



Stewarding Wilderness in the Anthropocene: Fish and Wildlife Management in the Fossil Ridge Wilderness, Colorado, USA

by Tobias Nickel



Personal Introduction

- BA in Philosophy, Political Science, & Environmental Science from the University of San Diego
- Forest Service, Bureau of Land Management, National Park Service, California Wolf Center, Catalina Island Conservancy, European Union
- MEM in Public Land Management at Western Colorado University
- Passion for stewarding, defending, and learning about wilderness



Outline

- Wilderness-wildlife interrelationships
- Wildlife management from the perspective of wilderness character
- Wildlife-related wilderness stewardship dilemmas
- Introduction to the Fossil Ridge Wilderness
- Selecting and Conserving Priority species
- Concluding Thoughts



Wilderness-Wildlife Interrelationships



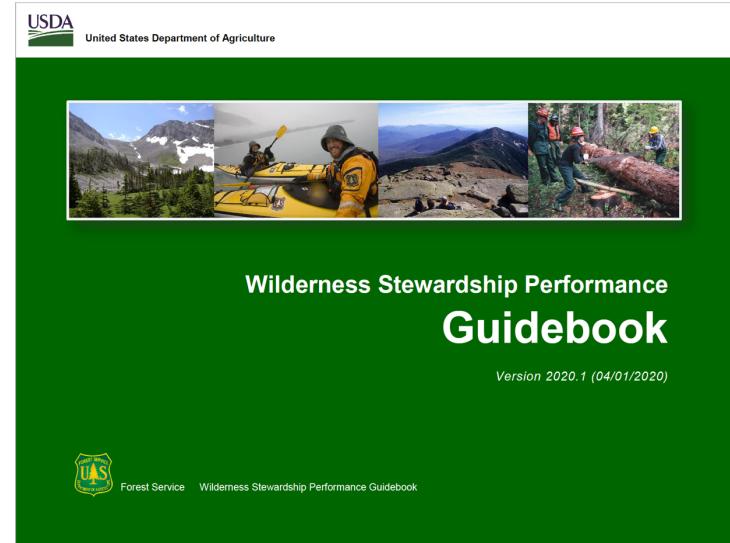
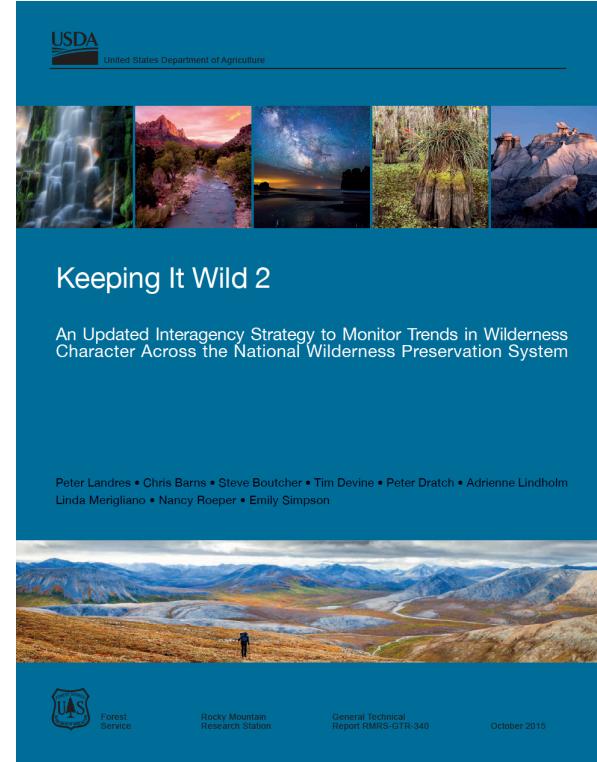
Wilderness Role in Fish and Wildlife Conservation

- Protected areas and biodiversity conservation
- Reduce extinction risk
- Prohibit land uses incompatible with conservation
- Intact, unfragmented habitat
- Importance of refuge function due to climate change
- Natural processes and evolution
- Laboratory and baseline

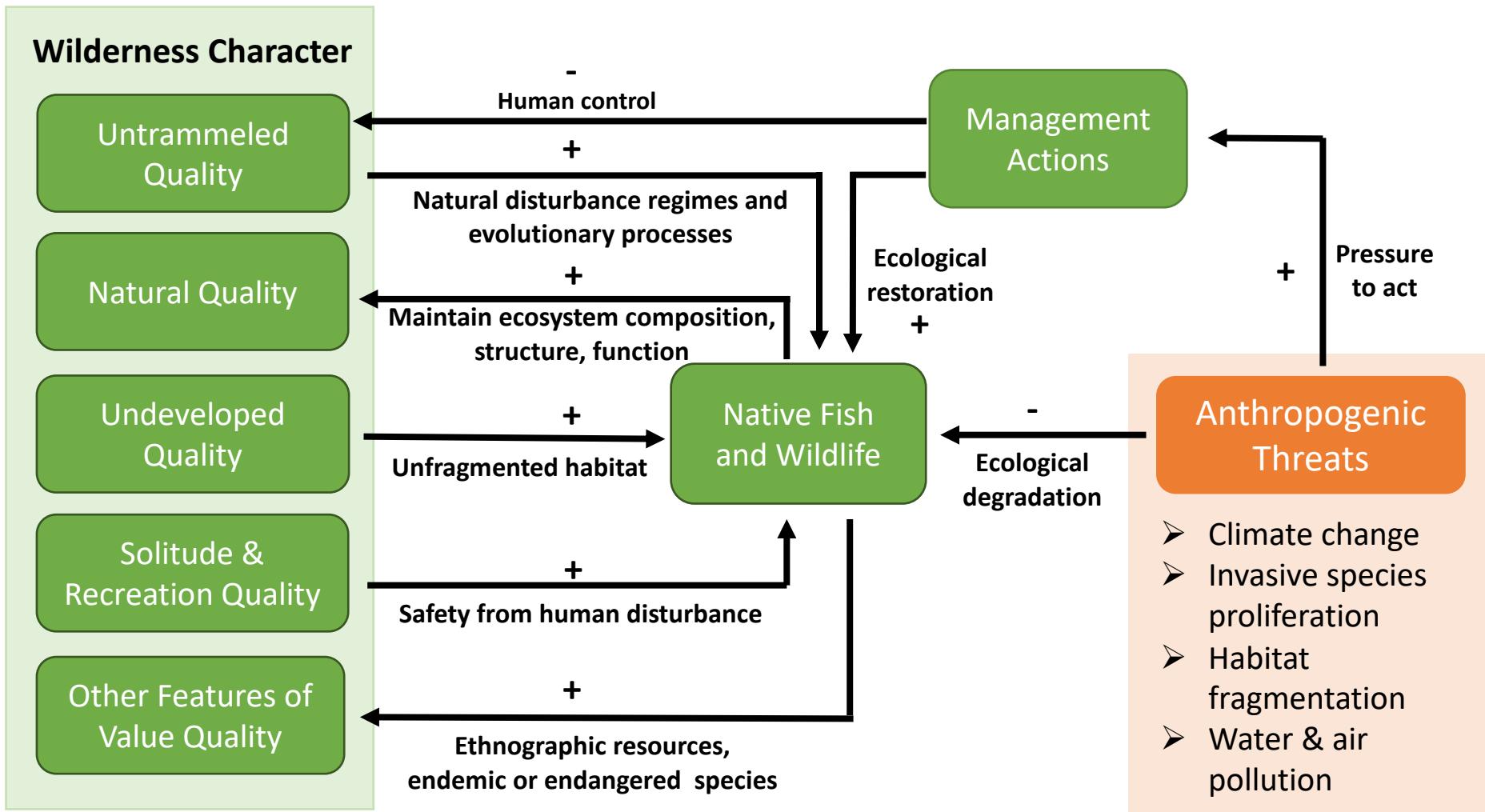


Fish and Wildlife as a Measure of Wilderness Character

- Wildlife as an integral component of wilderness character
 - Culturally
 - Ecologically
- Presence or absence of species as indicators of wilderness character
- National wilderness character monitoring and stewardship programs



Fish and Wildlife Management from the Perspective of Wilderness Character



Wilderness Stewardship Dilemmas: Balancing the Natural and Untrammeled Qualities of Wilderness Character

- *Untrammeled Quality:*
Wilderness is self-willed and not subjugated to human purposes and intentional manipulation
- *Natural Quality:*
Wilderness is free from the effects of modern civilization
- Often linked in an inverse way
 - Controlling invasive species
 - Prescribed burns
 - Species reintroductions
- Decision trade-offs



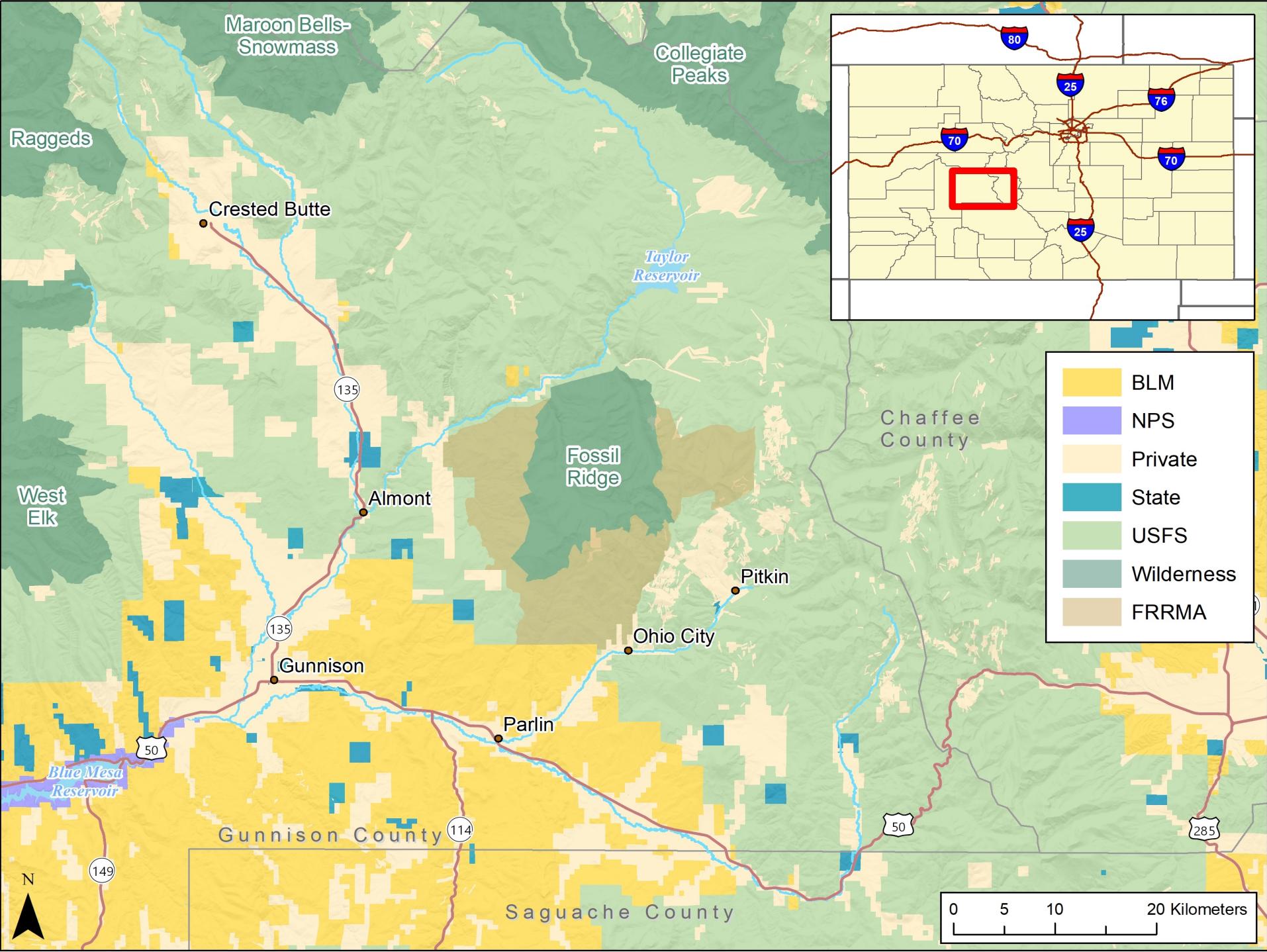
Wilderness Stewardship Dilemmas (continued)

- Ecological restoration efforts took place in 37% of U.S. wilderness areas between 2011 and 2015 (Lieberman et al., 2018)
- “The combination of climate change with other landscape stressors is driving ecological restoration to be one of the single most important, challenging, and potentially litigious wilderness stewardship issues.” (Landres et al., 2020)
- “Decisions allowing or denying restoration in wilderness are currently made on a case-by-case basis in the context of scientific uncertainty, ambiguous law and policy, and competing values.” (Landres et al., 2020)

Welcome to the Fossil Ridge Wilderness!

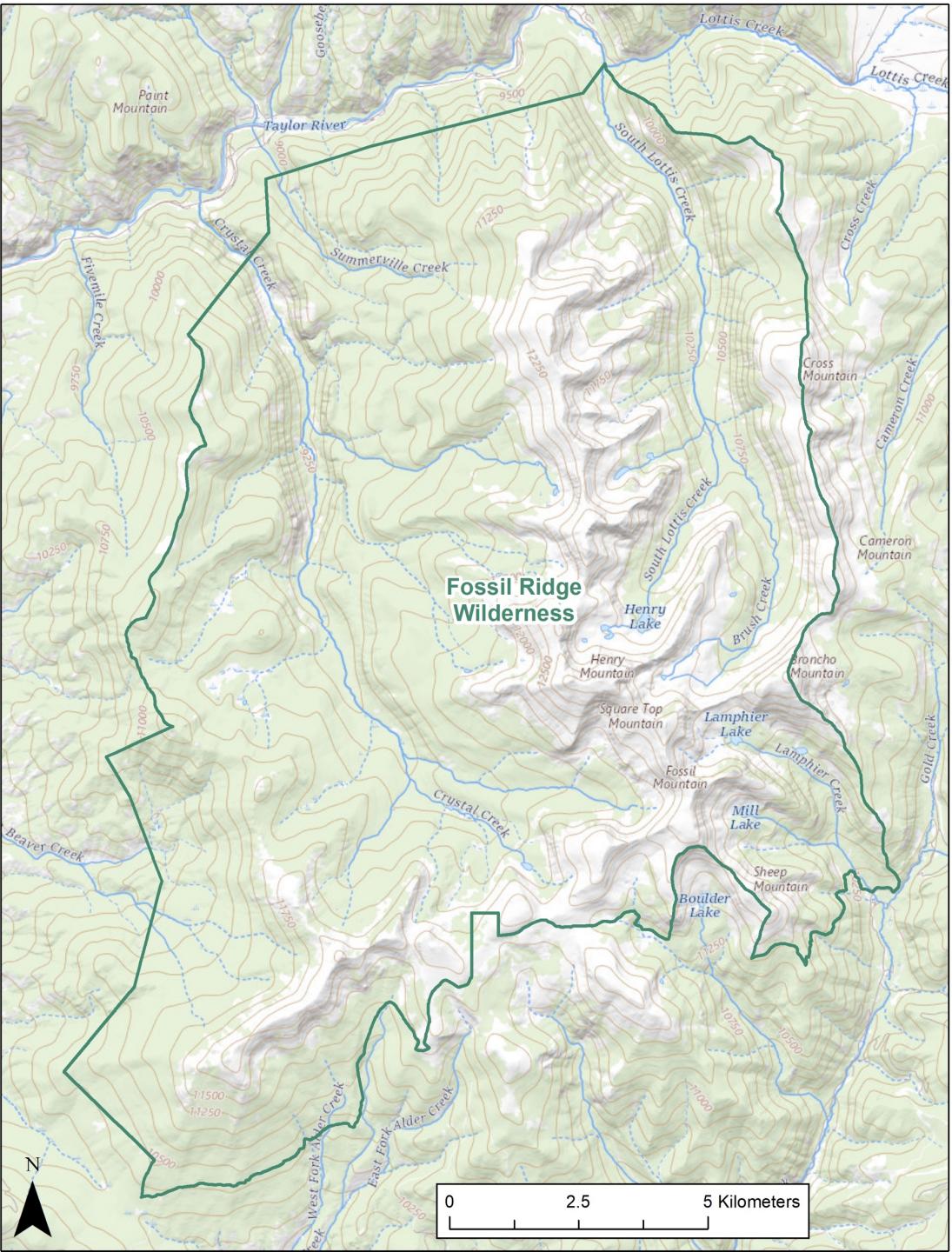






Fossil Ridge Wilderness

- U.S. Forest Service
- Designated in 1993
- 33,060 acres
(134 km²)
- 8,800 ft – 13,254 ft
(2,680m – 4,040m)
- Alpine and subalpine ecosystems
- Marine fossils
- Low-use



In Partnership with Western Colorado University

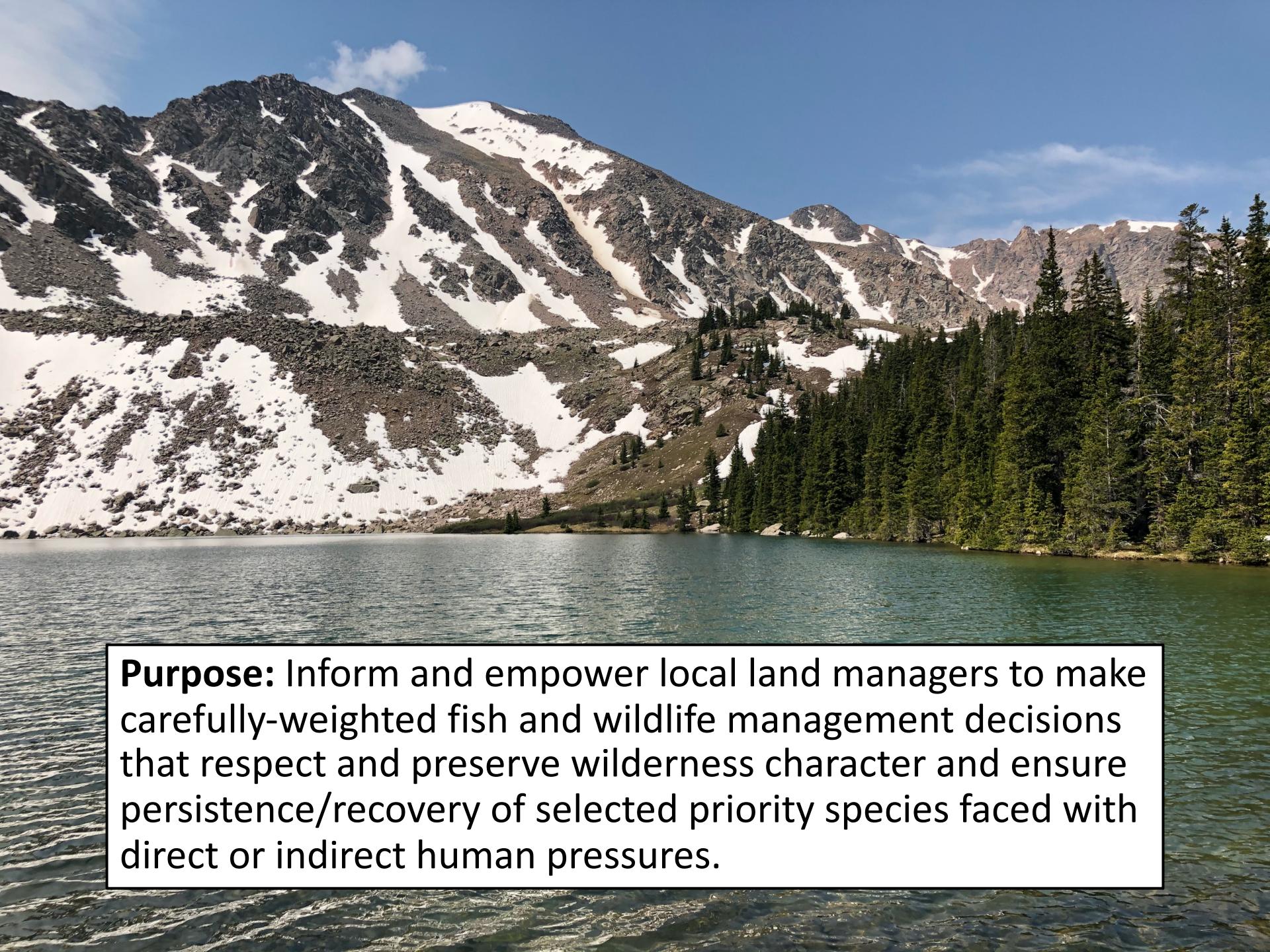
Indigenous Fish and Wildlife Management Strategy

Fossil Ridge Wilderness, Gunnison National Forest



“Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher ‘standard of living’ is worth its cost in things natural, wild, and free.”

— Aldo Leopold

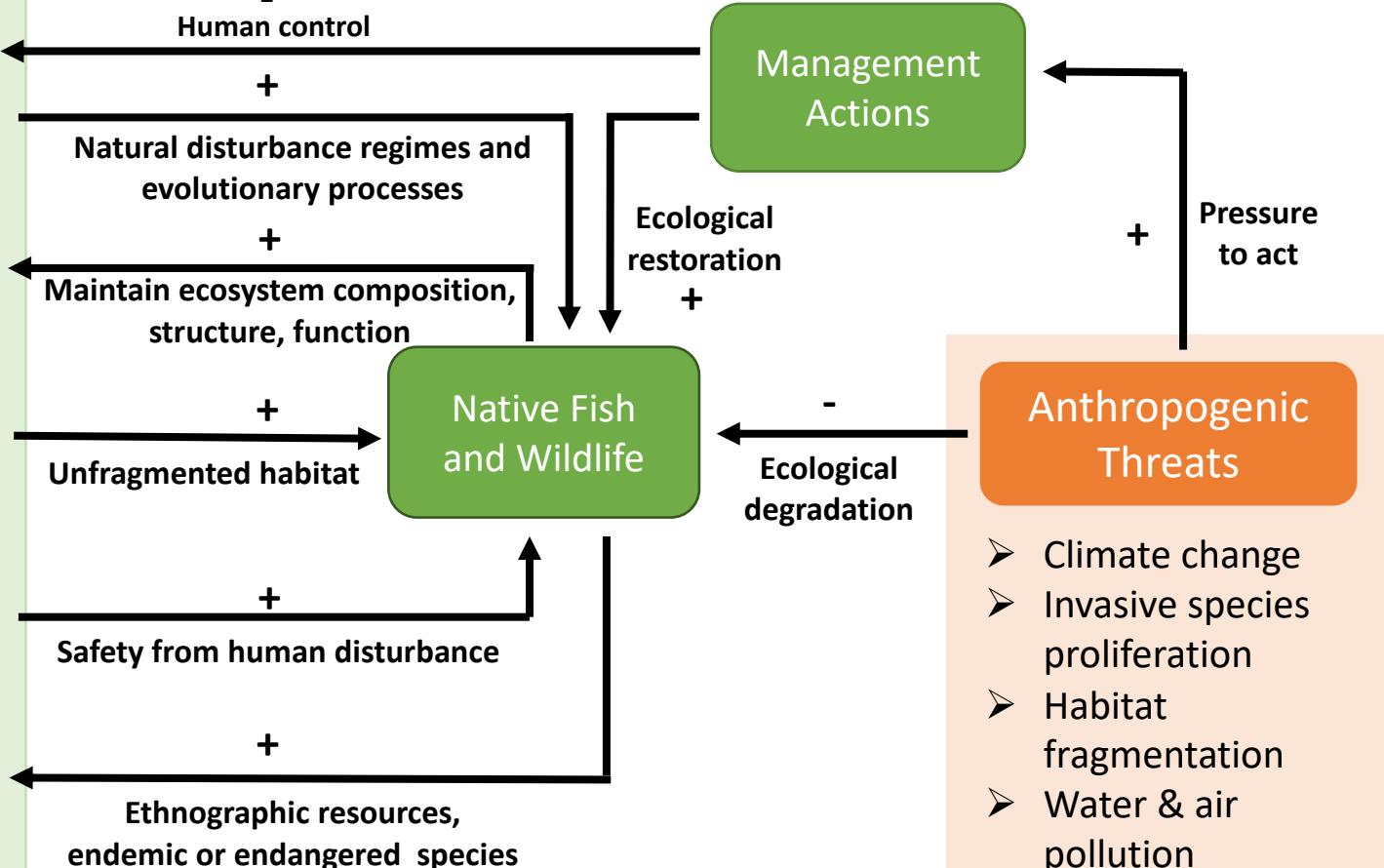


Purpose: Inform and empower local land managers to make carefully-weighted fish and wildlife management decisions that respect and preserve wilderness character and ensure persistence/recovery of selected priority species faced with direct or indirect human pressures.

Indigenous Fish & Wildlife Management Strategy

Careful, informed decision-making that balances biodiversity *and* wilderness objectives

Wilderness Character



- Climate change
- Invasive species proliferation
- Habitat fragmentation
- Water & air pollution

Needs Assessment

- Cooperatively develop management objectives
- Guide conservation efforts and sustain biodiversity
- Facilitate coordination and communication among stakeholders
- Educate stakeholders on wilderness character
- Clarify how management actions influence wilderness character
- Support transparent and defensible decision-making
- Preserve institutional knowledge
- Provide a pilot project



Priority Species

- Indigenous species for which there is a perceived management need now or in the foreseeable future
- Literature review and consultation of government planning documents and databases
- Stakeholder analysis and interviews
- Rationales for selection and non-selection



Priority Species

- Species life cycle, needs and threats
- Status assessment
- Management objectives
- Management Recommendations
- Contingency planning
- Analysis of trade-offs
- Monitoring questions



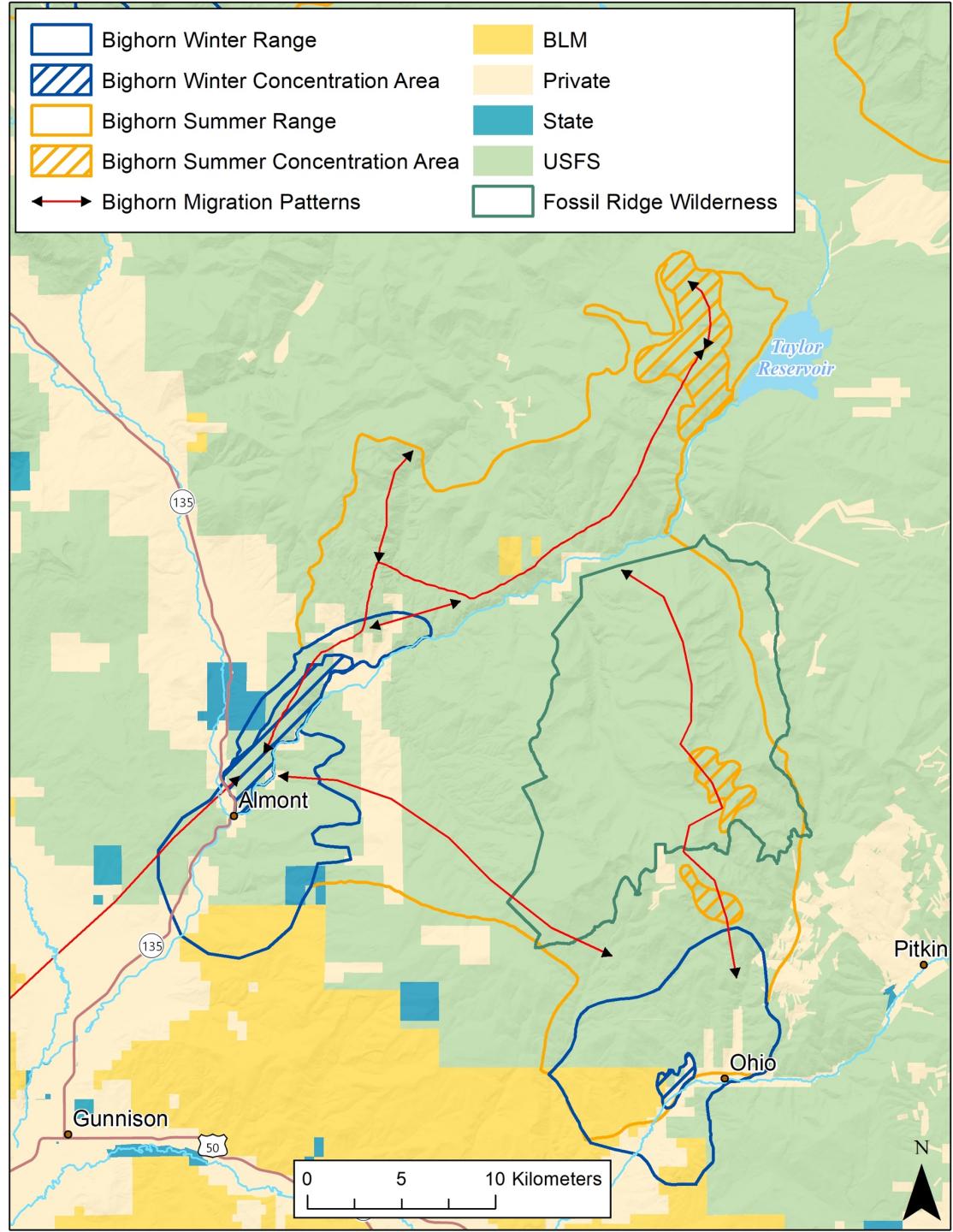
Fossil Ridge Wilderness: Priority Species

- Rocky Mountain bighorn sheep
(*Ovis canadensis canadensis*)
- Southern White-tailed Ptarmigan
(*Lagopus leucura altipetens*)
- Colorado River cutthroat trout
(*Oncorhynchus clarkii pleuriticus*)
- Boreal toad
(*Anaxyrus boreas boreas*)



Rocky Mountain Bighorn Sheep

- Principal threat:
disease transmission
- Disease outbreak
2007-2008
- Collaborate across
jurisdictional and
ownership boundaries



Rocky Mountain Bighorn Sheep

- Management:
 - Aerial surveys
 - Separate bighorn sheep from domestic livestock
 - Monitor bighorn sheep-mountain goat interactions
 - Monitor visitor use and study recreational impacts
 - Promote metapopulation functionality
- Contingency:
 - Population augmentation
 - Predator control
- Wilderness considerations:
 - Untrammeled vs. natural
 - Inside vs. outside wilderness
 - Aircraft use
 - Research



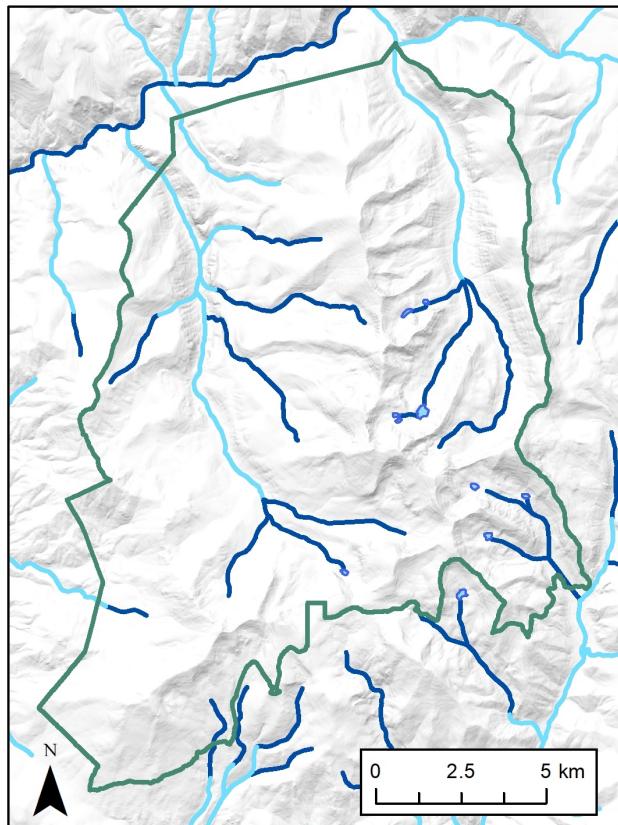
Colorado River Cutthroat Trout

- Fish stockings since 1952
- Principal threat:
non-native salmonids
- Climate Change

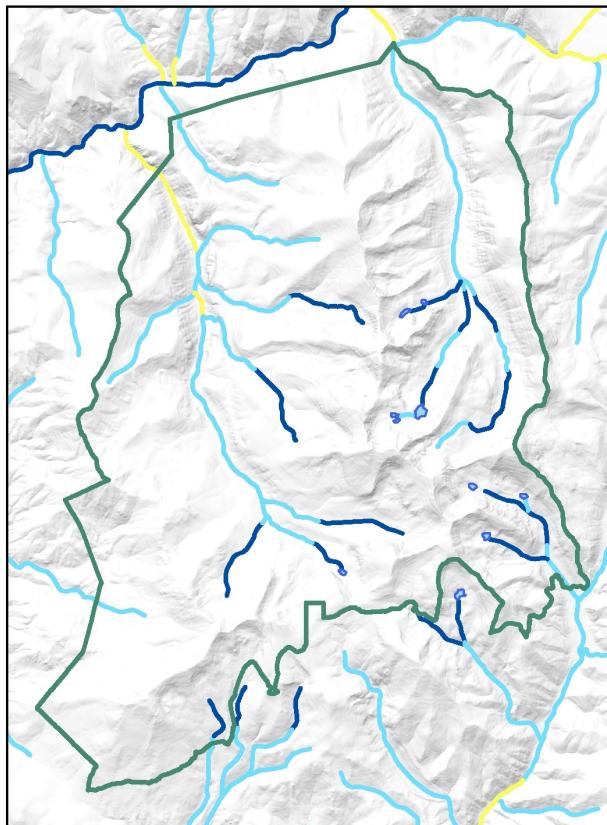


NorWeST Summer Stream Temperature Model (Isaak et al., 2017):
Predicting Climate Forcing and Stream Responsiveness in the Western U.S.

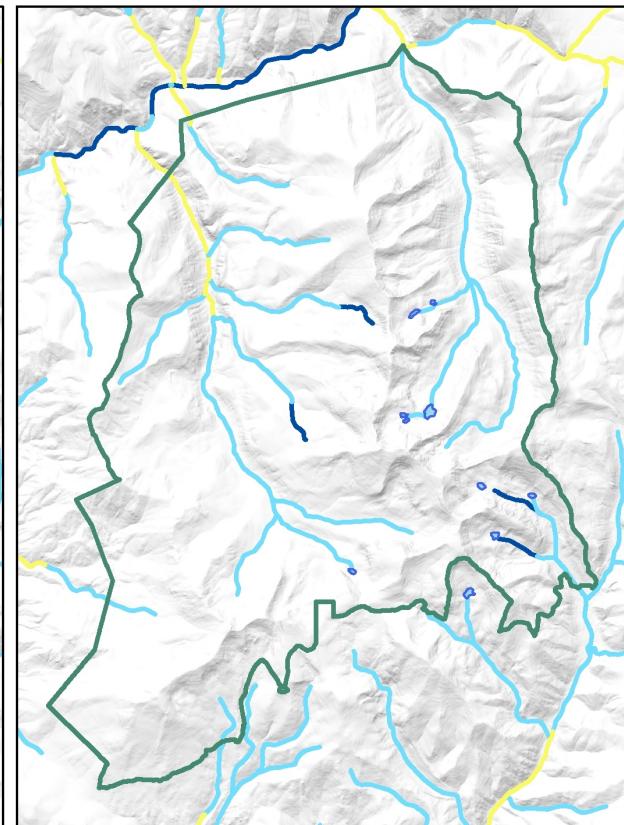
1993-2011 Baseline Period



2040 Model Predictions



2080 Model Predictions



Mean August Stream Temperatures

— 4.7 - 9.0 °C — 9.1 - 12.0 °C — 12.1 - 15.0 °C — 15.1 - 18.0 °C — > 18.0 °C

Colorado River Cutthroat Trout

- Current Management
 - Aerial Fish stocking
 - Survey recovery streams
- Contingency Planning
 - Install fish barrier
 - Eradicate non-native salmonids
 - Establish a conservation population
 - Monitor population
 - Maintain genetic purity



Colorado River Cutthroat Trout

Wilderness Considerations

- Untrammeled vs. natural
- Social vs. ecological values
- Restoring fishless lakes?
- Grandfathered in uses
- Cooperation between state and federal agencies
- The role of taxonomy in conservation



Boreal Toad

- Principal threat: chytrid fungus
- Management
 - Identify suitable habitat
 - Survey distribution
 - Test for chytrid
- Contingency
 - Reintroduction
- Wilderness considerations
 - Untrammeled vs. natural
 - No prohibited uses
 - Inside vs. outside wilderness
 - Suitable, high-elevation habitat
 - Metapopulation dynamics



Southern White-tailed Ptarmigan

- Principal threat: climate change
- Indicator species
- Management
 - Inventory and monitor
 - Evaluate habitat
 - Minimize grazing impacts
 - Record historic mining sites
 - Visitor use in the alpine
 - Trail maintenance
 - Evaluate metapopulation connectivity and gene flow
- Wilderness considerations:
 - Inside vs. outside wilderness
 - Preserving the natural quality
 - Unconfined recreation



Conclusion:

Wilderness Stewardship in the Anthropocene

- Paradigm shift in wilderness management?
- Tension between untrammeled and natural wilderness
- Inherent trade-offs
- Ambiguous law and policy and competing values
- Transparency, communication, and collaboration
- Stewardship across boundaries and jurisdictions
- Planning in the context of uncertainty and rapid socio-ecological change
- Built-in flexibility, scenario and contingency planning, adaptive management, monitoring
- Humility, thoughtfulness, and collaborative stewardship



Thank you!

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