COLORADO FOREST RESTORATION INSTITUTE
2016 ANNUAL REPORT

https://cfri.colostate.edu

Tony Cheng, Director
133 Forestry Building
Colorado State University
Fort Collins, Colorado 80523-1472
Email: tony.cheng@colostate.edu
Voice: +1 (970) 491-1900
Fax: +1 (970) 491-6754

COLORADO FOREST
RESTORATION INSTITUTE

Colorado State University

About the Colorado Forest Restoration Institute

The Colorado Forest Restoration Institute (CFRI) was established in 2005 as an application-oriented program of the Department of Forest & Rangeland Stewardship in the Warner College of Natural Resources at Colorado State University. CFRI's purpose is to develop, synthesize, and apply locally-relevant science-based knowledge to achieve forest restoration and wildfire hazard reduction goals in Colorado and the Interior West. We do this through collaborative partnerships involving researchers, forest land managers, interested and affected stakeholders, and communities. Authorized by Congress through the Southwest Forest Health and Wildfire Prevention Act of 2004, CFRI is one of three Institutes comprising the Southwest Ecological Restoration Institutes, along with centers at Northern Arizona University and New Mexico Highlands University.

The Colorado Forest Restoration Institute at Colorado State University receives financial support through the Cooperative and International Programs of the U.S. Forest Service, Department of Agriculture, under the Southwest Forest Health and Wildfire Prevention Act. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights Room 326-A, Whitten Building 1400 Independence Avenue, SW Washington, DC 20250-9410 or call (202) 720-5964 (voice & TDD).

Physical address: 133 Forestry Building, 1001 West Drive, Fort Collins, CO 80523
Mailing Address: 1472 Campus Delivery, Colorado State University, Fort Collins, CO 80523-1472

BACKGROUND

Fire is an essential part of how forests renew and sustain. However, historic land uses and decades of fire suppression has excluded fire from millions of forested acres of in Colorado and across the western United States. Since the early 1990s, the size and severity of wildfires has increased; human land use and development in fire-prone forests has also increased. This combination of factors has resulted in the loss of life, property, and highly-valued natural, social, and economic assets from wildfires. This is forecasted to continue due to increases in average annual temperatures and the frequency, duration, and severity of drought. The US Forest Service estimates that approximately 80 million acres of western forests are vulnerable to large severe wildfires.

Forest restoration aims to reduce this vulnerability by applying mechanical, manual, and managed fire (both natural and planned ignitions) methods to alter or remove forest vegetation. By doing this, fires – when they do occur – can result in lower social and economic losses and costs, and serve their natural role in renewing forests. However, the cost, complexity, and controversy associated with forest restoration requires that forest managers and interested and affected stakeholders access and apply locally-relevant science-based knowledge to strategically identify the location, size, and types of restoration actions to produce the most benefits. While researchers in federal agencies and universities produce scientific findings relating to forest and fire ecology, it is not in their missions to engage with managers and stakeholders to localize these findings into project planning, analyses, design, and monitoring, and adapting future plans. Similarly, managers and stakeholders rarely have sufficient time and expertise to access, interpret, and localize scientific findings to inform effective forest restoration. What is needed are entities that can act as bridges and translators between research and management.

To address this gap, the Southwest Forest Health and Wildfire Prevention Act was enacted by Congress in 2004 (Public Law 108-317). The act authorized the establishment and federal funding support for university-based institutes in Arizona, Colorado, and New Mexico. As specified by the Act, the duties of each Institute are to:

> (1) Develop, conduct research on, transfer, promote, and monitor restoration-based hazardous fuel reduction treatments to reduce the risk of severe wildfires and improve the health of dry forest and woodland ecosystems in the interior West;
> (2) Synthesize and adapt scientific findings from conventional research to implement restoration-based hazardous fuel reduction treatments on a landscape scale using an adaptive ecosystem management framework;
> (3) Translate for and transfer to affected entities any scientific and interdisciplinary knowledge about restoration-based hazardous fuel reduction treatments;
> (4) Assist affected entities with the design of adaptive management approaches (including monitoring) for the implementation of restoration-based hazardous fuel reduction treatments; and
> (5) Provide peer-reviewed annual reports.

Per the fifth duty of the act, this annual report provides information about accomplishments of the Colorado Forest Restoration Institute (CFRI) at Colorado State University for calendar year 2016 for deliverables under the FY16 work plan approved on January 15, 2016 by the Southwest Ecological Restoration Institutes (SWERI) Executive Team.

ORGANIZATION

CFRI is hosted in the Department of Forest and Rangeland Stewardship, one of five academic departments in the Warner College of Natural Resources at Colorado State University. Tony Cheng is Professor in the Forest and Rangeland Stewardship department and the director of CFRI. Dr. Cheng has been director since April 2008. In calendar year 2016, CFRI had six full-time employees and eighteen part-time employees. All employees report to Dr. Cheng. In turn, Dr. Cheng reports to the head of the Forest and Rangeland Stewardship. Heads of all departments in the Warner College report to the college's Dean.

ACCOMPLISHMENTS

Funding

CFRI utilizes funding appropriated under the SWERI-approved work plan as leverage for additional funding from federal and state government and nongovernmental sources. The table below displays all CFRI's funding sources, amounts, and agreement numbers for calendar year 2016.

Source	Project title	Agreement No.	Amount
Colorado Conservation Exchange	Developing an Ecological Benefits Quantification Tool and an Environmental Economic Return on Investment Calculator for the Colorado Conservation Exchange	Internal university transfer	$80,000
USDA Forest Service - Southwest Region	Colorado Forest Restoration Institute, FY16	16-DC-I 1031600-014	$150,000
USDA Forest Service - Rocky Mountain Region	MOD 1: Assistance to R2 - Regional Office with science support for 2012 Forest Planning Rule	15-CS-11020000-058	$35,000
USDA Forest Service - Rocky Mountain Research Station	MOD 1: Provide science-based information to aid the GMUG in implementing adaptive management strategies in beetle impacted spruce-fir forests.	15-CS-11221633-098	$37,711
USDA Forest Service - Rocky Mountain Research Station	MOD 7: Characterizing Patterns of Tree Regeneration Following Large Wildfires	13-JV-11221633-083	$46,268
USDA Forest Service - Rocky Mountain Region	Forest-to-Faucets Assessment and Monitoring	16-CS-11020000-062	$185,000
US Forest Service, Grand Mesa-Uncompahgre-Gunnison NF	MOD 5: Monitoring Ecological, Social, and Economic Effects of the Uncompahgre Plateau Collaborative Forest Landscape Restoration Project	12-CS-11020400-049	$24,000

US Forest Service, Arapaho-Roosevelt NF/Pawnee NG	MOD 6: Ecological and Socioeconomic Monitoring Support for Colorado Front Range Collaborative Forest Landscape Restoration Project	12-CS-11021000-033	$95,000
USDA Forest Service - Rocky Mountain Research Station	Strategic Science Application and Delivery Efforts in the Interior West	16-JV-11221631-139	$12,000
USDA Natural Resource Conservation Service (via Texas A&M Gulf Coast CESU Sub-Award)	Modeling conservation effects in Rocky Mountain dry forest systems	Coop. agreement 68-7482-16-521	$75,000
The Nature Conservancy	Upper South Platte Partnership Monitoring	G052017-CFRI	$134,000
CSFS	Upper South Platte Partnership Monitoring	Internal university transfer	$50,000
CSFS	Upper South Platte Partnership Fire Response	Internal university transfer	$50,000
		TOTAL	**$973,979**

State support

The State of Colorado, through its support to Colorado State University, provides financial support for CFRI facilities and administration. In 2016, this support totaled $329,164.

Project deliverables

For agreement number 16-DC-11031600-014, CFRI reports the following accomplishments toward each project deliverables in the work plan:

Deliverable	Status of Deliverables
Project 1: Supporting Collaborative Forest Landscape Restoration Projects	
1.1 One status of knowledge summary of dry mixed-conifer forest ecology and management.	In process. forthcoming publication of the General Technical Report, *Principles and practices for the restoration of ponderosa pine and dry mixed-conifer forests of the Colorado Front Range"*.

1.2 1-3 technical documents regarding multi-party monitoring strategies and results for the Front Range Collaborative Forest Landscape Restoration Project.	Completed report, "2016 Front Range CFLRI Monitoring: Progress, Outcomes, and Recommendation." Accessible at: https://cfri.colostate.edu/wp-content/uploads/2016/09/2016_FR_CFLRP_Jam_Session.pdf A draft revision of the multi-party monitoring plan for the Front Range CFLRP has been developed and awaiting final review of the collaborative group.
1.3 1-3 technical documents regarding multi-party monitoring strategies and results for the Uncompahgre Collaborative Forest Landscape Restoration Project.	Report on 2015 multi-party monitoring results drafted and presented to the Uncompahgre CFLRP March 2016. Final report in process. Strategy for monitoring the effects of Gambel oak treatments on subsequent understory plant communities developed. Accessible at: https://cfri.colostate.edu/wp-content/uploads/2016/08/2016-CFRI-Gambel-Oak-Understory-Study-Summary.pdf Revision of the multi-party monitoring plan for the Uncompahgre CFLRP in process.
1.4 At least two (2) field-based workshops per CFLR project to review and deliberate treatment effects and desired conditions	Co-organized and -sponsored two field trips with managers and stakeholders, Summer 2016.
1.5 Disseminating CFLR treatment design and monitoring approaches to other place-based collaborative forest efforts	Gambel oak treatment effects study summary (see above) distributed to San Juan Headwaters Forest Health Partnership and Front Range Roundtable Landscape Restoration Team.
Project 2: Addressing Knowledge Gaps for Post-Disturbance Forest Recovery Management Decision-Making	
2.1 1-3 status of knowledge summaries of vegetation response following large-scale forest mortality events	Manuscript submitted to peer-review journal on tree regeneration patterns following high-severity fire in ponderosa pine-dominated forests of the Colorado Front Range.

2.2 In collaboration with Mike Battaglia at Rocky Mountain Research Station, compile, synthesize, and disseminate 1-3 technical reports or management briefs concerning the status of scientific knowledge about spruce management effects	Completed research brief, "Engelmann spruce germination in group selection", March 2016. Accessible at: https://cfri.colostate.edu/wp-content/uploads/2016/06/2016-UP-Spruce-Seeding-Study.pdf Completed report, "Engelmann spruce regeneration following natural disturbances and forest management: A literature and expert-knowledge review focused on southwestern Colorado". Accessible at: https://cfri.colostate.edu/wp-content/uploads/2017/01/2016-CFRI-Spruce-Regeneration-in-SW-Colorado-compressed.pdf
2.3 Convene at least one (1) workshop to facilitate knowledge exchange regarding post-bark beetle forest management effects	Not completed in this performance period.
Project 3: Assessing Treatment Effectiveness	
3.1 Between 1-3 written reports on fuel treatment effects on landscape-scale fire behavior, forest vegetation dynamics, and/or watershed values	Paper published in peer-review journal Restoration Ecology. Accessible at: https://cfri.colostate.edu/wp-content/uploads/2016/06/2016-Dickinson_etal_RE_MonitoringHorizontalForestComplexity.pdf Manuscript submitted to peer-review journal entitled, "Return on investment from fuel treatments to reduce severe wildfire and erosion in a payment for ecosystem services program in Colorado".
3.2 Between 1-3 field-based workshops to review and deliberate treatment effects and desired conditions	Co-organized and facilitated workshop October 2016 in western Boulder County to assess the effects fuel treatments on firefighting effectiveness and fire effects of the Cold Springs Fire, June 2016. Workshop attended by federal, state, and local government agencies and community members.
Project 4: Supporting Collaborative Capacity-Building	
4.1 Between 1-3 site visits or workshops that bring together research scientists from RMRS, other federal agencies, and universities with participants of individual place-based forest collaboratives to transfer knowledge about, and assist in the development of, science-	Not yet initiated.

based methods for multi-party monitoring	
4.2 Between 1-3 site visits or workshops that bring together research scientists from RMRS, other federal agencies, and universities with participants of multiple place-based forest collaboratives to identify common knowledge gaps, compare results from common multi-party monitoring approaches, and develop strategies to link multi-party monitoring approaches with research programs.	Not yet initiated.