COLORADO FOREST RESTORATION INSTITUTE 2024 ANNUAL REPORT

COLORADO FOREST
RESTORATION INSTITUTE
COLORADO STATE UNIVERSITY

September 2025

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 (CSU). 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 strive to earn trust through being rigorous and objective in integrating currently available scientific information into decision-making through collaborative partnerships involving researchers, land managers, policy makers, interested and affected entities, 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 rigor and appropriateness before applying in your own work.

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 2004 Southwest Forest Health and Wildfire Prevention Act (Public Law 108-317). This annual report provides a snapshot of accomplishments of the Colorado Forest Restoration Institute at Colorado State University across all funding sources, and reports on deliverables for agreements that were active in calendar year 2024 approved by the Southwest Ecological Restoration Institutes Executive Team and funded under the Act through Congressional annual appropriations.

Acknowledgments: I thank the many other CFRI staff who contributed to compiling information, developing the CFRI 2024 Facts at a Glance, or writing text in previous reports that remains in this report, including Hannah Brown, Tony Cheng, Karissa Courtney, Angela Hollingsworth, Hannah O'Reilly, Brooke Simmons, and Camille Stevens-Rumann.

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Cover Photo Credit: Andrew Slack, Sand Springs Prescribed Burn, South Platte Ranger District, Pike-San Isabel National Forest

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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 2024. 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.

[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

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 served as the director of CFRI from April 2008 through June 30, 2024. In October 2024, Camille Stevens-Rumann, Associate Professor in the Forest and Rangeland Stewardship Department and CFRI Assistant Director, was named CFRI Interim Director. CFRI had twenty-seven full-time employees (including the Director) and approximately twenty-two part-time or seasonal employees, which was similar to 2023 staffing levels. Our seasonal and part time employees included undergraduate students, graduate students, and non-student staff. All CFRI employees report to the CFRI Director. In turn, the Director 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 the structures and processes of multi-stakeholder collaborative 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 to improve effectiveness of forest restoration, fuels treatment, and wildfire risk reduction activities by providing more descriptive performance measures than acres or volume produced.

Focal Area 4. Post-Wildfire Reforestation and Recovery
This focal area encompasses CFRI expertise and capacity, and our long-standing collaboration with scientists at numerous other universities and research institutions to develop, translate, and operationalize actionable scientific knowledge about post-fire reforestation and watershed recovery opportunities and challenges increasingly faced by land managers and their partners as patterns of disturbance and capacity to recover undergo continual change.

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, post-fire recovery and related topic Areas.

Focal Area 6. Collaborative Capacity-Building
For this focal area, we invest in both CFRI staff and our partners to co-develop, lead and participate in trainings, continuing education, peer-to-peer learning events, and the constant intra- and inter-organizational communications and administration required to sustain working relationships and keep projects moving to completion 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 appropriations allocated to each institute are approved by the Secretary of Agriculture, in consultation with the Secretary of Interior. With a ramp up of increased SWERI federal appropriations, beginning in federal fiscal year 2021 the three SWERI Institutes were able to achieve equal 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, state, and local government and non-governmental 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 2024 with CFRI staff as the Principal Investigator. CFRI staff leverage additional funding by participating as Co-Principal Investigators and collaborators in additional projects not listed here, which further expands our funding and impact.

Source	Project Title	Agreement Number	Amount
USDA Forest Service, Southwest Region	Colorado Forest Restoration Institute, SWERI FY24	24-DG-11030000-020	$2,200,000
USDA Forest Service, Grand Mesa-Uncompahgre-Gunnison National Forests	Monitoring Analysis and Interpretation Support for Science Informed Management	24-CS-11020400-033	$40,000
USDA Forest Service, Rocky Mountain Research Station	Adaptive Silviculture for Climate Change	24-JV-11221633-103	$80,794
Joint Fire Science Program, subaward through the USDA Agricultural Research Service	23-2-01-10: Using Landscape features, plot measurements, and remote sensing data to improve predictions of fuels treatment longevity in the CO Front Range	58-3012-4-001	$172,562
Colorado Department of Natural Resources	Colorado Forest Restoration Institute (CFRI) Colorado Strategic Wildfire Action Program (COSWAP) 2024-2028	192961	$270,712
TOTAL			**$2,764,068**

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)
2020	1,100	1,036	604
2021	2,000	414	1,051
2022	2,000	4,442	2,637
2023	2,200	2,470	1,625
2024	2,200	564	1,257
TOTAL	**9,500**	**8,926**	**7,174**

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 funding to support a portion of faculty salary for institute Directors, including 4.5 months of faculty salary to Tony Cheng (Director January to June), and 6.75 months of faculty salary to Camille Stevens-Rumann (Assistant Director, and Interim Director July to December). In 2024, all state support totaled approximately $1,256,623.

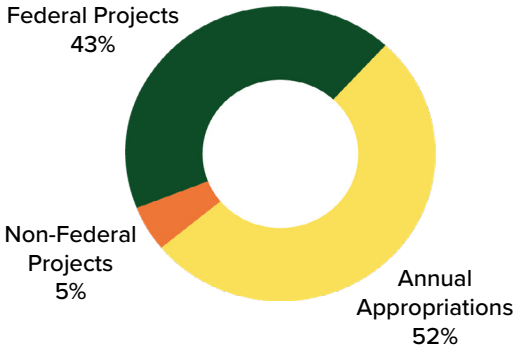
Below is the CFRI 2024 Facts at a Glance with highlights of our 2024 projects and accomplishments across all our funding agreements.

COLORADO FOREST RESTORATION INSTITUTE
COLORADO STATE UNIVERSITY

2024 Facts at a Glance

ANNUAL OPERATING BUDGET

Approximately **$3 million** annually



Since 2010 CFRI has raised more than **$27 million**, leveraging annual appropriations 1:1 with external funding

The State of Colorado, through CSU, provides partial directors' salary and in-kind support for CFRI facilities and administration equivalent to over **$10 million** since 2010

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

FOREST HEALTH AND WILDFIRE RISK

PROJECT MONITORING

638
plots measured in 2024

5,201
total plots since 2010

433
forest management units across 74,000+ acres

WILDFIRE PLANNING TOOLS

6
new landscapes in 2024

39
total landscapes continually engaged

137+ million
acres on the ground impact across the western USA

BEFORE FIRE

SETTING FORESTS AND FIREFIGHTERS UP FOR SUCCESS

- Pre-planning where to engage fires before they start with Potential Operational Delineations (PODs)
- Identifying the most efficient and effective places to support firefighting efforts with forest management

DURING FIRE

DELIVERING CRITICAL INFORMATION TO PROTECT FORESTS AND COMMUNITIES

- Assessing and improving efficiency of communication through Incident Strategic Alignment Process (ISAP)
- Providing critical spatial data to improve firefighting effectiveness

AFTER FIRE

REPLANTING FORESTS AND PROTECTING WATER SUPPLIES

- Research and monitoring in burned areas to understand where and why trees aren't growing back after fires
- Addressing gaps and providing solutions to accelerate reforestation
- Protecting drinking water supplies by prioritizing post-fire erosion control and flooding mitigation

SWERI Southwest Ecological Restoration Institutes

cfri.colostate.edu

SOCIAL SCIENCE

Translating learning from local adaptive management processes to make national initiatives like the Collaborative Forest Landscape Restoration Program more effective

Researching decision support tools to make risk management decisions more robust on the ground

We align partners to build common operating pictures and validate decisions to get the right work done in the right places.

ECOLOGICAL SCIENCE

Monitoring forest management to improve community safety and optimize forest ecology outcomes

Sharing lessons learned from our place-based forest and fire monitoring to improve adaptive management across the West

Our forest and wildfire monitoring reduces conflict, increases effectiveness, and accelerates implementation of forest management.

200+ Students trained for careers in forestry and wildland fire

APPLYING LESSONS LEARNED LOCALLY TO ADDRESS REGIONAL CHALLENGES

TRACKING FOREST MANAGEMENT AND WILDFIRES FROM LOCAL TO NATIONAL

- Making data accessible for planning on the ground
- Tracking forestry and fuels reduction funding
- Forest and wildfire interactions

COLORADO FOREST TRACKER

Federal, state, local, and private forest management across Colorado

TREATMENT AND WILDFIRE INTERAGENCY GEODATABASE VIEWER

Translating across federal data systems nationally

EXPERTISE

- SPATIAL WILDFIRE DECISION SUPPORT
- ECOLOGICAL MONITORING AND RESEARCH
- TRANSLATE PRINCIPLES TO PRACTICE
- COLLABORATIVE ADAPTIVE MANAGEMENT
- POST WILDFIRE REFORESTATION AND RECOVERY

COLORADO FOREST RESTORATION INSTITUTE
COLORADO STATE UNIVERSITY

May 2025

PROJECT DELIVERABLES

Following is a report on deliverables under all agreements active during calendar year 2024 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 2024, CFRI had three active agreements under the Act. Deliverable accomplishments for each are included in this report:

- FY22 CFRI annual work plan, active 8/31/2022 through 9/30/2024
- FY23 CFRI annual work plan, active 7/14/2023 through 12/31/2024
- FY24 CFRI annual work plan, active 7/01/2024 through 12/31/2024

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 September 30th, 2024.

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	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

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.	Agencies Appropriations Act of 2022. July, 2023, Southwest Ecological Restoration Institutes. https://cfri.box.com/s/vlq399ckd44dc4rdxccnit24l27tuy0m 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	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-

associated with forest restoration, resilience and wildfire risk mitigation.	content/uploads/sites/22/2023/08/Beeton_etal_2023_CFLRP_CollaborationAssessmentReport_RioChama.pdf - 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 university researchers, and Forest	CFRI staff Marin Chambers, in coordination with research partners at New Mexico State University and New Mexico Highlands University, developed and convened the Southwest Reforestation Partnership. The mission of the Partnership is to support

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.	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 Community Wildfire Protection	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 for a non-fire professional audience. These graphics were used in multiple

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.	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.	This agreement funded CFRI in the development, customization, and application of spatial wildfire decision support planning frameworks to assist partners with cross boundary adaptive management in the following landscapes. Many additional landscapes across land ownerships, not listed here, were engaged with funding from US Forest Service Washington Office, national forest level units, and other funding sources. • The Denver Water from Forests to Faucets Partnership • Supported the Northern Colorado Fireshed Collaborative wildfire risk assessment applications and outcome tracking • 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 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.	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/ Dannels, R., Kotlinski, N., Mueller, S., West Fordham, A., & Wolk, B. (2024). *Colorado Forest Management Activity Tracker (Forest Tracker) Report, v1 2024 (BETA)*. Colorado State Forest Service. Dec 2024. https://csfs.colostate.edu/wp-content/uploads/2024/12/CSFS_ColoradoForestTracker_V1_Final_Accessible.pdf Continued work supporting development and integration of spatial wildfire decision support tools in western Colorado with the West Region Wildfire Council and their partners. This included supporting local fire response partners developing potential operational delineations across all lands in 5 western Colorado counties, and supporting development of the Gunnison County Community Wildfire Protection Plan update by leading application of spatial wildfire decision support tools and collaborative planning frameworks. Subject matter expert for many partners and emerging groups to support development and application of spatial wildfire decisions support frameworks, such as the Headwaters of the Colorado Initiative, a multi-party collaborative group of public and private land managers focused on improving forest health and watershed resilience to wildfire in southern Wyoming and northern Colorado.
1.3 Improve wildfire risk and resilience analysis decision support	CFRI staff worked with the Denver Water From Forests to Faucets Partnership to develop new analysis integrating fire risk analytics with updated predictions of future fire weather

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.	scenarios using hotter and drier predictions to calibrate analysis to better reflect recent and predicted future local conditions. This was further integrated with new analysis of fire risk transmission in relation to source water vulnerability to wildfire. The new analytics allow partners to better target areas for limiting fire spread in addition to broad scale fire mitigation priorities, highlighting opportunities for integrating actions such as reducing fire ignitions, enhancing fire response opportunities along pre-planned POD boundaries, and reducing fire hazard across the landscape. CFRI staff integrated new analysis of fire risk transmission in relation to multi-resource wildfire risk assessment with partners in Gunnison County, Colorado, as part of their community wildfire protection plan update. The new analytics allowed partners to better target areas for limiting fire spread in addition to broad scale fire mitigation priorities, allowing fire chiefs, foresters, water providers, and community members to better balance tradeoffs and target effective management actions such as reducing fire ignitions, enhancing fire response opportunities along pre-planned POD boundaries, and reducing fire hazard throughout the community. Lead developer, facilitator, and presenters for three-day workshop for leadership and staff of the Arapaho-Roosevelt National Forest/Pawnee National Grasslands to organize for Wildfire Crisis Strategy planning, implementation, and adaptive management, March 5-7, 2024. Project co-funded by the Arapaho-Roosevelt with additional CFRI staff support and presentations provided by this agreement.
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-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.	We shared information through the following presentations and workshops: 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 presentation and co-taught 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. Supported POD prioritization and integration with fuels management strategies with managers that led to an updated POD boundary layer with the multi-jurisdictional Upper South Platte Partnership and the USFS South Platte Ranger District. May 7th, 2024. Delivered presentations of CFRI activities at the From Forests to Faucets annual partnership meeting, January 8th, 2024, in Lakewood, Colorado. Brett Wolk. "Forest to Faucets Effectiveness Monitoring Update". https://cfri.box.com/s/3nmi6ennkly053kobz1waoghg15u0gza We produced the following written publications: Colavito, M. M., & Beeton, T. A. (2024, March). *Understanding and applying wildfire risk science and decision support tools* (Southwest Ecological Restoration Institutes briefing paper). https://cfri.box.com/s/nmdyua5p4zr1ygsb9lnaaf6c95qnf08k North, M., Bisbing, S., Hankins, D., Hessburg, P., Hurteau, M., Kobziar, L., Meyer, M., Rhea, A., Stephens, S., & Stevens-Rumann, C. (2024). Strategic fire zones are essential to wildfire risk reduction in the western United States. *Fire Ecology, 20*(1). https://fireecology.springeropen.com/articles/10.1186/s42408-024-00282-y Rhea, A., Wolk, B., Ritter, S., & McDonald, M. (2024). *From Forests to Faucets Partnership wildfire risk assessment* (CFRI-2414). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/09/Rhea_etal_FromForeststoFaucetsPartnership_WildfireRiskAssessment_CFRI_2414.pdf Rhea, A., Wolk, B., Ritter, S., & McDonald, M. (2024). *Integrating spatial decision support frameworks with the From Forests to Faucets Partnership*. Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-

	content/uploads/sites/22/2024/09/Rhea_F2F_RADS_CFRI_2416.pdf Balik, J. A., Coop, J. D., Krawchuck, M. A., Naficy, C. A., Parisien, M. A., Parks, S. A., Stevens-Rumann, C. S., & Whitman, E. (2024). Biogeographic patterns of daily wildfire spread and extremes across North America. *Global Ecology and Biogeography, 7*, 1355361. https://doi.org/10.3389/ffgc.2024.1355361
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. CFRI staff worked on combining the collaborative readiness framework with indicators and metrics of community readiness with Colorado State Forest Service to support development of social monitoring metrics into the evaluation of CSFS Forest Restoration and Wildfire Risk Mitigation grant program. Ch'aska Huayhuaca participated in the Western Collaborative Conservation Network's Collaborative Capacity Working Group. This included the WCCN's 2024 Confluence workshop, April 2-4 in Tucson, AZ. Ch'aska delivered a presentation on the Stages of Collaborative Readiness Framework and co-led two breakout workshop sessions: 1) "Working Across Scales - Scale and Values in Collaboration: What are the Questions?" and 2) a breakout session for the capacity-building working group.
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,	CFRI staff co-developed the Colorado Forest Resilience Planning Guide working with the Colorado Forest Health Council and with partners from CO Department of Natural Resources, Colorado State Forest Service, and Colorado Forest Collaboratives Network, Collaborative Decision Resources Associates. The guide leverages the Collaborative Stages of Readiness framework to organize a series of recommended actions to help Colorado communities develop and implement forest resilience strategies to mitigate, respond, and recover from common forest disturbances.
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	We shared information through the following presentations and workshops: Huayhuaca, C. (Sept. 20, 2024). Stages of collaborative readiness: Preparing landscapes and communities for a future with fire. Presented at the Society of American Foresters Convention in Loveland, CO. https://www.eforester.org/Safconvention2024/Main/Events/Event_Display.aspx?EventKey=CONVT24&WebsiteKey=6feb6ef1-cd6c-4911-a405-8ebc2e19055e Stevens-Rumann CS, Barrett K, Wolk B, Cheng A. 2024. CFLRP: adaptive management through the lens of CFRI. CO/WY Society of American Foresters Annual Meeting, March 2024, Loveland, CO. Jarod Dunn presented on Conditions Based Management at the Federal Environmental Symposium. Lessons Learned from the Spruce Beetle Epidemic Aspen Decline Management Response (SBEADMR) Project. March 11-14, 2024. Virtual. https://mregs.nih.gov/FileStorage/NIGMS/DL3D-23Z3/2024%20FES%20Agenda%20FINAL%20V3.pdf 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 We produced the following written publications: Beeton, T. A., Snitker vonHedemann, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP Collaborative Governance Assessment Report for the Missouri Pine-Oak Woodland Restoration Project*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/01/Beeton_etal_2024_CollaborativeGovernanceAssessmentReport_MPO.pdf vonHedemann, N., Beeton, T. A., Snitker, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the Southern Blues Restoration Coalition CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/06/vonHedemann_etal_2023_CollaborativeGovernanceAssessmentReport_SouthernBlues.pdf vonHedemann, N., Beeton, T. A., Snitker, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the North Central Washington CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/06/vonHedemann_etal_2024_CollaborativeGovernanceAssessmentReport_NCWA.pdf Beeton, T. A., Snitker, A. J., vonHedemann, N., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the Southwest Colorado Collaborative Forest Landscape Restoration Initiative*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/04/Beeton_etal_2024_CollaborativeGovernanceAssessmentReport_SWCO.pdf vonHedemann, N., Beeton, T. A., Snitker, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the North Yuba Forest Partnership CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/05/vonHedemann_etal_2024_CollaborativeGovernanceAssessmentReport_NYuba.pdf vonHedemann, N., Beeton, T. A., Snitker, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the Western Klamath Restoration Partnership CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/05/vonHedemann_etal_2024_CollaborativeGovernanceAssessmentReport_WKlamath.pdf vonHedemann, N., Beeton, T. A., Snitker, A. J., Colavito, M. M., Teel, T. L., Huayhuaca, C., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment report for the Northeast Washington Forest Vision 2020 CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/07/vonHedemann_etal_2024_CollaborativeGovernanceAssessmentReport_NEWashington_PRINT.pdf Beeton, T. A., Teel, T. L., Colavito, M. M., vonHedemann, N., Huayhuaca, C., Cheng, A. S., Ghasemi, B., & Snitker, A. J. (2024). *Developing reliable and valid measures for evaluating collaborative governance and adaptability: An example from the Collaborative Forest Landscape Restoration Program*. Journal of Environmental Management, 370, Article 122664. https://doi.org/10.1016/j.jenvman.2024.122664 O'Reilly, H., Beeton, T. A., vonHedemann, N., Colavito, M. M., Teel, T. L., Huayhuaca, C., Snitker, A. J., & Cheng, A. S. (2024). *CFLRP collaborative governance assessment: Summary of findings for the Rogue Basin Landscape Restoration Project*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/05/OReilly_etal_CFLRP_Rogue_Brief.pdf

	O'Reilly, H., Beeton, T. A., vonHedemann, N., Colavito, M. M., Teel, T. L., Huayhuaca, C., Snitker, A. J., & Cheng, A. S. (2024). *Collaborative governance assessment for the Rogue Basin CFLRP*. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/05/OReilly_etal_2024_CollaborativeGovernanceAssessmentReport_Rogue.pdf Dunn, J., Brown, H. L. C., & Cheng, A. S. (2024). *NEPA and condition-based management in practice: A framework and case study of the spruce beetle epidemic and aspen decline management response in southwest Colorado* (CFRI-2407). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/08/NEPA_CBM_SBEADMR_CaseStudy.pdf
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 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	CFRI conducted collection, management, analysis, and/or 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 the hiring, planning, training, and supervision of approximately 20 seasonal staff and undergraduate students supporting field monitoring efforts. Sites with field-based monitoring data collected in the 2024 field season included forestry projects on federal, state, local, and private lands. Sites monitored with at least partial funding from this agreement included (land ownership): • Newton Park (Denver Mountain Parks) • Payne Gulch (US Forest Service) • Heavens (Private lands with Colorado State Forest Service) • Little Morrison / Sand Springs (US Forest Service) • Forsythe II (US Forest Service) • Silver Trident (US Forest Service) • Ben Delatour Scout Ranch (Private lands) • Lone Mesa State Park (Colorado Parks and Wildlife) • Monument Work Center (US Forest Service)
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 2024, CFRI staff contributed to monthly meetings (6 total), as well as frequent communication with the Colorado State Forest Service Monitoring Team to build shared monitoring practices across organizations, advise and learn on monitoring protocols, share monitoring results, and discuss monitoring goals and recent ecological research. CFRI worked with CSFS field office staff at multiple forestry sites to discuss and train staff on monitoring protocols, and help support adaptive management to make monitoring data relevant to CSFS staff. In 2024, CFRI staff had over a dozen meetings with forest and fire managers one-on-one or small groups in the field at forest and fire management sites to discuss management planning, monitoring results, and conduct collaborative adaptive management to increase the effectiveness and application of forest management activities across Colorado. These occurred with a variety of agencies including Colorado State Forest Service, U.S. Forest Service, Natural Resources Conservation Service, local conservation districts, municipal open space agencies, non-governmental organizations, and other forest and fire management partners. CFRI staff continued developing tools to communicate monitoring strategies and build capacity of other organizations to understand, implement, and integrate monitoring and adaptive management frameworks into their own organizational operations. This included publishing the Monitoring Handbook, and conducting several workshops, including at the Society for American Foresters national convention in Loveland, Colorado, Sept 18, 2024, and at the Northern Colorado Fireshed Collaborative quarterly meeting, September 26, 2024.

	Slack, A. S., Morici, K. E., & Barrett, K. J. (2024). *Colorado Forest Restoration Institute Monitoring Handbook for Evaluating Forest Management Outcomes* (CFRI-2417). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/09/Slack_etal_CFRI_MonitoringHandbookforEvaluatingForestManagmentOutcomes_CFRI_2417.pdf Slack, A.W., Morici, K.E., Barrett, K.J. Providing field-based monitoring guidance to build capacity for peer learning and science-based forest management. Society of American Foresters Annual Convention, Loveland, Colorado. September 18th, 2024.
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.	CFRI staff continued development and advancement of tabular and geospatial data collection and management systems to organize, summarize, and share CFRI monitoring findings with internal staff and external partners. CFRI staff continued to serve as a resource for other organizations and collaborative group partners in best management practices for data management.
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.	We delivered the following presentations: Barrett, Kevin. 2024. Collaborative Monitoring and Adaptive Management for the Front Range CFLRP: Was it Successful? Slack, Andrew and Frank Falzone. Monitoring and Adaptive Management with the Upper South Platte Partnership. Presentation and discussion at the Colorado Front Range JAM session, October 21, 2024. Broomfield, Colorado. Morici, Kat. *Prescribed Fire Monitoring*. 2024. Presentation and discussion at the Colorado Front Range JAM session, October 21, 2024. Broomfield, Colorado. Mueller, Stephanie. 2024. Extreme 2020 Colorado Wildfires: Treatments Altered Fire Severity Across Forest Types and Days of Burning. Presentation and discussion at the Colorado Front Range JAM session, October 21, 2024. Broomfield, Colorado. Slack, Andrew and Frank Falzone. 2024. Monitoring and Adaptive Management with the Upper South Platte Partnership. Presentation and discussion at the Colorado Front Range JAM session, October 21, 2024. Broomfield, Colorado. We produced the following written publications: Barrett, K. J. (2024). *Silver Trident prescribed fire: Post-burn monitoring summary* (CFRI-2406). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/06/Silver-Trident-Prescribed-Fire-Post-Burn-Monitoring-Summary_Barrett_2406.pdf Barrett, K. J., & Parrish, M. K. (2024). *Monument fire center monitoring summary* (CFRI-2024). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/06/MonumentFireCenter_MonitoringSummary_Barrett_CFRI_2404.pdf Slack, A., & Lehnert, S. (2024). *Payne Gulch prescribed fire: Post-burn monitoring summary* (CFRI-2418). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/10/Slack_PayneGulch_PostBurnSummary_CFRI_2418.pdf Eastburn, J. F., Campbell, M. J., Dennison, P. E., Anderegg, W. R. L., Barrett, K. J., Fekety, P. A., Flake, S. W., Huffman, D. W., Kannenberg, S. A., Kerr, K. L., Sánchez, A. J., & Vogeler, J. C. (2024). *Ecological and climatic transferability of airborne lidar-driven aboveground biomass models in Piñon-Juniper woodlands*. GIScience & Remote Sensing, 61(1). https://doi.org/10.1080/15481603.2024.2363577

	Prevéy, J. S., Jarnevich, C., Pearse, I. S., Munson, S., Stevens, J., Barrett, K., Coop, J. D., Day, M., Firmage, D., Fornwalt, P., Haynes, K., Johnston, J., Kerns, B., Krawchuck, M., Miller, B., Nietupski, T., Roque, J., Springer, J. D., Stevens-Rumann, C., Stoddard, M. T., & Tortotelli, C. (2024). *Non-native plant invasion after fire in western USA varies by functional type and with climate*. Biological Invasions, 26(4), 1157-1179. https://doi.org/10.1007/s10530-023-03235-9 Fowler, J. A., Nelson, A. R., Bechtold, E. K., Paul, R., Wettengel, A. M., McNorvell, M. A., Stevens-Rumann, C. S., Fegel, T. S., Anderson, E., Rhoades, C. C., Wilkins, M. J. (2024). *Pile burns as a proxy for high severity wildfire impacts on soil microbiomes*. Geoderma, 448, 116982. https://doi.org/10.1016/j.geoderma.2024.116982 Gardiner, T., Cheng, A. S., Chambers, M. E., Snyder, V., Robertson, L., & Free, J. (2024). *Multi-party monitoring for the Uncompahgre Plateau Collaborative Forest Landscape Restoration Project* (CFRI-2402). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/02/Snyder_Chambers_UPCFLRP_10Yr_MonitoringReport_CFRI2402.pdf
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.	CFRI staff Marin Chambers and others collaborated with The Nature Conservancy to convene and lead a conifer 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. Cone Collection - Scouting and Monitoring Workshop - July 29, 2024. CFRI staff convened professionals from over 20 agencies to provide in-depth training on cone scouting and monitoring for cone collection activities. Organized workshop in partnership with Josh Sloan (NMHU), Catherine Schloegel (TNC), Erica Hample (CSU Extension), Shane Milne (BCPOS), and Anthony Massaro (Jefferson County Open Space).
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 and others, in coordination with research partners at New Mexico State University and New Mexico Highlands University, in 2024 continued 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. CFRI staff Allie Rhea performed emergency post-fire erosion modeling for Alexander Mountain Fire in Colorado, shared data, and presented results with Alexander Mountain Fire recovery team through the Big Thompson Watershed Health Partnership on 8/28/24. These results were used by the post-fire team to assess and inform priorities for post fire watershed stabilization and recovery efforts. CFRI staff participated in quarterly Watershed Wildfire Protection Group meetings with water utilities, consultants, and state and federal agencies, to learn about watershed and wildfire issues and help partners integrate the latest science into watershed protection planning, management, and policy.
4.3 Collaborate and coordinate with affected entities, other SWERI and university researchers, Forest Service	CFRI staff assisted with data sharing and conceptual integration of existing CFRI post-fire watershed risk analysis with the Colorado Water Conservation Board Wildfire Ready Watershed program, often through one-time virtual meetings. This created efficiencies for

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.	place-based groups and state agencies to better leverage existing data. CFRI staff supported integration with at least 10 different groups across the state.
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	Coalition for the Poudre River Watershed's Replant the Poudre Pub Talk, May 16, 2024, Fort Collins, CO. CFRI staff Marin Chambers and Allie Rhea contributed lightning talks from forestry experts and Q&A session. • "Post-fire reforestation: Challenges and considerations for the Cameron Peak Fire and beyond" - Marin Chambers, Colorado Forest Restoration Institute • "Reforestation rocks! - TNC Contributions to Reforestation in the Poudre" - Rob Addington, The Nature Conservancy • "Spatial Prioritization of Reforestation" - Allie Rhea, Colorado Forest Restoration Institute • "Replanting the Poudre: Reforestation on Private Lands in the Poudre Watershed" - Cory Dick, Coalition for the Poudre River Watershed CFRI staff helped organize and presented research data on tree regeneration trends in the Cameron Peak Fire as part of the High Altitude Revegetation Committee and Society for Ecological Restoration annual summer field tour, CSU Mountain Campus CO (July 2024), 80 participants. Rhea A and B Wolk. April 16th, 2024. Comparing the Cost and Watershed Impacts of Pre- and Post-Fire Mitigation Actions: a Risk Assessment Case Study. Oral presentation shared at the After the Flames Conference. Estes Park, CO. https://coco2024.exordo.com/programme/presentation/26 Chambers, M., 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 shared at the After the Flames Conference. Estes Park, CO. April 16, 2024. https://coco2024.exordo.com/programme/presentation/41 We produced the following written publications: Dobrowski, S. Z., Aghai, M. A., Chichilnisky du Lac, A., Downer, R., Fargione, J., Haase, D. L., Hoecker, T., Kildisheva, O. A., Murdoch, A., Newman, S., North, M., Saksa, P., Sjoholm, M., Baribault, T., Buonanduci, M. S., Chambers, M. E., Gonzales-Kramer, L. E., Harvey, B. J., Hurteau, M. D., Loevner, J., Safford, H. D., & Sloan, J. (2024). *Mind the gap: Reforestation needs vs. reforestation capacity in the western US*. Frontiers in Forests and Global Change, 7, 1402124. https://doi.org/10.3389/ffgc.2024.1402124 Rodman, K. C., Fornwalt, P. J., Holden, Z., Crouse, J. E., Davis, K. T., Marshall, L. A. E. R. A., Stoddard, M. T., Andrus, R. A., Chambers, M. E., Chapman, T. B., Hart, S. J., Schloegel, C. A., & Stevens-Rumann, C. S. (2024). *Green is the new black: Outcomes of post-fire tree planting across the US interior West*. Forest Ecology and Management, 574, 122358. https://doi.org/10.1016/j.foreco.2024.122358 Schloegel, C. A., Chambers, M. E., & Sloan, J. L. (2024). *Ponderosa pine seed collection on the Colorado Front Range: A field guide* (CFRI-2409). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/07/Schloegel_etal_PonderosaPineSeedCollectiontheCOFrontRangeAFieldGuide_CFRI_2409.pdf Schloegel, C. A., Chambers, M. E., & Sloan, J. L. (2024). *Ponderosa pine seed collection on the Colorado Front Range: Supplemental information* (CFRI-2409A). Colorado Forest Restoration Institute. https://cfri.colostate.edu/wp-

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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/ Front Range Forest and Fire Symposium: CFRI led the initiation, planning, and overall direction for the Front Range Forest and Fire Symposium. This was a 3-part symposium to learn from project work to understand how science, monitoring, and adaptive management are impacting our effectiveness to cumulatively impact larger ecological and fire management outcomes along the Colorado Front Range. This included two all day field trips and an all-day peer learning JAM session workshop that collectively brought together over 100 individuals across a wide range of agencies and interests. Events were co-funded by the Arapaho Roosevelt National Forest and Pawnee National Grassland and Pike San Isabel National Forest Cimarron Comanche National Grassland. • August 19th, 2024: Northern Front Range fieldtrip • September 9th, 2024: Southern Front Range fieldtrip • October 21st, 2024: JAM session. Agenda: https://cfri.box.com/s/i1iz6kzgrw43ozgb7qwzjo7p4akb3n6n
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	Dunn, J., Brown, H., Cheng, A., Simmons, B., Newton, K., & Hollingsworth, A. (2024). Condition-based management and NEPA planning infographic. *Colorado Forest Restoration Institute*, CFRI-2405. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/05/Dunn_NEPA_CBM_Steps_Infographic_April2024_print.pdf Dunn, Jarod. A framework to simplify and understand condition-based management. Blog post for the Northern Colorado Fireshed Collaborative. August, 2024. https://nocofireshed.org/cbm-framework/ Rhea, A., Wolk, B., Ritter, S., & McDonald, M. (2024). Prioritizing vegetation management with the From Forests to Faucets Partnership. *Colorado Forest*

general audiences. Topics may include, but are not limited to: 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.	*Restoration Institute*. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/11/Rhea_F2F_Communication_CFRI_2415.pdf Stevens-Rumann, C., Vorster, A., Cheng, A., & Chambers, M. (2024). A path forward: Understanding how forest management mitigates wildfires. *Southwest Ecological Restoration Institutes*. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/04/StevensRummann_etal_Path_TrtEffectivenessBrief_SWERI.pdf Completed 2023 CFRI Facts at a Glance. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/08/2023-Annual-Report-CFRI_FactsataGlance.pdf Wilson, M.A. and Simmons, B.A. (2024). CFRI Monitoring Handbook Videos. Colorado Forest Restoration Institute. Developed, filmed, edited, and published a series of 8 videos with over 87 minutes of footage to facilitate communication, application, and support training for CFRI monitoring handbook monitoring protocols. The videos help partners understand monitoring concepts and better interpret results, while also providing resources for partners to more easily participate in the monitoring process. This also increased efficiency of training CFRI field crews in data collection methods. https://www.youtube.com/playlist?list=PLwf7wwmtbtxl9jz20WbgpV3r9S0hOOtMY
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.	This project has stalled and the demand for material translated into Spanish has shifted to other needs. Resources dedicated to this deliverable were shifted to add more presentations, peer learning, and direct partner engagement in deliverable 5.2 and 5.5.
5.5 Develop and publish 1-2 written products, and deliver 2-4 presentations	CFRI staff served as subject matter experts and provided support to dozens of individuals, organizations, and multi-party collaborative groups on strategies to engage in

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.	communication around the selective use of science to develop misleading narratives in forest and wildfire ecology and management. Brown, S.J., Hagmann, K., Hessburg, P., Jones, G., Brown, H., Sawyer, S. (2024, April 24). Sifting through selective science and misinformation for collaborative forest management. Science for Managers Webinar co-hosted by Rocky Mountain Research Station and Southwest Ecological Restoration Institutes. Over 300 participants and 500+ registered. https://research.fs.usda.gov/rmrs/products/multimedia/webinars/sifting-through-selective-science-and-misinformation Barrientos, E., Maiolo-Heath, M., **Brown, H.**, & Pyle, A. (2024, April 15). Post-fire Science Communication [Conference presentation and discussion]. After the Flames: Tools and tactics for communities and agencies impacted by wildfire, Estes Park, CO. https://coco2024.exordo.com/programme/presentation/7 Selective Science Communications Practice Group—CFRI staff Hannah Brown and Brett Wolk provided subject matter expertise with the Colorado Forest Collaboratives Network to support development of a selective science communications practice group. The group served to develop an informal peer learning network and convened several workshops throughout 2024 for collaborative communicators to work through challenges and opportunities together related to selective science issues in social media, face-to-face conversations, and the news. Staff Hannah Brown provided subject matter expertise and attended sessions, developed content, and lead discussions. Summary: https://collaborativeconservation.org/2024/06/12/reflections-on-the-selective-science-communications-practice-group/ Northern Colorado Fireshed Communication, Education, & Outreach Committee—CFRI staff attend and actively participate in quarterly meetings, provide feedback on communications strategy for the Fireshed, and occasionally directly support developing messaging and publications, particularly around selective science. Delivered workshop on Science Communication to university and high school ecology students. Brett Wolk and Katie Magrath Novak. Panning for Nuggets of Science Gold: Reframing Ecological Science Communication. February 1st, 2024. Front Range Student Ecology Program, Fort Collins, CO. Published the following written products: Brown, H. L., Cheng, A. S., Clark, N. C., Slack, A. W., & Wolk, B. H. (2024). Creating boundary objects supports knowledge co-development processes: A case study evaluation from the Colorado Front Range. *Journal of Forestry, 122*(4), 363-372. https://doi.org/10.1093/jofore/fvae010 Cheney, A., Jones, K., Stevens-Rumann, C. S., & Salerno, J. (2024). Perceived changes in social-ecological resilience in fire-prone ecosystems in Colorado. *Ecology and Society, 29*(4), 5. https://doi.org/10.5751/ES-15436-290405
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	2024 SWERI Leadership retreat: CFRI staff (6) participated in and contributed to the planning, logistics, meeting facilitation, and documentation for the 2024 SWERI Leadership Retreat October 2nd-4th, 2024, in Flagstaff, Arizona. The event convened approximately 25 staff across all SWERI to enhance zones of agreement on key issues impacting the SWERI. Agenda here: https://cfri.box.com/s/g1jfncv431eiigy1t9ye8gbdglt0lktn 2024 CFRI Strategic Planning Workshop: CFRI staff developed and convened the 2024 CFRI Strategic Planning Workshop, 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. Agenda here: https://cfri.box.com/s/pdinlo6dztvcftjmaekxc1mq2m9kqyfb
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.	CFRI staff 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 served on the planning committee for the Colorado Forest Collaboratives Summit, held September 4th-6th, 2024. The event gathered over 100 collaborative leaders from across Colorado and the region in Durango, Colorado. Event summary here: https://collaborativeconservation.org/2024/12/11/2024-colorado-forest-collaboratives-summit-summary-resources/ CFRI helped convene and support facilitation for an initial meeting January 11, 2024, and ongoing meetings and communication to increase alignment with other Warner College of Natural Resources forestry related centers, including Colorado State Forest Service, Colorado Natural Heritage Program, and Center for Collaborative Conservation. CFRI staff Tony Cheng and Camille Stevens-Rumann contributed to development and served as subject matter experts in the podcast series United by Fire, produced by The Institute for Science and Society at the Denver Museum of Nature and Science. https://institute.dmns.org/united-by-fire/ Tony Cheng served as a subject matter expert for the US Forest Service Western Prescribed Fire Training Center interagency working group. Convened and led 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. • October 15, 2024. Challenges and Recommendations for Evaluating Treatment Effectiveness. Tony Vorster, Colorado State University Research Scientist Natural Resource Ecology Laboratory. • November 19, 2024. Red Feather Lakes Area Wildfire Defense Project: Structure and Strategy for Implementation in the Upper Poudre River Watershed: Daniel Bowker, Forests Program Manager, Coalition for the Poudre River Watershed. • December 17, 2024. Climate Adaptation and Assisted Migration for Reforestation in the Southwest. Marin Chambers, Colorado Forest Restoration Institute. Cory Dick, Coalition for the Poudre River Watershed. James Calabaza, Trees, Water, and People. Mike Battaglia, USFS Rocky Mountain Research Station.
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 learning and implementation of CSU Principles of Community to increase shared understanding and practice amongst CFRI staff, and explore opportunities to expand impact with external partners to better incorporate new ideas in forestry and fire research and collaborative adaptive management. Activities in 2024 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 field crew trainings, student mentorship, field crew exit interviews, and initiating a CFRI student focused team, and enhance CFRI new employee onboarding materials. CFRI staff Hannah Brown and Allie Rhea attended the New Mexico Tribal Forest & Fire Summit, Santa Ana Casino, New Mexico, January 30th-February 1st, 2024, to grow knowledge about forest and fire management on Tribal and Ancestral Lands.

For FY24 agreement number 24-DG-11030000-020, CFRI reports the following cumulative accomplishments toward each project deliverables in the work plan for dates while the agreement was active, including July 1st, 2024 through December 31st, 2024:

Deliverable	Status of Deliverables
Focal Area 1. Spatial Wildfire Decision Support	
1.1 Expand engagement with between 1-3 cross-jurisdictional, multi-partner initiatives identified in federal- state Shared Stewardship strategies, NRCS strategic investments, State Forest Action Plans, US Forest Service focal investment areas to develop, update, or monitor cross-boundary, shared stewardship forest and wildfire resilience strategies.	CFRI will continue supporting the development, customization, and application of spatial wildfire decision support planning frameworks to assist partners with cross boundary adaptive management.
1.2 Expand engagement with between 1-3 cross-jurisdictional, multi-partner initiatives not identified in federal-state Shared Stewardship strategies, NRCS strategic investments, State Forest Action Plans, US Forest Service focal investment areas to develop, update, or monitor cross-boundary, shared stewardship forest and wildfire resilience strategies.	In progress.
1.3 Develop, deploy, pilot test, monitor, and report on education, training, and coaching resources for a broader audience to be able to develop landscape forest and fire resilience strategies and action plans.	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-maker briefings to report on research, applications, effectiveness, and limitations of spatial wildfire decision support frameworks for achieving desired outcomes from cross-boundary, shared stewardship forest and wildfire resilience strategies.	We shared information through the following presentations and workshops: Beeton, T.A., Wolk, B (2024). A primer on wildfire analytical tools for cross-boundary planning and response. Invited presentation and discussion with over 35 staff from the National Park Service Intermountain Region to find alignment with NPS planning tools and other spatial wildfire decision support frameworks. 11/18/2024. Virtual.
Focal Area 2. Collaborative Adaptive Management	

2.1 Collaborate and coordinate with other SWERI, and CFLRP program managers, to collect, analyze, and report on in-depth case studies of collaborative governance for between 3-6 projects as part of the National Collaborative Forest Landscape Restoration Program Common Monitoring Strategy.	CFRI staff continue coordinating with other SWERI and sustain regular communication to serve as a resource for USFS program managers with the national Collaborative Forest Landscape Restoration Program. This engagement includes conducting an assessment of collaborative resilience across all currently funded CFLRP projects across the country. Beeton, T.A, O'Reilly, H., vonHedemann, N., Colavito, M.M., Teel, T.L., Huayhuaca, C., Snitker, A.J., and Cheng, A.S., 2024. CFLRP collaborative governance assessment report: A national baseline synthesis for the Common Monitoring Strategy. Southwest Ecological Restoration Institutes. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/12/Beeton_CFLRP_ProgramCollaborativeGovernanceAssessment_CFRI_2419.pdf
2.2 Collaborate and coordinate with other SWERI, and coordinators for cross-boundary, multi-partner forest and wildfire resilience collaboratives, to apply and report on the stages of collaborative readiness framework as both an assessment and a performance measurement tool for federal and state investments in wildfire resilience initiatives.	In progress.
2.3 Collaborate and coordinate with other SWERI and affected entities to develop, deploy, adapt, and report on 1-3 educational, training, and coaching resources to enhance collaborative adaptive management.	CFRI staff co-planned and convened, presented, and led adaptive management discussions at the USPP Monitoring JAM Session, November 21, 2024. This was attended by nearly 40 individuals from a variety of agencies and interests to integrate monitoring results of practices by partnership members to improve forest and fire management strategies. Funding also provided by the Pike and San Isabel National Forest that was augmented with this agreement to add capacity and bring additional CFRI insights and experience from working in other areas to the USPP group. Agenda and materials here: https://drive.google.com/drive/folders/149q-Nw4m4osHSCwUClf-oCfHZ0IySMr6
2.4 Collaborate and coordinate with other SWERI and affected entities to compile, assess outcomes, and report on between 2-4 case studies in place-based adaptive management processes associated with collaborative, landscape-scale forest and wildfire resilience initiatives on federal lands.	In progress.
2.5 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. (Nov. 22, 2024). PECS Stages of collaborative readiness: Preparing landscapes and communities for a future with fire. Presented virtually for the Programme for Ecosystem Change and Society (PECS) Methods Webinar Series and archived as part of the In Common Podcast Series: https://www.incommonpodcast.org/podcast/pecs-55-stages-of-collaborative-readiness-preparing-landscapes-and-communities-for-a-future-with-fire-with-chaska-huayhuaca/

Focal Area 3. Ecological Monitoring and Research	
3.1 Collaborate and coordinate with affected entities, other SWERI, other	CFRI staff began planning for 2025 field season to support the collection, management, analysis, and reporting of forest vegetation and wildfire fuels monitoring data to examine longer

university researchers, and Forest Service R&D and other federal natural resource research programs to develop, deploy, and adapt monitoring strategies, and report on 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, composition, and arrangement e. Effects on wildlife.	term (e.g. 1-10 year) ecological trends following forest and fire management. This also included initiating hiring and developing training in field monitoring protocols for approximately 20 seasonal staff and undergraduate students.
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 4-6 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.	Mueller S, Stevens-Rumann CS, Newton KRA, VanDusen HRA. 2024. Extreme Colorado 2020 fires: Treatments altered fire severity across forest types and days of burning. Southwest Association for Fire Ecology Meeting, November 2024, Santa Fe, NM. Morici, KE and Parrish, MK (2024) Ophir Monitoring Summary: 3 years post-treatment. CFRI-2417. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/12/Ophir_Monitoring_3YearPostTreatment_Morici_CFRI_2417.pdf Morici, KE and Flood, S (2024) Kawland Monitoring Summary: 3 years post-treatment. CFRI-2420. https://cfri.colostate.edu/wp-content/uploads/sites/22/2024/12/Kawland_Monitoring_3YearPostTreatment_Morici_CFRI_2420.pdf
Focal Area 4. Climate Adaptation and Post-Fire Recovery	

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.	In progress.
4.2 Collaborate and coordinate with affected entities, other SWERI, other university researchers, and Forest Service R&D to compile, synthesize, and report on 2-4 research findings on post-fire reforestation and watershed recovery trends in collaboration with on-the-ground managers.	In progress.
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: Translating Science Principles to 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 SWERI Cross Boundary Landscape Restoration Workshop and/or between 1-3 follow-up topic- or geography-specific workshops.	In progress.

5.2 Develop and disseminate between 2-4 outreach products through a diversity of media (i.e., written briefing papers, video, podcasts, social media, 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 generally support and align with the projects and identified needs within other focal areas in this workplan, such as: 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 geographic and social 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.	In progress.
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 updating and standardizing processes for internal publications to provide more profession and consistent content for our publications.

5.4 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.	Cheng, A.S. "Staging and situating wildland fire science & technology products to be meaningful and actionable to local-level managers and their partners". Presentation to the National Science Foundation's FIRE-PLAN Community Meeting, November 8, 2024, Boulder, CO.
Focal Area 6: Collaborative Capacity-building and Peer-learning Across Diverse Perspectives	
6.1 Sustain and adaptively management a responsive, accountable, and inclusive organization capable of achieving CFRI's legislative duties and delivering on the annual program of work on time and within budget.	2025 CFRI Strategic Planning Workshop: CFRI staff began planning a workshop for Feb 10-12, 2025, 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.
6.2 Develop, sponsor, support and report on between 1-4 training, continuing education and leadership development in collaborative adaptive ecosystem management processes for CFRI staff.	Delivered presentation and discussion: Knowledge Co-Production and Tools for Ecology Informed Forest and Fire Management. November 5th, 2024, Colorado State Forest Service annual meeting. Fort Collins, CO.
6.3 Develop trainings, resources, internal processes, and organizational structures for CFRI staff to be knowledgeable about and implement principles of diversity, equity, and inclusion with internal and external colleagues.	In progress.