

# BEAVER RESTORATION AND MOUNTAIN MEADOWS



**Sierra Meadows Workshop**

**Calistoga, CA • February 10, 2016**

**Kate Lundquist and Brock Dolman, WATER Institute Directors**

**Occidental Arts and Ecology Center**

**[www.oaec.org/water](http://www.oaec.org/water)**



**WATER  
INSTITUTE**  
Occidental Arts &  
Ecology Center





## BRING BACK THE BEAVER CAMPAIGN

Cultivating a culture of beaver  
stewardship through:

- Education & Outreach
- Research & Demonstration
- Policy Change
- Citizen Science

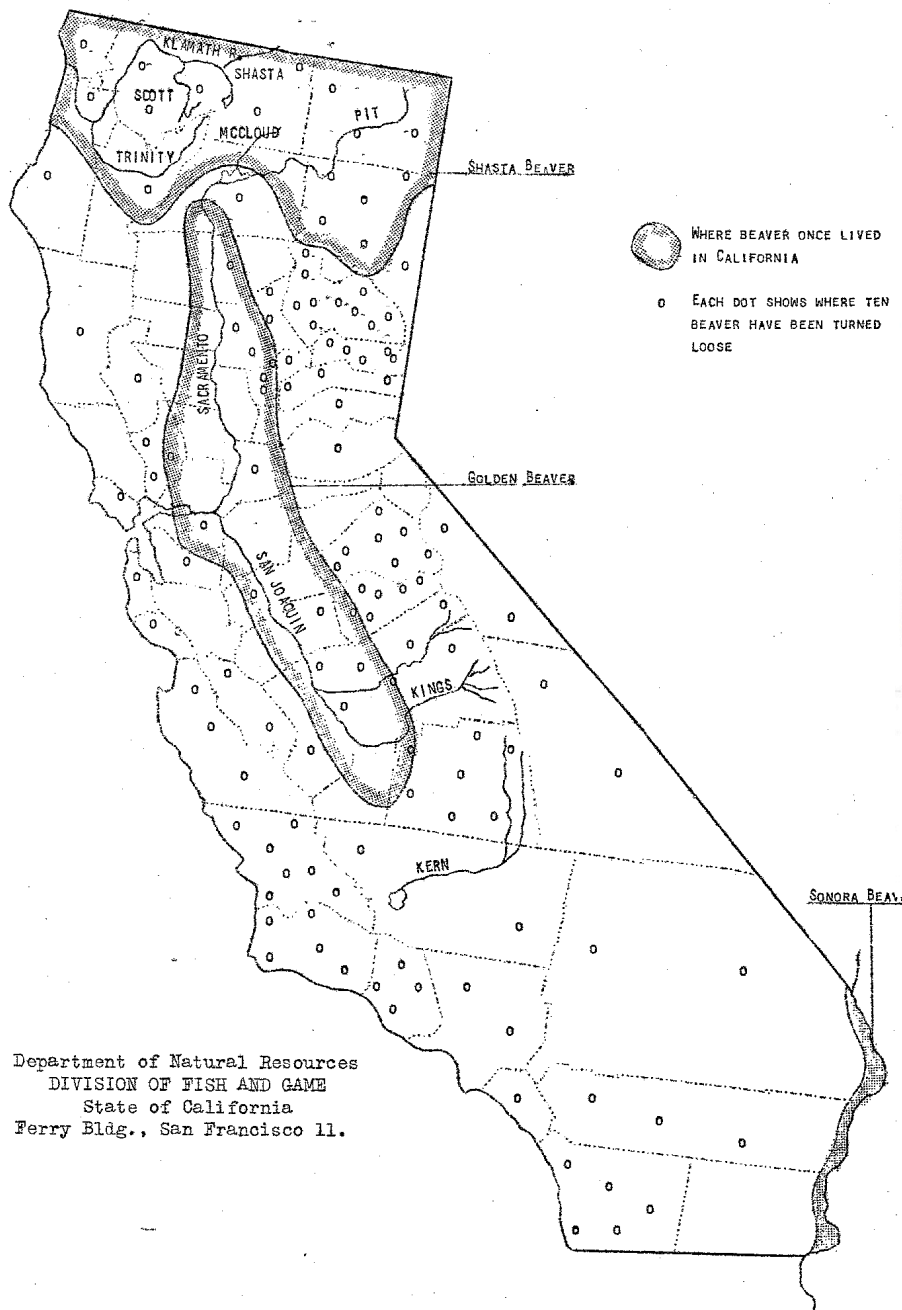


[www.oaec.org/beaver](http://www.oaec.org/beaver)





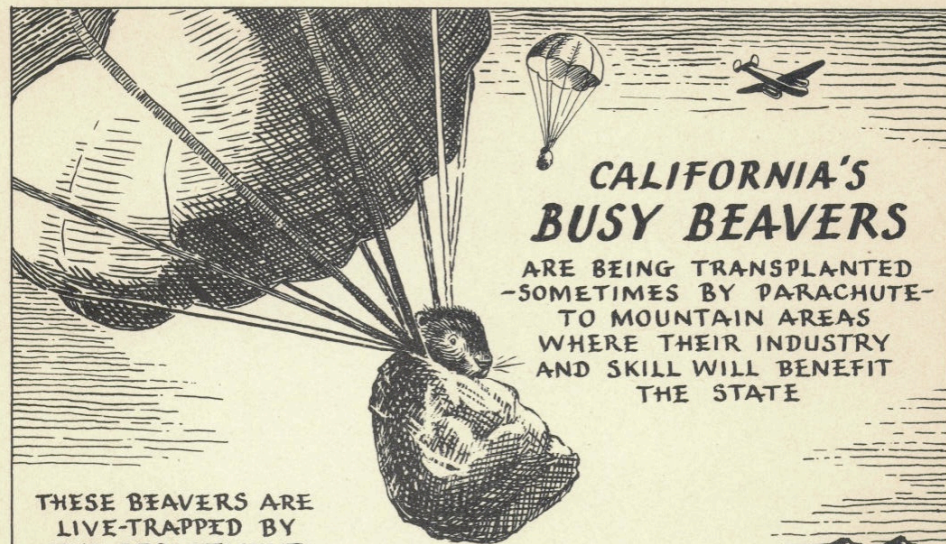
# BEAVER IN CALIFORNIA



Department of Natural Resources  
DIVISION OF FISH AND GAME  
State of California  
Ferry Bldg., San Francisco 11.



## OUTDOOR CALIFORNIA BY THE DIVISION OF FISH & GAME



### CALIFORNIA'S BUSY BEAVERS

ARE BEING TRANSPLANTED  
-SOMETIMES BY PARACHUTE-  
TO MOUNTAIN AREAS  
WHERE THEIR INDUSTRY  
AND SKILL WILL BENEFIT  
THE STATE

THESE BEAVERS ARE  
LIVE-TRAPPED BY  
THE DEPARTMENT  
OF FISH AND GAME  
IN FARM AREAS WHERE  
THEY CAN DAMAGE  
CROPS AND LEVEES



BAILEY LIVETRAP  
ARE HARMLESS

BEAVER DAMS IN THE MOUNTAINS SAVE WATER  
FOR FISH, WILDLIFE AND AGRICULTURE.

STATE OF CALIFORNIA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF FISH AND GAME

GAME BULLETIN No. 3

# The Status of Beavers in California

BY  
DONALD T. TAPPE



1942

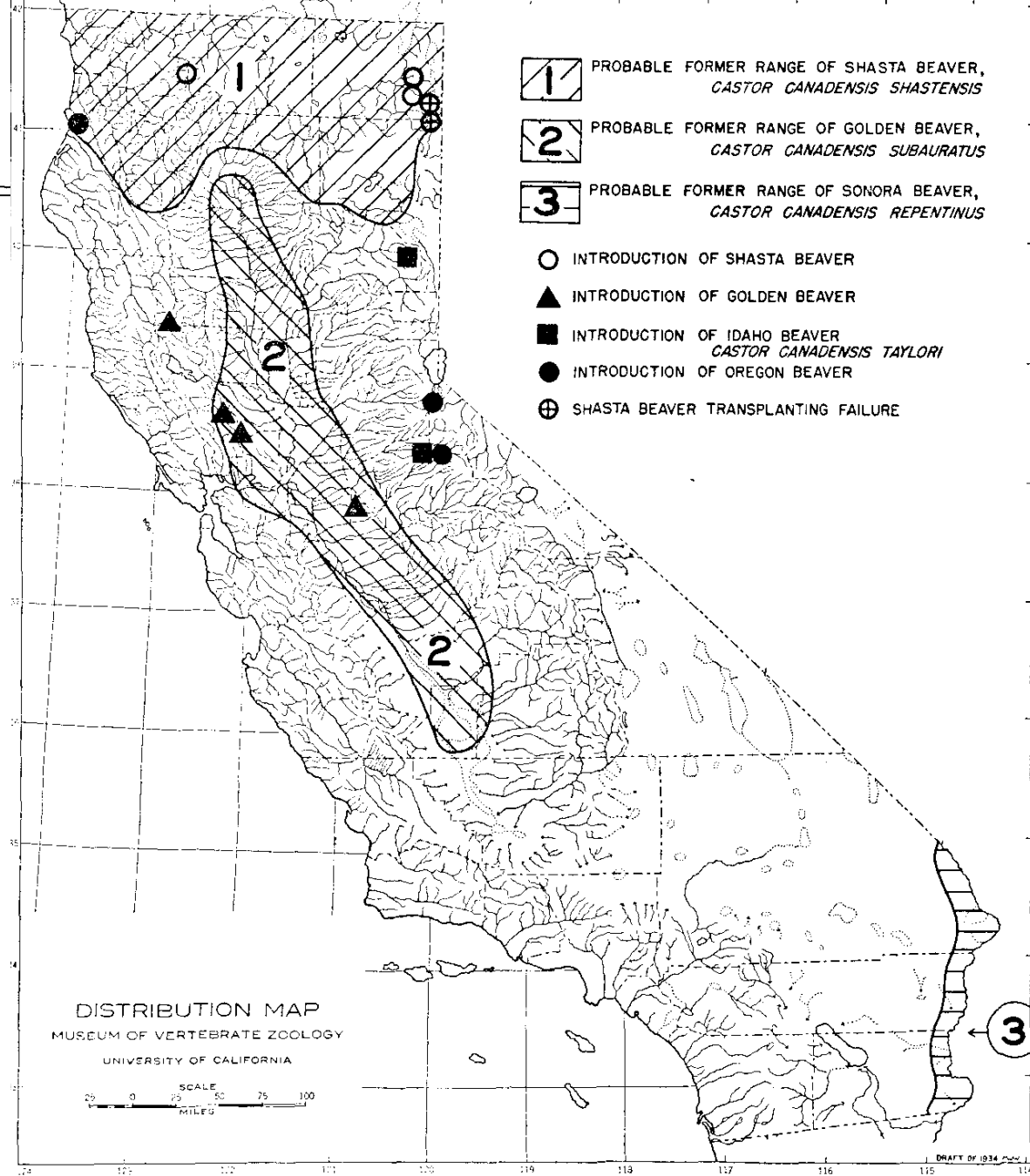


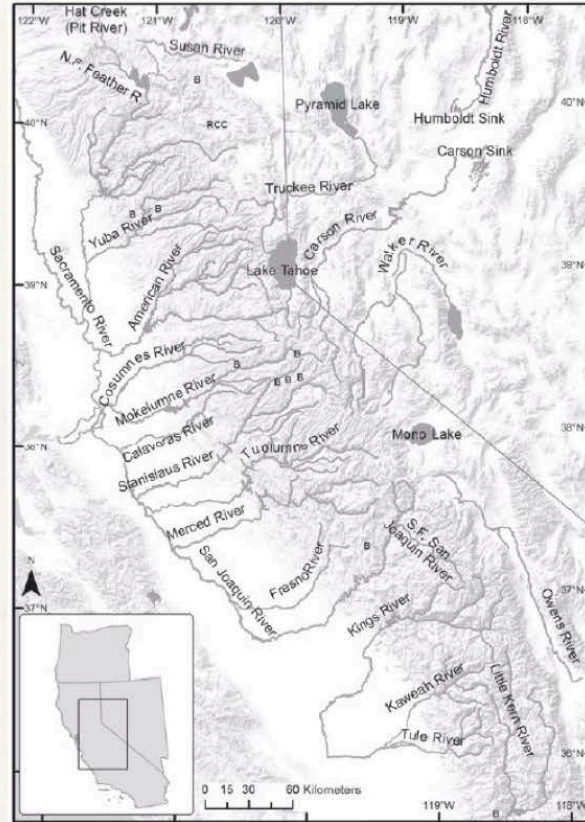
FIG. 2. Probable former range of beavers in California, with location of sites where beavers have been transplanted by governmental agencies in recent years.



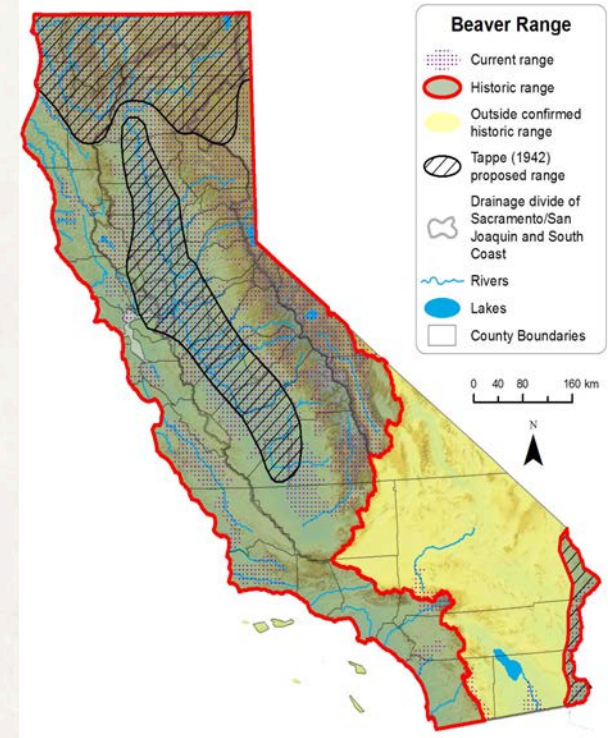
# PEER-REVIEWED PAPERS RE-EVALUATE THE HISTORIC RANGE OF BEAVER IN CALIFORNIA - CALIFORNIA FISH AND GAME JOURNAL



Novel Physical Evidence that Beaver were Native to the Sierra Nevada



The Historic Range of Beaver in the Sierra Nevada



The Historical Range of Beaver in Coastal California (Update)

James and Lanman, California Fish and Game 2012  
Lanman et al. California Fish and Game 2012  
Lanman et al. California Fish and Game 2013

[www.oaec.org/beaver](http://www.oaec.org/beaver)



## Riverbend Sciences



### What is the Beaver Mapper?

The Beaver Mapper shows the locations of beaver sightings in California and Oregon. The goal of the system is to provide information to people seeking to restore beaver populations for the benefit of our rivers, salmon, and water supply.

Click on a point in the Beaver Mapper to view location details



[www.riverbendsci.com/projects/beavers](http://www.riverbendsci.com/projects/beavers)

# Add Current Sightings To The Beaver Mapper!



# WHY BEAVER?



## And on ecosystem functioning:

- Regulation of stream flows and flood attenuation
- Increased water storage and raised water table
- Sediment retention and sorting
- Reduction in erosion and decreased turbidity
- Improved hydrological connectivity within and between surface and groundwaters
- Increased hydrological & morphological diversity
- Improved lateral connectivity between channel and floodplain
- Increased nutrient cycling
- Improved acid-neutralizing capacity
- Carbon retention, pollutant retention and water purification

## Beavers dams can exert many positive effects on biological diversity including:

- Improved habitat for invertebrates, fish, amphibians, birds and mammals, including LCT, Cascade frog and Willow flycatcher
- Increase in habitat heterogeneity
- Increase in species richness and diversity
- Increase in aquatic, transition and deadwood habitats
- Increase in open canopy riparian habitats and improved riparian understory
- Increased in-stream woody debris
- Improved connectivity and resilience





# BEAVER HABITAT CAN BENEFIT MANY SPECIES



Photo: Brock Dolman



Photo: Brock Dolman

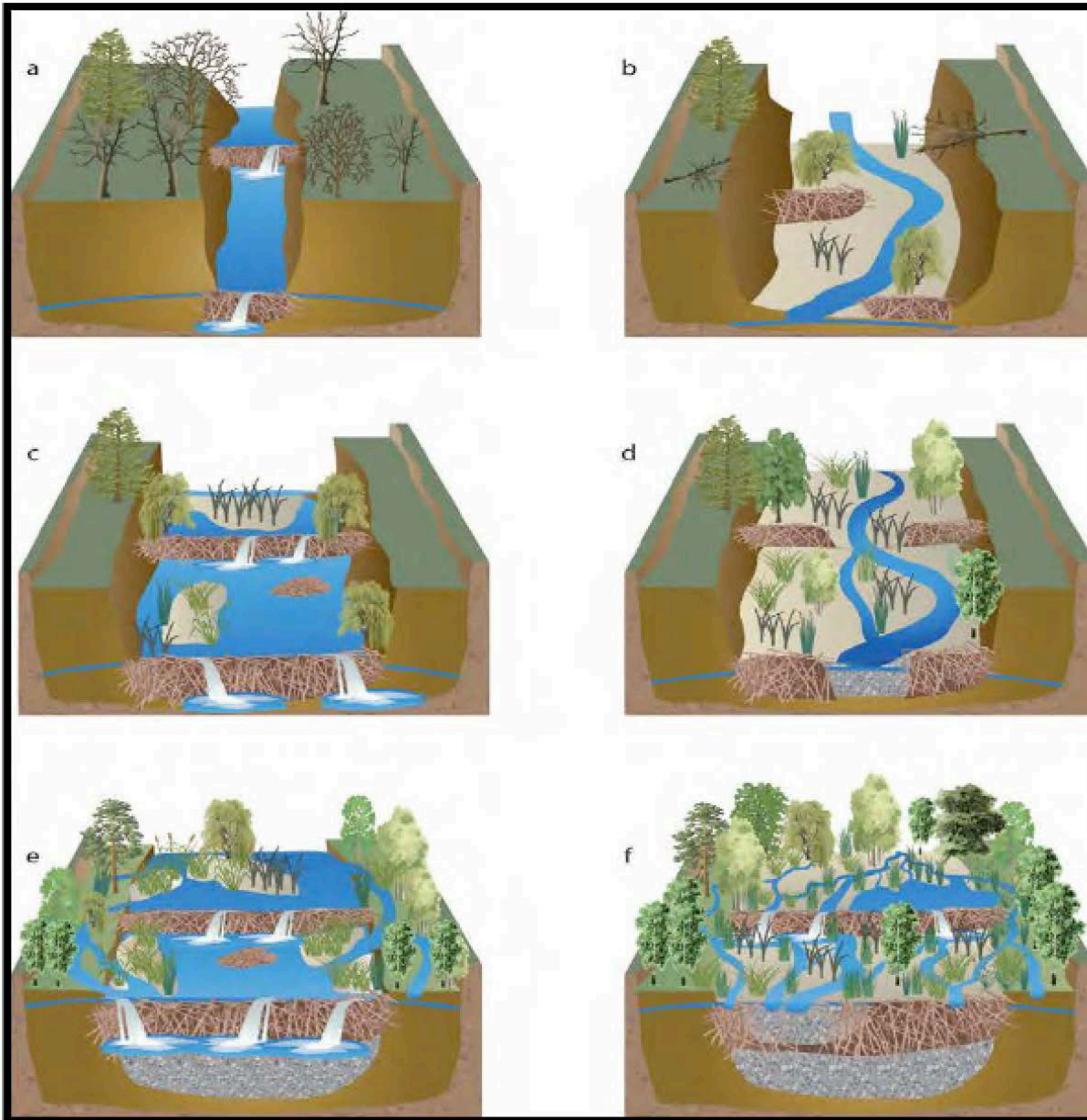


Photo: Brock Dolman





# How beaver dams affect the development of incised streams





# BEAVER DAMS CAN ENHANCE WATER QUALITY AND QUANTITY

THE EFFECT OF BEAVER (*Castor canadensis*) DAM REMOVAL ON TOTAL  
PHOSPHORUS CONCENTRATION IN TAYLOR CREEK AND WETLAND,  
SOUTH LAKE TAHOE, CALIFORNIA

SARAH MUSKOPF

OCTOBER 2007



**KEEP  
TAHOE  
BLUE**

League to Save Lake Tahoe (530) 541-5388 [www.KeepTahoeBlue.org](http://www.KeepTahoeBlue.org)



# Landscape-scale carbon storage associated with beaver dams

Ellen Wohl<sup>1</sup>

## Beaver and Climate Change Adaptation in North America

A Simple, Cost-Effective Strategy

WildEarth Guardians | Grand Canyon Trust | The Lands Council



A Report from



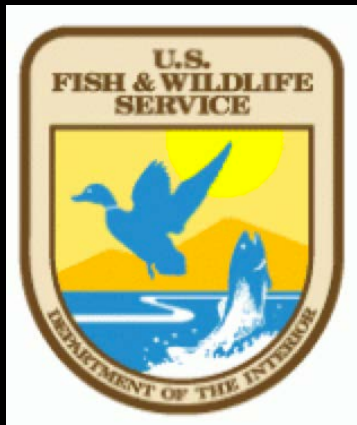
SEPTEMBER 2011



## BEAVER BACK TO THE FUTURE

"Beaver restoration is one of the most important things we can be doing."  
Kent Woodruff, Wildlife Biologist, Methow Valley Ranger District





# The Beaver Restoration Guidebook

*Working with Beaver to Restore Streams, Wetlands, and Floodplains*

*Version 1.02, July 14, 2015*



*Photo credit: Worth A Dam Foundation (martinezbeavers.org)*



# Three Approaches to Beaver Restoration:

- Passive actions such as trapping restrictions or changes in grazing regimes



- Active habitat manipulation to entice beaver to build dams and establish colonies
- Actively relocating beaver to areas with the intent that they will establish colonies



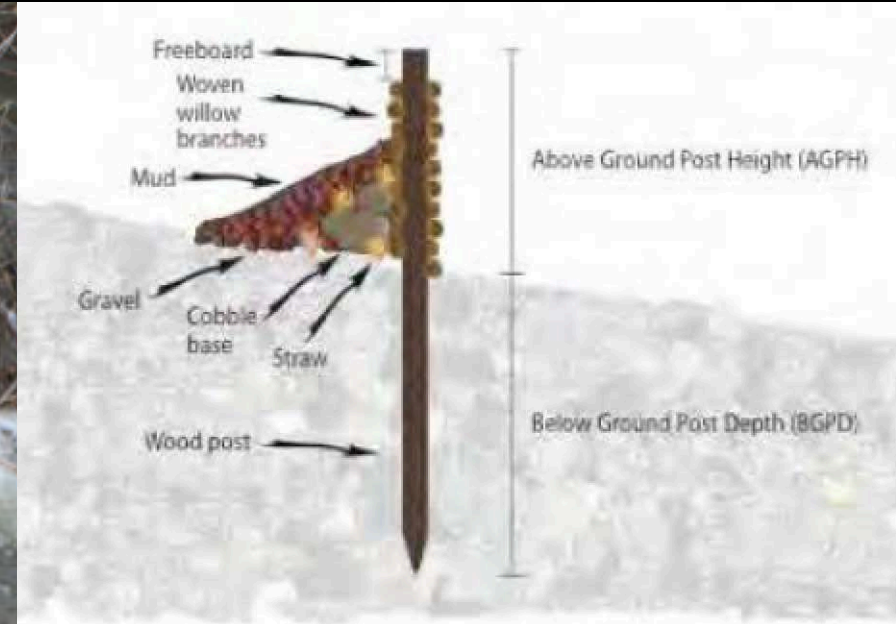
# Grazing Regime Change Allows Beaver to Colonize Susie Creek - Carlin, NV 1992 to 1999 to 2012



Courtesy of Carol Evans, BLM Elko District



# Beaver Dam Analogues (BDAs) entice beaver to build dams



## Working with Beaver to Restore Salmon Habitat in the Bridge Creek Intensively Monitored Watershed

Design Rationale and Hypotheses

Michael M. Pollock, Joseph M. Wheaton,<sup>1</sup> Nick Bouwes,<sup>2</sup> Carol Volk,<sup>3</sup> Nicholas Weber,<sup>2</sup> and Chris E. Jordan

October 2012



# AUDRAIN MEADOW RESTORATION



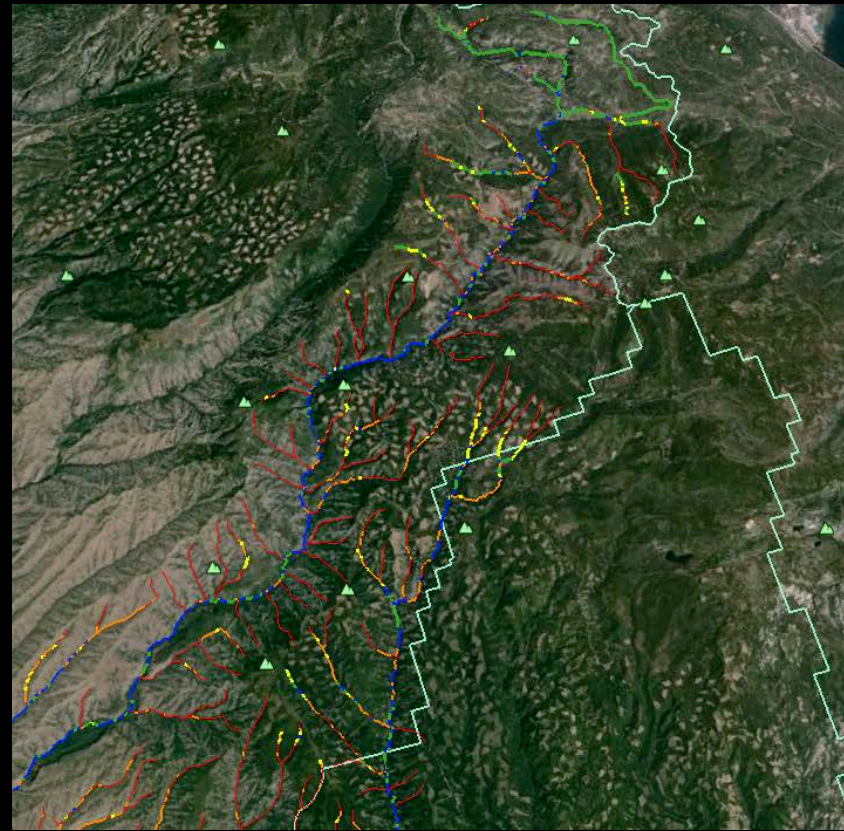
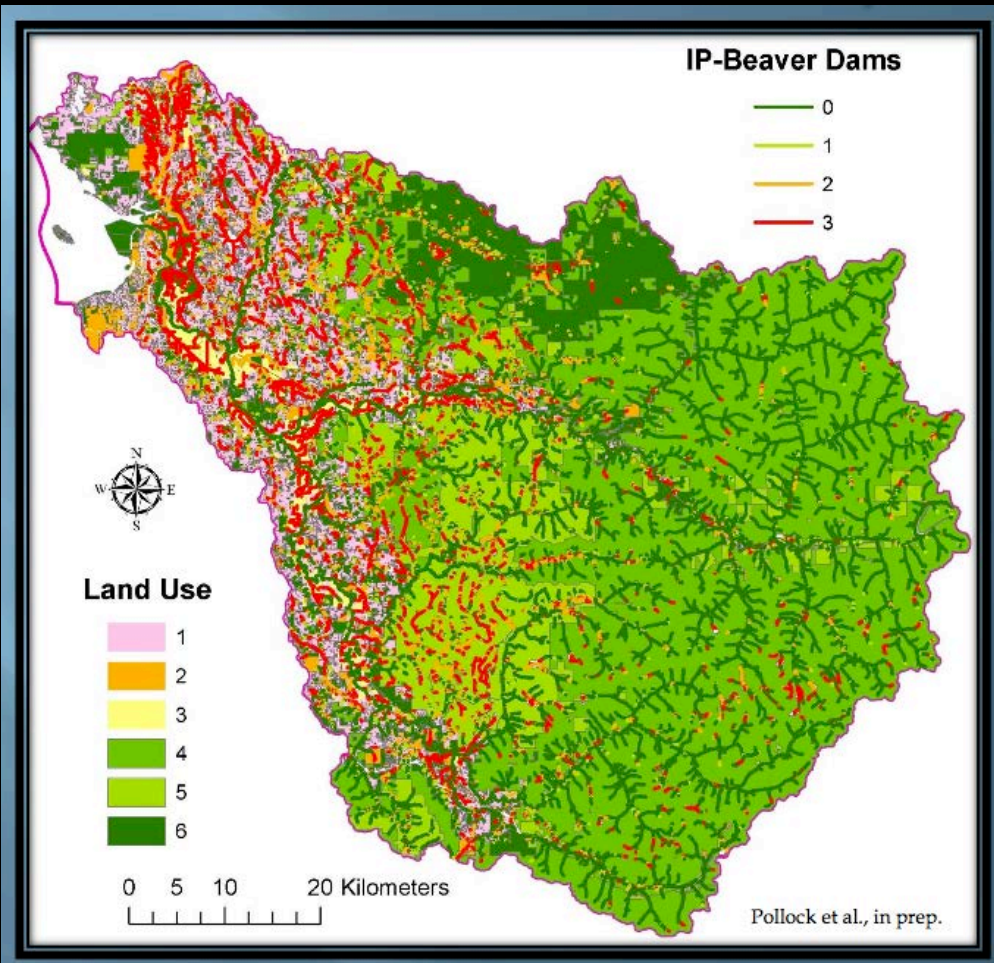
Partnership with:

Private landowner, USFWS, Point Blue, NRCS

Damion Ciotti of USFWS will share details on NFWF Meadows call in March 2016



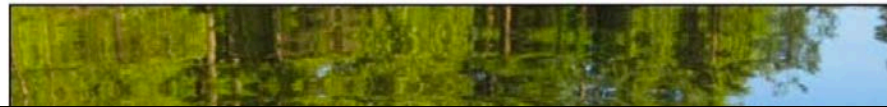
# ASSESS BEAVER RESTORATION FEASIBILITY USE TOOLS LIKE THE CASTOR MODEL (UNDER DEVELOPMENT FOR CALIFORNIA)





# Permitting? Regulatory Environment?

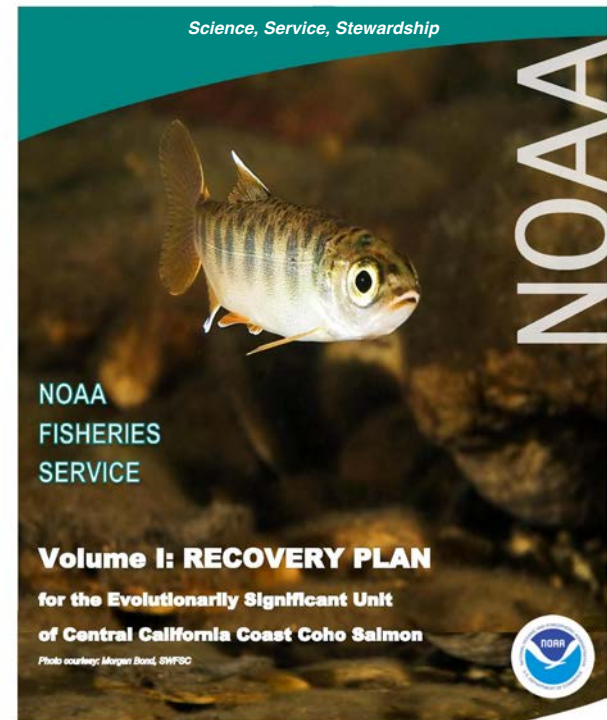
## Beaver Bill Unanimously Passes Washington State Senate



### UTAH BEAVER MANAGEMENT PLAN 2010 – 2020



## State Wildlife Action Plan: A plan for conserving California's wildlife resources while responding to environmental challenges





# WORKSHOP COMING UP AT THE SALMONID RESTORATION FEDERATION CONFERENCE IN FORTUNA, CA, APRIL 6, 2016

## Evolving Science and Policy to Restore Streams Using Instream Obstructions and Beaver Dam Analogues

34th Annual Salmonid Restoration Conference

**April 06, 2016**

9:00am - 5:00pm

**Workshop Coordinator:**

[Eli Asarian, Riverbend Sciences](#)

Instream structures such as beaver dams, wood jams, living vegetation, and other obstacles that slow the downstream movement of water and sediment are essential to the restoration of streams. These obstructions can be used to accelerate the development of "stage zero" channels (Cluer and Thorne 2013) which are increasingly recognized as having intrinsic high value because of the multiple and synergistic ecosystem goods and services that such systems provide. Stage zero channels have well connected floodplains with elevated water tables, spatially variable hydrologic regimes and structurally complex aquatic and riparian habitat. As such, they provide incredibly valuable habitat for a suite of terrestrial and aquatic taxa, including several Pacific salmon species that are in decline.







THANK YOU!  
QUESTIONS FOR US?



## OUR QUESTIONS FOR YOU:

1. How many of you are working on sites where beaver are present?
2. If not present, do you have evidence that they occurred there historically?
3. If they are present, what are you observing about their impacts?
4. Are you monitoring their impacts? If so, have you published your results?
5. Suggestions for metrics can we use to best monitor both the biotic and abiotic impacts?
6. Are conflicts arising and beaver being depredated?
7. Do you need help with damage mitigation?
8. Are you designing your treatments to include beaver restoration?
9. If not, why? What support do you need to do so?