

Southwest Ecological Restoration Institutes' Work Plan Fiscal Year 2010

Ecological Restoration Institute

Introduction

1) Evidence-Based Conservation

Evidence-based conservation means the application of ecological science to restoration, conservation, and management of ecosystems. Evidence-based conservation is increasingly applied worldwide to make the best use of unbiased scientific information to support stakeholders who are making conservation decisions¹. The Ecological Restoration Institute (ERI) at Northern Arizona University is advancing the paradigm of evidence-based conservation for providing science support for ecological restoration of fire-adapted ecosystems where frequent-fire forests are a key forest type. Our work in evidence-based conservation includes the permanent Long-term Ecological Assessment and Restoration Network (LEARN), the longest-established and best-monitored replicated forest restoration demonstration sites in the Southwest. In FY2010, we will synthesize knowledge about a critical restoration issue in a systematic review, collaborate with partners in developing key information about habitat for wildlife and rare plants, and completing a multi-year project on rehabilitation options following severe wildfires. Lack of well documented, objective knowledge about these issues often limits restoration treatment implementation.

1. **The LEARN** system of restoration research, demonstration, and applications sites are located in Arizona, New Mexico, Colorado, and southwestern Oregon in forests ranging from mixed conifer through ponderosa pine to pinyon-juniper woodlands (Figure 1). Treatments at new sites and monitoring of existing sites have provided a substantial amount of scientific knowledge about forest responses to treatments, effects on potential fire behavior, and changes in wildlife habitat and biodiversity: information that forms the building blocks for landscape-scale treatments. In FY2010, measurements at a site reaching the 10-year post-treatment date will be measured and the information will be synthesized for managers and their stakeholders.
 - o **Deliverable:** Information will be analyzed using the rigorous standards of peer-reviewed scientific publications. One project will be completed for professional publication in 2010. This information, and all scientific information described throughout this work plan, will contribute to the practical, management-oriented outlets described in *Section 7: Service to the Intermountain West*.
2. **Systematic review** summarizing published literature, “grey” literature (reports not rigorously peer reviewed), and expert opinion on a key issue of concern for forest restoration. Managers and stakeholders often find synthesis of existing information to be one of the most valuable knowledge services for designing effective restoration projects.

¹ Collaboration for Ecological Evidence, www.environmentalevidence.org/EBConservation.htm.

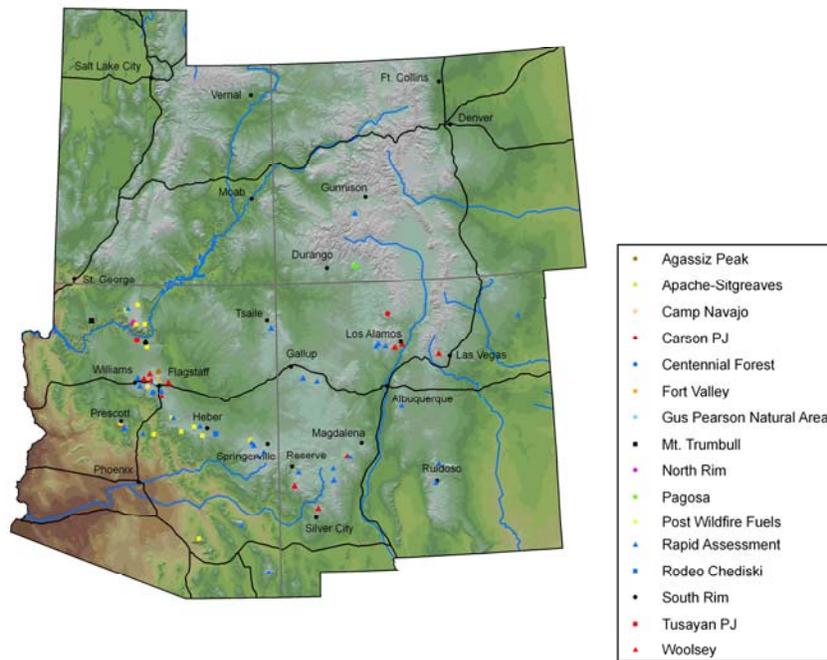


Figure 1. Map of LEARN sites and other ERI field sites in the Southwest.

Systematic reviews have proven highly successful in medical science; in recent years, the adoption of this thorough, unbiased approach has been increasingly advocated in ecology and conservation². Under previous work plans and external funding, the ERI has completed or is presently carrying out systematic reviews on treatment effects on crown fire behavior, restoration effects on goshawk prey species, use of native seeds for post-wildfire, and pinyon-juniper fire ecology.

- Deliverable: A systematic review on a topic to be developed with input from affected entities served by ERI.
3. **Wildlife responses** to restoration are critical for designing appropriate management techniques and concerns about wildlife responses are often a major factor constraining restoration activities. The Arizona Game and Fish Department (AGFD) Research Branch has collaborated with ERI and the Rocky Mountain Research Station on long term studies of wildlife responses to restoration treatments in northern Arizona. Primary focus in FY 2010 will be completion of products from data collection for ongoing studies in Wildland Urban Interface (WUI) areas. Other efforts will include, but not be limited to, coordination with ERI, local stakeholders and others to develop, plan, and implement new research, education, and outreach activities.

Deliverables:

- A summary report; and,
- One journal manuscript.

² www.cebc.bangor.ac.uk/Documents/Reviewguidelinesversion3.0_FINAL.pdf

4. **Rare species** of plants are of high management concern. Similar to rare wildlife species, rare plants often comprise a stumbling block to advancing restoration activities simply because too little is known about their ecology. Ironically, some species are rare precisely because of degraded contemporary forest conditions and would be likely to flourish under restorative management. At the request of Forest Service specialists, the ERI will support measurement and testing for responses to restoration activities for one rare species in FY2010.
 - Deliverable: Report on restoration effects and implications for developing landscape-scale treatments that enhance rare species' habitat.
5. **Fuel treatments** are increasingly incorporating restoration approaches at larger scales. In collaboration with the Kaibab National Forest, fuel treatment approaches in pinyon-juniper woodland that incorporate the natural range of variability were developed and monitored for several years. Recommendations based on this work have been incorporated into a landscape-level fuel project. The ERI will work with Forest staff to measure treatment effects and evaluate changes in the potential for severe fire behavior. This multi-year project will be completed in FY2011.
 - Deliverable: Summary report on analysis of pre-treatment fire behavior data.

2) Stewards of Place

The “stewards of place” model reflects a return to the roots of traditional regional universities as learners as well as teachers; publically engaged to tackle the myriad of challenges facing communities and regions of which universities are a part. The Ecological Restoration Institute, operating through NAU as a “stewards of place” university, has a long history of public engagement to include a wide variety of outreach activities, applied research, service learning, and collaboration with a wide range of local stakeholders to identify conservation problems, explore potential solutions and test those solutions through on-the-ground application.

The latest project in this model is the Implementation of Restoration-based Treatments at the Landscape Scale. This project involves the four northern Arizona national forests and will likely have a special emphasis on the Coconino National Forest and the Kaibab National Forest. This project was begun in FY 2008, continued in FY 2009 and will likely move into the execution phase in FY 2010. The Institute's role in this project will be conducted in collaboration with the NMFRI and the CFRI. ERI is the lead institute in this effort. Each institute will utilize its expertise to contribute to the successful execution of the deliverables specified here. This project will also appear in the annual workplans of NMFWR and CFRI.

The *Statewide Strategy for Restoring Arizona's Forests* and the *Wood Supply Study* appear to be opening a window of opportunity for advancing to project-level planning and on the ground treatment implementation. This project seeks to “capture the moment” and actualize the science-driven, broad-based public agreements that are emerging from these recent efforts.

For this effort to be successful, best available science across disciplines (ecological, social, political, and economic) must be readily accessible to a wide cross-section of restoration

stakeholders to include the Forest Service. ERI is poised to provide that science-support for accelerating restoration at the landscape scale.

Deliverables:

- A document describing the design for landscape restoration handbook --an illustrated guide describing decision support information approaches and lessons learned useful in collaborative, place-based restoration workshops and agency trainings.

3) Ecosystem Services

Ecosystem services include clean air, clean water, cycling of nutrients, and other critical roles that ecosystems play to support populations of plants, animals, and people. Although these benefits are essential, they have historically been overlooked and undervalued. Recent federal initiatives have raised the prominence of ecosystem services and seek to develop techniques for assessing and valuing them³. Ecosystem services have been important throughout the development of ecological restoration techniques and ERI seeks to support federal agencies in this arena through a systematic review of watershed impacts and investigation of ecosystem sustainability.

1. Understanding **watershed impacts** of wildfires and restoration treatments is critical for ensuring that management alternatives are developed and evaluated with solid information about hydrology, erosion, surface and groundwater flows, and downstream impacts. These considerations are especially timely in FY2010 because the regional shift toward landscape-scale treatments means that restoration activities are beginning to occur at scales that affect watershed attributes. In the arid Southwest, the watershed implications of restoration treatments—or severe wildfires—in the high-elevation headwater forests affect perhaps the single most important ecosystem service of these public lands.
 - Deliverable: Systematic review of watershed impacts of wildfires and restoration treatments.
2. **Ecosystem sustainability** is central to maintaining ecosystem services into the future, but the sustainability of forested southwestern landscapes is threatened by severe fires, climate change, drought, fragmentation, and pathogen outbreaks. Using the pinyon-juniper forest, most widespread forest type in the Southwest, as a model system, we will assess landscape changes and implications for sustainability. The information tools supporting this analysis include disturbance histories (fire, drought, pathogens), modeling of fire behavior and transitions among ecosystem states, and evidence of successional patterns of recovery after disturbance. Much of this data was assembled from the existing literature or through field studies under previous work plans.
 - Deliverable: Analysis of pinyon-juniper ecosystem sustainability at the landscape scale, prepared for professional publication.

³ www.fs.fed.us/ecosystems/services/

4) Climate

Climate change is expected to have substantial impacts on forest ecosystem of the interior West in the near-term and throughout the 21st century. Warming will increase moisture stress and drought-caused forest dieback, facilitate insect outbreaks, and foster increasingly large, frequent, and severe wildfires⁴. Restoration of the naturally resilient characteristics of fire-adapted forests will significantly improve their ability to persist under warming conditions, but a variety of lines of research suggest that plant communities will have to track changing climatic envelopes. Restoration is likely to have to encompass new approaches, including facilitated shifts of species upwards on elevational gradients and perhaps *ex situ* conservation or translocation of high-elevation, mesic species. Considerable uncertainty is inherent in the situation, but thoughtful analysis of the probable effects of climate change will increase the likelihood that the best possible management plans can be developed.

1. **Fire and climate** have been closely linked since the evolution of the forests that cover the western landscape. The connections between fire and climate remain imperfectly understood, however, because of the relatively scattered locations of fire regime reconstruction studies and the geographical and temporal patterns of climate forcing factors such as El Niño/Southern Oscillation (ENSO). As is being done elsewhere, improving our understanding of the historical fire-climate link will improve the capability for forecasting future fire regimes. In contrast to work done elsewhere, the unique data sets and fire behavior information assembled by ERI will permit an enhanced prediction of future fire regimes with and without restoration treatments, allowing for a more comprehensive evaluation of the long-term and large-scale impacts of restoration.
 - Deliverable: Report demonstrating the integration of existing and new information on fire/climate/fuels interactions.

5) Economies and Job Creation

With the worsening condition of the U.S. economy, forested rural communities and Native peoples have been hit particularly hard. Many of them are still struggling to address the loss of a forest products-related industry. There is a tremendous information need for how to create more employment opportunities and markets for the by-products of forest restoration in these economically depressed forested rural communities while also promoting ecosystem and social health.

Deliverables:

⁴ Westerling et al. 2006, Seager et al. 2007.

- Report and fact sheet describing the financial feasibility of enhancing economic development of Arizona's Native American tribes through a tradable carbon rights system.

6) State and Private Forestry

State and Private Forestry programs bring land management assistance and expertise to a diversity of landowners and natural resource managers, ranging from private lands to, tribal and state lands. Assistance includes helping landowners, land managers, and the communities they are a part of care for their forests, strengthen local economies, and improve the quality of life.

The State of Arizona encompasses almost 73 million acres. Roughly twenty-seven percent (about 20,000,000 acres) is forested. A significant chunk of that forested land is state and private. Forty-one percent of the 20 million acres of forested land is private, including Indian Trust land. Six percent is state owned.

The 2008 Farm Bill (section 8001) establishes a new set of national private forest conservation priorities that are supported by the ongoing work of the ERI: (1) intervention to protect forests from threats such as catastrophic wildfires, invasive species, unnatural insect or disease outbreak, and restoring forested landscapes in response following degradation from such threats and (2) enhancing public benefits from private forests.

Currently the Arizona State Forestry Division is conducting a statewide assessment of forest resource conditions, trends, and priorities and a strategy for addressing identified threats. The initial assessment and strategy are called for by the 2008 Farm bill and will form the basis for future federal forestry assistance funds.

Deliverables:

- A report on science support for the statewide assessment. Building on its track record with the Governor's Forest Health Council in the development of the Statewide Strategy for Restoring Arizona's Forests, ERI will work with its partners in the Rocky Mountain Research Station and other research institutes; institutions of higher education; and science-based NGO's to coordinate science support for the Division in its statewide assessment.

7) Services to the Intermountain West

The ERI provides knowledge services to managers, stakeholders, and the public concerned with restoration and conservation of frequent-fire adapted forests across the Intermountain West. We work in partnership with the other SWERI members to leverage the skills and resources of SWERI for the greatest public benefit.

1. Outreach to forest managers across the West.
2. Workshops for continuing professional education.

3. One of the most important activities of the ERI is to respond to requests for assistance from land managers. We have found that as veteran staff members from the Forest Service, BLM, Park Service, and other agencies retire, the need for direct hands-on help is increasing. A cornerstone of this service is to work with local personnel to understand the historic and desired forest conditions at a proposed treatment site through preparation of Rapid Assessments (RAP's). The ERI will bring qualified field technicians to the site, where a quick inventory is performed to assess historic fire regime, forest structure and other site attributes. This work provides the ecological basis for developing comprehensive forest restoration treatments. Work to support the RAP's includes fulfilling information requests and site visits including on-the-ground training for participants.
 - Continued support for Forest Plan Revisions
 - Five Rapid Assessments
 - List of associated information requests
 - List of associated field visits/training
 - Three field trips (non-RAP related)
4. Knowledge services: web and publications.
 - The ERI maintains an integrated web site that includes publications and information about the biophysical and social science aspects of restoration. Recommendations are peer reviewed and the ERI maintains the highest standards for information posted to the site.
 - Report on support for web in FY10
 - Occasional short summaries that compile best available information are needed by non-technical stakeholders and practitioners. These summaries are prepared as important needs are identified in response to requests.
 - One white paper
 - Practitioners and stakeholders need concise, accessible descriptions of land management treatment options and the outcomes of alternative treatments. Working papers will be developed from information gained throughout ERI's program of work and in response to requests from managers and stakeholders. Fact sheets provide summaries of key findings based on restoration science to inform management and policy in a "least you need to know" format.
 - Two working papers
 - Four fact sheets
 - Direct, in-person communication of useful knowledge is preferred by conservation professionals and their stakeholders. The ERI will continue to provide in-person delivery to convey emerging scientific information on restoration treatments, community collaborations and other relevant topics.
 - Seven presentations
 - The ERI will continue to take diverse audiences to the field to demonstrate and discuss the outcomes of forest restoration on ecological health and wildfire behavior.
 - Seven field trips