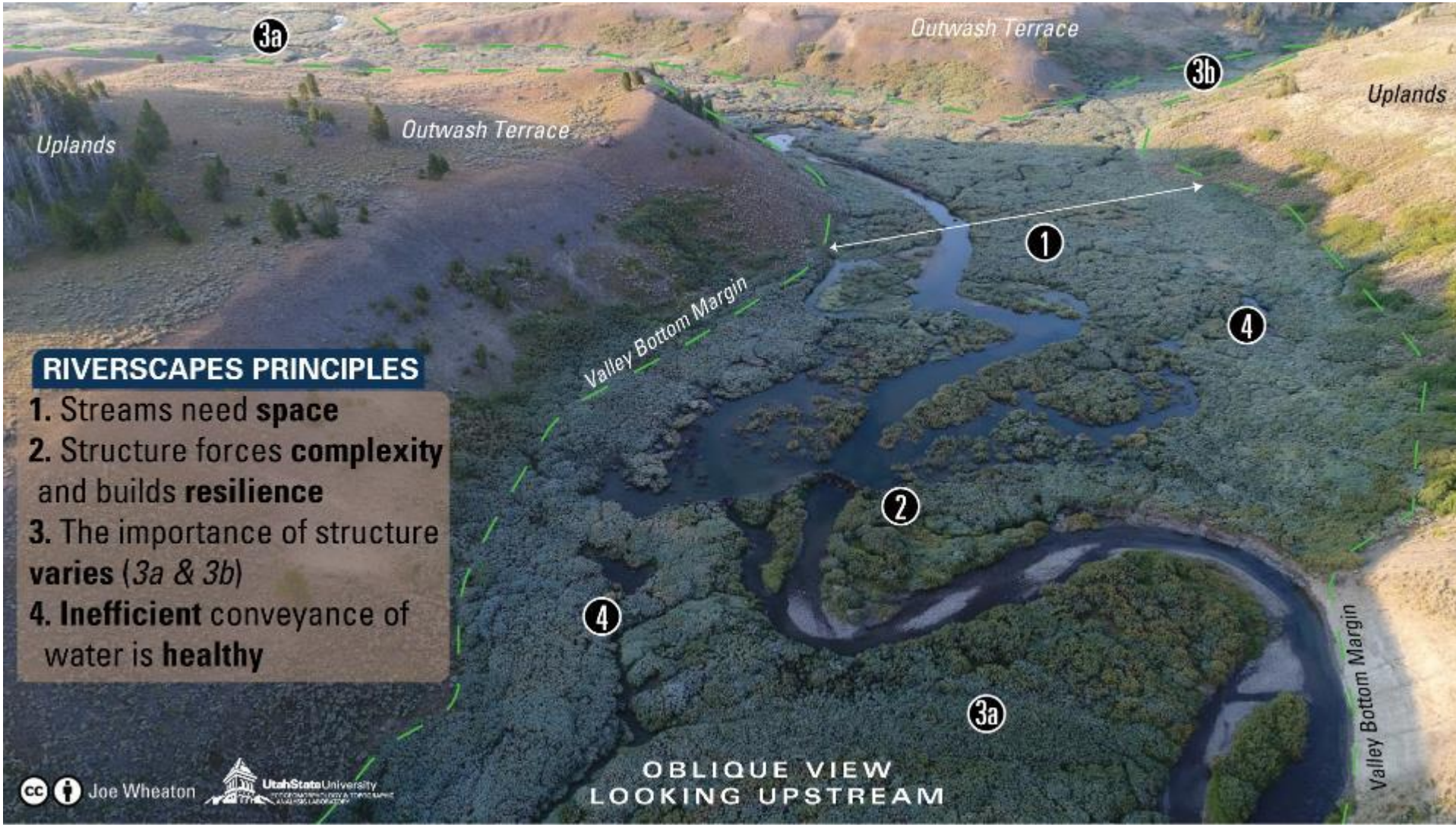
Stream evolution model



This is our reference condition (Stage-0)



What constitutes a healthy riverscape?



Riverscapes Principles

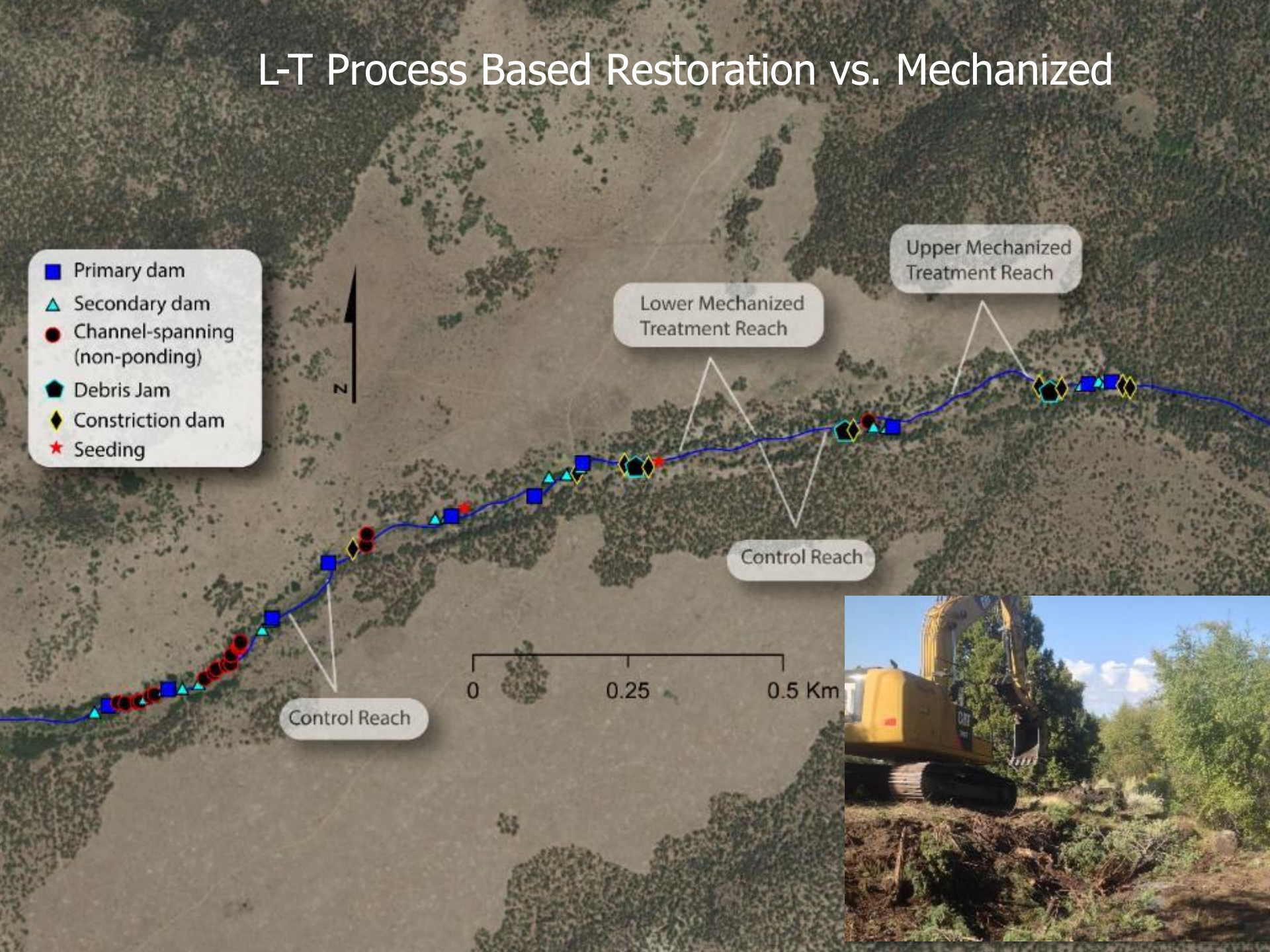
From pages 3-4 of Pocket Guide; Wheaton et al. (2019)

DOI: 10.13140/RG.2.2.28222.13123/1

See Wheaton et al. (2019, p 60): Chapter 2 LTPBR Manual for Principles

DOI: 10.13140/RG.2.2.34270.69447

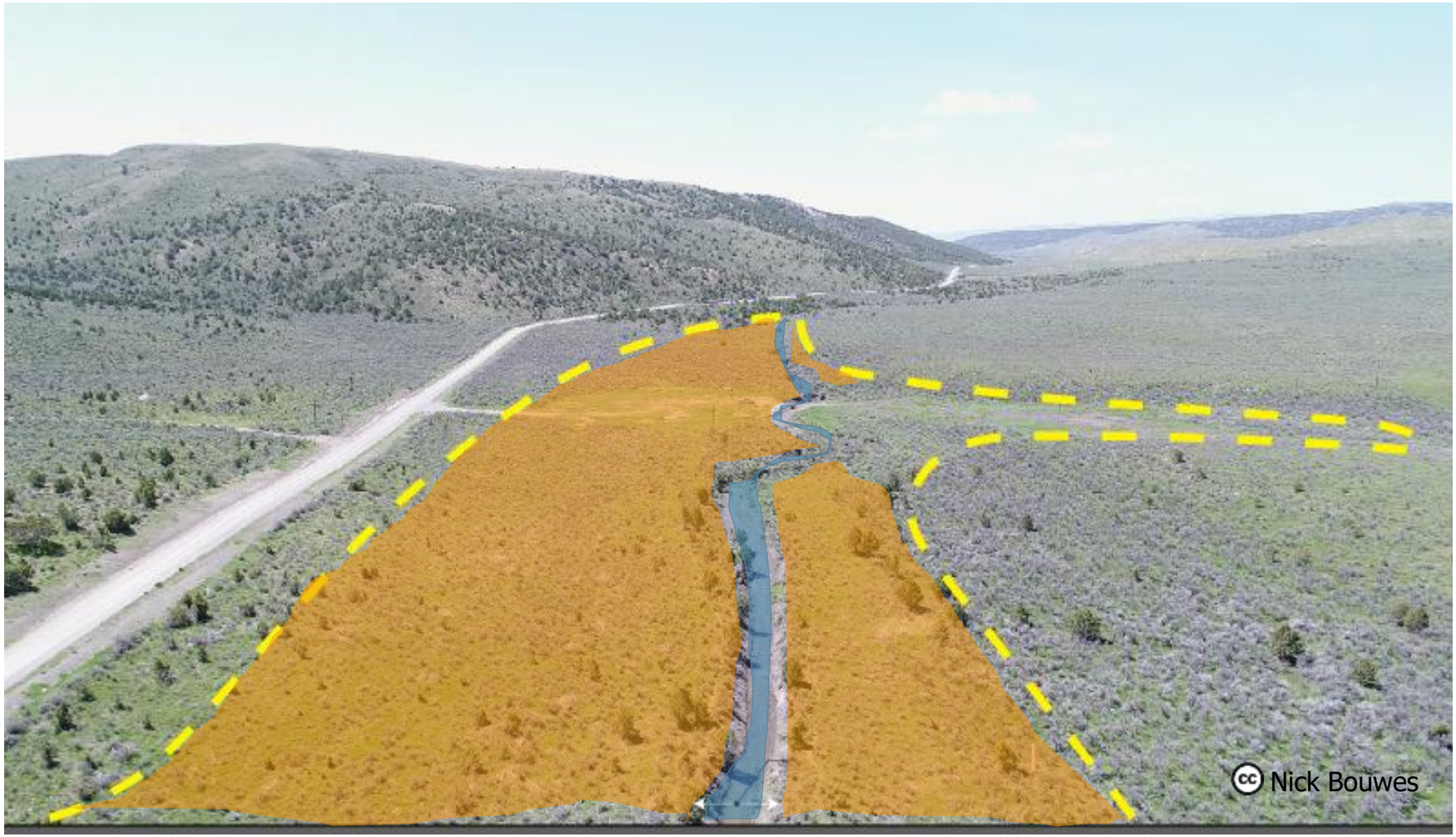
L-T Process Based Restoration vs. Mechanized



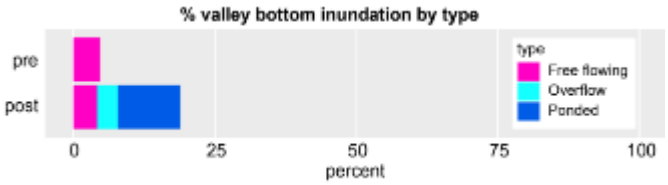
Ten common barriers to beaver/BDA work

1. Regulatory Challenges: NEPA, T&E species, & water rights
2. Local agency project buy-in/ownership
3. Communication/understanding roles between partners
4. Grazing management associated with restoration projects
5. Beaver dispersal & mortality associated with translocations
6. The perception that beaver dams/BDAs "steal water"
7. Potential infrastructure damage from beaver dam building
8. Intolerance of beaver and/or slowing the flow
9. Different perceptions of what constitutes reference condition
10. **Restoration effectiveness monitoring**

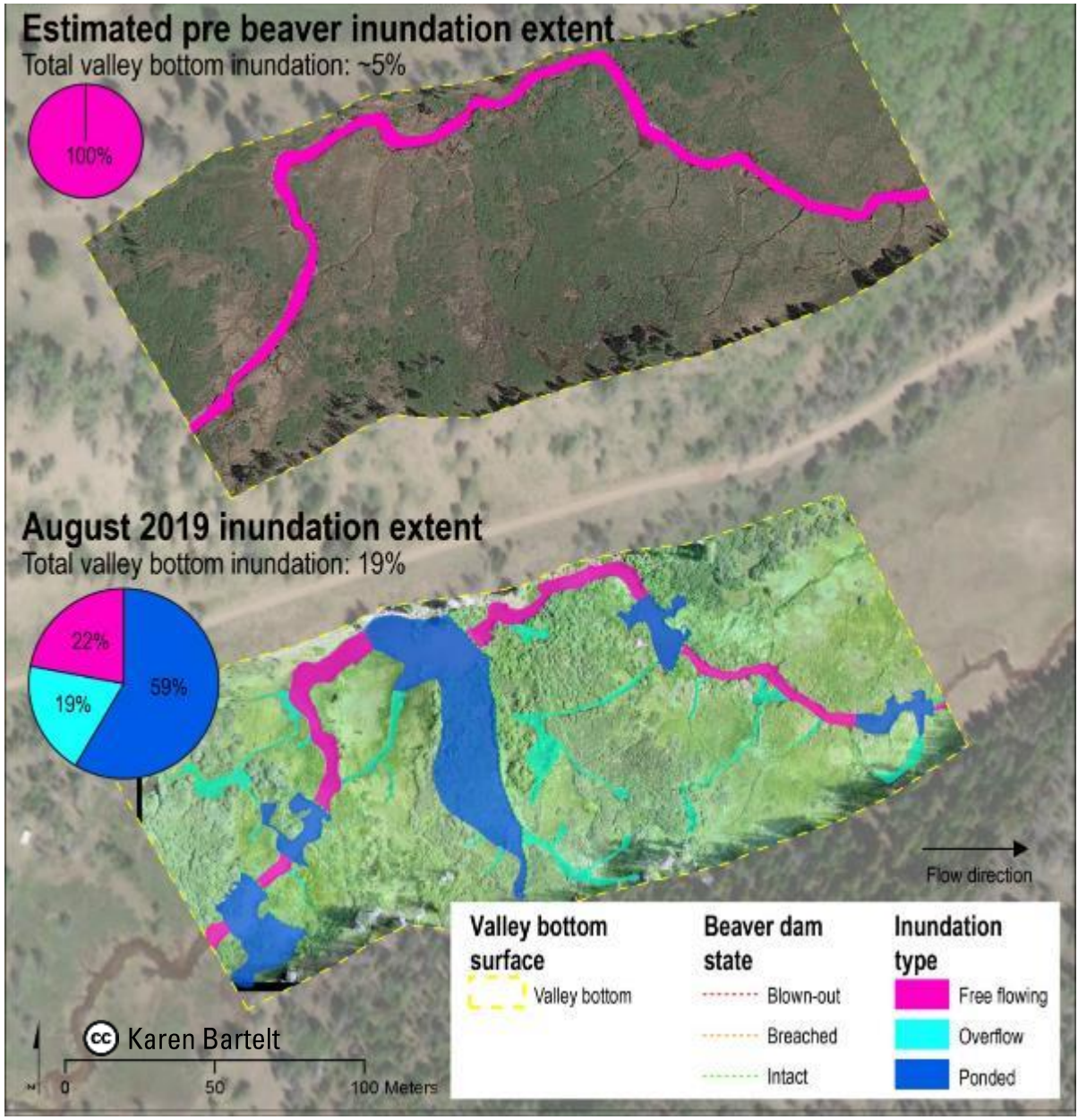
Focus on the entire valley bottom not just the channel



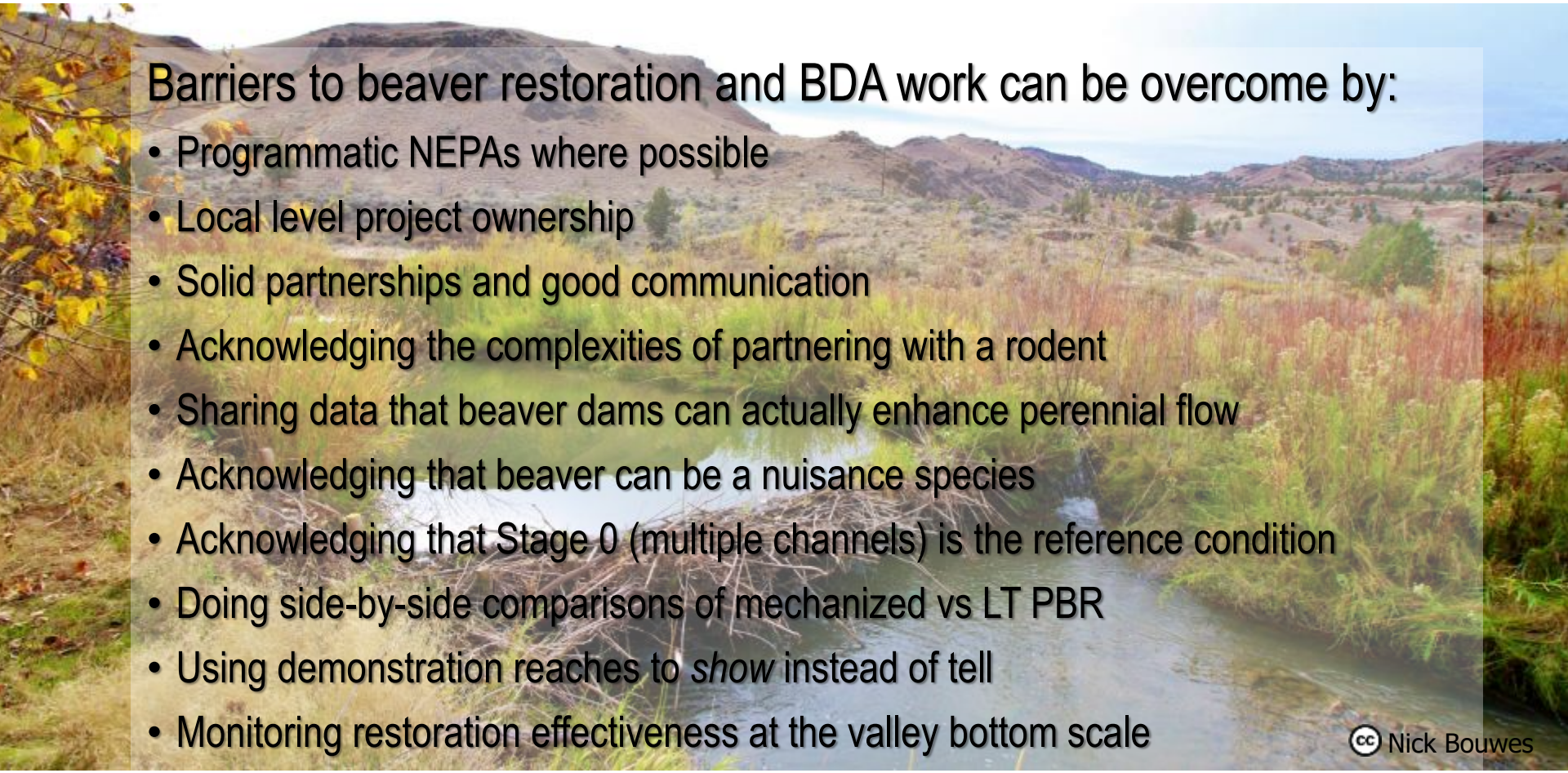
Beaver Dam Induced Flooding



- Inundation types great proxy for residence time…



Conclusions



Barriers to beaver restoration and BDA work can be overcome by:

- Programmatic NEPAs where possible
- Local level project ownership
- Solid partnerships and good communication
- Acknowledging the complexities of partnering with a rodent
- Sharing data that beaver dams can actually enhance perennial flow
- Acknowledging that beaver can be a nuisance species
- Acknowledging that Stage 0 (multiple channels) is the reference condition
- Doing side-by-side comparisons of mechanized vs LT PBR
- Using demonstration reaches to *show* instead of tell
- Monitoring restoration effectiveness at the valley bottom scale

Acknowledging 'WE' …

- Joe Wheaton (USU)
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- Dana Truman (BLM)
- Jared Goodall (BLM)
- Dan Keller (UDWR)
- Jay Wilde (Rancher)
- And many others… we are neglecting

U.S. Department of the Interior Bureau of Land Management
Utah Department of Environmental Quality
Utah DNR Wildlife Resources
Utah's Watershed Restoration Initiative
U.S. Fish & Wildlife Service
Piute Conservation District — Conserving Our Natural Resources
UDAF

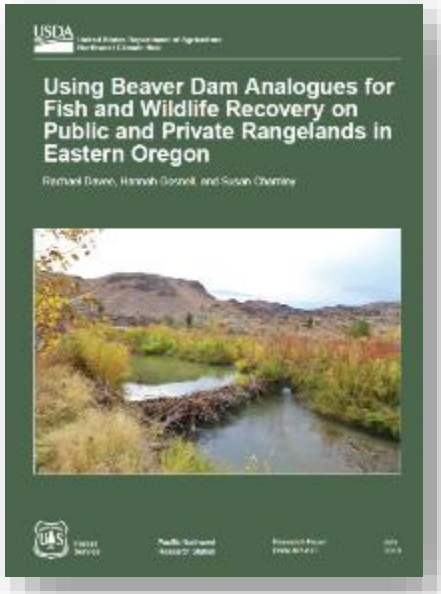
A Lot of Amazing People are behind LTPBR:

Joe Wheaton

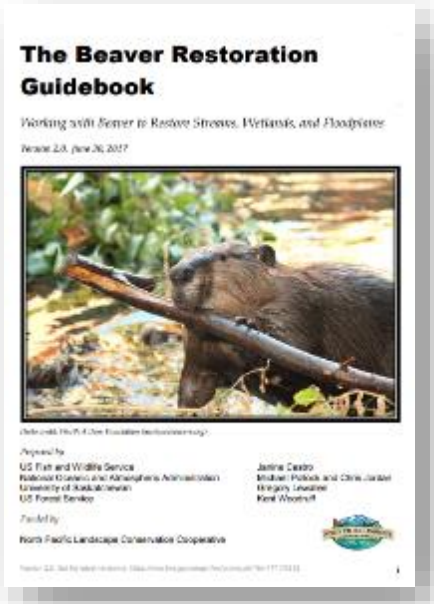
An incomplete acknowledgement…

Jeremy Maestas

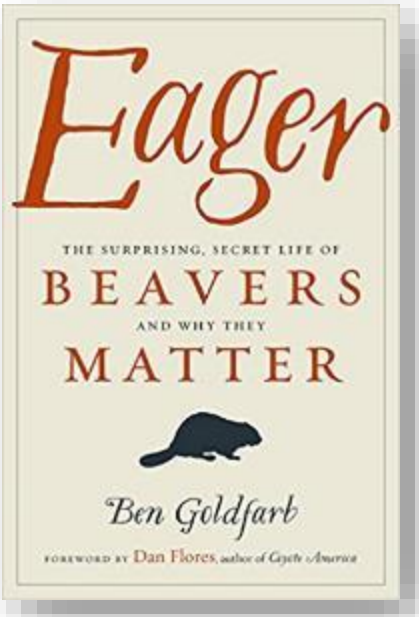
Beaver Restoration & BDA Resources

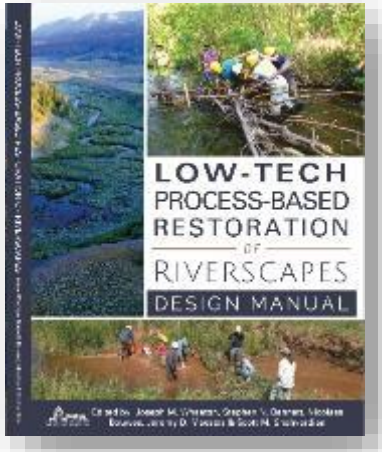


Davee et al. (2019).



Pollock et al. (2017).

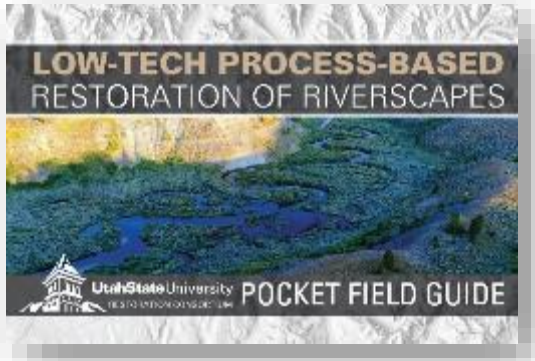




http://lowtechpbr.restoration.usu.edu

BRAT

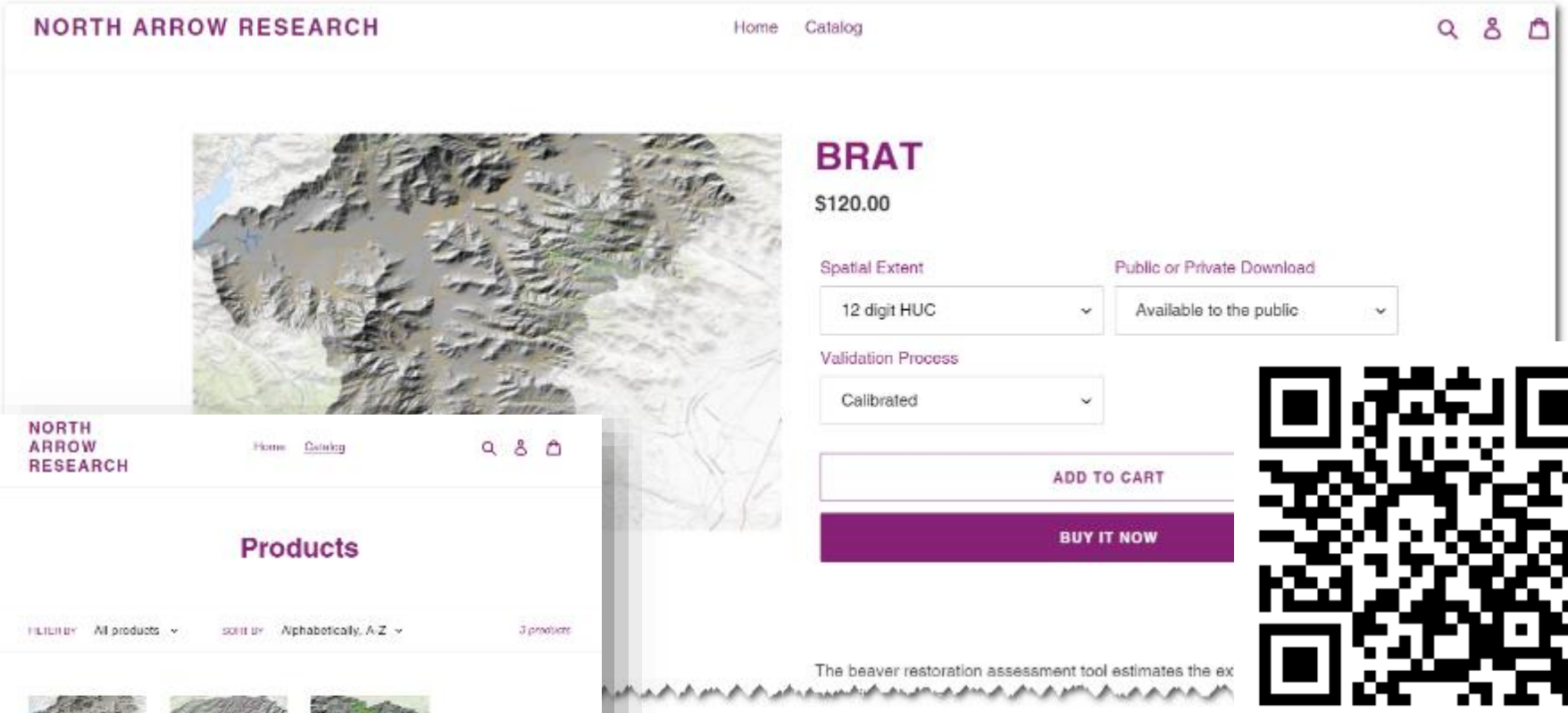
http://brat.riverscapes.xyz/

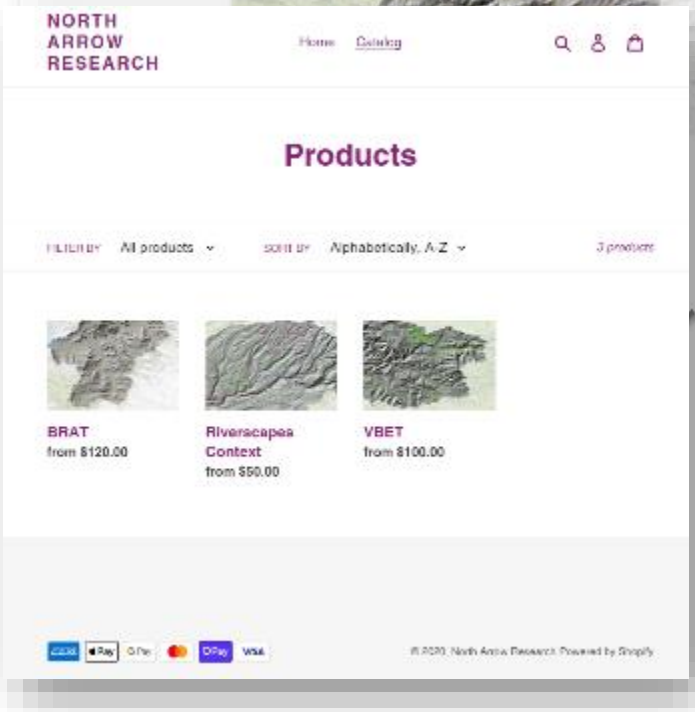


http://lowtechpbr.restoration.usu.edu

While we wait for Commercial Grade, YOU can help crowd source this & GET BRAT for your AREA

PRODUCTION GRADE





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