

**Ecological Restoration Institute Cooperative Work Plan  
Fiscal Year 2005**

***Revised based on Executive Committee Comments on May 4, 2005  
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## Proposal Summary

This work plan will help ensure that the best available science is used by land managers and stakeholders to develop and implement comprehensive, restoration-based forest treatments. It seeks to fill a critical void that exists between applied and existing scientific findings, and the translation and transfer of that knowledge to inform forest management. Improving the knowledge base of practitioners will be accomplished through an active analysis of scientific information within the framework of land manager realities. The information will include an explicit articulation of science-based actions that can accomplish land management objectives. Central to the proposal is a commitment to develop effective communication approaches for land managers and stakeholders, these include: continuing education, user friendly GIS-based decision support tools, and written and electronic products that will result in the transfer of knowledge to practitioners.

In March 2005 the Washington D.C. office of the Forest Service made \$400,000 available to the Ecological Restoration Institute at Northern Arizona University for work in Fiscal Year 2005. Harv Forsgren, Regional Forester for Region 3, decided that the plan of work proposed by the ERI should serve as a “straw man” to test the review and approval structure developed by the Forest Service as part of the implementation of PL 108-317.

The work outlined in this document is a small part of a much larger, comprehensive set of activities underway at the Ecological Restoration Institute. The comprehensive set of actions responds to numerous specific land manager needs compiled in the document entitled, “Examples of Specific Land Manager Needs, March 10, 2005.” (see Appendix C) Four additional sources also inform this plan of work. They include: 1. The Forest Service Strategic Plan; 2. Ideas articulated by Region 2 and 3 at an October 29<sup>th</sup>, 2004 meeting in Flagstaff; 3. Ongoing policy directives that include the Western Governors’ Association (WGA) 10-Year Comprehensive Strategy, the Healthy Forest Restoration Act, the new Forest Planning rule and others; and, 4. Gaps revealed to Ecological Restoration Institute (ERI) scientists and practitioners while working with stakeholders and land managers.

Some of the deliverables for 2005 build on previously funded activities. The proposed products will increase the breadth of knowledge and increase the number of audiences that benefit from earlier work. For example, the analysis of understory responses to different restoration treatments is informed by monitoring that extends back to 1995.

Based on the needs and opportunities identified, we have developed the following goals under this work plan:

**To be completed with initial funding available:**

***Goal One: Contribute to improving the health of degraded public and private forest lands at risk for unnatural, catastrophic fire through the development and promotion of science-based restoration treatments for project-level action.***

The following goals will be completed with amended funding when available:

**Goal Two:** *Translate and transfer biophysical and social science research into communication products for land managers, communities and other stakeholders to inform project-level action.*

**Goal Three:** *Support collaborative action to identify utilization options for small diameter wood.*

## Background

The ERI strives to understand and anticipate the needs of land management agencies and stakeholders and to provide the best available and most timely science to support management activities. Our core function is to work with partners to develop scientifically credible treatments that make operational and ecological sense and get them implemented on the ground. Unlike most research or university-based institutes we are committed to producing science and information to answer contemporary and immediate management questions. We actively develop, synthesize and analyze scientific information, translate it for land managers and other stakeholders, and aggressively transfer it to key audiences through publications, workshops, field trips and training. The ERI collaborates with thirteen community-based groups throughout the Southwest, assists in treatment design and planning on over 680,000 acres of federal and state land, and is frequently called upon by Congress, the Western Governors' Association, and other powerful stakeholders to provide the best available information on forest restoration and actions that can be taken to reduce and minimize the threat of catastrophic wildfire.

On October 5, 2004 President Bush signed into law the SOUTHWEST FOREST HEALTH AND WILDFIRE PREVENTION ACT, identifying the Ecological Restoration Institute at Northern Arizona University as one of three Institutes in the Southwest established for the purpose of ensuring the best available science is used in the development, implementation and monitoring of forest restoration treatments. Congressional intent was clear, that treatments should incorporate science-based restoration design that will simultaneously improve forest health, reduce the threat of unnatural wildfire and provide economic and social benefits to forest communities. To accomplish this goal the statute outlines explicit duties that include:

1. Develop, transfer, apply, monitor, and regularly update 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. Synthesize and adapt scientific findings from conventional research programs to the implementation of forest and woodland restoration on a landscape scale;
3. Facilitate the transfer of interdisciplinary knowledge required to understand the socioeconomic and environmental impacts of wildfire on ecosystems and landscapes;
4. Collaborate with Federal agencies--
  - a. to use ecological restoration treatments to reverse declining forest health and reduce the risk of severe wildfires across the forest landscape;
  - b. to design, implement, monitor and regularly revise wildfire treatments based on the use of adaptive ecosystem management;
5. Assist land managers in--
  - a. treating land with restoration-based applications; and
  - b. using new management technologies (including the transfer of understandable information, assistance with environmental review, and field and classroom training and collaboration) to accomplish the goals identified in--

- i. the report entitled '10-Year Comprehensive Strategy: A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment' of the Western Governors' Association ;
  - ii. the report entitled 'Protecting People and Sustaining Resources in Fire-Adapted Ecosystems-A Cohesive Strategy' (65 Fed. Reg. 67480); and
  - iii. The National Fire Plan.
6. Provide technical assistance to collaborative efforts by affected entities to develop, implement, and monitor adaptive ecosystem management restoration treatments that are ecologically sound, economically viable, and socially responsible; and
7. Assist 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.

## Needs Assessment

Forest management is in a period of rapid change. Over the past four years the Forest Service, the Western Governors’ Association, and the Department of the Interior have produced policy directives designed to advance forest restoration and reduce the risk of unnatural wildland fire. Imbedded in each policy are similar themes that include the need for: multi-jurisdictional collaboration and cooperation; science-informed treatments; and prioritization and action at the landscape scale (see Table One). The goal of these directives is to revise policy and action to meet the challenge of restoring 132 million acres of degraded public and private land.<sup>1</sup>

Policy Document		Collaboration	Best Available Science	Landscape-level Planning	Prioritization of Treatments	Coordination with State / Local Governments
National Forest Management Act	2005 Planning Rule	X	X	X		X
Healthy Forests Restoration Act		X		X	X	X
HFI/HFRA Field Guidance		X	X	X	X	X
Executive Order: Cooperative Conservation		X				X
National Fire Plan Documents	Managing the Impact of Wildfires on Communities and the Environment	X		X		X
	10-year Comprehensive Strategy	X	X	X	X	X
	10-year Strategy Implementation Plan	X		X	X	X
GAO Report GAO-03-805					X	
Forest Service Strategic Plan, 2000 Revision		X	X		X	X

**Table 1: Analysis of federal policy directives**

<sup>1</sup> USDA Forest Service. 2004. USDA Forest Service Strategic Plan for Fiscal Years 2004-2008. October 2004 FS-810

The land management agencies have rapidly increased the area treated with hazardous fuel reduction treatments beginning in the mid-1990s. Between 1994 and 2000, the Forest Service and the Bureau of Land Management increased the number of acres treated from fewer than 500,000 acres in 1994 to more than 2.4 million<sup>2</sup>. From a National Forest perspective the Coconino National Forest has completed over 60,000 acres of hazardous fuel reduction treatments around local communities since 2001—with many of the treatments selected and designed through a collaborative process.<sup>3</sup> The Forest Service Strategic Plan sets an ambitious, yet attainable annual goal of treating two million acres of degraded forests in the wildland-land urban interface and in the wildlands, respectively.

Yet, restoring forest ecosystems takes more than hazardous fuel reduction. It includes restoring forest structure and function, protecting and restoring critical habitat, riparian areas, watersheds and a plethora of other attributes as well. Our experience shows that there is confusion and ambiguity about what is meant by ecological restoration by most practitioners. This is also true at the highest policy levels, where a recent letter from the WGA Forest Health Advisory Committee (FHAC) identified the need for a clear definition of ecological restoration.<sup>4</sup>

The land management agencies have considerably more responsibilities than just reducing hazardous fuels. For example, National Forest Planning is underway throughout the West. New guidance for forest planning requires collaboration and the use of the best available science. In September 2003, Tom Thompson, Deputy Chief, National Forest System stated to a group of the leaders in collaborative forestry that the complexity and challenges of land management coupled with limited human and financial resources creates a new urgency for land managers and stakeholders to find innovative ways to work together to solve problems.

Two polls<sup>56</sup> conducted in Arizona demonstrate that the public believes the Forest Service and the Universities are the most credible sources of information for land management. A recent unpublished poll of 693 individuals revealed that although people want to be informed of land management activities they believe the experts should do the work. The activities outlined in this work plan will enhance and expand the capacity of the Forest Service and other land managers to improve their expertise and advance rigorous, effective, and socially acceptable forest ecosystem restoration.

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<sup>2</sup> USDA and USDI, 2000. The National Fire Plan. September 2000. Washington, D.C.

<sup>3</sup> USDA Forest Service. 2004. 2004 Coconino National Forest: Report to Stakeholders. Flagstaff, Arizona

<sup>4</sup> Western Governors' Association Forest Health Advisory Committee (FHAC). 2004. Report to the Western Governors on the Implementation of the 10-Year Comprehensive Strategy. November 2004. Denver, Colorado

<sup>5</sup> Solop, F. 2003. Social Research Lab, Northern Arizona University. Grand Canyon Poll: A Survey to Assess Public Attitudes Towards Forest Health and Management. <http://www4.nau.edu/srl/News.aspx?Year=2003>.

<sup>6</sup> Delost, J. 2001. Public attitudes toward forest restoration methods in Arizona. Thesis paper, Northern Arizona University.



## Program Design

***Goal One: Contribute to improving the health of degraded public and private forest lands at risk for unnatural, catastrophic fire through the development and promotion of science-based restoration treatments for project-level action.***

*--From "A Collaborative Approach For Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Comprehensive Strategy*

### **Goal Three: Restore Fire Adapted Ecosystems**

- Restoration – Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically severe fires on a priority watershed basis through long-term restoration
- Using Science and Information – Promote the development and use of the best available science along with local and indigenous knowledge.
- Monitoring – Monitor restoration and rehabilitation projects for effectiveness and share the results in order to facilitate adaptive implementation. (p.10)

To achieve goal one the ERI will obtain, synthesize and analyze existing scientific information in support of forest restoration. Specifically, these activities will lead to explicit management recommendations that will provide the best available science to land managers and other stakeholders for purposes of informing and encouraging appropriate management activities. These activities include: (1) synthesis/analysis of existing scientific information, (2) identification of wildlife habitat use in wildland-urban interface treatment areas, (3) inventorying impacts of landscape-scale wildland fire use in ponderosa pine and higher elevation forests, and (4) short administrative studies, synthesis and analysis documents to answer emerging management questions.

1. Summarizing, analyzing and interpreting existing scientific information for land management purposes is one of the most cost-efficient ways to bring new findings to the attention of managers. Under this work plan, we will focus on biodiversity responses to forest restoration treatments. Up to 99% of plant species richness is comprised by the herbaceous and shrub plant community. This diversity is directly related to wildlife resources, erosion control, fire spread, and conservation of rare species. We will summarize biodiversity data from long-term study sites in Arizona and Colorado over a range of thinning and burning treatments.
  - Technical synthesis and analysis paper on biodiversity response to forest restoration treatments that includes recommendations to practitioners *Field work completed by September 30, 2005; Report due December 31, 2005.*
2. Wildlife habitat use is poorly understood in wildland-urban interface treatment areas, especially for nocturnal foraging forest bats, several of which are managed as sensitive species. We will assess bat habitat use, taking advantage of an externally-funded study, to maximize information about the wildlife implications of restoration in the urban interface.

- Report on forest bat habitat use following treatments in the wildland-urban interface, including considerations and recommendations important for the conservation, protection and habitat enhancement of bats as it relates to treatments. *Field work completed by September 30, 2005; Report due December 31, 2005.*
3. Wildland fire use (the explicit use of natural ignitions that are planned for and permitted to burn) is a promising management tool for the restoration of ecological processes and the reduction of hazardous fuels across large landscapes. However, a number of constraints limit wildland fire use, including inadequate knowledge about the effects of these fires on ecosystem diversity and productivity. Under this work plan, we will take advantage of large-scale wildland fires that burned over pre-existing forest monitoring plots across a broad elevational range from ponderosa to mixed conifer, aspen, and spruce-fir forests. Measurements on tree effects were previously funded by the interagency Joint Fire Science Program; we are adding resources under this work plan to include monitoring and of vegetation diversity, productivity, and exotic species.
- Report on effects on diversity and productivity following landscape-level wildland fire use that will be published in a form that is beneficial to land managers and stakeholders. *Field work completed by September 30, 2005; Report due December 31, 2005.*
4. Management questions arise that require intensive collecting and analysis of existing information. The ERI will prepare a synthesis of knowledge document to answer an emerging and urgent question.
- A status of knowledge report based on a topic to be determined. The report will explicitly serve information requested by stakeholders and land managers. *September 30, 2005*

*\*The deliverables in this section fulfill the following needs articulated in the "Examples of Specific Land Manager Needs, March 10, 2005": A(1)a, A(1)c, A(1)d, A(1)e, A(2)c, A(2)d, A(3)e, B(2)d,C(2)a-c*

***Goal Two: Translate and transfer biophysical and social science research into communication products for land managers, communities and other stakeholders to inform project-level action.***

*From—USDA Forest Service Strategic Plan*

**Objective 3.c: Improve the knowledge base provided through research, inventory and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.**

We will...

- Provide research results and tools through technology transfer that support effective management, protection, and restoration of ecosystems
- Incorporate/integrate the best available science in all broad-scale assessments and land and resource management plan revisions

The Office of Management and Budget (OMB) has asked the Joint Fire Science Program to identify new performance measures to evaluate the effectiveness of scientific research. The traditional measure of success for the research community is the number of peer-reviewed publications resulting from research. Research is undeniably important and memorializing it in the scientific literature is critical to learning and ensuring accuracy and high standards. However, there are few practitioners that seek answers to management questions in the scientific literature. The request by OMB is indicative of a growing desire to transfer more research into measurable action on the ground.

The ERI has an active translation and transfer program that ensures that practitioners are receiving the best available science. For example, over the last two years the ERI has offered land manager workshops that explain the difference between ecological restoration treatments and hazardous fuel reduction treatments. The workshops include lectures and field trips designed to ensure transfer of this knowledge to project-level action. Although it is difficult to quantify, our work has led to a change in attitude about the amount of fuel reduction necessary to enable the return of low-intensity fire. These services are in high demand. The level of interest by practitioners could lead to creating a permanent continuing education program at the field level.

The ERI also actively supports community collaboration. We are actively engaged in the development of multi-party monitoring protocols and the training of the practitioners that will use them as a part of the New Mexico Cooperative Forest Restoration Program.

For 2005 funds the ERI will continue to offer an integrated set of communication tools and activities to maximize information exchange with land managers, stakeholders and decision-makers.

1. It has been several years since a conference covering the restoration of frequent fire forests has been held. The ERI will begin planning for national workshop on forest restoration for land managers and stakeholders that will focus on interpreting current research findings for application on the ground. The date for the conference is October 2006.

- A conference work plan, timeline and report on progress *September 30, 2005*
- 2. The ERI will prepare fact sheets, short analyses and white papers to respond to land manager and stakeholder inquiries
  - Copies of all materials, *September 30, 2005*

*\*The deliverables in this section fulfill the following needs articulated in the "Examples of Specific Land Manager Needs, March 10, 2005": A(2)e, B(2)b, B(2)c, C(2)a-c, D(2)a*

**Goal Three: Support collaborative action to identify utilization options for small diameter wood.**

*From-- "Contractor Selected for White Mountain Stewardship Project on Arizona's Apache-Sitgreaves National Forests" Press Release, August 20, 2004*

"The forests of the Southwest are in dire need of thinning, and stewardship contracts will provide a much needed mechanism by which large tracts of land can be treated resulting in increased protection of communities and improved health of our precious forests," said Harv Forsgren, Regional Forester of the Southwestern Region. "A stewardship contract allows for the costs of removal of small trees, residue and slash to be exchanged for the value of the excess trees that are removed. **The goal is to find uses for all the wood fiber and by doing so, reduce the amount of wood burned in the forest, reduce treatment costs and provide jobs in the local communities.**"

Finding ways to utilize the huge quantity of small diameter wood generated during restoration continues to impede implementation of treatments at the pace and scale required to adequately address the problem. It is an issue at the interface of ecology, economy and social acceptability. The ERI continues to participate in efforts to promote small wood utilization. A fundamental and controversial question associated with utilization is defining exactly how much harvesting and utilization is ecologically sustainable. The answer can lead to higher comfort by interest groups who want land management decisions decoupled from economic activity.

1. The ERI will work with businesses and NGO's in Arizona to develop the information and implement the actions required to successfully attract small wood utilization businesses. The work envisioned under this activity is specifically focused on assisting the business development efforts of the Greater Flagstaff Economic Council (GFEC) and other similar organizations. The products articulated below were identified by GFEC as essential to developing a marketing portfolio. The strategy for the Flagstaff region is to develop an integrated campus of activity that includes an anchor industry with the development of smaller-scale affiliates that can use by-products or provide related goods and services.
  - Collect, organize, and present baseline supply information and data on the physical properties and characteristics of wood to inform what products are appropriate for the available wood supply. (This action will identify what products are suitable) *July 1, 2005*
  - Categorize the wood supply by volume, diameter, and distribution for regional units, adjusted by transportation and infrastructure variables. (This action tells the private sector how much wood is available and where) *July 1, 2005*

- Articulate the potential utilization options for anchor industries and associated small scale activities and characterize the supply and availability for each scenario *July 1, 2005*
- Identify the barriers and opportunities presented by the public land management agencies' policies and procedures, such as planning, that affect continuity of supply and investor confidence. Articulate the changes that are needed. *September 30, 2005*

*\*The deliverables in this section fulfill the following needs articulated in the "Examples of Specific Land Manager Needs, March 10, 2005": A(3)a, C(2)a-c, D(2)a*

## **Monitoring and Evaluation Criteria**

The Ecological Restoration Institute will provide a report articulating progress on the deliverables on December 31, 2006 and after all funds have been expended consistent with the agreement that accompanies this work plan. The ERI will also follow billing protocols and requirements established by the Forest Service. The progress reports, along with all materials resulting from work funded under this grant, will be provided to the project representatives for the Forest Service.

## Appendix A – Examples of the Specific Land Manager Needs

Examples of the Specific Land Manager Needs	
Specific Need	Although Much Remains to be Done, The Ecological Restoration Institute has Made Major Progress in Meeting Many Specific Land Manager Needs
<p>A.) Will the activities described in the Institute’s work plan:</p> <p>(1) enhance the capacity to develop, transfer, apply, monitor, and regularly update practical science-based forest restoration treatments that will reduce the risk of severe wildfires, and improve the health of dry forest and woodland ecosystems in the interior West;</p> <p>Examples of specific land manager needs:</p> <p>(a) Define stand/patch structure and disturbance regimes as related to reference conditions, at the landscape scale by vegetative cover type, that represent ecological functionality.</p>	<p>ERI has a strong program in meeting this need. To date we:</p> <ol style="list-style-type: none"> <li>1. have determined reference conditions of forest structure (and in most cases, fire regime) on the Coconino National Forest (Bar-M Canyon, Fort Valley, and San Francisco Peaks), Mt Trumbull, Grand Canyon, Kaibab National Forest (Grandview + N. Kaibab R.D.), and Camp Navajo.</li> <li>2. are using the historical Woolsey plot network to reconstruct early twentieth century forest structure on the Coconino, Prescott, Gila, Cibola, Lincoln, Carson, and Santa Fe National Forests.</li> <li>3. are measuring the effects of ecological restoration treatments on ecological functionality including, for example, vegetation structure and function, fuel loading and fire behavior, hydrologic processes, soil processes, wildlife habitat, insect populations, and biodiversity.</li> <li>4. measured modern long-needled pine reference sites which have ongoing frequent fire regimes for forest structure and fire processes in northern Mexico and at Grand Canyon.</li> <li>5. have initiated new studies focused on: a) reference conditions for understory plant communities and b) pinyon-juniper ecosystems.</li> </ol> <p>Virtually all studies are published in peer-reviewed journals within two years of data collection and developed for interpretation for managers in Working Papers, continuing education workshops, and input to GIS data layers, as well as on the internet.</p>
<p>(b) Develop a process to prioritize restoration treatments as related to risk for both wildland urban interface and landscape scale ecosystems.</p>	<p>The ERI has worked with collaborative groups to prioritize restoration treatments in the wildland: urban interface and in landscape scale assessments. ForestERA is the largest of these:</p> <ol style="list-style-type: none"> <li>1. we have used the ForestERA decision support system to support landscape scale assessments that led to treatment implementation include Greater Flagstaff Forests Partnership,</li> </ol>

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	<p>Mt. Trumbull landscape, and several N.M. projects (Ruidoso, Cloudcroft, Wahoo Watershed, Collaborative Forest Restoration projects).</p> <ol style="list-style-type: none"> <li>2. have worked with the Arizona and New Mexico state wide forest/watershed restoration advisory councils to develop principles for prioritizing projects.</li> <li>3. have given testimony and presentations to Congress, legislatures, the Western Governors' Association, and state and federal agency leaders from the local to the national level on our results from treatment prioritization projects.</li> </ol>
(c) Develop/study fuels and restoration treatments that support other land management objectives and not strictly fuels/restoration objectives.	<p>The ERI has focused most of its efforts on interdisciplinary approaches to develop information that supports the broad goals of ecosystem management. For example:</p> <ol style="list-style-type: none"> <li>1. all of our work is focused on determining the effects of a range of treatments on ecological conditions essential to determining effects on resource values.</li> <li>2. our Long-term Ecological Network studies include not only strict sense restoration treatments but a range of other treatments designed to meet other landscape management objectives.</li> <li>3. our work includes wildlife studies in partnership with Arizona Game &amp; Fish (Mt. Trumbull: deer, turkeys, squirrels, herpetofauna, birds) and others (invertebrates, butterflies, passerine birds, turkey habitat).</li> <li>4. Virtually all our landscape-scale studies and replicated experiments include comprehensive study of understory plant communities and exotic species</li> </ol>
(d) Address uneven-aged silvicultural systems and not just even-aged management.	<p>ERI has partnered in:</p> <ol style="list-style-type: none"> <li>1. the establishment and measurement of restoration experiments following an uneven-aged approach in Fort Valley and</li> </ol>



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	<p>Centennial Forest, Arizona.</p> <ol style="list-style-type: none"> <li>2. a major study since 2003 on effects of the Rodeo-Chediski fire traces fuel-reducing effects of landscape-scale uneven-aged treatments on White Mountain Apache Tribal lands.</li> </ol>
<p>(e) Develop/study and propose fuels and restoration treatments that allow for both commercial and noncommercial harvest.</p>	<p>The Ecological Restoration Institute:</p> <ol style="list-style-type: none"> <li>1. has developed treatments on the Coconino, Kaibab, Apache-Sitgreaves, Gila, and San Juan National Forests, plus BLM and Arizona State Lands, all of which included commercial and noncommercial harvest.</li> <li>2. has supported research and development work on the economic impacts of alternative harvesting systems and wood utilization techniques.</li> <li>3. has only two exclusively noncommercial experiments, both of which were small-scale treatments in the Gus Pearson National Area and at Grand Canyon National Park.</li> </ol>
<p>(f) Determine natural ranges of variability and stand dynamics including historical representation of Pinyon-Juniper ecosystems.</p>	<p>All Ecological Restoration Institute study sites serve to determine ranges of variability in current and past stand dynamics and to communicate the results to managers and stakeholders. Key examples include:</p> <ol style="list-style-type: none"> <li>1. the Gus Pearson Natural Area (initiated 1992), Mt Trumbull (1995—led to the construction of new facilities for researchers and visitors to see this remote restoration example), and the Greater Flagstaff Forests Partnership sites (1997) near Flagstaff. Similar work in Pinyon-Juniper ecosystems are now under way.</li> <li>2. A new initiative (the Rapid Assessment program) is designed to quickly determine ranges of variability and stand dynamics and demonstrate techniques to local partnerships.</li> <li>3. studies of thinning and slash treatment responses and background ecological restoration information (ranges of variability, changes since settlement, and restoration treatment</li> </ol>

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	responses) in Pinyon-Juniper ecosystems was initiated in 2002.
(2) synthesize and adapt scientific findings from conventional research programs to the implementation of forest and woodland restoration on a landscape scale; Examples of specific land manager needs: (a) Identify the appropriate application of restoration treatments at the landscape scale.	We have been working with collaborative groups to use the spatial decision support system, ForestERA, to design and prioritize restoration treatments at scales ranging from tens of thousands of acres to 2-3 million acres.
(b) Promote agreement on what treatment prescriptions are appropriate spatially and temporally across the landscape using an integrated approach across a wide variety of disciplines.	Examples of integrated planning include participation with local collaborative groups (e.g., the Greater Flagstaff Forests Partnership, Mt. Trumbull landscape, the Natural Resource Working Group) and statewide efforts in New Mexico and Arizona.
(c) Develop a geospatial analysis process to strategically place landscape restoration and wildland urban interface protection treatments to optimize patch dynamics and buffer infrastructure	The Ecological Restoration Institute: 1. participates in the development and application of the GIS based decision support tool, ForestERA, on strategic placement of restoration treatments to achieve multiple land management objectives. 2. analyzes fuel treatments and potential fire behavior in the Flagstaff/San Francisco Peaks region.
(d) Develop experimental designs with plot, site or area level sampling for research that is hierarchical and therefore easy to aggregate for extrapolation to the landscape scale.	Experimental research in the Ecological Restoration Institute is <b>scaled</b> from replicated randomized study units (scale 10-100 acres) up to large treated/control landscapes (1,000+ acres) and regional scale measurements and GIS-based analysis (1,000,000+ acres).
(e) Develop innovative methods to present synthesized scientific information in a way that is easily accessed by the intended user (field specialist and first line managers)	All studies are <b>published in peer-reviewed journals</b> , usually within two years of data collection, and developed for <b>interpretation for managers</b> in Working Papers, continuing education workshops, and for input to GIS based decision tools, as well as for distribution on

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	the internet.
(f) Develop a series of demonstration sites that illustrate a variety of proven scientific methods to address various management issues;	All restoration sites serve a demonstration purpose, but <b>key examples</b> include: <ol style="list-style-type: none"> <li>1. the Gus Pearson Natural Area (initiated 1992).</li> <li>2. Mt Trumbull (1995—led to the construction of new facilities for researchers and visitors to see this remote restoration example).</li> <li>3. the Greater Flagstaff Forests Partnership sites (1997) near Flagstaff.</li> <li>4. the seven (to date) Long-term Ecological Restoration Network sites</li> <li>5. new initiatives to quickly demonstrate techniques to local partnerships is the <b>Rapid Assessment program</b>, setting up side-by-side treatment examples throughout the Region.</li> </ol>
(g) Determine the effects of anthropogenic influences as they relate to restoration treatment efficacy.	<b>Further clarification is needed to understand the specific desired outcome</b>
(3) facilitate the transfer of interdisciplinary knowledge required to understand the socioeconomic and environmental impacts of wildfire on ecosystems and landscapes; Examples of specific land manager needs: (a) Define the relevant social, economic, and ecological factors associated with the wildfire and restoration programs.	The ERI supports the development the interdisciplinary knowledge to accomplish restoration. Examples include: <ol style="list-style-type: none"> <li>1. Workshop in September 2003 to identify barriers and solutions to the success of collaborative forestry</li> <li>2. A survey synthesis (in review) that identifies both issues of understanding and areas of support by the public. It will reveal where more education is needed for the general public</li> <li>3. Ongoing support for efforts to utilize wood and develop a restoration work force. Support given to the Americorps program in 2001 launched a successful program of training and work experience that continues today.</li> <li>4. In 2003 the ERI subcontracted with the NAU School of Forestry for a cost/benefit analysis of restoration for the</li> </ol>

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	Western Governor's Association
(b) Design and convene collaborative forums to build a common vision on the socioeconomic and environmental impacts of wildfire, and the increase in ecological services that can result from forest restoration treatments.	The ERI provides service to fourteen communities throughout the Southwest who seek to develop collaborative approaches for forest restoration. The ERI participates in state (Forest Health Oversight Council, Forest Health Advisory Council) and regional organizations working to accomplish restoration.
(c) Format data and information for technology transfer so that it is compatible with Agency corporate information systems and the standards of the Federal Geographic Data Committee (FGDC).	<b>Further information is needed to clarify the specific desired outcome</b>
(d) Develop innovative methods to transfer the scientific results that are being funded through the National Fire Plan and Joint Fire Sciences Program;	The 2005 work plan specifically addresses this challenge by taking work previously funded by the Jt. Fire Science Program and translating it for broad application. The ERI will examine other studies produced by the JFSP and consider options for synthesis and interpretation for the land management community in future years
B.) Does the work plan demonstrate how the Institute will collaborate with Federal agencies to: (1) use ecological restoration treatments to reverse declining forest health and reduce the risk of severe wildfires across the forest landscape; and (2) design, implement, monitor, and regularly revise representative wildfire treatments based on the use of adaptive ecosystem management; Examples of specific land manager needs: (a) Identify a range of suitable treatments and their appropriate application including costs, advantages and disadvantages, and application guidelines.	The ERI is in the process of developing a series of working papers that will provide a side-by-side analysis of the known outcomes of several popular restoration treatments. These will be published and sent to our extensive list of land managers and available on our website. Treatments for analysis include: Strict sense restoration (pre-settlement), related treatments that leave higher levels of basal area, the natural processes model, and multi-aged group restoration treatments. This product has been requested by almost all stakeholders involved in restoration.
(b) Deliver mechanisms that would disseminate information on suitable treatments including written materials, on the ground workshops, and collaborative	The ERI has produced 10 working papers on subjects relevant to restoration, will conduct 11 continuing education workshops for land managers, communities and other stakeholders in FY 2004 and will

<b>Examples of the Specific Land Manager Needs</b>	
<b>Specific Need</b>	<b>Although Much Remains to be Done, The Ecological Restoration Institute has Made Major Progress in Meeting Many Specific Land Manager Needs</b>
pilot projects with practitioners.	follow those workshops with on-site visits to critique treatment design.
(c)Design approaches to adaptive management that includes collaboration, multi-scale monitoring, and spatial and ground-based monitoring systems. Develop assessments, plans and NEPA related documents that identify management options based on thresholds, monitoring trigger points and critical indicators to invoke adaptive management options.	The ERI is developing a section on our website designed to serve the needs of planners and environmental review.
(d)Determine effectiveness of treatments to maintain or reestablish native vegetative communities associated with historical disturbance regimes.	The ERI assesses treatment effectiveness for re-establishing native vegetative communities at all experimental sites. This objective is met in this work plan under Goal One in three separate geographic locations.
<p>C.) Will the activities described in the work plan assist land managers:</p> <p>(1) treat acres with restoration-based applications;</p> <p>(2) use new management technologies (including the transfer of understandable information, assistance with environmental review, and field and classroom training and collaboration) to accomplish the goals identified in—</p> <p>(a) the National Fire Plan;</p> <p>(b) the report entitled 'Protecting People and Sustaining Resources in Fire-Adapted Ecosystems-A Cohesive Strategy' (65 Fed. Reg. 67480); and</p> <p>(c) the report entitled '10-Year Comprehensive Strategy: A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment' of the Western Governors' Association?</p> <p>Examples of specific land manager needs:</p> <p>(a)Develop and deliver long distance learning and short courses for college credit in the Biological Sciences and other subjects for Interagency Fire Management Program certification from the technician to professional series;</p>	<p>As of March 31, 2004, the ERI is or has been involved with planning on 686,353 acres that will result in treatments on 184,441 acres. The number of acres treated will increase as additional acres in the planning process are identified for implementation. The ERI has also financially and intellectually supported the ForestERA decision support tool which prioritized treatments on 2.2 million acres of the Western Mogollon Rim. The Eastern Mogollon Rim will be prioritized by December 31, 2005</p> <p>See page 7 of this report for a detailed analysis of the requirements of major policy documents. The ERI actively supports the land management objectives articulated in these policies by: producing and transferring the best available science to land managers and other stakeholders, supports community collaboration with technical advise, multi-party monitoring training and rapid ecological assessments.</p>

<b>Examples of the Specific Land Manager Needs</b>	
<b>Specific Need</b>	<b>Although Much Remains to be Done, The Ecological Restoration Institute has Made Major Progress in Meeting Many Specific Land Manager Needs</b>
and	
(b) Promote the development of a network or clearinghouse for storing, retrieving and distributing relevant restoration information to the public, research and management community.	The ERI maintains a robust website with an attached library. This provides access to all ERI peer-reviewed and popular publications. Data is stored using university protocols.
<p>(D) Will the Institute:</p> <p>(1) provide technical assistance to collaborative efforts by affected entities to develop, implement, and monitor adaptive ecosystem management restoration treatments that are ecologically sound, economically viable, and socially responsible; and</p> <p>Examples of specific land manager needs:</p> <p>(a) Provide Collaborative Forest Restoration Program (CFRP) grantees, grant applicants and their partners with current scientific information and assist in the design, implementation and monitoring of forest restoration and small diameter utilization projects implemented under the CFRP.</p>	<p>Since the start of the CFRP project (Oct. 2003) the ERI in collaboration with others has completed the following:</p> <ol style="list-style-type: none"> <li>1. 6 handbooks - distributed to all grantees &amp; others interested in multiparty monitoring of restoration projects</li> <li>2. 7 training workshops for CFRP grantees (over 100 representatives from 36 projects have attended at least 1 training)</li> <li>3. 10 youth trainings in ecological monitoring field methods (over 150 youth trained)</li> <li>4. 1 teacher training (incorporating CFRP monitoring into their curriculum)</li> <li>5. 23 projects received direct technical assistance</li> </ol> <p>The ERI has also made presentations about this program at various workshops and conferences:</p> <ol style="list-style-type: none"> <li>1. Consortium for Research on Community-Based Collaboratives Workshop (June 04)</li> <li>2. Riparian Restoration Conference at San Juan (July 04)</li> <li>3. Southwest Sustainable Forestry Partnership (Sept 04)</li> <li>4. National Network of Forest Practitioners Annual Workshop (Nov. 04)</li> <li>5. County Partnership in Restoration Conference (March 05)</li> <li>6. Environmental Conflict Resolution Conference (May 05)</li> </ol>

<b>Examples of the Specific Land Manager Needs</b>	
<b>Specific Need</b>	<b>Although Much Remains to be Done, The Ecological Restoration Institute has Made Major Progress in Meeting Many Specific Land Manager Needs</b>
(b) Improve the capacity to utilize excess woody material by developing and improving on existing technologies and evaluating the impacts of state and federal incentive programs.	Goal 3, articulated in this work plan serves this purpose.
(2) assist 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. Examples of specific land manager needs: (a) Develop a variety of products (brochures, posters, displays, popular articles, media pieces, demonstration plots or areas, public conferences, workshops and forums) to provide information on the role of fire, fire management, and the need for active restoration efforts;	The ERI has actively engaged in every forum articulated in this example. For example some of the deliverables articulated in the FY'04 cost-reimbursable agreement include: <ol style="list-style-type: none"> <li>1. 6 working papers</li> <li>2. 2 white papers</li> <li>3. 11 continuing education workshops</li> <li>4. 22 forest visits to critique projects</li> <li>5. two book chapters or technical reports on pinyon/juniper restoration</li> <li>6. 3 rapid assessments</li> <li>7. one landscape assessment</li> <li>8. the FY'05 work plan serves this objective in Goal 2.</li> </ol>
(b) Deliver information to the public that follows Agency direction and policy regarding publication and video production standards, and is congruent with Agency communication plans. Evaluate Information that may relate to pending decisions prior to releasing it to the public.	<b>Further information is needed to understand the specific outcome</b>