Photo: Joe Leonhard/TNC

# Integrating Low-Tech Process-Based Restoration with Invasive Vegetation Management in High Desert and Southwest Riverscapes


**Joe Leonhard,** The Nature Conservancy

**John Leary,** RiversEdge West

**Alix Pfennigwerth,** The Nature Conservancy

**Gabriel Bissonette,** Bureau of Land Management


The Nature Conservancy

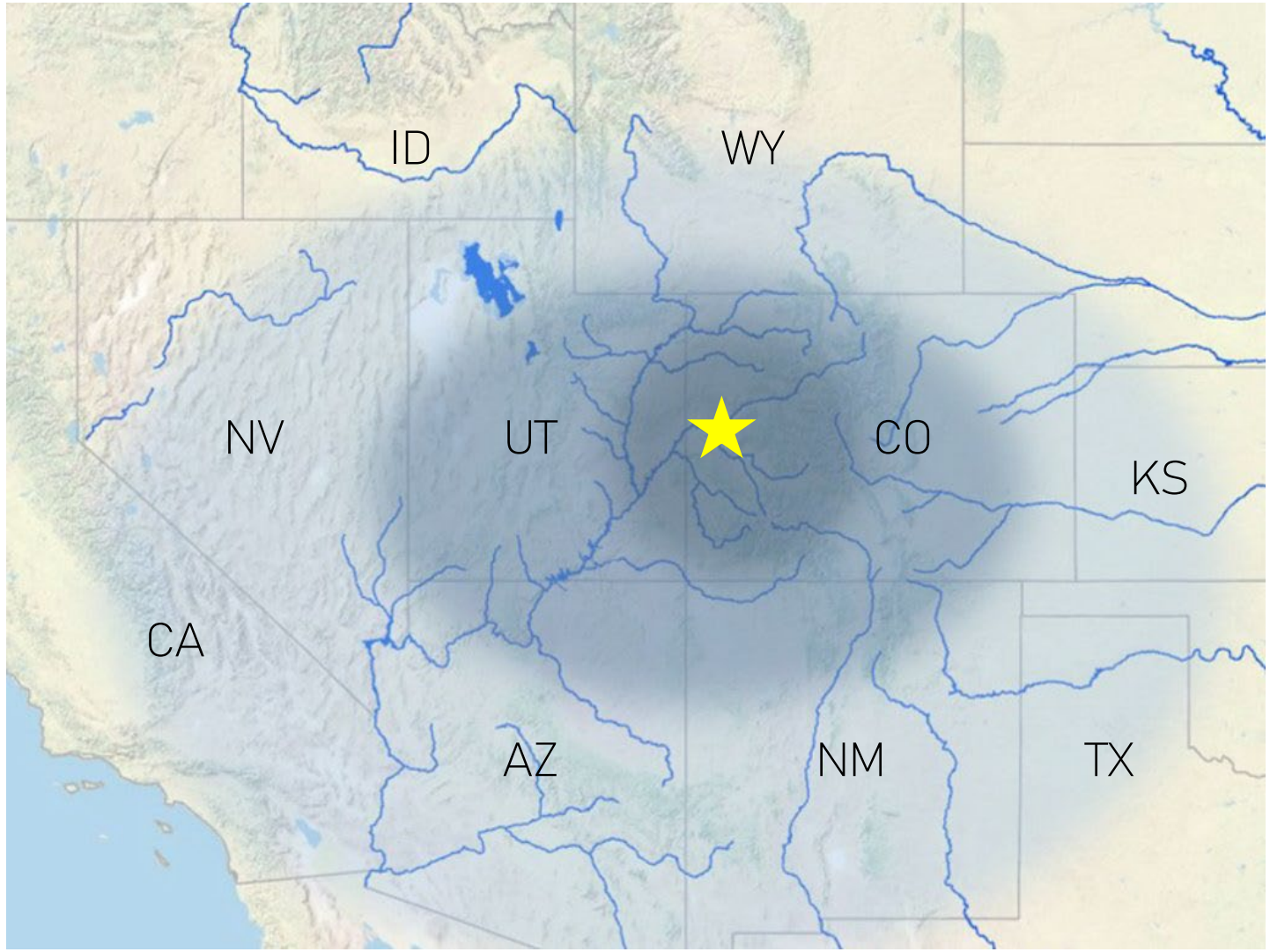
U.S. Department of the Interior Bureau of Land Management

RiversEdge West
RESTORE + CONNECT + INNOVATE

# RiversEdge West

- Mission: Restore riverside ecosystems (riparian lands) through education, collaboration, and technical assistance
- Vision: We envision a network of healthy riparian ecosystems throughout the Western US.

RiversEdge West
RESTORE + CONNECT + INNOVATE



# The Nature Conservancy

•Mission: To conserve the lands and waters on which all life depends

•Our work addresses the interconnected crises of climate change and biodiversity loss.

•Three priorities

- Tackle climate change
- Protect oceans, lands, and fresh water
- Provide food and water sustainably

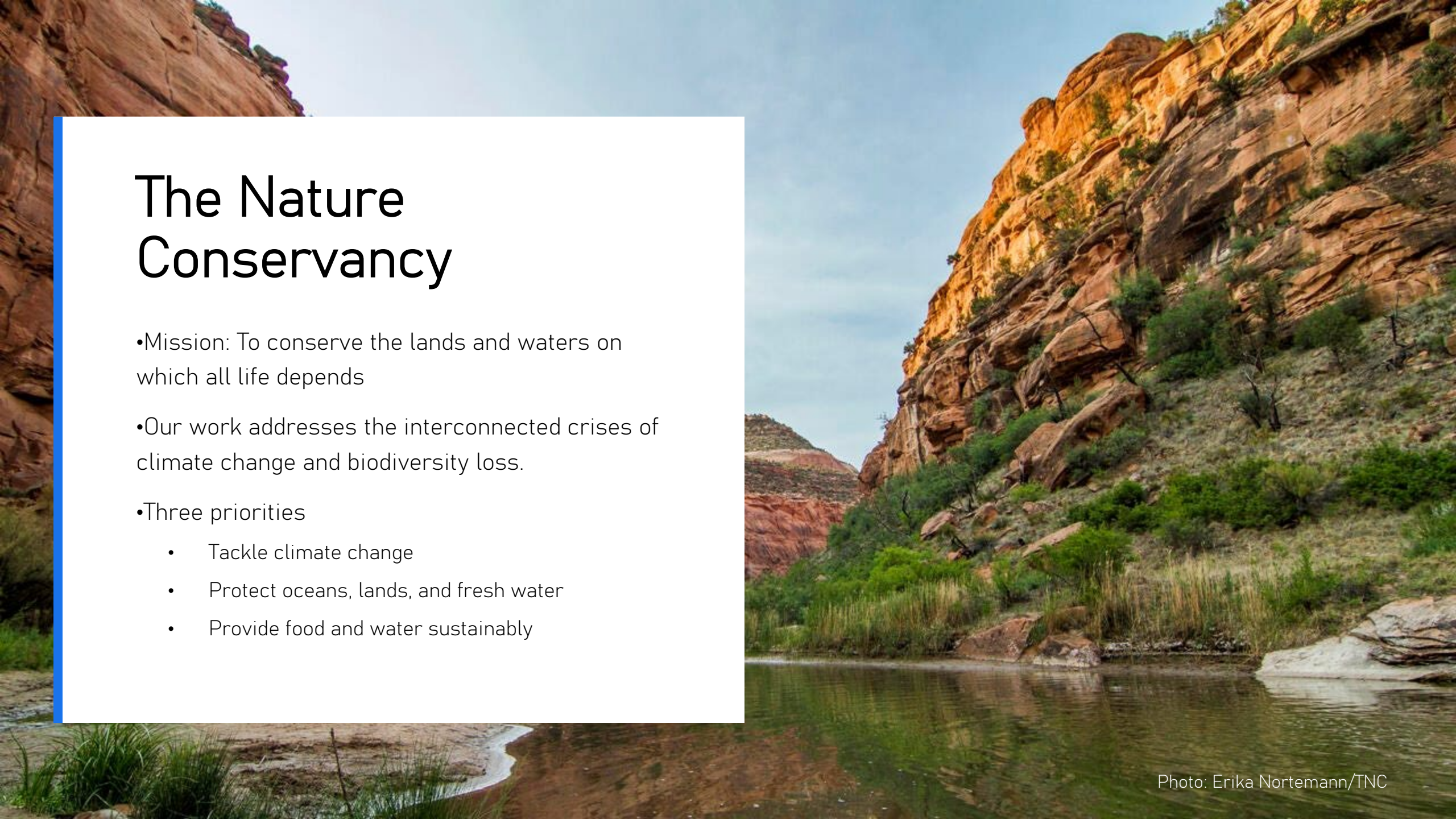
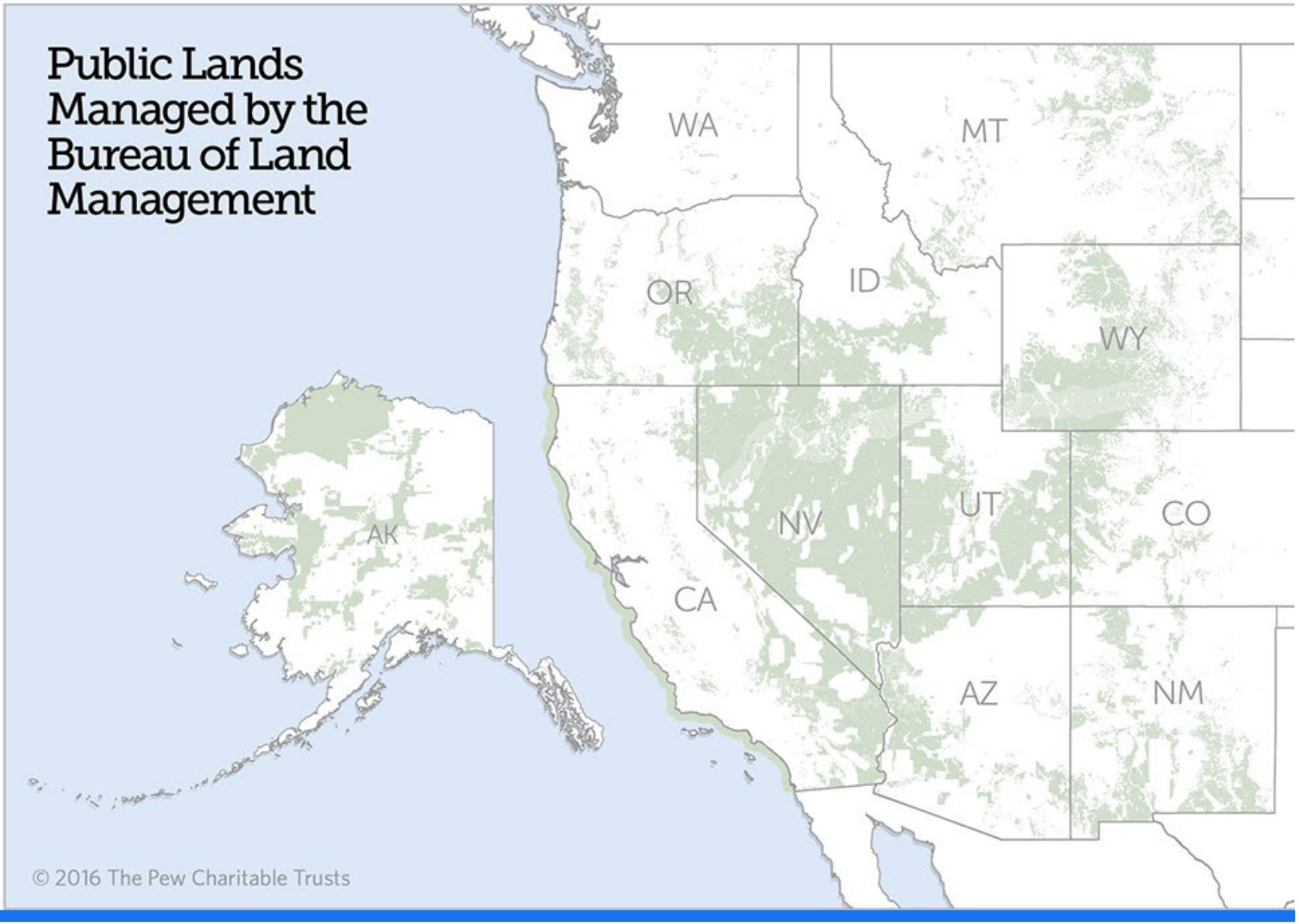


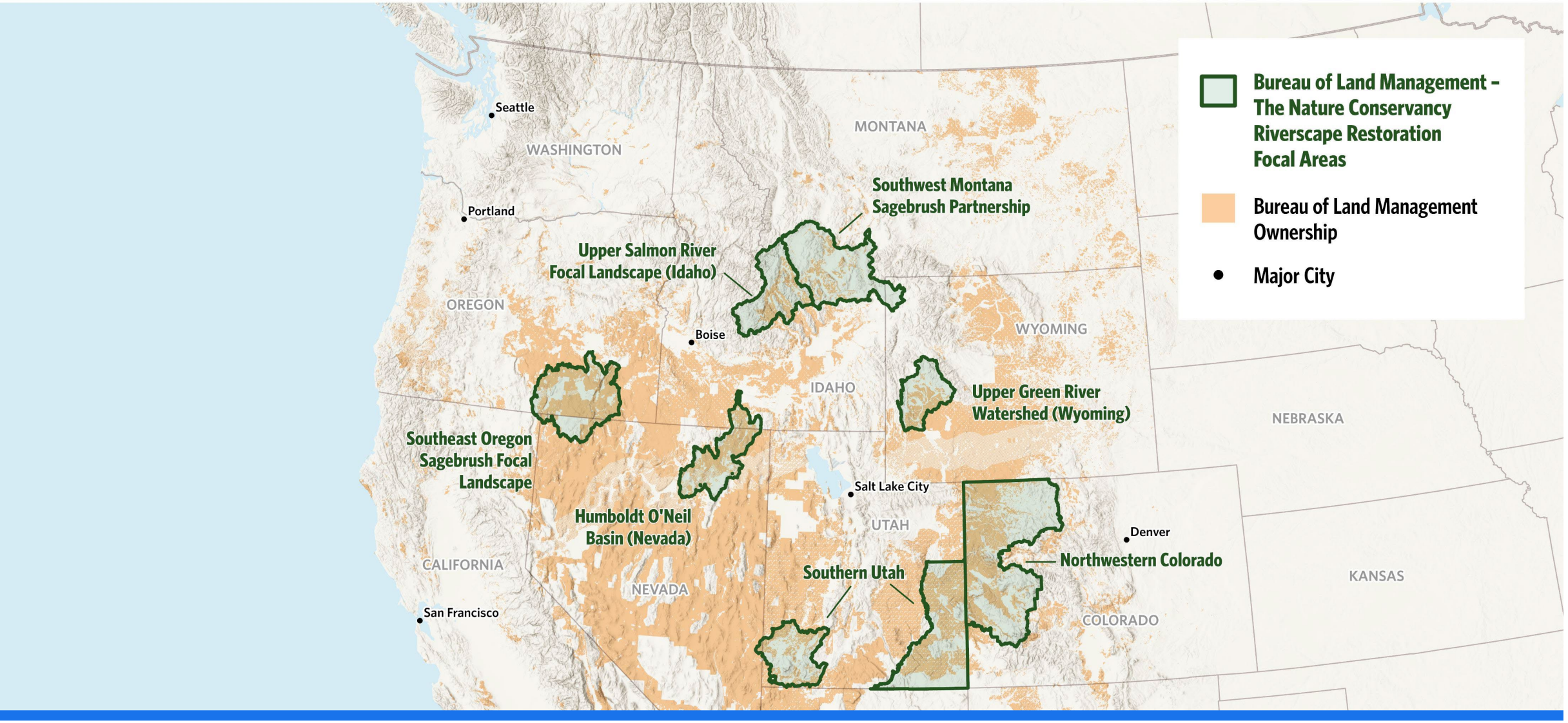
Photo: Erika Nortemann/TNC




# Bureau of Land Management

•Mission: To sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

# Bureau of Land Management – The Nature Conservancy Riverscape Restoration Focal Areas



## Convergence

- 3 organizations with shared geographies
- Riparian health goals
- Tools
  - Low-tech Process-based Restoration
  - Invasive plant management

Photo: Joe Leonhard/TNC

## Unique Ecological Context

- Saline soils
- Long-term loss of beaver activity
- Ongoing and intensifying drought
- Pervasive woody invasive species

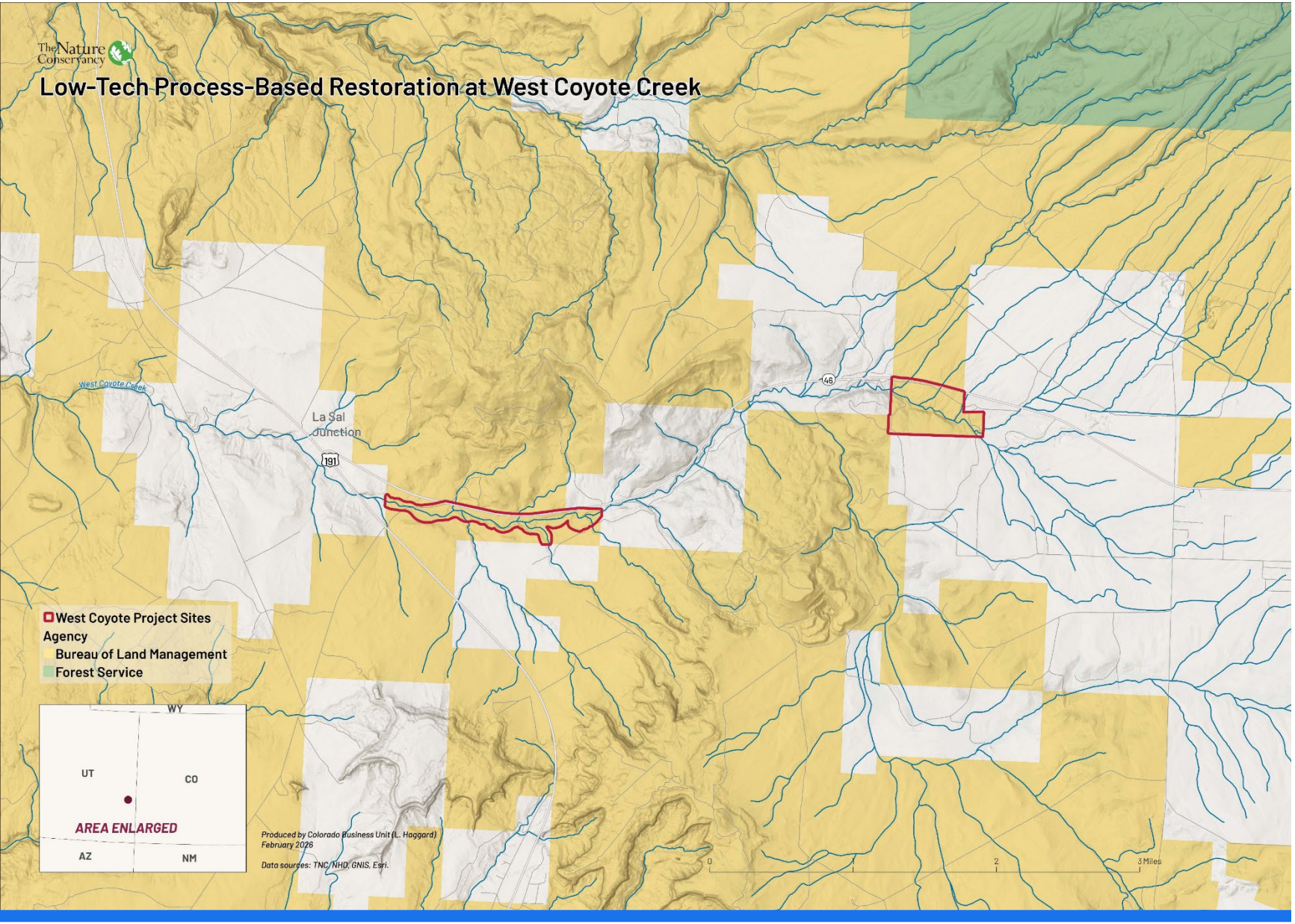
# Why pair invasives removal and LTPBR?

- Both methods recognized as important tools for restoration
- Gap in literature about their combined effects despite widespread use
  - Pennock et al. (2022)
- Our working hypothesis:
  - Combining these methods may produce synergistic effects
- Practical application where native wood sources are lacking

# Project Objectives

- Improve overall riverscape health
- Increase channel complexity and floodplain connectivity
- Lengthen temporary water storage and residence time
- Reduce invasive cover; increase native woody riparian vegetation extent
- Higher quality habitat for a variety of species
- Extend perennial extent

Photo: Alix Pfennigwerth/TNC




# Case Study #1: West Coyote Creek

- Small, perennial-intermittent stream
- 20 miles south of Moab, UT
- Spring-fed baseflows
- Upstream diversions
- Likely supported beaver populations historically
- Cattle trailing area
- Current project area: 1.7 stream miles

Photo: Alix Pfennigwerth/TNC

# Phase I: tamarisk removal

- **2023-2024:** tamarisk removal + native seedbank restoration

# Phase II: LTPBR implementation

- **Oct 2025:** over 100 Beaver dam + log jam analogs installed
- Cured tamarisk biomass used as:
  - Keystone logs in BDAs
  - Primary material in log jams
  - Drift fence/barriers to deter cattle from walking on structures

Photos: Alix Pfennigwerth/TNC; Utah Conservation Corps

# Future directions

- Ongoing monitoring
  - Changes in inundation, channel complexity, & riparian vegetation (USU drone imagery)
  - BLM riparian/wetland/lotic AIM
  - Tamarisk re-treatment needs
- Spring 2026: LTPBR adaptive maintenance + additional structures
- Phase III: replicate same phased approach on 2.5 miles of adjoining state-managed stream

Photo: Alix Pfennigwerth/TNC

# Case Study #2: Yellow Creek

- Perennial stream
- 25 miles west of Meeker, CO
- Spring-fed baseflows + additional snowmelt & monsoon inputs
- Active beaver complexes, but lacks native woody vegetation
- BLM horse management area

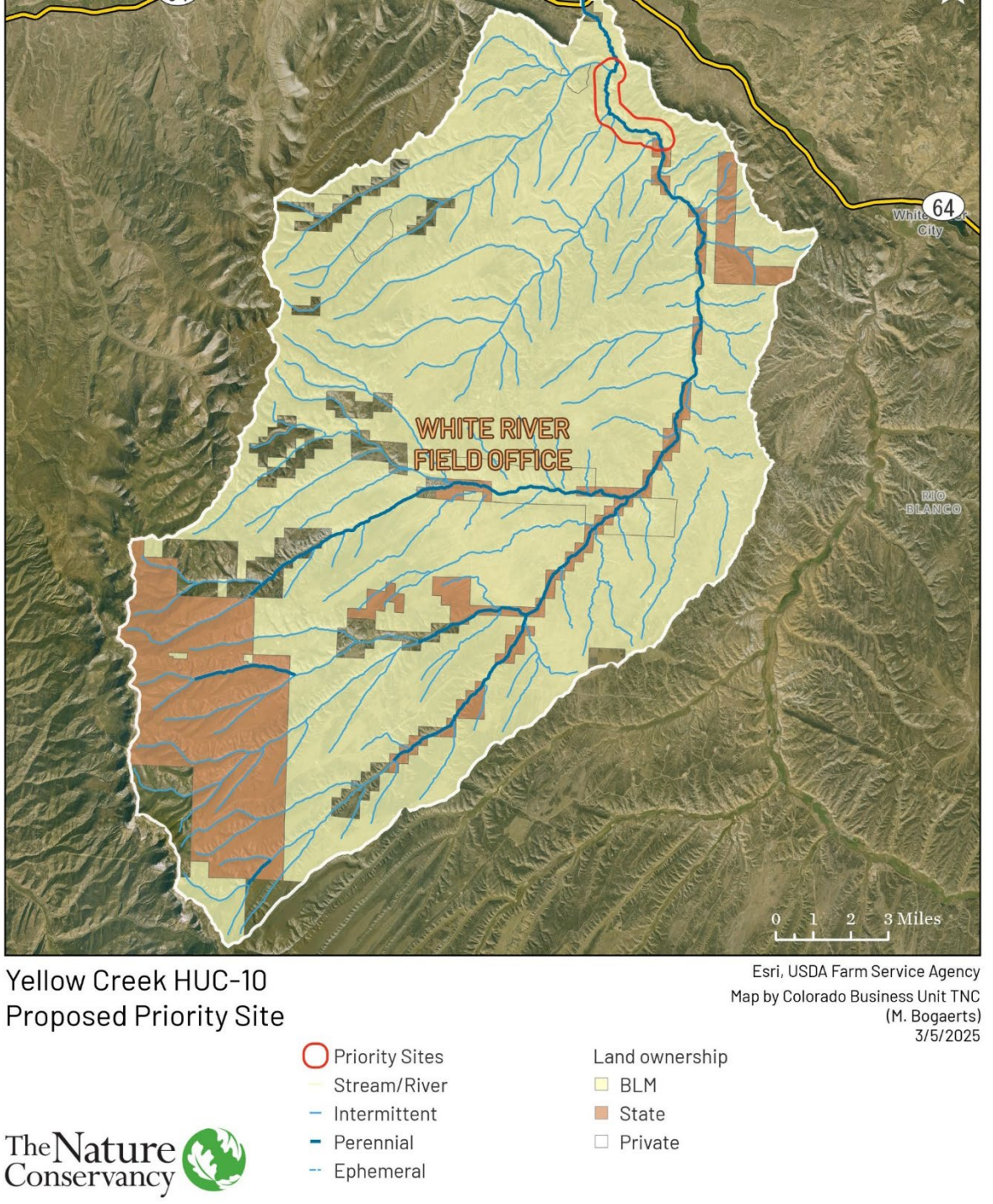


Photo: Joe Leonhard/ TNC

# Yellow Creek

- 2021 Prioritized Tamarisk Management
  - White River Partnership
  - BLM WRFO, REW, White River Alliance, White River Conservation District, landowner, permittee





- Tamarisk Treatment
  - Western Colorado Conservation Corps
- Native vegetation planting
  - Western Colorado Conservation Corps
  - RiversEdge West
  - White River Alliance

Photo: Western Colorado Conservation Corps

Photo: John Leary/REW

Photo: Western Colorado Conservation Corps

# Project Management

Short term

- Piling tamarisk for future use
- Cutting access to the creek
- Learning and information sharing

# LTPBR Implementation

- **Sept 2025:** 70 structures (BDAs, PALS, rock/sod plugs) installed on 1.3-mile reach
- Cured tamarisk biomass used in PALS
- Biocontrol-weakened tamarisk used in some BDAs
  - Especially in areas with limited access
  - Will they resprout?

Photos: Joe Leonhard/TNC

# Yellow Creek next steps

Use of tamarisk in structures

- Biomass management
- LTPBR needs material
  - Logistics and cost

Adaptive Management

- Monitoring
- USGS Salinity Study
- Fall 2026: LTPBR structures + maintenance
- Invasive plant management
- Native plant revegetation

How to grow a tamarisk tree

Michael Holland

Published: Monday, 1 May 2023 at 4:32 pm

Advice on growing and caring for a tamarisk tree, in our Grow Guide.

Gardenersworld.com

# What are we learning?

- Removing invasives creates space
  - Native vegetation
  - Lateral movement of creek
- Cured tamarisk biomass is useful in some applications
- Efficiencies gained
  - NEPA
  - Contracting
  - Materials

Photo: Alix Pfennigwerth/TNC

# Outstanding Questions

- What is the needed cure time for tamarisk and Russian olive?
- How will invasives respond to inundation and changing groundwater levels?
- What are the best management practices?

Photo: Joe Leonhard/TNC

Photo: Joe Leonhard/TNC

# Call to action

- Doing similar work? We'd love to learn from you!
- Join the **Riverscapes Cosortium Southwest PBR Community,** or just reach out!

Photo: Alix Pfennigwerth/TNC

# Thank you!


**Joe Leonhard**
joseph.leonhard@tnc.org

**John Leary**
jleary@riversedgewest.org

**Alix Pfennigwerth**
a.pfennigwerth@tnc.org

**Gabriel Bissonette**
gbissone@blm.gov


The Nature Conservancy

RiversEdge West
RESTORE + CONNECT + INNOVATE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT