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**ECOLOGICAL RESTORATION INSTITUTE**  
**PROP 301 FY'2007**  
**Final Report**

**I. Introduction**

Since voters passed Proposition 301 in 2000, Arizona has invested significant public resources to improve our competitive position in the global marketplace. The majority of these investments focus on supporting discoveries in high tech fields, bio-medical applications and e-learning—all viewed as building blocks for the new economy. However, all the documents that outline recommendations on “how to compete” recognize that a highly skilled workforce is the creative engine for advancement. These workers are mobile and consciously choose places that offer a high quality of life that includes scenic beauty, a desirable climate and recreational opportunities. According to “Prosperity in the 21<sup>st</sup> Century West” by the Sonoran Institute, “The West’s competitive advantage in the global marketplace is its unique landscape and quality of life.” In other words, when all things are equal, it is the aesthetic and physical quality of a place that will be the deciding factor for where people will chose to live.

The ecological goods and services produced by the pine forests of Arizona are economically valuable and critical to the quality of life and well being of Arizona citizens. These forests provide a permanent home to many people and a cool summer respite for urban dwellers. The pine forests are the source of surface and ground water for Phoenix and other communities. Recreation and tourist dollars are the single largest contribution to the rural economies of northern Arizona. In addition, these forests provide critical wildlife habitat and sequester carbon—two ecosystem services that are difficult to quantify yet are unique and valued by the citizenry.

Unfortunately, Arizona’s forests are threatened by unnatural catastrophic fire, drought, bark beetles and disease. These threats exist because the carrying capacity of the forest is compromised by a century of man induced changes. The single largest problem is the over-stocking of the forest by small trees. These trees are the fuel for unnatural fire and create harmful competition for the water and nutrients required to maintain healthy trees. This competition weakens old, large trees and compromises their ability to resist diseases and insects.

On May 29<sup>th</sup>, 2007 the human ignited “Vincent Fire” began on the Apache-Sitgreaves National Forest just to the southwest of a newly developed private second home and tourist development. The fire ignited in heavy fuels and developed into areas of torching and crown fire. According to the incident report prepared by the Forest Service, “The fire [eventually] burned into thinned areas along its northern boundary. This greatly reduced the speed and intensity of the fire and aided in the fire suppression

efforts. No evacuations [were] issued and no structures were lost. **The thinned area, where suppression efforts were able to get a strategic advantage, used a treatment developed in consultation with the Ecological Restoration Institute.**

The ERI strives to provide assistance and the best available biophysical and social science to the land managers, practitioners and stakeholders who influence the design and implementation of forest restoration and hazardous fuel reduction treatments. The ERI merges science and outreach to provide relevant, practical answers to contemporary land management challenges. Among the many accomplishments in FY 2007 is the critical support we provided to completion of the “Statewide Strategy to Restore Arizona’s Forest”. This visionary document creates the logic and identifies the actions needed to restore Arizona’s forests over 20 years. It is an example of the quality service and relevant science we provide to the state of Arizona.

The accomplishments enumerated in this report represent leveraged federal, state and Prop 301 2006-2007 dollars. Proposition 301 dollars contributed to the completion of these projects by funding the faculty and staff who conduct research, develop and teach classes and continuing education programs, mentor students, and work with communities and other collaborators.

The ERI is grateful to the University and Arizona taxpayers for the continued funding provided by Prop 301.

## II. Report on Deliverables

	<b>ERI Commitment FY 07</b>	<b>Accomplished as of 12/31/06</b>
1. Return on Investment		
Leveraged Federal and State Funds	\$2.7 million	\$1,926,490
Leveraged Industrial Dollars		
Leveraged Other Dollars		\$352,000
Other Qualitative Returns (including Presentations and publications)	20 publications 30 presentations	29 publications 40 presentations
Losses to AZ Economy Averted		\$5,698,799
2. Tech. Transfer		
Patent Applications		
Spin-Off Companies Generated		
Products Generated that are in Marketplace		
Sponsored conferences and workshops workshops	4 workshops	3
Business Expansions		
<p>The Ecological Restoration Institute continues to play an active role providing information to businesses and policy-makers that can lead to the location of small wood utilization and biomass businesses in northern Arizona. Our most recent efforts include leadership and participation in a rigorous effort to characterize the commercially available small wood supply across the Mogollon Rim. By creating reliable numbers that are collaboratively developed we hope to contribute to a foundation of information for business planning while simultaneously supporting the land management and environmental communities in efforts to identify what is ecologically sustainable to harvest and therefore appropriate.</p>		
3. Companies Identifying the University as reason for relocating to Arizona		
4. Work Force Contributions		
Graduate Students in Pipeline or Graduated	4 students	<b>9 students</b>
Post-Doctoral Students in Pipeline or Graduated	N/A	N/A
High-end Baccalaureates or Graduate Degrees	10 students	<b>14 students</b>

produced in specific disciplines

Transition to Professional Employment	6 students	<b>8 students</b>
Transition to Graduate Degree Programs	1 student	<b>4 students</b>
Undergraduate Internships	3 students	<b>6 students</b>
Certificates granted	N/A	N/A
New K-12 teachers in science and mathematics	N/A	N/A
Undergraduate students in the pipeline	30 students	<b>38 students</b>
Continuing Education Professionals	55 students	<b>40 students</b>

#### 5. Specific Curriculum Innovations for Access and Workforce

New programs – full time students

New courses - full time students

Revised programs and courses	1	<b>2</b>
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New programs – practicing professionals		<b>2</b>
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#### 6. Specific Collaborations

Community College	1	<b>1</b>
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Tri-University

Industry/Private Sector - University	10	<b>12</b>
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Community-Based (including tribal)	41	<b>43</b>
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Regional, national, international	45	<b>46</b>
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### III. DETAILED DOCUMENTATION<sup>1</sup>

#### 1. Return on Investment

##### Leveraged Federal and State Funds

- *\$1.75M from Congress in FY'07 through the USDA Forest Service*
- *\$127,660 from the BLM Joint Fire Sciences Program. "Modeling Forest Change & Management Alternatives on a Restored Landscape"*
- *\$25,000 additional funding for Technical Assistance to Wahoo Watershed Workgroup (WWW), Sierra Soil & Water Conservation District & the Black Range Ranger District of the Gila National Forest.*
- *\$23,830 grant from University of Nevada, Las Vegas. "Conserving Rare Plants in NV and AZ"*

##### Leveraged Other Dollars

- *\$352,000 from the National Science Foundation. "Interaction of Fire, Climate, and Forest Structure in Northern Mexico". Note: this is the first two year allotment of a total installment of \$703,000 over a four year grant.*

##### Losses Averted

- The work of the ERI directly contributes to the avoidance of catastrophic wildfire. Full cost accounting of the Rodeo-Chediski fire totaled over \$400 million dollars. This includes the cost of suppression, rehabilitation of burned lands, lost timber revenues, lost property tax revenues and many more variables. Unaccounted for was the social disruption and pain created by a disaster of this magnitude. Mental health professionals reported increases in domestic violence, depression and other problems resulting from the fire.

In the December 2006 edition of the Journal of Forestry a study funded by the Ecological Restoration Institute and prepared by members of the faculty of the School of Forestry demonstrated the economic value of avoiding fire through restoration treatments. Their research showed that using these very conservative economic values, avoided future costs justify spending \$238–\$601/acre for hazard reduction treatments in the southwest. The figure represented in this report is an extremely conservative estimate of the value of restoration to the state of Arizona.

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More information on each activity can be obtained from the principal ERI contact person listed.

**Publications (sorted by Last Name)**

- Abella, S.R., P.Z. Fulé, and W.W. Covington. 2006. Diameter caps for thinning southwestern ponderosa pine forests: viewpoints, effects, and tradeoffs. *Journal of Forestry*. 104(8):407-414.
- Bakker, J.D., M.M. Moore, and W.W. Covington. 2006. Long-term vegetation studies in the Southwest. Pp. 187-195 in *Long-term silvicultural & ecological studies: results for science and management*. L.C. Irland, A.E. Camp, J.C. Brissette, and Z.R. Donohew (editors). Global Institute for Sustainable Forestry, School of Forestry and Environmental Studies, Yale University, New Haven, CT. GISF Research Paper 005.
- Bakker, J.D. and M.M. Moore. 2007. In press. Controls on vegetation structure in southwestern ponderosa pine forests, 1941 and 2004. *Ecology*.
- Bell, D.M., P.F. Parysow, and M.M. Moore. In review. Assessing the representativeness of the oldest set of permanent inventory plots in Northern Arizona ponderosa pine forests. *Restoration Ecology*.
- Berlin, L.G., and J.E. Crouse. In press. Prehistoric agricultural assessment of the Highway 89 project area using multirate aerial photographs. In: M.D. Elson (ed.), *Sunset Crater Archaeology: The History of a Volcanic Landscape*. Chapter 5, *Anthropological Papers No. 33*. Tucson: Center for Desert Archaeology.
- Binkley, D., M. M. Moore, W. H. Romme, and P. Brown. 2006. Was Aldo Leopold Right about the Kaibab Deer Herd? *Ecosystems* 9:227-241.
- Daly, C., C. Moseley, M. Enzer, and A. Moot. 2006. "Forest Service Contracting: a basic guide for restoration practitioners." Published in collaboration with the University of Oregon Ecosystem Workforce Program, Sustainable Northwest, and the Flathead Economic Policy Center. *The Ecological Restoration Institute White Paper*. Flagstaff, AZ.
- Dodge, R.S., P.Z. Fulé, and C.H. Sieg. In review. Dalmatian toadflax (*Linaria dalmatica*) response to wildfire in a southwestern forest. *Ecoscience*.
- Fulé, P.Z., J.P. Roccaforte, and W.W. Covington. In review. Post-treatment mortality affects forest structure after ecological restoration treatments, Mt. Trumbull, Arizona, USA. *Environmental Management*.
- Fulé, P.Z. and D.C. Laughlin. 2007. Wildland fire effects on forest structure over an elevational gradient, Grand Canyon National Park, USA. *Journal of Applied Ecology*. 44: 136-146.
- Fule, P.Z, C. Denton, J.D. Springer, E.L. Kalies, & D. Egan. 2007. "Prescribed and Wildland Use Fires in the Southwest: Do Frequency and Timing Matter?" *Ecological Restoration Institute Working Papers in Southwestern Ponderosa Pine Forest Restoration #18*. Flagstaff, Arizona
- Huffman, D.W. 2006. Production, losses, and germination of *Ceanothus fendleri* seeds in an Arizona ponderosa pine forest. *Western North American Naturalist* 66:365-373.

- Huffman, D.W., P.Z. Fulé, K.M. Pearson, and J.E. Crouse. In Review. *Fire history and structural patterns of pinyon-juniper woodlands in Arizona and New Mexico. Canadian Journal of Forest Research.*
- Huffman, D.W., M.T. Stoddard, P.Z. Fulé, W.W. Covington, and H.B. Smith. In review. *A demonstration project to test ecological restoration of a pinyon-juniper ecosystem. Proceedings of the Joint Meeting of the Southwest and Intermountain Chapters of the Society of American Foresters, St George, UT.*
- Huffman, D.W. Critical review of "Pinyon-Juniper". Chapter 12 In: *"Historical Range of Variability for Natural Vegetation Types of the Southwest: Southwest Forest Assessment Project". Provided to The Nature Conservancy, Arizona Chapter, Tucson. April 17, 2007.*
- Huffman, D. Contributed interpretive segment related to historical fire regimes of mixed conifer forests for *Fire Wise DVD*, distributed by University of Arizona. August 2006.
- Laughlin, D. and P. Fulé. 2006. *Meeting forest ecosystem objectives with wildland fire use. Fire Management Today 66(4):21-24.*
- Laughlin, D.C., J.D. Bakker, M.L. Daniels, M.M. Moore, C.A. Casey, and J.D. Springer. In review. *Restoring plant species diversity and community composition in a ponderosa pine-bunchgrass ecosystem. Plant Ecology.*
- Laughlin, D.C. and P.Z. Fulé. In review. *Wildland fire effects on understory plant communities in fire-prone forests. Canadian Journal of Forest Research.*
- Lowe, K. 2006. "Snags and forest restoration" *The Ecological Restoration Institute Working Papers in Southwestern Ponderosa Pine Forest Restoration #16. Flagstaff, AZ.*
- Miller, J.D. and A.E. Thode. 2006. *Quantifying burn severity in a heterogeneous landscape with a relative version of the delta Normalized Burn Ratio (dNBR). Remote Sensing of Environment. (2007)., doi:10.1016/j.rse.2006.12.006.*
- Minard, A. with C. Peterson, D. Vosick and D. Egan. 2006. *Backyard wildlife habitat and fire safety: A guide for residents of Flagstaff. Ecological Restoration Institute Occasional Paper. Flagstaff, AZ.*
- Minard, A. In press. *"Bat habitat and forest restoration treatments." Ecological Restoration Institute Working Papers in Southwestern Ponderosa Pine Forest Restoration #17. Flagstaff, AZ.*
- Ostergren, D. 2006. *"Wilderness management and the restoration of fire: An analysis of laws and regulations in northern Arizona." The Ecological Restoration Institute White Paper. Flagstaff, AZ.*
- Rudebusch, F., J. D. Bakker, and M. M. Moore. In review. *Scale-Dependent Effects of Long-Term Livestock Grazing and Habitat on Understory Vegetation in Southwestern Ponderosa Pine Forests. Western North American Naturalist.*
- Rudeen, A. 2006. *"Communications between Forest Managers and property owners in Pine Flats: a case study of community interactions in a high fire hazard area." ERI Issues in Forest Restoration. The Ecological Restoration Institute White Paper. Flagstaff, AZ.*

- Sánchez Meador, A.J., M.M. Moore, J.D. Bakker, and P.F. Parysow. In review. Short- and long-term effects of selective harvesting on spatial pattern and stand development in a ponderosa pine forest. Journal of Vegetation Science.*
- Springer, J., M. Nazaire. Completed final species descriptions on 130 species and have completed 15 plant keys for Plants of Northern Arizona field guide. Worked on final edits of field guide. From January 15 through February 14. Final editing should be done by May 15, 2007.*
- Strom, B.A. and P.Z. Fulé. In press. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. International Journal of Wildland Fire.*

**Presentations and Service (sorted by date of event)**

- Abrams, J., Sisk, T., Hampton, H. White Mountains Landscape Assessment follow-up stakeholder workshop (ERI co-chaired with ForestERA). Show Low, AZ. July 31, 2006. 24 participants.*
- Covington, W.W. "Southwestern Forest Restoration Information Management and Technology Coordination Meeting." Final Report. Albuquerque, NM. August 11, 2006.*
- Long, R. "Creating an Effective Resume." Lecture given to NAU School of Forestry juniors. Flagstaff, AZ. September 8, 2006. 17 attendees.*
- Long, R. "References and Cover Letters." Lecture given to NAU School of Forestry juniors. Flagstaff, AZ. September 13, 2006. 17 attendees.*
- Long, R. "Successful Interview Techniques." Lecture given to NAU School of Forestry juniors. Flagstaff, AZ. September 26, 2006. 17 attendees.*
- Long, R. Coordinated mock interview session for NAU School of Forestry juniors with 10 local employers, 7 of whom are School of Forestry alumni, Flagstaff, AZ. September 27, 2006. 19 attendees.*
- Fulé, P.Z. and D.C. Laughlin. "Wildland fire use effects on forest structure over an elevational gradient, Grand Canyon National Park." 33rd Annual Natural Areas Conference, Flagstaff, AZ. September 21, 2006. 38 attendees.*
- Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Poster Presentation. "Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments at Mt Trumbull, Arizona." 33rd Annual Natural Areas Conference, Flagstaff, AZ. September 21, 2006. 40 attendees.*
- Denton, C. and D. Lund. "Goshawk Workshop" for Forest Service Arizona, Flagstaff, AZ. October 5, 2006. 80 attendees.*
- Covington, W.W. "Forest Health and Wildfire." Presentation for six CEO's from Phoenix Corporations. Gus Pearson, AZ. October 6, 2006. 6 attendees.*
- Smith, H.B. "Forest Restoration" for Forest Resources Association. Field Trip. Flagstaff, AZ. October 19, 2006. 25 participants.*
- Smith, H.B. "Fire & Ecosystem Restoration in SW USA". Swedish Forestry Practitioners. Field Trip. Flagstaff, AZ. October 22, 2006. 8 participants.*
- Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Poster Presentation. "Monitoring treatment implementation and effectiveness of a landscape-scale ponderosa pine*

- restoration project." *Conserving and Restoring Frequent Fire Landscapes of the West: Linking Science, Collaboration and Practice*, 2006 National Conference. Flagstaff, AZ. October 24-26, 2006. 200 attendees.
- Kalies, E.L. and C.L. Chambers. "A review of the impacts of ecological restoration of southwestern ponderosa pines forests on wildlife diversity." *Ecological Restoration Institute's Conserving and Restoring Frequent Fire Landscapes in the West: Linking Science, Collaboration, and Practice*, October 24-26, 2006, Flagstaff, Arizona. 140 attendees.
- Moore, M. M., J. D. Bakker, A.J. Sánchez Meador, W. W. Covington, S. D. Olberding, and C. E. Edminster. "Long-term vegetation research in the Southwest: past, present, future." Oral presentation (invited speaker) at the Long-term Research Session, Society of American Foresters National Convention, Pittsburgh, PA. October 25-29, 2006.
- Abrams, J. 2006. *Collaboration, Forestry, and Democracy*. Presentation to ENV181 (Environmental Challenges), Northern Arizona University, Flagstaff, AZ. Nov. 3, 2006. 40 attendees.
- Pregitzer, C. "Soils as Agents of Selection." Annual Cottonwood Symposium. Flagstaff, AZ. November 3, 2006. 50 attendees.
- Roccaforte, J.P., P.Z. Fulé, and W.W. Covington. Poster Presentation. "Landscape-scale changes in canopy fuels and potential fire behavior following ponderosa pine restoration treatments." 3rd International Fire Ecology & Management Congress, San Diego, CA. November 13-17, 2006. 1000 attendees.
- Bakker, J. D., M. M. Moore, and A. J. Sánchez Meador. 2006. "Land-use legacies in southwestern ponderosa pine forests: Effects of historical livestock grazing." Oral presentation at the 3rd International Fire Ecology & Management Congress, San Diego, CA. November 13-17 2006.
- Sánchez Meador, A.J., M.M. Moore, and J.D. Bakker. "Land use legacies in southwestern ponderosa pine forests: effects of historical harvesting practices." Invited presentation in "Do past management activities compound the effects of fire exclusion in western forests?" Special Session, International Fire Ecology and Management Congress, November 14, 2006, San Diego, CA. 100 participants.
- Springer, J. and T. Dekker. "Conserving Rare Plants in Nevada and Arizona: A Survey of Monitoring and Management Activities on Public Lands." Talk given to the Southwestern Task force on Rare Plants. Northern Arizona University, Flagstaff, AZ. December 7, 2006. 30 participants.
- Yazzie, V. *Statewide Strategy Landscape Assessment Completion for the Navajo and Hopi Reservations*. Solidified the GIS maps needed in the Statewide Strategy Communicated and developed a strong working relationship for the Statewide Strategy, agreement to participate from both tribes. Initiated the idea for possible collaboration between Hopi and Navajo Tribes to development a CWPP for the pinyon-pine ecosystem Contacted BOFRP to help in develop this CWPP using the Integrated Resource Management Planning protocol within the Bureau of Indian Affairs. January, 2007

- Abrams, J.B. 2007. "Southwestern Mixed Conifer: Changes Since Euro-American Settlement." Presentation to Pinaleno Partnership, Safford, AZ. January 9, 2007. 20 participants.
- Abrams, J.B. Presentation: "Historic and Modern Mixed Conifer Forests of the Southwest". Pinalenos partnership. Safford, AZ. January 9, 2007. 20 participants.
- Vosick, D. Co-chaired joint meetings of the Governor's Forest Health Oversight Council on Thursday, January 11, 2007. Phoenix, AZ. 20 attendees.
- Covington, W. W. "Forest, Fire and Water: It matters what we do." Oral presentation to the Arizona House Committee on Water and Agriculture. January 18, 2007. 40 attendees.
- Yazzie, V. Midwest Regional Annual Forest and Fire Meeting. "Cooperation between Agencies and the Tribes in Forest Management." Grand Portage, MN. January 21-27, 2007. 85 attendees.
- Yazzie, V. Midwest Regional Annual Forest and Fire Meeting. "The Importance of Forest Management Planning: Walking the Talk." Grand Portage, MN. January 21-27, 2007. 85 attendees.
- Springer, J., S. Nyoka. Met with Barb Phillips and Debra Crisp of the Coconino NF on January 26, 2007 to discuss rare plant research possibilities. Flagstaff, AZ.
- Robinson, G. "Sustainable living." Willow Bend Environmental Education Center, Flagstaff, AZ. January 26, 2007. 25 attendees.
- Covington, W. Vosick, D., Bullington, C. Healthy Forest Day, sponsored by the Governor's Forest Health Council. Event for Arizona Legislators and staff to learn how Arizonans are working together to restore forest health and reduce the threat of wildfire to our communities. Phoenix, Arizona. February 6, 2007.
- Covington, W. Healthy Forest Day Media Event (Channel 12), February 6, 2007.
- Kalies, E.L. 2007. An occupancy modeling approach to small mammal community-level responses to forest management in southwestern ponderosa pine forests. The Wildlife Society's Arizona and New Mexico Joint Annual Meeting, Albuquerque, New Mexico. February 6-8, 2007. 300 attendees.
- Vosick, D. Co-Chair for Governor's Forest Health Council. February 7, 2007.
- Vosick, D. Region 3 of the Forest Service: Chief's Review. Presentation on the work of the Arizona Forest Health councils and the Statewide Forest Restoration Strategy. February 27, 2007. Payson, AZ. 35 participants, including Mayor of Payson and community members.
- Vosick, D. Co-chaired joint meetings of the Forest Health Council on Thursday, March 1, 2007. Phoenix, AZ. 20 attendees.
- Yazzie, V. University of Wisconsin, American Indian Studies Program and the College of Forest Ecology and Management. "Integrating a Cultural Ethic in Tribal Forest Management: The Human Dimension of Silviculture." Madison, WI. March 6, 2007. 35 attendees.
- Huffman, D.W. "Reference conditions for a pinyon-juniper woodland of northern Arizona". Oral presentation given at the Southwest Chapter of the Society of American Foresters Meeting, April 13, 2007. Tusayan, AZ. 40 attendees.

*Huffman, D.W. "Fire history in pinyon-juniper ecosystems of the Southwest". Oral presentation given to Bureau of Land Management, Grand Staircase-Escalante National Monument staff. April 18, 2007. Kanab, UT. 20 attendees.*

*Abrams, J. "Preliminary Results of a Study on the White Mountains Landscape Assessment." Presentation to White Mountain Stewardship Contract Multiparty Monitoring Board. Pinetop, AZ. May 22, 2007. 14 participants.*

## 2. Tech. Transfer

Patent Applications

Spin-Off Companies Generated

Products Generated that are in Marketplace

Sponsored Conferences and Workshops

- *Abrams, J., Sisk, T., Hampton, H. White Mountains Landscape Assessment follow-up stakeholder workshop (ERI co-chaired with ForestERA). Show Low, AZ. July 31, 2006. 24 participants.*
- *Denton, C. and D. Lund. "Goshawk Workshop" for Forest Service Arizona, Flagstaff, AZ. October 5, 2006. 80 attendees.*
- *ERI and partner organizations. 2006 National Conference, Flagstaff, AZ. October 24-26, 2006*

Business Expansions- N/A

## 3. Companies identifying the University as reason for relocating

## 4. Work Force Contributions

Graduate Students in Pipeline or Graduated

These students are supervised by faculty supported, in part, by 301 funds:

- Corrine Diggins (Fulé)
- Liz Kailies (Covington)
- Amanda Kuenzi (Fulé)
- Valerie Kurth (Fulé)
- Daniel Laughlin (Moore)
- Chris McGlone (Fulé)
- Cory Miller (Covington)
- Andrew Sanchez Meador (Moore)
- Kenneth Stella (Fulé)

High-end Baccalaureates or Graduate Degrees awarded in specific disciplines

- *Laura Ball, Nursing*
- *Francis Eaton, Forestry*
- *Danielle Gift, Forestry*
- *Christopher Gonzales, Forestry*
- *Amanda Kuenzi, Forestry*
- *Jon Lamb, Forestry*
- *Jeffrey Muehlbauer, Biology/Chemistry*
- *Cory Miller, Forestry*
- *Ryan Nosek, Anthropology*

- *Clara Pregitzer, Forestry*
- *Andrew Sanchez Meador, Forest Science*
- *Theresa Smalley, Forestry*
- *Jennifer Tsonis, Forestry*
- *Sonja Wilson, French*

#### Transition to Professional Employment

- *Ball, L. 2007. Hired as a nurse for Flagstaff Medical Center.*
- *Gonzales, C. 2007. Hired as a summer seasonal Forestry Technician (Timber Sale Preparation) for the USDA Forest Service, Mormon Lake District in Flagstaff, AZ.*
- *Lamb, J. Hired as a Fuels Specialist for the Beckworth Ranger District on the Plumas National Forest in Blairsden, CA.*
- *Nosek, R. Hired as seasonal forestry aid on the fire crew of the Tusayan Ranger District with Kaibab National Forest.*
- *Peterson, C. 2006. Selected for a student teaching position teaching Physics at a Department of Defense high school on a base in Naples, Italy.*
- *Smalley, T. Hired as a Forester with the Marianville Ranger District on the Allegheny National Forest, Marianville, PA.*
- *Tsonis, J. Environmental Educator with Jr. Forester Academy (Seasonal position). NAU Centennial Forest.*
- *Wilson, S., Hired as trail crew member Peaks Ranger District, Coconino National Forest*

#### Transition to Graduate Degree Programs

- *Eaton, F. Accepted as a Master of Science student in Forestry by the Department of Forestry and Environmental Studies at Yale University, New Haven, CT.*
- *Gift, D. Accepted as a Master of Science student in Forestry by the Department of Forestry, Virginia Tech, Blacksburg, VA.*
- *Muehlbauer, J. Accepted as a Master of Science and PhD student with the Department of Ecology at the University of North Carolina, Chapel Hill, NC.*
- *Pregitzer, C. Accepted as a Master of Science student in Ecology by the Department of Ecology and Evolutionary Biology at the University of Tennessee, Knoxville, TN.*

#### Undergraduate Internships

- *de la Faye, M. Selected for an animal caretaker internship at the Zooparc of Saint-Jean Cap-ferrat in France.*
- *Lofgren, S. Hired as a seasonal Fuels Management Crew Member with the City of Flagstaff Fuels Management Program, Flagstaff, AZ.*
- *Robertson, M. Hired as an Environmental Permitting intern with El Paso Electric Corporation, Houston, TX.*
- *Robinson, G. Environmental Educator Intern at Willow Bend Environmental Education Center, Flagstaff, AZ Fall 2006.*

- *Sorensen, C. Hired as a Forestry Intern with the Oregon Department of Forestry, Coos Bay, OR.*
- *Steffen, N. Hired as a Forestry Intern with the Oregon Department of Forestry, Tillamook, OR.*

Certificates Granted – N/A

New K-12 Teachers in Science and Mathematics – N/A

## Undergraduate students in the pipeline

### *Funded Undergraduate Research Experience During Undergraduate Enrollment*

<b>Students</b>	<b>Major</b>
Ball, Laura	NUR
Becenti, Yolanda	ENV SCI
Bedford, Ashton	ENV SCI
Bennett, Lydia	ANTHRO
Bickford, Isaac	FOR
de la Faye, Marie	BIO
Dickson, Rachael	FOR
Eaton, Francis	FOR
Garcia, Michael	PARKS & REC MGMT
Gift, Danielle	FOR
Gonzales, Christopher	FOR
Hartman, Jenny	IAFF - Honors
Hyp, Ian	UND
Irby, Christen	ENV SCI
Johnson, Ian	BIO
Lamb, Jon	FOR
Leppert, Justy	UND
Lofgren, Skyler	PARS & REC MGMT
Lyons, Austin	BIO - Honors
Machula, Charles	FORESTRY
Mackinnon, Kat	UND
Motichek, James	UND
Mousavi, Kamran	UND
Muehlbauer, Jeffrey	BIO/CHM - Honors
Muehlhausen, Ryan	BIO
Nietupski, Ryan	BIO
Nosek, Ryan	CU ANT
Peterson, Pamela	UND
Pregitzer, Clara	FOR
Robertson, Megan	UND
Robinson, Gina	ENV SCI
Rudebusch, Faith	ENV SCI-Honors
Smalley, Theresa	FOR
Sorensen, Chris	FOR
Steffen, Niki	FOR
Tsonis, Jennifer	FOR
Tymrak, Kaitlin	ENV ENG - Honors
Wilson, Sonja	UND

Notes: The students supported by the ERI are very accomplished as demonstrated by the following:

- *Six of our 14 graduating students graduated with honors:*

- Francis Eaton, *Summa Cum Laude*
  - Danielle Gift, *Summa Cum Laude*
  - Jon Lamb, *Cum Laude*
  - Jeff Muehlbauer, *Summa Cum Laude* (with a double major in Chemistry & Biology!)
  - Clara Pregitzer, *Cum Laude*
  - Jen Tsonis, *Magna Cum Laude*
- Bennett, L. Volunteered to serve as a peer mentor on a three day camping trip at Centennial Forest for new freshmen Native American students as part of NAU's Welcome Week activities. Flagstaff, AZ. August 2006.
  - Gift, D.M. Re-elected forester (president) of Xi Sigma Pi, the only national forestry honor society. Elected treasurer of NAU's Forestry Club. May 2006.
  - Hartman, J. Studying abroad at the Universidad de Rio Pedras in San Juan, Puerto Rico for academic year 2006-2007.
  - Mousavi, K. Featured in article "Deaf student's voice heard loud and clear" in the NAU Lumberjack Newspaper. Flagstaff, AZ. September 2, 2006.
  - Mousavi, K. Featured in article "Deaf forest worker speaks for the trees" in Arizona Daily Sun Flagstaff newspaper. Flagstaff, AZ. July 29, 2006.
  - Mousavi, K. Awarded the 2007 University ADA Committee Leadership Award for fostering a campus climate that values individuals with disabilities, NAU Diversity and Equity Awards dinner, Flagstaff, AZ. March 29, 2007.
  - Robinson, G. Featured in article "Students tackle greenhouse emissions from campus" in Inside NAU. March 29, 2007.
  - Sorensen, C. Traveled to Ghana for a 3 week overseas field experience course in Sustainable Forestry in Tropical Ecosystems. Ghana. July 29 - August 8, 2006.
  - Steffen, N. Traveled to Ghana for a 3 week overseas field experience course in Sustainable Forestry in Tropical Ecosystems. Ghana. July 29 - August 8, 2006.
  - Tymrak, K. Selected to study abroad at Jonkoping University's School of Engineering in Jonkoping, Sweden for the Spring 2007 semester.
  - Wilson, S. Represented the ERI at NAU's Undergraduate Showcase with a booth display of her research on Abert squirrels. Flagstaff, AZ. November 30, 2006.
  - ERI's student workers provide immeasurable assistance to our research staff including:
    - Read, checked, measured and entered age data for 544 San Juan cores
    - Read checked, measured and entered age data for 500 COC S5 cores
    - Read 1074 Will Bill cores for Hill plots; Read and checked approximately 250 COC S4B cores
    - Read and checked 150 Valles cores for Rapid assessment project
    - Measured ring widths for Gus Pearson Natural Area cores.

Continuing Education Professionals

40 people

- *Attendees at the Continuing Education for Ecosystem Management Course*

## 5. Specific Curriculum Innovations for Access and Workforce

New programs – full time students

- *None in this reporting period*

New courses - full time students

- *None in this reporting period*

Revised programs and courses

- *Huffman, D. and P. Fulé. Co-taught session on "Ecological Restoration" for International Seminar on Forest Administration and Management (ISFAM). Flagstaff, AZ. October 16, 2006. 22 participants.*
- *Fulé, P.Z., and D.W. Huffman. Field trip to Sinclair Wash restoration site, given as part of International Seminar on Forest Administration and Management (ISFAM) course. October 16, 2006. 22 participants.*

New programs – practicing professionals

- *Yazzie, V. Continuing Education for Ecosystem Management Course. "Integration and Cooperation between Agencies and Tribes in Natural Resource Management Planning." Flagstaff, AZ. February 6, 2007. 40 agency representatives from the USFS, BIA, BLM.*
- *Yazzie, V. Continuing Education for Ecosystem Management Course. "Understanding the Native American Perspective in Management Planning." Flagstaff, AZ. February 6, 2007. 40 agency representatives from the USFS, BIA, BLM.*

## 6. Specific Collaborations/Ongoing Partnerships

### **Community College**

- *Fulé, P.Z. Fire, Climate, and People in the Pine Forests of Northern Mexico. Prescott College Fall 2006 Environmental Sciences Colloquium Series, "From Fire Ecology to Global Warming: Hot Topics in the Environmental Sciences." Prescott, AZ. November 9, 2006.*

### **Tri-University**

- *None in this reporting period*

## **Industry/Private Sector – University**

### New in FY07

- *Centennial Forest Junior Forestry Academy (Long)*
- *Enviro-Systems Management, Inc. (Nyoka, Springer; Northern AZ Native Seed Association)*
- *Northern Arizona Forest Restoration Products (Vosick)*
- *Northern Arizona Wood Products Association (NAPA) (Vosick)*
- *Public Lands Institute and School of Life Sciences, University of Nevada Las Vegas (Laughlin)*
- *Renegy (Vosick)*

### Current and Established in Previous FY Funding

- *The Ecological Restoration Institute is actively involved with an effort by the Greater Flagstaff Economic Council and the Greater Flagstaff Forests Partnership to establish a private, integrated wood utilization campus at Camp Navajo. The ERI is key to marketing the opportunities presented by small wood utilization to the private sector*
- *Alternative Forestry Unlimited, Silver City, NM (Abrams)*
- *De La Sierra Lumber Recovery, Albuquerque, NM (Abrams)*
- *Gila Woodnet, Silver City, NM (Abrams)*
- *University of Arizona Cooperative Extension for Navajo County (Abrams)*
- *University of Nevada, Las Vegas, NV (Fulé)*
- *Flagstaff Native Plant and Seed, Flagstaff, AZ (Long)*

## **Community-Based (including tribal)**

### New in FY07

*Bar-T-Bar Ranch (Nyoka, Springer; Northern AZ Native Seed Association)*

*Kane Ranch (Nyoka, Springer; Northern AZ Native Seed Association)*

*EMS-Babbitt Ranches (Nyoka, Springer; Northern AZ Native Seed Association)*

*Hopi Tribe (Nyoka, Springer; Northern AZ Native Seed Association)*

### Current but Established in Previous FY Funding

*Aldo Leopoldo Environmental High School, Silver City, NM (Abrams)*

*Applegate Partnership (Covington)*

*Arizona-New Mexico Coalition of Counties (Vosick)*

*Arizona State Lands Department (Smith)*

*Arizona Sustainable Forests Partnership (Moote, Abrams)*

*Coconino Board of County Supervisors, (Smith)*

*Colorado State University, Colorado Forest Restoration Institute (Covington)*

*Ft. Lewis College, Durango, CO (Fulé)*

*Gila Tree Thinners (Abrams)*

*Governor's Forest Health Advisory Committee (Covington)*

*Governor's Forest Health Oversight Committee (Vosick)*

*Greater Flagstaff Forest Partnership (Smith, Denton, Moote, Viers)*  
*Greater Ruidoso Area Wildland Urban Interface Working Group (Denton et al)*  
*Healthy Forests-Happy Potters, Taos, NM (Abrams)*  
*Jemez Mountain Schools, Gallina, NM. (CFRP monitoring assistance)(Abrams)*  
*La Lama Neighborhood, Questa, NM (Abrams)*  
*Mescalero Apache (Denton)*  
*Natural Resources Working Group, White Mountains, AZ (Abrams, Denton)*  
*Navajo Nation (multiple collaborations) (Yazzie)*  
*Navajo Tribe (Covington)*  
*Northern Arizona Native Seed Association (Nyoka, Springer)*  
*Otero County Natural Resources Working Group (Denton et al)*  
*Ponderosa Fire Advisory Council (Smith)*  
*Prescott Area Wildland/Urban Interface Commission (Smith)*  
*Pueblo of Acoma, New Mexico. (CFRP monitoring assistance) (Abrams)*  
*Pueblo of Jemez, NM (Moote, Abrams)*  
*Pueblo of Sandia, NM (Abrams)*  
*Ramah Band of Navajos, Ramah, NM (Abrams)*  
*Rural Community Fuels Management (Smith)*  
*Santa Ana Pueblo (Moote, Abrams)*  
*Santa Fe Watershed Association (Vosick)*  
*Santo Domingo Pueblo, New Mexico. (CFRP monitoring assistance) (Abrams)*  
*Southern Pueblos Agency (BIA) in Albuquerque, NM (Abrams)*  
*Tierra Y Montes Soil & Water Conservation District (Abrams)*  
*Tree New Mexico, Albuquerque, NM (Abrams)*  
*Wahoo Work Group of Sierra County, New Mexico (Smith)*  
*White Mountain Stewardship Contract Monitoring Board (Denton et al)*  
*White Mountain Apache, (Fulé)*  
*Willow Bend Environmental Educational Center (Long/Friederici)*

### **Regional, national, international**

#### New in FY07

*Arizona Native Plant Society*  
*US Forest Service, Coconino NF (Huffman)*  
*US Forest Service, Apache-Sitgreaves NF (Huffman)*  
*US Forest Service, Lincoln NF (Huffman)*  
*US Forest Service, Region 3, Regional Office (Huffman)*  
*US Forest Service, Southern Research Station (Nyoka, Springer; No. AZ Native Seed Association)*  
*USGS National Wetlands Research Center (Laughlin)*

#### Current but Established in Previous FY Funding

*Arboretum at Flagstaff (Nyoka, Springer)*  
*Arizona Game and Fish Department (Covington, Smith, Huffman, McGlone, Pearson/Senior projects)*  
*Arizona State Land Department (Smith, Denton, Bakker)*

*Bureau of Land Management, Arizona Strip (Huffman, Springer, McGlone)*  
*Centennial Forest (Bakker)*  
*City of Flagstaff Fuels Management Department (Smith, Denton, Long)*  
*Ecological Society of America, SEEDS program for minority student involvement (Long)*  
*Forest Guild, Santa Fe, NM (Moote)*  
*Four Corners Institute, Santa Fe, NM (Moote, Abrams)*  
*Governor's Forest Health Advisory Council (Covington)*  
*Governor's Forest Health Oversight Council (Vosick)*  
*Institute for Ecosystem Studies, New York (Long)*  
*Joint Legislative Healthy Forest Task Force (Covington)*  
*Jornada LTER (McGlone)*  
*Kaibab National Forest: Pinyon-Juniper Project (Smith)*  
*Maricopa County Parks and Recreation Department (Abella)*  
*Montezuma County, CO (Moote)*  
*Museum of Northern Arizona (Friederici)*  
*National Advanced Resource Training Center (Smith)*  
*National Park Service: Bandelier National Monument, New Mexico (Bakker)*  
*Nature Conservancy, New Mexico Valles Project (Smith)*  
*Plumas National Forest, Quincy, California (Long)*  
*Prescott National Forest (Smith, Denton, Bedell, Bakker)*  
*Southwest Sustainable Forests Partnership (Viers)*  
*Sustainable Northwest, Portland, OR (Moote, Abrams)*  
*USFS Allegheny National Forest, Pennsylvania (Long)*  
*USFS Cibola National Forest (Smith, Denton, Bedell, Bakker)*  
*USFS Coconino National Forest Herbarium (Covington)*  
*USFS Coronado National Forest (Moote, Abrams)*  
*USFS Gila National Forest, New Mexico (Bakker)*  
*USFS, Pacific Northwest Research Station (Viers, Moote)*  
*USFS Peaks Ranger District (Smith, Denton, Long)*  
*USFS Region 3- Regional Leadership Team (Smith, Covington)*  
*USFS Region 3 – Collaborative Forest Restoration Program (Moote, Abrams)*  
*USFS Rocky Mountain Research Station (Pearson/Senior Projects)*  
*USFS Rocky Mountain Research Station Herbarium (Covington)*  
*USFS Santa Fe National Forest, New Mexico (Bakker)*  
*USFS Tusayan Ranger District (Smith, Huffman)*  
*Western Governors' Association (Covington, Vosick)*