

Final Report
on
Cooperative Work Plan FY'09

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- Appendix A: Reviews/Reports (*alphabetically sorted by title*)
- Appendix B: Knowledge Services (*alphabetically sorted by title*)
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Summary

This report presents an integrated and coordinated series of actions for \$1.5 million awarded to the ERI in Fiscal Year 2009 for the final year in a 5-year cooperative agreement.

Major activities funded by this award include direct knowledge support to practitioners and stakeholders designing treatments, assessment and testing of operational, experimental, and demonstration restoration and hazardous fuel reduction treatments, synthesis and analysis of information regarding the Historic Range Variation, work on invasive exotic plants, examination of wildlife responses, analysis of treatment effects on fire behavior, improving the use of explicit evidence in restoration programs and treatments, analysis of impacts of wood chipping as a slash disposal technique, an evaluation of decision models and tools for managers and stakeholders, geographic information system and collaborative facilitation support for greater ecosystem scale restoration treatment strategies, knowledge support for wood and other resource utilization sectors, technical and training support for monitoring and evaluation, and technical and information support for community-based groups.

All of the activities presented in this report were designed to be responsive to stakeholder needs and to be synthesized with the larger body of scientific evidence, translated into appropriate languages for target audiences, and delivered in a range of formats from in person one on one and group presentations and discussions, to printed and electronically accessible fact sheets, short technical reports, longer white papers and management reports, and peer reviewed archival literature.

The series of actions proposed in the FY09 work plan and the related deliverables reported here are fully integrated to support all facets of land management action from ecological restoration to support for sustainable economies and communities. They are also designed to support creation of the social contract required to move forward.

Project 1: Ponderosa Pine/Mixed Conifer

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 and adjacent forest types. The work conducted in 2009 will maintain the commitment to monitoring a variety of biophysical and fire behavior responses to treatments. These data are best-monitored and most reliable long-term restoration sites in the Southwest. Requests for ecosystem responses and fire behavior responses to treatments are some of the most frequent information requests we receive from land managers. The need for this information was validated by collecting information requests at the Restoration of Frequent Fire Forests Conference held in Flagstaff in October 2006. In addition, the need was identified by the Arizona Governor's Forest Health Advisory Council and ongoing discussions with land managers and Forest Service personnel working on forest plan revisions.

Items one and two listed below will contribute to the joint SWERI project number 4 in the NMFWR and CFRI plan on dry mixed conifer forests.

Deliverables

- 1) Monitoring of treatment actions and ecosystem responses derived from field studies conducted in 2009 from sites in the Long-term Ecological Assessment Restoration Network (LEARN). Analysis of this long-term monitoring will inform working papers, presentations, field trips and workshops included in other projects.
 - a. Summary of activity.
 - ✓ Summary of Activities for Monitoring Restoration Treatments in the LEARN Network. Prepared by Don Normandin and Pete Fulé. **Complete. Reference Appendix A.**
- 2) Scientific paper/ fact sheet describing LEARN study results.
 - ✓ Hurteau, M.D., M.T. Stoddard, P.Z. Fulé. 2010. The carbon costs of mitigating high-severity wildfire in southwestern ponderosa pine. *Global Change Biology*. doi 10.1111/j.1365-2486.2010.02295.x. **Complete. Reference Appendix D.**
- 3) Cheatgrass ecology: invasion by cheatgrass affects fire hazard and fire severity in ponderosa pine ecosystems. In FY 09 the ERI will complete a multi-year study of cheatgrass ecology. Partially funded in prior years by the Rocky Mountain Research Station. Deliverables include
 - a. One dissertation.

- ✓ McGlone, C. Cheatgrass-Native Plant Community Interactions in an Invaded Southwestern Forest. PhD Thesis, School of Forestry, Northern Arizona University, Flagstaff, AZ, May, 2010. **Complete. Reference Appendix D**
- b. One scientific paper on the effect of experimental treatments on cheatgrass
 - ✓ McGlone, C.M., J.D. Springer, and W.W. Covington. Cheatgrass encroachment on a ponderosa pine forest ecological restoration project in northern Arizona, USA. Ecological Restoration. **Complete. Reference Appendix D**
- 4) Wildlife: The Arizona Game and Fish Department (AGFD) Research Branch and NAU Ecological Restoration have collaborated on long term studies of wildlife responses to restoration treatments in northern Arizona. Primary focus will be completion of products from data collection for ongoing studies in Flagstaff area 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 include:
 - a. A summary report. **Complete. Reference Appendix A**
 - ✓ Yarborough, R.F., C.W., S.S. Rosenstock, C.D. Loberger. "Wildlife Responses to Restoration Treatments in Northern Arizona Forest and Grassland Habitats." AZ Game and Fish Department Annual Progress Report for 2010. September 3, 2010.
 - b. Two journal manuscripts. **Complete. Reference Appendix D**
 - ✓ Loberger, C. D., T. C. Theimer, R. F. Yarborough, S. S. Rosenstock. In review. Edge and Island Effects Impact Squirrel Use of Restored Ponderosa Pine Forests.
 - ✓ Loberger, C. D., T. C. Theimer, S. S. Rosenstock, C. S. Wightman. In review. Tassel-Eared Squirrel use of Restoration-treated Ponderosa Pine Forest.
- 5) Wildlife Systematic Review. Key questions in implementing ecological restoration center on wildlife impacts. A growing body of research exists to address the positive and negative, short-term and long-term effects. This project will follow a formal systematic review process to address how restoration, in the context of food webs, support multi-species conservation. Deliverable:
 - a. Systematic review. **Complete. Reference Appendix A**
 - ✓ Kalies, E.L., W.W. Covington, C.L. Chambers, and S.S. Rosenstock. 2010. Collaboration for Environmental Evidence. Systematic Review No. 66: How do thinning and burning treatments in southwestern conifer forests in the United States affect wildlife density and population performance? Center for Evidence-Based Conservation.
 - b. Executive summary (that will be developed into a white paper) for managers. **Complete. Included in the Systematic Review reported above.**

- 6) The use of native species for seeding after restoration treatments and wildfire is recommended by agency guidelines and widely agreed to be useful, but there are almost no quantitative data on seeding effects in the Southwest. In FY'09 we will assemble existing information and develop new data in a chronosequence study of past seeding treatments on Federal lands following restoration and fire to determine persistence of seeded species, both natives and non-natives (including sterile non-natives). This activity will build from work conducted with the Rocky Mountain Research Station.
- a. Summary report
 - ✓ Springer, J., T. E. Wood, D. Pyke, K. Knutson, D. Pilliod, M. L. Daniels, and M. Miller. The Need for Long-term Monitoring and Adequate Recordkeeping for Seeding Treatments in the Intermountain West: Executive Summary. **Completed. Reference Appendix A.**
 - b. Presentation to resource managers. **Completed.**
 - ✓ Peppin, D.L., P.Z. Fulé, J.L. Beyers, C.H. Sieg, and M. Hunter. Does seeding after severe fires mitigate negative impacts on soils and plant communities in forested ecosystems of the western USA? The Association for Fire Ecology, 4th International Fire Ecology and Management Congress: Fire as a Global Process. Savannah, GA, November 30- December 4, 2009. 75 people
- 7) Post-wildfire fuels: 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 reburn 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 reburning. In FY09 the ERI will complete a multi-year project on post-wildfire fuel loads that measured fuels in northern AZ (2007) and central/southern AZ (2008).

Deliverable:

- a. A summary report suitable for scientific publication/fact sheet. **Complete. Reference Appendix A.**
 - ✓ Roccaforte, J.P., P. Z. Fulé, W. W. Chancellor, D. C. Laughlin. Woody debris and tree regeneration dynamics following severe wildfires in Arizona. Post-wildfire fuels summary report. 2010.
- 8) Results from a workshop conducted in FY08 that will explore “least you need to know” monitoring approaches.
- Deliverable:
- a. White paper or working paper depending upon the level of detail that will be needed to report conclusions.
 - ✓ Seidenberg, J., J. Springer, T. Nicolet, M. Battaglia, and C. Votja. Southwest Ecological Restoration Institutes (SWERI) Biophysical Monitoring Workshop Report. ERI--Issues in Forest Restoration. **Complete. Reference Appendix B**

Project 2: Pinyon/Juniper

There is little information to guide the design or anticipate the outcomes of comprehensive restoration and fuel reduction treatments in pinyon-juniper ecosystems, but southwestern land management agencies are confronted with millions of acres of fire-prone

pinyon-juniper ecosystems. Degradation of these systems leads to wildfires and forest health problems that are considered undesirable by managers, coupled with poor forage and wildlife habitat and increased erosion. This project synthesized existing information about pinyon-juniper ecosystems, making it available to managers and scientists, and contributed new data on fire ecology that will support environmental analyses of proposed treatments.

Expanding our work to pinyon-juniper ecosystems is consistent with the Duty #1, Table one articulated in PL 108-317 and responds to requests from the Washington DC office of the Bureau of Land Management, practitioners and stakeholders at the district and local level throughout the Southwest and requests for information provided at the Southwest Ecological Restoration Institute conference in October 2006.

Deliverables

- 1) Preparation of a series of publications on pinyon-juniper ecology and restoration in the Southwest. Coordination of manuscript preparation and journal submission (sorted by author last name). **Complete. Reference Appendix D**
 - ✓ Huffman, D. W. In review. Structural Dynamics and Restoration of Pinyon-Juniper Ecosystems. Ecological Restoration
 - ✓ Floyd, L.M, W.H. Romme. In review. Ecological Restoration in Pinyon-Juniper Woodlands: What's Needed? Ecological Restoration.
 - ✓ Loftin, S. In Review. Restoration of Pinyon and Juniper Woodland Landscapes: A Practical Approach. Ecological Restoration.
- 2) Pinyon-juniper fire ecology: 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. Previously collected and new data on fire dates, stand ages, and fire evidence will be analyzed to help answer this important variable.

Deliverable: A scientific paper/ fact sheet describing fire ecology study results.

- ✓ Huffman, D.W., A.J. Sánchez Meador, J.E. Crouse. In revision. Coarse woody debris and vegetation 30 years after stand-replacing fire in a pinyon-juniper woodland. Rangeland Ecology and Management. **Complete. Reference Appendix D**
 - ✓ Pinyon-Juniper Woodland Recovery Fact Sheet reported in Project 7, Deliverable 3.
- 3) There is a substantial body of literature on southwestern pinyon-juniper ecosystems but it has not been brought together to address practical questions related to restoration and fuel reduction treatments. This project will follow a formal systematic review process of pinyon-juniper ecology, existing research, and past management treatments. The information will be applied to address the design and implementation of restoration and related treatments in pinyon-juniper.

Deliverable: A systematic review and executive summary for managers

- ✓ Huffman, D.W. Executive Summary. Land-use influences on historical expansion and infill of pinyon-juniper woodlands: A systematic review of the literature. **Complete. Reference Appendix D.**
- ✓ Huffman, D.W., M.L. Daniels, S.E. Nyoka, M. T. Stoddard. In review. Land-use influences on historical expansion and infill of pinton-juniper woodlands: A systematic

review of the literature. To be submitted to Rangeland Ecology and Management.
Complete. Reference Appendix D.

Project 3: Implementation of Restoration-based Treatments at the Landscape Scale

The *Statewide Strategy for Restoring Arizona's Forests* and the *Wood Supply Study* have opened a window of opportunity for advancing to project-level planning and on the ground treatment implementation. This project is designed to “capture the moment” and actualize the science-driven, broad-based public consensus that has emerged from these recent efforts.

In order 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.

Initial work on this project began in FY 2008. The work included ERI participation in and support to the Arizona Governor's Forest Health Council and a Landscape Implementation Working Group convened by the Council. The Council, through the Working Group, successfully completed the following work to advance the project: development of objectives, development of criteria and data layers to determine the scale of the project; and identification of potential project sites in northern Arizona.

In FY2009, the ERI continued this project in cooperation with CFRI and NMFWR.

Deliverables:

- 1) Capacity development toward a spatial decision support system that is composed of spatial data, models, and software tools that provide users with the data and the guidance needed to develop alternative treatment scenarios that can accelerate restoration.
 - ✓ *Interim project report* GRAIL Geodatabase and Internet Mapping Services. *June 28, 2010. Complete. Reference Appendix A*
- 2) Knowledge Synthesis report of available, viable, contracting tools and mechanisms to cost-effectively implement treatments on a landscape-scale.
 - ✓ Moseley, Cassandra, E. Davis. *Stewardship Contracting for Landscape-Scale Projects; Ecocsystem Workforce Program Working Paper 25, Summer 2010. Complete. Reference Appendix B*
- 3) Lessons-learned report on collaboration in project planning.
 - ✓ “Watershed Restoration through Forest Management”. Project Progress Report, 6/9/10 (S. Masek-Lopez). **Complete. Reference Appendix A**
 - ✓ “Restoration of Frequent Fire Forests in Oregon Building the Foundation for Strategic Conservation at the Landscape Scale” A Collaboration Project of Northern Arizona University and the Oregon Chapter of the Nature Conservancy. Final Report, 3/12/2010. **Complete. Reference Appendix A**

- 4) Report on using the U.S. Forest Service Terrestrial Ecosystem Survey for assessing reference conditions and response functions for restoration treatments across large landscapes.
 - ✓ “Applications of U.S. Forest Service Ecosystem Survey Data in Planning Landscape-Scale Ecological Restoration and Information Needs for Restoration in the Spring Mountains.” Final Report submitted by Dr. Scott Abella, Assistant Research Professor, School of Environmental and Public Affairs, University of Nevada, Las Vegas.
Complete. Reference Appendix A

Project 4: Technical support for land managers (state, federal and tribal)

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 Forest Service employees 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 (RAPs). 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 logic to develop comprehensive forest restoration treatments. Work to support the RAPs includes fulfilling information requests and numerous site visits that include training opportunities.

In 2009 we continued to respond to requests from National Forests in Region 3 as well as personnel at the regional office to provide scientific support for forest planning. In addition, our team conducted field trips and other services for land managers that are outside the Rapid Assessment approach. A testimonial to the value of this work is included below.

“The Uncompahgre Plateau Project and U.S. Forest Service sponsored a field tour in June with the Colorado Forest Restoration Institute-Colorado State University and the Ecological Restoration Institute-Northern Arizona University to view the current conditions of ponderosa pine stands on the Uncompahgre Plateau. We are very excited about the possibility of establishing demonstration sites on the Plateau that allow people to see the range of forest conditions that follow various restoration treatments.” Uncompahgre Plateau July 2007 newsletter.

Deliverables

- 1) Continued support for Forest Plan Revisions. **Summary Report in Appendix A**

2) Ten Rapid Assessments. **Reference Appendix C.**

- ✓ Denton, C., D. Brewer, H.B. Smith, J. Seidenberg and B. Greco. Participated in Rapid Assessment and plot establishment for Upper Beaver Creek Project to assist Forest Service. Mogollon Rim Ranger District, Coconino National Forest. May 20, 2009.
- ✓ Brewer, D., C. Denton. Completed Field Work on Mount Lemon Demonstration Plot. Tucson, AZ. June 16, 2009
- ✓ Brewer, D., C. Denton. Field Review of Galiuro Firescape on Coronado National Forest. Safford, AZ. June 17, 2009.
- ✓ Brewer, D., D. Lund, H. B. Smith, C. Denton. Flagstaff Pulliam Airport Fuels Reduction Project. October 21- November 13, 2009. Flagstaff, AZ.
- ✓ Brewer, D. Initial soil classification in ponderosa pine/oak ecosystems on the Coconino National Forest. Report provided to Wayne Robbie, Regional Soil Scientist, Region 3, Rory Steinke, Forest Soil Scientist, Coconino National Forest, and Scott Abella at University of Las Vegas. Flagstaff, AZ. December 1, 2009.
- ✓ Denton, C., D. Brewer, D. Lund. Blue Water Restoration Project.
- ✓ Additional RAPS attempted but not completed (see list)

a. List of associated information Requests. **Completed.**

1. Lund, D. Contacted BLM and others and coordinated meeting between BLM and ERI concerning future research at Mount Trumbull. Flagstaff, AZ. April 13, 2009.
2. Denton, C. Sent information to Kaibab NF Planner as requested for use in Revised Forest Plan. Flagstaff, AZ. April 15, 2010.
3. Greco, B. Met with Coconino Leadership Team (CLT) staff to explore information and project needs of the Coconino National Forest (COF) at the Coconino NF Headquarters. Flagstaff, AZ. April 15, 2009. 5 participants.
4. Greco, B. Conducted oral histories to document history of reference conditions around Ft. Valley Experimental Forest circa 1940's + beyond. RMRS, Flagstaff, AZ. April 24, 2009. 5 participants.
5. Greco, B. Meeting with Brian Giles & Margaret Moore to determine research compatibility of research patterns in RMRS units. Flagstaff, AZ. May 7, 2009.
6. Greco, B. Consultation with Forest Supervisor Nora Rasure and Deputy FS Joe Stringer about Four Forest Restoration Initiative process and ERI. Flagstaff, AZ. May 29, 2009.
7. Greco, B. Meeting with Ranger Mike Elson regarding ERI services to FS Strategic planning process & support to Ranger District Units. Peaks Ranger District, Flagstaff, AZ. June 2, 2009.
8. Greco, B. Meeting with FS Resource Staff to discuss Rapid Assessment capabilities & Needs Assessment for Prescott NF. Prescott, AZ. June 4, 2009.
9. Greco, B. Meeting with Forest Supervisor Mike Williams regarding Four Forest Initiative & ERI assistance to forest planning. Kaibab NF Headquarters, Williams, AZ. June 4, 2009.

10. Greco, B. Meeting with Forest Supervisor Gene Blankenship and Deputy FS Tom Klabunde regarding Four Forest Initiative & ERI assistance to forest planning. Tonto National Forest Headquarters, Phoenix, AZ. June 8, 2009. 4 participants.
 11. Greco, B. Meeting with Fire Staff Officers regarding Fire program , application support capacity, technology needs and ERI services. Tonto National Forest Headquarters, Phoenix, AZ. June 8, 2009.
 12. Greco, B. Preliminary discussion regarding Wildland Fire Suppression Qualification System Memorandum of Agreement (MOA). Arizona State Forestry Office, Flagstaff, AZ. June 26, 2009.
 13. Greco, B., W. Chancellor. Coordinated Centennial Forest Rx burn with J.J. Smith, Centennial Forest Manager. Flagstaff, AZ. September 1, 2009.
 14. Greco, B. Met with Coconino National Forest and USFS Region 3 people to work on fire program planning and monitoring proposal. Flagstaff, AZ. September 17, 2009.
 15. Greco, B. Met with Arizona State Forestry staff to discuss Fire Qualifications Coordination. Flagstaff, AZ. September 18, 2009.
 16. Lund, D., M. Stoddard. Discussed proposed restoration treatments with Rocky Mountain Research Station personnel. Long Valley Experimental Forest, Flagstaff, AZ. September 24, 2009.
 17. Brewer, D., D. Lund, H. B. Smith, C. Denton. Survey of Airport Project and determination of presettlement dbh. This area has been previously identified through the Greater Flagstaff Forest Partnership collaborative process as a component of the wildland urban interface of the City. Flagstaff, AZ. October 20-21, 2009.
 18. Brewer, D., C. Denton, D. Lund, J. Seidenberg. Marked Airport Project for City of Flagstaff. Flagstaff, AZ. October 26-November 13, 2009.
 19. Brewer, D. Talked with Stu Lovejoy at the Kaibab National Forest, concerning forest regulation paper looking at uneven age management at the group/clump level. Flagstaff, AZ. November 23, 2009.
 20. Denton, C. Contacted Grassland Units on Cibola NF concerning Kiowa Thin and Burn and N. Vercere prescribed Burn concerning assistance. No response. Flagstaff, AZ. March 1, 2010.
 21. Denton, C. Contacted Glenwood District Ranger concerning assistance on Pueblo Park WUI project. Flagstaff, AZ. Answered back on March 2, 2010.
 22. Denton, C. Contacted Smokey Bear RD concerning Madden Wildlife habitat project concerning assistance. Flagstaff, AZ. Response on March 5, 2010.
 23. Denton, C. Contacted Reserve RD on Buroo Creek Restoration Project concerning assistance. Flagstaff, AZ. Response and sent info on March 11, 2010.
 24. Denton, C. Contacted Apache NF Silviculturist concerning assistance on Beaverhead Project. Flagstaff, AZ. Response on April 6, 2010.
- b. List of associated field visits/training. **Completed.**
1. Brewer, D., C. Denton, W. Greer. Photographed Post-Treatment of Eagar South Restoration Project. Eagar, AZ. June 10, 2009.
 2. Brewer, D., C. Denton. Completed Field Work on Mount Lemon Demonstration Plot. Tucson, AZ. June 16, 2009

3. Denton, C., D. Brewer. Reviewed completed and in-progress USFS treatments in Spring mountains at request of Scott Abella, University of Nevada, Las Vegas. Spring Mountains, NV. August 10-13, 2009.
4. Denton, C., D. Brewer. Reviewed and retook photos in demonstration plots (2002) as well as corings to determine if trees were released by treatments. Los Alamos, NM. September 21, 2009
5. Denton, C., D. Brewer. Reviewed and retook photos in project areas for Jefferson County properties which were harvested in 2004 and 2005. Denver, CO. September 23, 2009.
6. Greco, B., W. Chancellor, JP Roccaforte. Field visit to Centennial Forest to review prescription burn plans. Flagstaff, AZ. October 19, 2009.
7. Lund, D. Met with North Kaibab personnel to discuss 16 inch caps. North Kaibab Ranger District, AZ. December 16, 2009.
8. Stevens, B. Attended 2010 Hopi Tribal Inauguration of Chairman LeRoy Shingoitewa and Vice Chairman Herman Honanie at Hopi. Discussed ERI and upcoming restoration training in White Mountains with chairman, vice chairman and staff member Curtis Honanie. Hopi, AZ. Jan. 7, 2010.
9. Lund, D. Field visit to Grants, NM supporting Blue Water Restoration Project Rapid Assessment. Grants, NM. April 10, 2010.

3) Five field trips (non-RAP related). **Completed**

1. Huffman, D.W. Field trip provided to Federal and State land managers as part of the Grand Canyon-Parashant National Monument – Mount Trumbull Coordination Meeting. Participants were given a tour of a pinyon-juniper restoration demonstration site and research results were interpreted. May 2009. 20 participants.
2. Greco, B., D. Brewer. Hart Prairie Fuels Reduction & Forest Health Restoration Field Trip. Coconino National Forest, Flagstaff, AZ. June 30, 2009. 20 participants.
3. Greco, B., D. Lund. Took a group of seven ERI staff and ten Hopi tribe members for a Hopi field trip and consultation with the tribe. Presented material on restoration methods to Hopi Tribal Resource Management Personnel. Hopi Nation, AZ. August 6, 2009. 10 attendees.
4. Stevens, B. Field trip to Grand Canyon North Rim for review of the Aspen Fire. I was able to obtain fly-over and on-the-ground shots of fire demonstrating natural behavior in an area where fire has burned recently. Discussion with Forest Service and National Park Service personnel on fire's role in the ecosystem. (Special report for the Arizona Daily Sun) August 9, 10, 2009. Grand Canyon, AZ.
5. Stevens, B. Field trip to Pulliam Airport area with Arizona Game & Fish, GFFP, FS and independent foresters to discuss restoration treatments south of Flagstaff. August 13, 2009. Flagstaff, AZ.

Project 5: Support for the restoration economy

Based on experience over the last eight years the ERI receives requests for information by business and communities to provide information and technical support on issues relevant to a restoration economy. In the past the ERI has been asked to do a variety of activities including: analyze and characterize the supply of wood in a 40 mile radius of Flagstaff; participate in community forums designed to attract business; provide information to public officials on utilization; and, help fund other entities like the Greater Flagstaff Forests Partnership to participate in wood utilization activities. This item in the work plan anticipated that these requests would continue.

Deliverable

1) Two information requests. Completed.

- ✓ Stevens, B. News release “Healthy Forests create Healthier Economies: Economist says Large-scale Forest Restoration Means Money and Jobs for Rural Northern Arizona,” Flagstaff, AZ. April 29, 2010. **Reference Appendix D**
- ✓ Kim, Yeon-Su. The Role of Regional Economics in Restoring the Southwestern Ponderosa Pine Ecosystems. Presented at the 10th Biennial Conference on the Colorado Plateau. Flagstaff, AZ. October 5-8, 2009. 65 attendees.

Project 6: Stakeholder Assistance

The ERI is committed to implementation of the Statewide Strategy for Arizona’s Forests. Although ERI work on this project is largely state funded, elements of the strategy pertain directly to work that supports federal and tribal land management action.

Community stakeholders have unique information and technical assistance requirements. These require expertise with individuals who understand socio/political issues, can assist collaboration and can anticipate what communities need.

Deliverables

1) Support for the Statewide Strategy

a. Two information requests to support the strategy. Completed.

- ✓ Greco, B. Consulted with Richard Powskey of the BIA Western Regional Office on assistance to develop Fire Management Plans for all tribes in Arizona. Flagstaff, AZ. April 24, 2009.
- ✓ Seidenberg J. Researched and authored an analysis of cultural issues associated with Arizona’s Forest Resources. The analysis will be incorporated into the Arizona Statewide Forest Resource Assessment that is being developed in response to The Food, Conservation, and Energy Act of 2008 (Farm Bill). Flagstaff, AZ. February 23, 2010.

2) Five information requests to assist communities and stakeholders. Completed.

1. Covington, W.W., B. Greco. Collaboration meeting with environmental coalition and Interagency reps to formulate position for Four Forest Landscape Assessment process. Flagstaff, AZ. May 14, 2009. 10 participants.
2. Covington, W.W., B. Greco. Collaboration meeting with Environmental coalition and Interagency representatives to formulate position for Four Forest Landscape Assessment process. Flagstaff, AZ. May 26, 2009. 10 participants.
3. Seidenberg J. Resource document provided to Rachel Sheridan, Field Canvass Coordinator with the AZ League of Conservation Voters, requesting information on biomass energy. 6/2/09
4. Seidenberg, J. Resource document provided to the 4-Forest Restoration Initiative detailing the pros and cons of using a third-party facilitator in natural resource land management planning. Flagstaff, AZ. July 24, 2009. 16 Participants.
5. Huffman, D.W. Sent research articles and photographs to Dr. Bill Ripple, Oregon State University. August 11, 2009.
6. Daniels, Mark. Dr. William Ripple, a remote sensing specialist from Oregon State University in Corvallis asked for assistance with information. Multiple exchanges over several months. Flagstaff, AZ. June through September, 2009.
7. Laughlin, D., J. Springer. Met with the Grand Canyon Trust on Sept 15 for 30 minutes to answer their questions regarding plant data. Flagstaff, AZ. September 15, 2009. 3 attendees.
8. Seidenberg J. Discussed and provided technical information on forest health and ecological restoration topics in Northern Arizona with members of the public at the Flagstaff Festival of Science in the Park. Flagstaff, AZ. September 26, 2009.
9. Lund, D., M. Stoddard. Potential restoration treatment on the Warren Smith property, private in-holding within Coconino National Forest. Flagstaff, AZ. October 15, 2009.
10. Seidenberg, J. Sent a document listing sources for biomass research to Jennifer Spinti, Associate Professor, Institute for Clean and Secure Energy, University of Utah. October 19, 2009.
11. Covington, W.W., B. Greco, D. Vosick, B. Stevens. 4FRI Collaborative Meeting. Pinetop, AZ. March 24, 2010. 35 participants.
12. Seidenberg J. Facilitated a meeting with members of the 4FRI Steering Committee to discuss strategies for improving internal communication among stakeholders participating in 4FRI. Flagstaff, AZ. April 20, 2010.

Project 7: Knowledge Services

The ERI strives to deliver information in the form and language required by diverse audiences. We also seek to support immediate information needs to address land management challenges. This suite of information products is designed to meet the

information needs of the public, policy makers, land managers, academics, business and environmentalists. Below is a recent testimonial supporting the importance of these products.

“...Like so many (Forest Service) retirees, my work is not finished. I continue to speak publically on the issues of forest and watershed health, contributing the challenge of informing the public of natural resource reality. I have three such engagements in January. The Southwest Working Papers from the ERI represent an important part of continuing education, not only for me, but for the members of my audience. ERI’s work is appreciated.”
George Duda

Deliverables

- 1) 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.
 - a. Support for web.
 - ✓ 2010 Website Statistic Analysis. **Complete. Reference Appendix B.**
 - ✓ 2010 SEO Rankings. **Complete. Reference Appendix B.**
- 2) Occasional short summaries that compile best available information are needed by non-technical stakeholders and practitioners.
 - a. Two white papers.
 - ✓ Egan, D. and J. Seidenberg. Carbon Credits for Restored Western Dry Forests? ERI--Issues in Forest Restoration. **Complete. Reference Appendix B.**
 - ✓ Kim, Y-S. Ecological Restoration as Economic Stimulus: A Regional Analysis. **Complete. Reference Appendix B.**
- 3) Practitioners and stakeholders need very short, concise descriptions of land management options and the outcomes of those options.
 - a. Four working papers .
 - ✓ Kalies, E.L. and C.L. Chambers. 2010. Guidelines for Managing Small Mammals in Restored Ponderosa Pine Forests of Northern Arizona. Flagstaff, AZ: Ecological Restoration Institute Working Paper 23. **Complete. Reference Appendix B.**
 - ✓ Abella, S., C. Denton, D. Brewer, W. Robbie, R. Steinke, and W. Covington. Using a Terrestrial Ecosystem Survey to Estimate the Historical Density of Ponderosa Pine Trees in Northern Arizona (published as an ERI Fact Sheet). **Complete. Reference Appendix B.**
 - ✓ Huang, Ching-Hsun, C. Sorenson. Exploring the Potential of Obtaining Carbon Credits for Restoration Activities on Navajo Tribal Forest Lands (published as an ERI White Paper). **Complete. Reference Appendix B.**
 - ✓ Huffman, D., A. Sanchez Meador, and J. Crouse. Pinyon-Juniper Woodland Recovery (published as an ERI Fact Sheet). **Complete. Reference Appendix B.**
 - ✓ Noss, R. and W. Covington. Comparative Ecology and Management of Pine Savannas and Woodlands (draft report completed; working paper in revision). **Reference Appendix B**

- 4) Direct communication with individuals is still the knowledge delivery choice preferred by practitioners and stakeholders alike. In FY09 the ERI continued to provide in person delivery to convey emerging scientific information on restoration treatments, community collaborations and other relevant topics.
- a. Fifteen presentations. **Completed**
1. Seidenberg, J., Tuten, M., Egan, D. Kaibab Fire Awareness Fair in Williams, AZ. Williams, AZ. April 4, 2009. 50 attendees.
 2. Huffman, D.W. Participated in Collaborative Forest Restoration Program, Technical Advisory Panel Meeting. Albuquerque, NM. April 27 - May 1, 2009.
 3. Greco, B. Made presentation to Coconino NF Leadership Team (CLT) on partnership & collaborative opportunity (outreach) with ERI. Flagstaff Arboretum, Flagstaff, AZ. May 26, 2009. 27 attendees.
 4. Greco, B. Made presentation to Regional Forester & Staff regarding ERI services & support to agency planning & implementation process. Western Region Headquarters, BIA, Phoenix, AZ. June 8, 2009. 10 attendees.
 5. Stevens, B. Created billboard – backdrop display with ecological principles to display at National Conference on Ecological Restoration in Los Angeles. This will also be used for networking and ERI awareness opportunities with individuals from across the country. July 20-24, 2009. Los Angeles, CA.
 6. Greco, B., J. Seidenberg. Made presentation to the Board of Directors of the Greater Flagstaff Forest Partnership on the ERI's mission. Flagstaff, AZ. August 4, 2009.
 7. Greco, B. Presentation on "Restoration Objectives in Marking Guides", at Natural Resources Working Group. Lakeside, AZ. August 12, 2009. 22 attendees.
 8. Greco, B. Met with Four Forests Supervisors and USFS Regional Directors and made a presentation on ERI's 2009/2010 Program of Work. Flagstaff, AZ. August 17, 2009. 13 attendees.
 9. Greco, B. Attended Natural Resources Working Group meeting and made presentation on the Four Forest Restoration Initiative. Springerville, AZ. September 9, 2009. 15 attendees.
 10. Stevens, B. Created :30 video clip for YouTube, Web site and Fox (statewide) airing in September, 2009. Flagstaff, AZ.
 11. Denton, C. Presented at workshop for local logging contractors, Arizona Game and Fish, and Flagstaff Fire Department on "How to mark a restoration prescription." Flagstaff, AZ. October 18, 2009. 19 participants.
 12. Greco, B., D. Laughlin, J. Seidenberg. Gave presentation on Desired Forest Conditions, (DFC) to the Four Forests Initiative group. Flagstaff, AZ. November 6, 2009. 27 attendees.

13. Seidenberg J. Provided the Coconino County Sustainable Economic Development Initiative-Resource Based Industry Development Team with recommendations on prioritizing their plan of work for 2010. Flagstaff, AZ. December 2, 2009.
 14. Roccaforte, J.P., P.Z. Fulé, and W.W. Chancellor. "Woody debris and tree regeneration dynamics following severe wildfires in Arizona." Association for Fire Ecology International Congress, Savannah, GA. December 4, 2009. 50 participants.
 15. Seidenberg J. Provided a presentation to the City of Flagstaff Sustainability Commission regarding the ERI and ecological restoration/forest health issues in frequent fire ecosystems. Flagstaff, AZ. February 10, 2010.
 16. Seidenberg J. Provided a presentation to the Arizona Wildlife Federation regarding the ERI, ecological restoration and forest health/wildlife issues in Arizona. Carefree, AZ. 22 participants. February 27, 2010. 22 attendees.
 17. Smith, H.B. Doc. Presentation for the Coconino Rural Environmental Core (CREC) on January 26, 2010. Title of presentation was "Southwestern Ecosystems and Restoration." Flagstaff, AZ. Note that this has been presented on multiple occasions to the CREC including:
 - a. July 14, 2009. 22 participants
 - b. August 29, 2009. 25 participants
 - c. November 10, 2009. 18 participants
 - d. December 1, 2009. 9 participants
 - e. January 26, 2010. 8 participants
- 5) Seeing is believing. Fortunately, many restoration treatments have been applied throughout the Southwest. In FY09 the ERI continued to take diverse audiences to the field to demonstrate and discuss the outcomes of forest restoration on ecological health and wildfire behavior.
- a. Fifteen field trips. **Completed.**
 1. Greco, B., J. Seidenberg. Meeting with The Nature Conservancy Manager Neil Chapman regarding Fire application options and Rapid Assessments on the property. The Nature Conservancy, Flagstaff, AZ. June 10, 2009
 2. Greco, B., J. Seidenberg. Meeting with Hopi Tribal Officials, Bureau of Indian Affairs Western Regional Office and Tribal Natural Resource Directors. Flagstaff, AZ. June 22, 2009. 12 participants.
 3. Smith, H.B. Doc. Field trip for the Coconino Rural Environmental Core (CREC) on July 15, 2009. The field trip was to show examples of Southwestern ecosystems and restoration results. Flagstaff, AZ. July 15, 2009. 22 participants.
 4. Smith, H.B. Doc. Field trip for the Coconino Rural Environmental Core (CREC) on August 22, 2009. The field trip was to show examples of Southwestern ecosystems and restoration results. Flagstaff, AZ. August 22, 2009. 26 participants.

5. Seidenberg, J., D. Brewer , M. Stoddard. A field trip was provided to Sinagua High School Advanced Placement Science class and staff members of Willow Bend Environmental Education Center. Participants were educated on forest health issues and principles of ecological restoration in dry western forests. Flagstaff, AZ. October 2, 2009. 30 participants.
6. Stevens, B., H. B. Smith, J. Seidenberg. Ecological Restoration Walk in the Woods –public field trip about pre-settlement conditions, today’s degraded forests and forest restoration efforts during Flagstaff Festival of Science. Flagstaff, AZ. October 3, 2009. 12 participants.
7. Stevens, B. Meeting and Prescott forest site visits with foresters from Prescott National Forest to discuss opportunities to reach the public with forest restoration tour and information. Also discussed the use of ERI Fire and Smoke billboards in Prescott’s ranger station. Oct. 7, 2009. Prescott, AZ.
8. Smith D., Seidenberg J. A field trip was provided to members of the public as part of a Great Flagstaff Forest Partnership (GFFP) outreach event. Participants were educated on forest health issues and principles of ecological restoration in dry western forests. Flagstaff, AZ. October 17, 2009. 16 participants.
9. Stevens, B., D. Huffman, H. B. Smith. Walk in the Woods public field trip to Gus Pearson and Fort Valley restoration demonstration with Brenda Strohmeier from the Forest Service Rocky Mountain Research Station . The group learned about, viewed and discussed pre-settlement conditions, today’s degraded forests of the Southwest and what it will take for landscape-scale restoration. Flagstaff, AZ. October 26, 2009. 20 attendees.
10. Stevens, B., B. Greco. Field trip to Payson Ranger District with Ranger Ed Armenta and Forester Don Nunley. Discussed treated sites and forest health issues to be addressed in a public field trip Tuesday, December 8 in the Christopher Creek Area. Payson, AZ. November 4 and 24, 2009.
11. Seidenberg J., J. Roccaforte, D. Lund. A field trip was provided to Flagstaff High School A.P. Science class and staff members of Willow Bend Environmental Education Center. Participants were educated on forest health issues and principles of ecological restoration in dry western forests. Fort Valley Experimental Forest, Gus Pearson, Flagstaff, AZ. November 4, 2009. 30 participants.
12. Stevens, B., D. Huffman, H.B. Smith. Walk in the Woods public field trip to Prescott National Forest and urban interface to discuss forest restoration. Bradshaw District Ranger Laura Jo West and Forest Service foresters joined with the public. Group learned about, viewed and discussed pre-settlement conditions, today’s degraded forests, the need for thinning and burning and what it will take for landscape-scale restoration in our Southwestern forests. Prescott, AZ. November 9, 2009. 40 attendees.
13. Smith, H.B. Doc. Field trip for the Coconino Rural Environmental Core (CREC) on November 11, 2009. The field trip was to show examples of Southwestern

ecosystems and restoration results. Flagstaff, AZ. November 11, 2009. 22 participants.

14. Smith, H.B. Doc., M. Sensibaugh. Field trip for the Coconino Rural Environmental Core (CREC) on December 1, 2009. The field trip was to show examples of Southwestern ecosystems and restoration results. Flagstaff, AZ. December 1, 2009. 9 participants.
15. Brewer D., Seidenberg J., Stoddard M., Walker C. ERI staff members provided a forest restoration/fire ecology training workshop for Grand Canyon National Park environmental education staff members. Grand Canyon National Park, AZ. April 13, 2010. 8 participants.

Appendices

Appendix A: Reviews/Reports

Appendix B: Knowledge Services

Appendix C: Rapid Assessments/Field-Related

Appendix D: Publications