

Final Report
on
Cooperative Work Plan FY'07

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Submitted by:

W. W. Covington

Ecological Restoration Institute
Northern Arizona University

P. O. Box 15017 • Flagstaff • AZ • 86011
Tel 928-523-7854 • Fax 928-523-0296 • Email Kathleen.Mitchell@nau.edu

Table of Contents

| | |
|--|----|
| Introduction..... | 1 |
| Work Plan Summary..... | 2 |
| Summary of Deliverables | 3 |
| Project 1: Ponderosa Pine/Mixed Conifer Restoration | 3 |
| Project 2: Pinyon-Juniper Restoration | 5 |
| Project 3: Evaluating Post-Fire Re-burn Potential, Implications for Salvage Logging and Other Post-Fire Treatments..... | 7 |
| Project 4: Landscape Assessment | 8 |
| Project 5: Practitioner and Stakeholder Knowledge Services..... | 10 |
| Project 6: Utilization..... | 16 |
| Project 8: Assistance to Practitioners..... | 18 |
| Conclusion | 23 |
| Appendices..... | 24 |

Introduction

The ERI is a national leader in developing, testing and transferring science-based treatments to accomplish forest restoration. Our intent is simple – to develop practical science-based restoration treatments that can be readily implemented on the ground. This concise objective is the foundation of our many accomplishments. However, our goals do not stop there. While scientists are continually seeking to develop creative strategies for improving forest health, other staff members transfer this information by:

- Creating collaborative networks with federal agencies and other stakeholders;
- Working to synthesize scientific findings into outreach materials for diverse audiences;
- Assisting land managers with specific problems in the forest; and
- Providing technical assistance to those who seek to create healthy forests in their communities.

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. The report outlines the progress we have made in accomplishing this goal with Fiscal Year 2007 funds.

The funding for Fiscal Year 2007 was established in two separate allocations of \$350,000 and \$1.4M for a total amount of \$1.75M.

This is the final report for the FY2007 funding. All promised deliverables are complete.

Work Plan Summary

The plan of work outlined for this funding served to accomplish the following eight projects.

Project 1: Ponderosa Pine/Mixed-Conifer Restoration

Project 2: Pinyon-Juniper Restoration

Project 3: Evaluating Post-Fire Re-burn Potential, Implications for Salvage Logging and Other Post-Fire Treatments

Project 4: Landscape Assessment

Project 5: Practitioner and Stakeholder Knowledge Services

Project 6: Utilization

Project 7: Assistance to Communities to Design and Monitor Treatments

Project 8: Assistance to Practitioners

Summary of Deliverables

Project 1: Ponderosa Pine/Mixed Conifer Restoration

The ERI is known for 30 years of continuous, applied scientific investigations that explore all aspects of the restoration of forest health in frequent fire forests. The primary emphasis for our work is the ponderosa pine ecosystem. The work proposed in 2007 will continue to reap the benefits of treatments initiated over the past five to ten years by collecting data that monitor a variety of biophysical and fire behavior responses to treatments. These data are the best-monitored and most reliable long-term restoration sites in the Southwest. Requests for ecosystem responses and fire behavior responses to treatments are one of the most frequent information requests we receive from land managers. In addition, the Arizona Governor's Forest Health Advisory Council has expressed the need for this information. This information is essential to design effective, long-term treatments.

Deliverables:

- 1.1 Summary of treatment actions and ecosystem responses from sites in the Long-term Ecological Assessment Restoration Network (LEARN) for practitioners. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)
 - Prepare manuscript of working paper on seasonality of fire use (See #5.4). Complete. Research associated with Working Paper #18, "Prescribed and Wildland Use Fires in the Southwest: Do Frequency and Timing Matter?"
Reference Appendix A, Working Papers.
- 1.2 Article for scientific journal summarizing responses. These are usually peer reviewed publications. Peer review is necessary to establish legitimacy and ensure accuracy, and validate the conclusions that result from monitoring data. Peer review provides strong evidence and enhances the credibility of the recommendations to practitioners, stakeholders, scientists and for inclusion in NEPA documents.
 - Completed analysis of San Juan mixed conifer data and one publication. Forest reconstruction data analysis in progress.
 - Publications (**Reference Appendix G**)
 - Korb, J.E., and P.Z. Fulé. 2008. Intra and inter-annual vegetation change: implications for long-term research. *Restoration Ecology* 16(1):5-11.

- Korb, J.E., M.L. Daniels, D.C. Laughlin, and P.Z. Fulé. 2007. Understory communities of warm/dry mixed conifer in southwestern Colorado. *Southwestern Naturalist* 52(4):493-503.

1.3 Invasive exotics are vexing practitioners and restoration projects throughout the Intermountain West. Severe wildfire creates conditions for invasion by exotics, but thinning and prescribed burning can sometimes also lead to the unintended establishment of nonnative plants. In 2007 we will monitor and evaluate existing treatments that are designed to test whether or not cheatgrass invasions can be avoided and/or how restoration treatments should be modified to avoid creating opportunities for invasion.

1.3.a. A summary of treatment actions, responses and recommendations for avoiding cheatgrass invasions for practitioners. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Preparation of cheatgrass information for translation to practitioners. Complete. Working paper #20: "Controlling Cheatgrass in Ponderosa Pine and Pinyon-Juniper Restoration Areas." **See Appendix A.**

1.3.b. Preparation of cheatgrass results for scientific publication.

- Cheatgrass manuscript in review. McGlone, C.M., J.D. Springer and D.C. Laughlin. In Review. Can forest restoration increase native plant diversity and abundance and simultaneously resist nonnative invasion? *Applied Vegetation Science*.
- One publication. McGlone, C.M., J.D. Springer and W.W. Covington. In Press. Cheatgrass encroachment on a ponderosa pine forest ecological restoration project in northern Arizona, USA. *Ecological Restoration*. **See Appendix G.**

1.3.c. A summary of a rigorous monitoring project of post-fire exotic species establishment and change over time through 2007 for practitioners. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Information assembled and one manuscript in review; modify information for practitioners. **Complete.**
- One publication. Dodge, R.S., P.Z. Fulé, and C.H. Sieg. In press.

Dalmatian toadflax (*Linaria dalmatica*) response to wildfire in a southwestern USA forest. *Ecoscience*. **See Appendix G.**

1.4 Understanding how different restoration treatments influence extreme crown-fire behavior is essential to properly design restoration treatments focused on reducing hazardous fuels and reducing wildfire intensity. This information will help determine the amount of thinning, burning and frequency of prescribed burning that are necessary to maintain long-term reduction of hazardous fuels. This project will be a retrospective analysis of areas that were treated prior to wildfire to determine how the treatment modified fire intensity.

1.4.a. Summary of treatments and influence on fire behavior for land managers, practitioners and decision makers. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Assembled project team and charter. **Complete.**
- Develop plan for knowledge acquisition and synthesis (systematic review). **Complete.** Systematic review protocol has been accepted by the Centre for Evidence-Based Conservation and is **posted online at <http://www.environmentalevidence.org/CEE%20Protocols.htm>**.

1.5 Re-establishment of native understory plant communities is a critical factor in forest restoration. This project will evaluate different seeding approaches with the goal of encouraging natives while discouraging exotics.

1.5.a. Summary of findings related to seeding techniques for practitioners
Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Working paper (see 5.4). **Complete.** Working Paper #19, "Understory Seeding in Southwestern Forests Following Wildfire and Ecological Restoration Treatments". **See Appendix A.**

Project 2: Pinyon-Juniper Restoration

There is little information on the outcomes of comprehensive restoration treatments in pinyon-juniper ecosystems, yet the agencies are confronted with millions of acres of degraded pinyon-juniper woodlands. Degradation of these systems leads to wildfires that are considered undesirable by managers, coupled with poor forage and wildlife habitat and increased erosion. This project will continue work already underway at the Grand Canyon Parashant National Monument, on the Tusayan Ranger District in the Kaibab National Forest, on the White Mountain Apache Reservation, and in other

locations in the Southwest. It includes an integrated series of actions to examine herbaceous, overstory and understory responses to treatments. Expanding our work to pinyon-juniper ecosystems responds to requests from the Washington DC office of the Bureau of Land Management, and practitioners and stakeholders at the district and local levels.

Deliverables:

2.1. Overstory responses to restoration

2.1.a. Summary of results of treatments that can be used by practitioners.

Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Report results of PJ demonstration projects at Mt. Trumbull. Huffman, D.W., M.T. Stoddard, P.Z. Fulé, W.W. Covington, and H.B. "Doc" Smith. In Press. A demonstration project to test ecological restoration of a pinyon-juniper ecosystem. Proceedings of the Southwest and Intermountain Chapters of the Society of American Foresters, April 2005, St. George, Utah.

2.1.b. Preparation of results for publication in a scientific journal.

- **In progress, will incorporate 2006 monitoring.**

2.2 Understory responses to restoration

2.2.a Summary of understory responses to treatments that can be used by practitioners. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Initiate preparation of PJ understory information for translation to management audiences. Stoddard, M.T., Huffman, D.W., Alcoze, T.M and Fulé, P.Z. Effects of slash on herbaceous communities in pinyon-juniper woodlands of northern Arizona. In review, *Rangeland Ecology and Management*. **See Appendix G.**

2.2.b Preparation of results for publication in a scientific journal

- Edit manuscript for submission. Stoddard, M.T., D. W. Huffman, D. C. Laughlin, P. Z. Fulé, and W. W. Covington. Variation in understory community responses to restoration treatments in Southwestern pinyon-juniper woodlands. To be submitted to *Restoration Ecology*
- One publication. The publication listed above will be submitted for

publication.

2.3 Understanding the role and frequency of natural fire in pinyon-juniper ecosystems is essential to inform the design of restoration treatments. Currently there is much confusion about this topic in the management and stakeholder communities. Data, such as fire dates, stand ages, and fire evidence will be collected to help answer this important variable.

2.3.a Summary of findings related to natural fire regimes for practitioners. Information will be provided through working papers, presentations, field trips and workshops (see projects 5,7,8)

- Develop background data and prepare monitoring permit request.

Complete.

- Submit monitoring permit application, develop field schedule for future measurements. *Measurements minimal in 2007 due to funding.*

Complete.

2.3.b Preparation of results for publication in a scientific journal

- Submit results from PJ fire study in Tusayan and Canjilon. Huffman, D.W., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. In Press. Fire history of pinyon-juniper woodland-ponderosa pine ecotones in Arizona and New Mexico. Submitted to *Canadian Journal of Forest Research*.

Project 3: Evaluating Post-Fire Re-burn Potential, Implications for Salvage Logging and Other Post-Fire Treatments

Post-fire salvage of timber is an issue of concern to managers, policy makers, and the public. An ecological reason cited in support for removing trees is the fear of re-burn and the damage it may cause to soils. However, a countervailing concern is that salvage logging itself has negative consequences. Little reliable quantitative scientific information exists in the Southwest to help evaluate the vulnerability of severely burned forests in the semi-arid Southwest to environmentally harmful re-burning. This may be partially due to the very contemporary nature of the problem (it is only in the last 10 years we've seen overstocked forests burn catastrophically at a large scale). This project will proceed in two parts. First we will conduct a synthesis of what is known about the potential for re-burn in the semi-arid Southwest, followed by initiating an analysis of fuel loads at sites that have burned catastrophically. The Colorado and Arizona Institutes will collaborate in this endeavor. Colorado will take the lead on compiling the status of current knowledge and a synthesis of this information. Arizona will sample burned areas to determine the potential for re-burning.

Requests for information about salvage logging have come from congressional offices.

Deliverables:

- 3.1. Initiate analysis of post-wildfire sites that have not been salvaged to determine potential effects of severe re-burn.
 - Develop background data and prepare monitoring permit request. **Complete.**
 - Prepare & submit special use permit requests, Kaibab NF and Grand Canyon NP. **Complete.**
- 3.2. Summary of potential reburn effects for stakeholder community in the form of a working paper.
 - Data collection will occur in 2007 to support preparation of a working paper in 2008. Data collection has been completed at 7 wildfire sites and a salvaged/unsalvaged comparison site. Data analysis is in progress. Summary of 2007 data and salvaged/unsalvaged fire ("Pot" fire) is complete.

Project 4: Landscape Assessment

The state of the art for strategic location and monitoring of restoration-based hazardous fuel reduction treatments urges planning at the landscape scale. The ForestERA Project convenes and supports a neutral process for collaboration by practitioners and stakeholders to engage in a constructive dialogue for prioritizing treatments and identifying appropriate management actions at the landscape scale. It also can help build working relations for achieving collaboration objectives during the forest plan revision process.

Evidence for the importance of this tool is the fact that it is referenced in the multi-agency USDA/DOI Wildland Fire Use Guide (http://www.fs.fed.us/fire/fireuse/wildland_fire_use/use_index.html). The Guide includes examples of the Western Mogollon Plateau Adaptive Landscape Assessment data (pp.17-18) and describes the use of landscape-scale analysis in Wildland Fire Use planning. The authors downloaded the images directly from the ForestERA web pages. The introduction states that it "provides **standardized procedures**, specifically associated with the planning and implementation of wildland fire use."

On February 6th, representatives of Arizona Fire Map (State Lands and Cartographers offices) and WALTER (U of A) information management tools met with the staff from ForestERA to determine how best to coordinate and combine efforts. By combining these three tools coverage of all lands in Arizona will be increased, accessibility by all citizens and practitioners will improve and some of the most basic information management questions asked by policy makers can be answered. Finally,

this collaboration should result in improved efficiency of both human and financial resources.

Deliverables:

4.1. Complete the Statewide Strategy

- Administrative support to Statewide Strategy sub-committee and editor of Statewide Strategy report. **Complete**
- Final statewide strategy document to be completed by July 2007. **Complete, See Appendix C**

4.2. Wildlife layers

4.2.a. Initiate field work, data integration, and spatial analysis to develop a model for Goshawk occupancy that will allow ForestERA scenario analysis and assessment of northern goshawk responses to proposed forest treatments. This project will span two years with the following deliverables being accomplished in this funding period:

- Progress report. Complete, **see Appendix C.**
- Foundational data layers. The ForestERA has acquired and processed the Foundational data layers to support Goshawk models, leveraging where possible the data development efforts associated with the Small-diameter supply analysis project, and the Kaibab landscape assessment. ForestERA is currently establishing the accuracy of these foundational layers. For additional detail please **reference the progress report in Appendix C.**
- Models and maps of Goshawk habitat occupancy. The ForestERA has fully populated a spatial database on the occurrence of goshawk using location information provided by goshawk researchers and US Forest Service personnel for all USFS lands within the study area boundary. For additional detail, **please reference the progress report in Appendix C.**

4.3. Validation of watershed models - In order to increase confidence in ForestERA watershed data layers, independent field data is needed to assess model accuracy and enhance technology transfer.

- Collect field data to validate landscape-level models of watershed vulnerability to post-fire erosion and sedimentation. Conduct analyses and report on model

accuracy to stakeholders; submit paper for publication. **Please reference the progress report in Appendix C.**

All the actions proposed under Duty #1, Projects 1 & 2 have an integrated synthesis and translation component designed to serve the needs of practitioners and stakeholders. The ERI has ten years of experience from which to predict the level of information services that will be requested from our customers and the number of requests that can be met with available resources. Flexibility to define specific writing topics is needed so that the ERI can respond to important and emerging needs. As a general rule those topics that serve the most audiences will be the highest priority for completion. The services delivered in project five are requested from collaborative groups, practitioners, and community organizations.

Project 5: Practitioner and Stakeholder Knowledge Services

Deliverables:

- 5.1. In 2005 the number of requests for information, fact sheets and other rapid response information increased dramatically. This activity ensures that land manager and stakeholder questions are answered in a complete and timely manner.
 - 5.1.a. Fulfill information requests
 - Provide answers to questions. Reference 5.1.b for list
 - 5.1.b. List of information requests
 - Report on requests including information on who requested the information, what was provided and approximate the amount of time spent fulfilling request. **Complete, See Appendix B.**
- 5.2. Occasional short summaries that compile best available information as needed by non-technical stakeholders and practitioners.
 - 5.2.a. Two white papers based on requests
 - Two white papers. **Complete, see Appendix A**
 - “Navigating the Motives and Mandates of Multiparty Monitoring”
 - “Case Study of a Community Stewardship Success: *The White Mountain Stewardship Contract.*”
- 5.3. Practitioners and stakeholders need very short, concise descriptions of land management options and the outcomes of those options. The Working papers

distill information that already exists in the literature or is generated through monitoring activities conducted in Project 1 and 2.

5.3.a. Four Working Papers or Technical Notes.

➤ **4 Completed. See Appendix A**

- Working Paper #18. "Prescribed and Wildland Use Fires in the Southwest: Do Frequency and Timing Matter?"
- Working Paper #19. "Understory Seeding in Southwestern Forests Following Wildfire and Ecological restoration Treatments."
- Working Paper #20. "Controlling Cheatgrass in Ponderosa Pine and Pinyon-Juniper Restoration Areas."
- Working Paper #21. "Managing Coarse Woody Debris in Fire-Adapted Southwestern Forests".

5.4. 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.

5.4.a. Report on major updates to the web

➤ Report on updates. **Complete, see appendix D.**

5.5. Direct communication with individuals is still the knowledge delivery choice preferred by practitioners and stakeholders alike. The ERI will continue to provide in person delivery to convey emerging scientific information on restoration treatments, community collaborations and other relevant topics.

5.5.a. 10 presentations

➤ **33 presentations completed.**

- Denton, C., D. Brewer. White Mountain Stewardship Contract Monitoring Board meeting. Presentation on "Eagar South Demonstration Project Implementation." Pinetop, AZ. January 16, 2007. 12 attendees.
- Denton, C., D. Brewer. Greater Ruidoso Area Wildland Urban Interface Group meeting. Presentation updating work with Forest Service on "Creating Goshawk guidelines" and Assessment Committee update. Ruidoso, AZ. January 29-31, 2007. 19 attendees.

- Covington, W. Vosick, D., Bullington, C. Healthy Forest Day, sponsored by the Governor's Forest Health Council. Event for Arizona Legislators and staff to learn how Arizonans are working together to restore forest health and reduce the threat of wildfire to our communities. Phoenix, Arizona. February 6, 2007.
- Covington, W. Healthy Forest Day Media Event (Channel 12), February 6, 2007
- Covington, W. Region 3 of the Forest Service: Chief's Review. Presentation on "The Southwest Forest Restoration Act (PL108-317)." Pinetop-Lakeside, AZ. February 27, 2007. 45 participants, including executive level Forest Service, Mayor of Payson, tribal representatives and community members.
- Denton, C. Attended regular meeting of the Planning Group for the Greater Ruidoso WUI Working Group; Presentation on "Project Assessment Report." Ruidoso, NM. February 27, 2007. 17 attendees.
- Vosick, D. Region 3 of the Forest Service: Chief's Review. Presentation on the work of the Arizona Forest Health councils and the Statewide Forest Restoration Strategy. February 27, 2007. Payson, AZ. 35 participants, including Mayor of Payson and community members.
- Denton, C. Attended meeting of the Otero County Natural Resource Working Group; Presentation on "Goshawk restoration projects" and new Fact Sheets for DFC consideration. Cloudcroft, NM. February 28, 2007. 9 attendees.
- Smith, H.B. "Importance of Mt. Trumbull Research and Applications for Arizona BLM." Presentation for BLM State Fire Management Staff. Prescott, AZ. March 1, 2007. 40 attendees.
- Denton, C. and P. Fulé. At request of USFS, attended Winter meeting for FS Region 3 Timber Staffs and Silviculturists; made presentations on present research activities and present technical transfer projects in providing assistance in program/project planning. Albuquerque, NM. March 12, 2007. 60 attendees.
- Fulé, P.Z. "Ecological restoration research update." USDA Forest

Service Annual Timber/Silviculture Staff Meeting, Region 3. March 12, 2007. Albuquerque, NM.

- Covington, W. "Ecological Restoration Conservation and the Role of the USFS." Presentation at the Fire and Aviation and Forest Management Director's Meeting. San Antonio, TX. March 20, 2007. 100 attendees.
- Fulé, P.Z. Ecological restoration overview. Community Forum, Greater Flagstaff Forests Partnership. April 3, 2007. Flagstaff, AZ
- Van Horne, M., and P.Z. Fulé. "How accurate are fire-scar sampling methods at multiple scales?" US-International Association of Landscape Ecology 22nd Conference. April 10, 2007. Tucson, AZ.
- Huffman, D.W. "Reference conditions for a pinyon-juniper woodland of northern Arizona." Oral presentation given at the Southwest Chapter of the Society of American Foresters Meeting, April 13, 2007. Tusayan, AZ. 40 attendees.
- Huffman, D.W. Critical review of "Pinyon-Juniper". Chapter 12 In: "Historical Range of Variability for Natural Vegetation Types of the Southwest: Southwest Forest Assessment Project." Provided to The Nature Conservancy, Arizona Chapter, Tucson, AZ. April 17, 2007.
- Huffman, D.W. "Fire history in pinyon-juniper ecosystems of the Southwest." Oral presentation given to Bureau of Land Management, Grand Staircase-Escalante National Monument staff. April 18, 2007. Kanab, UT. 20 attendees.
- Fulé, P.Z., B. Strom, A. Kuenzi, K. Baumgartner, and C.H. Sieg. Rodeo-Chediski fire: "Effects of pre-fire treatment and post-fire response." Presentation to White Mountain Apache Tribe and Bureau of Indian Affairs staff. April 25, 2007. Whiteriver, AZ.
- Roccaforte, J.P., H.B. Smith. "Fire." Interview for Inside NAU Webcast #113, Segment 2. Fort Valley, Flagstaff, AZ. May 3, 2007. Available at: <http://www.tv.nau.edu/insidenau/>.
- Abrams, J. "Preliminary Results of a Study on the White Mountains Landscape Assessment." Presentation to White Mountain Stewardship Contract Multiparty Monitoring Board. Pinetop, AZ. May 22, 2007. 14

participants.

- Smith, H.B. "Ponderosa Pine Restoration on the Umcompaghre Plateau." Presentation made for the Umcompaghre Plateau Project on the Grand Mesa, Umcompaghre and Gunnison national forests. Montrose, CO. June 4 and 5, 2007. 25 attendees.
- Huffman, D.W. "Reference conditions for Southwest ponderosa pine forests." Oral presentation for U.S. Forest Service, Region 3, Regional Goshawk Workshops. Flagstaff, AZ. June 11, 2007.
- Lund, D. Attended Goshawk workshop the Forest Service put on for Wildlife agencies and environmental groups. Made 1 hour presentation during field trip to the Kaibab restoration demo site. Flagstaff, AZ. June 11-12, 2007. 50 participants.
- Huffman D.W. "Reference conditions for Southwest ponderosa pine forests." Oral presentation for U.S. Forest Service, Region 3, Regional Goshawk Workshops. Albuquerque, NM. June 14, 2007.
- Lund, D. Attended Goshawk workshop the Forest Service put on for Wildlife agencies and environmental groups. Made 1 hour presentation during field trip to the Jemez restoration demo site. Albuquerque, NM. June 14-15, 2007. 40 participants.
- D.C.Laughlin, S.R.Abella. 2007. "Explaining gradients in plant community composition with a general multivariate model." Oral presentation at the Ecological Society of America Annual Meeting, San Jose, CA, August 6, 2007. Approx 100 people.
- Fulé, P.Z. "Reference ecosystems and characteristic assemblages and disturbance regimes - is there a right answer?" Annual Meeting, Ecological Society of America and Society for Ecological Restoration, San José, CA, August 6, 2007. 300 attendees.
- Vosick, D. "Statewide Strategy for Restoring Arizona 's Forests." Presentation made at the Governor's Rural Development Conference. Tucson, AZ. August 16, 2007. 25 attendees.
- Vosick, D. "Arizona's Statewide Strategy for Restoring Arizona's Forests." Oral presentation for U.S. Forest Service, Region 3. Albuquerque, NM. August 22, 2007.

- Covington, W.W. "Fire in the Woods: Perspective on Forest Restoration." Presentation made at the Western Progress "Pay Dirt: Building a Restoration Economy for the Rocky Mountain West" workshop. Missoula, MT. October 4, 2007. 70 attendees.
- Huffman, D. Gave talk on "Restoration principles. International Seminar on Forest Administration and Management." October 12, 2007. Flagstaff, AZ. 22 participants.
- Huffman, D., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. "Fire regimes and restoration of southwestern pinyon-juniper ecosystems." Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ. 50 attendees.
- Fulé, P.Z. "What does the Rodeo-Chediski fire tell us about future fires and future forests? AND Fire and Forests in the American Southwest." Fire in the Southwest: Integrating Fire into the Management of Ecosystems. Regional Conference, The Association for Fire Ecology. January 28-31, 2008, Tucson, AZ. 150 attendees.

5.6. Seeing is believing. Fortunately, many restoration treatments have been applied throughout the Southwest. 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.

5.6.a. 10 Field Trips. **10 completed**

- Brewer, D., D. Lund. Led field trip and discussions on restoration treatments for the Kanab BLM. Kanab, AZ. April 18, 2007. 15 participants.
- Denton, C., D. Lund, and D. Brewer. Assisted Springerville RD (Apache-Sitgreaves NF) with ecological restoration prescription criteria by marking restoration treatments for Eagar South project. Eagar, AZ. April 23-24, 2007. 14 participants.
- Vosick, D. Took Cynthia Warzecha, Coconino County Extension, on field trip. Flagstaff, AZ. August 1, 2007. 2 people.
- Lund, D. Met with North Kaibab District Ranger and timber staff for field trip to update Goshawk and restoration study. Fredonia, AZ. August 2 -3, 2007. 4 participants.

- Vosick, D. Led a field trip for Lucy Murfitt of Senator Jon Kyl's office to the old growth site on the Coconino National Forest. Flagstaff, AZ. August 28, 2007. 2 participants.
- Covington, W.W., Fulé, P.Z. "Forest Health and Wildfire." Field trip for 22 CEO's from the World President's Organization. Gus Pearson, AZ. October 6, 2007. 22 attendees.
- Vosick, D. Led a field trip on "Restoration Treatments" at Ft. Valley and Gus Pearson for April Reese, reporter for the Land Letter. Flagstaff, AZ. October 22, 2007.
- Lund, D., M. Tuten. Worked with District Ranger Office in Fredonia, AZ to finish restoration and goshawk plots. Fredonia, AZ. November 1, 2, 2007.
- Lund, D., D. Brewer. Coordinated BLM, AG&FD and ERI meeting. Included field trip to Williams restoration treatment site. Williams, AZ. November 6-8, 2007. 23 participants.
- Vosick, D. Led field trip to restoration sites in and around Flagstaff for Ryan Yates, Associate Legislative Director for the National Association of Counties; Liz Archuleta, Coconino County Supervisor; Lucinda Andreani, Special Projects Coordinator. November 14, 2007. Flagstaff, AZ. 4 participants.

Project 6: Utilization

Following seven years of struggle to attract small wood utilization businesses to the Flagstaff region we are on the brink of a breakthrough. Development is underway to create an integrated wood utilization campus ten miles west of Flagstaff and in Winslow, Arizona. Although still in the preliminary stages of development, the Greater Flagstaff Economic Council believes it is realistic to have businesses operating at the 80 acre site in 2008. To realize the vision of an "integrated campus" at Camp Navajo the ERI-NAU has been invited to participate and provide the knowledge services required to help both the private and public sector realize the full potential of this endeavor. We will work in partnership with the Forest Products Lab, NAU School of Engineering and Greater Flagstaff Economic Council to help in this new endeavor. Our participation was specifically requested by the Greater Flagstaff Forests Partnership and the Greater Flagstaff Economic Council.

Deliverables:

6.1 Report on contributions

The ERI has played an active and important part to advance small wood utilization in Arizona during 2007. The ERI led an ad hoc group effort in late 2006 to discuss

a collaborative study that would determine the amount and characteristics of the wood supply currently available in the National Forests along the Mogollon Rim. In January of 2007, a subset of the ad hoc group approached Region 3 to fund the wood supply analysis in order to evaluate the appropriateness and efficacy of the myriad of private wood utilization proposals advancing in the region. In addition, the stakeholders were aware that Region 3 had been asked by industry to assemble one to several large stewardship contracts that would guarantee supply to support private utilization proposals under discussion in Northern Arizona.

- The ERI sent representatives to all seven collaborative meetings to determine the wood supply available for mechanical harvest in Arizona. In addition, the ERI was asked for technical assistance to evaluate the feasibility of identifying some areas of the landscape as burn first and only to manage for fuels (**See Appendix E**), to explain the relationship of soils to forest structure and composition, and to present historical data that describe historic tree stocking and basal area as a basis for determining desired future conditions following thinning.
- The ERI also responded to two requests for information from Lucinda Andreani, staff for the Coconino County Board of Supervisors, for: a) a review and synthesis of the history of utilization efforts in Coconino County, and b) past studies that analyzed small wood characteristics, products and markets that are appropriate for the small wood generated by restoration thinning in Arizona. (**See Appendix E**)

Project 7: Assistance to Communities to Design and Monitor Treatments

Community collaborative groups endeavor to assist the land management agencies in the design, implementation and monitoring of restoration treatments. Most stakeholders are neither foresters nor resource professionals. Our work with these groups shows that workshops to assist with collaborative forestry in addition to field consultations are invaluable methods for advancing constructive collaboration and science-based (as opposed to ideologically based) treatments.

Deliverables:

7.1 One workshop for communities and other stakeholders

- **One workshop completed.**
 - Tuten, M. Led an evidence-based ecological restoration prescription tree marking workshop for the Wahoo Watershed Workgroup and the Gila National Forest (Black Range R.D.) Poverty Creek, NM. February 2-3, 2007. 10 participants.

7.2. Five field consultations

- **6 consultations completed**

- Brewer, D. and D. Lund. Attended meeting of the Pinaleno Collaborative Group; made presentation on "Restoration within mixed conifer ecosystems", at request of the Coronado National Forest. Globe, AZ. February 2, 2007. 50 attendees.
- Springer, J. Met with Jonathan Long (Mohave Co. Extension) and Judy DeHose (Cibecue School Board) about restoration projects in the White Mountains. March 20, 2007
- Nyoka, S. Participated in a Revegetation Management Plan meeting for Picture Canyon. Flagstaff, AZ. March 28, 2007. 15 attendees.
- Denton, C., D. Lund, and D. Brewer. Field review of Eagar South project with Regional Office, Forest, and District personnel, Navajo County Natural Resource Working Group, and White Mountain Stewardship Monitoring Board. Eagar, AZ. May 23, 2007. 44 participants.
- Denton, C. Led field trip to project area for the Ruidoso WUI working group meeting. Ruidoso, NM. July 30-August 1, 2007. 21 participants.
- Fulé, P.Z., restoration info to private landowner, Heber AZ. August 17, 2007.

Project 8: Assistance to Practitioners

Our experience reveals that the most effective way to improve the design of restoration treatments is to spend a combination of time with practitioners in the classroom and in the field. In particular, field consultations that include demonstrations of how to design and implement restoration treatments have the highest education impact. Rapid Assessments that reveal historic fire regimes, stand density, spacing and structure for a given project enhance science-based treatment design. The ERI considers these activities some of the most important aspects of our work.

Deliverables:

8.1 Two workshops for practitioners

➤ Two workshops. **2 completed.**

- Lund, D., D. Brewer. Coordinated BLM, AG&FD and ERI meeting. Included field trip to Williams restoration treatment site. Williams, AZ. November 6-8, 2007. 23 participants.
- Huffman, D. Presented a half-day CEEM (Continuing Education for Ecosystem Managers) course on ecological restoration. February 3, 2007. Flagstaff, AZ. 42 participants.

➤ Ten field consultations **21 completed**

- Lund, D. Met with Rick Miller and other staff of the AZ Game and Fish Department, to provide information on ecological restoration principles. Distributed requested research papers and synthesis of existing information. Flagstaff, AZ. January 3, 2007. 4 participants.
- Brewer, D. At request of Forest Service, attended USFS Region 3 LUP working group meeting charged with the development of the State and Transition models for Grazing; provided information and assistance regarding herbaceous vegetation and herbivory. Albuquerque, NM. February 19-23, 2007. 8 participants.
- Brewer, D. Attended Forest Planning meeting on Risk Assessments and contributed information on how to conduct risk assessments related to State and Transition models for the various ecosystems. Flagstaff, AZ. March 1, 2007.
- Denton, C., D. Lund, and D. Brewer. Attended initial planning meeting for the Bonito Watershed project in Lincoln National Forest. Ruidoso, NM. March 7, 2007. 17 attendees.
- Lund, D. and A. Meador. At request of AZGFD, attended AZ G & FD internal staff meeting to discuss PP presettlement conditions: size of groups, openings, and changes that have occurred and the effects of those changes. Flagstaff, AZ. March 9, 2007. 10 attendees.
- Denton, C. Assisted Apache Sitgreaves National Forest with the writing of the prescriptions for ecological restoration on Eagar South Project. Flagstaff, AZ. February 16 & 23, 2007. March 9 & 13, 2007. 2 participants.
- Huffman, D. Met with USFS Tusayan Ranger District personnel to discuss fuels treatments for pinyon-juniper woodlands in the wildland-urban interface near Tusayan airport. Tusayan, AZ. March 28, 2007. 4 participants.
- Denton, C. Discussed pre-settlement conditions of Northern Arizona Pinyon-Juniper communities with Fire Management Officer on Peaks Ranger District, Coconino National Forest. Flagstaff, AZ. April 1, 2007. 2 participants.
- Denton, C. Assisted consulting forester for Community Wildfire Protection Plan (CWPP) on Cibola National Forest with data on coarse woody debris needs. Flagstaff, AZ. April 5, 2007. 2 participants.

- Denton, C. Assisted Springerville District (Apache-Sitgreaves National Forest) on prescriptive criteria for goshawk and ecological restoration treatments for Eagar-South project. Eagar, AZ. April 6, 2007. 2 participants.
- Brewer, D. Collaboration with Forest Service Herbivory Group on State and Transition Models. Coconino National Forest, Peaks Ranger District. April 25, 2007. 6 participants
- Brewer, D. Communicated with Rueben Weisz from the Region 3 Regional Office on concerns with information being utilized by the Herbivory working group for the Land-use Planning (LUP) revisions. May 07, 2007. 2 participants.
- Denton, C., D. Lund, and D. Brewer. Reviewed goshawk Post-Fledgling Area (PFA) and restoration prescriptions with Springerville Ranger District and Apache-Sitgreaves National Forest personnel on Eagar South project. Eagar, AZ. May 16, 2007. 8 participants.
- Brewer, D. Communicated with Wayne Robbie, Region 3 Regional Office concerning successional modeling being used by Land Use Plan revision Herbivory group. Also followed up with Williams Ranger District on present use of pre-settlement marks for current restoration projects. Flagstaff, AZ. May 24, 2007. 3 participants.
- Lund, D. and M. Tuten. Field identification of goshawk comparison study plots. Brief district personnel on project objectives/ use of Categorical Exclusion (CE) for NEPA. July 18, 2007. North Kaibab Ranger District. 3 participants
- Denton, C. Discussed with and gave copy of Mexican Spotted Owl Protected Activity Center report to Perk-Grindstone Enterprise team. Ruidoso, NM. July 31, 2007. 2 participants.
- Lund, D., C. Denton, D. Brewer. Field trip with Sitgreaves National Forest district timber staff for the spatial distribution project. Heber, AZ. August 6, 2007. 4 participants.
- Lund, D. Met with AZ Game and Fish Dept. for spatial distribution discussions. Flagstaff, AZ. August 20, 2007. 5 attendees.
- Lund, D. Field visit to ERI treated goshawk and restoration areas on the Williams Ranger District with a Forest Service silviculturalist. Williams, AZ.

August 27, 2007.

- Lund, D. Field visit to the Safford Ranger District, Coronado National Forest, for the Mt. Graham restoration project with FS silviculturist. Safford, AZ. September 10-12, 2007.
- Brewer, D. Assisted Kaibab National Forest in re-reading old range data points to determine changes in range condition. Williams, AZ. September 20, 23, 24, 2007.
- Miscellaneous
 - Fulé, P.Z., J. Springer. Assisted BLM on an Environmental Assessment for Mt. Trumbull. July 12, 2007.

8.2 Three rapid assessments. **7 completed.**

- Denton, C., D. Lund, and D. Brewer. Completed field work gathering pre-settlement and existing conditions field data for Mexican Spotted Owl (MSO) plots within Perk-Grindstone project in Lincoln National Forest. Completed report on MSO presettlement plots for Lincoln NF, Perk-Grindstone project. March, 2007. (See Appendix F)
- Denton, C. and D. Brewer. Assisted Springerville Ranger District (Apache-Sitgreaves National Forest) with ecological restoration prescription criteria by marking restoration treatments for Eager South project (note that this has been a work in progress beginning in late 2006). Eager, AZ. May 1-3, 2007. 8 participants. (See Appendix F)
- Brewer, D. Participated with Forest Service in field survey of Warm Fire to assess accuracy of Terrestrial Ecosystem Survey (TES) mapping and soil erosion modeling. Assisted FS in mapping of burned area in Warm fire. Fredonia, AZ. June 12-13, 2007. 3 participants. (See Appendix F)
- Lund, D. Developed treatments for two proposed restoration plots in wet and dry mixed conifer for the Pinalenos Project in the Coronado National Forest. October 3, 2007. (See Appendix F)
- Brewer, D. Worked with district in development of survey for Upper Bonito Watershed. October 15-19, 2007. Ruidoso, NM. (See Appendix F)
- Denton, C., D. Lund, and D. Brewer. USDAFS Region 3 requested information concerning historical pine spatial features on sedimentary soils

in Arizona. Plots were established on the Kaibab, Coconino and A/S National Forests and data was collected. (See Appendix F)

- Brewer, D. and C. Denton. Assisted the USFS Regional office and Coconino, Kaibab and A/S Land Use Planning Committees with data for Forest Plan Revisions. February, 2007, ongoing. (See Appendix F)

Project 9: Peer-Reviewed Reports

The legislation establishing the Institutes is explicit that there should be annual peer-reviewed reports. The 2007 report is in progress and will be distributed under separate cover.

Conclusion

This report documents completion of the work plan for FY'07 funding of \$1.75M. The ERI and its partners are grateful to the Forest Service for this financial support. This funding is focused on synthesizing and analyzing existing scientific information into fact sheets, white papers, working papers and peer-reviewed manuscripts; identifying wildlife habitat use in WUI treatment areas; and inventorying the impacts of landscape-level wildland fire use in ponderosa pine and other higher elevation forest types. We have also continued to work with NGOs and businesses to identify and refine methods for extracting and utilizing small diameter trees. These efforts will make substantial contributions to the advancement of forest restoration in the southwest.

Appendices

- Appendix A: Working Papers**
- Appendix B: Requests for Information**
- Appendix C: Statewide Strategy and ForestERA Report**
- Appendix D: ERI Website Updates**
- Appendix E: Utilization**
- Appendix F: Rapid Assessments**
- Appendix G: Publications (sorted by Last Name)**