How the Colorado Forest Restoration Institute Can Help

COLORADO FOREST RESTORATION INSTITUTE

Dan Binkley, Director

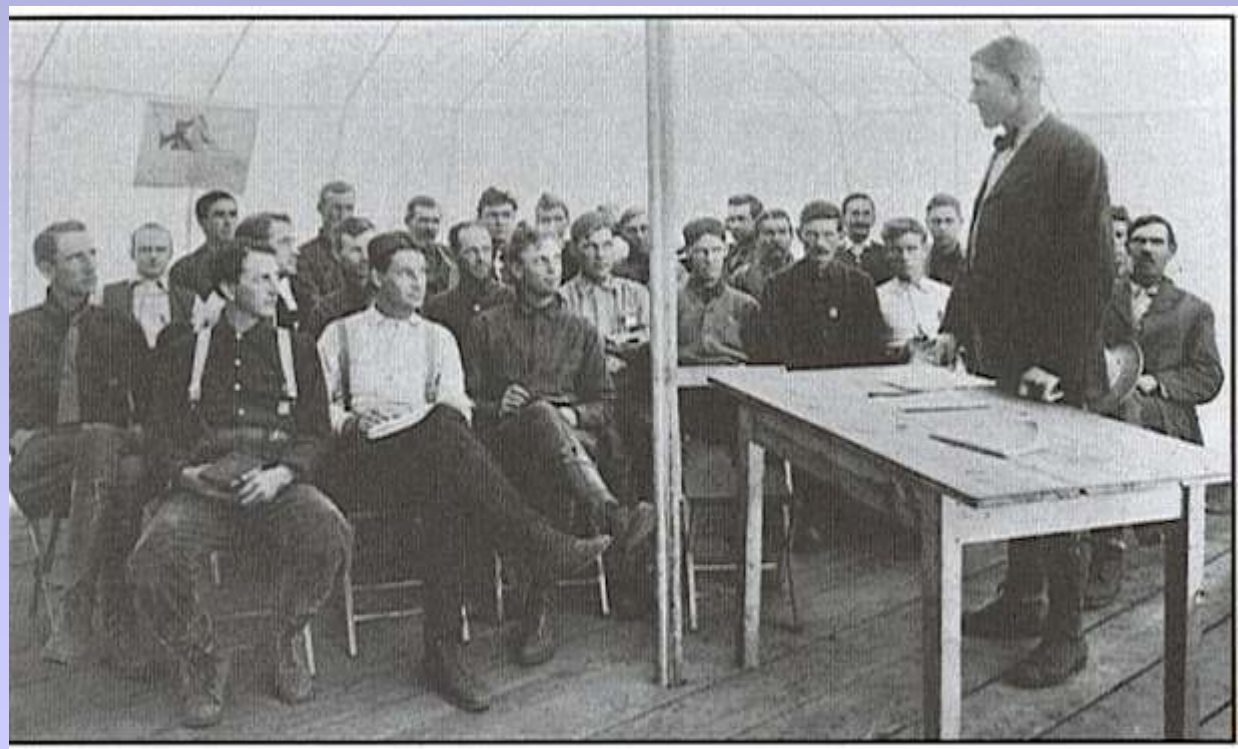
- How the need developed
- How the Institute developed
- How we can help

Starting the story 100 years ago, 400 miles away:

Historic conditions in some ponderosa pine forests included healthy trees, healthy meadows, frequent fire

In 1907, Flagstaff lumbermen T.A. Riorden and M.J. Riordan asked Gifford Pinchot for help in getting ponderosa pine to regenerate after logging.

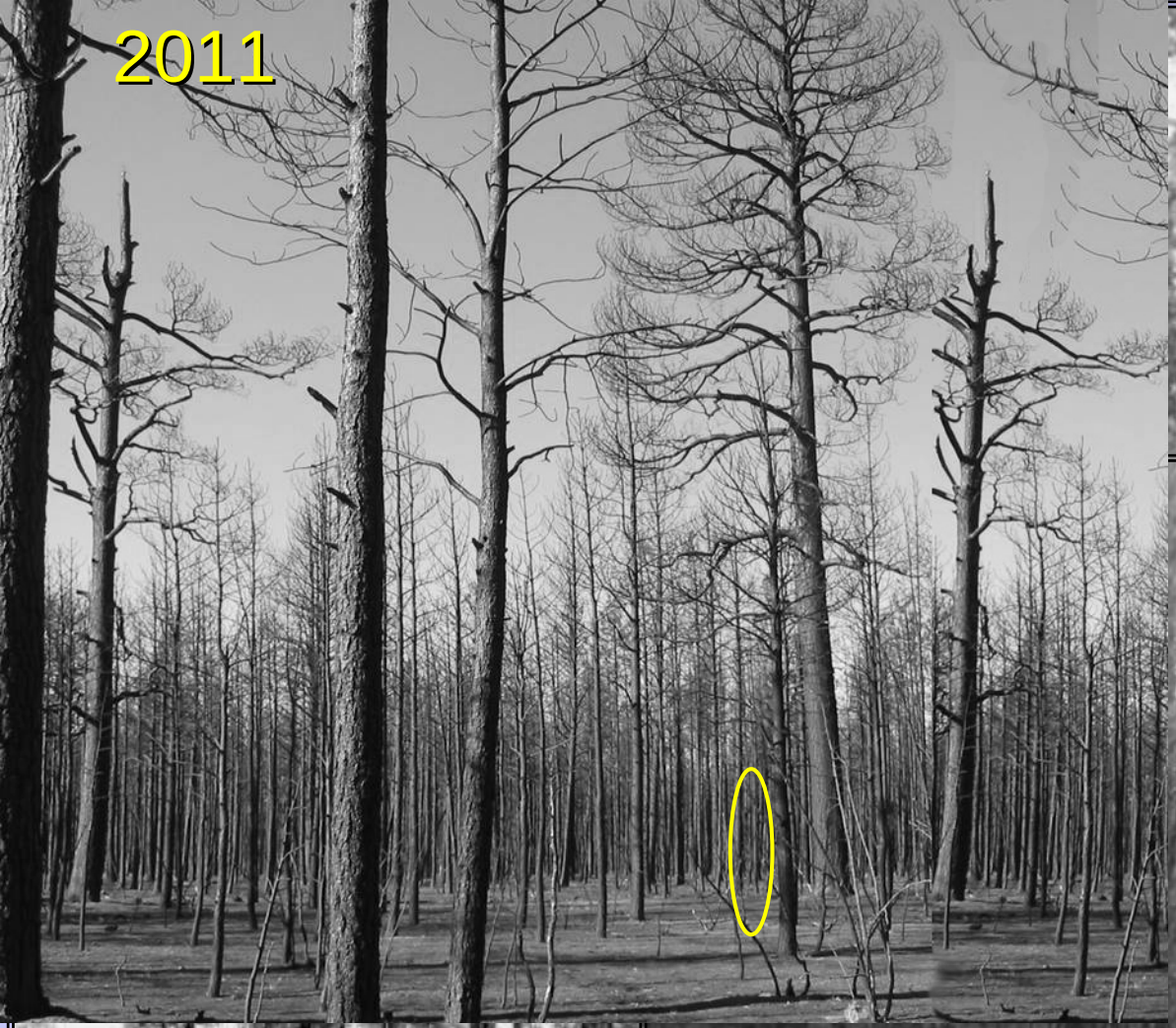
Gus Pearson launched the Ft. Valley Exp. Forest in 1908; became the USDA-FS Rocky Mountain Research Station



Gus Pearson lectured in 1909 at the Fort Valley Ranger School. It was Pearson's custom when speaking to trainees to refer to ponderosa pine as "God's greatest tree."
United States Forest Service

Success with pine regeneration came with unintended, unanticipated consequences:

"…prevention of light burning during the past 10 years… has brought in growth on large areas where reproduction was hitherto largely lacking. Actual counts show that the 1919 seedling crop runs as high as 100,000 per acre…" Aldo Leopold


2011


1938


2002
Photo by J. Waskiewicz

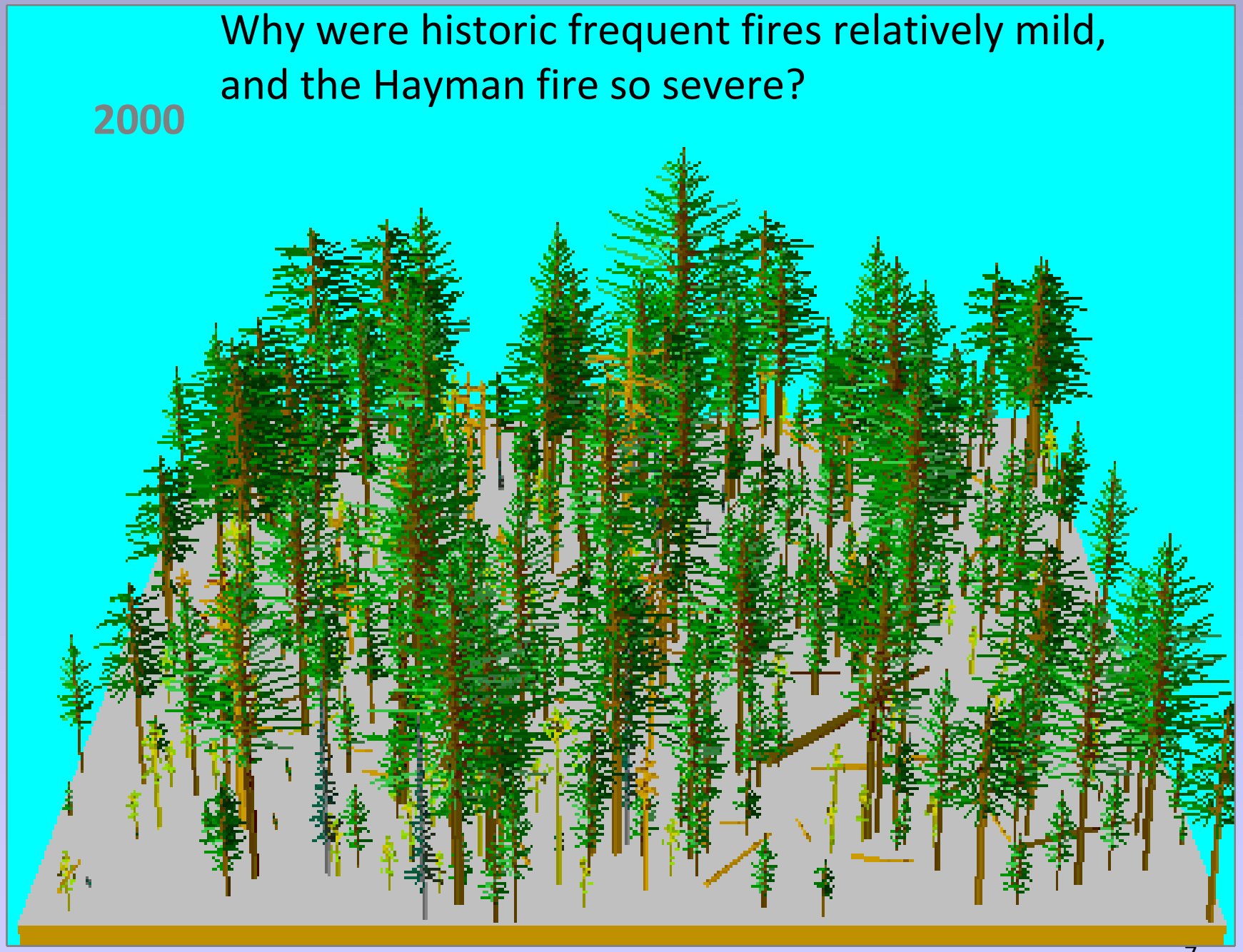

Photo by G. Pearson

Moving to Colorado

1899 (Photo Denver Water)

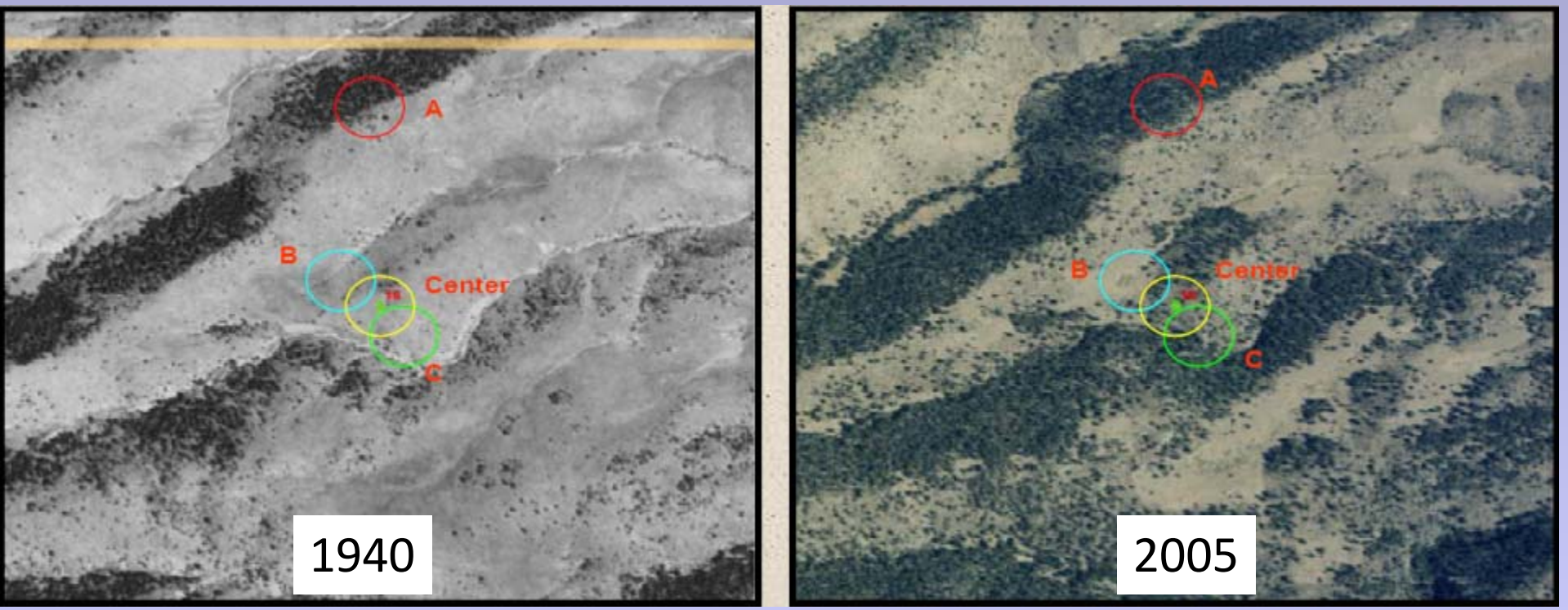
2000 Photo Merrill Kaufmann

Why were historic frequent fires relatively mild, and the Hayman fire so severe?



Provided by Merrill Kaufmann, USDA Forest Service Rocky Mountain Research Station

But “one size doesn’t fit all” – our forests change dramatically across even small distances:



5% loss of meadows, 3% increase in forest, 2% increase in woodland in 65 years

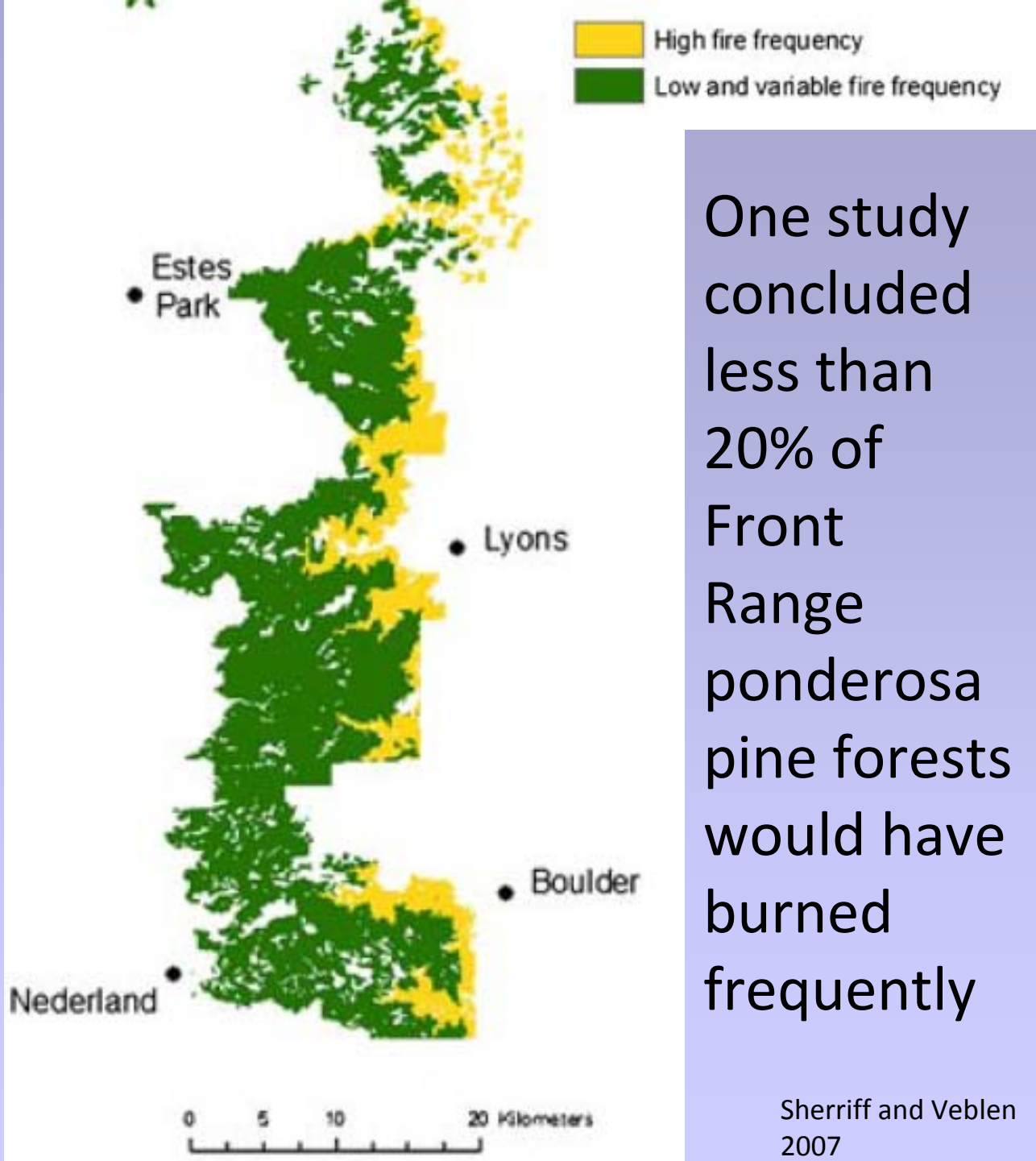
Natural Resource Ecology Laboratory

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

Colorado Forest Restoration Institute
www.cfri.colostate.edu
Warner College of Natural Resources
Colorado State University
Fort Collins, CO 80521

Inisghts from Arizona (or from any single place) cannot be applied directly to Colorado.

How do we determine what evidence helps us, and what might mislead us?



One study concluded less than 20% of Front Range ponderosa pine forests would have burned frequently

Sherriff and Veblen 2007

Unwanted, small-diameter trees have been pulverized on more than 100,000 acres in the Front Range

Any unintended consequences? Smoldering risk, heat flux into soil (and roots), nutrient tie-up, understory plant diversity and growth?

Unintended consequences: understory cover 5 years after chipping treatment:

0 tons/acre

4 tons/acre

16 tons/acre

We need to consider site-specific details, looking for evidence of historic conditions (and, of course, current fire-hazard issues)

Starting with the Big Picture: Policy and Analysis

A Collaborative Approach for Reducing Wildland Fire Risks to Com

10-Year

August 20

Living with Fire: Protecting Communities and Restoring Forests

Findings and Recommendations of the Front Range Fuels Treatment Partnership Roundtable

May 2006

Front Range Fuels Treatment Partnership Roundtable

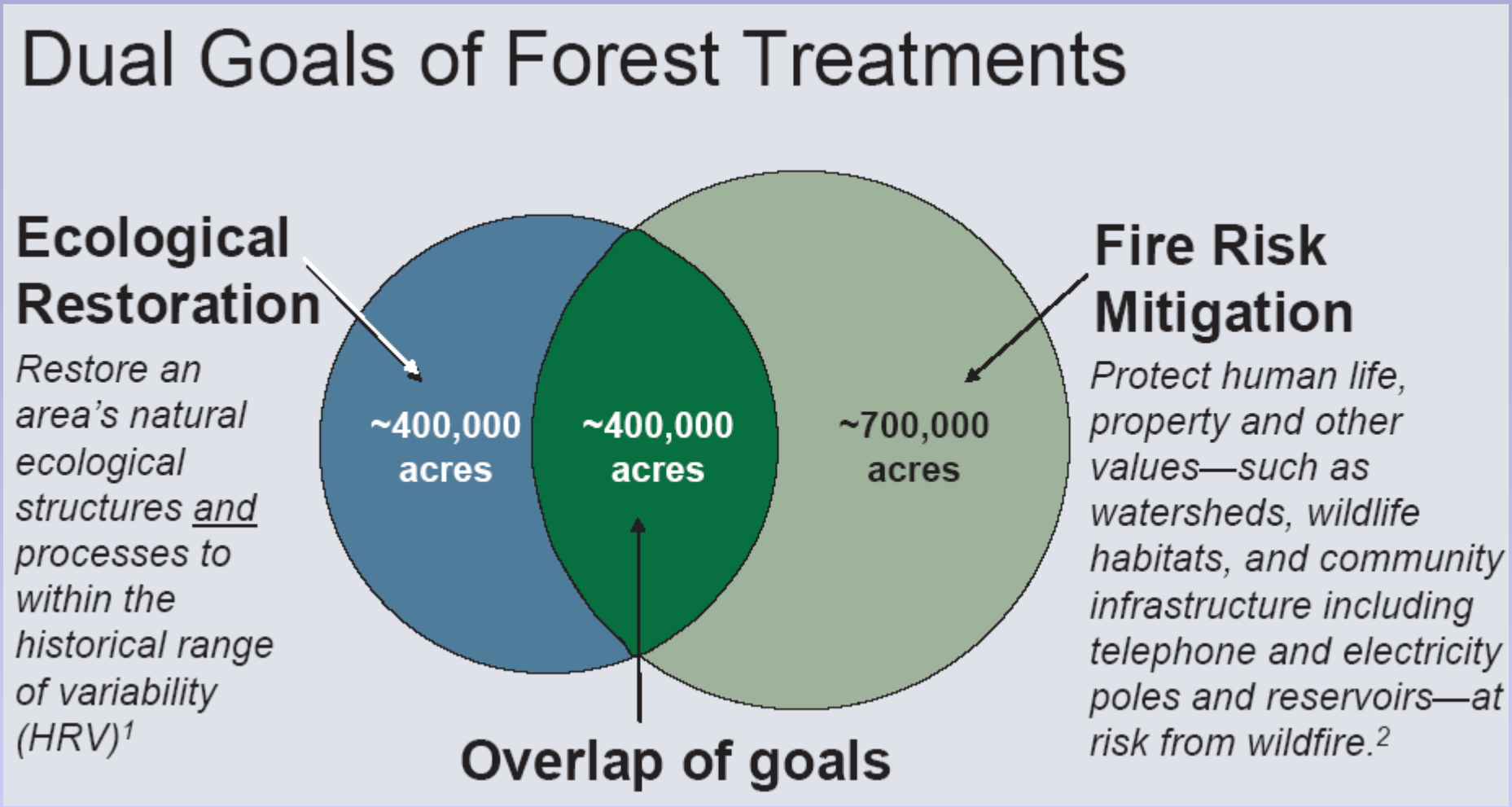
Clean and Diversified Energy Initiative

TERN GOVERNORS' ASSOCIATION

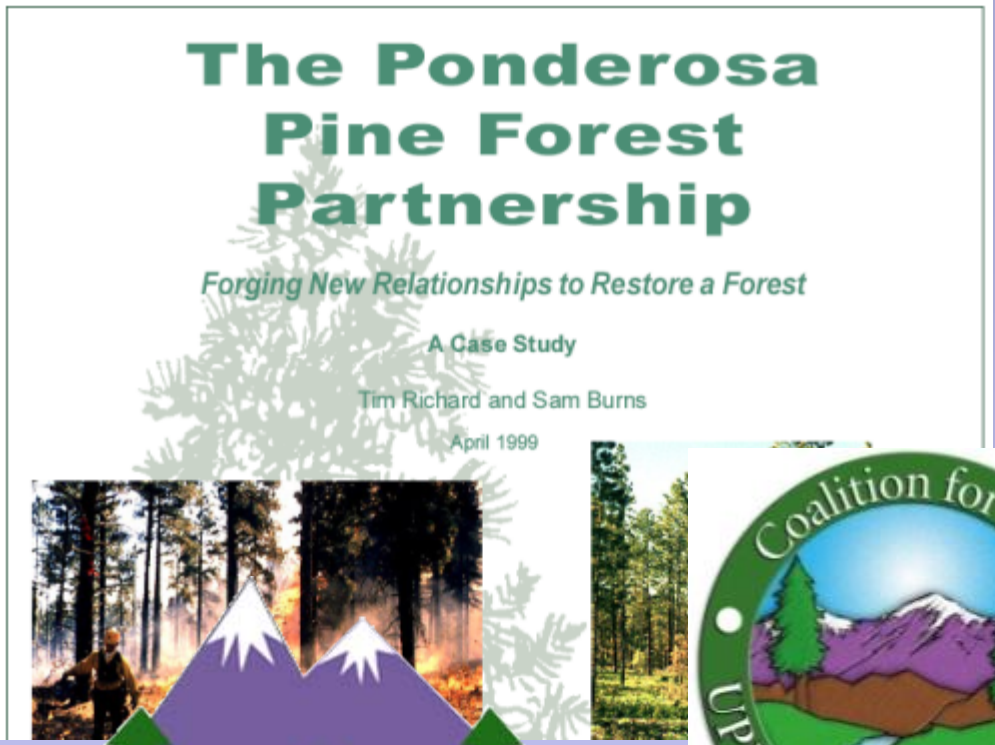
Biomass Task Force Report

January 2006

Front Range Fuels Treatment Partnership



How do we take a great plan and turn it into great implementation?



Collaborative groups are thriving in Colorado (though all need better long-term support) – but we need to help them turn plans into action

CFRI: Needs Assessment for Colorado (updated annually)

Ecological Needs

1. Characterizing Historic Range of Variation.

Treatment Development, Monitoring, and Evaluation

2. Evaluating the Impacts of Wood Chipping and Mastication.
3. Synthesizing the Ecological Impacts of Post-fire salvage Logging and Restoration.
4. Improving Evaluations of Effectiveness of Restoration Treatments.
5. Prioritizing treatments.
6. Developing Monitoring Protocols and Opportunities.
7. Increasing Opportunities for Prescribed Fire and Wildland Fire Use on Private Lands.
8. Investigating Interactions of Restoration Treatments and Exotic Species Invasion.
9. Increasing Availability and use of Native Species Seeds.

Economics/Industrial Development

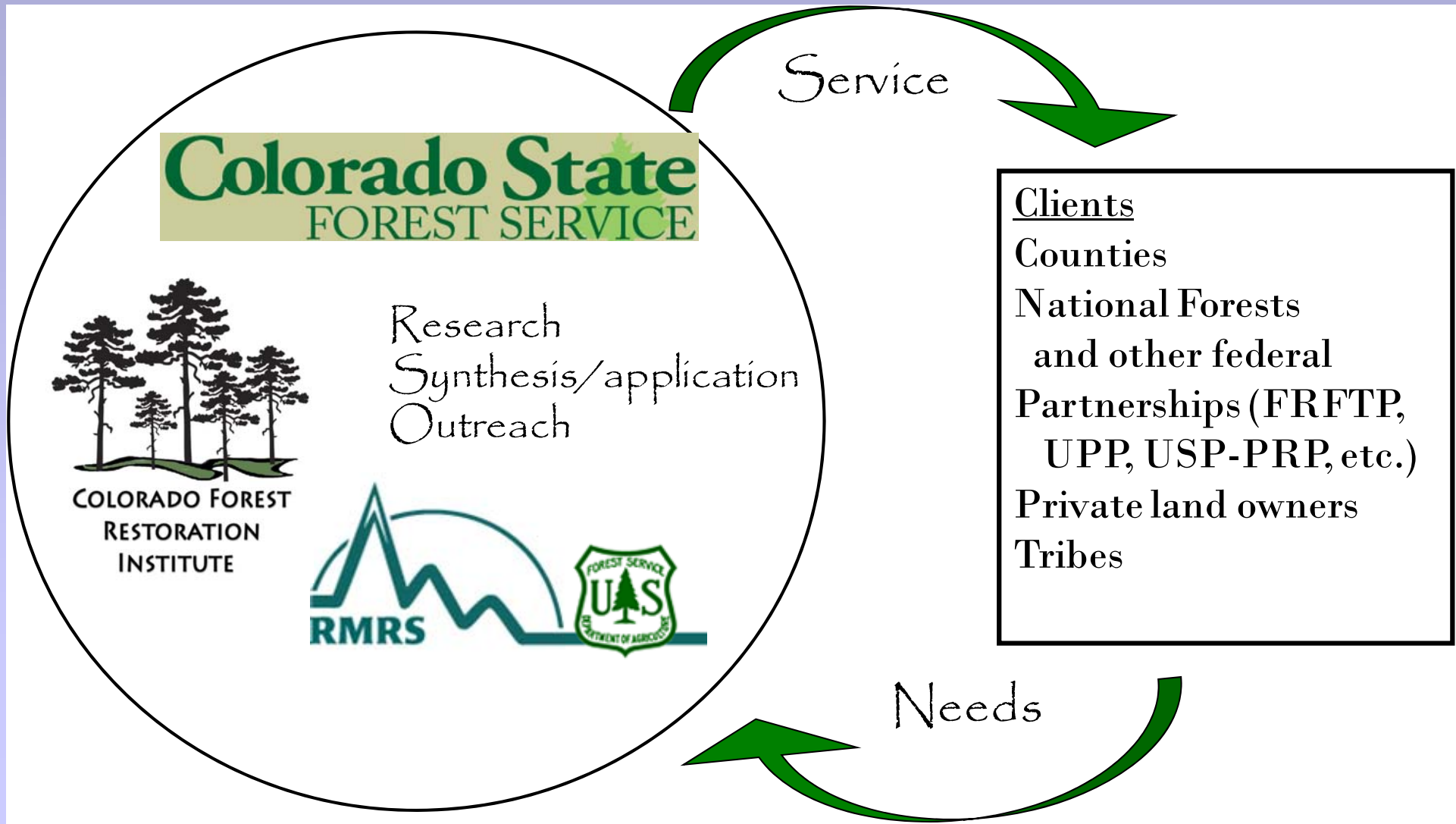
10. Developing Opportunities for Utilization of Small-diameter Wood.

Human Dimensions

11. Fostering Partnerships.
12. Developing Public Education and Outreach.

CFRI: Part of a Forest Information Consortium for Colorado

Understanding stakeholder needs, generating knowledge, providing the knowledge to stakeholders in powerful ways



Zeroing in on "The Best Available Science"

Why?

1. The work has already been done; information already paid for is always cheaper than reinventing information

2. Choices have consequences; well-informed choices are better than ill-informed choices

3. A focus on available evidence can allow competing views to be examined less passionately

4. USDA-FS planning rules require best available science be considered.

How do we know what's "The Best Available Science"?

1. Scientific papers on individual projects or sites

Ecology, 86(11), 2005, pp. 3030–3038

CLIMATE AND DISTURBANCE FORCING OF EPISODIC TREE RECRUITMENT IN A SOUTHWESTERN PONDEROSA PINE LANDSCAPE

PETER M. BROWN[1,3] AND ROSALIND WU[2]

How do we know what's "The Best Available Science"?

2. Scientific reviews

RESEARCH ARTICLES

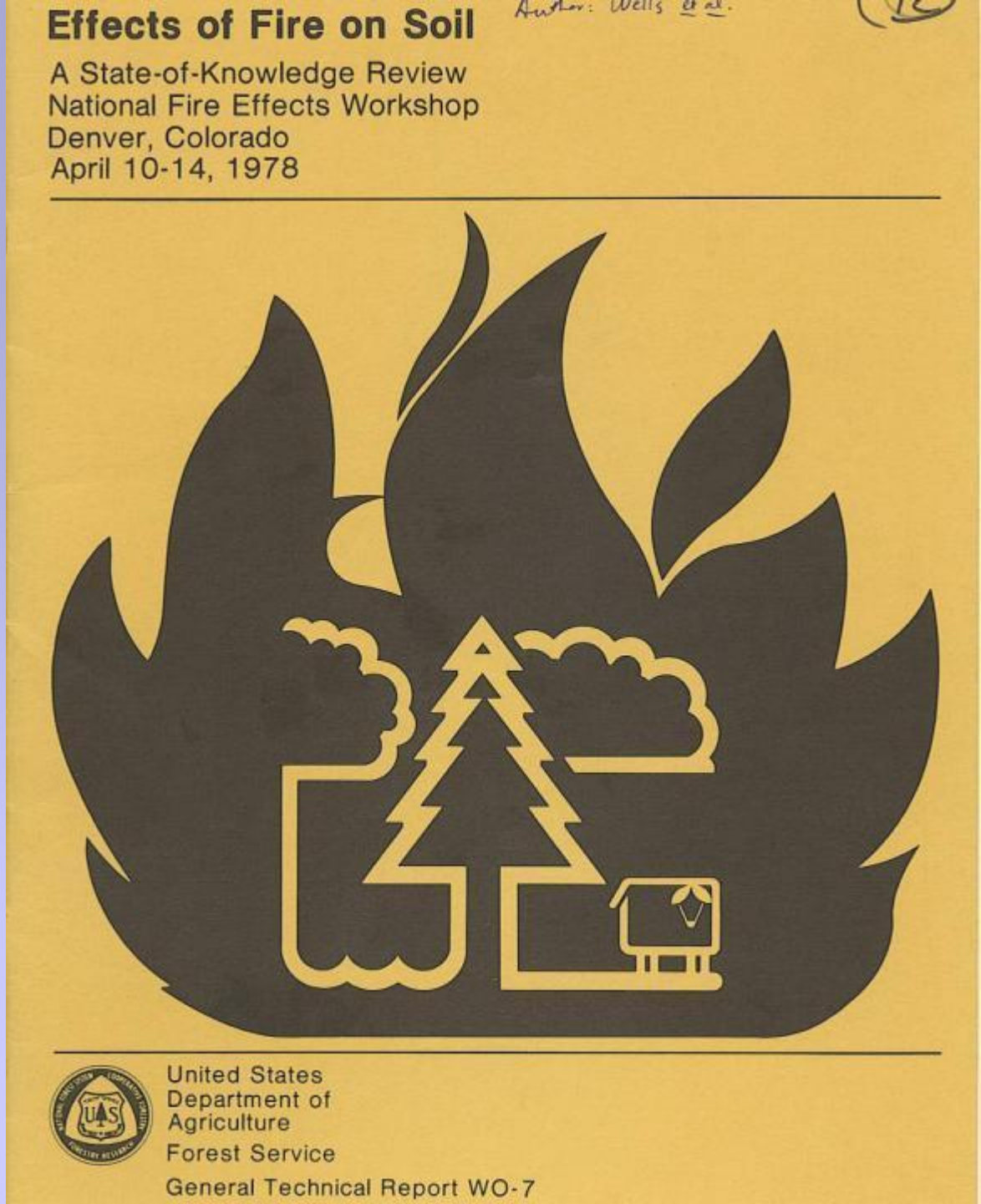
Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity

A. L. Westerling,[1,2*] H. G. Hidalgo,[1] D. R. Cayan,[1,3] T. W. Swetnam[4]

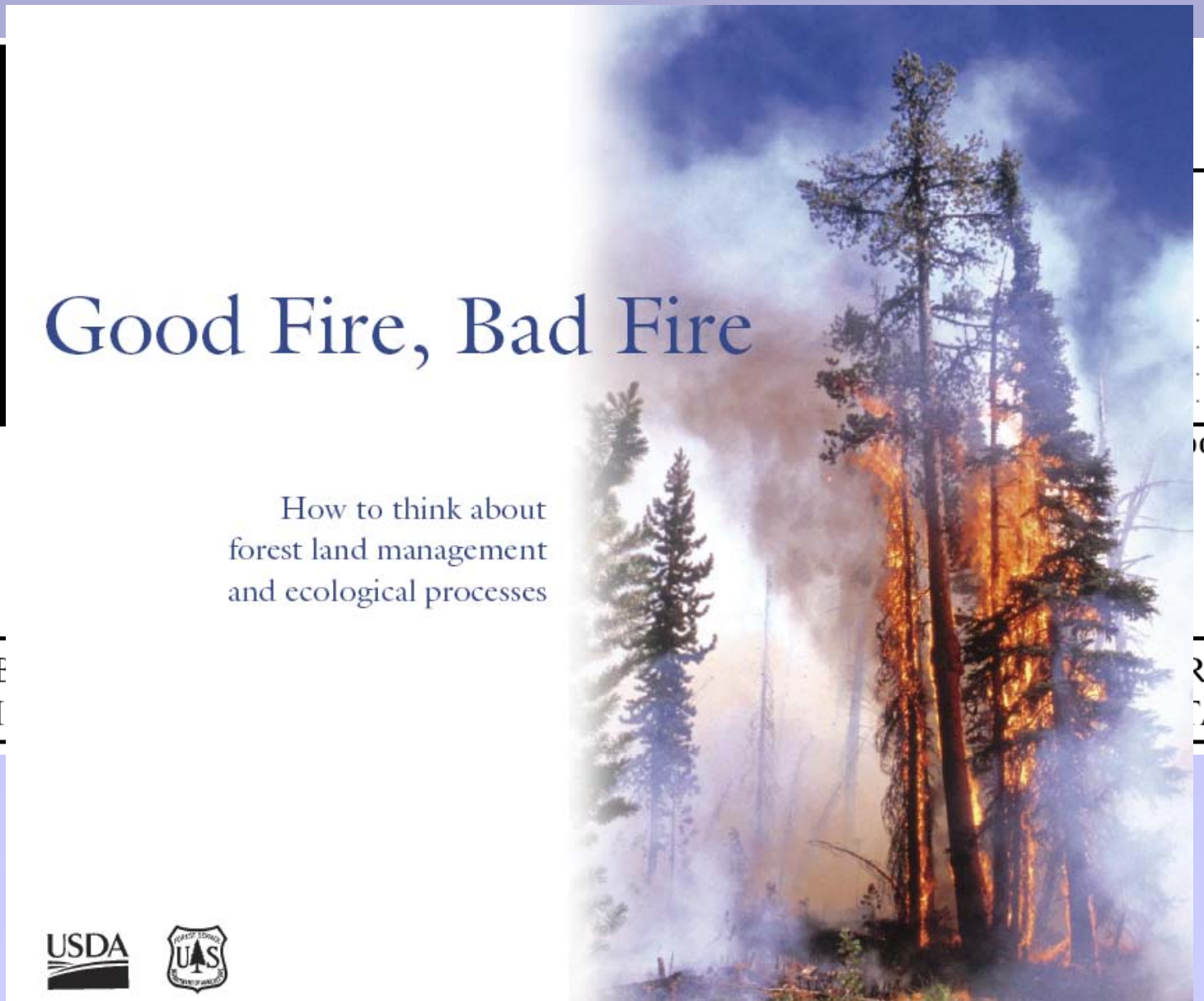
18 AUGUST 2006 VOL 313 SCIENCE www.sciencemag.org

How do we know what's "The Best Available Science"?

3. Status of knowledge reports



How does “The Best Available Science” reach practitioners, or the public?



Let’s zoom in on a current challenge:

How do we determining the “best available science”, and how do we translate it into “the most useful tools”?

Historical Range of Variability for Forest Vegetation of the National Forests of the Colorado Front Range

Thomas T. Veblen
Joseph A. Donnegan

USDA Forest Service
Rocky Mountain Region
740 Simms St
Golden, CO 80401

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WARNER COLLEGE OF NATURAL RESOURCES
Colorado State University
Fort Collins, CO 80521

A classic approach:

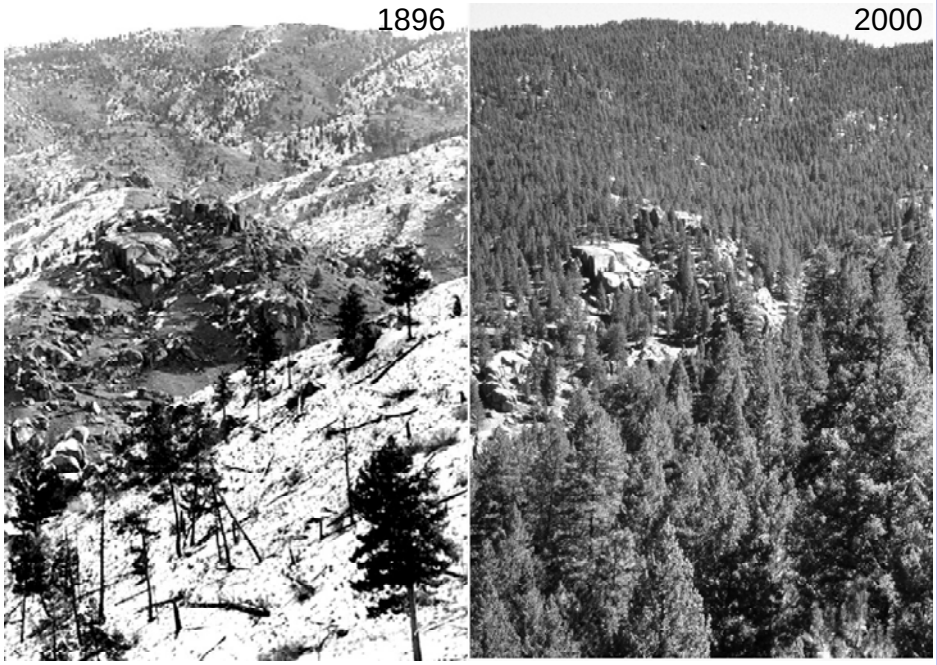
USDA - FS Region 2 commissioned a series of HRV reports from experts

Official peer rview by Ecological Society of America

Published by R2 and CFRI

Peer Review does not mean the end of the story – in science, debates continue, insights improve

Historical Fire Regimes in Ponderosa Pine Forests of the Colorado Front Range, and Recommendations for Ecological Restoration and Fuels Management



Merrill R. Kaufmann, Rocky Mountain Research Station, Fort Collins, CO
Thomas T. Veblen, University of Colorado at Boulder, Boulder, CO
William H. Romme, Colorado State University, Fort Collins, CO

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www.cfri.colostate.edu

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

Colorado State University

But what if experts disagree among themselves?

A newer model:

Bring them together and clearly identify areas of agreement, disagreement, and critical information gaps that limit agreement.

Our next attempt at best science:

Diverse team, but not as diverse as the spectrum of concerned people and experts

The report stated, “We do not advocate any particular policy or management treatment,” leading some readers to think the report argued *against* any action

Not as useful as we hoped, and we learned some lessons on how to do it better next time

What's Happening in Colorado's Aspen Forests?

-- Gradual, long-term changes and recent widespread death of aspen trees --

The normal development of forests includes changes, with most trees growing larger while other trees die as a result of natural processes of competition. Just like the day-to-day development of plants in a summer garden, these annual changes are barely noticeable until years have passed. Gradual changes are sometimes interrupted by sudden changes, when forests experience fire, insect outbreaks, severe winds, or major droughts. All the aspen forests in Colorado are changing; most of the forests are developing through periods of gradual change, but in recent years many landscapes have experienced rapid changes including the death of many large, old trees. Why are so many trees dying now?

Aspen forest development

Most of the aspen forests in Colorado developed after a stand-replacing disturbance such as fire. The root systems of aspens usually survive fires, sending up thousands of new stems (suckers) to regenerate the forest. Only a few of these suckers will survive more than a decade or two, as competition weeds out the smaller stems. In many cases, conifers such as lodgepole pine and Engelmann spruce establish as seedlings soon after the same fires, but faster growth of aspen suckers allows aspen to dominate the forest for decades (Figure 1). The continued growth of understory conifers reduces the opportunities for new aspen suckers to develop, and conifers may replace aspens in the overstory as the old aspen trees eventually die.

Not all aspen forests have conifer seedlings and saplings, and these forests may remain dominated by aspen for more than a century.

A wide variety of insects and diseases occur in aspen forests. Canker (fungal) diseases and stem borer insects often are more common as trees become more stressed; they are often present when trees die, even when the primary cause of death is drought or some other factor. Forest tent caterpillars and large aspen tortrix eat aspen leaves, and periodic outbreaks may defoliate entire aspen canopies in early summer (Figure 2).

Aspen trees commonly live for more than 100 years, with the oldest trees reaching 200 or more years. Forests with large numbers of conifers mixed with aspens will shift to conifer dominance, often around 75 or 100 years after the last major disturbance. More than 95% of Colorado's aspen forests are now older than 80 years, so a large portion of the forests are maturing, or shifting to conifer dominance.

Figure 1. Some stands have few conifer trees, and aspen trees remain dominant for a century or more (left). Other stands have large numbers of conifer trees establishing, reducing the number of new aspen trees and gradually leading to conifer dominance. Both types of aspen forests are common in Colorado.

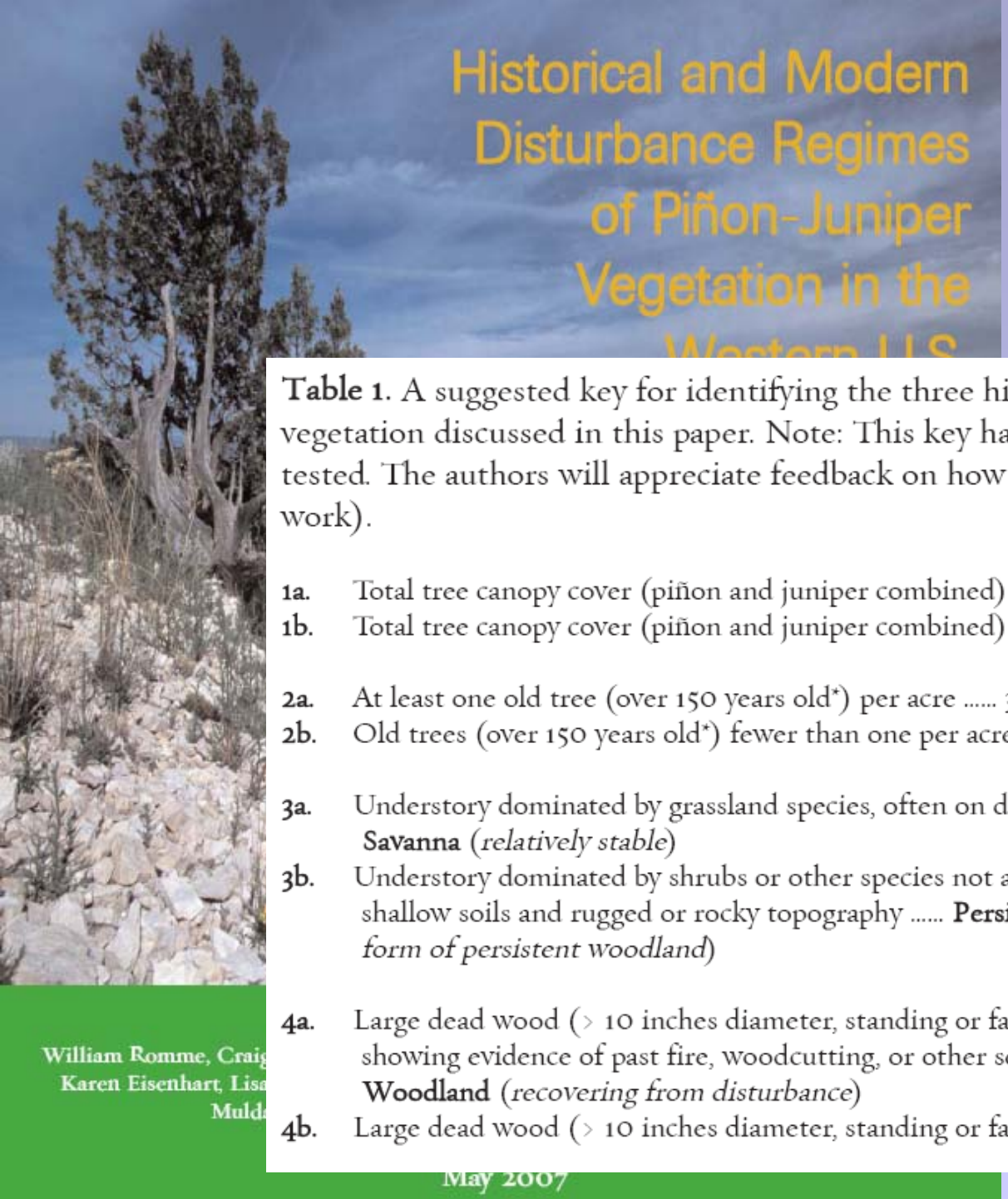
Figure 2. Forest tent caterpillars form webbed nests in aspen trees, and during major outbreaks can defoliate entire canopies in early summer. Aspen usually survive even severe defoliation, although several years of caterpillar outbreaks will kill some trees.

January 2007

Next effort at identifying Best Available Science:

Ask agency leaders to identify the people they want to have on the writing team

Keep rewriting till every person is okay with the product



Providing the knowledge to stakeholders in powerful ways

Table 1. A suggested key for identifying the three historical types of piñon-juniper vegetation discussed in this paper. Note: This key has not yet been extensively field tested. The authors will appreciate feedback on how well it works (or does not work).

1a. Total tree canopy cover (piñon and juniper combined) < 10 % 2
1b. Total tree canopy cover (piñon and juniper combined) > 10 % 6

2a. At least one old tree (over 150 years old*) per acre 3
2b. Old trees (over 150 years old*) fewer than one per acre 4

3a. Understory dominated by grassland species, often on deep soils and gentle topography ..... **Savanna** (*relatively stable*)
3b. Understory dominated by shrubs or other species not associated with grassland, often on shallow soils and rugged or rocky topography ..... **Persistent Woodland** (*a very sparse form of persistent woodland*)

4a. Large dead wood (> 10 inches diameter, standing or fallen), conspicuously present, showing evidence of past fire, woodcutting, or other severe disturbance ..... **Persistent Woodland** (*recovering from disturbance*)
4b. Large dead wood (> 10 inches diameter, standing or fallen), conspicuously absent 5

Next step in the evolution of The Best Available Science – not just the best science, but the best way to put science to work:

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ECOLOGICAL RESTORATION INSTITUTE

RMRS

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

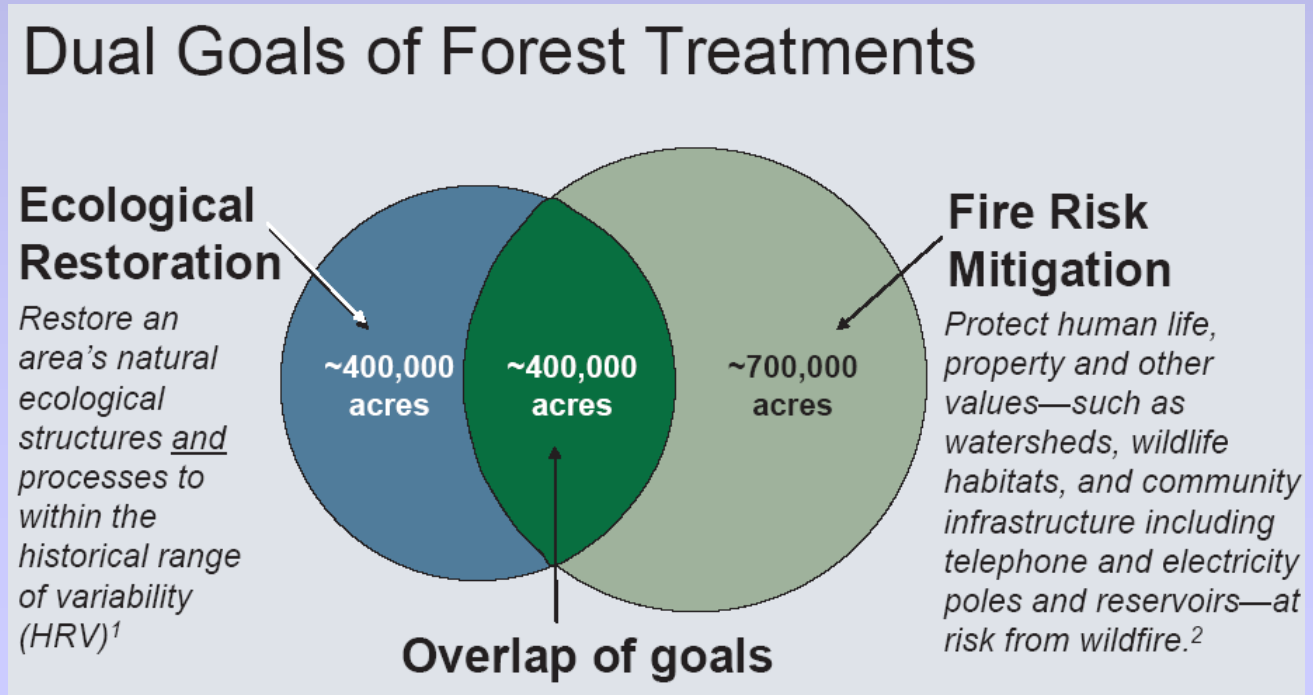
Workshop on Evidence-Based Approaches in Conservation, Forestry and Restoration

The next approach we'd like to test-drive for providing the Best Available Science in Powerful Ways:

1. Convene stakeholders and resource experts to identify major questions that limit effective land treatments
2. Expert team (including stakeholder rep.) conducts a systematic review of information
3. Initial findings brought back to the stakeholders and discussed; *then* final reports and development of outreach products

The Office of Management and Budget wants us help develop ways to analyze and improve treatment efficiency and effectiveness:

FY2009 budget: …*includes funding for a pilot project with partners in the Southwest Ecological Restoration Institutes to develop and test prioritizing restoration-based fuel reduction treatments that use the best available science and a collaborative process* (P.L. 108-317).



How to get help from CFRI:

Contact us – phone or email or drop in! Check our webpage!

Get on our mailing list – attend a workshop or field trip…

Small projects can often be supported from our current year's funding

Big projects can be included in our annual workplan of stakeholder-identified needs, reviewed by our multi-agency partners.

COLORADO FOREST
RESTORATION
INSTITUTE

"Restoring forest health and reducing severe wildfires"

Pulling for Colorado's Forests