



The Ecological Restoration Institute (ERI) *Accelerating Restoration in the West* Fiscal Year 2016

Final

3/9/2016

The November 2015 U.S. Forest Service report, *“From Accelerating Restoration to Creating and Maintaining Resilient Landscapes and Communities Across the Nation”* highlights recent progress to increase the pace and scale of forest restoration across national forests. It also acknowledges the important role of partnerships for achieving these gains. The Ecological Restoration Institute provides an integrated suite of services to land managers, stakeholders and decision-makers that support science-based forest management. From identifying best available science to technical support for collaboration ERI is focused on the actions that will improve forest health and resiliency while protecting communities. A quick analysis of the U.S. Forest Service report shows that not only is Wally Covington quoted as an authority about the effectiveness of Slide Fire treatments, but our contributions to the science (GTR-310) of restoration, the success of the Four Forest Restoration Initiative (4FRI) and other Collaborative Forest Landscape Restoration (CFLR) Program pilots, technical assistance for implementation of the 2012 forest planning rule, synthesis of lessons learned from the 4FRI collaborative process and NEPA, are in sync with all major land management initiatives underway today at the USFS.

The ERI leverages funding to serve a broad spectrum of other affected entities¹ as well. Over the past four years the ERI has assisted the Salt River Project with efforts to educate the public in desert cities about the relationship of their water to a healthy forest. We’ve also partnered with the Southwest Fire Science Consortium to increase our outreach to the fire community and we continue to provide technical support to collaboratives throughout the West. Meanwhile we strive to anticipate the science needs of land managers by testing and monitoring forest restoration treatments in pinyon-juniper woodlands, mixed-conifer forests and retrospective analyses of the effectiveness of managed fire to achieve restoration goals.

The Fiscal Year 2016 work plan for \$1.2 million will contribute to an acceleration of the pace of restoration. Appendix A of this work plan lists projects where, with additional funding, our outreach impact can be increased. The ERI is grateful for the funding provided by the U.S. Forest Service and looks forward to working in partnership with USFS and others to deliver a program of excellence in Fiscal Year 2016.

The Ecological Restoration Institute (ERI) at Northern Arizona University is nationally and internationally recognized for expertise and leadership in science-based forest restoration and fire. In 2004 Congress passed the Southwest Forest Health and Wildfire Prevention Act (PL108-317) that authorized the ERI to be one of three ecological restoration institutes focused on developing and providing the best available science to land managers, practitioners and stakeholders in order to restore forests and reduce fire risk at the landscape scale. The institutes represent a proactive strategy for bridging the gap between scientific research and practical application to achieve desired land management outcomes.

¹ Defined in PL108-317 to be land managers, stakeholders, concerned citizens and states of the Interior West, including political subdivisions of the states.

Project 1: Science Support for Collaborative Restoration and Conservation from the Local to the Landscape Scale

April 17, 2015 is a day to remember for contemporary forest management. It is the day that the Final Record of Decision (ROD) was signed for the first Four Forest Restoration Initiative (4FRI) Environmental Impact Statement (EIS). That action clears 430,261 acres for mechanical thinning and burning as well as an additional 155,849 acres for burning only. It breaks all records by being the largest EIS in Forest Service history authorizing this scale of mechanical treatments. It also accomplishes a major paradigm shift by demonstrating that it is possible to conduct an environmental analysis at the scale of the problem, develop a solution to match that scale, and improve the efficiency of NEPA by conducting a large analysis that approves hundreds of thousands of acres for treatment.

The ERI is vitally important to the success of the 4FRI. Among our many contributions we provide leadership, administrative, and science support. A 2015 survey of the 23 Collaborative Forest Landscape Restoration (CFLR) projects concluded that “CFRLP groups see administrative support as essential, and think it is best to have a dedicated position to fill that role.” The 4FRI is an example of a well-organized collaborative that is capable of getting innovative work done.

<http://library.eri.nau.edu/gsd/collect/erilibra/index/assoc/D2015014.dir/doc.pdf>

The ERI also assists other large landscape restoration projects by filling information requests and technical assistance. Presently the ERI is on the planning committee for the April 2016 National Restoration Workshop scheduled for Denver, Colorado. As a part of that role we will help plan and deliver at least one conference track. As a part of this work plan we will provide follow-up identified at the conference that will support the goals of the CFLR Act. At a minimum we will assemble the lessons learned from one of the conference tracks; however, we anticipate there will be additional next steps identified by conference participants. Promoting information sharing across projects was identified by the Government Accountability Office in their report, “Forest Restoration: Adjusting Agencies’ Information Sharing Strategies Could Benefit Landscape Scale Projects” (GAO-15-398).

Project 1: Science Support for Collaborative Restoration and Conservation	
Fulfills Duties under the Act: 1,2,3,4	
Action	Requested by
1.1. Provide support for the 4FRI, an approved CFLR project. Actions include: support for integrating science, monitoring and adaptive management in planning and implementation; assistance in the organization and leadership of the 4FRI Stakeholder Group and working groups; assistance to develop landscape planning approaches that are scalable down to the treatment level.	<u>Requestor</u> : The 4FRI stakeholders <u>Outcome</u> : Successful collaboration and implementation at the landscape scale
1.2 Assistance to landscape-scale restoration projects across the West. Specifically, execute next steps and support following the 2016 National Restoration Workshop.	<u>Requestor</u> : CFLR and other landscape-scale restoration projects <u>Outcome</u> : Successful collaboration and implementation at the landscape scale

Deliverables

1.1) Provide support for the Four Forest Restoration Initiative (4FRI), a Collaborative Forest Landscape Restoration Act project.

- a) Deliverable: Report on technical assistance to the multi-party monitoring board and the Forest Service as EIS#1 proceeds to implementation; and support for EIS#2 analysis.
- b) Deliverable: Report on leadership activities and work group participation
- c) Deliverable: Report on IT support for the 4FRI website and BASECAMP (an online collaborative work space) and administrative support including minutes and agendas.

1.2) Provide scientific and technical support and follow up from the April 2016 National Restoration Workshop.

- a) Deliverable: Report on follow up and actions in response to the April 2016 National Restoration Workshop.
- b) Deliverable: White paper describing lessons learned from a learning track (utilization or planning) and capturing science needs from stakeholders and agency partners, based on the April 2016 National Restoration Workshop.

Project 2: Information Analysis to Assist Evidence-Based Conservation

Land managers aspire to use the best available scientific information (BASI) to guide management decisions. In fact, federal agency directives including the 2012 Planning Rule require use of BASI. Yet determining what *is* the best available science is confusing to nonscientists. In some cases interest groups or individuals will argue that science is conflicting in order to cast doubt on management actions. Professionally developed protocols to determine the strength of the evidence from the literature and other sources for answering management questions can be used to identify the best available scientific information.

Based on the urgency of the question and the quantity and quality of the information available, the ERI produces various products. For example, rapid reviews of key information sources, produced in a matter of weeks, may be needed to respond to highly urgent questions; whereas rigorous comprehensive reviews that require a greater level of effort may be needed to answer broader questions. For all review efforts, the ERI will follow a systematic, evidence-based approach to assemble, evaluate, and weigh findings from scientific research, practitioner experience, and gray literature to objectively identify the best evidence for making management decisions. This approach can help diminish the controversy over seemingly “conflicting” science through determining the best available science by analyzing the strength of the evidence presented in scientific studies and other sources.

In FY 2016, we propose to conduct a review of the literature in order to rigorously examine the evidence (peer reviewed literature) pertaining to historic fire regimes in ponderosa pine and mixed conifer forest types of the West. The goal is to examine the quality of the science describing historic fire regimes in the context of newly published conflicting science that suggests that catastrophic fire in these two forest types is consistent with reference conditions that pre-date Euro-American settlement. The outcome of the workshop will be an article summarizing the quantity and quality of the evidence describing fire regimes.

Project 2: Evidence-based Conservation	
Fulfills Duties under the Act: 1,2	
Action	Requestor
2.1. Literature or Systematic Review examining historic fire regimes in ponderosa pine and mixed conifer forest types of the West	<u>Requestor</u> : 4FRI Interdisciplinary team and other planners and stakeholders in the West <u>Outcome</u> : Best available science informs action

Deliverables

2.1) Evidence-based review of the literature describing fire regimes in ponderosa pine and dry mix conifer forests in the West.

- a) Deliverables:
 - i. Literature review
 - ii. Completed draft manuscript

Project 3: Ecological Monitoring and Evaluation for Adaptive Management

The core focus of the Ecological Restoration Institute is to develop and transfer practical, science-based knowledge regarding forest restoration treatments that improve the health and resilience of western forest and woodland ecosystems. This is accomplished both through synthesis of existing science as well as original work aimed at increasing the body of knowledge surrounding critical management questions. Activities in described in Project 3 represent primary investigations designed to address prevailing questions for which science-based information is presently lacking or incomplete. Rigorous methodologies for monitoring and scientific study will allow knowledge developed in this project to be widely relevant and useful for restoration planning and adaptive management.

In FY 2016, we will continue to respond to key science needs identified by land managers, stakeholders, and researcher partners. Science-based information is crucially needed on the following: 1) ecological differences between alternative restoration treatment approaches in mixed-conifer ecosystems; 2) effectiveness of restoration treatments for increasing resiliency of mixed-conifer forests to severe wildfire; 3) interactions of wildfire and climate on forest composition and structure; and 4) effectiveness of resource benefit wildland fires for meeting restoration objectives.

To address these science needs, we will: 1) continue planning and implementation of a long-term ecological assessment and restoration network (LEARN) project at a warm/dry mixed-conifer site on the Mogollon Rim Ranger District (Coconino National Forest); 2) make use of previously established sample plots to monitor and document long-term tree mortality responses and understory plant community patterns within treated and untreated mixed-conifer forests of the 2011 Wallow Fire; 3) make use of permanent monitoring plots within the 2001 Leroux Fire to analyze associations between climate and composition of ponderosa pine and mixed-conifer forests; and 4) expand FY 2015 work to investigate effectiveness of resource benefit wildfires for moving frequent-fire landscapes toward desired conditions.

Information produced from activities completed under Project 3 will be highly valuable and relevant to resource managers, and will aid in planning for restoration and conservation of dry forest landscapes of the western United States. Science delivery from these activities will target not only resource managers but also researchers, interested stakeholders, policy makers, and the public.

The ERI would like to discuss expanded funding for implementing a pilot project to test new broader-scale monitoring protocols. These protocols are being developed through our current contract focused on identifying monitoring indicators useful for informing adaptive management of forest plans consistent with the 2012 planning rule. We also would like to discuss a number of other projects that address critical science needs for landscape restoration (see Appendix A, Project 3).

Project 3: Monitoring and Evaluation for Adaptive Management	
Fulfills Duties under the Act: 1,2,3	
Action	Requestor
3.1 Continue development of long-term study in a mixed-conifer forest on the Mogollon Rim Ranger District of the Coconino National Forest (build from FY 2015).	<u>Requestor</u> : 4FRI ID Team: Dick Fleishman and Bill Noble. These interests date back to the original 2006 East Clear Creek project. Outlined in the 2006 FONSI are requests for more analysis of thinning and burning in mixed-conifer. This request was made by the Grand Canyon Wildlands Council and Grand Canyon Trust. Jim Youtz, regional silviculturalist <u>Outcome</u> : Best available science to inform development of restoration treatment prescriptions
3.2 Examine effects of pre-wildfire, restoration and fuels treatments on mixed-conifer forest understory communities: Remeasurement of Wallow Fire sites.	<u>Requestor</u> : USFS staff, research scientists, 4FRI stakeholders <u>Outcome</u> : New information concerning effectiveness of treatments for increasing resilience of mixed conifer forests to severe wildfire
3.3 Monitor secondary mortality of trees after wildfire in mixed conifer forests: Comparison of treated and untreated sites.	<u>Requestor</u> : USFS staff, research scientists, 4FRI stakeholders. <u>Outcome</u> : New information concerning effectiveness of treatments for increasing resilience of mixed-conifer forests to severe wildfire.
3.4 Analyze interactions of fire severity and climate effects on structure, species composition, and regeneration at the ponderosa pine-mixed conifer forest ecotone.	<u>Requestor</u> : USFS staff, research scientists, 4FRI stakeholders <u>Outcome</u> : New information concerning responses of mixed-conifer forests to severe wildfire

Project 3: Monitoring and Evaluation for Adaptive Management	
Fulfills Duties under the Act: 1,2,3	
3.5 Investigate effects of multiple entries with resource benefit wildfire on forest structure and composition.	<p><u>Requestors</u>: This anticipates need, and is consistent with the Southwest Fire Science Consortium interest in the topic of using fire to meet ecological objectives. A proposal to JSFP had letters of support written by William Van Bruggen, Kelly Russell, Mike Williams, Linda Chappell and Linda Wadleigh (via email). 4FRI is planning fire-only treatments, however, there is very little data available. Jim Youtz, regional silviculturist also supports this project.</p> <p><u>Outcome</u>: Best available science provided to inform action</p>

Deliverables

3.1) Continue development of long-term study in a mixed-conifer forest on the Mogollon Rim Ranger District of the Coconino National Forest (build from FY 2015).

- a) Deliverables:
 - i. Report on progress.
 - ii. Coconino National Forest to train crews and implement treatment marking.

3.2) Effects of pre-wildfire, restoration, and fuels treatments on mixed-conifer forest understory communities: Remeasurement of Wallow Fire sites.

- a) Deliverables:
 - i. Manuscript prepared for publication.
 - ii. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.3) Secondary mortality of trees after wildfire in mixed conifer forests: Comparison of treated and untreated sites. Collaborative project with USFS Forest Health and Protection

- a) Deliverables:
 - i. Manuscript prepared for publication.
 - ii. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.4) Fire severity and climate effects on structure, species composition, and regeneration at the ponderosa pine–mixed-conifer forest ecotone.

- a) Deliverables:
 - i. Manuscript prepared for publication.
 - ii. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.5) How does re-entry with resource benefit wildfire affect stand structure at multiple scales? This project builds on work completed in FY15. New sites will be identified for study on USFS and/or NPS lands in northern Arizona.

- a) Deliverable:
 - i. Manuscript prepared for publication.
 - ii. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

Project 4: Understanding and Solving the Economic, Social and Political Issues and Opportunities of Ecological Restoration

Accelerating the pace and scale of restoration will require resources and innovation that go beyond current federal funding and human resources. For the past several years the ERI has pursued actions that can expand the resources that will be required to achieve the goal of restored forest health and resilient landscapes. In 2016 we will continue to support and respond to emerging opportunities to develop innovative funding strategies for restoration.

The successful completion of the 4FRI EIS#1 demonstrates the capacity of the Forest Service to successfully complete NEPA at the landscape scale. However, what remains unproven is re-creating the socio-economic conditions that enable private sector investment, harvest, and utilization to implement restoration. Beginning in early 2016 and continuing throughout the year we will strive to help advance private sector opportunities to expand wood harvest and utilization.

Fifteen years of collaboration with federal land management agencies has revealed that there are federal laws that work at cross-purposes for achieving contemporary land management goals. This problem was evident in the preparation of the first 4FRI EIS and will continue to plague restoration planning and implementation. With additional funding in FY 2016 we propose conducting an experts workshop to identify targeted policy changes that will improve the efficacy of science-based restoration (see Appendix A, Project 4).

Project 4: Understanding and Solving Social, Political and Economic Issues	
Fulfills Duties under the Act: 6,7	
Action	Benefit
4.1 Support the discovery and implementation of innovative funding mechanisms to achieve restoration.	<u>Requestor:</u> The ERI is assisting the City of Flagstaff, the Salt River Project, and Coronado NF. Creating new funding streams is a focus of the USDA Undersecretary for Environment and Natural Resources <u>Outcomes:</u> Innovative approaches to funding are developed across the West
4.2 Facilitate activities to advance private sector development of harvest, manufacturing, and utilization.	<u>Requestor:</u> Industry <u>Outcome:</u> Contributes to the revitalization of the wood sector and rural economic recovery

Deliverables

4.1) Actions to increase understanding of innovative funding approaches for achieving forest restoration and wildfire risk reduction. Past and future actions may include helping to facilitate discussions in southeastern Arizona designed to achieve restoration on the Coronado National Forest and outreach to other communities explaining the funding mechanisms of the Flagstaff Watershed Protection Project.

a) Deliverable: Report on actions that support innovative funding approaches to restoration.

4.2) Help facilitate private sector harvest, manufacturing and utilization approaches. An example may include facilitating discussions and actions (such as a workshop or conference) that will lead to biomass utilization. In FY’ 15 we are working with key interests to develop a long-term biomass utilization strategy. This work is likely to continue in FY’ 16.

a) Deliverable: Report on actions and outcomes.

Project 5: State, Tribal and Private Forestry – The All-Lands Approach

The National Cohesive Strategy has gained momentum across the West. At its core is the desire for the landowners and decision-makers beyond the boundaries of federal land to accept responsibility for implementing land management policies to restore forest and land health while simultaneously reducing the threat of catastrophic fire to communities. Engaging all affected landowners, stakeholders and decision-makers is a labor intensive task.

Consistent with our enabling legislation, the ERI strives to serve the needs of all affected landowners. In 2016 we will continue to lend support to the multi-jurisdictional Arizona Prescribed Fire Council, contribute to the five-year revision of the Arizona Natural Resource Assessment and Strategic Plan and provide support as resources allow to Arizona tribes.

With additional funding in FY 2016 the ERI could increase its support to tribes. We are also collaborating with the Washington Office of the USFS, Rocky Mountain Research Station, USFS Region 3, the Arizona State Forester and the NAU School of Forestry to create an Arizona Restoration Partnership to advance the Cohesive Strategy to all lands in Arizona (see Appendix A, Project 5).

Project 5: State, Tribal and Private Lands—An All Lands Approach	
Fulfills Duties of the Act: 1, 3, 4	
Action	Requestor
5.1 Service to the Arizona Prescribed Fire Council.	<u>Requestor</u> : Members of the Prescribed Fire Council <u>Outcomes</u> : Education, increased use of prescribed fire, smoke management and coordination
5.2 Assist in the rewrite of the Arizona Natural Resource Assessment and Strategic Plan as required by the 2008 Farm Bill.	<u>Requestor</u> : Deputy Chief for State and Private Forestry, Discussions with State Forester

	<u>Outcomes</u> : State Strategy aligned with the National Cohesive Strategy
5.3 Provide technical assistance for the Hopi Tribal forest management plans.	<u>Requestor</u> : Hopi Tribe <u>Outcomes</u> : Science-based Tribal management plan

Deliverables

- 5.1) **Assist the Arizona Prescribed Fire Council.** The mission and purpose of the Arizona Prescribed Fire Council is to serve as a forum for all prescribed fire practitioners (government, academic institutes, tribes, coalitions, and individuals) in order to work collectively to promote, protect, conserve, and expand the responsible use of prescribed fire in Arizona’s fire-dependent ecosystems.
 - a.) Deliverable: Report on technical support provided to the council and for website services.
- 5.2) **Assist the Arizona State Forester to revise the Arizona Natural Resource Assessment and Strategy.**
 - a.) Deliverable: Report on technical support.
- 5.3) **Assist the Hopi Tribe to revise their forest management plan.**
 - a.) Deliverable: Report on assistance.

Project 6: Services to the Intermountain West

According to the “Forest Restoration: Adjusting Agencies’ Information Sharing Strategies Could Benefit Landscape Scale Projects” (GAO-15-398) the federal agencies believe that more information sharing is important to advance knowledge gained from large landscape restoration planning and implementation. Project 6 focuses on translating and transferring best available science and lessons learned to land managers and all affected entities.

In FY 2016, the ERI will continue to make the best available science user friendly so it can be mobilized to support treatment design and implementation. The ERI will provide technical assistance to help managers understand historic and desired forest conditions and treatment options through services such as Rapid Assessments (RAPs), workshops, field trips, and planning and monitoring support.

Rapid Assessments are particularly valuable to land managers in planning and designing landscape-scale projects. A RAP includes data gathering to localize science and provide information about historic and current conditions. This information is then used to develop a Purpose and Need for action, to guide treatment prescriptions and for outreach and education. The ERI is also using these sites to provide on-the-ground training for land managers.

The services under Project 6 address a broad spectrum of initiatives including: Forest Plan revisions, the Watershed Condition Framework, stewardship contracting, the National Cohesive Strategy, and the Chief’s plan to accelerate restoration. ERI’s emphasis in providing program support to help meet these objectives remains a high priority.

With additional funding, the ERI will develop a handbook and protocols for land managers who want to conduct Rapid Assessments. We will also engage affected entities in reviewing and revising our website to ensure that it is user friendly for external audiences.

Project 6: Service to the Intermountain West	
Fulfills Duties of the Act: 1, 2, 3, 4	
Action	Requestors
6.1 Provide support to federal land managers with technical assistance, rapid assessments, workshops, and presentations.	<u>Requestors</u> : See below <u>Outcomes</u> : RAPs, workshops, field trips, transfer of best available science
6.2 Provide scientific support for forest plan revisions.	<u>Requestor</u> : Tonto, Carson, and Coconino national forests <u>Outcomes</u> : Forest plans use best available information
6.3 Maintain and transfer science through the website for land managers and all affected entities.	<u>Requestors</u> : 4FRI Stakeholders, USFS (SWERI), Scientific and Stakeholder community <u>Outcomes</u> : Best available science used to inform action
6.4 Translate and summarize scientific and journal articles for land managers and affected entities.	<u>Affected entities</u> : Land Managers, stakeholders <u>Outcomes</u> : Knowledge transfer and best available science used to inform action
6.5 Transfer science to non-federal entities using field trips, filling information requests, and making presentations.	<u>Affected entities</u> : Stakeholders, general public <u>Outcomes</u> : Knowledge to inform action
6.6 Educate the general public.	<u>Affected entities</u> : General public <u>Outcomes</u> : Raise awareness and support for restoration

Deliverables

6.1) Provide support to federal land managers with treatment planning and implementation.

- a) Deliverable: Report on actions to support project assessments, data collection, treatment design, and use of best available science by federal land managers to achieve desired conditions and outcomes.
 - i. A combination of 10 total services based on previous and anticipated demand that may include: workshops, technical assistance, science support, field trips, and presentations.
 - ii. Deliver webinars in partnership with the Southwest Fire Science Consortium and National Forest Foundation to present emerging science to land managers and practitioners.
 - iii. Two Rapid Assessments (RAPs) are presently planned to support landscape restoration projects at the forest level.

1. Apache-Sitgreaves NF: Black Forest River Restoration Project.
2. Tonto NF: All conifer types.

6.2) Assist with forest planning and implementation by recommending best available science and program support. Science and timing of support are variable for each national forest based on its individual planning schedule.

- a) Deliverable: Report on actions to support forest plan revisions on the Tonto and Carson national forests.

6.3) Provide website support for ERI, SWERI, 4FRI (see Project 5 for support to the Arizona Prescribed Fire Council).

- a) Deliverable: Report on technical support for ERI, SWERI, and 4FRI websites.

6.4) Translate biophysical and social-political-economic information for affected entities.

- a) Deliverable: Editorial support for a total of three (3) white papers and or working papers
 - i. White paper compiling lessons learned on implementation or other restoration topics from the 2016 National Restoration Workshop
 - ii. Two (2) working papers in cooperation with the Southwest Fire Science Consortium
- b) Deliverable: Eight (8) fact sheets that translate and summarize scientific papers and journal articles.

6.5) Initiate and facilitate knowledge services and science support for non-federal entities through field trips, filling information requests, and presentations for affected entities.

These numbers may vary based on demand.

- a) Deliverable: Report on actions to educate and support affected entities. Provide a minimum of 10 services that may include field trips, presentations, and information requests.

6.6) Use media to educate the general public.

- a) Deliverable: Two (2) newspaper articles in response to fire events to educate the general public about the need for forest restoration to restore frequent-fire forests.

Project 7: Duty 5 under the ACT — Provide Annual Progress Reports

The legislation establishing the Institutes requires an annual progress report.

Deliverable

7.1) Complete annual progress report on June 30, 2016 and June 30, 2017.

FY16 Budget \$1,200,000

	Project 1: Science Support for Collaborative Restoration and Conservation from the Local to the Landscape Scale	Project 2: Information Analysis to Assist Evidence-Based Conservation	Project 3: Ecological Monitoring and Evaluation for Adaptive Management	Project 4: Understanding and Solving the Economic, Social and Political Issues and Opportunities of Ecological Restoration	Project 5: State, Tribal and Private Forestry – The All-Lands Approach	Project 6: Services to the Intermountain West	Total
Personnel:	\$ 165,457	\$ 69,606	\$ 419,465	\$ 42,060	\$ 80,647	\$ 243,429	\$ 1,020,664
Travel:	\$ 1,040	\$ -	\$ 14,763	\$ 1,141	\$ 403	\$ 10,231	\$ 27,578
Operations & Supplies:	\$ 3,309	\$ 348	\$ 23,368	\$ 1,429	\$ 806	\$ 9,407	\$ 38,667
Outside Services:	\$ -	\$ -	\$ -	\$ 4,000	\$ -	\$ -	\$ 4,000
Total Direct Costs:	\$ 169,806	\$ 69,954	\$ 457,596	\$ 48,630	\$ 81,856	\$ 263,067	\$ 1,090,909
Indirects:	\$ 16,981	\$ 6,995	\$ 45,760	\$ 4,863	\$ 8,185	\$ 26,307	\$ 109,091
Total Requested:	\$ 186,787	\$ 76,949	\$ 503,356	\$ 53,493	\$ 90,041	\$ 289,374	\$ 1,200,000

Supplemental Requests FY16 (Details in Appendix)

Total: \$ 1,752,500

Related Project (details in appendix)	Estimated Cost
Project 2: Information Analysis to Assist Evidence-Based Conservation	\$ 165,000
Project 3: Ecological Monitoring and Evaluation for Adaptive Mgmt	\$ 828,500
Project 4: Understanding and Solving the Economic, Social and Political Issues and Opportunities of Ecological Restoration	\$ 165,000
Project 5: State, Tribal and Private Forestry – The All-Lands Approach	\$ 434,500
Project 6: Services to the Intermountain West	\$ 159,500

APPENDIX A

The following list of projects will be completed subject to additional funding. These projects are organized under the project number from the annual work plan that is consistent with the proposed activity.

Project 2: Information Analysis to Assist Evidence-Based Conservation

2.1) Literature or Systematic Review of effects of resource benefit wildfire on forest structure and landscape patterns. (75,000)

- a.) **Deliverable:** Completed review and draft manuscript or technical report.

Project 3: Ecological Monitoring and Evaluation for Adaptive Management

3.1) Implementation of the broader-scale monitoring strategy developed in cooperation with Regions 2 and 3 and the Washington Office. (Amy, 0.4 FTE; Bryce 0.3 FTE; Tzeidle or Landscape Ecologist 0.6 FTE each year for two years. CFRI support: Courtney Schultz, 1 month; Research Associate 3 months each year for 2 years) (\$295,000).

- a) Deliverable: Description of actions to implement the broader scale monitoring strategy on a pilot project area across 2-4 forests.

3.2) Long-term stand dynamics following operational restoration treatments implemented across a ponderosa pine landscape. This project will endeavor to re-measure the Ecosystem Monitoring (EM) plot grid (excluding Wilderness) in Grand Canyon-Parashant National Monument. **Cost: 8 summer technicians, 3 analysts (0.3 FTE) (\$165,000).**

- a) Deliverable: Manuscript prepared for publication.
i. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.3) Population dynamics of an important endemic plant: Re-measurement of long-term *Penstemon clutei* plots in Coconino National Forest and Sunset Crater National Monument. In this project, long-term *P. clutei* plots will be relocated and remeasured to describe population dynamics on various forest microsites. **Cost: 2 summer technicians, 2 analysts (0.2 FTE) (\$55,000).**

- a) Deliverable: Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.4) Fire history in ponderosa pine – chaparral ecosystems. This project will reconstruct fire history of ponderosa pine forests with shrub understories on the Prescott National Forest. **Cost: 2 analysts (0.2 FTE) (\$33,000).**

- a) Deliverable: Manuscript prepared for publication.
i. Presentation for USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.5) Analyze red squirrel presence and species occupancy in FWPP and areas surrounding Flagstaff, AZ. Cost: 3 summer technicians, 2 analysts (0.3 FTE) (\$82,500).

- a) Deliverable: Manuscript prepared for publication.
i. Presentation for AZGF staff, USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.6) Evaluate wildlife habitat connectivity of pronghorn and Abert's squirrels. Cost: 3 analysts (0.3 FTE) (\$88,000).

- a) Deliverable: Manuscript prepared for publication.
 - i. Presentation for AZGF staff, USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

3.7) Analyze small and mid-size carnivores (fox, bobcat, coyote) on the North Kaibab and/or managed wildfire landscapes. Cost: 6 summer technicians, 4 analysts (0.2 FTE) (\$110,000).

- a) Deliverable: Manuscript prepared for publication.
 - i. Presentation for AZGF staff, NAU, USFS leadership and staff, collaborative stakeholder groups, and/or professional conference.

Project 4: Understanding and Solving the Economic, Social and Political Issues and Opportunities of Ecological Restoration

4.1) Experts workshop designed to identify policy barriers and solutions to achieving science-based ecological restoration (\$165,000).

- a.) Deliverable: Expert's workshop and recommendations.

Project 5: State, Tribal and Private Forestry – The All-Lands Approach

5.1) Technical assistance to Tribes with particular focus on Tribes adjacent to the 4FRI landscape (2-year budget: \$242,000).

- a.) Deliverable: Report on services provided.

5.2) Participation and leadership in the Arizona Restoration Partnership. (\$192,500/year)

- a.) Deliverable: Report on services provided.

Project 6: Services to the Intermountain West

6.1) Development of a Rapid Assessment handbook for land managers (\$82,500)

- a.) Handbook.

6.2) Website evaluation and redesign based on affected entity input (\$77,000)

- a.) Assessment report and web redesign.

Notes regarding the post development team:

From the Narrative: 2.1 FY 2016 we propose to examine the effects of resource benefit wildfires on forest structure (tree density, size distribution, species composition) and landscape patterns. The opportunity to use wildland fires managed for resource benefit is receiving a lot of attention as a way to accomplish restoration on more acres with greater efficiency. However, how well these fires perform to restore desired conditions is not well analyzed. This project will analyze available literature to determine how well managed wildland fire is approaching management objectives under different environmental and fire behavior conditions. Should additional funds become available (Appendix A, Project 2) we will analyze the weight of evidence describing fire regimes in ponderosa pine dominated forests in the West.