



Warner College of Natural Resources

Colorado  
State  
University

*Knowledge to Go Places*

# Colorado Forest Restoration Institute

## Colorado Forest Restoration Needs Assessment 2005



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## **Summary**

The reduction in fires in lower-elevation forests of Colorado has led to unnaturally dense forests, with suppressed understory vegetation and high probability of intense crown fires. The Southwest Forest Health and Wildfire Prevention Act of 2004 provided for the establishment of the Colorado Forest Restoration Institute (CFRI) in the Warner College of Natural Resources, with the mission to restore the health of Colorado forests and reduce the threat of unnatural wildfires. Implementation of this goal requires clear identification of the needs of Colorado clients, and a range of stake-holder input activities were conducted in 2005. Twelve needs were identified:

### ***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.

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### Introduction

The lower-elevation forests of Colorado developed under climatic conditions that included dry periods in spring, summer and fall that would allow fires to burn extensively. The time period between fires ranged from several years to several decades in forests dominated by ponderosa pine and associated species. Dry periods were more pronounced in even lower elevation woodlands of pinyon and junipers, but the dryness limited the production of tree canopies and understory vegetation, providing discontinuous fuel beds for fires. The time period between fires in these woodlands probably ranged from several decades to centuries.

The historic fire regimes in these forests and woodlands changed, as a result of changes in fine fuels with the onset of intensive grazing in the 19<sup>th</sup> Century, and active fire suppression in the 20<sup>th</sup> Century. Longer periods between fires allows increased dominance of overstory trees, increased bulk density of canopies, reduced biodiversity, and perhaps reduced water yields. These changes in turn have led to increased prevalence of high intensity fires, with greater ecological and human impacts than in historic times.

Colorado has 21 million acres of forests with federal lands comprising about 2/3 of the forested area. Over 200,000 private land owners control 6 million acres. These forests are changing rapidly; the standing growing stock of wood has increased by more than 40% over the past 50 years, to the current level of 20 billion cubic feet (Smith et al. 2001, Forest Service Gen. Tech. Rep. NC-219). This dramatic increase in wood content of Colorado forests also represents a major increase in potential fuels for wildfires.

Forest landscapes in Colorado are complex mosaics of forest types and ownerships, with nearly 1 million people living in the "red zone" area with high risk of catastrophic fires, largely as a result of unnatural changes in our forests. Direct costs for fire suppression totaled over \$200 million since 2000. Declining forest health may decrease the diversity of species, increase risks of outbreaks of insects and diseases, and reduce the flow of rivers that provide water to all the states of the southwest.

A variety of collaborative efforts across Colorado began to address issues of increased fire hazard and reduced forest ecosystem health in the 1990s, such as the Ponderosa Pine Project in the southwestern part of the state. Work intensified after major fires in 2000 and 2002, with the development of more collaborative groups (such as the Uncompahgre Plateau Partnership/ Public Lands Partnership, and the Front Range Fuels Treatment Partnership), and increased federal funding for fuels and restoration treatments.

Colorado State University's Warner College of Natural Resources began to develop an informal Colorado Forest Restoration Network (CFRN) in 2003, with the goal of bringing people together from around the state to enhance our abilities to improve forest ecosystem health and reduce fire risks. The CFRN hosted a state-wide workshop in Glenwood Springs late in 2004, to identify our current state of knowledge about restoration; to identify key people and collaborative groups working in the field; and identify major opportunities for making these efforts more efficient and more effective.

On October 5, 2004 President Bush signed into law the Southwest Forest Health and Wildfire Prevention Act, and in the spring of 2005 Colorado State University was designated by the Secretary of Agriculture as the host institution for Colorado. The mission of the Colorado Forest Restoration Institute (CFRI) in the Warner College of Natural Resources is to restore the health of Colorado forests and reduce the threat of unnatural wildfires. Our goal is to provide the best-available science in forest ecology, restoration, and management, in ways that are readily usable by the diverse group of land managers and clients in Colorado. The CFRI will help federal, state, and private land owners develop and implement the strategies of the Healthy Forest Restoration Act/Initiative, National Fire Plan, and the Forest Service's Strategic Plan. Under the authority of the Southwest Forest Health and Wildfire Prevention Act, CFRI will work on woodlands and ponderosa pine and associated forest types. With other sources of funding, the CFRI goals extend to all forest lands in the state.

Forest restoration treatments incorporate science-based restoration designs that simultaneously improve forest health, reduce the threat of unnatural wildfire and provide economic and social benefits to forest communities. Explicit duties defined in the Southwest Forest Health and Wildfire Prevention Act include:

1. Development, transfer, application, and monitoring, and regularly updating practical science-based forest restoration treatments that will improve the health of dry forest and woodland ecosystems and reduce the risk of severe wildfires, in the Interior West;
2. Synthesis and adaptation of scientific findings from conventional research programs to the implementation of forest and woodland restoration on a landscape scale;
3. Facilitating the transfer of interdisciplinary knowledge required to understand the socioeconomic and environmental impacts of wildfire on ecosystems and landscapes;
4. Collaboration with federal agencies to use ecological restoration treatments to design, implement, monitor and regularly revise wildfire treatments based on the use of adaptive ecosystem management;
5. Assisting land managers in restoration treatments, using new management technologies
6. Providing technical assistance to collaborative efforts by clients (affected entities) to develop, implement, and monitor adaptive ecosystem management restoration treatments that are ecologically sound, economically viable, and socially responsible; and
7. Assisting federal and non-federal land managers in providing information to the public on the role of fire and fire management in dry forest and woodland ecosystems in the Interior West.

This assessment of forest restoration needs was developed as part of the FY2005 workplan for CFRI, as part of the process for implementing the Southwest Forest Health and Wildfire Prevention Act. The specific needs identified in for Colorado forests follow below, after a description of the process used to identify those needs. This Needs Assessment will serve as the basis for the development of detailed workplans for formal approval. The Appendices provide background information on:

1. Forest partnerships around Colorado;
2. A summary of the state of knowledge on historic range of variation for Colorado forests
- 3/4. Notes from the open stake-holder meetings in Montrose and Durango;
5. A list of the people engaged by one or more of the CFRI client input opportunities; and

6. A summary of the current demands for wood products in Colorado.

### **Client input process**

We obtained information on the needs and opportunities for forest restoration through a wide range of engagement opportunities with Colorado clients (affected entities):

1. Working group discussions at the Colorado Forest Restoration Workshop (Glenwood Springs, November 2004, 115 participants), supported by CSU, the Colorado State Forest Service, and the Society of American Foresters.

2. Group discussions at the Chipping and Mastication in Forest Ecosystems Workshop (36 participants), supported by the Rocky Mountain Research Station and hosted by CSU ([http://www.frftp.org/chip\\_mast\\_workshop.htm](http://www.frftp.org/chip_mast_workshop.htm)).

3. Discussions during a 3-day field trip, Bonanza of Ponderosa Pine, with tours of forests and restoration in the San Juan National Forest, Great Sand Dunes National Park, and the South Platte Watershed (sponsored by CFRI, 37 attendees).

4. Participation by CFRI in workshops organized by other groups around the state, including:
  - A. Ecology and Management of Pinyon-Juniper & Sagebrush Communities, Montrose, CO
  - B. NRCS Land Management Workshop, La Veta, CO.
  - C. Western Forestry Leadership Coalition meeting, Casper, WY
  - D. Roundtable on Forest Ecology, sponsored by the Front Range Fuel Treatment Partnership

5. Meetings with leaders, individually and in small groups, aimed at informing CFRI about restoration needs, including:

- A. Leadership of the Colorado State Forest Service, including opportunities for sponsoring short courses (in Ft. Collins).
- B. Leadership group of the Front Range Fuels Treatment Partnership (in Ft. Collins)
- C. Leadership group of the Colorado Timber Industry Association (in Fraser)
- D. Leadership group of the Uncompahgre Plateau Partnership (in Ft. Collins)
- E. Leadership group of USDA Forest Service Region 2 (in Denver)
- F. Leslie Alison, manager of Banded Peak Ranch (in Chromo)
- G. Jim Webb with Forest Stewardship Concepts (in Chromo)
- H. Craig Taggart, Tercio Ranch Environmental Manger (S. Colorado)
- I. Mark Stiles, Forest Supervisor (FS) and Field Office Manager (BLM), San Juan Public Lands Center (in Durango)
- J. Gini Pingnot, Colorado Counties, Inc. (in Denver)
- K. Jim Hubbard, former Colorado State Forester (in Washington, DC)

6. Stakeholder input meetings aimed specifically at informing CFRI:

- A. Invited CFRI Planning Board (in Denver), including attendees: Greg Aplet (Wilderness Society), Mike Babler (The Nature Conservancy), Sam Burns (Fort Lewis College), Frank Cross (USDA Forest Service Region 2), Dave Hessel (Front Range Fuels



Treatment Partnership), Mark Morgan (Morgan Timber Products), Paul Orbuch (Western Governors Association), Mike Foley and Harold Gibbs (USDA Forest Service, representing Jim Bedwell), Merrill Kaufmann (Rocky Mountain Research Station), Greg Eckert, Randy Walsh, Kara Paintner and Linda Kerr (National Park Service).

- B. Community meeting, hosted by the Uncompahgre Plateau/Public Lands Partnership (organized by Jim Free in Montrose); 27 attendees representing USDA Forest Service, Colorado State Forest Service, Division of Wildlife, Colorado Timber Industry Association, Bureau of Land Management, CSU-Continuing Education, and private citizens.
- C. Community meeting, hosted by Fort Lewis College's Office of Community Services (organized by Sam Burns); 25 attendees representing USDA Forest Service, Colorado State Forest Service, Division of Wildlife, Durango Fire and Rescue, Banded Peak Ranch, Mountain Studies Institute, Ute Mountain BIA, and private citizens.

## **Needs Expressed by Colorado Affected Entities (not ranked)**

### ***Ecological Needs***

1. Characterizing Historic Range of Variation. We have substantial knowledge of the historic conditions of many forest regions in Colorado, sufficient for use as a basis for determining the future desired conditions for these landscapes. Our stakeholder input process identified major needs for improved understanding of historic conditions in:

- 1. Pinyon-juniper woodlands in SE Colorado; Extensive & rapid exurban development is now occurring in this type of vegetation and we have almost no information on HRV or current condition.
- 2. Ponderosa pine vegetation in SE and SW Colorado, especially in landscapes with major shrub understories (such as Gambel oak) and encroachment of shade-tolerant conifers (especially white fir).
- 3. Pinyon-juniper woodlands in NW Colorado; the HRV remains almost unknown

### ***Treatment Development, Monitoring, and Evaluation***

2. Evaluating the Impacts of Wood Chipping and Mastication. In the absence of well-developed marketing opportunities for small-diameter wood, the lowest cost option for restoration and fire-hazard reduction treatments is to chip or masticate trees in the field. These treatments reduce the bulk density of forest canopies and lower the probability of sustaining crown fires, but the total mass of fuels remains unchanged. The addition of massive quantities of wood chips and chunks to the soil surface may alter understory plant diversity, tree regeneration, and small mammal habitat. The impacts of fires burning these soil-surface material may include excessively high inputs of heat to the soil. These potential impacts may or may not develop; the current state of knowledge is too limited to say. Studies are needed in operational treatments to determine: the mass, size classes, and spatial distribution of woody material; the impacts on vegetation and small mammals; and the effects of surface fires on soils.

3. Synthesizing the Ecological Impacts of Post-fire salvage Logging and Restoration. Post-fire salvage logging may provide large quantities of moderate-to-high value material to mills, but

post-fire landscapes may be susceptible to impacts from logging impacts in addition to the legacy of the fire. Proposed timber sales following the Missionary Ridge fire near Durango were appealed on the basis of ecological impacts that were based on an assessment from the Pacific Northwest. A synthesis on the ecological impacts of post-fire salvage and restoration treatments is needed to provide the best-available science to land managers who may plan these treatments.

4. Improving Evaluations of Effectiveness of Restoration Treatments. The costs of restoration treatments are highly variable, depending details about location, forest condition, and type of operation (thinning with product removal, mastication, etc.). The effectiveness of these treatments in reducing fire hazard may not be directly proportional to the quantity of trees removed; changes in potential crown-fire behavior following a 1/3 reduction in basal area may be slight, whereas a 2/3 reduction in basal area might dramatically lower fire hazard. Responses of understory vegetation (and animal habitat?) are also non-linear in relation to the proportion of basal area (and canopy) removed. The overall effectiveness of a program of restoration treatments depends strongly on the selection of which acres to treat (in relation to forest structure, topography, and proximity to communities). The long-term effectiveness of treatment options also needs to consider the level of post-treatment maintenance that will be required to sustain the initial benefits. Issues of effectiveness and efficiency also have policy-level implications. If an agency tackles high-cost projects to lower fire hazard for high-value areas, how can this be optimal choice receive appropriate weight (relative to more low-cost acres of lower priority) in an outcomes-based assessment of performance?

5. Prioritizing treatments. Building on Need #5, objective (and defensible) approaches are needed to prioritize areas to be treated. Community Wildfire Protection Plans often include high-cost treatments in the wildland-urban interface, but how do these projects connect to opportunities for wildland fire use outside the WUI? What proportion of a landscape needs to receive restoration treatments to provide an overall improvement in health and fire risk for the entire landscape? These types of optimization questions have been addressed in forestry operations management, and these approaches need to be adapted (and implemented) with forest restoration goals. It will be important to develop scale-appropriate, and goal-appropriate systems for prioritizing treatments. The prioritization needs for optimal treatment decisions on individual landscape will need different information and resolution than required for regional (on the order of 1+ million acres) assessments.

6. Developing Monitoring Protocols and Opportunities. The effectiveness and efficiency of restoration treatments can only be determined from information gained from assessments of treatments. Monitoring is a foundation for adaptive management. Agency personnel commonly do not have time (and in some cases, capacity) to design, implement, measure, and synthesis information on responses to treatments. Agencies are also challenged by the relatively rapid turnover of personnel relative to the time span of ecological responses to treatments. CFRI should take the lead in developing a multi-level plan for monitoring impacts of restoration treatments. The levels should include protocols for monitoring in situations where agencies (and multi-party collaborators) could monitor only the most basic features; for moderately intensive opportunities (perhaps in collaboration with local college courses); and for research-level monitoring (perhaps as part of research collaborations with universities). CFRI should



develop an overall database for maintaining the monitoring information, and regularly revise its outreach efforts to take advantage of lessons learned from monitoring.

7. Increasing Opportunities for Prescribed Fire and Wildland Fire Use on Private Lands. In the late 20<sup>th</sup> Century, prescribed fire (and wildland fire use) programs were almost exclusively limited to public and tribal lands. Colorado has substantial areas of private forest land, with most of it interspersed with public ownership land. A rational approach to reducing fire hazard has to include both private and public ownerships, and this requires lowering barriers to prescribed fire and wildland fire use on private lands. Barriers include county-level control of burning permits (some states have “right-to-burn” policies, but not Colorado), state-level regulations on smoke generation, availability of a professional (non-agency) workforce, and liability. The Colorado State Forest Service is developing some key projects, but the challenges would also benefit from a broader approach incorporating CFRI.

8. Investigating Interactions of Restoration Treatments and Exotic Species Invasion. We know from previous restoration treatments that the risk of invasion by exotic plant species is substantial (but not uniform). How can these risks be categorized, how can risks be reduced, and what is the long-term impact? How much can we rely on information from other regions, such as the Great Basin for cheatgrass ecology? These issues would benefit from a coordinated assessment of the state of knowledge; incorporation into monitoring protocols; and experimentation with approaches for reducing invasions (including washing of equipment before treatments, timing of treatment, degree of soil disturbance, and post-treatment grazing intensity).

9. Increasing Availability and use of Native Species Seeds. Several major issues constrain the use of native species seeds in restoration programs. Only a few of the hundreds of native species are commercially cultivated, with only a few genetic varieties for each species. The commercial production of native seeds is limited by basic ecological knowledge of the physiology and ecology of seed production through seedling establishment. Uncertainties in the reliability of demand for native seeds also limit the profitability of native seed producers. The BLM Montrose Field Office has been very involved in a native seed program, with productive collaboration with Region 4 of the Forest Service in Utah. The focus has been on pinyon-juniper areas, mule deer winter range, and moving now into the pinyon-juniper/ponderosa ecotone and dry mixed conifer. Can CFRI help on these issues?

### ***Economics/Industrial Development***

10. Developing Opportunities for Utilization of Small-diameter Wood. The single factor that limits the number of acres of forest restoration treatments is the high cost of operations, and the absence of profitable uses for small diameter material. The inherent low value of small diameter material is exacerbated by the very limited infrastructure in Colorado for processing woody material. The Colorado Wood Utilization and Marketing Program (Colorado Wood, <http://www.colostate.edu/programs/cowood/>) is developing a variety of approaches for attacking these economic issues, and CFRI can work with Colorado Wood to identify barriers to improving market opportunities. These approaches may concentrate on uses of small diameter trees, but should also include enhancing the overall timber infrastructure in Colorado. A strong forest

industry that processes higher-value logs may provide opportunities for utilizing small-diameter wood as well. Grasses comprise a substantial part of the diet of grizzly bears, but healthy grizzlies also require high-quality foods such as berries and fish.

### ***Human Dimensions***

11. Fostering Partnerships. Colorado benefits from a variety of partnerships around the State (see Appendix 1). Some partnerships are more active (and better funded) than others, and the breadth of focus differs substantially. CFRI could play a role in enhancing the partnership's capacity to address the full suite of restoration issues, and foster information flow and interaction among the various partnerships (and outside entities); a critical need will be developing the economic support systems necessary to carry forward long-term restoration work. These issues have been addressed through the Four Corners Partnership, and the Community Forestry Restoration Program in New Mexico; Colorado is far behind Arizona and New Mexico in the support of community efforts (although we have isolated examples—Pine Partnership, the Uncompahgre Plateau Project, the South Platte Coalition, and various other wildfire mitigation, and restoration groups around the state). The abilities to change, adapt, innovate, and marshal informal and civic resources are constrained by formal systems and mandates, while the energy and resources of communities may remain underutilized. As many cases and experience show, the failures or delays in getting work done on the ground are quite often social and political in nature, centered in misunderstandings and value conflicts over the role and contributions of forest lands, and confusion over active or inactive resource management.

Colorado also needs a central location for maintaining the legacy of information, insights, and experiences accumulated by the broad range of restoration activities in the state; CFRI should develop and maintain a central data base chronicling the variety of information from clients and partnerships.

12. Developing Public Education and Outreach. This may be one of the greatest needs that CFRI could address, with the broadest range of products including (but not limited to):

- Working with the press to inform the public about forest restoration issues;
- Producing ERI-style working papers translating current science into practical formats;
- Collaborating in developing demonstration areas that help clients and communities to understand the visual, ecological, and economic aspects of restoration;
- Providing a list of experts who would be ready to offer rapid replies to client questions
- Provide internships
- Provide a tie between scientists and partnerships to enhance the ability of partnerships to obtain funding
- Develop several types of outreach products such as short courses, education videos, and pamphlets.
- Ensure scientists have ample opportunity to learn from managers.
- Create a publication that locates existing interpretive areas and gives additional information on the restoration work that has occurred at each site.



## Appendix 1. Forest Partnerships in Colorado

Partnership	Contact	Objectives	Date Established	Key Products and webpage
Building Bridges Northwest Colorado Council of Governments	Gary Severson NW CO Council of Governments P.O. Box 2308 Silverthorne, CO 80498 970.468.0295 / fax 970.468.1208	The development and coordination of a process where elected officials, community leaders, and federal land and resource decision level personnel can share information and collaborate with each other regarding multi-jurisdictional policy and direction will enable all jurisdictions to participate in "boundaryless" planning.		Blue River restoration project; Forest fuels reduction project; Social impact assessment for ski area expansion <a href="http://www.nwc.cog.co.us/">http://www.nwc.cog.co.us/</a>
Coalition for the Upper South Platte	Coalition for the Upper South Platte PO Box 490 Hartsel, CO 80449; Hayman Recovery Assistance Center, PO Box 726 Lake George, CO 80827 800-420-9110; 719-748-0033 719-302-2852 fax	Protect a watershed that covers approximately 2,600 square miles of central Colorado	1998	Collaborative planning Newsletter Volunteer projects <a href="http://www.uppingsouthplatte.net/">http://www.uppingsouthplatte.net/</a>
Culebra Range Community Coalition	Tom Perry 719-868-3331 barniranch@aol.com 6614 State Highway 12 Weston, CO 81091	To restore forest health, improve wildlife habitat, reduce risk of unnatural fire, and facilitate small diameter timber based businesses.		Resource inventory Forest health education workshops Fires history study <a href="http://www.cooperativeconservationamerica.org/">http://www.cooperativeconservationamerica.org/</a>
Public Lands Partnership	PLP PO Box 1027 Delta, Colorado 81416 Mary Chapman 970-874-8806 Robbie LaValley 970-872-3280	The Public Lands Partnership strives to be a catalyst, promoting public education and awareness of economic and environmental issues related to public lands, and to provide a local forum for airing different sides of natural resource issues.	1992	Uncompahgre Plateau Project Living History Project Logger Demonstration Project Rancher Habitat Project <a href="http://upproject.org/UPP/PLP.html">http://upproject.org/UPP/PLP.html</a>

<b>Partnership</b>	<b>Contact</b>	<b>Objectives</b>	<b>Date Established</b>	<b>Key Products and webpage</b>
Front Range Fuels Treatment Partnership	Dave Hessel Colorado State Forest Service 303-635-1597 dhessel@lamar.colostate.edu John Bustos 970-295-6674 jbustos@fs.fed.us	The goal of the strategy is to enhance community sustainability and restore fire-adapted ecosystems through identification, prioritization and rapid implementation of hazardous fuels treatment projects in the Front Range of Colorado.	2003	Collaborative planning Fuels Treatment Cross-Boundary Management Research <a href="http://www.frftp.org/">http://www.frftp.org/</a>
Lake County Forest Project	Jessica Clement 719-486-1420 jclement@cnr.colostate.edu	To provide community understanding of the surrounding forest, to create a Community Wildfire Protection Plan, and to sustain collaborative effort through economic development of forest products.	2002	Community collaboration, and to explore sustainable economic opportunities tied to forests
Northwest Colorado Stewardship	Helen Littrell The Keystone Center 1-800-574-8157, ext. 5825 support@nwcs.org	Seeks to engage a wide diversity of local interests in working together to find solutions to previously intractable natural resource management issues.	2003	integrated fire management plan update of the BLM Resource Mnt plan habitat restoration design <a href="http://www.nwcs.org/">http://www.nwcs.org/</a>
Ponderosa Pine Partnership	Carla Harper 970-565-6061 Phil Kemp 970-882-7296 Sam Burns 970-247-7193 260 Center of SW Studies Fort Lewis College 1000 Rim Drive Durango, Co 81301	Improving the condition of ecosystems, and sustaining valuable, small, rural, timber industries necessary for forest restoration	1993	Collaborative planning and management; Adaptive management; Restoration ecology; Small diameter forest products research <a href="http://ocs.fortlewis.edu/SWCommunityForestry/">http://ocs.fortlewis.edu/SWCommunityForestry/</a>
Office of Community Services -Fort Lewis College	Ken Francis, Director francis_k@fortlewis.edu (970) 247-7310 Sam Burns Burns_s@fortlewis.edu 970-247-7193 260 Center of SW Studies Fort Lewis College 1000 Rim Drive Durango, Co 81301	OCS assists local communities, students, and faculty to improve academic, social, and ecological well-being of the Four Corners region.		Lessons learned from 4-corners project; Biomass networking; Sustainable development; Southwest Community Forestry Caucus; Collaborative Forest Planning; Collaborative Fire Planning; <a href="http://ocs.fortlewis.edu/SWCommunityForestry/">http://ocs.fortlewis.edu/SWCommunityForestry/</a>

<b>Partnership</b>	<b>Contact</b>	<b>Objectives</b>	<b>Date Established</b>	<b>Key Products and webpage</b>
North Park Natural Resources Community Group	Beth Metzger, North Park Natural Res Com Group, P.O. Box 223 Walden, CO 80480 (970) 723-8606 npnrcg@yahoo.com	Working together for the wise utilization of natural resources while creating and sustaining healthy lands and communities and providing opportunities for the people of Jackson County.	2004	Collaborative planning; Small diameter utilization feasibility studies Stewardship contracting
Four Corners Sustainable Forestry Partnership, and Colorado Wood Utilization and Marketing Program	Tim Reader, Colorado State Forest Service, PO Box 7233, Durango, CO 81301, Phone: 970-247-5250 treader@lamar.colostate.edu	The Partnership highlights the linkages between healthy forest ecosystems and healthy communities. It received funding from 1999-2003 by special Congressional request through the USDA, Forest Service Economic Action Programs. General interest in the region in promoting biomass energy	1997	Demonstration Grants Program Evaluation Report <a href="http://www.rmrs.nau.edu/fourcorner_sforests/">http://www.rmrs.nau.edu/fourcorner_sforests/</a>
Harris Park Fuels Management Project	Greystone Environmental Consultants Attn: Harris Park Environmental Analysis Team 5231 South Quebec Street Greenwood Village, Colorado, 80111 harrispark@greystone.us	The proposed project (which will treat 7000 to 10000 acres) is part of a larger, 38,975-acre interagency effort to address wildland fire hazards across agency boundaries in the Platte Canyon and Elk Creek Fire Protection Districts, from Conifer to Bailey. Treatments could include both mechanical treatment and prescribed burning, and would be expected to begin as early as 2005 continuing for as long as five years.	2004	<a href="http://www.fs.fed.us/r2/psicc/spl/harrispark_fuels.shtml">http://www.fs.fed.us/r2/psicc/spl/harrispark_fuels.shtml</a>
Healthy Landscape Partnership, 8 counties in SW Colorado	John Moore USFS-GMUG 2250 Highway 50 Delta, CO 81416 970-874-6698 jmoore06@fs.fed.us	Under development, with the intent to empower local communities to engage in restoration treatments, using the Partnership as a network	2006	

## **Appendix 2. Historic Range of Variation for Ponderosa Pine Forest and Pinyon Juniper Woodlands**

Ponderosa pine forests and pinyon-juniper woodlands are two of the most extensive and important vegetation types in Colorado. However, the historic extent, composition, ecological variation in these broad forest types is not known precisely, and current management issues in these types vary across the regions of the state (see Table 1). The historic conditions are generally better known for ponderosa pine forests, especially in landscapes with understories lacking major shrub components. The ecology of Colorado's pinyon-juniper woodlands has not been studied intensively; these ecosystems appear to be more similar to pinyon-juniper woodlands in southern Utah than to woodlands in Arizona and New Mexico. Perhaps the least-characterized forests of Colorado are the ponderosa pine and pinyon-juniper landscapes in southeastern Colorado (Sangre de Cristo and Culebra Ranges, San Luis Valley, and the plateau country of the southeastern counties).



Table A-2-1. Summary of distribution patterns, composition, historical fire regimes, and current conditions for ponderosa pine forests in four regions of Colorado.

<b>Ponderosa Pine forests</b>				
<b>Region</b>	<b>NE Colorado</b> (including Front Range & Pikes Peak)	<b>NW Colorado</b> (including Park & Gore Ranges, Grand Mesa)	<b>SE Colorado</b> (including Sangre de Cristo Range, and San Luis Valley)	<b>SW Colorado</b> (including San Juan Range & Uncompahgre Plateau)
National Forests	Arapaho-Roosevelt, Pike-San Isabel	Routt, White River, Grand Mesa, Uncompahgre, Gunnison	Pike-San Isabel (limited portion)	San Juan, Rio Grande, GMUG <sup>1</sup>
HRV Assessment Documents	Veblen and Donnegan; in press (available on line: <a href="http://www.colorado.edu/geography/biogeography/publications/FrontRangeHRV_FinalDec4_04.pdf">www.colorado.edu/geography/biogeography/publications/FrontRangeHRV_FinalDec4_04.pdf</a> )	Kulakowski and Veblen; in review	Veblen and Donnegan, in press	Romme et al., in review
Extent	Major forest type, mid-elevations	Minor forest type, limited extent	Major forest type, mid-elevations	Major forest, mid-elevations
Major Species	Ponderosa pine, Douglas-fir, mountain mahogany, bitterbrush, currant	--	Ponderosa pine, Douglas-fir, Gambel oak	Ponderosa pine, white fir, Gambel oak, serviceberry
HRV fire regime	Mixed severity, heterogeneous mosaic of high & low severity fires	--	Not well documented, probably mixed severity	Mixed severity, but predominantly low-severity
HRV stand & landscape structure	Variable; low-density all-aged, and high-density even-aged	--	Not well documented, probably variable	Variable, but predominantly low-density all-aged
Departure of current landscape from HRV	Moderate according to HRV reports, but high according to Landfire project	--	Not well assessed; high according to Landfire project	Moderate to high according to HRV reports, and high according to Landfire project
Wildland/urban interface hazards	Very hazardous over very large (and increasing) area	--	Hazardous over small to moderate area	Very hazardous over large (and increasing) area
Major restoration projects	Front Range Fuels Treatment Partnership	--	none	Ponderosa pine partnership, Uncompahgre Partnership, San Juan National Forest

Table A-2-2. Summary of distribution patterns, composition, historical fire regimes, and current conditions for pinyon-juniper woodlands in four regions of Colorado.

<b>Pinyon-Juniper Woodlands</b>				
<b>Region</b>	<b>NE Colorado</b> (including Front Range & Pikes Peak)	<b>NW Colorado</b> (including Park & Gore Ranges, Grand Mesa)	<b>SE Colorado</b> (including Sangre de Cristo Range, and San Luis Valley)	<b>SW Colorado</b> (including San Juan Range & Uncompahgre Plateau)
National Forests	Arapaho-Roosevelt, Pike-San Isabel	Routt, White River, Grand Mesa, Uncompahgre, Gunnison	Pike-San Isabel (limited portion)	San Juan, Rio Grande, GMUG <sup>1</sup>
HRV Assessment Documents	Veblen and Donnegan; in press	Kulakowski and Veblen; in review	Veblen and Donnegan, in press	Romme et al., in review
Extent	Minor component	Extensive woodlands in foothills, and intermingled with prairie	Extensive woodlands in foothills, plateaus, and basins	Extensive woodlands in foothills, plateaus, and basins
Major species	--	Colorado pinyon, Utah juniper, big sagebrush	Colorado pinyon, one-seed juniper	Colorado pinyon, Utah juniper, big sagebrush, bitterbrush
HRV fire regime	--	Not well documented, probably predominantly high-severity	Not well documented, probably predominantly high-severity	Predominantly high-severity
Departure of current landscape from HRV	--	Not well documented, probably heterogeneous mosaic of high and low density, all-aged stands	Not well documented, probably heterogeneous mosaic of high and low density all-aged stands	Heterogeneous mosaic of high and low density all-aged stands
Wildland/urban interface hazards	--	Not yet assessed well, high according to Landfire	Not yet assessed well, high according to Landfire	Low to moderate according to HRV reports, but high according to Landfire
Significant WUI hazards	--	Hazardous over relatively small area	Very hazardous over large (and increasing) area	Very hazardous over large (and increasing) area
Major restoration projects in progress	--	none	none	Uncompahgre Partnership, San Juan NF

### **Appendix 3: Notes from the Montrose Stakeholder Meeting: Uncompahgre Plateau Partnership, Public Lands Partnership**

Dan Binkley and Bob Sturtevant met with people from these partnerships on November 2, 2005, to obtain input on issues and opportunities for forest restoration in the region. Dan provided a short introduction to the Colorado Forest Restoration Institute, and then asked for any general questions or comments, and esp. ideas about the issues and opportunities for enhancing forest restoration treatments in this region.

#### **Section 1: Question and Answers**

How does administration of the CFRI fit in the USFS hierarchy? (Dan described the system set up by USFS Region 2 to coordinate development of workplans, with the Development Team and Executive Team (representing state and federal agencies. Congressional funding would support work with the full range of federal, state, and local agencies, as well as conservation organizations and private citizens)

How does the \$30 million endowment to Warner College of Natural Resources affect the Institute? (The overall health of the WCNR is good for CFRI, but supporting CFRI was not a goal of the donor.)

How can the Institute get money to work in the higher elevations? Mortality of subalpine fir may be leading to a fire problem; some operators (such as Len Langford) make a living in salvage logging of these sorts of forests. (The authorizing legislation defined “dry forest and woodland ecosystem” as an ecosystem that is dominated by ponderosa pines and associated dry forest and woodland types,” so funds provided under that authorization would not be for use in moist, high-elevation forests. However, the CFRI is interested in all forested areas of the state, and would be interested in high-elevation issues using other sources of funds.)

Where are we in the federal funding sequence? (Given the late passage of the authorizing legislation, our hopes for FY2006 depend on redirection of existing agency funds, but this now looks unlikely. We’re also late for the FY2007 budget cycle, but we are working to obtain funds through earmarks supported by the congressional delegations from the 3 states. For FY2008, we hope to be in the President’s original budget request.)

What do we visualize as success? (A budget on the order of \$1million or more a year; providing regular short courses on forest restoration ecology around the state; supporting community groups with such information in treatment prioritizing and effectiveness. Success would include developing information on the uniqueness of local ecosystems (such as the shrub understory found on the western slope), and having a regular presence on the western slope.

How will the Institute assist with the Uncompahgre Plateau Partnership? Will CFRI provide mini-grants? (CFRI aims to lower barriers to the effective and efficient application of restoration treatments to large landscapes. Part of this would be to work with UPP (and any concerned and interested groups) to identify those barriers (from DOT regulations that increase transportation costs to gaps in ecological knowledge). We would provide access to expert information (from wherever it can be found), in forms that are directly useful. We would be particularly interested in collaborating (and partially funding) demonstration areas, and project designed to fill in gaps (including monitoring of treatment effectiveness). Increasing

opportunities for marketing and utilization is also a high priority. We expect our budget might fluctuate, and in good years we might be able to support mini-grants of some sort.

What is the University charging for overhead? (CFRI currently has an agreement with the USFS for a 10% indirect cost recovery rate, though future budgets might differ somewhat.)

Will having Colorado State University involved help with the legal aspects of forestry projects? (A well-designed, transparent process should help make implementation of restoration treatments more acceptable, and the university can act as a facilitator in collaborative planning. Universities are often viewed as being more objective than conservation organizations or government agencies, and we would work hard to maintain an unbiased, non-partisan approach to restoring forest health and reducing wildfire risk.)

## **Section 2: Background from the stakeholders**

The participants provided summaries of recent and current efforts, successes, and issues. The USFS is currently providing good assistance for the community plans, but some concerns remain about effectiveness of treatments (both fire hazard reduction and ecosystem health). Long-term monitoring of these treatments would be good.

A key issue on the West Slope is the reliability of wood supplies. Industrial development will need a clear idea of the resource available, and assurance of the steady availability of the resource. We have a huge potential for many small operators, but what is keeping these small operators from being successful, and how can they be helped?

We have a legacy of collaborative efforts on the Uncompahgre Plateau that provide a fairly sophisticated current situation, and a track record of effective conversations and collaborations. Our collaborative projects (Uncompahgre Plateau Partnership, Public Lands Partnership) have been well supported (including funds from the Ford Foundation, National Forest Foundation, and support from the Forest Service to collaborate at the county level on forest health issues), and our people have worked together very well. This provides about a 5 or 10 year head start on many of the issues that concern CFRI.

We have developed major plans for two watersheds outside Montrose (Spring Creek and Dry Creek, each about 125,000 acres; the entire UP is about 1.5 million acres), including assessments of historic conditions, mosaic vegetation patterns, with monitoring at the level of individual projects and the entire landscapes. This foundation of knowledge in forest ecology was developed in part by collaborations with Karen Eisenhart and Tom Veblen (University of Colorado), Bill Romme and Skip Smith (CSU), Wayne Sheppard (USFS RMS), and Bill Baker (University of Wyoming).

These two watersheds were chosen because they are close to Montrose (almost “urban forest” conditions), with good mule deer habitat, grazing, lots of historic management activities, and many fire starts. The watershed ownership pattern includes about 1/3 private land, 1/3 National Forest, and 1/3 BLM. We’ve planned about 50,000 acres of treatments, and about half of this has been accomplished. We have over 3000 acre area designated for outdoor education.

The UP has two utility companies on the UP technical committee. Vegetation treatment on the ROW’s as well as outside can achieve multiple benefits by including them in our partnership. The WUI, wildlife habitat, and visuals can all be achieved with one treatment. One of our partners is the power company. We want to look at the effects of fire on power lines. How does prescribed fire heat and smoke affect the lines?

Our financial structure (UNCOM Group, Public Lands Partnership) has been effective at collectively managing funds from a range of sources.

We have 3 years of post-fire community-based monitoring of the Burn Canyon area, including repeat photography.

The Colorado Division of Wildlife, BLM and the US Forest Service are working on restoration efforts, demonstration sites and monitoring with good outcomes. We haven't had many appeals due to this work. There is documentation of these projects.

We held a Pinyon/Juniper conference last summer with lots of good information. What seems to make things work here is bringing all the experts together in one room (and especially on field trips). This is extremely effective in making the right decisions for the land. We have gaps, our local people now understand the basic issues surrounding our forests. Outside groups don't have this level of understanding and may cause problems. Field trips have been very successful to inform people about vegetation needs and responses to treatments.

The limited availability of seeds of native species (and varieties) is a major challenge in restoration of our lower-elevation vegetation types. The BLM Montrose Field Office has been very involved in a native seed program, with lots of collaboration with R-4 USFS in Utah. The focus has been on pinyon-juniper areas, mule deer winter range, and moving now into the PJ/ponderosa ecotone and dry mixed conifer.

#### **Identified issues:**

Cheatgrass invasion is a major threat in the lower elevations, and we don't know how much we can rely on ecological information about cheatgrass that was developed in the Great Basin. More information is needed about invasive species in general, including:

1. Longer-term monitoring after treatments: do the invasives expand in dominance, how fast are they expanding or do the native begin to take over?
2. How does the development of invasions interact with grazing management systems? Some enclosure studies in other areas have shown cattle grazing reduces noxious weeds (relative to within the fenced plots). Burn Canyon does have grazed and ungrazed comparisons underway.

Data compatibility across agencies has been limiting; we've had to "dumb down" to the lowest common denominator when combining data bases. Future work across agency and ownership boundaries would be facilitated by using the same scales. Integration (in general) still needs a lot of work.

Our previous and current work on Spring Creek and Dry Creek needs to be extended to other areas on the Plateau (together they comprise only about 20% of the Plateau).

Funding remains the major hurdle – from the point of conducting landscape assessments, NEPA compliance, and operational treatments.

Current treatments in pinyon-juniper landscapes have very little production of wood products. What opportunities could be developed for utilization and marketing? How much more could go into biomass fuels (including direct heating), and what air quality limitations be?

The opportunities for further work in developing native plant material for restoration is almost unlimited.

We would like to see stewardship contracting expanded in this area.

We would like to see a sharing of economic information across boundaries: counties, state, national. What are the economics (real costs) and social-economic costs of wildfires?

Wildland fire use is very effective. Fire is an effective tool for restoration. Wildfire has many negative effects depending on heat intensity, location and size. Some issues that relate directly to fire:

- We need for the university to put out information about the beneficial use of fire, broadening public education and support.
- Information on WUI should be augmented with information about the benefits of fire, and how we can use fire to benefit natural communities.
- Fire use versus air quality issues. How can we use fire under the current restrictions?
- Wildlife issues:
  - Gunnison Sage Grouse – habitat impaired by juniper encroachment.
  - Lynx – all higher elevations considered habitat
  - Deer – main issue, winter range improvement. Eric Berguan doing research
    - looking at response of radio-collared animals
  - Desert Bighorn Sheep – are found on the plateau, and may have habitat issues related to restoration.

The current supply of wood from National Forests is too small to support the industrial infrastructure that is needed for widescale forest restoration. Currently, the amount of wood cut from all the National Forests in Colorado is not enough to run just one mill at full capacity; the mill processing aspen has cut back to ½ shift.

Budgets for federal land management continue to decline, and fewer bodies are available to implement treatments and monitor responses. Cooperation with interested citizens and scientists is vital for obtaining funds, and executing projects that go beyond the scope of single agencies. Collaboration increases credibility too. Smart people want data and figures, and then they can become advocates for good collaborative work.

### **Individual comments going around the room**

Collaboration projects across jurisdictional boundary's are impeded by challenges of exchanging funds between agencies. Projects need to have good fiscal accountability – yet allow for flexibility to fit the project implementation needs i.e. cross-boundary work. How can we use funds flexibly without losing accountability? For example, how would multi-agency projects deal with overhead?

CFRI should avoid any urge to do everything for everybody; we should figure out where the real gains in effectiveness are likely, and concentrate work there. (CSU has missed this point at times in the past.)

CFRI might be very useful in working up long-term monitoring strategies that go beyond current practices, including consistency in measurements. The information needs to be readily accessible and usable.

The value of publicly available databases (user-friendly) could be increased with workshops, and open access (web based).

Definitions of collaboration vary among users; development of explicit definitions would be good. What does it mean that CSU wants to collaborate with the UP group? Need to look at the community and county engagement part of collaboration. How does collaboration work in these groups? How do we get *more* people involved? UP had to pass on applying for some grants because they didn't have connection with academics.

Where should demonstration areas be located? Near people with good access.

Healthy Landscape Partnership, is an 8 county program that meets quarterly as a full group and monthly as working groups. Robbie LeValley (CSU Continuing Education) is the coordinator. Public Lands Partnership needs to get better at outreach to community. CSU can help with the outreach. Could CSU do the next landscape assessment (like Dry Creek and Spring Creek, benefiting from UPP experience), and develop it in a way that it would be “portable” to other locations?

We need to consolidate information for practitioners, highlighting what was tried, what worked, and whatever details might help with other projects.

We need to bring the livestock operators to the table when discussing all these issues.

We need have more uses for small diameter material.

Invasive species are a huge issue, especially cheat grass. .

CFRI should keep an ongoing list of concerns even though we can't respond to them all.

UP has always been a bottom-up process and it has been difficult to keep some of the upper management engaged. Need to raise the profile of the program.

On-the-ground accomplishments are critical for success. Every dollar spent in planning is a dollar less used for implementation. Integration is the key to getting more done for each dollar spent.

We would like to see someone on UP on the CFRI oversight committee.



**Appendix 4: Notes from the Durango Stakeholder Meeting:  
Ponderosa Pine Partnership, San Juan Public Lands Center, Fort Lewis College**

**Current Efforts in Forest Restoration & Stewardship in southwest Colorado**

The Ponderosa Pine Partnership was established in 1993 to address management of 180,000 acres of second growth ponderosa pine in the western San Juan National Forest (SJNF). The partnership includes SJNF, state, Montezuma County, CSFS, CSU, FLC, and private landowners. Seven 50-100 acre pilot projects were conducted between 1995-99, including thinning, prescribed burning, research efforts. About 8500 acres have been treated or are under contract. The principles developed in these pilot projects are now being applied to all ponderosa pine management. The Ponderosa Pine Partnership continues now as an Informal organization, along with formal agreements for research.

Community Wildfire Protection Planning Groups: Five county fire plans prepared under the National Fire Plan framework. The La Plata County fire plan is being updated to meet new requirements for HFRA, and updates are expanding to 5-county area. This effort includes developing a coarse-scale fire risk map/assessment for private lands. A grant application is being submitted to survey homes in relation fire-fighting capabilities and constraints. The key contact is Bill Ball (web page SWColoradofires.org)

Four Corners Sustainable Forestry Partnership was created in 1997 to develop the connection between healthy forest ecosystems and healthy communities. The Partnership was funded from 1999-2003 by special Congressional request through the USDA, Forest Service Economic Action Programs. The Southwest Community Forestry Caucus is a continuation of the "lessons learned" through this partnership effort. (Contact is Sam Burns)

The San Juan National Forest and the Bureau of Land Management have fuels programs that 10,000 acres/yr (SJNF) and 2500-3000 acres/yr (BLM) (contact is Mike Johnson). The SJNF is also in the process of revising its forest plan, and part of this exercise involves applying the RMLANDS model to describe the historic range of variation, including evaluation of landscape effects of alternative management scenarios (Thurman Wilson key contact)

FRAME (Facilitating Research for Adaptive Management of Ecosystems) is a collaborative effort among USGS, Mesa Verde National Park, Colorado State University, Northern Arizona University, and others to apply science (especially modeling) to national park management issues (contact: Christine Turner, USGS).

A group is working on the east side of SJNF to develop a dry mixed conifer project, similar to ponderosa pine partnership. The area is struggling with the loss of a lumber mill, and with NEPA requirements. Denny Lynch helped with initial pilot study, and the current contact is Dave Crawford (SJNF)

The Colorado State Forest Service continues to work with interested private land owners to mitigate fire risk. Some examples include the Falls Creek Ranch, Banded Peak Ranch, and land owners with forest-ag classification. Cost-sharing with the state is possible in some cases (contact is Kent Grant, CSFS). The BLM also works intensively with private land owners on fire management across boundaries between private and public lands (for information, contact Allan Farnsworth, San Juan Public Lands Center; also Lesli Allison, Banded Peak Ranch).

The Mountain Studies Institute (MSI) contemplating a series of short presentations for County commissioners at their meetings (contact is Koren Nydick, MSI)

### **Needs that could be addressed by CFRI**

(1) Assistance in monitoring and evaluating restoration and fuel reduction treatments. Agencies are not equipped (and often do not have the time) to do more than verify contract performance during restoration treatments. In some cases, agency personnel may have opportunities to collect monitoring data, but be limited in opportunities for data analysis, synthesis, and management recommendations. For example, National Forest personnel collected information on more than 860 monitoring plots established in the Missionary Ridge burn area, but funding has run out and data are no longer being collected. Major issues of ecosystem recovery, restoration, exotic species invasion, depend on fundamental insights that can come only from monitoring baseline changes in forests, and changes in response to management treatments (and wildfires). It would be very valuable to have CFRI take the lead in designing some approaches to monitoring that could be implemented by agency personnel, by the public, and perhaps by students.

(2) Assistance in evaluating effectiveness of restoration & fuel reduction treatments in meeting ecological and fire management goals. A wide variety of forest restoration treatments are available to accomplish multiple goals, so we have a fundamental need to understand whether the treatments are effective and efficient at achieving these goals. We have wide uncertainty when it comes to the historic conditions in ponderosa pine/oak forests and in pinyon-juniper woodlands. Treatments that meet restoration and fire hazard goals near Flagstaff or along the Front Range may not be appropriate (adequate) for our region. How much reduction in fire hazard is accomplished by a given investment in removing a given number of small diameter trees (should we be removing more, or fewer)? How rapidly will forest structure return to pre-treatment conditions, and what long-term maintenance treatments would be needed (especially important with oak resprouting)? If small trees and shrubs are chipped/masticated, what are the effects of chipped material on subsequent fire behavior, herbaceous understory composition & viability, and tree regeneration? What are appropriate restoration and fire management goals in mixed conifer and high-elevation moist forests? We need a better understanding of HRV in these forests, especially for non-woody components and for landscape-level conditions & dynamics).

(3) Assistance in evaluating current status and opportunities for expansion of local timber industry, including identifying current capacity, constraints on expanding the amount of wood processed ("bumps in the road"). The SJNF and Colorado Wood Group have some data, but the data need analysis, and additional data probably are needed as well

(4) Assistance in evaluating the ecological impacts of post-fire salvage logging. Information is needed for the Southwest (including treatment effects on post-fire landslides and water quality), so that planning and assessment of impacts can be based on locally appropriate knowledge (rather than issues raised in the Pacific Northwest). and evaluating post-fire salvage logging & rehabilitation, including a a summary of potential benefits & impacts, with emphasis on local situations (rather than PNW).

(5) Assistance in developing native seed sources for restoration & rehabilitation. A limited supply of native seeds is available for restoration work (provided by Southwest Seed between Dolores & Cortez; Meeker Plant Center for herbaceous species; Bessie Nursery in Nebraska is developing trees & shrubs). Important issues remain about appropriate seed sources for post-fire rehabilitation and other restoration/rehabilitation projects. For example, how local must the genotypes be? Are there less expensive and benign non-natives that could be used? Overall, we have very spotty knowledge on the historic range of variation in herbaceous communities. We need to identify the few reference sites that have not been extensively disturbed or altered, and characterize the herbaceous communities.

(6) Assistance with smoke management. Current issues and policies regarding smoke generation from prescribed fires, and wildland use fires. The value of educational programs/materials on smoke effects and management would be high.

(7) Assistance with public education. Private land owners may have limited access to reliable, unbiased information on forest conditions and how these conditions change over time. Much of the available information is outdated, too simplistic, or too technical; existing GIS layers are not always accurate enough to support key decisions. It would be important for CFRI to play a major role in disseminating information in a wide variety of formats, including ERI-type working papers, local radio stations and newspaper articles, and providing information for the SWColoradoFires.org website. CFRI could hold a workshop on what restoration means in various vegetation types of SW Colorado; facilitate forums to discuss projects & issues; maintain a directory of people working on various topics (such as oak management), and provide a “wisdom storehouse” on effective programs of public engagement and education (as provided by the Quivira Coalition in Santa Fe).

(8) The term “wisdom storehouse” may be an important role for the CFRI. There are many descriptions or definitions of **public engagement and education**. These two terms lean somewhat towards the institutional or formal methods. There are approaches that focus more deeply on building relationships with the community for ongoing resource stewardship. When I say “ongoing”, I am thinking of the need for capacity building within many social and political systems—from local governments, to ecological regions and to neighborhoods. There is also the critical need for building economic support systems, similar to those addressed through the Four Corners Partnership, and being targeted through the Community Forestry Restoration Program in New Mexico. One challenge is that Colorado is extremely far behind Arizona and New Mexico in the support of community efforts, although there are isolated examples—Pine Partnership, the Uncompahgre Plateau Project, the South Platte Coalition, and various other wildfire mitigation, and restoration groups around the state.

Whether it is the responsibility of the CFRI to give support to these capacity building efforts is perhaps debatable, but lacking these social development processes, the work of the CFRI will be made more difficult because there is no system, network, or multi-jurisdictional capacity to capture, utilize, and sustain the knowledge that CFRI might provide. Then we will have to resort to inter-institutional arrangements with all the vagaries and limitations of organizations, programs, budgets, bureaucracies, personnel changes, and so on. The abilities to change, adapt, be innovative, and marshal informal and civic resources are then extremely

constrained by formal systems and mandates, while the energy and resources of communities go underutilized. As many cases and experience show, the failures or delays in getting work done on the ground are quite often social and political in nature, centered in misunderstandings and value conflicts over the role and contributions of forest lands, and confusion over active or inactive resource management.

## Appendix 5. What doesn't work well or needs improvement in Colorado?

Excerpts from the *Proceedings of the Western Governors' Association's Workshop on Forest and Rangeland Health Collaboration: The Central Rockies Workshop (Colorado – South Dakota – Wyoming) May 19-20, 2005, Casper, Wyoming*. Workshop cosponsored by USDA Forest Service, U.S. Department of the Interior, National Association of Counties, International Association of Fire Chiefs, The Wilderness Society, and the Council of Western State Foresters

- At the district level, there is still miscommunication or information that is not making it to the right people by virtue of not knowing (not for not trying) across agencies.
- Collaboration can always work better, perhaps more so at the local level.
- There isn't much transparency about how projects are selected and why. Also, funding and data are hard to get. Specifically it is challenging to follow the money and get reliable, summarized data for actual expenditures.
- Measuring and monitoring – and are we measuring the right outcomes, and not just outputs.
- Acre targets for agencies undermine collaboration.
- Accountability measures for collaborating need to be used.
- There seems to be interest and commitment to collaboration at the community level, but an overarching culture and political messages are different.
- Incentives may be leading to a disconnect at the national level.
- There is a lot of uncertainty about funding, inconsistent participation and lack of continuity.
- Lack of commitment at agency executive level to the collaboration and its outcomes.
- Need to fund and hire a full-time coordinator.
- There are struggles with changing culture and how to empower people.
- Commitment to up-to-down and down-to-up communication.
- Need to include those really on the ground to hear the problems (“infantry troops”).
- Make a greater effort to include (e.g. loggers, others).
- Need to help people speak up and engage and commit.
- Be clear about levels of collaboration and where people are key and fit in.
- Need to engage urban citizens. Need to help them see connections.
- Voters and the Legislature may not understand their connection and how they are affected (e.g. through recreation, water quality, and air quality).
- Need industry involved at all levels. Associations at policy level as well as someone appropriate at each level.
- Very difficult to get working people to participate – difficult to get representation.
- Lost/diminished capacity within industry.
- At the higher level of structure it is hard to represent those who are not in a formal network or organized. This happens with industry at a more local level.
- Utilization of great quantities of biomass.

### Colorado Action Plan

The Colorado breakout group then agreed a collaborative process or structure is necessary

for the state to improve forest/rangeland health. It was then discussed who should lead the effort and by when.

Though there was a previous effort at creating a statewide group such as was discussed, it turned into more of an information group and never achieved the original intent for a variety of reasons. Colorado will try to renew its efforts.

1. Paige Lewis of Colorado and Dennis Zachman (BLM) agreed to bring the issue to an interagency meeting with the USFS and DOI. Paige and Dennis will raise for discussion:

- A statewide structure(s), the role of different groups and stakeholders, and how to get resources and a point person to keep everything going and everyone in the loop.
- The implementation of CWPPs and others – initial strategies/workshops to help these.
- Re-examine the local governments' roles and opportunities to be involved so their needs can be understood and represented.
- CWPPs – what kind of coordination is needed? Do they need a point person?
- How will they get local participation?

It was generally agreed that there were going to be funding concerns about a point person to keep everything going, as well as broader funding questions with declining budgets and attention, and increasing expectations through CWPPs.

2. Tom Fry from The Wilderness Society agreed to approach the Front Range Roundtable to talk about the role the roundtable stakeholders can play (in a climate of decreasing funding and increasing expectations.)

3. The Group discussed the need to approach the Congress, State Legislature and/or the Governor to get needed support for ongoing work. Discussion included collaboratively developing a process and proposal that will be brought forward with multiple messengers to attract money and improve interagency coordination. Bill Wilcox agreed to have some initial discussions about legislation for a state forest health advisory board with money for a coordinator.

## Appendix 6: List of people engaged in one or more stake-holder input opportunities

Note: the issues and ideas presented in this needs assessment should not be construed as endorsed uniformly by everyone on this list.

<b>Last Name</b>	<b>First Name</b>	<b>Organization</b>
Abercrombie	Dave	Durango Fire and Rescue
Abramson	Arthur	Sustainable Forest Management Services
Alexander	Jill	Douglas County
Allison	Lesli	Banded Peak Ranch
Aplet	Greg	The Wilderness Society
Babler	Mike	The Nature Conservancy
Ball	Bill	Office of Community Services
Banulis	Brad	2300 S. Townsend Ave.
Bauman	Jodi	Bureau of Land Management
Bedwell	Jim	Arapahoe and Roosevelt Nat. Forest
Bell	Ron	1230 E. 7th St.
Bentsen	Ken	New Mexico Highlands University
Bergman	Eric	Division of Wildlife
Berry	Joyce	Colorado State University
Billerbeck	Rob	Colorado State Parks
Binkley	Dan	Forest Ecologist
Boggs	Ryan	The Nature Conservancy
Bol	Keith	Jefferson County Open Space
Boscheinen	Kristy	CSFS - Golden District
Brignull	Ember	Natural Resource Specialist
Brinton	Sara	San Juan National Forest
Brown	Karl	USGS
Brown	Reeves	Club 20
Buria	Barney	PO Box 141
Burns	Sam	Office of Community Services
Cables	Rick	USDA Forest Service
Cadenhead	Andy	U.S. Forest Service
Campbell	Coleen	Smoke Management Program Coordinator
Caplan	Susan	Bureau of Land Management
Carroll	Don	White River National Forest
Chapman	Mary	408 1740 Rd.
Cheng	Tony	Colorado State University
Clement	Jessica	Colorado State University
Coupal	Steve	USDA Forest Service
Covington	Wally	Northern Arizona University
Crawford	Dave	USDA Forest Service
Cross	Frank	U. S. Forest Service
Cunio	Jim	Uncompahgre Field Office, BLM
Dale Gregory	Lisa	The Wilderness Society
Dallison	David	San Juan National Forest
Dalrymple	Robert	
Davey	Pat	Plant Materials Specialist
Dennis	Frank	Colorado State Forest Service
Dettman	Bob	Forest Service



Dollerschell	Jim	BLM
Duda	Joe	Colorado State Forest Service
Dunn	Walter	Region 3
Ebert	Vern	San Miguel County
Eckert	Greg	National Park Service
Ecklund	Vic	Colorado Springs Utilities
Edwards	Richard	USDA Forest Service
Edwards	Richard M.	
Ellis	Dennis	Governor Owens' Office
Ellison	Mark	Wyoming State Forestry Division
Ellwood	Leslie	Wildlife Biologist
Everhart	Ron	National Park Service
Everhart	Ron	National Park Service
Feinstein	Jonas	Colorado State University
Findley	DeWayne	Aspen Wall Wood
Fishing	Nancy	Colorado Timber Industry Assn.
Foley	Mike	USDA Forest Service
Fornwalt	Paula	Rocky Mountain Research Station
Francis	Ken	Office of Community Services
Frank	Randy	Jeffco Open Space
Free	Jim	14920 6000 Rd.
Freeman	Jon	Natural Resource Ecology Laboratory
Fry	Tom	The Wilderness Society
Frye	Bob	U.S. Forest Service
Gann	David	The Nature Conservancy
Garner	Jim	2300 S. Townsend Ave.
Garrison	Kristin	Colorado State Forest Service
Gartner	Lindsay	Colorado State Forest Service
Gibbs	Harold	USDA Forest Service
Gildor	Cara	San Juan National Forest
Goodell	Craig	USDA Forest Service
Goodtimes	Art	San Miguel County
Grant	Kent	Colorado State Forest Service
Griffin	Jim	Rio Grande National Forest
Haines	Todd	NM State Forestry
Hall	Sid	Rio Grande National Forest
Hardgrave	Kathryn	Colorado State Forest Service
Harper	Carla	Montezume County Public Lands Program
Hayward	Greg	University of Wyoming Forest Service
Hearth	Michael	
Hendricks	Alison	Forester
Henry	Shane	Colorado Dept. of Natural Resources
Hessel	David	Colorado State Forest Service
Hessler	Mike	USFS - Pike National Forest
Hill	Alison	USDA - Rocky Mountain Research Station
Hodges	Ellen	USDA Forest Service
Hodges	Johnny	U.S. Forest Service
Hodgson	Ron	Bureau of Land Management
Holloway	Deb	Pleasant Valley Management, LLC
Howard	David	USDA Forest Service

Hoyt	Lynn	2378 Robins Way #129
Huckaby	Laurie	U.S. Forest Service
Huisjen	Dan	2465 S. Townsend Ave
Jahnke	Jeff	Colorado State Forest Service
Johnson	Nan	Colorado State Forest Service
Johnson	Randy	
Johnson	Mike	San Juan National Forest
Jones	Beth	Columbine RD/San Juan National Forest
Julian	Chad	Boulder County Open Space
Kalkhan	Mohammed	Colorado State University
Kaufmann	Merrill	USDA Forest Service
Kemp	Phil	U.S. Forest Service
Kinateder	Dave	Bureau of Land Management
Knight	Dennis	University of Wyoming
Korb	Julie	Fort Lewis College
Krabath	Mark	San Juan National Forest
Krebs	Stu	Public Lands Partnership
Krickbaum	Bruce	BLM
Kurzel	Brian	CU-Boulder, Biogeography Lab
Langowski	Paul	Fuels-Fire Ecology
Larry	Don	Mill operators
Leatherman	David	Colorado State Forest Service
Lee	Brook	Colorado State Forest Service
LeValley	Robbie	CSU Continuing Education
Lewis	Paige	Colorado State Forest Service
Lohman	Steve	Manager of Water Quality
Lowrance	Ben	Colorado State University
Martin	Mark	Arapaho-Roosevelt National Forest
Martin	Deborah	Research Hydrologist
Mask	Roy	USDA Forest Service
McLaughlin	Pat	Colorado State Forest Service
McPeek	Brian	The Nature Conservancy
Meine	Curt	University of Wisconsin
Mickley	Donna	USDA Forest Service
Montgomery	April	PO Box 551
Moore	John	USFS-GMUG
Morgan	Mark	Morgan Timber Products
Motley	Pam	821 N 1st St.
Murphy	John	Rio Grande National Forest
Murphy	Shiela	Hydrologist
Nydick	Koren	Mountain Studies Institute
Olmsted	Edwin	Olmstead Consulting
Orbuch	Paul	Western Governors Association
Owens	Tom	Supv. Physical Scientist
Paddock	Craig	Douglas County
Page	Ed	1001 N. 2nd St.
Palestro	Nicole	
Patton-Mallory	Marcia	Rocky Mountain Research Station
Penry	Josh	Colorado Legislator
Pingenot	Gini	Colorado Counties Inc

Powell	Janine	Assistant Director
Preston	Mike	Federal Lands, Mont. Cty #302
Price	Zachary	Boulder County Open Space
Raitano	Flo	Colorado Rural Development Council
Ramirez	Jesse	USDA Forest Service
Randall	Christina	Wildland Risk Manager
Reader	Tim	Colorado State Forerst Service
Redders	Jeff	San Juan National Forest
Redente	Edward	Colorado State University
Regan	Claudia	USFS Rocky Mountain Region
Rennick	Tom	BIA Ute Mountain Agency
Resh	Sigrid	Colorado State University
Richardson	Todd	Montrose Interagency Fire (BLM/USFS)
Romme	Bill	Colorado State University
Rutledge	Chris	Central Rockies chapter of the Society for Ecological Restoration
San Miguel	George	
Sargent	Howard	Bureau of Land Management
Schanel	James	Battalion Chief Wildland Ops Manager
Schmidt	Marcus	Smoke Management Specialist
Schoennagel	Tania	University of Colorado
Schofield	Mark	Western Colorado Congress
Schott	Dave	Jeffco Open Space
Schrock	Steve	408 1740 Rd.
Secher	Cory	CSFS - Boulder District
Sherriff	Rosemary	University of Colorado
Shoemaker	Sloan	Wilderness Workshop
Shoemaker	Susan	Natural Resource Consultants
Sibold	Jason	University of Colorado
Silvieux	David	United States Forest Service
Slade	Russell	Society of American Foresters
Smith	Rocky	Colorado Wild
Smith	Ty	PO Box 476
Sokal	Dan	Bureau of Land Management
Soller	Ellie	P.O. Box 9614
Staeble	Alan	PO Box 714
Stephens	Art	Western Colorado Congress
Stevens	Dave	Bureau of Land Management
Stiles	Mark	San Juan National Forest
Story	Donna	Society of American Foresters
Sturtevant	Robert	Colorado State University
Suckla	Julie	Mill operators
Surber	Mike	USFS Grand Valley Ranger District
Theobald	Dave	Colorado State University
Thinnes	Jim	White River National Forest
Thrash	Gary	San Juan Public Lands Center
Tobler	Matt	Blue Mountain Environmental Consulting
Tomback	Diana	University of Colorado
Troxel	Tom	Intermountain Forest Association
Twitchell	John	Colorado State Forest Service
Van Den Berg		Durango home owner

van Schaik	Peter	Public Lands Partnership
Van Landingham	Shelly	Colorado State Forest Service
Veblen	Tom	University of Colorado
Vosick	Diane	Northern Arizona University
Walsh	Randy	National Park Service
Watson	Dick	Bureau of Land Management
Webb	Jim	Forest Stewardship Concepts
Wells	John T.	U.S. Forest Service
Will	Dennis	Colorado State Forest Service
Will	Perry	Division of Wildlife
Wilson	Pam	San Juan National Forest
Winkler	Fred	Colorado State Forest Service
Wu	Rosemary	San Juan National Forest
Yarrow	Ray	Rio Grande National Forest
Zeman	Mike	PO Box 132

## Appendix 7. Demand for Wood Products in Colorado

Colorado uses large quantities of wood each year, spending more than \$1 billion on solid wood and chipped wood products (paper products not included; see table below from Lynch and Mackes 2001). The magnitude of this demand illustrates the potential market for increased wood production from Colorado forests; the long-term increase in meeting Colorado wood demands from Colorado forests depends on developments in economics, policy, and ecological effects of management.

Since the study was conducted, the state population has increased by an annual rate of 1.75%, thus the overall totals can be increased by a similar amount. Capacity to produce these products has not increased considerably since the Lynch and Mackes study. We have seen minimal increase in forest products infrastructure while there has been an increase in forest management activities. Most of these activities are in the area of fire mitigation for communities and watersheds.

Much of the management work being conducted is using mastication (the chipping or chunking of material) to reduce the standing trees to mulch. This removes the aerial fuels but leaves the biomass on the forest floor to decompose. In some management units, saw logs are removed first, followed by mastication of the smaller material. This only occurs if the logger can transport the material to a local at a profit.

Efforts are being made to use the chipped biomass for the production of heat and/or electricity. Several chip furnaces are being installed that use local chipped material. Examples of these include the chip furnace in Nederland that provides heat for the town's community center, a furnace heating the green house at the North Park School in Walden, and a facility in Longmont that is heating the Boulder County maintenance facility. There are numerous other facilities studying the feasibility of these units.

One of the main concerns about biomass furnaces is the cost and availability of the chips. In order to make the system pay the chips have to be close to the heating unit and they have to be available for little or no cost. Simply moving the chips from management unit to furnace facility is expensive. How long will chips be available at a reasonable price, is a concern to the facility managers.

Some progress has been made on the utilization of small diameter trees though much more is needed. Renewable Resources has installed a new shaving machine to make animal bedding from small logs. A forester in southern Colorado is building small shelters with small diameter material. Some "green" builders are using small diameter Colorado logs in their homes. The efforts are positive, but many more of these innovative uses of wood are needed to make a difference.

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**Volume and value (2000) of primary products annually consumed in Colorado.** From Lynch, Dennis L.: Mackes, Kurt, 2001. Wood Use in Colorado at the turn of the twenty-first century. USDA For. Serv. Res. Pap. RMRS-RP-32. 2001.

<b>Products</b>	<b>Volume in 2000</b>	<b>Retail value</b>
<b>Lumber</b>	<b>Millions of board feet</b>	<b>Million of \$</b>
Residential framing	603.7	\$370.40
Mobile home	9.8	\$5.99
Commercial-industrial	35.8	\$22.00
Residential remodeling	228.0	\$140.11
Residential fencing	38.6	\$25.00
Decking	2.2	\$47.40
Highway	6.9	\$5.10
Truck transportation	1.1	\$0.66
Pallet	50.0	\$11.00
Mining rough sawn and finished	<u>2.1</u>	<u>\$0.90</u>
<b>Subtotal</b>	<b>1047.2</b>	<b>\$628.56</b>
<b>Timbers</b>	<b>Millions of board feet</b>	<b>Million of \$</b>
Landscape	11.0	\$5.60
Railroad ties	8.2	\$4.60
Highway guard posts	3.4	\$3.40
Highway sign posts	0.1	\$0.05
Mine cribbing	<u>2.4</u>	<u>\$1.32</u>
<b>Subtotal</b>	<b>25.1</b>	<b>\$14.97</b>
<b>Other sawn products</b>		
Shakes & shingles	10.5 million square feet	\$16.60
Mining capboards & wedges	0.27 million bd-ft	<u>\$0.26</u>
<b>Subtotal</b>	dissimilar units	<b>\$16.86</b>
<b>Panels</b>	<b>Millions of Square feet</b>	
Residential sheathing	479.0	\$142.10
Residential siding	35.9	\$20.90
Mobile home	9.1	\$2.34
Commercial-industrial panels	38.3	\$19.20
Commercial-industrial hardboards	0.4	\$0.20
Residential remodeling panels	135.0	\$67.80
Residential remodeling hardboard	75.0	\$6.00
Highway panels	18.3	\$9.20
Railway shipping	<u>0.2</u>	<u>\$0.06</u>
<b>Subtotal</b>	<b>791.2</b>	<b>\$267.80</b>
<b>Roundwood</b>	<b>Millions of Board-feet</b>	
Log home logs	19.2	\$37.50
Agricultural fencing	2.3	\$2.30
Utility poles	27.4	\$16.90
Highway pilings	10.9	\$4.90
Mine props	<u>1.0</u>	<u>\$0.71</u>
<b>Subtotal</b>	<b>60.8</b>	<b>\$62.31</b>
<b>Christmas trees</b>	<b>Millions of Trees</b>	
<b>Subtotal</b>	0.495	<b>\$11.60</b>
<b>Wood energy</b>		
Firewood	.026 million cords	\$20.70
Firelogs	1.2 million logs	\$2.50
Pellets	0.05 million tons	<u>\$8.80</u>
<b>Subtotal</b>		<b>\$32.00</b>
<b>Mulch, chips &amp; sawdust</b>	<b>Million Cubic yards</b>	
Landscape mulch	0.13	\$4.10
Dairy cattle bedding	0.12	\$0.86
Horse bedding	0.80	\$8.00
Small mammal bedding	0.28	\$0.23
Turkey & chicken bedding	0.08	\$0.90
Laboratory animal bedding	0.002	\$0.13
<b>Subtotal</b>	<b>1.418</b>	<b>\$14.22</b>

**\$ Grand Total = \$1,048.32**

Since the Lynch and Mackes report, Colorado has experienced a sharp rise in tree-killing insect activities. Pinyon ips, mountain pine beetle, spruce bark beetle, and balsam fir beetle have all been increasing in population. The result is hundreds of thousands of dead trees throughout the state. The ips beetle epidemic has mostly subsided, however, the other three insects are continuing to increase and many more thousands of trees are expected to die in the next few years. These dead trees add additional resources to an already over-whelmed forest industry. The dead trees also are more of an immediate issue to the counties and homeowners who want them removed because of fire and esthetic reasons. It is expected that there will be legislative action to commit resources to the Mountain pine beetle epidemic occurring in Grand, Summit, Eagle and Jackson counties.

Salvage of the insect killed timber will compete with forest restoration efforts due to the small number of mills in the region and the concern mills have with blue stain. There are only two "large" mills that are cutting lumber in significant amounts: Intermountain Resources in Montrose, CO and Big Horn Lumber in Laramie, Wyoming. Intermountain will purchase timber that has insect-caused staining while Big Horn will not. This limits the landowner's ability to sell the timber. The Intermountain mill is 250-300 miles from where much of the beetle kill currently stands. High fuel costs will lower the timber value and will limit how much wood can be moved to the Montrose facility. It can be assured that the mill will want the best timber available and will be able to choose which contracts to pursue.

Capacity to remove, transport and process small diameter and insect killed timber is one of the most critical components in restoring our forests. More attention and funding is needed to jump start numerous forest industry endeavors to handle the trees that need to be removed from Colorado's dense forests.