

NORTHERN
ARIZONA
UNIVERSITY



**Ecological
Restoration Institute**

UPCOMING EVENTS

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**Ecological
Restoration
Institute**

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Large, mature ponderosa pines accompany a dense growth of resprouting Gambel oak in the San Juan National Forest near Pagosa Springs, Colorado. *Ecological Restoration Institute, NAU*

RESTORATION NEWS: Creative Solutions to Funding Restoration

Arizona forests today are overstocked with trees, creating conditions for high-intensity, severe wildfires on the scale of several hundred thousand acres. These forests provide a multitude of resources and are also home to critical watersheds, which are greatly affected by too many trees. Research shows that an overabundance of trees competing for resources can yield less water for watersheds. In addition, devastating wildfires that result from poor forest conditions can cause flooding and erosion, which pollutes critical reservoirs downstream and affects water quality.

Along with these challenges, we face many opportunities for investing in the future health of our forests and, in turn, our watersheds. In early October, ERI and other forest experts convened in Scottsdale, Ariz. for a two-day conference to discuss obstacles and explore solutions to restoring Arizona forests. Hosted by the Salt River Project (SRP), the "Investment Strategies to Restore Arizona Forests and Watersheds"

conference featured a variety of speakers who offered creative strategies to increase funding of current and future restoration projects at the local, regional and national level.

Learn more about the [2013 conference](#).

ERI IN THE NEWS



Partners for the [Flagstaff Watershed Protection Project](#) (FWPP) assess impacts and capabilities of logging equipment on steep slopes during a FWPP pilot project in July. The partnership is an example of an innovative way to fund forest restoration. *Photo courtesy of FWPP*

Saving Arizona's Threatened Landscape

ERI's Wally Covington and others discuss solutions to funding costly forest thinning projects—and why our future depends on it.

[More...](#)

Experts Discuss How to Preserve Arizona's Forests

Forest experts discuss investment strategies to fund Arizona forest restoration projects.

[More...](#)

Wildfires Still Pose Risk for Arizona in Slow Year

Twenty-five percent of Arizona's forests have burned since 2000, and an estimated 3–3.5 million acres remain in danger of burning as drought conditions continue and forests need treatment.

[More...](#)

PUBLICATIONS:

ERI FACT SHEETS:

Wyatt, C.J.W. 2013. Fact Sheet: [How Restoration Thinning Treatments on Conifer-dominated Watersheds Affect the Water Budget](#). Ecological Restoration Institute, Northern Arizona University. 2p.

The systematic review of 37 relevant experimental studies from around the world indicates when 20–100% of a conifer-dominated watershed is thinned the water yield can increase 10–35%, with differences due to variables such as climate, topography, and soil types.

Wyatt, C.J.W. 2013. Fact Sheet: [Interpretive Model of Regional Semi-arid Aquifer Responses to Large-scale Forest Restoration Treatments and Climate Change](#). Ecological Restoration Institute, Northern Arizona University. 2p.

Researchers modified the Northern Arizona Regional Groundwater-Flow Model to see how 4FRI restoration treatments might affect groundwater in a sub-basin of the Verde River. The model predicts a short-term increase in groundwater after treatments, then a decline due to vegetative regrowth.

ERI WORKING PAPERS:

Margolis, E.Q., D.W. Huffman, and J.M. Iñiguez. 2013. Working Paper 28: Southwestern Mixed-Conifer Forests: Evaluating Reference Conditions to Guide Ecological Restoration Treatments. Ecological Restoration Institute/Southwest Fire Science Consortium, Northern Arizona University, *ERI Working Papers*, 8 p.

These forest ecologists present in-field diagnostics for determining the compositional and structural differences between warm/dry and cool/moist mixed-conifer forests in the Southwest. Evaluating these conditions allows land managers to make informed decisions about restoration activities.

Yocom, L. 2013. Working Paper 27: Fuel Treatment Longevity. Ecological Restoration Institute/Southwest Fire Science Consortium, Northern Arizona University, *ERI Working Papers*, 8 p.

Dr. Yocom's review of the relevant literature from studies across the West indicates that forest restoration treatments and fuel hazard reduction efforts typically last 10–15 years before losing their effectiveness and requiring further management action.

ERI REPORTS:

Crouse, J.E. and A.E.M. Waltz. 2013. Identifying priority forest treatment areas across the Apache-Sitgreaves National Forests. Special report to the Apache-Sitgreaves National Forests, USDA Forest Service, Region 3. Ecological Restoration Institute, Northern Arizona University. 50 p.

ERI researchers used various GIS data layers to help U.S. Forest Service personnel working on the Apache-Sitgreaves National Forests to 1) identify priority restoration treatment areas and 2) locate forested areas within the Wallow Fire perimeter that remain vulnerable to uncharacteristic wildfire.

Huffman, D.W., B. Greco, W.W. Chancellor, J.E. Crouse, J.D. Springer, A.E.M. Waltz. 2013. White Mountain Stewardship Program Monitoring Report. Special report to the Apache-Sitgreaves National Forests, USDA Forest Service, Region 3. Ecological Restoration Institute, Northern Arizona University. 33 p.

The White Mountain Stewardship Program's 2011 forest treatments were studied to determine whether: 1) there was a difference between pre- and post-treatment crown fire potential, 2) treated acres exhibited a change in Fire Regime Condition Class, 3) untreated or lightly treated areas are connected, and 4) invasive species are present in disturbed areas.

Roccaforte, J.P., M.T. Stoddard, P.Z. Fulé. 2013. Preliminary results from the Mineral Ecosystem Management Area (EMA) experimental block study: One-year post-treatment. Special report to the Apache-Sitgreaves National Forests, USDA Forest Service, Region 3. Ecological Restoration Institute, Northern Arizona University. 18 p.

This report presents early results of an experiment the ERI conducted to 1) determine reference conditions, 2) measure and evaluate pre-treatment forest structure variables, and 3) test responses to full restoration and burn only treatments—in a ponderosa pine forest on the A-S National Forests.

Roccaforte, J.P. 2013. The Wallow Fire and its effects on mixed-conifer forest: A comparison with reference conditions. Special report to the Apache-Sitgreaves National Forests, USDA Forest Service, Region 3. Ecological Restoration Institute, Northern Arizona University. 17 p.

This study evaluated high-severity burn patch characteristics in the Wallow Fire to determine if they were within the historical range of variability (HRV) for Southwest mixed conifer forests. From 28–69% of the dry mixed conifer burned outside the HRV, while wet mixed conifer was entirely within the HRV.

Sensibaugh, M., B. Greco, W.W. Chancellor, M.T. Stoddard. 2013. Larson Forest Restoration Project Historic Range of Variation (HRV Reference Conditions) Assessment Report. Special Report to the Apache-Sitgreaves National Forests, U.S. Forest Service, Region 3. Ecological Restoration Institute, Northern Arizona University, 20 p.

The ERI worked with the Black Mesa Ranger District of the A-S National Forests to determine the historic forest structure and composition, fire history, and current stand conditions of an area of approximately 30,000 acres, dominated primarily by ponderosa pine.

PUBLISHED IN JOURNALS:

Abella, S.R. and J.D. Springer. 2012. Soil seed banks in a mature coniferous forest landscape: dominance of native perennials and low spatial variability. *Seed Science Research* 22:207-217.

Abella and Springer evaluate the composition and relationships of seed banks with forest community types, vegetation cover, and environmental variables from 36 relatively undisturbed sites ranging from low-elevation pinyon-juniper to high-elevation bristlecone pine in southern

Nevada.

Kalies, E.L. and S.S. Rosenstock. 2013. Stand structure and breeding birds: Implications for restoring ponderosa pine forests. *Journal of Wildlife Management* 77(6):1157-1165.

These wildlife ecologists sampled birds and forest structural characteristics in 23 stands in northern Arizona. Using multi-season and multi-species occupancy models, their results suggest that restoration treatments will likely benefit a substantial portion of the breeding songbird community.

Korb, J.E., P.Z. Fulé, and R. Wu. 2013. [Variability of warm/dry mixed conifer forests in Southwestern Colorado, USA: Implications for ecological restoration.](#) *Forest Ecology and Management* 304:182-191.

These researchers found that historical fire regime variability exists within warm/dry mixed-conifer forests in a relatively small geographic area due to topographic variables. Their findings demonstrate the need to develop site-specific reference conditions when restoring this forest type.

Kurth, V.J., N. Fransioli, P.Z. Fulé, S.C. Hart, and C.A. Gehring. 2013. [Stand-replacing wildfires alter the community structure of wood-decay fungi in southwestern ponderosa pine forests of the U.S.A.](#) *Fungal Ecology* 6:192-204.

This effort to understand the effects of stand-replacing wildfires on wood-decay fungi suggests that in semi-arid areas such disturbances may have substantial, long-term impacts on wood-inhabiting fungal communities, which, in turn, may have consequences for wood decomposition and carbon cycling.

Shive, K.L., C.H. Sieg, and P.Z. Fulé. 2013. Pre-wildfire management treatments interact with fire severity to have lasting effects on post-wildfire vegetation response. *Forest Ecology and Management* 297:75–83.

In a study of post-fire vegetation recovery following the Rodeo-Chediski Fire, these researchers describe the plant community response, including exotic species and pines, eight years after the fire. They compared areas that experienced high- and low-severity fire as well as those treated prior to the fire.

Stevens-Rumann, C., K.L. Shive, P.Z. Fulé and C.H. Seig. 2013. Pre-wildfire fuel reduction treatments result in more resilient forest structure a decade after wildfire. *International Journal of Wildland Fire* <http://dx.doi.org/10.1071/WF12216>.

These forest ecologists studied the stand structure and surface fuel loadings on treated and untreated sites within the 2002 Rodeo–Chediski Fire area. Their data from 140 plots on seven sites provides vital information about basal area, stand density, snags, and coarse woody debris following a severe wildfire.

THESES AND DISSERTATIONS

Wyatt, C.J.W. 2013. [Estimating groundwater yield following forest restoration along the Mogollon Rim, Arizona](#). Master's thesis. School of Earth Sciences and Environmental Sustainability. Northern Arizona University. 100 p.

Wyatt presents an overview of the potential effects large-scale forest restoration, like that envisioned by the 4FRI, on watershed surface water and groundwater. He also discusses these effects within the context of the Northern Arizona Regional Groundwater-Flow Model and climate change.

NEWS FROM THE FIELD



An example of historic forest structure found in the Larson project area on the Black Mesa Ranger District of the Apache-Sitgreaves National Forests. *Photo courtesy of the Ecological Restoration Institute, NAU*

AGENCY OUTREACH

In addition to several other efforts to provide land managers with technical assistance, the Agency Outreach Team has just completed the Larson Forest Restoration Project, Historic Range of Variation (HRV Reference Conditions) Assessment Report. The Larson project is located on the Black Mesa District of the Apache-Sitgreaves National Forests. The project covers approximately 30,000 acres, dominated by ponderosa pine, and it is designed to restore forest conditions that exhibit forest health, promote large tree development, and reduce the risk of a stand-replacing fire. The district engaged the ERI outreach group to establish reference conditions that would serve as an important guide for management planning.

The Outreach group also recently completed follow-up monitoring of the Bluewater Ecosystem Management Project on the Mt. Taylor District of the Cibola National Forest. ERI has been working with the district to participate in the collection of monitoring information on a series of different restoration treatments. These treatments include burn-only and three different thinning applications, including an evidence-based mark. The monitoring is designed to display the tradeoffs and effects of the different treatments as they relate to restoration goals and management objectives. The plots will be revisited in two years, before the report is finalized.

For more information on agency outreach, contact Outreach Program Coordinator [Mark Sensibaugh](#) at (928) 523-6651.

ERI RESEARCH

Over the 2013 field season, ERI field crews were successful in collecting ecological data to help answer important restoration questions related to reference conditions, management influences on long-term, post-wildfire responses, and comparison of forest restoration treatments across different forest types to enhance ecosystem resilience to increasing high-intensity crown fire. Data was collected in Arizona, Colorado and New Mexico.

Six new undergraduate research assistants joined ERI field crews. Class standings range from freshman to junior and academic majors include forestry, civil engineering, and environmental studies. ERI Research and Development staff, along with undergraduate research assistants, are busy processing samples and analyzing data collected throughout the field season. This includes a large effort to process dendrochronology samples that will aid in determining tree ages for questions related to reference conditions. For more information, contact [Walker Chancellor](#) at (928) 523-7284, or [John Paul Roccaforte](#) at (928) 523-7229.

PARTNERS



Spotlight: Southwest Fire Science Consortium
www.swfireconsortium.org

The Southwest Fire Science Consortium (SWFSC) is a way for managers, scientists, and policy makers to interact and share science. SWFSC's goal is to see the best science used to make management decisions and scientists working on the questions managers need answered. The SWFSC tries to bring together localized efforts to develop scientific information and to disseminate that to practitioners on the ground through an inclusive and open process. This comprises a variety of products such as the upcoming event, "Fostering resilience in Southwestern ecosystems: A problem solving workshop" in Tucson, Ariz., February 25–27, 2014. Travel grants are available.

SWFSC and ERI have successfully partnered on several projects, including the recently released working papers, *Southwestern Mixed-Conifer Forests: Evaluating reference conditions to guide ecological restoration treatments and Fuel Treatment Longevity*.

UPCOMING EVENTS:



Fostering resilience in Southwestern ecosystems: A problem solving workshop

Southwest Fire Science Consortium

Tucson, AZ

February 25–27, 2014

[More Information](#)



Rx510 – Advanced Fire Effects

National Advanced Fire & Resource Institute (NAFRI)

Tucson, AZ

January 13–17, 2014

[More Information](#)



Association for
Fire
Ecology



International
Association
of Wildland Fire

Large Wildland Fires: Social, Political & Ecological Effects

Association for Fire Ecology / International Association of Wildland Fire

Missoula, MT

May 19–23, 2014

[More Information](#)

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