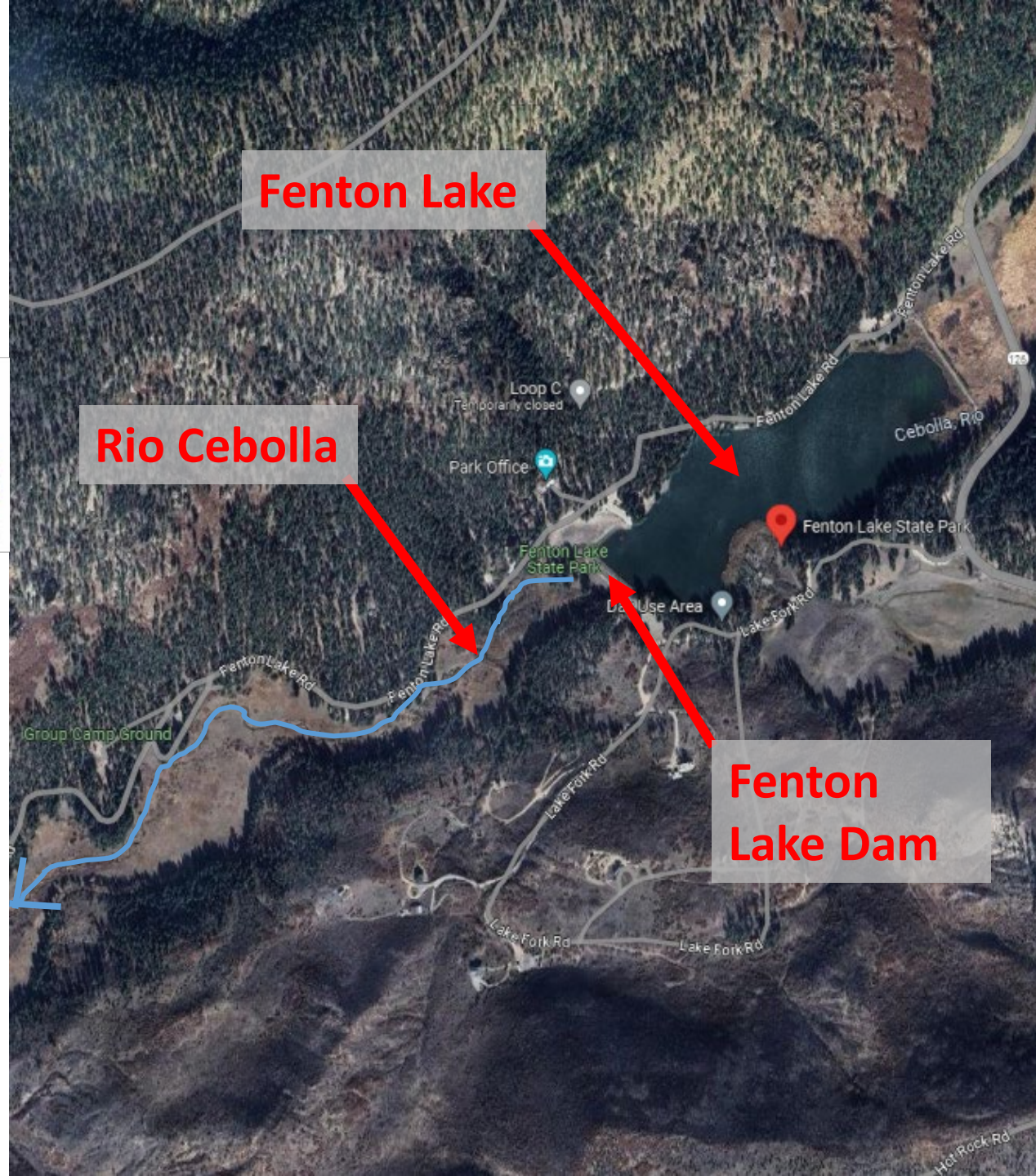


RiversEdge West
Riparian Restoration Conference
March 2024

The Original Ecological Engineer:
How Can Beavers Help With Restoration and Resiliency
of Streams and Riparian Areas?

Sydney Salzwedel





Fenton Lake State Park Fishing Enhancement with Beaver Dam Analogs

Phase 1 – Planning and Assessment



Eager

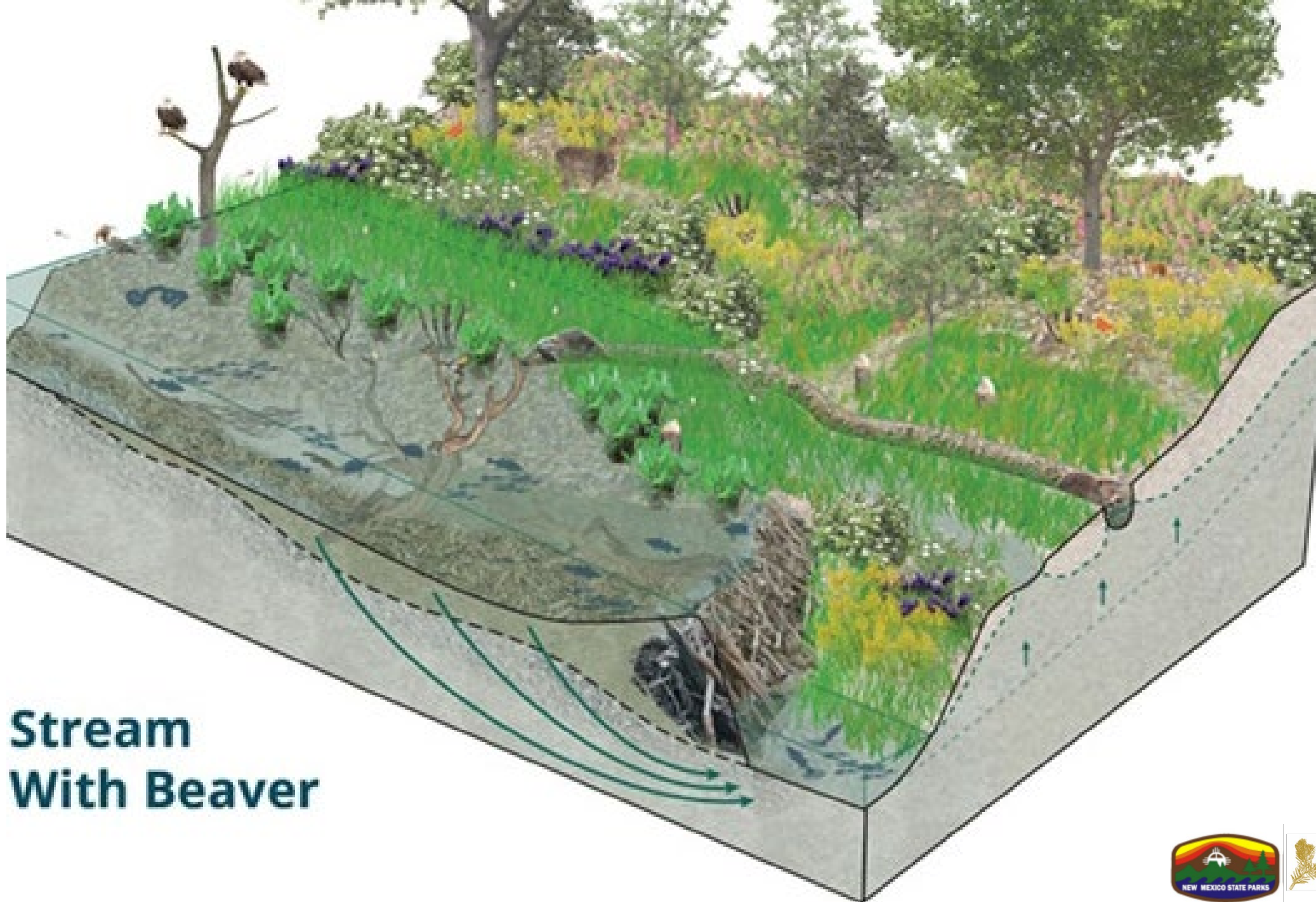
THE SURPRISING, SECRET LIFE OF
BEAVERS
AND WHY THEY
MATTER



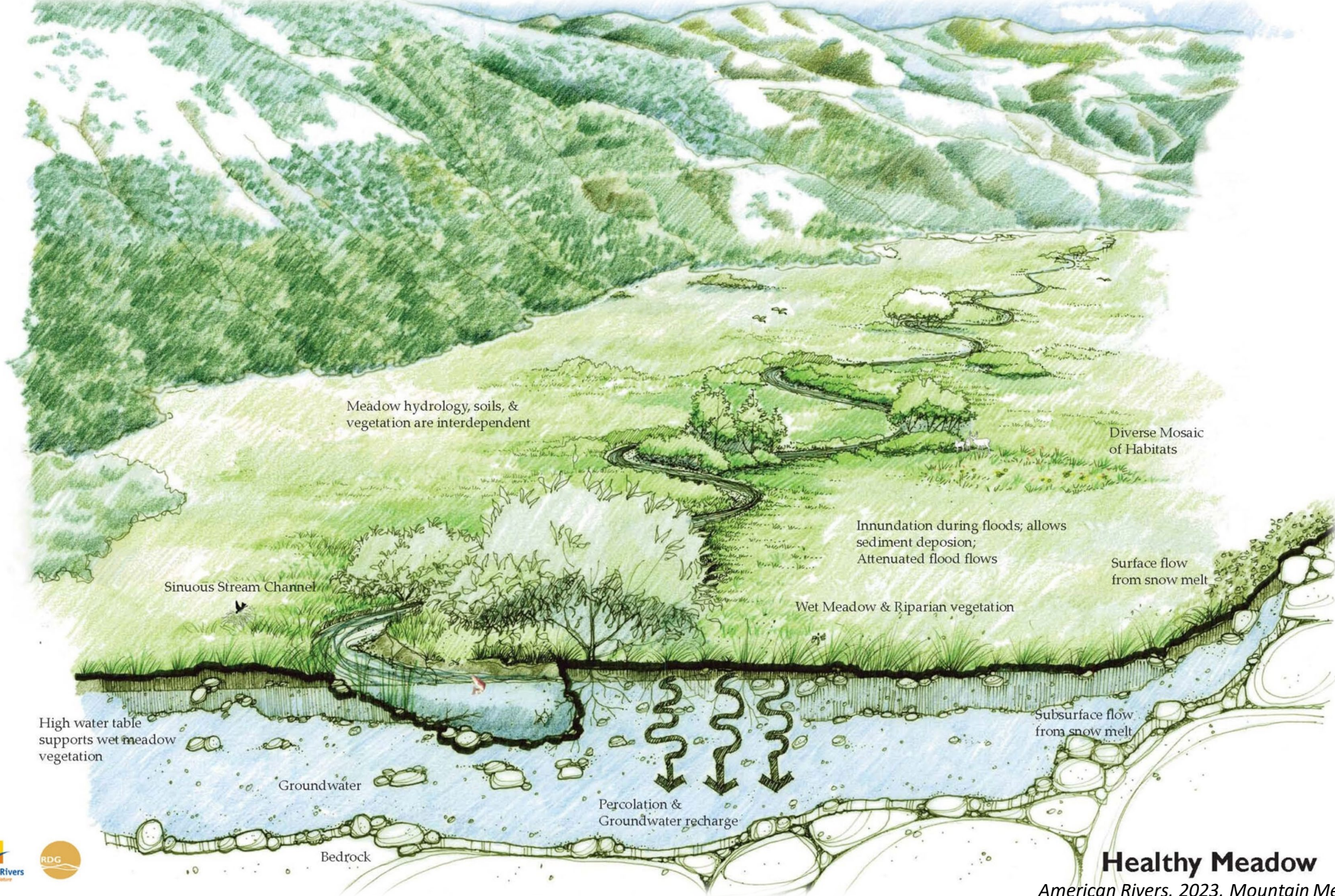
Ben Goldfarb

FOREWORD BY DAN FLORES





Stream With Beaver



Meadow hydrology, soils, & vegetation are interdependent

Diverse Mosaic of Habitats

Sinuous Stream Channel

Inundation during floods; allows sediment deposition; Attenuated flood flows

Surface flow from snow melt

Wet Meadow & Riparian vegetation

High water table supports wet meadow vegetation

Subsurface flow from snow melt

Groundwater

Percolation & Groundwater recharge

Bedrock

Healthy Meadow

American Rivers, 2023, Mountain Meadow Restoration



rodeotalesgypsytrails.blogspot.com

European trapping and colonization nearly eradicated beaver from North America in 40-60 years.

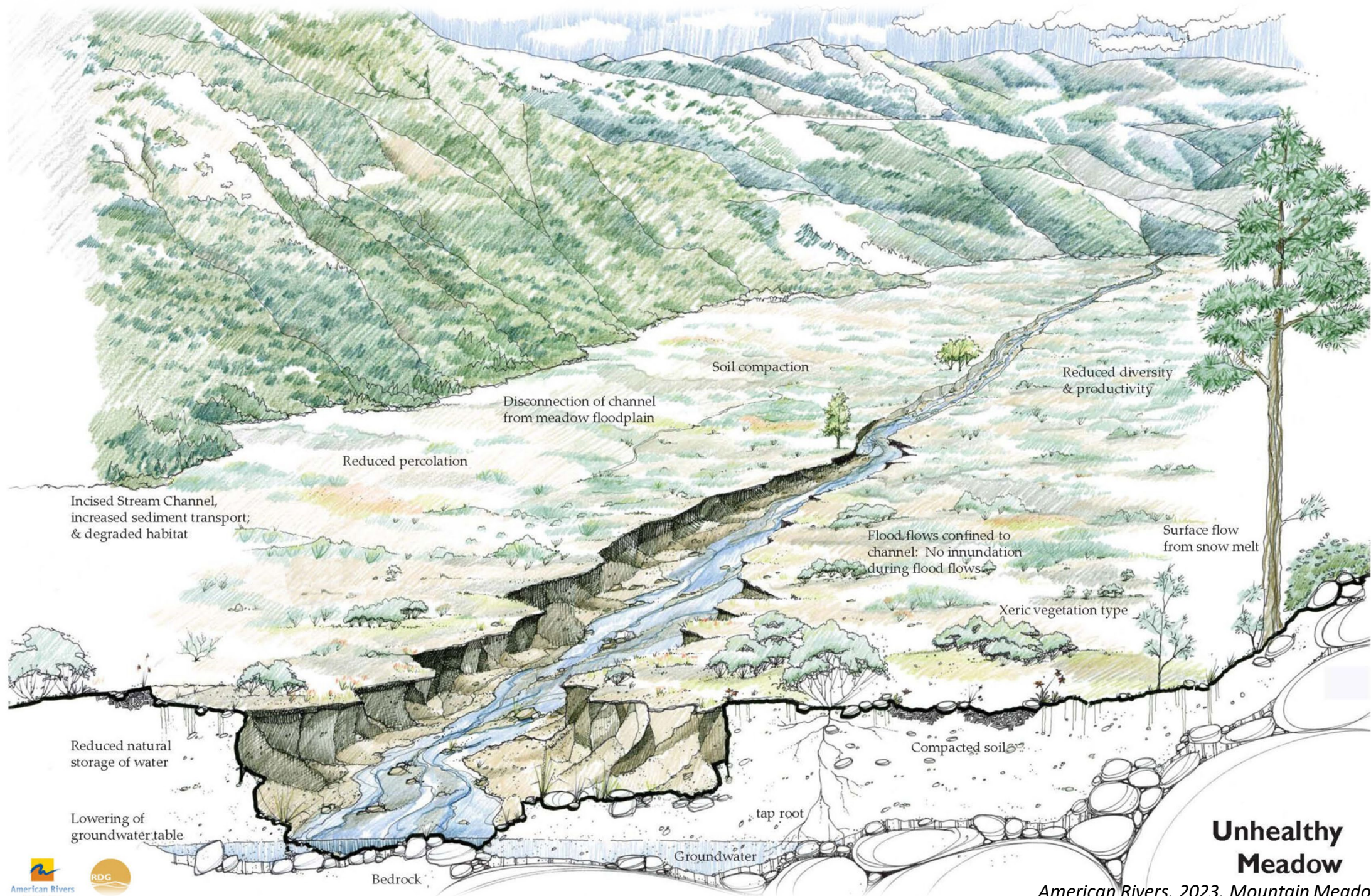
Their habitat was converted for waterpower and agriculture. Beaver were generally seen as a nuisance to society.



www.murfreesborotn.gov/164/Cannonsburgh-Village



Biohabitats
SOUTHWEST BASIN & RANGE BIOREGION



Soil compaction

Disconnection of channel from meadow floodplain

Reduced diversity & productivity

Reduced percolation

Incised Stream Channel, increased sediment transport; & degraded habitat

Flood flows confined to channel: No inundation during flood flows

Surface flow from snow melt

Xeric vegetation type

Reduced natural storage of water

Lowering of groundwater table

Compacted soil

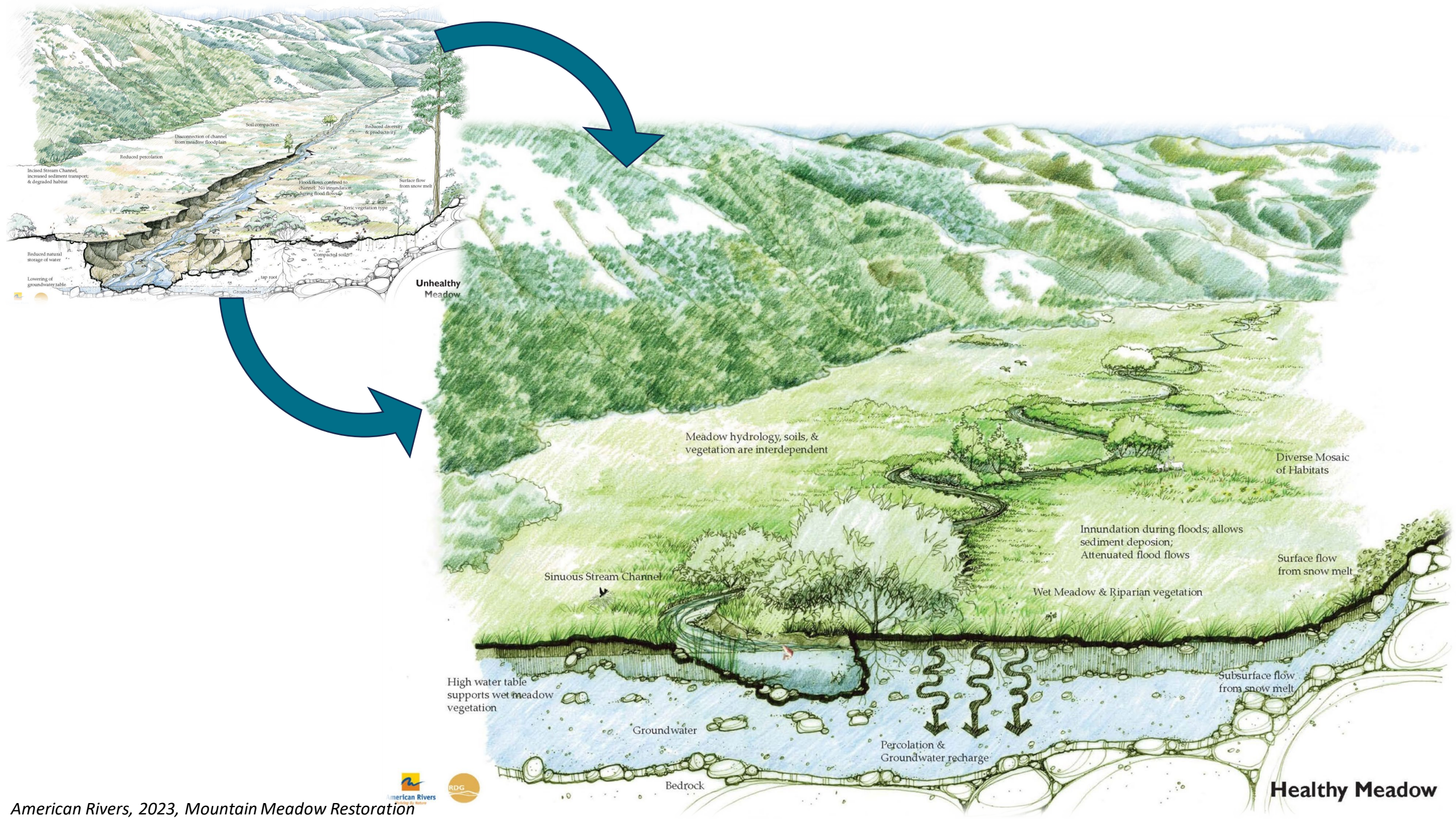
tap root

Groundwater

Bedrock

Unhealthy Meadow

American Rivers, 2023, Mountain Meadow Restoration

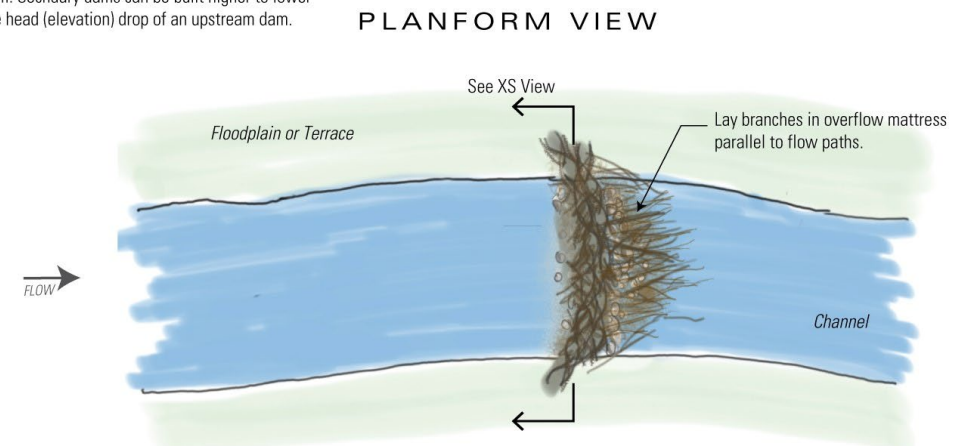
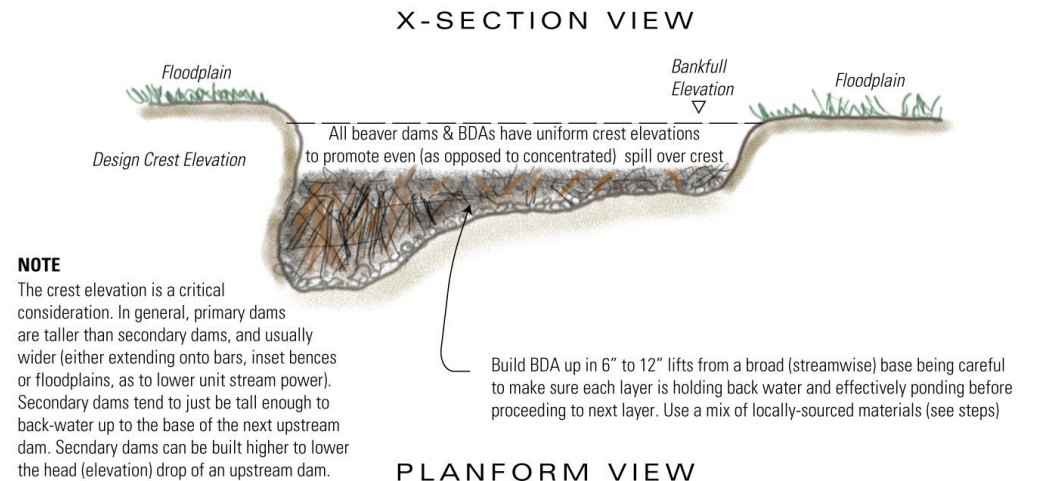
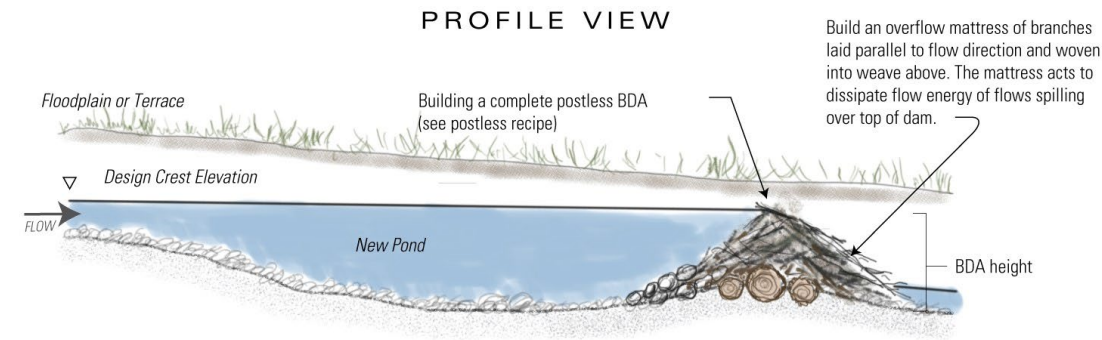


Beaver Based Restoration

Beaver Dam Analog (BDA) Structures:

“A permeable, channel-spanning structure with a constant crest elevation, constructed with a mix of woody debris and fill material to form a pond and mimic a natural beaver dam.”

- Mimic and promote beaver dam activity
- Encourage hydraulic diversity
- Hand-built with locally sourced natural material
- Permeable
- Not permanent without beaver involvement
- Should be built in high numbers



Before and After BDA Construction

Before:



After:



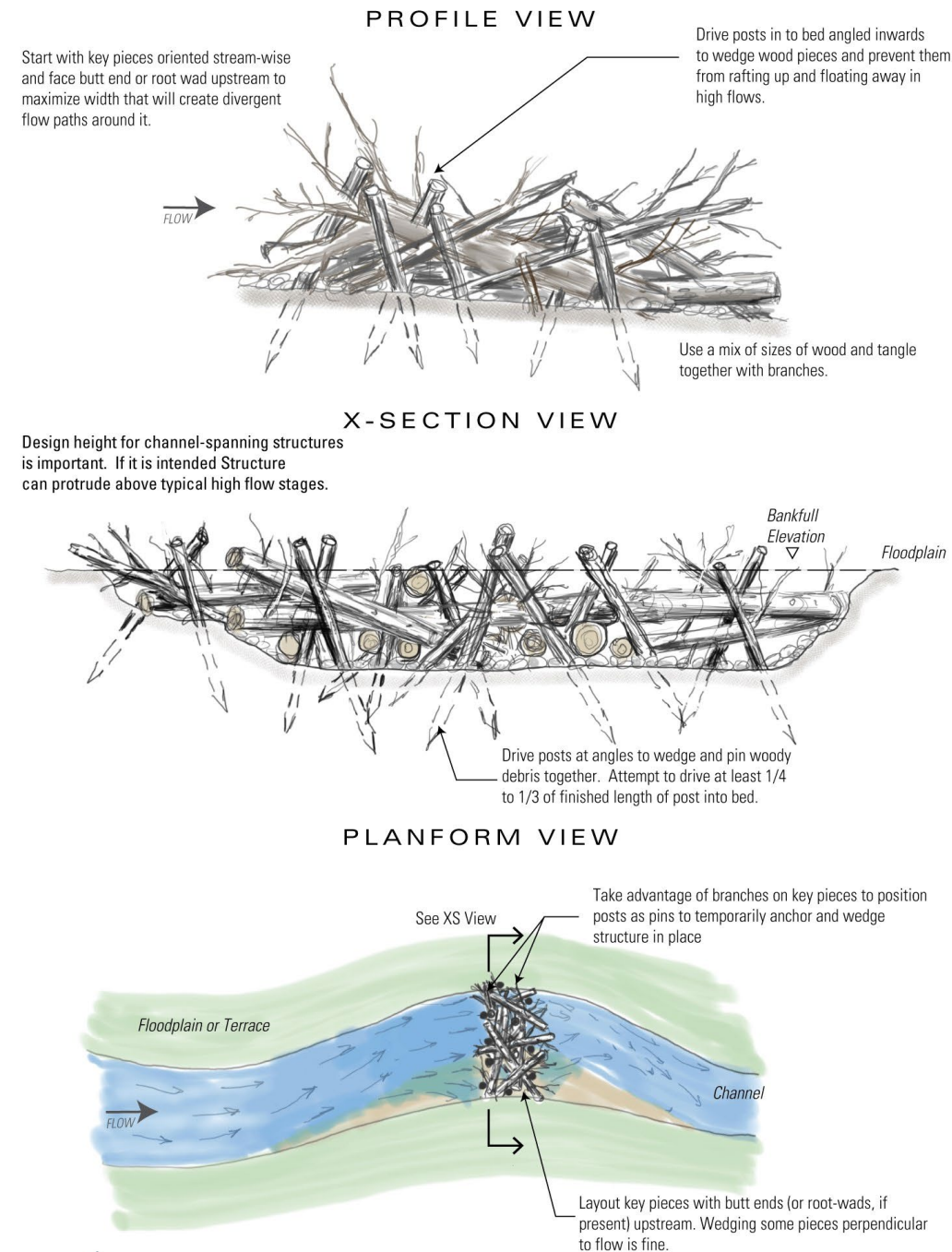
Distance of Water Surface to Top of Bank
Structure Location

Beaver Based Restoration

Post-Assisted Log Structures (PALS):

“Woody material of various sizes pinned together with untreated wooden posts driven into the substrate to mimic natural wood accumulations”

- Mimic and promote the processes of wood accumulation
- Hand-built with locally sourced natural material
- More permeable, temporary
- Should be built in high numbers
- Range of shapes, sizes and orientations



Before and After PALS Construction

Before:

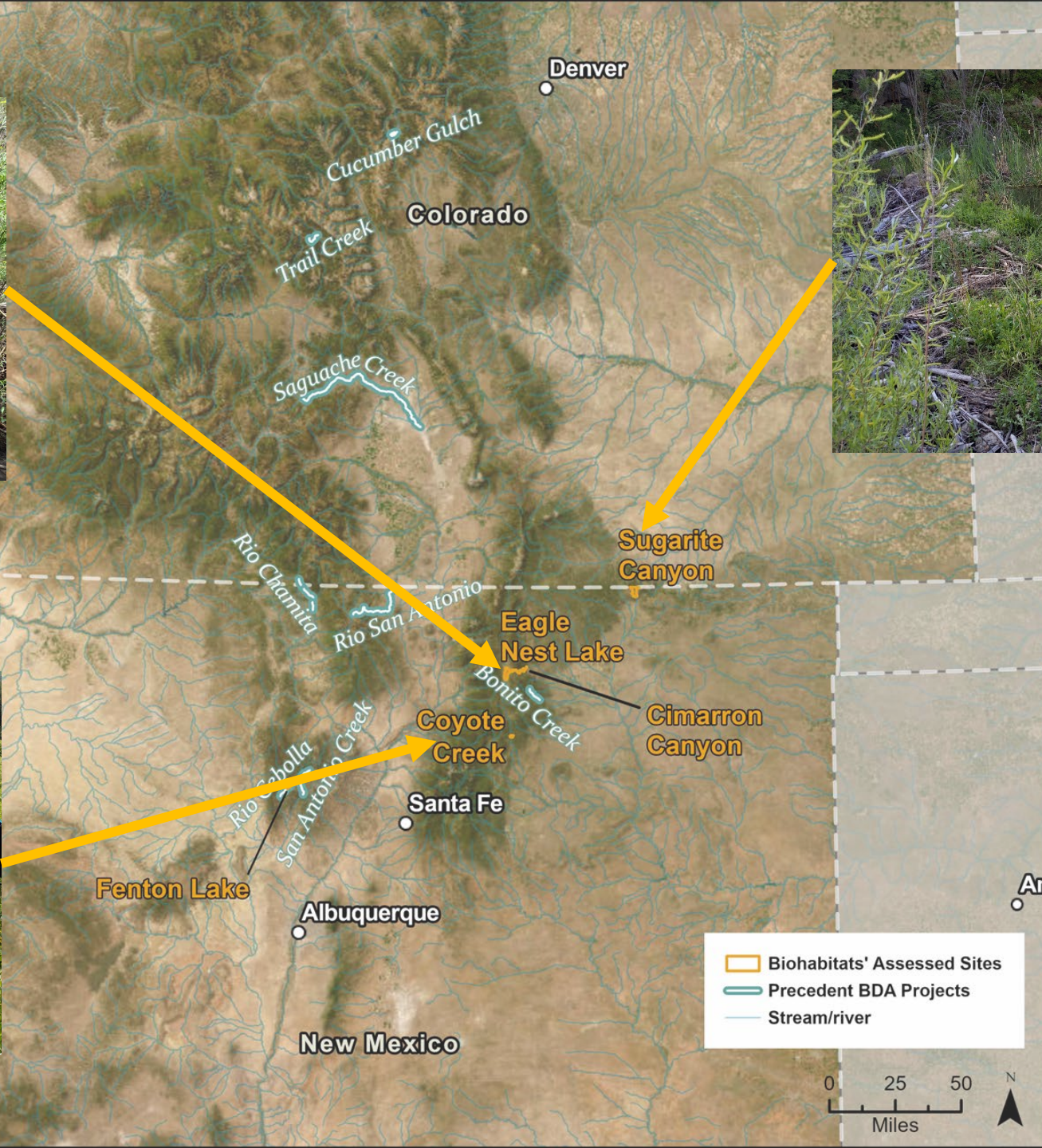


During:



After:





Existing Projects in New Mexico

Rio Cebolla
Built: 2017, 2018



San Antonio Creek
Built: 2020



Lessons Learned from Existing Projects

- **Accept some degree of “failure”**
- **Structure redundancy**
- **Structure height, width**
- **Location can be key!**
- **Vegetation is a large part of beaver recruitment**



Fenton Lake Aerial Comparison

September 2017
No Beavers



May 2020
Beavers!



Aerial Comparison (continued)

**May 2020
Beavers!**



**June 2022
Beavers!!**



Aerial Comparison (continued)

June 2022 (Google Earth)
Beavers!



August 2023 (drone flight)
No Beavers 😞



VALLEY BOTTOM MARGIN

BEAVER DAM STRUCTURE

OLD FLOODPLAIN EXTENTS

OLD WETTED EXTENTS

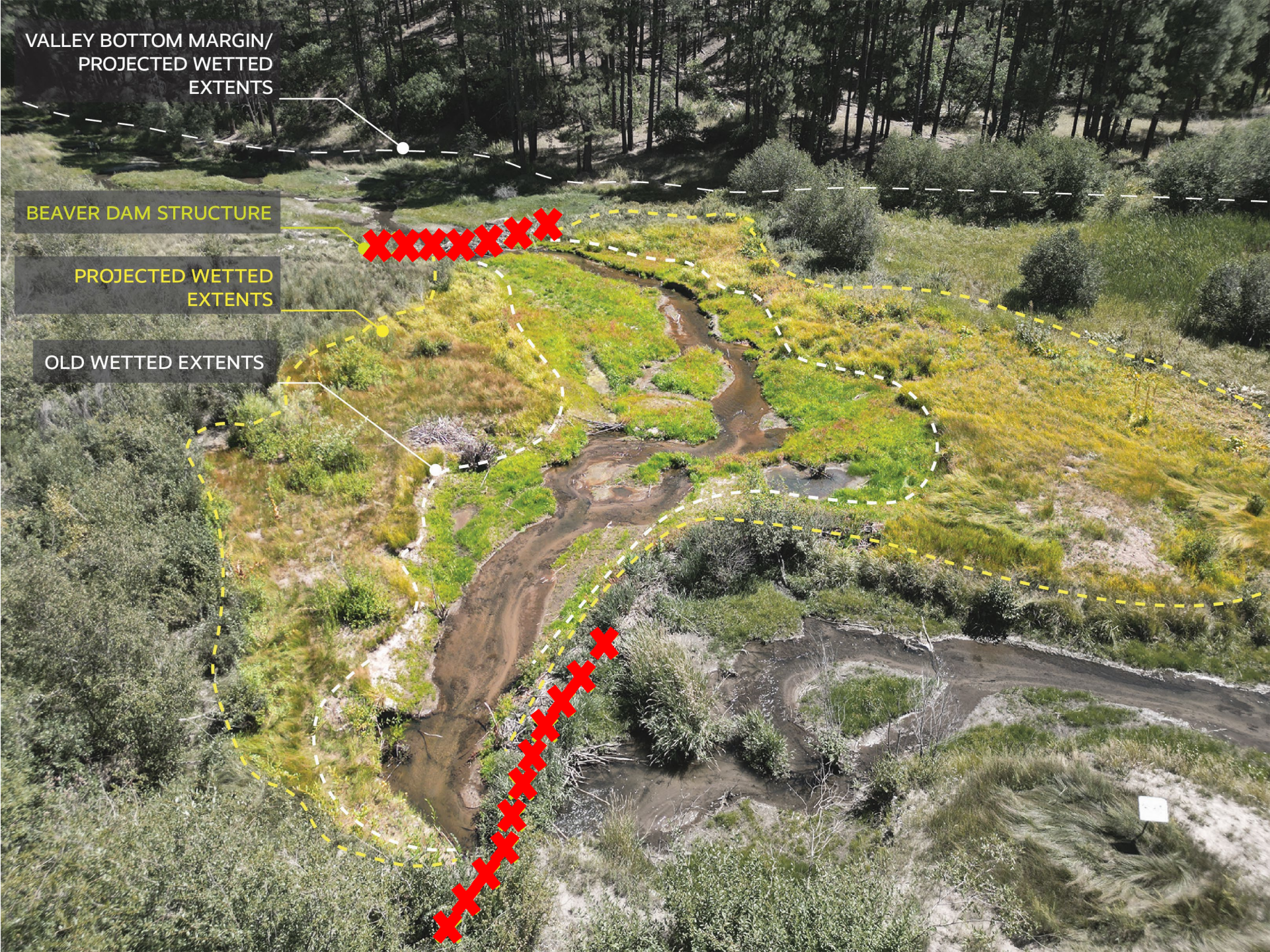


VALLEY BOTTOM MARGIN/
PROJECTED WETTED
EXTENTS

BEAVER DAM STRUCTURE

PROJECTED WETTED
EXTENTS

OLD WETTED EXTENTS





RESTORE
BEAVER DAM ANALOG

VALLEY BOTTOM MARGIN

EXISTING

EXISTING



COMPLEX 03

FENTON LAKE

SYSTEM STATS

- Q 2yr = 226 cfs
- Slope = 0.5%
- Width = 10'
- Sinuosity = 1.36
- Drainage Area = 48 sq miles

COMPLEX 01

COMPLEX 02

COMPLEX 02

COMPLEX 01

COMPLEX 03



1000 FT



C2



C2



C3



C3



Beaver Based Restoration at Fenton Lake State Park:

Stream and
Riparian
Restoration

Recreation
Enhancement

Low Tech and Cost
Effective



Where are we now?

Site assessment
Project planning

What's next?

Final design
Permitting
Construction



Discussion:

**For those who do this work, what lessons have YOU learned?
Other key information/considerations for LTPBR projects?**



THANK YOU!

