COLORADO FOREST RESTORATION INSTITUTE 2023 ANNUAL REPORT

COLORADO FOREST
RESTORATION INSTITUTE
COLORADO STATE UNIVERSITY

The Colorado Forest Restoration Institute (CFRI) was established in 2005 as an application-oriented, science-based outreach and engagement organization hosted at Colorado State University. Along with centers at Northern Arizona University and New Mexico Highlands University, CFRI is one of three Institutes that make up the Southwest Ecological Restoration Institutes, which were authorized by Congress through the Southwest Forest Health and Wildfire Prevention Act of 2004. We develop, synthesize, and apply locally-relevant, actionable knowledge to inform forest management strategies and achieve wildfire hazard reduction goals in Colorado and the Interior West. We rigorously and objectively integrate the best-available scientific information into decision-making through collaborative partnerships involving researchers, land managers, policy makers, interested and affected stakeholders, and communities. CFRI holds itself to high standards of scientific accuracy and aims to promote transparency in the production and communication of science-based information. Always carefully evaluate sources for appropriateness and rigor before applying in your own work.

The Colorado Forest Restoration Institute at Colorado State University receives financial support under the Southwest Forest Health and Wildfire Prevention Act provided through the U.S. Forest Service, Department of Agriculture. 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).

CSU Land Acknowledgment: Colorado State University acknowledges, with respect, that the land we are on today is the traditional and ancestral homelands of the Arapaho, Cheyenne, and Ute Nations and peoples. This was also a site of trade, gathering, and healing for numerous other Native tribes. We recognize the Indigenous peoples as original stewards of this land and all the relatives within it. As these words of acknowledgment are spoken and heard, the ties Nations have to their traditional homelands are renewed and reaffirmed. CSU is founded as a land-grant institution, and we accept that our mission must encompass access to education and inclusion. And, significantly, that our founding came at a dire cost to Native Nations and peoples whose land this University was built upon. This acknowledgment is the education and inclusion we must practice in recognizing our institutional history, responsibility, and commitment.

Document Development: The annual report is produced each year in accordance with the fifth (5) duty of the the 2004 Southwest Forest Health and Wildfire Prevention Act (Public Law 108-317). This annual report provides information about accomplishments of the Colorado Forest Restoration Institute at Colorado State University for calendar year 2023 for deliverables approved by the Southwest Ecological Restoration Institutes Executive Team and funded under the Act. Information in this report was compiled by Brett Wolk, Tony Cheng, Camille Stevens-Rumann, Hannah Brown, Angela Hollingsworth, and Brooke Simmons.

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Authors[1]: Brett Wolk, Tony Cheng, Camille Stevens-Rumann, Hannah Brown, Angela Hollingsworth, and Brooke Simmons.

1. All from Colorado Forest Restoration Institute, Department of Forest and Rangeland Stewardship, Colorado State University, Fort Collins, CO

Cover photo credit: Andrew Slack; Sand Springs Prescribed Burn, South Platte Ranger District, Pike-San Isabel National Forest

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Contact: Brett Wolk, brett.wolk@colostate.edu

Colorado State University
Colorado Forest Restoration Institute
Department of Forest & Rangeland Stewardship
Mail Delivery 1472
Colorado State University
Fort Collins, Colorado 80523
(970) 491-4685 • www.cfri.colostate.edu

BACKGROUND

Since the early 2000's, wildfires in the Western US are increasingly impacting communities and overwhelming forest resilience to regenerate. Forest land managers and their partners can be overloaded with the complexity of scientific information, multiple planning tools, and various objectives when they are deciding when, where, and how to act to enhance forest resilience and reduce wildfire risk. Signed into law in 2004, the Southwest Forest Health and Wildfire Prevention Act (P.L. 108-317)[1] authorized university-based entities in Arizona, Colorado, and New Mexico to co-develop, translate, and apply actionable knowledge in collaboration with forest land managers and partners to foster fire-resilient forests for the benefit of communities and nature, now and in the future. The Secretary of Agriculture designated the Colorado Forest Restoration Institute (CFRI) at Colorado State University (CSU), the Ecological Restoration Institute at Northern Arizona University, and the New Mexico Forest & Watershed Institute at New Mexico Highlands University – collectively the Southwest Ecological Restoration Institutes (SWERI) – to carry out the Act.

As specified by the Act, the Duties of the SWERI 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;
5) Provide peer-reviewed annual reports.

Per the fifth (5) duty of the act, this annual report provides information about accomplishments of the Colorado Forest Restoration Institute for calendar year 2023.

In addition to the federal authorization establishing the primary Duties for CFRI, CSU and the State of Colorado signed a charter[2] agreeing to host the institute, provide facilities and administration, and other means of support. CFRI integrates our federal and state-driven functions, and strives to uphold CSU's mission as a land-grant university to provide teaching, research, public service, and engagement. Integrating our federal and state-driven missions, CFRI serves as a bridge between knowledge development (research) and knowledge application (management), distilling complexity to help affected entities apply locally-relevant, actionable knowledge to restore the resilience of forests to wildfire and a changing climate. CFRI works across ownership boundaries, spatial scales, and decision-making levels, thereby advancing shared stewardship strategies for forest lands and natural resources.

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. Dr. Tony Cheng is Professor in the Forest and Rangeland Stewardship department and has served as the director of CFRI since April 2008. In calendar year 2023, CFRI had

[1] Southwest Forest Health and Wildfire Prevention Act (P.L. 108-317): https://www.congress.gov/108/plaws/publ317/PLAW-108publ317.pdf

[2] Charter of the Southwest Ecological Restoration Institutes: https://sweri.eri.nau.edu/wp-content/uploads/2022/02/Charter_Final_Signed.pdf

twenty-seven full-time employees (including Dr. Cheng) and approximately twenty-four part-time or seasonal employees. Our staffing increased by 2 full-time employees over 2022. Our seasonal and part time employees included undergraduate students, graduate students, and non-student staff. All CFRI employees report to Dr. Cheng. In turn, Dr. Cheng reports to the head of the Forest and Rangeland Stewardship department. Heads of all departments in the Warner College report to the college's Dean. In addition to staff who hold their primary appointment with CFRI, we leverage other CSU faculty, staff, and graduate students to add their specialized expertise for our projects on an as-needed basis.

Our work is divided into six focal areas:

Focal Area 1. Spatial Wildfire Decision Support
This focal area encompasses CFRI's expertise and contributions in customizing and applying existing science-based wildfire risk analysis and decision support frameworks so that they are used by, and useful for, local-level managers, partners and stakeholders to achieve shared forest and wildfire management goals.

Focal Area 2. Collaborative Adaptive Management
This focal area builds upon CFRI's social science expertise and practical experience in co-designing, mentoring, monitoring, and adaptively managing multi-stakeholder collaborative shared stewardship processes focused on forest landscape restoration and wildfire resilience.

Focal Area 3. Ecological Monitoring and Research
This focal area focuses on developing, training, collecting, analyzing, and interpreting results of ecological monitoring strategies for forest restoration, fuels treatment, and wildfire outcomes. By documenting outcomes of management actions across multiple goals and jurisdictions, we provide funders of forest restoration and wildfire resilience a broader portfolio of outcome measures than acres or volume produced.

Focal Area 4. Climate Adaptation and Post-Fire Recovery
This focal area encompasses CFRI expertise and capacity, and our long-standing collaboration with scientists at Forest Service R&D and many other research institutions, to develop, translate, and operationalize actionable scientific knowledge about post-fire reforestation and watershed recovery issues, opportunities, and challenges increasingly faced by land managers and their partners as the climate changes.

Focal Area 5. Translating Science Principles to Practice
This focal area encompasses CFRI's expertise and capacity to convene and organize peer-learning exchanges and translate and innovatively communicate the continuously-evolving body of physical, natural and social scientific knowledge about forest restoration, proactive wildland fire management, climate change and related topic areas.

Focal Area 6. Collaborative Capacity-building and Peer-learning Across Diverse Perspectives
For this focal area, we invest in both CFRI staff and our partners to co-develop, lead and participate in peer-to-peer learning events, trainings, and the constant intra- and inter-organizational communications required to sustain working relationships and keep projects moving to completion. Additionally, consistent with CSU's priority commitment to enhancing diversity, equity, and inclusion in education, research, and engagement, we invest in capacity-building and peer-to-peer learning targeting under-represented groups in forest and wildland fire management and science.

ACCOMPLISHMENTS

Funding

Congress annually appropriates funds to support SWERI work plans through the US Department of Agriculture's Forest Service Hazardous Fuels/Fuels Management budget line item, administered as a direct grant through the Southwestern Region. Annual workplans for dollars allocated to each institute are approved by the Secretary of Agriculture, in consultation with the Secretary of Interior. Beginning with increased SWERI federal appropriations in fiscal year 2021,

the three SWERI Institutes were able to achieve equitable distribution of federal workplan funding for the first time, which empowered us to be responsive to an emerging wildfire crisis and expanded our impact across the region. CFRI uses annual work plan funds from Congress to incubate and support innovative new ideas, augment existing CFRI agreements and projects where significant value can be added, and support knowledge transfer and application between projects and partners. Additional CFRI funding comes from agreements with federal and state government and nongovernmental sources, competitive research grants, and charitable gifts.

CFRI amplifies the impact of applied research and leverages deep engagement in place-based local monitoring and adaptive management processes to share cumulative broader impacts throughout the Interior West. Many of our agreements span multiple years. As a snapshot of our funding, the table below includes all funding sources and agreements signed during calendar year 2023 with CFRI staff as the Principle Investigator. CFRI staff leverage additional funding by participating as Co-Principle Investigators and collaborators in additional projects not listed here, which further expands our funding and impact.

Source	Project Title	Agreement Number	Amount
US Forest Service, Washington Office Fire and Aviation Management	Potential Operational Delineations Development, Refinement, and Coordination	22-CA-11132543-056	$1,200,000.00
US Forest Service, Southwest Region	Colorado Forest Restoration Institute, SWERI FY23	23-DG-11030000-012	$2,200,000.00
US Forest Service, Grand Mesa-Uncompahgre-Gunnison National Forests	Science-Based Support to Inform Collaborative Adaptive Management on the GMUG National Forests MOD	20-CS-11020400-035	$69,000.00
US Forest Service, Grand Mesa-Uncompahgre-Gunnison National Forests	Uncompahgre Plateau Collaborative Forest Landscape Restoration Program Monitoring (Additional funding to existing agreement to fund 2023 field season)	20-CS-11020000-025	$15,441.00
US Forest Service, Arapaho and Roosevelt National Forests and Pawnee National Grassland and the Pike-San Isabel National Forest and Cimarron and Comanche National Grasslands	Collaborative adaptive management to support wildfire-resilient forests, watersheds, and communities on the Colorado Front Range Phase 2	23-CS-11021200-033	$406,041.43
USDA National Institute of Food and Agriculture	Tree Regeneration in a changing climate: climate-smart reforestation after wildfire	NA	$649,394.53
USDA Forest Service Rocky Mountain Research Station	Geospatial inventory of post-fire hillslope-to-stream biogeochemical linkages	23-JV-11221634-150	$100,000.00
US Forest Service (subaward with Northern Arizona University)	SWERI BIL Treatment and Wildfire data applications Subaward MOD 1	22-DG-111-32543-089	$680,791.00
Colorado State Forest Service	Gunnison RADS: Risk Assessment and Decision Support to Inform Community Wildfire Protection Planning in Gunnison County	1929106.1PROJ	$30,000.00
TOTAL			**$5,350,667.96**

CFRI leverages Congressionally appropriated funding to procure additional funded projects that support collaborative adaptive forest and wildland fire management on federal and non-federal lands. Over the past 5 years CFRI has successfully leveraged **work plan funding** roughly 1:1 with **additional funded projects**. CFRI also receives **state support** from Colorado and CSU as agreed to in the Charter signed between the three SWERI university presidents and State Governors.

Year	Work Plan Funding ($thousands)	Additional funded projects (federal, state, non-gov't) ($thousands)	State support (unrecovered indirect, facilities and admin) ($thousands)
2019	750	954	450
2020	1,100	1,036	604
2021	2,000	414	1,051
2022	2,000	1,529	1,498
2023	2,200	3,151	1,855
TOTAL	**8,050**	**7,084**	**5,458**

State Support

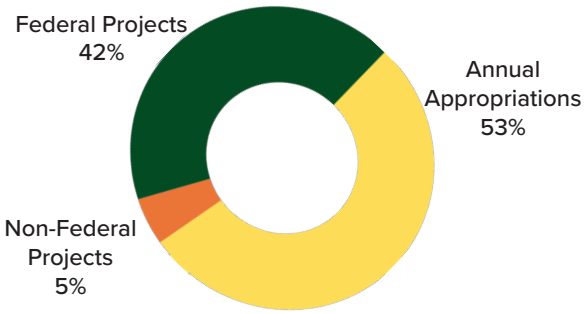
The State of Colorado, through its support to Colorado State University, provides support for CFRI as agreed to in the Charter. State support includes noncash contributions from CSU in the form of physical facilities, administrative support for CFRI, reduced indirect cost recovery on CFRI federal awards, and state funding to support a portion of faculty salary for institute Directors, including 9 months of faculty salary to Tony Cheng (Director), and 4.5 months of faculty salary to Camille Stevens-Rumann (Assistant Director). In 2023, this support totaled approximately $1,855,990. What follows is a brief highlight of our 2023 projects and accomplishments.

COLORADO FOREST RESTORATION INSTITUTE
COLORADO STATE UNIVERSITY

2023 Facts at a Glance

ANNUAL OPERATING BUDGET

Approximate Distribution of Annual Funding Source



In 2023, CFRI's budget was approximately **$3 million**, leveraging federal appropriations with federal subcontracts, competitive grants, and other resources.

The State of Colorado, through CSU, provides in-kind support for CFRI facilties and administration equivlent to nearly $**1.5 million** in 2023.

CFRI is congressionally authorized (PL 108-317) to receive federal appropriations administered by the USDA Forest Service.

EMPLOYMENT

Full-time staff: **27**

Year-round students: **6**

Seasonal field crew: **18**

152+ Student Jobs Provided
(last 6 years)

OUR EXPERTISE AND IMPACTS APPLIED BEFORE, DURING, AND AFTER FIRE

SPATIAL WILDFIRE DECISION SUPPORT

We develop and apply decision support tools that integrate natural resource planning with fire response, and work with managers and communities to locate and prioritize forest and fire management action to have the greatest impact.

CLIMATE ADAPTATION AND POST-FIRE RECOVERY

We are responding to manager needs for science, planning, and communication tools as wildfire interactions with a shifting climate have created novel environments, a loss of vital ecosystem services, and challenges for post-fire recovery.

ECOLOGICAL MONITORING AND RESEARCH

Our applied fire research supports management and adaptation for resilience of dynamic, fire-adapted forest ecosystems. We monitor individual projects across all lands, and develop metrics to evaluate management outcomes.

Project Monitoring

- **399 plots visited in 2023**
- **5,048+ plots since 2010**
- **422 forest management units across 74,000 acres**

Wildfire Planning Tools

- **11 landscapes engaged in 2023**
- **37 landscapes across 80+ million acres since 2018**

COLLABORATIVE ADAPTIVE MANAGEMENT

We develop frameworks to support collaborative readiness, quantify outcomes of social processes, and pinpoint best practices for integrating science into local decision making.

PRINCIPLES TO PRACTICE

We translate forest science, management, and policy principles into action by responding to arising communication needs and working to make research insights understandable, accessible, and usable for multiple audiences using a variety of media.

CAPACITY

We invest in CFRI staff and partners to share the latest science and management, deliver peer-to-peer learning events and trainings, and maintain tools that provide our partners easy access to the latest information.

PROJECT DELIVERABLES

Following is a report on deliverables under all agreements active during calendar year 2023 funded through Congressional appropriations authorized under the Southwest Forest Health and Wildfire Prevention Act and administered by the US Forest Service through the SWERI annual workplan process. This supports the Colorado Forest Restoration Institute to carry out the duties described in the Act. In 2023, CFRI had two active agreements under the Act. Deliverable accomplishments for each are included in this report:

- FY22 CFRI annual work plan, active 8/31/2022 through 12/31/2023
- FY23 CRI annual work plan, active 7/14/2023 through 12/31/2023

For FY22 agreement number 22-DG-11030000-011, CFRI reports the following cumulative accomplishments toward each project deliverables in the work plan for dates while the agreement was active, including August 31st, 2022 through December 31st, 2023.

Deliverable	Status of Deliverables
Focal Area 1. Develop and deploy risk-based, outcomes-focused decision support frameworks for restoring forest landscape resilience and co-managing wildfire risk in the face of a changing climate	
1.1 Collaborate and coordinate with affected entities to advise, customize, apply, update and report on RADS frameworks that inform cross-boundary assessment, planning, NEPA processes, and adaptive management on priority focal landscapes identified in federal-state Shared Stewardship strategies, NRCS strategic investments, State Forest Action Plans, US Forest Service focal investment areas, and other landscapes targeted for investments by collaborative partnerships.	CFRI staff Andrew Slack and Stephanie Mueller led an application of the Risk Assessment and Decision Support framework with a cross boundary collaborative group to inform the Lower North South Vegetation Management Project, which is a large conditions based pre-NEPA planning process with the South Platte Range District on the Pike National Forest. This involved semi-monthly meetings, extensive spatial analysis, development of communication tools such as sharing data via ArcGIS Online mapping tools, and other activities to support cross boundary partners making informed decisions about the best bang for the buck to implement forest management activities. Mueller, S. E., Slack, A. W., Ritter, S. M., & Hunter, T. M. (2023). Wildfire Risk and Treatment Prioritization for the Lower North-South Vegetation Management Planning Area. Colorado Forest Restoration Institute. CFRI-2314. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/WRTP_LowerNS_VegPlanMngt_CFRI2314.pdf Multiple CFRI staff, in partnership with the Coalition for the Poudre River Watershed and the Northern Colorado Fireshed Collaborative, provided an overview and applications for the Northern Colorado Fireshed Wildfire Risk Assessment. The webinar was intended to aid potential local user groups in applying the risk assessment to their own program of work and to spur enhanced cross-boundary collaboration on the Colorado Front Range. Funding for CFRI to develop and host the webinar was leveraged from the Arapahoe Roosevelt National Forest and US Forest Service Washington Office of Fire and Aviation Management, as well as this agreement. - NoCo Fireshed Risk Assessment: Project Scale Planning. NoCo Fireshed Risk Assessment for Practitioners Webinar. February 8th, 2023. https://www.youtube.com/watch?v=KdDUlP573xM CFRI staff Brett Wolk, Stephanie Mueller, and Allie Rhea provided ongoing engagement with Envision Chaffee County and Lake County Forest Health Council to help partners apply the Community Wildfire Protection Plan and Recreation prioritization planning tools within the Upper Arkansas Rocky Mountain Restoration

	Initiative priority landscape. This included activities such as attending Chaffee and Lake County Forest Health Council meetings to help foresters apply landscape scale outcomes in project level forest management activities, engaging with County Commissioners to apply wildfire science for updating land use codes, developing online mapping tools to make wildfire risk and priority management areas more accessible, and making maps for communication specialists, annual accomplishment reports, and grant applications for the group.
1.2 Collaborate and coordinate with affected entities in landscapes not identified in priority focal area lists to advise, customize inputs to, apply, update and report on RADS frameworks to inform cross-boundary assessment, planning, NEPA processes, and adaptive management to restore/enhance forest resilience and reduce wildfire risks.	CFRI staff led by Brett Wolk continued developing structures and processes with the West Region Wildfire Council to complete risk assessments and spatial fire planning support over a 6 county area in western Colorado (Gunnison, Ouray, San Miguel, Montrose, Delta, Hinsdale). This included advising and support developing collaborative governance structures to integrate PODs with Community Wildfire Protection Plans. Engagement included frequent communication with WRWC leadership and staff, as well as county emergency managers, Colorado State Forest Service, US Forest Service, BLM, and other partners throughout the 6 county area. This led to securing funding from Colorado State Forest Service to develop a CWPP in Gunnison and Ouray County, and initiating plans to develop PODs across all land ownerships in the 6 county area. Examples of presentations and facilitated discussions included: - Wolk, Brett. Risk Assessment and Decision Support (RADS) Framework and Modeling Process. Presentation and led discussion with the Upper Gunnison Shared Stewardship Council on July 19, 2023. https://cfri.box.com/s/jp7hxzxf0ur6pdjyj9z9jqgpp15by0m5 - Wolk, Brett. Delivered virtual presentation for the San Miguel Watershed & Wildfire Collaborative. "Wildfire and Forestry Planning and Risk Assessment Overview." December 12th, 2023. https://cfri.box.com/s/85om1nuu6ehdk0b3ukr02ev0dq2wx0um - Beeton, T.A., and Lyon, Z (2023). A primer on The Potential Operational Delineations (PODs) spatial fire planning framework for community Fire Planning. Invited presentation to the West Region Wildfire Council All-Areas Meeting, December 14, 2023. https://cfri.box.com/s/m7law3wpgzuszrya89nqqa158x7rp9e1 CFRI staff Brett Wolk served on the Colorado Forest Health Council as an academic representative with expertise in forest policy. This includes contributing to state level coordination and policy through attending semi-monthly meetings and participating on the Leveraging Resources subcommittee to advise the council's mission for improving forest health in Colorado through integrated, science-based approaches, with a focus on cross-jurisdictional collaboration. CFRI staff Brett Wolk and Stephanie Mueller, in collaboration with the Colorado State Forest Service, developed the concept for the Colorado Forest Management Activity Tracker. CFRI roles include conceptualization and leadership, as well as management of federal agency forest activity data systems. Making forest and fire management data accessible across all land ownerships facilitates equitable access to information and resources for communities not in priority landscapes. https://csfs.colostate.edu/colorado-forest-tracker/ In addition to regular engagement on the Colorado Forest Tracker through the Colorado Forest Health Council, delivered presentation and led discussion with forest collaborative partners:

	- Nic Kotlinski, Rebecca Dannels, Stephanie Mueller, and Brett Wolk. Forest Collaboratives and the New Colorado Forest Management Activity Tracker (Forest Tracker). Webinar for the Colorado Forest Collaboratives Network, October 19th, 2023. https://docs.google.com/document/d/1IInMqPSYSoBKnD3tcw_11uxG1DUwdTcjH8KgB1Xhg-4/edit CFRI staff Brett Wolk led conceptualization of the Colorado Forest Resilience Planning Guide to establish state guidance on forest planning and integrating spatial decision support tools with collaborative adaptive management frameworks. This resulted in a recommendation from the Colorado Forest Health Council annual report, and a contractor was hired by the Council to support developing the planning guide with CFRI support.
1.3 Collaborate and coordinate with RO-Fuels, RMRS and WO-FAM and other partners to refine and adapt risk analysis decision support analytical tools and data products based on updated local conditions and locally-relevant knowledge.	The majority of work related to coordinating with US Forest Service regional fuels and fire staff, RMRS, and USFS Washington Office of Fire and Aviation Management is now funded through a separate agreement with the US Forest Service WO-FAM. Funding for this deliverable has been shifted to other priorities within focal area 1 to enhance other spatial wildfire decision support activities.
1.4 Collaborate and coordinate with researchers and science delivery specialists at CSU and other academic institutions, Forest Service R&D, the USDA Climate Hub, USDI Climate Adaptation Science Centers and other climate change experts to identify opportunities for integrating climate vulnerability decision support frameworks, tools, and data products with risk analysis decision support frameworks and tools.	CFRI staff Brett Wolk, Allie Rhea, and Scott Ritter worked with climate scientists at Denver Water, their consultant Lynker, and a core technical team to integrate climate scenario planning into a risk assessment framework for Denver Water Forest to Faucets Partnership priority investments. This included integrating detailed climate projection modeling from Denver Water and Lynker to update CFRI fire modeling that considers impacts of climate warming on future fire behavior. Data considering likely tree regeneration in the face of changing climate and wildfire impacts was also integrated to consider management actions that conserve refugia for tree seeds to sustain future forest resilience. The new analysis stitched together PODs fire management strategies with wildfire risk assessments, advanced watershed modeling, and integrated climate adaptation strategies into spatially explicit planning tools, and assessing post-fire tree regeneration in a pre-fire planning context. CFRI staff convened an interdisciplinary climate adaption semi-monthly discussion group to explore the latest climate vulnerability data and intersections with our spatial wildfire modeling and planning tools. Participants included Assisted Silviculture for Climate Change program leads, US Forest Service Office of Sustainability and Climate and Region 2 Regional Ecologist and climate change advisor, the USGS, USFS Rocky Mountain Research Station, faculty from CSU and other academic institutions, as well as forest and fire managers from Colorado State Forest Service, US Forest Service, and other land management agencies.
1.5 Develop and publish written products, and deliver oral presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, capacities, and best practices regarding the use and effectiveness of science- and risk-based methodologies, approaches,	Buettner William C., Beeton Tyler A., Schultz Courtney A., Caggiano Michael D., Greiner Michelle S. (2023) Using PODs to integrate fire and fuels planning. International Journal of Wildland Fire 32, 1704-1710. https://doi.org/10.1071/WF23022 Colavito, MM, Beeton, TA, Cheng, AS. Independent Analysis of Managed Wildfire by the SWERI for Division G-Department of the Interior, Environment, and Related Agencies Appropriations Act of 2022. July, 2023, Southwest Ecological Restoration Institutes. https://cfri.box.com/s/vlq399ckd44dc4rdxccnit24l27tuy0m

and planning processes being used in collaborative forest restoration, resilience and risk mitigation approaches across the Interior West.	Colavito, MM, Beeton, TA. Wildland Fire Managed for Resource Benefits – Briefing for Wildland Fire Leadership Council. Southwest Ecological Restoration Institutes, June, 2023. https://cfri.box.com/s/ozgrnzxzxy99oo4pfjxcebo5yl9x01sv Ritter, S.M. 2023. Local Applications of Wildland Fire Decision Support Tools. Colorado Wildfire Conference. April 12th-13th, Fort Collins, CO. https://drive.google.com/file/d/1QlyM80F6-gUFiupIgnoMkzZVU4-n2Lyr/view Beeton, T.A., and Ritter, S. (2023). Colorado Forest Restoration Institute Wildfire risk assessment and decision support program. Invited presentation to Forest Service regional and national fire analysts. May 10, 2023
Focal Area 2. Enhance collaborative readiness, resilience, and adaptive management	
2.1 Collaborate and coordinate with affected entities to co-design, deploy and adapt strategies to monitor, assess and report on factors affecting the readiness, effectiveness, resilience and adaptiveness of multi-stakeholder collaborative processes associated with forest restoration, resilience and wildfire risk mitigation. Potential projects may include, but are not limited to: • Collaborative Forest Landscape Restoration Program "2.0" re-authorization selections in R2, R3 and elsewhere • Firesheds identified in the National Fireshed Registry • Community Wildfire Protection Planning groups	CFRI staff Andrew Slack and others participated in monthly meetings with the Upper South Platte Partnership to co-design and adapt strategies for wildfire risk reduction. Andrew Slack and others convened and participated in visits with interagency partners in the Upper South Platte Partnership on active and recent forest restoration projects in the Upper South Platte watershed to review treatment effects and desired condition. These included one to multiple days in the field with small groups of staff from each of the following organizations: Jefferson County Open Space, Jefferson Conservation District, Colorado State Forest Service, Denver Mountain Parks, and the USFS South Platte Ranger District staff. CFRI staff participate in regular meetings of the Southwest Colorado and Rio Chama CFLRP programs to inform ecological and social monitoring and adaptive management strategies, as well as assess and apply collaborative governance strategies to improve collaborative resilience. CFRI staff continue coordinating with other SWERI and national CFLR Program Managers to conduct an assessment of collaborative resilience across all currently funded CFLRP projects across the country. We worked with USFS national leadership teams, as well as regional CFLR program managers and leadership at over 14 individual CFLR projects to design questionnaire instruments that would enhance the effectiveness of collaborative efforts to improve management outcomes. We also provided capacity to support recruitment and administration of the questionnaire tools with staff at national, regional, and local CFLRP levels. Examples of this engagement to co-design monitoring strategies include presentations and leading discussions with USFS regional office staff on the Collaborative Forest Landscape Restoration Program Collaborative Governance Assessment. - Beeton, T.A., et al. (2023). CFLRP Collaborative Governance Assessment – Introduction to Forest Service Regions 5, 8, and 9. January 11, 2023 - Beeton, T.A., et al. (2023). CFLRP Collaborative Governance Assessment – Introduction to Forest Service Regions 6. January 18, 2023
2.2 Collaborate and coordinate with affected entities to co-design, deploy and adapt strategies to monitor, assess and report on social and economic outcomes of multi-stakeholder collaborative activities associated with forest restoration,	We produced summary reports for 11 CFLRP projects to monitor and assess long term trends of collaborative resilience for re-authorized and new CFLR multi-stakeholder collaborative projects. - Beeton, T.A, Snitker, A.J., vonHedemann, N., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Report for the Rio Chama CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/08/Beeton_etal_2023_CFLRP_CollaborationAssessmentReport_RioChama.pdf

resilience and wildfire risk mitigation.	- Beeton, T.A, Snitker, A.J., vonHedemann, N., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Report: Summary of findings for the Two Watersheds – Three Rivers – Two States Cohesive Strategy Partnership and Rio Chama CFLRP - Snitker, A.J., Huayhuaca, C., Beeton, T.A., vonHedemann, N., Colavito, M.M., Teal, T.L., and Cheng, A.S., 2023. Collaborative Governance Assessment Report for the Shortleaf-Bluestem Community CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/10/Beeton_etal_2023_CFLRP_CollaborationAssessmentReport_Shortleaf.pdf - Snitker, A.J., Beeton, T.A, vonHedemann, N., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Report for the Dinkey CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/Beeton_etal_2023_CFLRP_CollaborationAssessmentReport_Dinkey.pdf - Snitker, A.J., Beeton, T.A, vonHedemann, N., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Summary of findings for the Dinkey Collaborative - Huayhuaca, C., Beeton, T.A, Snitker, A.J., vonHedemann, N., Colavito, M.M., Teel, T.L., and Cheng, A.S., 2023. CFLRP Collaboration Governance Assessment Report for the Lakeview Stewardship CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/Huayhuaca_etal_2023_CollaborativeGovernanceAssessmentReport_Lakeview.pdf - Huayhuaca, C., Beeton, T.A, Snitker, A.J., vonHedemann, N., Colavito, M.M., Teel, T.L., and Cheng, A.S., 2023. CFLRP collaborative governance assessment: Summary of findings for the Lakeview Stewardship CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/12/Huayhuaca_etal_2023_CollaborativeGovernanceAssessmentReport_Lakeview_Brief.pdf - vonHedemann, N., Beeton, T.A, Snitker, A.J., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Report for the Zuni Mountains CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/vonHedemann_etal_2023_CollaborativeGovernanceAssessmentReport_Zuni.pdf - vonHedemann, N., Beeton, T.A, Snitker, A.J., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S. 2023. CFLRP collaborative governance assessment: Summary of findings for the Zuni Mountains Collaborative and CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/vonHedemann_etal_CFLRP_Zuni_Brief.pdf - vonHedemann, N., Beeton, T.A, Snitker, A.J., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP Collaborative Governance Assessment Report for the Deschutes Collaborative Forest Project CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/12/vonHedemann_etal_2023_CollaborativeGovernanceAssessmentReport_Deschutes.pdf - vonHedemann, N., Beeton, T.A, Snitker, A.J., Colavito, M.M., Teel, T.L., Huayhuaca, C., and Cheng, A.S., 2023. CFLRP collaborative governance assessment: Summary of findings for the Deschutes Collaborative Forest

	Project CFLRP. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/12/vonHedemann_etal_CFLRP_Deschutes_Brief.pdf
2.3 Based on monitoring and assessment results, collaborate and coordinate with affected entities to co-develop, deploy, and report on training, mentoring, and peer-learning methodologies and events that enhance the readiness, resilience and adaptiveness of multi-stakeholder forest and wildfire risk mitigation collaboratives across broader geographies, including areas traditionally under-served or over-looked in national and state focal priority area lists.	Huayhuaca, C., Kimple, A., Barton, A. (2023, May 3). Stages of Collaborative Readiness: A framework for building collaborative implementation. Presentation and interactive discussion at the SWERI Cross-Boundary Workshop, Fort Collins, CO. https://cfri.box.com/s/59vatngzlp4ymw5yufyuc9avakqc6t0i Huayhuaca, C. (2023, June 20). Stepping through stages of collaborative readiness to achieve process and performance outcomes. Presentation given to Southwest Collaboratives Support Network, virtual. https://cfri.box.com/s/kgitrsuz4mud40ag3yw49jkej3yjtv34 Orbuch, P., Williams, M., MacHamer, M., Streevy, H., Forrester, C., and Huayhuaca, C. (2023, July 27). The U.S. Forest Service and Forest Collaboratives in Colorado: How we can work together. Panel presentation to Colorado Forest Collaboratives Network at Branching Out webinar, virtual. https://docs.google.com/document/d/1PnQD0ohNFxngHCdl2tVjlShEo98v15ylDZphWwYsMOg/edit We engaged with national and regional CFLRP leadership, as well we place based CFLRP collaborative groups, to report on and help integrate lessons learned from monitoring long term trends of collaborative resilience to improve collaborative adaptive management processes and outcomes. - Beeton, T., Huayhuaca, C. (2023, February 23). CFLRP Collaborative Governance Assessment: Dinkey Collaborative CFLRP. Presentation given to Dinkey Collaborative. - Beeton, T., Huayhuaca, C. (2023, May 10). CFLRP Collaborative Governance Assessment: 2-3-2 Partnership and Rio Chama CFLRP. Presentation given to 2-3-2 Cohesive Strategy Partnership. - Beeton, T., Huayhuaca, C. (2023, August 17). CFLRP Collaborative Governance Assessment: Summary of findings for the Dinkey CFLRP. Presentation given to Dinkey Collaborative.
2.4 Develop and publish written products, and deliver oral presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, capacities, and best practices regarding strategies, capacities, and techniques to enhance the readiness, resilience and adaptiveness of multi-stakeholder forest and wildfire risk mitigation collaboratives to inform collaborative capacity-building investment strategies.	C. Huayhuaca, A.S. Cheng, T.A. Beeton, J.S. Sanderson, A.W. Barton, A.D. Kimple, M.M. Colavito, J. Zebrowski, J. Dunn, N. vonHedemann, A.W. Slack., 2023. Preparing landscapes and communities to receive and recover from wildfire through collaborative readiness: A concept paper. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/SWERI_etal_2023_CollaborativeReadinessFramework.pdf Dunn, J, Wolk, B. (2023). Risk Assessment Decision Support (RADS) in Chaffee County, Colorado: A Collaborative Process Case Study. CFRI-2303. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/03/Dunn_Wolk_ChaffeeCountyCaseStudy_CFRI_2303.pdf Dunn, Jarod. (May 8, 2023). Presented on Conditions-based management and NEPA for ecological restoration projects at the National Association of Environmental Professionals Conference on Conditions Based Management. https://cfri.box.com/s/uqwuw2fhg9sfn3cgbxf91q6e5j9tsgoc

	Snitker, A., Beeton, T., Colavito, M, vonHedemann, N., Teel, T. and Cheng, A. Designing an assessment of collaboration: Evaluating collaboration in the Collaborative Forest Landscape Restoration Program. Oral presentation at the International Association for the Society and Natural Resources (IASNR) conference, June, 14, 2023.
Focal Area 3. Measure biophysical outcomes of forest, wildfire, and climate adaptation projects and programs	
Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to develop, deploy, and adapt monitoring strategies, and report on monitoring outcomes that measure the biophysical outcomes pre- and post-fire treatments across spatial and temporal scales relative to collaboratively-defined desired conditions and outcomes. Outcomes may include, but are not limited to: a. Changes in fire metrics b. Post-fire forest recovery c. Woody biomass volume from mechanical treatments d. Effects on wildlife (i.e., pollinators e. Interactions with outdoor recreatio uses	CFRI supported the collection, management, analysis, and reporting of forest vegetation and wildfire fuels monitoring data to examine longer term (e.g. 1-10 year) ecological trends following forest management on the following projects. Field data was collected at over 100 field based plots across 4 forest restoration and fuel reduction projects and 3 wildfires in calendar year 2023, in addition to remote sensing monitoring of changes in forest structure. This also includes supporting the hiring, training, and mentoring of approximately 20 seasonal staff and undergraduate students in field monitoring protocols to collect data over 399 plots across all funding sources. Sites monitored in 2023 funded by this agreement included: - Pike National Forest: Little Morrison/Sand Springs and Payne Gulch - Arapahoe Roosevelt National Forest: Kawland - White River National Forest: Ophir - Third year post-fire vegetation recovery monitoring in the Cameron Peak, East Troublesome, and Mullen fires. CFRI staff Katarina Warnick developed and applied dendrochronology and field based research methods for assessing lodgepole pine drought resilience in subalpine ecosystems in collaboration with RMRS colleagues Mike Battaglia and Wade Tinkham. CFRI staff Andrew Slack continued analyzing data for dendrochronological monitoring methods examining tree growth and resin duct production for inferring individual tree response and climate resilience following forest management along the Colorado Front Range. CFRI staff Marin Chambers collaborated with partners at The Nature Conservancy, USGS, and RMRS to continue experimental monitoring studies of tree seed sowing and seedling planting to inform reforestation management strategies in recent and old high intensity wildfires along the Colorado Front Range. CFRI staff Marin Chambers and Camille Stevens-Rumann developed, implemented, and monitored 3rd year results from a common garden tree planting study to examine tree species regeneration success across elevational, topographical, and fire severity gradients in northern Colorado. This was implemented in partnership with the Arapaho Roosevelt National Forest to inform reforestation strategies following wildfires in 2020. CFRI staff Kate Weimer completed a masters degree monitoring post-fire vegetation development following wildfires in 2020 across northern Colorado and southern Wyoming. Weimer, Kate. “Forest Type and Burn Severity Affect Understory Response to Historic Wildfires.” ProQuest Dissertations Publishing, 2023. Print. https://colostate.primo.exlibrisgroup.com/permalink/01COLSU_INST/51l05n/cdi_proquest_journals_2820278773

	Marin Chambers collaborated with partners at RMRS and CSU to support the oversight, field data collection, and data management for pre-treatment monitoring at the Adaptive Silviculture for Climate Change experimental site at State Forest State Park. Field crew time was paid on a separate agreement with RMRS, while funding in this agreement was leveraged to expand CFRI's engagement and enhance monitoring data collection by supporting Chambers' time leading the project.
3.2 Collaborate and coordinate with affected entities (i.e., other SWERI, and researchers with Forest Service R&D and other institutions to develop, deploy, adapt, and report on training, peer-learning and technical assistance resources (i.e., protocols, field guides, desk guides, short-courses) aimed at building and enhancing the capacity of agencies, organizations and collaboratives to monitor and measure the ecological, economic and social effects of landscape restoration, resilience and wildfire risk mitigation investments on achieving collaboratively-defined desired conditions and outcomes.	Colorado Forest Restoration Institute (2023). Woody Habitat Structure Monitoring: Protocol Addendum. CFRI-2317a. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Habitat-Protocol-Addendum_PDF.pdf Colorado Forest Restoration Institute (2023). 2023 Mothership Plot Protocol. CFRI-2316. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Mothership-Protocol-2023-v2.pdf Colorado Forest Restoration Institute (2023). 2023 Simple Plot Protocol. CFRI-2315. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Simple-Plot-Protocol-2023-v2.pdf Convened, facilitated, and documented workshops to coordinate amongst SWERI staff in CO, AZ, and NM ecological monitoring and research sampling protocols, field crew hiring practices, data analysis techniques, and exploring data sharing to leverage collective efforts for larger regional impact. - SWERI Ecological Monitoring Workshop, Jan 5th, 2023. - SWERI Climate adaptation and reforestation workshop, September 21st, 2023. - SWERI Post-Fire Workshop, September 25th, 2023. - SWERI Remote Sensing Group, November 13th, 2023.
3.3 Leverage and combine CFRI and SWERI monitoring data and outcomes measures with existing monitoring networks to draw stronger inferences and enhance knowledge of long-term post-treatment effects on forest conditions as the climate changes.	Rodman, K. C., Davis, K. T., Parks, S. A., Chapman, T. B., Coop, J. D., Iniguez, J. M., Roccaforte, J. P., Sánchez Meador, A. J., Springer, J. D., **Stevens-Rumann, C. S.,** Stoddard, M. T., Waltz, A. E. M., & Wasserman, T. N. (2023). Refuge-yeah or refuge-nah? Predicting locations of forest resistance and recruitment in a fiery world. *Global Change Biology*, 29, 7029–7050. https://doi.org/10.1111/gcb.16939 Scott Ritter, Kat Morici, and Camille Stevens-Rumann. 2023. Efficacy of prescribed fire as a fuel reduction treatment in the Colorado Front Range. *Canadian Journal of Forest Research*. **53**(6): 455-462. https://doi.org/10.1139/cjfr-2022-0259. CFRI staff Kevin Barrett and others performed data curation of long term monitoring networks and supported data analysis and interpretation for the following publication. The research paper was co-funded by additional agreements with the Rocky Mountain Research Station and Arapaho Roosevelt and Pike San Isabel National Forests: - Arièl B. Demarest, Paula J. Fornwalt, Brett H. Wolk, Kyle C. Rodman, Miranda D. Redmond, Mechanical forest restoration treatments stimulate understory plants in the Colorado Front Range, Forest Ecology and Management, Volume 548, 2023, 121322, ISSN 0378-1127, https://doi.org/10.1016/j.foreco.2023.121322.

3.4 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to convene, facilitate and report on peer-learning and knowledge exchange workshops specifically focused on multi-scale (spatial and temporal) monitoring strategies, methods and data systems to ensure integration, utility and contributions towards adaptive management.	November 16, 2023, convened, facilitated, and delivered information for the annual peer learning monitoring JAM session meeting in the Upper South Platte Partnership. The workshop was a hybrid format with 60 people in attendance. In addition to leading the workshop, CFRI delivered presentations of monitoring results. Meeting recording: https://cfri.box.com/s/om0qcqtr36jw8on8au6nozagpchjwk4a - Barrett, K.J. Collaborative Monitoring and Adaptive Management on the Front Range CFLRP Landscape: Was it Successful? Presented to members of the Upper South Platte Partnership. CFRI. - Slack, A.W., Perri, A.D. Hunter, T.M., Lehnert, S., Barrett, K.J., and Morici, K.E. Forest management promotes ecological restoration and hazardous fuels reduction in the Upper South Platte Watershed. Presented to members of the Upper South Platte Partnership. CFRI and Denver Mountain Parks. - Mechanical Restoration Treatments Shape Plant Community Composition in Colorado Dry Conifer Forests. Arièl Demarest, Biological Technician, USFS Rocky Mountain Research Station. - Colorado's Woody Biomass Potential for Innovation. Dr. Carlos Rodriguez Franco, Lead Forester, US Forest Service.
3.5 Develop and publish written products, and deliver oral presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, capacities, and best practices regarding monitoring treatment outcomes on achieving forest and wildfire risk mitigation ecological, economic and social objectives.	Slack, A. W., Barrett, K. J., Morici, K. E., Wolk, B. H., & Brown, H. L. C. (2023). Sand Springs Prescribed Fire: Post-Burn Monitoring Summary. CFRI-2318. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/11/SandSpringsPrescribedFire_PreliminaryPostBurnMonitoring_Summary_Slack_CFRI_2318.pdf. Funding for data collection, analysis, and reporting was leveraged with multiple other sources. Hunter, T. Slack, A.W., 2023. Newton Park Monitoring Report. CFRI-2310. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Habitat-Protocol-Addendum_PDF.pdf. Funding for data collection, analysis, and reporting was leveraged with multiple other sources. Funding from the Forest to Faucet Partnership was leveraged with funding in this agreement to complete monitoring reports for Ophir and Kawland forest management projects: - Morici, Kat M. 2023. Ophir Monitoring Summary. CFRI-2306. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Ophir_MonitoringSummary_Morici_CFRI_2306.pdf - Morici, Kat M. 2023. Kawland Monitoring Summary. CFRI-2307. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/Kawland_MonitoringSummary_Morici_CFRI_2307.pdf Anthony G Vorster, **Camille Stevens-Rumann**, Nicholas Young, Brian Woodward, Christopher Tsz Hin Choi, **Marin E Chambers, Antony S Cheng,** Michael Caggiano, Courtney Schultz, Matthew Thompson, Michelle Greiner, Greg Aplet, Robert N Addington, Mike A Battaglia, Daniel Bowker, Ethan Bucholz, Brian Buma, Paul Evangelista, David Huffman, **Stephanie Mueller**, Charles Rhoades, William H Romme, Andrew J Sánchez Meador, Wade T Tinkham, Matt Tuten, Amanda West Fordham. Metrics and Considerations for Evaluating How Forest Treatments Alter Wildfire Behavior and Effects, *Journal of Forestry*, Volume 122, Issue 1, January 2024, Pages 13–30, https://doi.org/10.1093/jofore/fvad036

	Gelles, R. V., Davis, T. S., & Barrett, K. J. (2023). Prescribed fire is associated with increased floral richness and promotes short-term increases in bee biodiversity in the ponderosa pine forest of the Southern Rocky Mountains. Agricultural and Forest Entomology, 25(3), 435-448. https://resjournals.onlinelibrary.wiley.com/doi/full/10.1111/afe.12565 Lad, L. E., Tinkham, W. T., Stevens-Rumann, C. S., 2023. Re-greening trees: Assessing post-fire changes to individual tree health and mortality at the Calwood Education Center. CFRI-2302. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/05/Lad_Tinkham_StevensRumann_ReGreening_Trees_CFRI_2302.pdf CFRI staff delivered oral presentations at the 10th International Association for Fire Ecology and Management Congress, December 4-8, 2023. - Ritter, S.M., Morici, K., and Stevens-Rumann, C.S., 2023. Efficacy of Prescribed Fire as a Fuel Reduction Treatment in the Colorado Front Range. Association for Fire Ecology, 10th International Fire Ecology and Management Conference, December 4th-8th, Monterey, California. - **Ritter, S.M.**, Pittman, K. Tinkham, W., Rhoades, C., and Hoffman, C.M. 2023. Impacts of steep slope forest treatments on potential fire behavior. Association for Fire Ecology, 10th International Fire Ecology and Management Conference, December 4th-8th, Monterey, California
Focal Area 4. Develop and deploy outcomes-based and climate-forward decision support for post-fire recovery and restoration	
4.1 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to co-sponsor, co-convene and report out on workshops and symposia that bring together researchers and managers to share knowledge and lessons learned about post-fire reforestation and watershed recovery outcomes.	CFRI staff helped convene and plan a webinar workshop with Southern Rockies Fire Science Network, RMRS, SWERI, and CSU research staff. CFRI staff were co-authors on all four topics presented on the webinar, and Marin Chambers delivered one of the presentations during the workshop. - Southern Rockies Fire Science Webinar Series - Rising from the Ashes; Post-fire regeneration strategies from recent Front Range fires (December 7, 2022). - Webinar agenda, recording and resources here: https://www.southernrockiesfirescience.org/event/rising-from-the-ashes-post-fire-regeneration-management-strategies-from-recent-front-range-fires/ - Recording: https://youtu.be/ew6ouMzs7-Q Wildfire Resilience Interagency Working Group and Wildfire Commission Post-fire Recovery Workshop - January 24, 2023, hosted at Denver Water. CFRI staff Camille Stevens-Rumann and Marin Chambers were invited panelist, along with Chris Dahl (USFS), Matt McCombs (CSFS), Madeline McDonald (Denver Water), to discuss issues related to long-term post-fire recovery and reforestation with policy makers and managers from across the West. Staff from the CFRI, American Forests, The Nature Conservancy Colorado Chapter, New Mexico Highlands University, New Mexico State University, and New Mexico Energy, Mineral and Natural Resouces Department gathered professionals from more than 70 organizations across nine states on February 23, 2023, to discuss challenges and opportunities relating to native conifer seed collection, processing, and storage. Workshop video: https://www.youtube.com/watch?v=PS5Io9UmJ90
4.2 Collaborate and coordinate with affected entities, other SWERI, other	CFRI staff Marin Chambers, in coordination with research partners at New Mexico State University and New Mexico Highlands University, developed and convened the

university researchers, and Forest Service R&D to compile, synthesize, apply and report on current research findings on post-fire reforestation and watershed recovery trends in collaboration with on-the-ground managers.	Southwest Reforestation Partnership. The mission of the Partnership is to support current and future reforestation needs in Arizona, Colorado, New Mexico, and Utah by building cross boundary partnerships to exchange information, technology, and expertise in support of the development of critical capacity, research, and infrastructure. Participants include leadership from state forestry agencies in all four states, reforestation and timber management leadership from US Forest Service regions 2, 3, and 4, academic partners, non-government organizations, and others. The goals is to create a network of reforestation actors that can leverage resources, expertise, and authority to be efficient and effective across all aspects of the reforestation pipeline – seed, nursery, outplanting, post-planting, and monitoring. Marin Chambers and CFRI staff convened, developed agenda's, facilitated, and took meeting notes for roughly quarterly meetings throughout 2023. Marin Chambers and Allie Rhea contributed technical analysis and collaborative engagement with the Arapaho Roosevelt reforestation working group. This included applying tree regeneration data and climate projections to inform on the ground reforestation actions on public and private lands working with USFS partners and Coalition for the Pouder River Watershed. Funding for Marin Chambers time on this effort was leveraged with agreements with the Arapaho Roosevelt National Forest. Allie Rhea continued to coordinate with staff at the Colorado Water Conservation Board to serve as a technical expert on the Wildfire Ready Watersheds program to help local groups understand planning needs and provide technical support to apply existing risk assessments to this new state funding program.
4.3 Collaborate and coordinate with affected entities, other SWERI other university researchers, Forest Service R&D, and other entities with science expertise in this topic area to advise on, customize inputs to, and deploy site-specific decision support tools that can be used by, and useful for, local-level reforestation and watershed recovery program managers to assess "biggest-bang-for-the-buck", optimal management actions.	CFRI staff Allie Rhea and Brett Wolk led and presented in 15+ meetings with the core technical team to develop a framework for Denver Water Forest to Faucets Partnership priority investments in forest management totaling over $30 million dollars in the next 5 years. This included running watershed and wildfire risk modeling, led treatment constraints outreach to gather consensus on cost and feasibility of forest management actions, ran iterative treatment optimizations based on stakeholder input, began drafting the technical report, and built a geodatabase and ArcGIS online map to communicate results with partners. CFRI staff Allie Rhea delivered a virtual presentation of Wildlife Modeling in Risk Assessment and Prioritization frameworks to the Endangered Species Working Group for the Wildfire Crisis Strategy Landscapes on July 23, 2023, to assess "bang for the buck" application to wildlife species modeling prioritization. https://cfri.app.box.com/s/v5aeh48zvndfllhy8tv64oe40ab254s8 CFRI staff Allie Rhea worked with SWERI partners and local place-based groups in New Mexico to apply and interpret post fire watershed modeling in the Hermits Peak / Calf Canyon fire. This help partners understand federal modeling tools from agencies such as FEMA, NRCS, and US Forest Service, so they can better contribute to prioritizing post fire emergency watershed protection activities within the burned area. CFRI staff Allie Rhea participated in discussion with conference participants and presented in a panel titled "After the Cameron Peak Fire: Collaboration for Mitigation of Post-Fire Watershed Impacts" at the Colorado Wildland Fire Conference on April 13, 2023, Fort Collins, Colorado.

4.4 Develop and publish written products, and deliver oral presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, best practices, and outcome measures regarding post-fire reforestation and watershed recovery.	Wasserman, T.N., **Mueller, S.E.** Climate influences on future fire severity: a synthesis of climate-fire interactions and impacts on fire regimes, high-severity fire, and forests in the western United States. Fire Ecology, 19, 43 (2023). https://doi.org/10.1186/s42408-023-00200-8 Marshall LPD, Fornwalt P, **Stevens-Rumann CS**, Rodman K, Schoegel C, Chapman T (2023) Site- and microsite-level drivers of post-wildfire tree seedling survival and growth. Fire Ecology 19(1), 1-12 https://doi.org/10.1186/s42408-023-00181-8 McDowell NG, Anderson-Teixeira K, Biederman JA, Breshears DD, Fang Y, Fernández-de-Uña L, Graham EB, Mackay DS, McDonnell1 JJ, Nehemy MF, **Stevens-Rumann CS**, Stegen J, Tague N, Turner MG, Chen X (2023) Ecohydrological decoupling under changing disturbances and climate. One Earth. Volume 6, Issue 3, Pages 251-266 https://doi.org/10.1016/j.oneear.2023.02.007 Davis, K.T., M.D. Robles, K.B. Kemp, P.E. Higuera, T. Chapman, K.L. Metlen, J.L. Peeler, K.C. Rodman, T. Woolley, R.N. Addington, B.J. Buma, C.A. Cansler, M.J. Case, B.M. Collins, J.D. Coop, S.Z. Dobrowski, N.S. Gill, C. Haffey, L.B. Harris, B.J. Harvey, R.D. Haugo, M.D. Hurteau, D. Kulakowski, C.E. Littlefield, L.A. McCauley, N. Povak, K.L. Shive, E. Smith, J.T. Stevens, **C.S. Stevens-Rumann**, A.H. Taylor, A.J. Tepley, D.J N. Young, R.A. Andrus, M.A. Battaglia, J.K. Berkey, S.U. Busby, A.R. Carlson, M.E. Chambers, E.K. Dodson, D.C. Donato, W.M. Downing, P.J. Fornwalt, J.S. Halofsky, A. Hoffman, A.Holz, J.M. Iniguez, M.A. Krawchuk, M.R. Kreider, A.J. Larson, G.W. Meigs, J.P. Roccaforte, M.T. Rother, H.Safford, M. Schaedel, J.S. Sibold, M.P. Singleton, M.G. Turner, A.K. Urza, K.D. Clark-Wolf, L.Yocom, J.B. Fontaine, J.L. Campbell. Reduced fire severity offers near-term buffer to climate-driven declines in conifer resilience across the western United States. (2023). Proceedings of the National Academy of Sciences, 120(11), e2208120120. https://doi.org/10.1073/pnas.2208120120 Marshall, L. A., Fornwalt, P. J., **Stevens-Rumann, C**. S., Rodman, K. C., Rhoades, C. C., Zimlinghaus, K., Chapman, T. B., & Schloegel, C. A. (2023). North-facing aspects, shade objects, and microtopographic depressions promote the survival and growth of tree seedlings planted after wildfire. Fire Ecology, 19(1), 26. https://doi.org/10.1186/s42408-023-00181-8 Chambers, Marin, delivered presentation at the SWERI Cross-boundary Landscape Restoration Workshop, May 3, 2023, in Fort Collins, Colorado. “Reforestation Pipeline: Challenges and Opportunities in a Changing Climate.” Presentation: https://cfri.box.com/s/x6b2rgzrhgw7oumbcb6aii6b8xjqg3or Video recording: https://www.youtube.com/watch?v=NX4vwSYQS14 CFRI staff delivered oral presentations at the 10th International Association for Fire Ecology and Management Congress, December 4-8, 2023, Monterey, California. - **Mueller, S.E**., & Wasserman, T. N., “Climate influences on future fire severity: A synthesis of climate-fire interactions and impacts on fire regimes, high-severity fire, and forests in the western United States.” Poster presentation. - **Chambers, M.E**., Chapman, T., Schloegel, C., Fornwalt, P., Rodman, K., Stevens, J. “Give seeds a chance: opportunities and techniques to reestablish ponderosa pine forests using post-fire direct seeding.” Oral presentation.

	- **Stevens-Rumann CS,** Fornwalt P, Weimer K. 2023. Per to post-fire plant communities following extreme wildfires in Colorado. 10th International Fire Ecology and Management Congress, Monterey CA, December 2023.
Focal Area 5: Translate science principles into practice	
5.1 Collaborate and coordinate with the other SWERI, land and wildfire managers, regional and statewide boundary organizations and collaboration networks, RMRS and other science delivery entities to co-organize, convene and report on the SWERI workshop, "Cross-boundary Landscape Restoration and Resilience in the Southwest" and follow-up topic- or geography-specific workshops.	CFRI staff co-led planning for a Cross Boundary Landscape Restoration workshop held on May 2nd-4th, 2023, at Colorado State University in Fort Collins, Colorado. Nearly 300 participants participated in the event, which included keynote speakers from UDSA and DOI national leadership, tribal partners, leaders in academic research, and Rep. Joe Neguse, among many others. CFRI staff led all logistical planning for the workshop, in addition to co-leading agenda development and other workshop aspects with cross boundary partners, including the other SWERI in Arizona and New Mexico, The USFS Rocky Mountain Research Station, Forest Stewards Guild, the National Cohesive Wildland Fire Management Strategy, National Forest Foundation, and Trees, Water, and People. Cross Boundary website: https://sweri.org/cross-boundary-landscape-restoration-workshop/ CFRI staff Hannah Brown, Brett Wolk, and Jackie Edinger, co-authored a summary article with other SWERI partners. Cross-boundary workshop reimagines fire-adapted forest landscapes. CSU SOURCE. June, 2023. https://warnercnr.source.colostate.edu/cross-boundary-workshop-reimagines-fire-adapted-forest-landscapes/ Simmons B., Wilson M, Hannah B, and Wolk B. Cross Boundary Landscape Restoration Workshop - Adapting to a Climate-Altered West. Summary video. August, 2023. https://www.youtube.com/watch?v=5bAgWnwET1E&t=259s Working with other SWERI partners, CFRI staff have continued developing a summary of lessons learned and actions from the workshop.
5.2 Develop and disseminate a range of media (i.e., video, podcasts, social media, Story Maps) and products (i.e., colorful graphics, photos guides) that distill the scientific and management complexities about forest restoration, resilience and wildfire risk mitigation in a changing climate targeted to general audiences. Topics may include, but are not limited to: a. Basics of forest restoration, resilience and wildfire risk mitigation in the Southern Rocky Mountains and Interior West. b. Lessons learned from applications of risk assessment decision support methodologies to prioritize forest restoration and wildfire risk management actions at multiple scales, from	Collaborative Readiness: Prepare Landscapes and Communities to Receive and Recover from Wildfire. **Ch'aska Huayhuaca**, **Antony Cheng, Tyler Beeton,** John Sanderson, Alan Barton, Aaron Kimple, Melanie Colavito, Joseph Zebrowski, **Jarod Dunn**, Nicolena vonHedemann, **Andrew Slack**. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/09/SWERI_etal_2023_Summary_CollaborativeReadinessFramework.pdf Schloegel, C.A., **Chambers, M.E**. 2023. Ponderosa Pine Cone and Seed Collection: Frequently Asked Questions and Answers for the Colorado Front Range. CFRI-2308. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/07/PonderosaPineConeSeedCollectionQA_Schloegel_Chambers_CFRI2308.pdf Risk Assessment Decision Support (Rads) In Chaffee County, Colorado: Executive Summary. Jarod Dunn, Brett Wolk. CFRI-2304. https://cfri.colostate.edu/wp-content/uploads/sites/22/2023/03/Dunn_Wolk_ChaffeeCountyCaseStudy_ES_CFRI_2304.pdf CFRI staff Angela Hollingsworth developed graphics with CFRI and US Forest Service partners on the Wildfire Risk Management Science team to distill down concepts around implementing PODs using simple graphics and communication tools

Community Wildfire Protection Plans to large watersheds encompassing multiple ownerships and jurisdictions to regional or national programs. c. Lessons learned from applications of the Potential Operational Delineations (PODs) framework to advance pre-fire fuel treatment planning and cross-boundary wildfire response. d. Methods and best practices to enhance collaborative resilience for cross-boundary shared stewardship of high-priority landscapes. e. Operationalizing climate change decision support tools to inform forest landscape planning and wildfire risk assessments.	for a non-fire professional audience. These graphics were used in multiple presentations to land managers and national leadership audiences, as well as short summary briefs, storymaps, and other materials. Camille Stevens-Rumann and Allie Rhea developed a podcast to communicate the science based connection between fires and watershed processes, and share management applications. Published June 27, 2023. The River Radius podcast: Fires and Floods. https://www.theriverradius.com/episodes/episode/28f29e66/fires-and-floods
5.3 Develop, maintain, and regularly update CFRI online platforms and social media to communicate latest science applications that produced outcomes from forest restoration and wildfire risk management projects and programs.	Maintained up to date information and links on CFRI website and all associated pages, including posting publications, current events, and other information to keep the website up to date and relevant. https://cfri.colostate.edu/ CFRI staff worked to improve organization and updated graphics and information on the CFRI Collaborations webpage to better communicate our partnerships https://cfri.colostate.edu/collaborations-and-partnerships/. CFRI staff continued growing social media strategies and coordinated stories to deliver relevant information that informs forest restoration and wildfire risk reduction projects and programs. This includes maintaining platforms across Twitter / X, Facebook, and Instagram.
5.4 Synchronize science application and communication events with other SWERIs, Fire Science Exchange Networks, RMRS, and other research entities that feature ways in which managers and their stakeholders actually used scientific results and decision support methodologies to produce measurable outcomes. These may include, but not limited to: webinars, story maps, or multi-media expositions.	Co-coordinated and contributed to SWERI Communications team regular meetings and events to coordinate communication amongst institutes. This includes updating SWERI branding messaging and graphical elements, updating materials posted to the SWERI website www.sweri.org, creating a SWERI YouTube channel www.youtube.com/@SouthwestEcologicalRestoration to host recordings of SWERI events and messaging, promoting each SWERI institutes events and publications, and supporting cross-SWERI communication between subject matter experts. Convened quarterly meeting with RMRS Science Applications and Communication staff to coordinate overall communication efforts and develop messaging around the selective use of science information in forestry and wildfire collaborative adaptive management. This led to the development of a potential webinar on selective science use for a larger audience across the western USA, tentatively planned for spring 2024. Collaborated with Southern Rockies Fire Science Network for the Colorado Wildfire Risk Assessment (CO-WRA) Improved Tools and Analysis for Planning learning webinar session #1, July 19, 2023. The webinar covered the major changes in CO-WRA, including modification of standard fire behavior fuel models to better reflect fuel types in Colorado. https://www.youtube.com/watch?v=snpr0IHSLII

5.5 Translate science delivery and communication materials and multi-media expositions into languages other than English to increase accessibility to and audience for knowledge resources pertaining to forest restoration, resilience and wildfire risk mitigation.	Translating CFRI documents into Spanish was initiated by identifying an audience and relevant CFRI materials to be translated. A translator was hired and performed an initial draft translation. The process was stalled by lack of CFRI capacity, expertise, and ability to additional support not being able to find anyone with the capacity to quality check the first draft translation.
5.6 Develop and publish written products, and deliver oral presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on lessons learned and best practices for translating science-based principles into practice for forest restoration, resilience and wildfire risk mitigation.	Conducted research and submitted a manuscript for review in Journal of Forestry assessing the communication and outreach factors that facilitated science application of forest restoration principles on the Colorado Front Range. Project is conducted in partnership with Nehalem Clark and USFS Rocky Mountain Research Station. CFRI Director Tony Cheng provided a testimony to the United States Senate Committee on Agriculture, Nutrition, and Forestry on the topic: Forestry in the Farm Bill: The Importance of America's Forests. March 30th, 2024. https://www.agriculture.senate.gov/hearings/forestry-in-the-farm-bill-the-importance-of-americas-forests Brett Wolk and Hannah Brown presented on communicating the use of selective science to develop false narratives around forest and fire management. CSU Center for Collaborative Conservation Branching Out Webinar: Panning for Nuggets of Science Gold: Reframing Forestry & Wildfire Management Communication https://www.youtube.com/watch?v=94KbsBAK1jM August 24th, 2023. Wolk, Brett. Knowledge Co-Production and Tools for Ecology Informed Forest Management. Presented at a joint meeting of the NRCS/NWTF Western Forest Leadership Summit. August 31st, 2023, Fort Collins, CO. https://cfri.box.com/s/dbp7ilnj546a38c9nmzi3x4vrd1a4hyx Brett Wolk and Hannah Brown delivered a presentation and discussion with CSU's Science Writer's club around the use of selective science to develop false narratives around forest and fire management. Panning for Nuggets of Science Gold: Reframing Forestry & Wildfire Management Communication: https://cfri.box.com/s/nq8vn40vd030cv7xs34p55feecqgq7oz. November 29th, 2023. Sara Brown and Tony Cheng, Fire AFEx Talk. Nudging the anchor: deeply held assumptions and shifting the fire paradigm. Presented at the 10th International Fire Ecology and Management Congress, Association for Fire Ecology, December 5, 2023, Monterey, California, USA.
Focal Area 6: Collaborative capacity-building and peer-learning across diverse perspectives	
6.1 Develop, sponsor, support and report on training, continuing education and leadership development in collaborative processes for CFRI staff.	2022 SWERI Leadership Retreat, Santa Fe, New Mexico, October 2022. CFRI staff contributed to the planning team and 9 CFRI staff attended this 3-day retreat, which provided an opportunity for the SWERI to engage directly with collaborative processes, discuss strategic communications for the institutes, identify working groups to better coordinate projects, develop SWERI talking points for media relations, and discuss opportunities for incorporating DOI and tribal engagement amongst the institutes. Agenda: https://cfri.box.com/s/jkcsn0decvzreluwpptwkekq1ag48150

	2023 SWERI Leadership retreat: CFRI staff led all the planning, logistics, meeting facilitation, and documentation for the 2024 SWERI Leadership Retreat October 2nd-4th, 2023, in Durango, Colorado. The event convened approximately 25 staff across all SWERI to enhance zones of agreement on key issues impacting the SWERI. Event agenda here: https://cfri.box.com/s/0nmi7e5iurzqguy7znlfk4v0b8zior09 CFRI staff developed and convened a 3-day internal strategic planning workshop March 6th-8th, 2023, to develop clarity around CFRI focal areas of expertise, break down silos between staff and program areas, and discuss strategic partnerships and future directions amongst all staff. Agenda available here https://cfri.box.com/s/sat1kxsn2zzssft4d92tw418s8zwtvop
6.2 Develop, sponsor, support and report on training, continuing education and peer-learning opportunities around collaboration principles and best practices for forest and wildfire managers, researchers, collaborative leaders and interested and affected stakeholders.	Continued supporting the Colorado Forest Collaboratives Network by serving as advisors with the Center for Collaborative Conservation to support network development. CFRI staff Brett Wolk and Ch'aska Huayhuaca-Frye served on the planning committee for the Colorado Forest Collaboratives Summit, held September 6th-8th. The event gathered over 100 collaborative leaders from across Colorado and the region in Salida, Colorado. Brett Wolk served as a panelist to share secrets of success for integrating decision support tools with collaborative processes. https://collaborativeconservation.org/2023/10/06/cfcn-summit-summary-2023/ Matt Thompson, Tony Cheng, and Jim Menakis, Mapping the National Cohesive Wildland Fire Management Strategy through a systems approach. Facilitated "Fire Circle" workshop at the 10th International Fire Ecology and Management Congress, Association for Fire Ecology, December 5, 2023, Monterey, California, USA. Tony Cheng co-led development and facilitation of the workshop, with multiple CFRI staff supporting with note taking and small group facilitation. Convened and led 8 Firelab peer learning sessions in Fort Collins, Colorado. The CFRI Firelab peer learning series is an informal group that meets once a month for interactive peer-learning about wildland fire and forestry. Our goal is to bring together professors, students, professionals, and agency personnel from CSU and the local community to discuss current fire and forestry topics. - January 10, 2023. The WiRe Team: Putting People at the Center of Wildfire Solutions. James Meldrum, USGS Research Economist - February 14, 2023. Using Risk Assessment Decision Supports (RADS) for Updating Chaffee County's Community Wildfire Protection Plan (CWPP). Jarod Dunn, CFRI Research Associate - March 14, 2023. Inspiring Action after the Planning is Done. Megan Matonis, The Ember Alliance, Wildland Fire Analyst - June 11, 2023. Community Wildfire Risk Mitigation Capacity in Colorado. Karissa Courtney, Colorado State University M.S. Student - July 11, 2023. Colorado State Forest Service Nursery Tour and Insights. Scott Goodwin, Nursery Manager - August 8, 2023. Tour of OneCanopy. Katelynn Martinez, Director of Operations and Business Development - September 12, 2023. Strategy in Wildfire Management. Matt Thompson, USFS Research Forester - October 10, 2023. Reforestation Quick-Talks: Multiple experts and their perspectives in 10 minutes followed by Q&A. Co-hosted by Coalition for the Poudre River Watershed and CFRI.

	○ Introduction to reforestation challenges and solutions in USA and CO. Marin Chambers, Colorado Forest Restoration Institute ○ Reforestation Directory and marketplace and Cameron Peak Reforestation strategy and contributions by The Nature Conservancy. Rob Addington, The Nature Conservancy. ○ Cameron Peak Reforestation Group challenges and opportunities. Hally Strevey, Cory Dick, Megan Maiolo-Heath, Coalition for the Poudre River Watershed. ○ Arapaho & Roosevelt National Forest reforestation challenges and opportunities. Jonathan Grand, US Forest Service.
6.3 Develop, sponsor, support and report on outreach, internships and collaborative learning events involving individuals from under-represented populations in forest restoration, resilience and risk mitigation decision-making and management.	CFRI staff continued convening a Diversity, Equity, Inclusion, and Social Justice team to increase shared understanding and practice of DEIJ amongst CFRI staff, and explore opportunities to expand impact with external partners to better incorporate traditionally underrepresented populations and individuals in forestry and fire research and collaborative adaptive management. Activities in 2023 included monthly team meetings to share individual team member learning and organizational successes and challenges, coordinate activities between CSU students and CFRI staff such as DEIJ field crew trainings, student mentorship, field crew exit interviews, and initiating a CFRI Student DEIJ team, enhance CFRI new employee onboarding materials, and gather informed feedback for staff to implement more inclusive language in our work. CFRI staff Brett Wolk, Camille Stevens-Rumann, Brooke Simmons, Savannah Lehnert, and Marin Chambers met with students from urban Denver as well as rural areas in eastern Colorado on June 21, 2023 and June 28, 2023 at the Cal-Wood Education Center. CFRI staff led discussions on issues in forest and fire ecology and management in Colorado, explored education and career opportunities in Forestry beyond traditional academic faculty roles, and trained students on three different forest monitoring techniques. CFRI staff Savannah Lehnert and Sienna Wessel hosted and coordinated 4 Forest Chat learning sessions in 2023. These presentations connect Colorado State University students with the latest forestry research, management, and career paths by exploring the stories and work of CFRI staff and partners. - January 25, 2023. Restoring plant biodiversity by combining ecological theory and observation. Sienna Wessel, CFRI - March 2, 2023. Lessons learned from wildfires as a global phenomenon. Camille Stevens-Rumann, CFRI - March 29, 2023. We Feminine Foresters: Women, Nature, and Forestry, 1850-1970. Rachel Kline, USFS Historian - April 26, 2023. PODs: Safer and More Effective Wildland Fire Management. Ty Aldworth, CFRI

For FY23 agreement number 23-DG-11030000-012, CFRI reports the following cumulative accomplishments toward each project deliverables in the work plan for dates while the agreement was active, including July 14th, 2023 through December 31st, 2023:

Deliverable	Status of Deliverables
Focal Area 1. Spatial Wildfire Risk Assessment and Decision Support.	
1.1 Collaborate and coordinate with affected entities to advise, customize, apply, update and report on RADS frameworks that inform cross-boundary assessment, planning, NEPA processes, and adaptive management on between 1-3 focal landscapes identified in federal-state Shared Stewardship strategies, NRCS strategic investments, State Forest Action Plans, US Forest Service focal investment areas, and other landscapes targeted for investments by collaborative partnerships.	In Progress.
1.2 Collaborate and coordinate with affected entities in between 1-3 landscapes not identified in priority focal area lists to advise, customize inputs to, apply, update and report on RADS frameworks to inform cross-boundary assessment, planning, NEPA processes, and adaptive management to restore/enhance forest resilience and reduce wildfire risks.	Work continues supporting development and integration of spatial wildfire decision support tools in western Colorado with the West Region Wildfire Council and their partners. CFRI staff Brett Wolk and Stephanie Mueller, in collaboration with the Colorado State Forest Service, continue development of the Colorado Forest Management Activity Tracker. CFRI roles include conceptualization, communication, and leadership direction, as well as management of federal agency forest activity data systems and advising on database best management practices. Making forest and fire management data accessible across all land ownerships facilitates equitable access to information and resources for communities not in priority landscapes. https://csfs.colostate.edu/colorado-forest-tracker/
1.3 Improve wildfire risk and resilience analysis decision support frameworks and tools to better reflect a broader set of risks and tradeoffs for different management actions, which could include climate vulnerability decision support frameworks, social vulnerability and environmental justice considerations, explicitly connect fuels management, wildfire response, and post-fire recovery strategies, better aligning field observations with model assumptions, or integrating impacts of additional activities that compliment vegetation management to help communities better co-steward fire adapted forested landscapes.	In Progress.
1.4 Develop and publish between 2-4 written products, and deliver between 3-6 presentations at professional meetings, peer- learning events, academic-oriented conferences, and policy-	Beeton T., Aldworth T., Huayhuaca C., Wolk B. Integrating the Potential Operational Delineations (PODS) Spatial Fire Planning Framework into CWPP's: A Primer. https://cfri.box.com/s/o1j1iw5ao89k3vh1c6xygue1l63uuqzd. Delivered

maker briefings to report on strategies, capacities, analytical methods, and best practices regarding the use and effectiveness of science- and risk-based methodologies, approaches, and planning processes being used in collaborative forest restoration, resilience and risk mitigation approaches across the Interior West.	presentation, and CFRI staff Brett Wolk helped co-teach 2 day Community Wildfire Protection Plan training workshop with The Ember Alliance for 45 participants at the National Cohesive Wildland Fire Strategy Workshop, November 4th-5th, 2023, Santa Fe, New Mexico.
Focal Area 2. Collaborative Readiness, Resilience, and Adaptive Management.	
2.1 Collaborate and coordinate with other SWERI and affected entities to co-design, deploy and adapt strategies to monitor, assess and report on factors affecting the readiness, effectiveness, resilience and adaptiveness of multi-stakeholder collaborative processes associated with forest restoration, resilience and wildfire risk mitigation. Potential projects may include, but are not limited to: • Collaborative Forest Landscape Restoration Program • Community Wildfire Protection Planning groups • National Priority Landscapes identified under the US Forest Service's Wildfire Crisis Strategy	CFRI staff continue coordinating with other SWERI and sustain regular communication to serve as a resource for national CFLR Program Managers. This engagement includes conducting an assessment of collaborative resilience across all currently funded CFLRP projects across the country.
2.2 Collaborate and coordinate with other SWERI and affected entities to co-design, deploy and adapt methods to monitor social and economic outcomes of multi-stakeholder collaborative activities associated with forest restoration, resilience and wildfire risk mitigation,	In progress.
2.3 Develop and publish 2-4 written products, and deliver 3-6 presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, capacities, and best practices regarding strategies, capacities, and techniques to enhance the readiness, resilience and adaptiveness of multi-stakeholder forest and wildfire risk mitigation collaboratives to inform collaborative capacity-building investment strategies	Huayhuaca, C. (2023, October 12). Stepping through stages of collaborative readiness to achieve process and performance outcomes. Presented to the Capacity Working Group of the Western Collaborative Conservation Network, virtual. https://cfri.box.com/s/5cwt83iu23sf2wwsk956yieu109uy63c Beeton, T.A. (2023). Collaborative governance dynamics and durability: Processes and structures to maintain collaborative process and performance. Invited presentation to National Forest Foundation CFLRP Peer Learning session, November 9, 2023. https://vimeo.com/884197310
Focal Area 3. Measure Ecological Outcomes of Fire Adapted Forests.	
3.1 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D and other federal natural resource research programs to develop, deploy, and adapt monitoring strategies, and report on	CFRI staff began planning for 2024 field season to support the collection, management, analysis, and reporting of forest vegetation and wildfire fuels monitoring data to examine longer term (e.g. 1-10 year) ecological trends following forest management on the following projects. This also included initiating the hiring and planning for the training of approximately 20 seasonal staff and undergraduate students in field

monitoring outcomes for between 2-4 projects that measure the biophysical outcomes pre- and post-fire treatments across spatial and temporal scales relative to collaboratively-defined desired conditions and outcomes. Outcomes may include, but are not limited to: a. Changes in fire metrics b. Post-fire forest recovery c. Post-fire watershed recovery d. Forest structure and arrangement e. Effects on wildlife	monitoring protocols.
3.2 Collaborate and coordinate with affected entities to develop, deploy, adapt, and report on between 2-4 training, peer-learning and technical assistance resources (i.e., protocols, field guides, desk guides, short- courses) aimed at building and enhancing the capacity of agencies, organizations and collaboratives to monitor and measure the ecological effects of landscape restoration, wildfire risk mitigation, and post-fire forest and watershed recovery investments on achieving collaboratively-defined desired conditions and outcomes	In Progress.
3.3 Leverage and combine CFRI and SWERI monitoring methods, data, and outcome measures with existing monitoring data networks to improve monitoring practices and draw stronger inferences that enhance knowledge of long-term post-treatment effects on forest conditions as the climate changes.	In Progress.
3.4 Develop and publish between 2-4 written products, and deliver between 2-4 presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, capacities, and best practices regarding monitoring pre-fire mitigation and post-fire recovery treatment outcomes on achieving ecological, economic and social objectives.	In Progress.
Focal Area 4. Climate-forward Adaptation for Post-fire Recovery and Restoration	
4.1 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to co-sponsor, co-convene and report out on between 2-4 workshops and symposia that bring together researchers and managers to share knowledge and lessons learned about post-fire reforestation and watershed recovery outcomes.	Chambers, M.E, and Schloegel, C. convened a Cone Collection Strategy Workshop for federal, state, local, and NGO professionals titled: "The Need for Reforestation in Colorado." Hosted at Boulder County Parks and Open Space, Oct 18, 2023.

4.2 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to compile, synthesize, apply and report on current research findings on post-fire reforestation and watershed recovery trends in collaboration with on-the-ground managers.	CFRI staff Marin Chambers, in coordination with research partners at New Mexico State University and New Mexico Highlands University, continues convening the Southwest Reforestation Partnership. The mission of the Partnership is to support current and future reforestation needs in Arizona, Colorado, New Mexico, and Utah by building cross boundary partnerships to exchange information, technology, and expertise in support of the development of critical capacity, research, and infrastructure. Participants include leadership from state forestry agencies in all four states, reforestation and timber management leadership from US Forest Service regions 2, 3, and 4, academic partners, non-government organizations, and others. The goals is to create a network of reforestation actors that can leverage resources, expertise, and authority to be efficient and effective across all aspects of the reforestation pipeline – seed, nursery, outplanting, post-planting, and monitoring.
4.3 Collaborate and coordinate with affected entities, other SWERI and university researchers, Forest Service R&D, and other entities to explicitly connect fuels management, wildfire response, and post- fire recovery strategies and operational actions relative to water supplies and tree regeneration refugia at risk of loss from wildfire.	In Progress.
4.4 Develop and publish between 2-4 written products, and deliver between 4-6 presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on strategies, best practices, and outcome measures regarding post-fire reforestation and watershed recovery	In Progress.
Focal Area 5: Translate science principles into practice.	
5.1 Collaborate and coordinate with the other SWERI, land and wildfire managers, regional and statewide boundary organizations and collaboration networks, RMRS and other science delivery entities to co-organize, convene and/or complete reporting on the previous semi-annual event for the SWERI Cross Boundary Landscape Restoration Workshop and/or between 1-3 follow-up topic- or geography-specific workshops.	Working with other SWERI partners, CFRI staff have continued work developing a summary of lessons learned and actions from the 2023 SWERI Cross Boundary Workshop. https://sweri.org/cross-boundary-landscape-restoration-workshop/
5.2 Develop and disseminate between 2-4 outreach products through a diversity of media (i.e., video, podcasts, colorful graphics, photos guides, Story Maps) that distill the scientific and management complexities about forest restoration, resilience and wildfire risk mitigation in a changing climate targeted to general audiences. Topics may include, but are not limited to:	In progress.

a. Foundational principles of forest restoration, resilience and wildfire risk mitigation in the Southern Rocky Mountains and Interior West. b. Lessons learned from applications of risk assessment decision support methodologies to prioritize forest restoration and wildfire risk management actions at multiple scales, from Community Wildfire Protection Plans to large watersheds encompassing multiple ownerships and jurisdictions to regional or national programs. c. Lessons learned from applications of the Potential Operational Delineations (PODs) framework to advance pre-fire fuel treatment planning and cross-boundary wildfire response. d. Methods and best practices to enhance collaborative resilience for cross-boundary shared stewardship of high-priority landscapes. e. Operationalizing climate change decision support tools to inform forest landscape planning and wildfire risk assessments.	
5.3 Develop, maintain, and regularly update CFRI online platforms and social media to communicate latest science applications that produced outcomes from forest restoration and wildfire risk management projects and programs.	CFRI staff continue maintaining up to date information and links on CFRI website and all associated pages, including posting publications, current events, and other information to keep the website up to date and relevant. CFRI staff began assessing strategies for growing more impactful social media strategies and coordinated stories to deliver relevant information that informs forest restoration and wildfire risk reduction projects and programs. This includes maintaining platforms across Twitter / X, Facebook, and Instagram, and exploring establishing a presence on LinkedIn.
5.4 Translate science delivery and communication materials and multi-media expositions into languages other than English to increase accessibility to and audience for knowledge resources pertaining to forest restoration, resilience and wildfire risk mitigation.	In Progress.
5.5 Develop and publish 1-2 written products, and deliver 2-4 presentations at professional meetings, peer-learning events, academic-oriented conferences, and policy-maker briefings to report on lessons learned and best practices for translating science-based principles into practice for forest restoration, resilience and wildfire risk mitigation.	In Progress.

Focal Area 6: Collaborative Capacity-building and Peer-learning Across Diverse Perspectives	
6.1 Develop, sponsor, support and report on between 2-4 training, continuing education and leadership development in collaborative processes for CFRI staff	CFRI staff initiated planning for the 2024 CFRI Strategic Planning Workshop, scheduled for February 26-28th, 2024, to develop clarity around CFRI focal areas of expertise, break down silos between staff and program areas, and discuss strategic partnerships and future directions amongst all staff. Planning included securing venue and logistics, convening a planning team, and contracting with Peak Facilitation to facilitate the event.
6.2 Develop, sponsor, support and report on training, continuing education and peer-learning opportunities around collaboration principles and best practices for forest and wildfire managers, researchers, collaborative leaders and interested and affected stakeholders.	Continued supporting the Colorado Forest Collaboratives Network by serving as advisors with the Center for Collaborative Conservation to support network development. CFRI staff Ch'aska Huayhuaca-Frye is serving on the planning committee for the 2024 Colorado Forest Collaboratives Summit.
6.3 Develop, sponsor, support and report on outreach, internships and collaborative learning events involving individuals from under-represented populations in forest restoration, resilience and risk mitigation decision-making and management.	In Progress