



**NORTHERN ARIZONA
UNIVERSITY**

Ecological Restoration Institute

ERI Fall Newsletter–October 2015



ERI and Broad-Scale Monitoring

Federal law requires each national forest to have a Land and Resource Management Plan. These plans are the foundation and guide for all management activities on the national forest. In 2012, the U.S. Forest Service (USFS) issued a revised Planning Rule after two years of development and external review. There are many changes from the 1982 planning rule, including additional monitoring requirements that direct “the development of a broader-scale monitoring strategy for plan monitoring questions that can best be answered at a geographic scale broader than one plan area.” The Ecological Restoration Institute, in partnership with USFS Regions 2 and 3 and our sister institutes ([CFRI](#) and [NMFWR](#)) developed a proposal to create an effective multi-scaled monitoring strategy.

This project is designed to both develop the framework for a broad-scale

monitoring strategy, engage external participation, and identify the key questions, indicators, and associated parameters for a pilot area within USFS Regions 2 and 3. A USFS and academic project team assessed existing monitoring plans and conducted interviews with key experts in multiple federal and state agencies and non-government organizations to assess existing broader-scale monitoring successes and lessons-learned. A series of workshops will be conducted in 2016 to contribute to a broader-scale monitoring plan framework. For more information, visit the SW Ecological Restoration Institute website's Broad-Scale Monitoring [page](#).

ERI in the News

[Forest managers embrace the benefits of fire](#) - Arizona Daily Sun

[The science behind 4FRI](#) - KJZZ.org

[Working together to restore the Colorado Front Range](#) - USDA.gov

ERI Publications: May to October 2015

JOURNAL ARTICLES

Huffman, D.W., J.D. Springer, and W.W. Chancellor. 2015. [Long-term herbivore exclusion for recovery of buckbrush \(*Ceanothus fendleri*\) populations during restoration of ponderosa pine forests in northern Arizona](#). *Ecological Restoration*, 33:274-281.

*A team of ERI researchers describe results from a study wherein they compared characteristics of buckbrush (*Ceanothus*) plants receiving different levels of protection from large herbivores.*

Ouzts, J, T. Kolb, D.W. Huffman, A.J. Sánchez Meador. 2015. [Post-fire ponderosa pine regeneration with and without planting in Arizona and New Mexico](#). *Forest Ecology and Management*, 354:281-290.

This article assesses the fate of ponderosa pine seedlings planted after intense burning at multiple sites in Arizona and New Mexico.

Stoddard, M.T., A.J. Sánchez Meador, P.Z. Fulé, and J.E. Korb. 2015. [Five-year post-restoration conditions and simulated climate change trajectories in a warm/dry mixed-conifer forest, southwestern Colorado, USA](http://dx.doi.org/10.1016/j.foreco.2015.07.007). *Forest Ecology and Management*, <http://dx.doi.org/10.1016/j.foreco.2015.07.007>.

A team of researchers compared restoration treatments in a warm/dry mixed-conifer forest in southwestern Colorado to determine which treatment is most effective in maintaining forest structure, function, and resiliency. Results suggest that full restoration increases a forest's ability to withstand disturbances like drought, insect infestation, and high-severity fire in the face of a changing climate.

Strahan, R.T., M.T. Stoddard, J.D. Springer, and D.W. Huffman. 2015. [Increasing weight of evidence that thinning and burning treatments help restore understory plant communities in ponderosa pine forests](http://dx.doi.org/10.1016/j.foreco.2015.07.007). *Forest Ecology and Management*, 353:208-220.

ERI ecologists found that five years after treatment in a Long-term Ecological Assessment and Restoration Network (LEARN) research project, understory cover was significantly greater in units that received both tree thinning and prescribed fire, compared with the untreated control.

Taylor, M.H., A.J. Sánchez Meador, Y.S. Kim, K. Rollins, and H. Will. 2015. [The Economics of Ecological Restoration and Hazardous Fuel Reduction Treatments in the Ponderosa Pine Forest Ecosystem](http://dx.doi.org/10.5849/forsci.14-030). *Forest Science*, <http://dx.doi.org/10.5849/forsci.14-030>.

Researchers used a simulation model to evaluate and compare the economic benefits and costs of ecological restoration and hazardous fuel reduction treatments.

Tuten, M.C., A.J. Sánchez Meador, and P.Z. Fulé. 2015. [Ecological restoration and fine-scale structural regulation in southwestern ponderosa pine forests](#). *Forest Ecology and Management*, 348:57-67.

This study provides insight to how tree marking techniques using historical forest remnants may have important effects on resulting fine-scale forest structure patterns.

FACT SHEETS

Bryant, T. 2015. [Implications of Diameter Caps on Multiple Forest Resource Responses in the Context of the Four Forest Restoration Initiative](#). ERI Fact Sheets. Ecological Restoration Institute, Northern Arizona University. 2 p.

The fact sheet summarizes a scientific assessment of whether diameter caps allow for the management of multiple resource needs as well as socially constructed desired conditions, e.g., reduced fire behavior and long-term resilient forests.

Esch, B.E. 2015. [Administrative Support in Collaborative Forest Restoration](#). ERI Fact Sheets. Ecological Restoration Institute, Northern Arizona University. 2 p.

ERI coordinator Bryce Esch conducted a survey to understand how much Collaborative Forest Landscape Restoration projects rely on administrative support and to what capacity they maintain these functions.

Huffman, D.W. 2015. [Fire History of a Mixed-Conifer Forest on the Mogollon Rim, Northern Arizona, USA](#). ERI Fact Sheets. Ecological Restoration Institute, Northern Arizona University. 2 p.

Ecologists reconstructed fire regime characteristics of a mixed-conifer forest on the Black Mesa Ranger District of the Apache-Sitgreaves National Forests. They found that the historical fire regime was one of high frequency, low-severity fires and that current conditions call for ecological restoration

treatments. These findings were in sharp contrast to a study based on Public Land Survey records that presumed the area experienced historically high-severity fires.

Stoddard, M.T. 2015. [Ecological and Social Implications of Employing Diameter Caps at a Collaborative Forest Restoration Project Near Flagstaff, Arizona](#). ERI Fact Sheets. Ecological Restoration Institute, Northern Arizona University. 2 p.

The fact sheet presents key questions and findings from an ERI study that monitored the ecological results and social aspects of the collaborative Ft. Valley Ecosystem Restoration Project to understand the implications of employing diameter caps.

Swetnam, T. and D.A. Falk. 2015. [Carbon Cycling in Southwestern Forests: Reservoirs, Fluxes, and the Effects of Fire and Management](#). ERI Fact Sheets. Ecological Restoration Institute and Southwest Fire Science Consortium, Northern Arizona University. 2 p.

To accompany the working paper of the same name, this fact sheet summarizes how carbon cycles through different forest types and where science suggests that the cycling patterns are most likely to change due to climate in the coming years.

WORKING PAPERS

Egan, D. 2015. [The 2012 Mexican Spotted Owl Recovery Plan Guidelines for Forest Restoration in the American Southwest](#). ERI Working Paper No. 33. Ecological Restoration Institute, Northern Arizona University. 11 p.

This working paper provides an overview of the forest management guidelines in the 2012 Final Recovery Plan for the Mexican Spotted Owl, First Revision. The paper seeks to help land managers understand how the revised recovery plan affects forest restoration efforts where project goals include reducing the severity and scale of wildfires as well as protecting and restoring MSO habitat.

Swetnam, T. and D. Falk. 2015. [Carbon Cycling in Southwestern Forests:](#)

[Reservoirs, Fluxes, and the Effects of Fire and Management](#). ERI Working Paper No. 35. Ecological Restoration Institute and Southwest Fire Science Consortium, Northern Arizona University. 15 p.

This working paper explains the basics of the carbon cycle — detailing how much carbon moves through vegetation, water, and soils over time. It also summarizes where current science suggests that carbon cycling patterns are most likely to change in the coming years to decades, and how management can influence these changes.

Yocom Kent, L.L. 2015. [Climate Change and Fire in the Southwest](#). ERI Working Paper No. 34. Ecological Restoration Institute and Southwest Fire Science Consortium, Northern Arizona University. 6 p.

Ecologist Larissa Yocom Kent summarizes the current scientific knowledge about climate change predictions in the Southwest as well as the pathways by which fire might be affected.

WHITE PAPERS

Mottek Lucas, A. 2015. [Flagstaff Watershed Protection Project: Creating Solutions through Community Partnerships](#). ERI White Paper— Issues in Forest Restoration. Ecological Restoration Institute, Northern Arizona University. 28 p.

This case study spans the first two years of the Flagstaff Watershed Protection Project (FWPP) and describes for communities, municipalities, and/or government agencies the administrative functions and mechanisms used by the City of Flagstaff and the U.S. Forest Service to develop and implement FWPP.

GENERAL AND TECHNICAL REPORTS

Evans, A. 2015. [2014 Wildfire Season: An Overview, Southwestern U.S.](#) Ecological Restoration Institute and Southwest Fire Science Consortium, Northern Arizona University. 20 p.

Written by Alexander Evans of the Forest Guild and produced in cooperation with Southwest Fire Science Consortium, this overview describes the vegetation impacted by 2014's 12 largest fires (greater than 4,000 acres in AZ and NM) and the degree to which each fire affected resources including soils, vegetation, and structures.

MASTER'S AND DOCTORAL THESES

Dowling, H.E. 2015. [Mapped permanent quadrats: A window through time into herbaceous plant demography.](#) MS Thesis, Northern Arizona University. Ann Arbor: ProQuest/UMI, 2015. (Publication No. 1594001.)

In this study, Lisa Dowling compiled metadata from a historical dataset, developed an electronic field capture method, and used these data to examine the demographic rates of a dominant bunchgrass species in northern Arizona.

Rodman, K.C. 2015. [Reference conditions and spatial dynamics in a southwestern dry mixed-conifer forest.](#) MS thesis, Northern Arizona University. Ann Arbor: ProQuest/UMI, 2015. (Publication No. 1594148.)

In this study, Kyle Rodman reconstructed historical structure (density and spatial pattern) and species composition for four dry mixed-conifer stands on the Mogollon Rim, Arizona.

News from the Field





Research and Development – 2015 Summer Field Season Data Collection

By Walker Chancellor, Research Specialist

Flagstaff Watershed Protection Project (FWPP)

The goal of this project is to understand how restoration treatments may or may not affect Mexican spotted owl (MSO) habitat in Protected Activity Centers (PACs) in mixed conifer forests on roughly 11,000 acres around Dry Lake Hills and Mormon Mountain. This project is a partnership between the U.S. Fish and Wildlife Service (USFWS), City of Flagstaff, and U.S. Forest Service. The USFWS will monitor owl responses while ERI measures vegetation changes.

Managed Wildfire Project

The goal of this project is to quantify structural attributes at fine, mid, and landscape scales within wildfires managed for resource benefit, i.e., fires managed for multiple objectives including fuel reduction, maintaining fire in a fire-adapted ecosystem, increasing firefighter and public safety, and protecting cultural resources and wildlife habitat, in ponderosa pine and mixed-conifer forests. This research will provide much needed information concerning efficacy of wildfire for meeting desired conditions and natural ranges of variability in forest structure. Information gained in this study will be valuable to regional land managers, who seek to understand potential outcomes of various restoration strategies and weigh tradeoffs between these strategies for meeting hazardous fuels and restoration goals.

Managed Wildfire Project (North Rim, GCNP)

The goal of this project is to evaluate long-term changes in wildfires managed for resource benefit. By remeasuring permanent field plots, we will quantify changes in forest structure and understory communities within wildfires that burned more than 10 years ago in Grand Canyon National Park. This information will be available to assist planning for fire and resource managers.

Mineral LEARN (Long-term Ecological Assessment and Restoration Network)

In June, 2014 the San Juan wildfire burned into the Mineral Ecosystem Management Area, where the ERI has an established study to compare long-

term ecological responses to alternative restoration treatments. The fire burned untreated, burn-only, and thin and burn units. The ERI took this opportunity to document and compare fire effects in the different treatments.

Outreach Support

Projects supported by field staff for the Agency Outreach team included the Escudilla and Rio Tusas Restoration Projects. Rapid assessment plots were established in these locations to determine the natural range of variability in these areas. This information will be used to inform management actions.



Agency Outreach

By Bruce Greco, Director of Agency Outreach

During this year's field season, the ERI Agency Outreach team collected and analyzed data for several key USFS projects in the Southwestern Region. The team also provided science support to the USFS for restoration planning, implementation, and Forest Land Management Plan Revisions. A few highlights include:

West Escudilla Restoration Project – Springerville/Alpine Ranger District, Apache-Sitgreaves NF: ERI continued to coordinate with the forest to provide the field data we collected through a rapid assessment process on a ~64,000-acre restoration project. A specific component is the identification of historic pinyon-juniper woodland and grassland areas.

Rio Tusus-San Antonio Restoration Project – ERI is collecting data and providing science support for a ponderosa pine/dry mixed-conifer restoration project (100,000+ acres) on the Tres Piedras Ranger District, Carson NF. This

summer, Agency Outreach completed a rapid assessment for the conifer vegetation and is preparing a summary report. Additionally, we established a 40-acre “evidence-based mark” demonstration area.

Mixed-Conifer LEARN Study Plots – Mogollon Rim Ranger District, Coconino NF: Together with ERI’s Research and Development group, staff continue to facilitate the implementation of a long-term study that will provide information about treatment alternatives in mixed-conifer ecosystems.

Tonto NF Forest Plan Revision – We continue to assist the Tonto Forest Plan Revision by contributing science support, providing field-based information on ecological restoration concepts, and developing a historical overview of forested ecosystems on the Tonto NF based on existing literature.

4FRI Rim Country Analysis – Apache-Sitgreaves, Coconino and Tonto NF’s: ERI continues to provide science and administrative support through the collaborative process. We are participating in the newly formed Planning Working Group and are exploring additional rapid assessment projects in the 4FRI area.

Hopi Nation Support – The Agency Outreach team is assisting the Hopi tribe’s Department of Natural Resources to develop strategies to complete their Forest Management Plan for tribal lands. This effort will include support to provide best available science that will help inform their planning and analysis.

For additional information on ERI’s Agency Outreach program, please contact Bruce Greco, Director of Outreach, (928) 523-4663 or bruce.greco@nau.edu or Mark Sensibaugh, Program Coordinator, Sr. at mark.sensibaugh@nau.edu.

Partner Spotlight





Flagstaff Fire Department, [Wildland Fire Management](#)

The Flagstaff Fire Department's Wildland Fire Management program's mission is to promote, create, and maintain a sustainable healthy forest ecosystem and a FireWise community. The program was instrumental in developing a Community Wildfire Protection Plan, a Wildland Interface Code, and the Flagstaff Watershed Protection Project. Flagstaff Fire's role in the Flagstaff Watershed Protection Project is featured in the recent ERI white paper, "[Flagstaff Watershed Protection Project: Creating Solutions through Community Partnerships.](#)"

EVENTS

2015 SAF National Convention

Baton Rouge Convention Center

Baton Rouge, Louisiana

November 3-7

More [information/registration](#).

6th Annual International Fire Ecology and Management Congress

San Antonio, Texas

November 16-20

More [information](#).



NAU is an equal opportunity provider.

ERI's research is funded by many sources, including the USDA Forest Service and the AZ Board of Regents through the Technology, Research and Innovation Fund (TRIF).

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