2-3-2 Cohesive Strategy Partnership Multiparty Monitoring Plan

for the Rio Chama Collaborative Forest Landscape Restoration Program

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RIO CHAMA
Collaborative Forest Landscape Restoration Project

Forest Stewards Guild

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[1] This institution is an equal opportunity provider. Tables in this publication will be made available in accessible formats upon request.

Table of Contents

Tables

Figures

Glossary and Acronyms

2-3-2 Partnership: Two watersheds-Three rivers-Two states Cohesive Strategy Partnership. See *2-3-2 Cohesive Strategy Partnership* section of document.

ACS: American Community Survey. An ongoing survey that provides yearly information about the United States and its people (U.S. Census Bureau, 2022).

Adaptive Management: A planning process that uses monitoring as collective learning opportunities about the effects of on the ground management activities and adjusts decisions based on what is learned (CFLRP Common Monitoring Strategy, 2020).

BLM: Bureau of Land Management.

BOR: Bureau of Reclamation.

Burn severity: See *Fire severity*.

CANF: Carson National Forest.

Carbon sequestration: The process of capturing and storing atmospheric carbon dioxide, the most commonly produced greenhouse gas (USGS, n.d.).

CFLRP: Collaborative Forest Landscape Restoration Program.

CO: Colorado.

CPW: Colorado Parks and Wildlife.

CWD: coarse woody debris.

CWPP: County Wildfire Protection Plan.

dbh: diameter (at) breast height. The diameter of the stem of a tree measured at breast height (4.5 ft or 1.37 m) from the ground (Helms, 1998).

Departure: The difference in landscape condition between its current state and natural, sustainable range of variation (as derived from models, dendrochronology, bog coring, etc). Departure can be expressed in terms of vegetation, where the abundances of seral stages by vegetation type are compared against their modeled natural (historic) abundances. It can also be expressed in terms of the difference between current and historic fire frequency and severity estimates (CFLRP Common Monitoring Strategy, 2020; DeMeo et al., 2018; Haugo et al., 2015; LANDFIRE, n.d.).

Desired conditions: In a planning context, these are the ultimate goals of management actions, reflecting both the ecological and socioeconomic wishes of society. They are not necessarily the same as ecologically sustainable or resilient conditions (CFLRP Common Monitoring Strategy, 2020).

eDNA: Environmental deoxyribonucleic acid (DNA). eDNA is organismal DNA that can be found in the environment. eDNA originates form cellular material shed by organisms (via skin, excrement, etc.) into aquatic or terrestrial environments that can be sampled and monitored using new molecular methods to detect species presence (USGS, 2018a).

Environmental justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA, 2022).

EPA: Environmental Protection Agency.

EPS: Economic Profile System. A free, continuously updated tool operated by Headwaters Economics that provides 17 socioeconomic reports based on credible public data sources such as the U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, U.S. Census Bureau, U.S. Department of Interior, and U.S. Department of Agriculture (Headwaters Economics, 2023).

FACTS: The Forest Service Activity Tracking System. A USDA Forest Service database used to record planned and accomplished treatments (CFLRP Common Monitoring Strategy, 2020; USDA Forest Service, n.d.).

FIA: Forest Inventory and Analysis. The FIA program collects analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing, as well as how the trees and other forest vegetation are growing and how much has died or has been removed in recent years (FIA, 2022).

Fire intensity: The energy released from the fire or characteristics of fire behavior such as flame length and rate of spread. It is closely related to the amount of fuel available (CFLRP Common Monitoring Strategy, 2020; Keeley, 2009).

Fire Regime: Description of the patterns of fire occurrence, frequency, size, severity, and effects in a given area or ecosystem based on fire histories at individual sites (National Wildfire Coordinating Group, n.d.)

Fire return interval: The average time between fires in a fire regime (CFLRP Common Monitoring Strategy, 2020).

Fire severity: The degree of loss of or change in organic matter aboveground and belowground from fire, such as percent tree mortality or topkill (Keeley, 2009).

Fireshed: A Fireshed is the delineation of how fires are likely to spread to communities and Fireshed maps show the source of exposure to fire (USDA Forest Service, 2019).

Fire transmission risk: The likelihood of fire spreading to a community or land ownership based on fuel loadings and topography (Ager et al., 2014; CFLRP Common Monitoring Strategy, 2020).

FRAGSTATS: A spatial pattern analysis program for quantifying the composition and configuration of landscapes (McGarigal and Marks, 1995; USGS, 2022).

GIS: Geographic Information System.

Guild: Forest Stewards Guild.

Habitat: The vegetation structure, function and composition needed to support the needs of species (CFLRP Common Monitoring Strategy, 2020).

IFTDSS: Interagency Fuels Treatment Decision Support System. A web-based application designed to make fuels treatment planning and analysis more efficient and effective (CFLRP Common Monitoring Strategy, 2020).

IMPLAN: Short for "impact analysis for planning." A software platform combining databases, economic factors, multipliers, and demographic statistics with customizable modeling. The modeling shows direct, indirect, and induced effects (CFLRP Common Monitoring Strategy, 2020; IMPLAN, 2022).

Invasive species: Sometimes referred to as nonnative invasive species or exotic species. Any plant or animal species that is alien to the ecosystem under consideration and whose introduction does or is

likely to cause economic or environmental harm or harm to human health. Invasive species infest both aquatic and terrestrial areas (Executive Order 13112 – Clinton, 1999).

LANDFIRE: Landscape Fire and Resource Management Planning Tools. LANDFIRE is a shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior, providing landscape-scale geospatial products to support cross-boundary planning, management, and operations (LANDFIRE, n.d.).

Landscape: see *Scale of Monitoring* section of document.

Monitoring: Tracking the ecological, social, or economic aspects of the landscape over time. An integral part of adaptive management (CFLRP Common Monitoring Strategy, 2020).

MPM: Multiparty Monitoring. See *Multiparty Monitoring* section of document.

MSI: Mountain Studies Institute.

MTBS: Monitoring Trends in Burn Severity. An interagency program to consistently map burn severity on all lands of the United States. In the western United States, all fires over 1000 acres are mapped (MTBS, n.d.).

NAIP: National Agriculture Imagery Program. NAIP acquires 1-meter aerial imagery during peak growing seasons, "leaf on" conditions, for the conterminous United States (USGS, 2018b).

NEPA: National Environmental Policy Act.

NGO: Non-governmental organization.

NM: New Mexico.

NMDGF: New Mexico Department of Game and Fish.

NMFWRI: New Mexico Forest and Watershed Restoration Institute. One of the three Southwest Ecological Restoration Institutes and located in Las Vegas, NM.

R3 Analysis Framework: A system for the consistent assessment, monitoring, and management of landscapes for ecological integrity, climate adaptation, and the continued delivery of services to communities. The framework provides a streamlined and defensible approach to support Forest Management Plan revision and implementation, and is built upon a set of upland, riparian, aquatic, climate, and socioeconomic indicators. State-and-transition models assist in analysis and monitoring along with standard map products for landscape stratification mapping (Ecological Response Units or LANDFIRE Biophysical Settings) and existing vegetation mapping (INREV). By applying coefficients, the models can be augmented for some indicators including snag density, coarse woody debris, and carbon stocks. (J. Triepke, personal communications, January 26, 2023).

RATS: Restoration Activity Tracking Summary. The details of RATS are in development but will serve as a tool for tracking treatments across all-lands in the 2-3-2 Partnership footprint.

Resilience: The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker et al., 2004). The concept applies to both ecological and socioeconomic systems (CFLRP Common Monitoring Strategy, 2020).

RGNF: Rio Grande National Forest.

SFNF: Santa Fe National Forest.

SJNF: San Juan National Forest.

Subsistence economy: An economy where harvesting natural resources is important for the psychological, sociocultural, and material needs of a community. A subsistence economy incorporates private (market), public (government), and subsistence sectors (Glass et al., 1990).

Sustainability: The capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs (CFLRP Common Monitoring Strategy, 2020).

SWERI: Southwest Ecological Restoration Institutes. A consortium of three university-based research groups supporting CFLRP monitoring (CFLRP Common Monitoring Strategy, 2020).

TCA: Terrestrial Condition Assessment. TCA evaluates effects of uncharacteristic stressors and disturbance agents in land-type associations to identify restoration opportunities on national forest system lands (Cleland et al., 2017).

TIM: Timber Information Manager. Tim provides automated reporting mechanisms and tools for sales of forest products, including stewardship and other authorities. TIM data is used to analyze, track, and report data about forest product permits and sales, including the volume and value of forest products sold from national forests (USDA Forest Service, n.d.).

TPO: Timber Products Output. TPO is an industry survey conducted by the USDA Forest Service every 3-5 years to determine where wood is coming from, the products produced, and the species cut in each state (Northern Research Station, 2008).

Traditional Knowledge: The cumulative, collective understanding derived from individuals and communities about ecological processes, natural resources, and socio-cultural adaptive responses to the environment (Lake et al., 2017).

TREAT: Treatment for Restoration Economic Analysis Toolkit. TREAT was developed to provide CFLRP projects with a standard interface to estimate employment and labor income impacts from proposed or completed restoration activities. TREAT consists of a data-entry spreadsheet and an impact calculation spreadsheet (CFLRP Common Monitoring Strategy, 2020).

USDA: United States Department of Agriculture.

WCATT: Watershed Classification Assessment Tracking Tool. A USDA Forest Service system to collect, edit, and report watershed classification data and track on-the-ground restoration projects (USDA Forest Service, n.d.).

WCF: Watershed Condition Framework. A National Forest assessment of aquatic values using a six-step process and 12 indicators (CFLRP Common Monitoring Strategy, 2020; Potyondy and Geier, 2011).

Western Knowledge: The collective understanding and documentation of natural phenomena that results from observations, experimental manipulations, or modeling (Lake et al., 2017).

WFDSS: Wildland Fire Decision Support System. A data rich, map-centric application to track fires and streamline the decision-making process (Wildland Fire Decision Support System, 2019).

WIT: Watershed Improvement Tracking. A USDA Forest Service restoration activity tracking system intended to benefit watershed, wildlife, and aquatic ecosystems health and function (USDA Forest Service, n.d.).

WO: Washington Office.

WUI: Wildland-Urban Interface.

Executive Summary

This multiparty monitoring plan was developed for the Two Watersheds-Three Rivers-Two States Cohesive Strategy Partnership (2-3-2 Partnership) to track change across the 2-3-2 Partnership footprint. A significant portion of the 2-3-2 Partnership footprint is the focus of the Rio Chama Collaborative Forest Landscape Restoration Program (CFLRP) which was selected for 10 years of programmatic funding beginning in 2022. Multiparty monitoring is necessary to track and assess the ecological, social, and economic effects of the 2-3-2 Partnership, and the Rio Chama CFLRP treatments, at both the project- and landscape-scale.

This plan was compiled by members of the Forest Stewards Guild (Guild), with input from Mountain Studies Institute (MSI), and with guidance from the 2-3-2 Partnership Monitoring committee and the USDA Forest Service. This plan incorporates USDA Forest Service CFLRP Common Monitoring Strategy questions, as well as those identified by the 2-3-2 Partnership, to measure the implementation of the Rio Chama CFLRP and other management activities within the 2-3-2 Partnership footprint. The plan is designed to meet the following objectives:

- Inform adaptive management at the project- and landscape-scale;
- Provide transparency regarding project implementation;
- Provide opportunities for community engagement and project learning; and
- Maintain a connection to place by valuing individuals, collaboratives, and efforts already on the landscape.

RIO CHAMA
Collaborative Forest Landscape Restoration Project

Introduction

The Rio Chama Collaborative Forest Landscape Restoration Project (CFLRP) was developed to enhance the headwaters and communities tied to the Chama, Rio Grande, and San Juan watersheds. Numerous individuals and organizations are working to restore and sustain healthy forests, watersheds, and forest-adjacent communities by using prescribed fire, fuels treatments, managed wildfire, regeneration harvests, wetland restoration, a local workforce, and an established monitoring program.

The Rio Chama CFLRP boundary (Figure 1) contains the headwaters of the Chama and San Juan river and the source waters of the Rio Grande, critical drainages that supply the life blood of the arid Southwest. The project footprint spans over 3.81 million acres of public and private lands, of which over 55% (approx. 2.1 million acres) is managed by the San Juan, Rio Grande, Carson, and Santa Fe National Forests. Other lands within the project area are managed by the Jicarilla-Apache Nation, Southern Ute Indian Tribe, Santa Clara Pueblo, Ohkay Owingeh, the States of Colorado and New Mexico, the Bureau of Reclamation, the Bureau of Land Management, community land grants, and private land stewards. This landscape, and the communities that depend on it, has been impacted by wildfire, insects and disease, drought, and flooding. These disturbance agents traverse political and ownership boundaries and impact swaths of uninterrupted wildlife habitat, forest health, and city and rural water supplies. Treatments can increase forest resilience to disturbances, improve water quality and watershed function, improve range conditions and wildlife habitat and connectivity, support local rural economies, and create jobs by utilizing restoration by-products. If left untreated, landscape-scale disturbances in the Chama, Rio Grande, and San Juan watersheds would limit tribal, land grant, and acequia communities' ability to access water, as well as negatively impact the water supplies for population centers like Santa Fe, Albuquerque, and beyond to Texas and Mexico.

Taking a watershed-scale approach, the Rio Chama CFLRP footprint was determined by the four national forests and local partners over the course of multiple meetings. The CFLRP aims to work across socio-political boundaries to support the interdependence of local communities and resources. Local communities, non-governmental organizations (NGOs), industry, tribes, and state and federal land managers laid the groundwork for a landscape-scale approach through years of prioritizing cross-boundary restoration. For example, Rio Arriba County and the Fire Adapted New Mexico Learning Network have used grassroots organizing to reduce wildfire risk, the Rio Grande Water Fund is generating sustainable restoration funding, the San Juan-Chama Watershed Partnership brings together agencies and NGOs to support watershed health, the San Juan Headwaters Forest Health Partnership prioritizes cross-boundary planning and restoration efforts, the All Hands All Lands burn team supports prescribed fire implementation, and the Natural Resources Conservation Service committed $3.5 million

for private land restoration within the CFLRP footprint. Further efforts have been led by the USDA Forest Service and state agencies to prioritize collective stewardship in southern Colorado and northern New Mexico.

The forests and human communities within the Rio Chama CFLRP are spatially diverse and changing over time. Vegetation follows an elevational gradient from lower grasslands and piñon-juniper woodlands to ponderosa pine and mixed-conifer forests, upwards to aspen and spruce-fir forests. The characteristics of these vegetation types have changed over time in response to fire suppression, insect and disease outbreaks, and shifting grazing patterns. Similarly, human communities within the CFLRP span the rural landscape and possess rich cultural histories. Forests in the area support subsistence economies and ways of life centered around wood, water, forage, wild game, and traditional arts and culture.

Treatments across the Rio Chama CFLRP are intended to be adaptive, science-based, and collaborative in design. The project will align with the National Cohesive Wildland Fire Management Strategy's goal to restore and maintain landscape vegetation and fuels using prescribed fire, forest thinning, and managed wildfire for resource objectives. In turn, creating resilient landscapes that support fire adapted communities in which socioeconomic conditions improve over time within the CFLRP footprint. All treatments on federally managed lands will follow National Environmental Policy Act (NEPA) protocols. Project goals aim to sustain healthy forests and watersheds for future generations and monitoring will be essential to track, measure, and inform treatment outcomes. Although CFLRP treatment funds can only be applied to lands managed by the USDA Forest Service, the 2-3-2 Partnership will work to obtain funding for cross-boundary and priority work on non-USDA Forest Service managed lands within the 2-3-2 Partnership footprint.

National legislation mandates 15 years of Rio Chama CFLRP monitoring, however the 2-3-2 Partnership intends to continue MPM efforts for multiple decades to understand long-term landscape-scale change. These efforts will require participation from multiple stakeholders to be successful. This MPM plan was developed by members of the Forest Stewards Guild (Guild) and Mountain Studies Institute (MSI) with guidance from the Two Watersheds-Three Rivers-Two States Cohesive Partnership (2-3-2 Partnership), the 2-3-2 Partnership Monitoring Committee, and the USDA Forest Service. This plan incorporates USDA Forest Service Washington Office (WO) common monitoring questions (Appendix I), USDA Forest Service Region 2 and Region 3 interests, and questions identified by the 2-3-2 Partnership, that will help document project- and landscape-scale change over time.

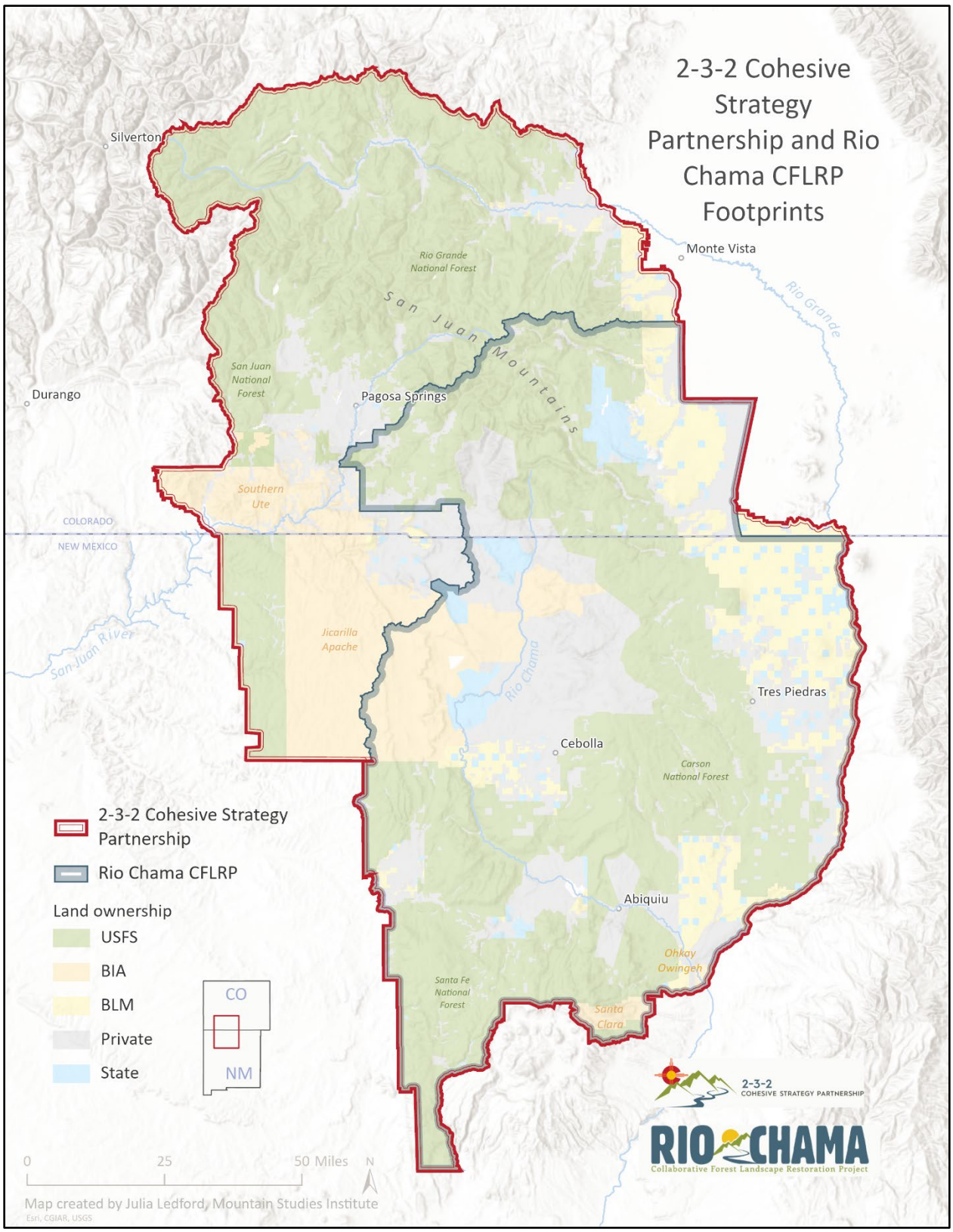


Figure 1. Map of 2-3-2 Cohesive Strategy Partnership and Rio Chama CFLRP footprints.

Purpose and Need

The purpose of the 2-3-2 Partnership multiparty monitoring (MPM) plan for the Rio Chama CFLRP is to guide a collaborative monitoring process that informs adaptive management. The 2-3-2 Partnership is committed to MPM because "without adequate monitoring, the ability to understand the impacts of restoration activities on ecosystem integrity and sustainability is severely limited" (Schultz et al., 2014). In addition, MPM requires diverse stakeholders to collectively buy-in, approve, and implement long-term measures. The purposes of this MPM plan are to:

- Outline the Rio Chama CFLRP monitoring program in line with USDA Forest Service expectations and 2-3-2 Partnership interests;
- Distill project goals into measurable and observable metrics;
- Develop protocols that measure changes at both the landscape- and project-scale, incorporate community science, and address USDA Forest Service Washington Office Common Monitoring Strategy, USFS Region 2 and Region 3 standard CFLRP guidance, and 2-3-2 Partnership questions;
- Utilize existing protocols, data, and remote sensing efforts to understand treatment effects within the context of dynamic landscape changes;
- Implement shared monitoring techniques to ensure data collection is cohesive and comparable across all landownerships within the 2-3-2 Partnership footprint;
- Determine an appropriate comprehensive data management plan;
- Create MPM plan timelines;
- Monitor CFLRP related treatments across all land jurisdictions to learn, and inform Adaptive Management;
- Analyze monitoring data and share findings with land managers, 2-3-2 Partnership participants, and beyond;
- Provide opportunities for MPM expansion if additional resources become available; and
- Serve as the 2-3-2 Partnership MPM plan within and beyond the Rio Chama CFLRP boundary and lifespan.

2-3-2 Cohesive Strategy Partnership

Covering two watersheds, three rivers, and two states, the 2-3-2 Partnership formed from community recognition of the need for a cohesive, multi-faceted strategy to address forest and watershed health concerns across 5.1+ million acres of southern Colorado and northern New Mexico (Figure 1). Launched in 2016, the 2-3-2 Partnership brings together a diverse "team of teams" and convenes collaborators across the landscape (https://232partnership.org/partners/) to build trust and identify shared goals. This relationship building led to a 2018 cross-boundary meeting with the USDA Forest Service Southwestern and Rocky Mountain Regions, and multiple stakeholders to discuss shared values and opportunities to advance resource-based economic development in the region. That conversation laid the foundation for the CFLRP proposal and continued collaborative development.

The 2-3-2 Partnership employs a consensus-based decision-making approach to leverage the diverse knowledge, interests, and expertise of participating partners. While the 2-3-2 Partnership reflects diverse interests, it is successful because members share common values, a collective vision, and a

commitment to making science-informed decisions. The 2-3-2 Partnership leads the Rio Chama CFLRP monitoring efforts and will coordinate with USDA Forest Service regional and forest staff, tribal leadership, private land stewards, Colorado and New Mexico state managers, and multiple NGO's to implement, adapt, and manage the monitoring plan as it is presented in this document.

Executive Committee

The Executive Committee is the decision-making body of the 2-3-2 Partnership. The committee consists of Active Members who engage at a higher level to support the basic functions and advancement of the 2-3-2 Partnership. This team works together to provide strategic direction for the partnership, establish and uphold foundational documents and partnership processes, determine support for funding initiatives and proposals, stand up implementation teams and committees, and support partnership administration.

Monitoring Committee

The Monitoring Committee is a sub-committee of the 2-3-2 Partnership and includes individuals with diverse local and regional expertise. The Monitoring Committee oversees plan development, and translates and communicates monitoring results to the full 2-3-2 Partnership and public entities.

About this Monitoring Plan

Monitoring is necessary to track and assess the ecological, social, and economic effects of project and landscape treatments across the 2-3-2 Partnership footprint. The Guild and MSI have, and will continue, to engage the 2-3-2 Partnership, including monitoring committee members and USDA Forest Service representatives, to develop an iterative MPM plan that covers the 2-3-2 Partnership footprint and fulfills the requirements associated with the Rio Chama CFLRP and Title IV of the Omnibus Public Land Management Act of 2009 (H.R. 146, 2009).

Monitoring consists of "repeated field-based empirical measurements [that] are collected continuously and then analyzed for at least 10 years" (Lidenmayer and Likens, 2010). Guided by this definition, the 2-3-2 Partnership MPM plan outlines the approach, protocols, and timeline to address the ecologic and socioeconomic questions related to the Rio Chama CFLRP and as-determined by the 2-3-2 Partnership. The Guild, MSI, and monitoring committee will seek feedback from technical experts to develop feasible and reliable monitoring protocols, and will bring together stakeholders with different backgrounds and perspectives to promote mutual learning, engender trust, and build relationships able to collectively address future challenges. This collective expertise and capacity will expand upon existing USDA Forest Service project monitoring to address "all-lands" and implement novel monitoring tools. Additionally, the MPM process provides opportunities to improve public understanding of and engagement in forest and wetland restoration, climate adaptation, and fire management. By witnessing firsthand the impacts and outcomes of restoration treatments, participating individuals will understand how restoration efforts can improve forest health within the 2-3-2 Partnership footprint, inform future management actions, and ensure that undesirable effects are mitigated to prevent repetition.

This plan will be implemented for at least 15 years (beginning federal Fiscal Year 2022) to inform adaptive management at the project- and landscape-scale; provide transparency regarding project implementation; provide opportunities for community engagement and project learning; and maintain a connection to place by valuing individuals, collaboratives, and efforts already on the landscape. The

MPM plan may be adjusted, with 2-3-2 Partnership feedback and monitoring committee approval, to account for technology improvements, additional resources, and landscape disturbances.

In an attempt to understand changes on the 3.81+ million-acre landscape, the MPM plan was developed by acknowledging USDA Forest Service requirements, incorporating an adaptive management strategy, considering monitoring scale, encouraging community science, consulting collaborative partners, prioritizing opportunities, and outlining program review.

CFLRP Common Monitoring Strategy

The 2-3-2 Partnership MPM plan for the Rio Chama CFLRP was created around the CFLRP Common Monitoring Strategy (2020; Appendix I). Upon review of 23 existing CFLRP projects, the USDA Forest Service Washington Office identified MPM as a "critical factor for project success and stakeholder trust" but noted the challenges of landscape-scale monitoring (CFLRP Common Monitoring Strategy, 2020). The new common monitoring strategy attempts to support landscape-scale monitoring and outlines mandatory questions and suggested indicators for each CFLRP to address alongside locally developed monitoring questions. This strategy will support national comparison of CFLRP projects and help inform the program into the future. Many of the CFLRP Common Monitoring Strategy questions closely aligned with 2-3-2 Partnership project goals and are outlined throughout this plan. For ease of recognition, all common monitoring strategy questions and associated indicators are marked as such. The 2-3-2 MPM plan will be adjusted over time to incorporate changes to the CFLRP Common Monitoring Strategy and to accommodate future 2-3-2 Partnership questions and needs.

Multiparty Monitoring

Multiparty monitoring (MPM) questions and approaches were determined by the monitoring committee to focus on project-specific interests and gaps in knowledge that the 2-3-2 Partnership felt were not adequately addressed by the CFLRP Common Monitoring Strategy or are of importance to local stakeholders. The 2-3-2 Partnership MPM relies on place-based knowledge to expand upon local energies and efforts, and capitalize on existing relationships -- to include NGOs, youth conservation corps, community scientists, academic researchers, and agency leads -- in monitoring-plan development and data collection. MPM will expand as additional partnerships, resources, capacity, and momentum build throughout the life of the CFLRP and beyond.

Adaptive Management Strategy

Adaptive management is a strategic approach to "manage natural resources in the face of uncertainty" (Rist et al., 2013) by treating management actions as scientific experiments and adjusting future actions based upon experimental results (Ralph and Poole, 2003). Adaptive management is a key priority of this MPM plan and Rio Chama CFLRP treatment implementation to ensure undesirable restoration effects can be mitigated to prevent repetition, and successful forest management can inform future actions within the project footprint and beyond.

In a fluctuating system with dynamic ecologic, social, and political components, it is essential to define a successful adaptive management strategy. Success can be defined as 1) a strict adherence to the cyclical adaptive management process or 2) by measuring an adaptive management strategy's ability to reduce uncertainty (Rist et al., 2013). The 2-3-2 Partnership recognizes the variable environmental and governance factors within the project footprint and is therefore focused on the latter definition of adaptive management success. The 2-3-2 Partnership is focused on reducing treatment uncertainty and

our collective understanding of the dynamic project area supports a “broader management framework” (Rist et al., 2013) approach to adaptive management.

The 2-3-2 Partnership Adaptive Management Strategy is designed to track treatment effects and outline a collaborative review process to guide future treatments. The 2-3-2 Partnership aims to develop monitoring and management plans that work together (Ralph and Poole, 2003) by engaging stakeholders and management agencies in the design, implementation, and review of a monitoring program (Schultz et al., 2014) and associated adaptive management strategy. Although “trigger points” are often used in adaptive management to prompt treatment changes (Schultz et al., 2014), ongoing stakeholder and agency discussions highlight the challenge of developing trigger points for the 2-3-2 Partnership landscape. First, defining trigger points in a 15-year monitoring plan will inherently miscalculate stochastic environmental and social changes -- such as insect and disease outbreaks, climate change impacts, flooding, and wildfires -- that will interact with forest treatments. Second, the Rio Chama CFLRP encompasses lands and waters managed by diverse agencies, Native nations, and private citizens who have differing abilities to implement and adjust treatment activities. Third, a collaborative project of this size and scale relies on multiple individuals whose roles and duties will change throughout the life of the project, and therefore the social support of pre-defined triggers may wane. Fourth, scientific research will continue to advance and trigger-appropriateness may change. Fifth, forest and human community succession make it difficult to respond to trigger points since they occur along a temporal timeline. Lastly, defining spatially-relevant triggers is challenging as treatment effects may differ at the project and landscape levels. For these reasons, the 2-3-2 Partnership Adaptive Management Strategy foregoes defining triggers and instead relies on adaptive management “watch-outs” and a science review network to connect monitoring data and treatment implementation.

Adaptive management watch-outs were outlined by the 2-3-2 Partnership and approved by the monitoring committee (see tables 1 and 11). The watch-outs are designed to fit into the bounds of what can and will be measured (Ralph and Poole, 2003) and focus on data trends in treatment areas and at the landscape-scale. The monitoring committee will review annual data trends and assess which adaptive management watch-outs are met. The monitoring committee will coordinate with the full 2-3-2 Partnership to determine what monitoring and treatment changes should be made, and over what time frame, in order to stop, reverse, or further understand data trends associated with adaptive management watch-outs.

This collaborative approach incorporates ecosystem and social dynamics into an adaptive management framework which creates a “planning process that uses monitoring as collective learning on the effects of ground activities and adjusts decisions based on what is learned” (CFLRP Common Monitoring Strategy, 2020). In order to collect data in an “experimental” fashion, treated and untreated (equivalent to experimental “controls”) will be incorporated and ecosystem variables will be measured before and after restoration treatments. In socioeconomic systems, baseline data will be collected at the beginning of CFLRP implementation and recollected at various intervals to measure project impacts over time.

Science and Local Knowledge

The 2-3-2 Partnership brings together individuals who are focused on watershed and forest resilience, are interested in landscape treatments in the region, and are informed by diverse backgrounds and knowledge systems. To do so, the 2-3-2 Partnership actively tracks relevant and timely scientific information across the Rio Chama CFLRP and adjacent landscapes to incorporate up-to-date, region-specific science in monitoring and analysis. In addition, local and traditional knowledge broaden collaborative efforts toward informed decision making.

Scale of Monitoring

Restoration treatment effects will be measured at the project- and landscape-scale, as well as across all landownerships within the 2-3-2 Partnership footprint. As Schultz et al. (2014) note, landscape restoration is a process and all steps in that process should be evaluated. Put another way, it is essential to track local results and the synergistic interaction of multiple projects at a larger scale (Ralph and Poole, 2003), because the cumulative landscape response to forest and watershed treatments is amplified in a non-linear fashion (SW Jemez CFLRP Report, 2021). In addition, the 2-3-2 Partnership values the diverse land stewardship in the region and is dedicated to tracking treatment effects with an "all-lands" approach. This MPM plan is designed to address each monitoring question in a way that measures both project and landscape effects across all land management areas.

Defining Landscape

Given the desire of the 2-3-2 Partnership and CFLRP Common Monitoring Strategy to monitor landscape-scale change (CFLRP Common Monitoring Strategy, 2020; Esch and Waltz, 2019), there is a need to outline a MPM plan definition of "landscape". The 2-3-2 Partnership footprint includes 5.1+ million acres and extends north of the 3.81+ million acre Rio Chama CFLRP, covering portions of southern Colorado and northern New Mexico. Given these socio-political boundaries, the monitoring landscape could be defined as the 2-3-2 Partnership or the Rio Chama CFLRP footprint. However, collective treatment effects on ecological and socioeconomic conditions do not stop at project borders, and a "landscape" viewed by economic reach is different than one viewed by migratory animals or ecosystem function (McGarigal and Marks, 1995).

Guidance from the CFLRP Common Monitoring Strategy (2020) indicates landscape extents should be large enough "to support fire regimes" and "encompass the disturbance processes of the area involved." With this understanding, the 2-3-2 Partnership MPM plan accepts the Urban et al. (1987) landscape definition of "a mosaic of heterogenous landforms, vegetation types, and land uses", as well as acknowledges that a series of social and economic landscapes exist within and around program boundaries.

In an effort to track landscape change over time, ecological monitoring data will be summarized across the entire Rio Chama CFLRP boundary as well as at the subwatershed level (Hydrologic Unit Code 12 (HUC12)), as defined by the U.S. Geological Survey Watershed Boundary Dataset (USGS and NRCS, 2013). Using HUC12 boundaries to track landscape change across the Rio Chama CFLRP highlights the program and 2-3-2 Partnership's focus on promoting watershed health within the headwaters and tributaries of the San Juan, Rio Chama, and Rio Grande rivers. In addition, HUC12s provide a consistent "landscape" delineation across all-lands within the Rio Chama CFLRP and will provide for on-going comparison and correlation between monitoring questions. There are 204 HUC12s encompassed within the Rio Chama CFLRP and each one is typically 10,000-60,000 acres. The use of HUC12 delineations can expand beyond the Rio Chama CFLRP for application in other portions of the 2-3-2 Partnership footprint.

Defining Local

Local contractors and organizations were defined as those with business addresses in the 19-county area of interest that surrounds the Rio Chama CFLRP -- Taos, Rio Arriba, Santa Fe, Sandoval, Los Alamos, San Miguel, Bernalillo, Mora, and San Juan Counties in New Mexico and Conejos, Archuleta, La Plata, Rio

Grande, Costilla, Alamosa, Montezuma, Dolores, Montrose, and Saguache Counties in Colorado. This delineation was chosen based on local knowledge of these county's economic dependance on national forestland within the Rio Chama CFLRP boundary. Residents of the listed counties depend on forested lands in many ways, including but not limited to meeting wood gathering and processing needs, biomass utilization at wood processing facilities, and employment related to forest product activities. This list of counties reflects the areas where the workforce for the Rio Chama CFLRP lives and where they will likely spend their wages.

Leakage of benefits out of the local area will be quantified based on three tiers: leakage to businesses in adjacent counties, leakage to businesses in other parts of New Mexico or Colorado, and leakage to businesses in other states (McIver, 2016).

Collaborative Monitoring

Collaborative monitoring is an ideal way for project stakeholders to directly participate in treatment implementation (Shultz et al., 2014) and partnerships are essential for the success of this MPM plan. Collaborative monitoring builds relationships and trust among stakeholders, even when there is a history of conflict (Walpole et al., 2017), and is an opportunity to incorporate human perspectives into natural resource management to improve social-ecological systems (Taracón et al., 2020). The 2-3-2 Partnership MPM plan recognizes the diverse social and cultural histories within the area and the need to incorporate both traditional and western knowledge in holistic landscape restoration (Lake et al., 2017). These different but complementary ways of knowing combine to generate co-produced knowledge that improves restoration and social-ecological outcomes (Lake et al., 2017; Long and Lake, 2018; Tarancón et al., 2020).

Building collaborative partnerships, and the relationships that maintain them, takes time. Establishing trust and creating a space for information sharing requires variable communication patterns and respect for nation sovereignty (Lake et al., 2017). In addition, community perspectives vary across the landscape (Brunswig et al., 2010) and efforts must be made to continually expand the reach of collaborative partners. As the collaborative process continues to grow, this MPM plan encourages monitoring question expansion and novel, multi-disciplinary approaches as resources allow. 2-3-2 Partnership members will continue to explore opportunities for additional monitoring funding and research partnerships.

Community Science

Community science (previously referred to as "crowdsourced science", "participatory science", and "citizen science") provides the opportunity for everyone, regardless of their background, to contribute meaningful data to further our collective understanding of treatment effects. Involving members of the greater community in collecting and analyzing monitoring data serves the concurrent purposes of generating additional data and involving interested or concerned individuals in shared learning with restoration scientists and resource managers. No matter where a volunteer was born, where they live, or where they call home, their observations and records of environmental data are valuable. Engaging the community is a key step to building trust and long-term project success (Olsen and Sharp, 2013) and members of the public will be invited to participate in community science monitoring as methods allow.

Prioritization

Given the size of the 2-3-2 Partnership footprint, limited monitoring resources, and diverse member interests, not all proposed approaches and questions were included in the MPM plan. There are inherent monitoring constraints including cost, linkage to CFLRP objectives, sensitivity to resources, and adaptive management potential. The monitoring committee explored various approaches to address proposed monitoring questions. The committee favored monitoring approaches that could be used to answer multiple monitoring questions, could be applied cohesively across “all-lands” within the 2-3-2 Partnership footprint, informed adaptive management, fulfilled knowledge gaps, were cost-effective, could be replicated over multiple years, provided opportunities for community participation, and had buy-in from multiple collaborative partners.

In addition, the monitoring committee recognized the need to pair monitoring prioritization with treatment prioritization. Multiple participants in previous CFLRPs identified challenges with allocating monitoring resources in-line with planned treatments and noted inefficiency where monitoring focal areas were never treated. The 2-3-2 Partnership will make concerted efforts to coordinate MPM in conjunction with all-lands treatments to ensure baseline and treatment-control data are collected at spatial and temporal scales to document treatment effects.

Program Review

An explicit program review process helps ensure that the 2-3-2 Partnership MPM plan increases shared learning and informs management actions. Analyzed monitoring data will be shared with USDA Forest Service personnel, the 2-3-2 Partnership, and other interested stakeholders on field trips, at annual review meetings, and in written summaries. These forums provide opportunities for participants to learn about and provide feedback on resource conditions and project implementation, outputs, and outcomes. More details about program review are included in the Results and Reporting section of this plan.

Monitoring Plan Workflow

While there is ongoing debate regarding the line between research and monitoring (Schultz et al., 2014), this MPM plan is meant to inform adaptive management processes, and to do so, must include thinking about monitoring as applied science (Ralph and Poole, 2003). Specifically, the plan must establish “good questions” based on a strong understanding of how ecosystems work, coordination amongst scientists and managers, and critical treatment evaluation (Lindenmayer and Likens, 2010). Good questions can inform adaptive management when they are led by a distinct set of desired conditions (Schultz et al., 2014), designed before treatment decisions are made (Ralph and Poole, 2003), and result in "quantifiable objectives" or “benchmarks” to clearly measure restoration progress (Lindenmayer and Likens, 2010; Ralph and Pool, 2003). The Guild, MSI, and monitoring committee developed a monitoring plan workflow (Figure 2) to guide monitoring development and ensure the monitoring approach is accountable to the project goals, desired conditions, and monitoring questions.

Project goals were defined by the Rio Chama CFLRP proposal (Collaborative Forest Restoration in the Rio Chama Landscape, 2020) and updated in 2022. The Rio Chama CFLRP brings together four National Forests and place-based collaboratives within the 2-3-2 Partnership to work at a landscape-scale to

implement Community Wildfire Protection Plans and Forest Land Management Plans. The goals of this work are to:

- Manage fuel loads to reduce the risk of uncharacteristically severe fire in target areas;
- Strive to restore natural fire regimes using prescribed and managed fire for multiple resource benefit;
- Restore or maintain desired forest diversity, structure, and/or old growth characteristics consistent with Forest Plans;
- Maintain or improve fish and wildlife habitat quality and connectivity for native and desired non-native fish and wildlife species;
- Conserve or restore important habitat to help recover threatened and endangered species;
- Improve or maintain water quality and watershed function;
- Implement climate change adaptation strategies;
- Maintain or increase the number of people from underserved and distressed communities who are directly or indirectly employed in forest and watershed restoration in the project vicinity;
- Maintain or increase the public acceptance of forest and watershed restoration activities including frequent, low-intensity wildfire or prescribed fire;
- Encourage market availability and product utilization to provide a long-term economic relationship between forest restoration products/by-products and local markets;
- Maintain or increase the availability and/or access to medicinal, food, heating, or building materials and pursue opportunities to integrate outcomes that may also facilitate public access; and
- Maintain or increase the number of acres treated to reduce fire hazard, expand wildfire response decision space, improve wildfire outcomes, and increase protection of homes and infrastructure.

Project goals determine the focus of the landscape treatments and MPM plan, and serve as guards to keep the plan focused. There is inherently ecologic and socioeconomic overlap between project goals, the specifics of which will be discussed in annual reports.

Desired conditions describe specific ecologic, economic, and/or social characteristics of an area toward which land management should be directed. It is difficult to concisely summarize desired conditions across the landscape, and therefore, desired conditions are frequently broad, subjective statements. In review of past CFLRP efforts, Schultz et al. (2014) note the need for measurable and "clear desired conditions to drive a more robust and effective monitoring approach." The monitoring committee collected the desired conditions listed in all four National Forest forest-wide land management planning documents (Cress, 2021; Dallas, 2020; Duran, 2021; Jiron, 2021; see Appendix E) related to each project goal. However, this produced a substantial list of desired conditions and the monitoring committee, with 2-3-2 Partnership input, created MPM desired conditions that tier from these forest plans and are applicable to all-lands within the 2-3-2 Partnership footprint.

Monitoring questions shape the indicators, metrics, and analyses used in the monitoring program and should "critically evaluate study manipulations" (Lindenmayer and Likens, 2010). The CFLRP Common Monitoring Strategy (2020) noted the importance of simple questions that were developed by stakeholders. Following the same core strategy document, the majority of monitoring questions included in this MPM plan were determined by the common monitoring strategy with additional

questions selected by USFS Region 2 and Region 3 leadership. Where resources, time, and interest allowed, additional monitoring questions were developed by the monitoring committee based on input from the 2-3-2 Partnership (Tables 1 and 11).

Indicators are specific approaches for addressing monitoring questions. The indicators break monitoring questions into measurable components that are sensitive to change over time (Derr et al., 2005). Some indicators were suggested by the CFLRP Common Monitoring Strategy (2020) and others were developed based upon monitoring committee feedback and interests.

Metrics identify the specific measures to be monitored and used to address a given indicator. Metrics identify what changes will be tracked.

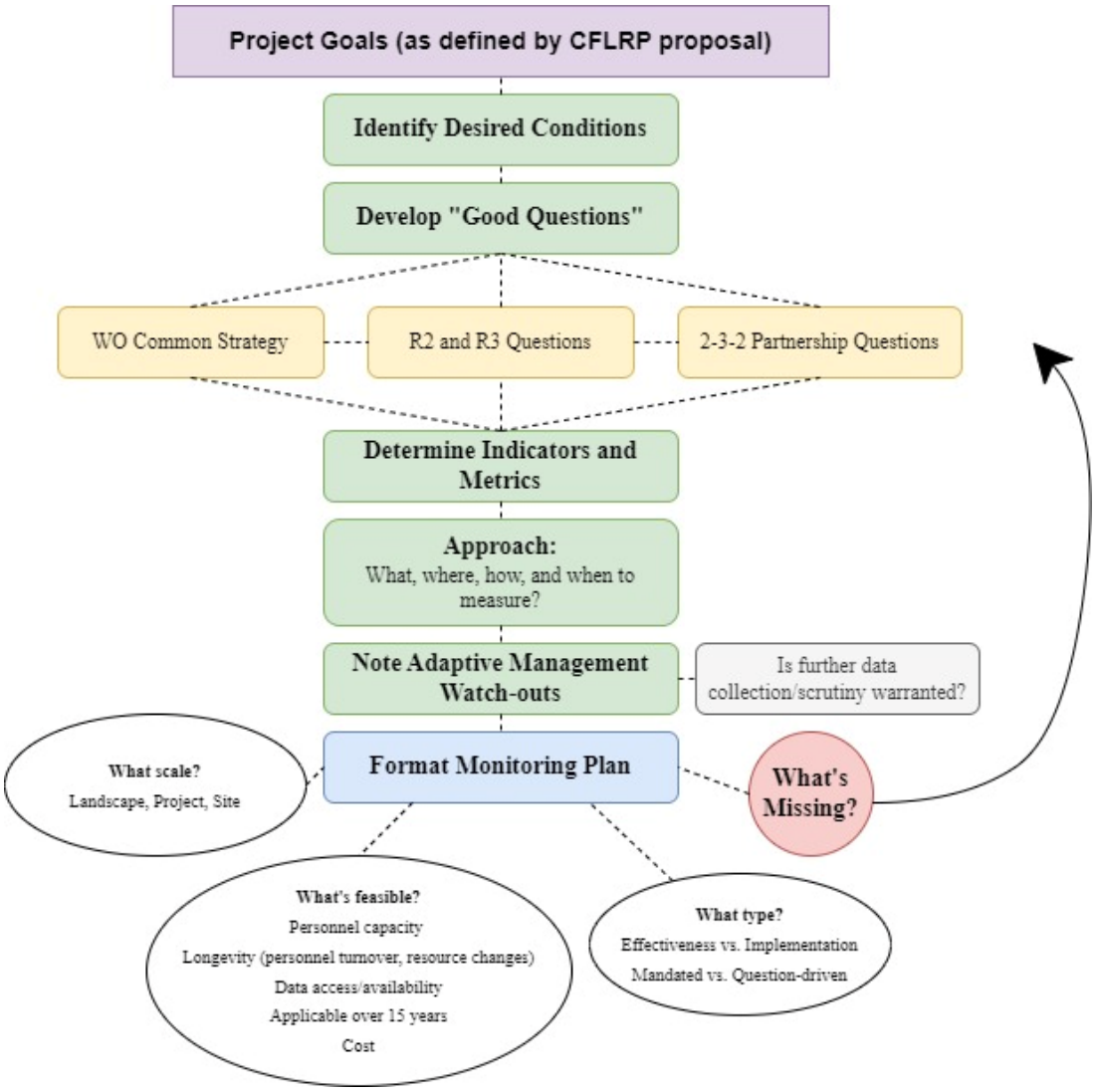
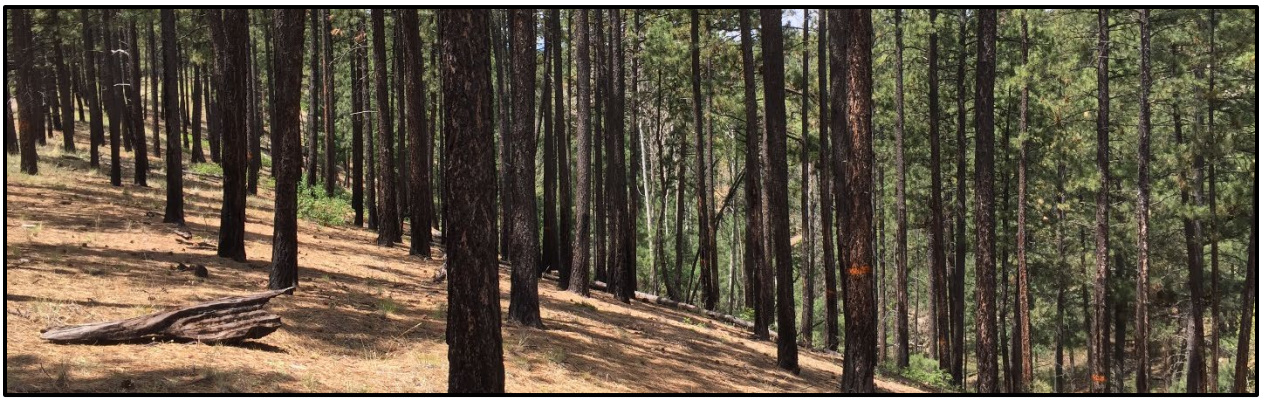


Figure 2. Monitoring plan workflow.

Monitoring approach refers to the determined information source and course of action to collect data and analyze the results for each monitoring metric. The approach outlines the specific database, tool, program, and/or framework to be used, who is responsible for data collection and analysis, and implementation frequency.

Adaptive management watch-outs are built in "checks" to determine if treatments are moving toward the desired and/or resilient conditions. These watch-outs were designed to identify departures from desired conditions, or potential undesirable treatment effects, and to "flag" areas where additional data and scrutiny are needed to inform adaptive management. Given the necessary crossover between a monitoring program and treatment implementation, the 2-3-2 Partnership sought significant input from the USDA Forest Service to define an adaptive management strategy that can be applied to all-land and cross-boundary projects. Adaptive management watch-outs should be worked into treatment plans and reviewed if met (see Adaptive Management Strategy section).



Ecological Monitoring

Ecological monitoring is used to determine if the current state of a biophysical system is moving toward a desired condition (Noon, 2003). This MPM plan began with the CFLRP Common Monitoring Strategy (2020) questions and suggested indicators and expanded outward to incorporate USDA Forest Service regional interests and 2-3-2 Partnership questions, as resources allowed. The reach and extent of ecological monitoring will grow throughout the lifespan of this plan and will be documented in Figure 3 (to be updated yearly).

In order to address both the CFLRP Common Monitoring Strategy (2020) questions and those determined by the 2-3-2 Partnership, as well as monitoring across all lands within the CFLRP boundary and at both the project- and landscape-scales, this MPM plan incorporates a mix of field surveys and model analyses to track treatment effects over time. Field surveys and model runs will be carried out by both the USDA Forest Service and the 2-3-2 Partnership to obtain project-specific data to inform landscape modeling. Forest plot data will address multiple monitoring questions and provide input for numerous models. There are a range of model options available to address the suite of indicators and questions outlined in this plan. Where possible, models will be selected to address multiple monitoring questions. Because there is not a single "golden" model, multiple models will be required. The following MPM approaches have been identified as priorities to address project goals and associated monitoring questions.

Table 1. Ecological monitoring goals, questions, and methodology.
*Overview of the ecological monitoring questions and methodology to be implemented in the 2-3-2 Cohesive Strategy Partnership's Rio Chama Collaborative Forest Landscape Program Multiparty Monitoring Plan. Project goals were determined by the 2-3-2 Cohesive Strategy Partnership. *Indicates methodology will be used to address multiple questions.*

	Project Goal	Monitoring Question	Question Source	Methodology	
Fire Regimes	Manage fuel loads to reduce the risk of uncharacteristically severe fire in target areas	What is the reduction in fuel hazard based on our treatments?	WO Common Strategy Q1	a. IFTDSS* b. FEMO Observations c. Forest Plots* d. FragStats e. MTBS	See Table 2.
	Strive to restore natural fire regimes using prescribed fire and managed fire for multiple resource benefit	What is the effect of the treatments on moving the forest landscape toward a more sustainable (or resilient) condition?	WO Common Strategy Q2	a. R3 Analysis Framework* b. Spatial analysis c. TCA d. Traditional Knowledge	See Table 3.
Forest Characteristics	Restore or maintain desired forest diversity, structure, and/or old growth characteristics consistent with Forest Plans	What is the trend in invasive species within the CFLRP project area?	WO Common Strategy Q5	a. FIA Analysis* b. Forest Plots* c. Project summaries*	See Table 4.
		How do treatments alter the density and distribution of large trees, snags, and coarse woody debris?	2-3-2 Partnership	a. Community Site Visits b. FIA Analysis* c. Forest Plots* d. R3 Analysis Framework* e. Repeat Photo Points*	See Table 5.
		What is the effect of treatments on the presence of forest pests and disease?	2-3-2 Partnership	a. Aerial surveys b. FIA Analysis* c. Forest Plots*	See Table 6.
		How do CFLRP activities affect carbon carrying capacity over time?	USFS Region 3	a. R3 Analysis Framework*	See Table 7.
Wildlife	Conserve or restore important habitat to help recover threatened and endangered species Maintain or improve fish and wildlife habitat quality and connectivity for native and desired non-native fish and wildlife species	What are the specific effects of restoration treatments on the habitat of at-risk species and/or the habitat of species of collaborative concern across the CFLR project area?	WO Common Strategy Q3	a. eDNA Sampling b. Forest Plots* c. Project summaries* d. Specialist Panel e. R3 Analysis Framework* f. Repeat Photo Points*	See Table 8.
		What are the specific effects of restoration treatments on populations of species of collaborative concern across the CFLRP project area?	2-3-2 Partnership	a. Forest Plots* (Pollinator surveys) b. Presence/absence (Beaver = visual survey; Cutthroat trout = eDNA)	See Table 9.
Water	Improve or maintain water quality and watershed function	What is the status and trend of watershed conditions in the CFLR area, with a focus on the physical and biological conditions that support key soil, hydrologic and aquatic ecosystem processes?	WO Common Strategy Q4	a. HOBO Sensors b. Project summaries* c. Repeat photo points* d. State water data e. WCF	See Table 10.

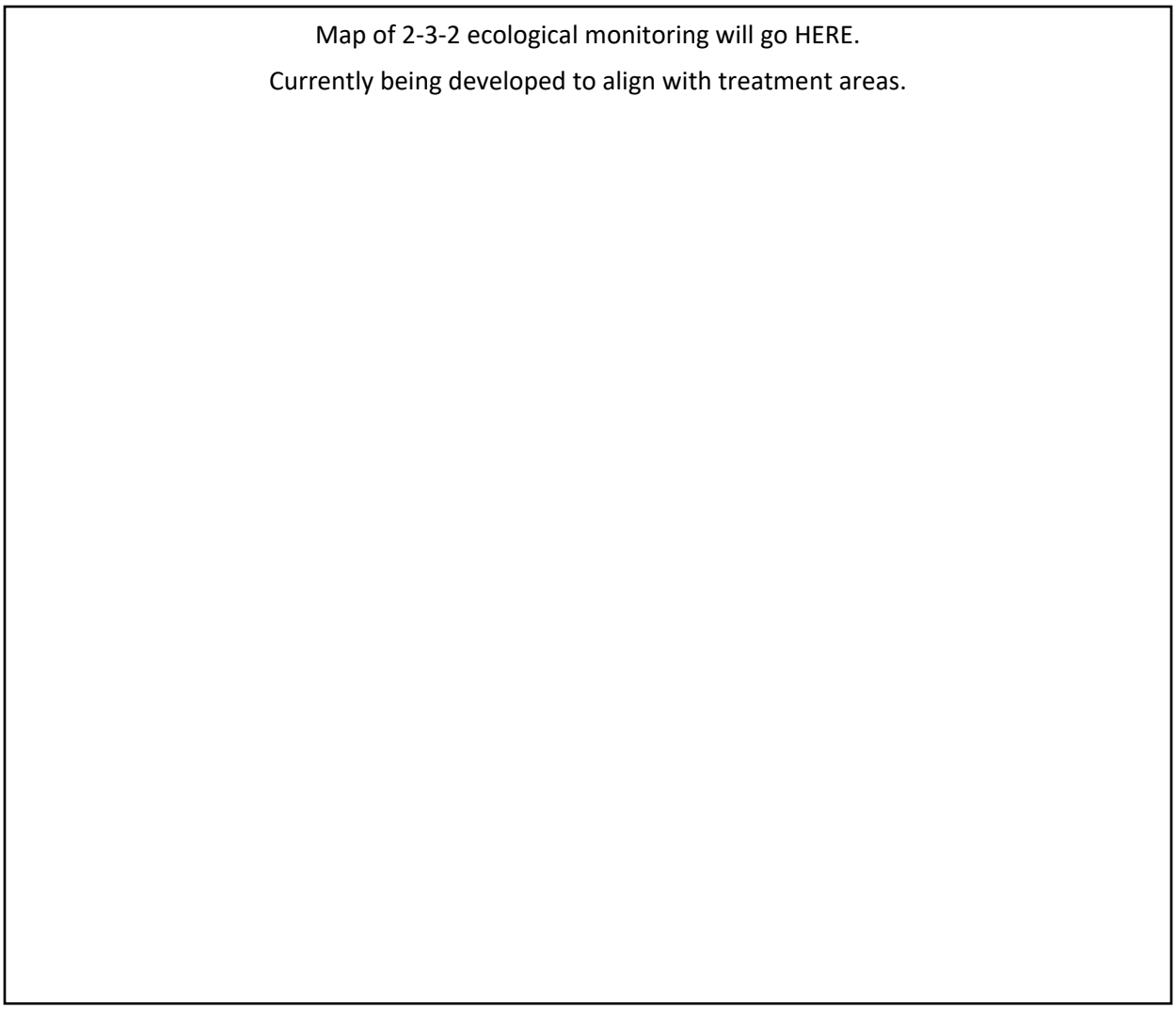


Figure 3. Map of 2-3-2 Cohesive Strategy Partnership ecological monitoring.

Fire Regimes

Fire regimes are the patterns of fire occurrence, frequency, size, severity, and effects in a given area or ecosystem (National Wildfire Coordinating Group, n.d.). Rio Chama CFLRP treatments intend to alter current fire regimes using a combination of thinning and prescribed burning to increase fire frequency and reduce fuel loading. Landscape-scale changes to fuel loads are expected to reduce fire severity and improve future fire management options (Evans et al., 2019; Korb et al., 2012; Lyderson et al., 2017; Prichard and Kennedy, 2013; Prichard et al., 2010).

Fire regime monitoring addresses two project goals and is divided into two questions related to fuel loads, and fire severity and frequency:

Project Goal: Manage fuel loads to reduce the risk of uncharacteristically severe fire in target areas.

Desired Condition: *Forest treatments decrease fuel loads in targeted areas and reduce predicted wildfire characteristics at the project- and landscape-scale.*

Q What is the reduction in fuel hazard based on our treatments? (Table 2)

Project Goal: Strive to restore natural fire regimes using prescribed fire and managed fire for multiple resource benefits.

Desired Condition: *Wildland fires burn within the desired range of severity and frequency for the affected vegetation communities and move ecosystems toward desired landscape conditions. Fire functions in its natural ecological role across administrative boundaries and under conditions where safety and values-at-risk can be protected.*

Q What is the effect of treatments on moving the forest landscape toward a more sustainable (or resilient) condition? (Table 3)

To understand if fuel treatments are promoting forest resilience, MPM will use established and vetted fire behavior models and forest plots to track changes over time. Fireline intensity and crown fire probability will be modeled using the Interagency Fuel Treatment Decision Support System (IFTDSS). Forest plots will follow MPM protocols (Appendix B) to establish baseline data, capture treatment-control change over time, and inform IFTDSS. Acres burned are tracked using USDA Forest Service and partner databases, and vegetation departure is modeled using the R3 Analysis Framework. Traditional Knowledge will inform the state of ecological conditions and the Terrestrial Condition Assessment (TCA) will be run at the national level to assess ecological integrity across all CFLRPs.

Table 2. What is the reduction in fuel hazard based on our treatments? (CFLRP Common Monitoring Q1)[2]

Baseline: Pre-treatment IFTDSS analysis and CWD loads.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Fireline Intensity[WO]	Δ in predicted flame lengths	FACTS[F] Forest Plots[C] (canopy cover, stand height, canopy base height)	IFTDSS[C,F]	Baseline and Annually[L,P]	Flame lengths increase by more than double baseline estimates.
	Observed fireline intensity	Fire behavior[C]	FEMO Report[C]	As able[P]	
Crown Fire Prob.[WO]	Δ in crown fire prob. class	FACTS[F] Forest Plots[C] (canopy cover, stand height, canopy base height)	IFTDSS[C,F] FragStats[C]	Baseline and Annually[L,P]	# of acres with crown fire activity increases.
Fuel Loads	Δ in CWD fuel loads and sapling density	Forest Plots[C] (CWD, sapling counts)	Excel, R[C]	Baseline, post-treat, and every 3 years after[P]	Significant change in fuel loads and sapling density.
Burn Severity	Ratio of burn severity classes between treated and untreated stands	Occurs on 1000+ acre fires[F]	MTBS[C,F]	Following wildfire[L,P]	Treated stands have greater % of high severity fire than adjacent untreated stands.

[2] For tables 2 through 10 and 12 through 25: [WO] indicates monitoring indicator was determined by CFLRP Common Monitoring Strategy (2020). [C] indicates collaborative partners are responsible for data collection and/or analysis. [F] indicates USFS are responsible for data collection and/or analysis. [L] indicates monitoring evaluates landscape-scale change. [P] indicates monitoring evaluates project-scale change.

Table 3. What is the effect of treatments on moving the forest landscape toward a more sustainable (or resilient) condition? (CFLRP Common Monitoring Q2)[2]

Baseline: Pre-treatment vegetation mapping and analysis.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Veg. Departure [WO]	Δ in acreage by seral state and fire regime	Landscape Stratification Mapping[F,C] (LANDFIRE, Oregon State Univ. Institute of Natural Resources)	R3 Analysis Framework[F]	Baseline and every 5 years[L]	Methodology not accounting for climate change.
					A notable stochastic event occurs within the CFLR footprint.
Acres Burned[WO]	Δ in acres burned by fire regime # of prescribed and managed fires for multiple resource benefits	Vegetation Mapping[F,C] (INRev maps, LANDFIRE, FIA) Landscape Updates[F,C] (NAIP, Tx shapefiles, FVS, fire severity maps, NMFWRI Opportunity Map, FACTS, WFDSS)	Spatial Analysis[F,C]	Annually[L]	Type of burning siloing (i.e., all federal or all NWCG). Decreasing number of federal and/or non-federal burns.
	Departure from NRV: # acres burned compared to natural regime	Data collection occurs at national level[F]	TCA[F]	Every 5 years[L]	A notable stochastic event occurs within the CFLR footprint. Forests are not moving toward desired conditions.
Eco Conditions	Δ from past and/or desired conditions	Engaged Listening[C]	Traditional Knowledge[C]	Continuous[L,P]	Untreated forest stands resemble desired conditions more than treated stands.

Forest Characteristics

Forest compositional and structural characteristics influence forest function and multiple ecologic interactions. For example, homogenous even-aged stands reduce variability and associated vegetative and wildlife diversity (Evans et al., 2019). The Rio Chama CFLRP proposal document (Collaborative Forest Restoration in the Rio Chama Landscape, 2020) notes the importance of using treatments to increase the presence of uneven-aged forests where the combination of forest openings reduces the risk of insect, disease, and stand-replacing wildfires, and large tree retention provides valuable wildlife habitat and carbon sequestration. Forest composition and structure will be monitored by a variety of means and will focus on specific forest characteristics.

This section addresses two project goals and asks four monitoring questions:

Project Goal: Restore or maintain desired forest diversity, structure, and/or old growth characteristics[3] consistent with Forest Plans.[4]

Desired Condition: *Terrestrial and aquatic ecosystems have a diverse composition of self-perpetuating, desired plant and animal species. Invasive species are decreasing in abundance and extent within project areas and at the landscape-scale.*

Q What is the trend in invasive species within the CFLRP project area? (Table 4)

Desired Condition: *Promote forest conditions that are broadly resilient to disturbances of varying frequency, extent, severity, and type. Promote current and future old forest characteristics by increasing desired multistory forest structure including large trees, old trees, snags, heterogeneous coarse woody debris, and diverse understories in forest and woodland vegetation communities.*

Q How do treatments alter the density and distribution of large trees, snags, and coarse woody debris? (Table 5)

Q What is the effect of treatments on the presence of forest pests and disease? (Table 6)

Project Goal: Implement climate change adaptation strategies.

[3] This MPM plan adheres to the old growth characteristics defined in the Forest Management Plan of the four forests contained within the 2-3-2 Partnership landscape (Cress, 2021; Dallas, 2020; Duran, 2021; Jiron, 2021) and will incorporate old growth and mature tree guidance resulting from The White House's Executive Order on Strengthening the Nations Forests, Communities, and Local Economies (Biden, 2022).

[4] Forest Plans refers to the most recent Forest Management Plan of each forest within the 2-3-2 Partnership landscape, as well as the desired conditions determined by the 2-3-2 Partnership for all-lands across the landscape.

Desired Condition: *Forested ecosystems maintain optimal carbon stocks that balance fire risk and long-term carbon storage.*

Q How do CFLRP activities affect carbon carrying capacity over time? (Table 7)

Data will be collected on invasive species presence through the project tracking systems, and forest plot data will be compared with Forest Inventory and Analysis (FIA) plots to see how invasive species trends in treatment areas compare to trends across the landscape. Treatment effects on large tree and snag densities, and coarse woody debris loading will be modeled using the R3 Analysis Framework. Field data will be collected using forest plots, established FIA plots, and repeat photo points. In addition, large tree retention monitoring will include qualitative feedback from collaborative site visits. Forest pest and disease trends will be captured through USDA Forest Service and the States of Colorado and New Mexico aerial surveys and FIA data. Treatment effects will be measured using forest plots and compared to landscape-wide trends. Finally, to track changes in carbon storage over time, the R3 Analysis Framework will model carbon stock by forest type.

Table 4. What is the trend in invasive species within the CFLRP project area? (CFLRP Common Monitoring Q5)[2]

Baseline: FIA plot extrapolation and pre-treatment forest plots.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Acres Treated[WO]	# acres treated, # individuals found, # acres inventoried	FACTS[F] RATS[C]	Project Summary[F,C]	Baseline and Annually[L,P]	# of individuals per acre inventoried increases or does not change Treated acres are double counted in agency database. Planned treatments are completed for a given area but follow-up treatments are needed to reach desired conditions.
Plot Extrap.	Δ in % cover of invasives of top concern; Δ in % cover of veg. Functional groups	FIA Plots[F] (~635)	FIA Analysis[F]	2019 and every 5 years[L]	Ground cover of invasive species in treatment areas increases at a greater rate than across FIA and control plots in similar ecosystem types.
		Forest Plots[C] (invasive cover, veg. func. group estimates)	Excel, R[C]	Pre-treat, Post-treat, and every 3 years[P]	
	Visual Change	Repeat Photo Points[C]	Visual Comparison[F,C]	Pre-treat, post-treat, and every 3 years after[P]	

Table 5. How do treatments alter the density and distribution of large trees, snags, and coarse woody debris? (2-3-2 Partnership Interest)[2]

Baseline: Field visits to proposed treatment areas. Plot extrapolation from forest plots and FIA data.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Forest Conditions	Δ in community and practitioner evaluation of forest health	Community Site Visits[F,C] (Field Trips)	Discussion tracking/review [C]	Yearly[P]	Treatment areas are straying from desired or anticipated conditions.
Plot Extrap.	Δ in tpa by species, size class, and live/dead, BA, # dead top trees, # snags, CWD, vegetation	FIA Plots[F] (~635)	FIA Analysis[F]	2019 and every 5 years[L]	Structural stage distributions move away from desired conditions. Conclusions oversimplify or generalize diverse landscape.
		Forest Plots[C] (tree counts, CWD estimates, veg. func. group estimates)	Excel, R[C]	Pre-treat, post-treat, and every 3 years[P]	
	Visual Change	Repeat Photo Points[C] (ground and drone imagery)	Visual Comparison[C,F]	Pre-treat, post-treat, and every 3 years after[P]	Observable trend in stand composition and structure moving away from desired conditions.
Frag. Metric	Δ in patch size and density of large trees and snags	Landscape Stratification Mapping[F,C] (LANDFIRE, Oregon State Univ. Institute of Natural Resources) Vegetation Mapping[F,C] (INRev maps, LANDFIRE, FIA) Landscape Updates[F,C] (NAIP, Tx shapefiles, FVS, fire severity maps, NMFWRI Opportunity Map, FACTS, WFDSS)	R3 Analysis Framework[F]	Baseline and every 5 years[L]	Trends in landscape fragmentation moving away from desired conditions.

Table 6. What is the effect of treatments on the presence of forest pests and disease? (2-3-2 Partnership Interest)[2]

Baseline: FIA plot extrapolation and landscape aerial surveys. Pre-treatment Forest Plots.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Plot Extrap.	Δ # dead trees, # trees with signs of infestation	FIA Plots[F] (~635)	FIA Analysis[F]	2019 and every 5 Years[L]	Forest plots indicate higher presence of pest/disease impacted trees than FIA data
		Forest Plots[C] (tree counts)	Excel, R[C]	Pre-treat, post-treat, and every 3 years[P]	
Aerial Surveys	# of acres tree mortality by insect/disease agent	Forest and State Aerial Detection Surveys[F]	Document Review[C]	Annually[L]	Aerial survey results not ground truthed.

Table 7. How do CFLRP activities affect carbon carrying capacity over time? (R3 Common Monitoring)[2]

Baseline: Pre-treatment vegetation mapping and analysis.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Stored Carbon	Δ in total carbon stock by forest type	Landscape Stratification Mapping[F,C] (LANDFIRE, Oregon State Univ. Institute of Natural Resources) Vegetation Mapping[F,C] (INRev maps, LANDFIRE, FIA) Landscape Updates[F,C] (NAIP, Tx shapefiles, FVS, fire severity maps, NMFWRI Opportunity Map, FACTS, WFDSS)	R3 Analysis Framework[F]	Baseline and every 5 Years[L]	Modeled carbon storage trends do not align with desired conditions for a given forest type. Model not accounting for below ground carbon.

Wildlife

Wildlife monitoring is designed to address at-risk species (selected by USDA Forest Service led panel) and species of collaborative interest (determined by the monitoring committee based on input from multiple stakeholders across the landscape). CFLRP thinning, burning, and riparian restoration treatments are expected to improve over 145,000 acres of terrestrial wildlife habitat. Potential habitat improvements include reduction of invasive species and maintenance of large and/or old tree habitat components.

This section addresses two project goals and asks two monitoring questions:

Project Goal: Conserve or restore important habitat to help recover threatened and endangered species.

Desired Condition: *Federally listed, proposed, and candidate species are conserved by maintaining or improving ecological conditions necessary for species persistence and recovery.*

Project Goal: Maintain or improve fish and wildlife habitat quality and connectivity for native and desired non-native fish and wildlife species.

Desired Condition: *Promote habitat configuration and availability to support fish and wildlife forage, shelter, genetic flow, and species' ability to adjust movements in response to major disturbance.*

Retain sufficient habitat characteristics, specific to at-risk species[5] and species of collaborative concern, to maintain species presence and/or movement between treated and adjacent untreated stands. Species and their associated desired habitat conditions are:

- *Abert's squirrel (Sciurus aberti) – Retain basal area diversity and mature conifer patches that provide interconnected structure and produce abundant foraging (cone crops and above/below-ground fungi) and reproductive habitat.*
- *American beaver (Castor canadensis) – Increase acreage of wetland and riparian habitat.*
- *Colorado River (Oncorhynchus clarkii pleuriticus) and Rio Grande cutthroat trout (Oncorhynchus clarki virginalis) – Natural and human-made barriers to upstream fish migration protect stream reaches large enough to support long-term population viability, and the distribution of cutthroat trout is increased where ecologically, sociologically, and economically feasible.*

[5] At-risk species refers to species listed as threatened or endangered under the Endangered Species Act and/or species of conservation concern as outlined in Forest Management Plans.

- *Lewis' woodpecker (Melanerpes lewis) – Increase forest age class diversity while retaining large trees, snags, and mature, acorn-producing oak. Retain and recruit mature cottonwoods in riparian habitats.*
- *Wild bees – Abundant and diverse understory vegetation is available throughout the growing season, with minimal presence of exotic plants. Downed woody debris is present for bee nesting and shelter.*

Q What are the specific effects of restoration treatments on the habitat of at-risk species and/or the habitat of species of collaborative concern across the CFLR project area? (Table 8)

Q What are the specific effects of restoration treatments on populations of species of collaborative concern across the CFLRP project area? (Table 9)

The CFLRP Common Monitoring Strategy (2020) focuses on changes to habitat characteristics which will be monitored using the R3 Analysis Framework and forest plots. In an effort to validate some of the selected habitat characteristics as well as broaden the MPM wildlife focus, presence/absence surveys will occur for cutthroat trout via eDNA sampling and for beavers via visual assessment, and population monitoring will occur for wild bees.

Table 8. What are the specific effects of restoration treatments on the habitat of at-risk species and/or the habitat of species of collaborative concern across the CFLR project area? (CFLRP Common Monitoring Q3)[2]

Baseline: NEPA decision documents. Pre-treatment forest plots, stream sensors, and vegetation mapping and analysis.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Active Restoration Sum.[WO]	# fish passage barriers removed, # fish passage barriers strategically built, miles road closed, miles road improved, # acres treated, # stream miles improved, # streams removed from 303D list, acres wetland/riparian habitat restored	FACTS[F] WIT[F] RATS[C]	Project Summary[F,C] Spatial analysis of completed treatments and monitoring[F,C]	Annually[L]	Less than 75% of planned projects achieved each year. Treatments do not appear to be benefitting selected species. Monitoring methodologies are misaligned with treatment types.
			Specialist Panel[F]	Every 2-5 years[L,P]	
Plot Extrap.	Δ in TPA by species and size class, BA, # dead top trees, downed woody fuel loads, # snags, % canopy cover	Forest Plots[C] (tree counts, CWD, canopy cover)	Excel, R[C]	Pre-treat, post-treat, and every 3 years[P]	Structural stage distributions move away from desired conditions. Conclusions oversimplify or generalize diverse landscape.

Frag. Metric	Δ in patch size and density of large trees and snags	Landscape Statification Mapping[F,C] (LANDFIRE, Oregon State Univ. Institute of Natural Resources) Vegetation Mapping[F,C] (INRev maps, LANDFIRE, FIA) Landscape Updates[F,C] (NAIP, Tx shapefiles, FVS, fire severity maps, NMFWRI Opportunity Map, FACTS, WFDSS)	R3 Analysis Framework[F]	Baseline and every 5 years[L]	Trends in landscape fragmentation moving away from desired conditions.
Habitat metrics	Δ in seral state acreage				New Threatened & Endangered species listing within Rio Chama CFLR footprint.
	Δ in stream temp. and intermittency	Temperature sensors[C]	Excel, R[C]	Annually[P]	Trend in stream temps. misaligns with state water data. Increase in max. seasonal temperatures. Earlier peak temperature. Increased days of intermittency.
Visual Change	Δ in riparian and geomorph. veg.	Repeat Photo Points[C] (ground and drone imagery)	Visual Comparison[C,F]	Pre-treat, post-treat, and every 3 years[P]	Significant change in geomorphology. Comparative photos taken at different points of hydrograph. Presence of woody invasive species. Absence of beaver activity. Presence of livestock activity.

Table 9. What are the specific effects of restoration treatments on populations of species of collaborative concern across the CFLRP project area? (2-3-2 Partnership Interest)[2]

Baseline: State and forest wildlife monitoring. Pre-treatment forest plots and eDNA sampling.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Pop. Trends	Δ in bee species diversity and abundance	Forest Plots[C] (veg. func. groups, pantraps)	Excel, R[C]	Annually[L,P]	Species presence responds differently than expected to habitat modifications.
Species Presence	Miles of stream occupied by cutthroat trout	eDNA samples[C] CPW Reports[C]	Excel[C] Spatial Analysis[C]	Baseline and every 5 years[L,P]	Detection of competing and/or predatory invasive species. Presence in areas outside of suitable habitat and/or defined range.
	% of focal subwatersheds with active beaver	Presence/Absence Surveys[C]			

Water Resources

Treatments aimed at improving watershed health include road and trail maintenance, hillslope stabilization, and riparian and aquatic restoration. These efforts aim to reduce travel and recreation impacts on water resources, reduce erosion, improve water quality, and increase aquatic habitat diversity. In addition, improving riparian and wetland functionality can retain more water in the system which benefits aquatic organisms, livestock, recreation, agriculture, and drinking water during droughts (Vose et al., 2019).

This section addresses one project goal and asks one monitoring question:

Project Goal: Improve or maintain water quality and watershed function.

Desired Condition: *Increase floodplain connectivity within subwatersheds, water quality at or above state standards, and connected hydrologic processes (including decreased stream channelization).*

Q What is the status and trend of watershed conditions in the CFLRP area, with a focus on the physical and biological conditions that support key soil, hydrologic, and aquatic ecosystem processes? (Table 10)

Watershed monitoring is designed around USDA Forest Service and 2-3-2 Partnership defined priority[6] and focal[7] subwatersheds within the Rio Chama CFLRP footprint (Figure 4). Priority and focal subwatershed characteristics will be tracked on USDA Forest Service lands using the Watershed Condition Framework (WCF) and established project tracking databases. On non-USDA Forest Service managed lands, review of existing state and local water quality data will occur. In addition, repeat photo points as well as temperature and intermittency monitoring will occur within select focal subwatersheds.

[6] Priority subwatersheds are associated with the USDA Forest Service Watershed Condition Framework and defined before implementation of the Rio Chama CFLRP.

[7] Focal subwatersheds supplement priority subwatersheds. Initial focal subwatersheds were proposed by USDA Forest Service leads based upon where current projects are underway and/or where future projects are planned. The 2-3-2 Partnership will incorporate a collaborative approach to highlight additional focal subwatersheds that contain non-USDA Forest Service managed lands and are important to regional water health and/or other partner values.

Table 10. What is the status and trend of watershed conditions in the CFLRP area, with a focus on the physical and biological conditions that support key soil, hydrologic, and aquatic ecosystem processes? (CFLRP Common Monitoring Q4)[2]

Baseline: Pre-treatment watershed summaries, ground and aerial imagery, and stream temperature sensors.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Trend of WCF[WO]	Δ in total watershed condition score (priority HUC12s)	FACTS[F] WIT[F]	WCATT[F]	Baseline and every 5 years[L]	Decrease in stream reach rating from one measurement to the next.
	Δ in indicator condition scores (priority HUC12s)				
	Δ in # streams meeting state standards	NM/CO stream data[C]	Document Review[C]	As reported[L]	
	Δ in proper functioning condition assessment	BLM reporting[C]	Document Review[C]	As reported[L] (every 5 years)	
Active Restoration Sum.[WO]	# fish passage barriers corrected, miles road closed, miles road improved, # stream miles treated	FACTS[F] RATS[C]	Project Summary[F]	Annually[L,P]	Increase in # of defunct barriers.
Subwater-shed treat. prog.[WO]	# of essential projects implemented (per subwatershed WRAP)	FACTS[F]	Project Summary[F]	Baseline and Annually[L,P]	Grazing allotments re-opened within riparian areas.
Visual Change	Δ in riparian geomorph. and veg.	Repeat Photo Points[C] (ground and drone imagery)	Visual Comparison[C]	Pre-treat, post-treat, and every 3 years[P]	Increase in extent of invasive plants. Decrease in vegetation diversity. Stagnation or decrease in flood plain connectivity. Stagnation or decrease in large wood recruitment. Reduced bank stability. Algae present.
Site Extrap.	Δ in stream temp. and intermittency	Temperature sensors[C,F]	Excel, R[C]	Annually[P]	Trend in stream temps. misaligns with state water data. Increase in max. seasonal temperatures. Earlier peak temperature. Increased days of intermittency.

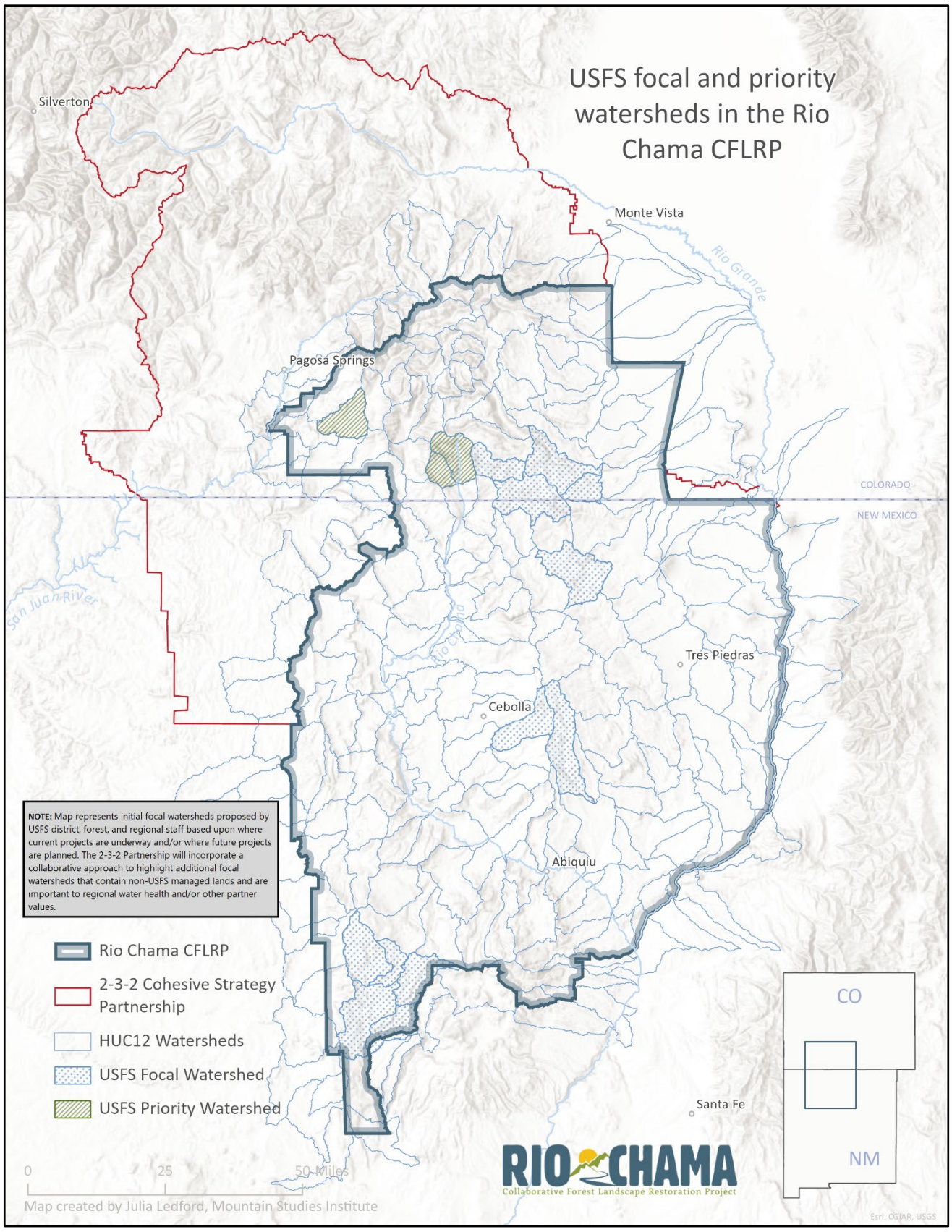


Figure 4. Map of Priority and Focal Watersheds within the Rio Chama CFLRP.

Socioeconomic Monitoring

Socioeconomic monitoring helps the USDA Forest Service and 2-3-2 Partnership understand the effects of restoration activities on workers, communities, and economies. This MPM plan began with the CFLRP Common Monitoring Strategy (2020) questions and suggested indicators and expanded outward to incorporate USDA Forest Service regional interests and 2-3-2 Partnership questions, as resources allowed. The extent of socioeconomic monitoring will grow throughout the lifespan of this plan as new data sources and methodologies are identified. Socioeconomic monitoring will focus on changes over time in the 19-county area surrounding the Rio Chama CFLRP (Figure 5; see *Scale of Monitoring* section of this document for more information about how these counties were selected).

Monitoring trends in the social and economic conditions surrounding the 2-3-2 Partnership landscape and Rio Chama CFLRP is essential for managers to contextualize project decisions. Trends in county-level data can be used to understand the correlation between project actions and broader social and economic changes – not to determine causality of project actions on the social and economic conditions of counties proximal to the project area. Socioeconomic data provides insight into the relative importance of the forestry and restoration sector in the economies of surrounding counties.

To evaluate the progress toward project goals, socioeconomic monitoring requires efforts at the local and national level to collect and model various data sources. For example, socioeconomic monitoring includes the Treatments for Restoration Analysis Toolkit (TREAT), a standardized method developed by the USDA Forest Service for comparison of economic "ripple effects" across all CFLRP projects, observed data generated from existing datasets (e.g. census data, etc.), and partner surveys[8].

[8] There are three partner surveys: the restoration and monitoring contractor survey, the wood processing and utilization survey, and the collaboration assessment survey. The first two surveys were developed by the Forest Stewards Guild and successfully implemented on landscape-adjacent CFLRPs, and the third survey was developed by the Southwestern Forest Restoration Institutes and standardized across all CFLRPs.

Table 11. Socioeconomic monitoring goals, questions, and methodology.
*Overview of the socioeconomic monitoring questions and methodology to be implemented in the 2-3-2 Cohesive Strategy Partnership's Rio Chama Collaborative Forest Landscape Program Multiparty Monitoring Plan. Project goals were determined by the 2-3-2 Cohesive Strategy Partnership. *Indicates methodology will be used to address multiple questions.*

	Project Goal	Monitoring Question	Question Source	Methodology	
Economic Sustainability	Encourage market availability and product utilization to provide a long-term economic relationship between forest restoration products/by-products and local markets	Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally?	WO Common Strategy Q9	a. TPO* b. Partner surveys* c. Project summaries*	See Table 12.
		Did CFLRP increase economic utilization of restoration by-products?	WO Common Strategy Q10	a. Partner surveys* b. Project summaries* c. TPO*	See Table 13.
		How did CFLRP support fuel wood programs in the project landscape?	2-3-2 Partnership	a. Document review b. Project summaries*	See Table 14.
	Maintain or increase the number of people from underserved and distressed communities who are directly or indirectly employed in forest and watershed restoration in the project vicinity	How have CFLRP activities supported local jobs and labor income?	WO Common Strategy Q7	a. Partner surveys* b. TREAT*	See Table 15.
		How are CFLRP activities supporting jobs and labor income for youth, minority group representatives, or people from low-income communities?	2-3-2 Partnership	a. Partner survey*	See Table 16.
		How are the benefits of restoration activities distributed amongst communities adjacent to the project boundary?	2-3-2 Partnership	a. Headwaters Economics data review b. IFTDSS* c. Project summaries* d. Spatial analysis	See Table 17.
		How do sales, contracts, and agreements associated with the CFLRP affect local communities?	WO Common Strategy Q8	a. Document review b. Partner surveys* c. TREAT*	See Table 18.
		How has the social and economic context changed, if at all, from the beginning of CFLRP to the end?	WO Common Strategy Q6	a. Headwaters Economics data review b. Spatial analysis	See Table 19.
Forest Co-Management	Maintain or increase the public acceptance of forest and watershed restoration activities including frequent, low-intensity wildfire or prescribed fire	If and to what extent has CFLRP investments attracted partner investments across the landscape?	WO Common Strategy Q13	a. Document review b. Partner Surveys* c. Project summaries*	See Table 20.
		How has the CFLRP affected acceptance for forest treatments, including prescribed fire amongst partners?	2-3-2 Partnership	a. Collaborative governance surveys*	See Table 21.
	Maintain or increase the number of acres treated to reduce fire hazard, expand wildfire response decision space, improve wildfire outcomes, and increase protection of homes and infrastructure	Have project treatments changed the net risk of fire to communities and water resources over time?	2-3-2 Partnership	a. IFTDSS* b. Project summaries*	See Table 22.
Collaboration	Maintain or increase the availability and/or access to medicinal, food, heating, or building materials and pursue opportunities to integrate outcomes that may also facilitate public access	How does the identification process of focal watersheds guide treatment locations and implementation processes that account for and support traditional use of fire (e.g. prescribed fire) and traditional forest use, including access to medicinal, food, heating, building materials, and/or archeological and extant cultural sites?	2-3-2 partnership	a. Document review	See Table 23.
	NOTE: There is no project goal specific to the collaborate process, but it is inherent to the success of this plan.	Who is involved in the collaborative and if/how does that change over time?	WO Common Strategy Q11	a. Document review b. Partner surveys*	See Table 24.
		How well is CFLRP encouraging an effective and meaningful collaborative approach?	WO Common Strategy Q12	a. Partner surveys*	See Table 25

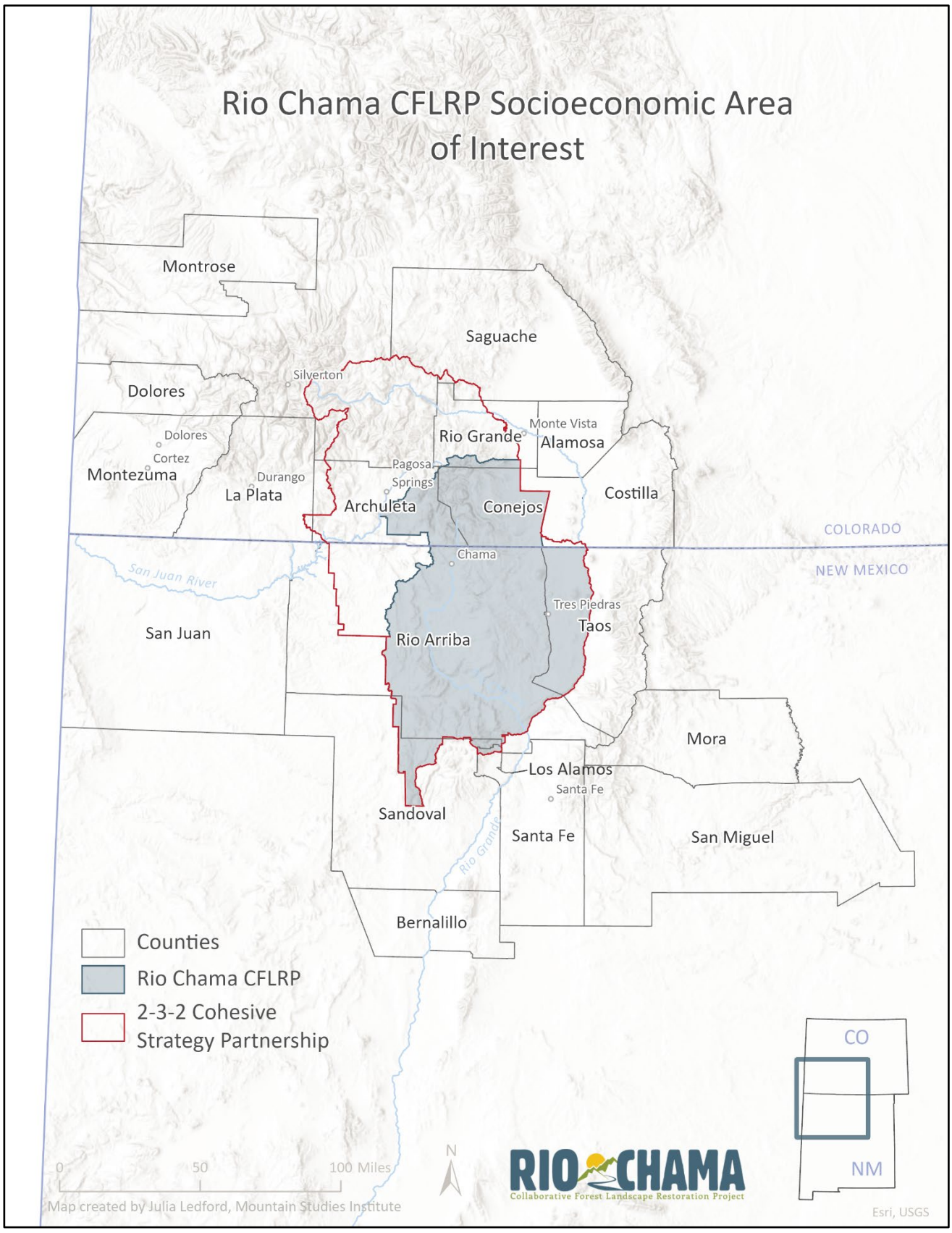


Figure 5. Map of 2-3-2 Cohesive Strategy Partnership socioeconomic monitoring.

Economic Sustainability

MPM of economic sustainability is designed around project goals and includes measures of wood product and by-product use, and employment trends.

Maintaining or enhancing local wood products infrastructure and markets will support employment and cost-savings within the 2-3-2 Partnership area. To evaluate treatment effects on local wood processing infrastructure and markets, we monitor the volume of wood delivered to local processors, the volume of products created and sold, and the number and type of wood processors operating in the project landscape.

Maintaining or enhancing utilization of restoration by-products may offset treatment costs and provide value to the restoration treatments of the 2-3-2 Partnership. Increasing utilization of restoration by-products can generate employment opportunities, offset the cost of forest treatments, and provide fuelwood to local communities living within and adjacent to the project boundary. To evaluate the utilization of restoration by-products, we monitor the volume of wood delivered to local processors, the volume of products created and sold, the number of development and training opportunities offered for biomass utilization, and the amount of fuelwood generated from treatments within the project landscape.

Monitoring changes to employment and wages allows managers to evaluate whether project actions are maintaining or increasing the number and quality of restoration-related employment opportunities in the project landscape. We capture quantitative data, in terms of number of employees and full-time equivalent positions, as well as qualitative data, in terms of the proximity of employment, safety of employment, employee retention, and career development opportunities offered.

This section addresses two project goals and asks eight monitoring questions:

Project Goal: Encourage market availability and product utilization to provide a long-term economic relationship between forest restoration products/by-products and local markets.

Desired Conditions: *Increases to the volume of wood product generated and used by local processors, use of restoration by-products, and value per acre of forest treatment.*

- Q Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally? (Table 12)
- Q Did CFLRP increase economic utilization of restoration by-products? (Table 13)
- Q How did CFRLP support fuel wood programs in the project landscape? (Table 14)

Project Goal: Maintain or increase the number of people from underserved and distressed communities who are directly or indirectly employed in forest and watershed restoration in the project vicinity.

Desired Conditions: *Maintain or increase employment in terms of full-time employment and number of people employed. Increased wages paid within the project landscape. Increased local capture of restoration contracts.*

- Q How have CFLRP activities supported local jobs and labor income? (Table 15)
- Q How are CFLRP activities supporting jobs and labor income for youth, minority group representatives, or people from low-income communities? (Table 16)
- Q How are the benefits of restoration activities distributed amongst communities adjacent to the project boundary? (Table 17)
- Q How do sales, contracts, and agreements associated with the CFLRP affect local communities? (Table 18)

Desired Conditions: *Population-level economic conditions are maintained or improved within and adjacent to the project boundary. Project managers account for immigration and emigration of minority populations from within and adjacent to project landscape.*

- Q How has the social and economic context changed, if at all, from the beginning of the CFLRP to the end? (Table 19)

To evaluate the extent in which restoration contracts are awarded to businesses within the project landscape, we will monitor trends in the percentage of contracts, agreements, or tools, additional outreach, and capacity building opportunities awarded to local businesses. This data will be used to increase local contract capture, which is an important factor in developing local capacity for forest restoration and the long-term sustainability of project goals in the 2-3-2 Partnership and Rio Chama CFLRP landscapes.

Table 12. Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally? (CFLRP Common Monitoring Q9) [2]

Baseline: Pre-implementation TPO and survey data.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Number, Size, and Type of Sawmills in and around the CFLRP area[WO]	Δ in # observed Δ in size of mills observed Δ in # of types of mills observed	TPO[F]	TPO[F]	Baseline and every 3-5 years[L]	Decrease in # of mills. Decrease in variety of mills. Decrease in variety of wood products.

[2] For tables 2 through 10 and 12 through 25: [WO] indicates monitoring indicator was determined by CFLRP Common Monitoring Strategy (2020). [C] indicates collaborative partners are responsible for data collection and/or analysis. [F] indicates USFS are responsible for data collection and/or analysis. [L] indicates monitoring evaluates landscape-scale change. [P] indicates monitoring evaluates project-scale change.

Volume and type of wood products generated in mills in and around CFLRP area[WO]	Δ in volume of product generated	Contractor surveys[C] BIO NRG Agency performance measure[F]	Excel[C]	Baseline and Annually[L]	
	Δ in # of types of product generated				
Volume of biomass utilized	Δ in volume of wood to various sawmills within project landscape				

Table 13. Did CFLRP increase economic utilization of restoration by-products? (CFLRP Common Monitoring Q10)[2]

Baseline: Pre-implementation TPO, TIM, and survey data.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Volume and type of wood products generated in mills in and around CFLRP area[WO]	Δ in volume of product generated	Contractor surveys[C] TPO[F] (UM BBER) TIM[F]	Excel[C]	Baseline and Annually[L]	Decrease in volume of wood products generated. Decrease in variety of wood products.
	Δ in # of types of product generated				
Volume of biomass utilized	Δ in volume of wood to various sawmills within project landscape	Contractor surveys[C] TPO[F] BIO NRG Agency performance measure[F]	Excel[C]	Baseline and Annually[L]	Decrease in volume of wood to mills.
# and type of trainings or biomass utilization devs. opportuns.	Δ in # of trainings or development events offered	Partner surveys[C]	Excel[C]	Baseline and Annually[L]	Trainings and development of biomass utilization are not offered.

Table 14. How did CFRLP support fuel wood programs in the project landscape? (2-3-2 Partnership Interest)[2]

Baseline: Pre-implementation amount of fuelwood permits and volume of fuelwood to fuelwood program contractors.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Amount of fuelwood generated from the project landscape	Δ in # of fuel wood permits to local collectors, leñeros, etc.	TIM[F] Forest-level document review[C]	Excel[C]	Annually[L]	Decrease in the number of fuelwood permits.
	Δ in volume of fuelwood sold to fuelwood programs (e.g. wood for life)				Fuelwood programs are discontinued.

Table 15. How have CFLRP activities supported local jobs and labor income? (CFLRP Common Monitoring Q7)[2]

Baseline: Pre-implementation survey data.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Number of full and part time jobs and number of employees	Δ in TREAT model outputs	Partner surveys[C] (avg. commute, worker safety, physical requirements, employee retention, enrollment in forestry programs at local accredited colleges and universities)	TREAT[C,F] Excel[C]	Baseline and Annually[L]	Number of FTE decreases. Proportion of full and part time jobs changes. Number of employees decreases.
	Δ in observed from partner surveys				
Quality of life	Δ in average commute time of employees				Average reported commute times increase.
Wages	Δ in % of wages paid				Wages paid decrease.
Turnover	Δ in ratio of people hired annually vs. employed				Increase in turnover. Turnover in CFLRP-specific positions.

Table 16. How are CFLRP activities supporting jobs and labor income for youth, minority group representatives, or people from low-income communities? (2-3-2 Partnership Interest)[2]

Baseline: Pre-implementation percentage of workforce representing youth, minority groups, and low-income communities.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Employment demographics	Δ in % of firms located within low income and/or minority communities	Partner surveys[C] (demographic data)	Excel[C]	Baseline and Annually[L]	Decrease in employment from low-income and/or minority communities.

Table 17. How are the benefits of restoration activities distributed amongst communities adjacent to the project boundary? (2-3-2 Partnership Interest)[2]

Baseline: Pre-implementation trends in proximity of acres protected through defensible space, fuel treatments, and other fuel-reduction projects and EJ communities within and adjacent to the project boundaries.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Proximity of CFLRP management activities to EJ communities	Δ in proximity of treatments to EJ communities	FACTS[F] RATS[C] Census data[C] Headwaters Economics EPS data[C]	IFTDSS[C] Spatial analysis[C]	Annually[L,P]	Decrease in % of treatments proximal to EJ communities.

Table 18. How do sales, contracts, and agreements associated with the CFLRP affect local communities? (CFLRP Common Monitoring Q8)[2]

Baseline: Pre-implementation surveys, TREAT analysis, and document review.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Number of full and part time jobs and number of employees	Δ in TREAT model	Partner surveys[C]	TREAT[C,F] Excel[C]	Baseline and Annually[L]	Decrease in amount of full and part time jobs.
	Δ in observed from partner surveys				
	Δ in ratio of FTE to employees				Decrease in the number of employees.
Wages	Δ in % of wages paid	TREAT[F] Partner surveys[C]	Excel[C]	Baseline and Annually[L]	Decrease in wages paid.
Local contract capture[WO]	Δ in % of contracts awarded locally	Partner surveys[C] USAspending.gov reports[C]	Excel[C]	Baseline and Annually[L]	Decrease in proportion of contracts awarded locally.
	Δ in # of contracts awarded to HUB businesses through SBA program	Document review of SBA[C]	Excel[C]	Baseline and Annually[L]	Decrease in number of contracts awarded to HUB businesses through SBA program.
Type of work captured locally[WO]	Qualitative information about contracts awarded locally vs. outsourced	Partner surveys[C]	Excel[C]	Baseline and Annually[L]	Partners report greater outsourcing of work that has historically been completed locally.
Number and type of trainings offered locally	Δ in % in number of trainings; variety of type of trainings	Partner surveys[C]	Excel[C]	Baseline and every 2-3 years[L]	No trainings offered.

Table 19. How has the social and economic context changed, if at all, from the beginning of the CFLRP to the end? (CFLRP Common Monitoring Q6)[2]

Baseline: Pre-implementation trends, until 2020, in demographic and economic data from the American Community Survey (ACS) of the US Census and the census-tract level for socioeconomic counties of interest (Figure 5).					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Income, employment and poverty data [WO]	Δ in percentage of low-income, unemployed, and poverty communities annually	ACS census-tract data[C] Headwaters Economics EPS data[C]	Spatial analysis of census data[C]	Baseline and every 5 years[L]	Increase in the number of census-tract communities that exhibit poverty-level conditions.
Demographic data[WO]	Δ in minority populations within or adjacent to project landscape	ACS census-tract data[C] Headwaters Economics EPS data[C]	Spatial analysis of census data[C]	Baseline and every 5 years[L]	Significant change in the number of census-tract communities that qualify as having a disproportionate concentration of minorities when compared to state reference conditions.

Working Towards Forest Co-management

Forest co-management monitoring focuses on partner investments, partner acceptance of restoration activities, and fire risk to communities and the resources they rely on.

This section addresses two project goals and asks three monitoring questions:

Project Goal: Maintain or increase the public acceptance of forest and watershed restoration activities including frequent, low-intensity wildfire or prescribed fire.

Desired Conditions: *Maintain or increase the acceptance of frequent, low-intensity wildfire or prescribed fire amongst project partners. Maintain or increase partner contributions (in-kind time and funding) committed to shared project goals.*

- Q If and to what extent has CFLRP investments attracted partner investments across the landscape? (Table 20)
- Q How has the CFLRP affected acceptance of forest treatments, including prescribed fire amongst partners? (Table 21)

Project Goal: Maintain or increase the number of acres treated to reduce fire hazard, expand wildfire response decision space, improve wildfire outcomes, and increase protection of homes and infrastructure.

Desired Conditions: *Promote cross-boundary defensible space treatments to increase wildfire preparedness amongst individuals and communities within the project landscape.*

- Q Have project treatments changed the net risk of fire to communities and water resources over time? (Table 22)

We will capture data on perceptions of forest treatments, and leveraged funding within the project landscape. By monitoring perceptions of forest treatments, managers can evaluate the social willingness to use cost effective restoration tools like prescribed fire and managed wildland fire. Monitoring leveraged funding within the project landscape will help managers understand the effectiveness of the all-lands restoration approach and identify additional funding mechanisms.

Human communities within the Rio Chama CFLRP have deep ties to forest and water resources and fire risk modeling will inform how treatments are changing the net risk of fire to communities. We will run a resource exposure analysis in IFTDSS. This approach takes fire behavior outputs from the ecological monitoring portion of this plan and incorporates 2-3-2 Partnership defined assets of importance. Particular attention will be given to Traditional Knowledge and the range of assets of importance that are not necessarily contained within the WUI (Lake et al., 2017; Tarancón et al., 2020).

Table 20. If and to what extent has CFLRP investments attracted partner investments across the landscape? (CFLRP Common Monitoring Q13)[2]

Baseline: Pre-implementation surveys and document review.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Amount and source of leveraged funding[WO]	Δ in amount of funding leveraged Δ in variety of leverage funding sources	Partner surveys[C]	Excel[C]	Baseline and Annually[L]	Leveraged funding decreases from baseline conditions.
Acres treated on non-federal lands	Δ in acres treated on non-federal lands in the project landscape	Partner surveys[C] Document review[C] (NRCS, CWDG, and other programs) RATS[C]	Excel[C]	Baseline and Annually[L]	Non-federal burns decreasing.
Amount and source of capital investment in partner businesses[WO]	Δ in the amount invested in partner businesses (e.g. training, equipment)	Partner surveys[C]	Excel[C]	Baseline and Annually[L]	No capital investment in partner businesses.

Table 21. How has the CFLRP affected acceptance of forest treatments, including prescribed fire amongst partners? (2-3-2 Partnership Interest)[2]

Baseline: CFLRP year 1 collaborative governance survey.					
Indicator	**Metric**	**Data Collection**	**Analysis**	**Frequency**	**AM Watch-out**
Perceptions of forest treatments	Δ in acceptance ratings of various treatment methods	Collaborative governance survey[C]	Excel[C]	Baseline and every 3 years	Partner acceptance decreases for all available forest treatment options. Significant political change within region or CFLR footprint.

Table 22. Have project treatments changed the net risk of fire to communities and water resources over time? (2-3-2 Partnership)[2]

Baseline: Pre-treatment IFTDSS analysis					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Active restoration sum.	Δ in acres treated to improve defensible space	FACTS[F] RATS[C]	Excel[C]	Annually[L]	Decreasing trend in acres treated to improve defensible space.
Exposure Analysis	Δ in burn prob., conditional flame length, and integrated hazard	ID locally important resources or assets[C,F] (Incorporate TK) Forest Plots[C] (fuel model, canopy cover, stand height, canopy base height)	IFTDSS[C]	Baseline and Annually[L,P]	Increase in % of locally important resources or assets exposed.

Collaboration

Monitoring participation in the 2-3-2 Partnership and Rio Chama CFLRP collaborative process helps managers evaluate whether they are creating adequate opportunities for engagement with project stakeholders. In addition, understanding partner perceptions of collaboration over time helps determine when changes are necessary to better capture and incorporate partner input, build trust and relationships, and develop social support for restoration treatments over time.

This section addresses one project goal, explores collaborative processes, and asks three monitoring questions:

Project Goal: Maintain or increase the availability and/or access to medicinal, food, heating, or building materials and pursue opportunities to integrate outcomes that may also facilitate public access.

Desired Conditions: *Forest resources important for cultural and traditional needs as well as for subsistence practices and economic support of rural historic communities are available and sustainable.*

Q How does the identification process of focal watersheds guide treatment locations and implementation processes that account for and support traditional use of fire (e.g. prescribed fire) and traditional forest use, including access to medicinal, food, heating, building materials, and/or archeological and extant cultural sites? (Table 23)

To understand how traditional uses are incorporated into treatment planning, we'll monitor the range of tribal and traditional communities represented in the identification process of focal watersheds.

Project Goal: There is no project goal specific to the collaborative process. However, collaboration is inherent to 2-3-2 Partnership success and will be monitored over time. The 2-3-2 Partnership outlined the following desired condition to address the two questions outlined by the CFLRP Common Strategy (2020):

Desired Conditions: *Increase representation within the 2-3-2 Partnership over time, particularly for tribes and traditional communities within the project landscape. Maintain or increase perceptions of collaborative effectiveness.*

Q Who is involved in the collaborative and if/how does that change over time? (Table 24)

Q How well is CFLRP encouraging an effective and meaningful collaborative approach? (Table 25)

Table 23. How does the identification process of focal watersheds guide treatment locations and implementation processes that account for and support traditional use of fire (e.g. prescribed fire) and traditional forest use, including access to medicinal, food, heating, building materials, and/or archeological and extant cultural sites? (2-3-2 Partnership Interest)[2]

Baseline: CFLRP year 1 meeting notes.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Community involvement	Range of tribal nations and traditional communities involved	Meeting notes[C]	Excel[C]	Annually[L]	Decreased # of participants.

Table 24. Who is involved in the collaborative and if/how does that change over time? (CFLRP Common Monitoring Q11)[2]

Baseline: CFLRP year 1 surveys and document review.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Individuals, organizations, and sectors represented in the collaborative over time[WO]	Δ in # of participants	Document review[C] (sign-in sheets, letters of support, etc.) Partner surveys[C]	Excel[C]	Baseline and Annually[L]	Continued lack of engagement from specific communities. Decreased # of participants active in sub. committees and monitoring efforts. Decreased authenticity in relationships. Stagnant or negative trend in representation and relationships. Partner representation is not geographically diverse. Stagnant or decreased # of community members participating.
	Δ in range of organizations, agencies, and stakeholder types				
	Δ in # of outreach/ engagement opportunities for Native nations and land grant communities	Document review[C] (sign-in sheets, letters of support, etc.)	Excel[C]	Baseline and Annually[L]	Decreasing # of outreach/engagement events. Partner representation is not geographically diverse.

Table 25. How well is CFLRP encouraging an effective and meaningful collaborative approach? (CFLRP Common Monitoring Q12)[2]

Baseline: CFLRP year 1 surveys.					
Indicator	**Metric**	**Data Collection**	**Analysis Tool**	**Frequency**	**AM Watch-out**
Partner perception[WO]	Δ in ratings of collaborative effectiveness	Partner surveys[C]	Excel[C]	Baseline and every 2 years[L]	Dissatisfaction with collaboration between 2-3-2 Partnership and USDA Forest Service. Partner satisfaction is increasing, but participation/representation is decreasing.

Results and Reporting

Comprehensive Data Management

Multiparty Monitoring data will be collected and managed following set protocols to ensure methods are replicable over time, data is accurate, data is secure, data sets can communicate using shared labels and formulas, and data can be shared widely. In addition, the 2-3-2 Partnership comprehensive data management plan (Appendix F) discusses quality control and data ownership. MPM results and findings will be reported annually to 2-3-2 Partners and through the USDA Forest Service CFLR program. When appropriate, monitoring data will be disseminated in peer-reviewed scientific journal articles.

The comprehensive data management plan will be overseen by Guild and MSI staff with input and analytical support from the monitoring committee and Regional USDA Forest Service leadership. Results will be shared on the 2-3-2 Partnership website.

Communication Products

Multiparty Monitoring results will be shared following the 2-3-2 Partnership communication strategy, including documentation on the 2-3-2 Partnership website (https://232partnership.org/) and presented at the annual 2-3-2 Partnership spring meeting.

Appendix A: Monitoring Timeline

Appendix B: Monitoring Protocols

Appendix C: Survey Materials

Appendix D: Other Monitoring Approaches Considered

Appendix E: USDA Forest Service Desired Conditions

Appendix F: Data Management Plan

Appendix G: Yearly Plan Evolution

Appendix H: Informing Adaptive Management

Appendix I: CFLRP Common Monitoring Strategy

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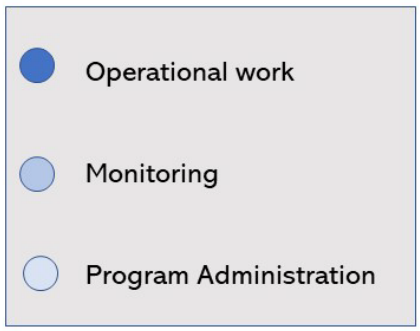
Appendix A: Monitoring Timeline

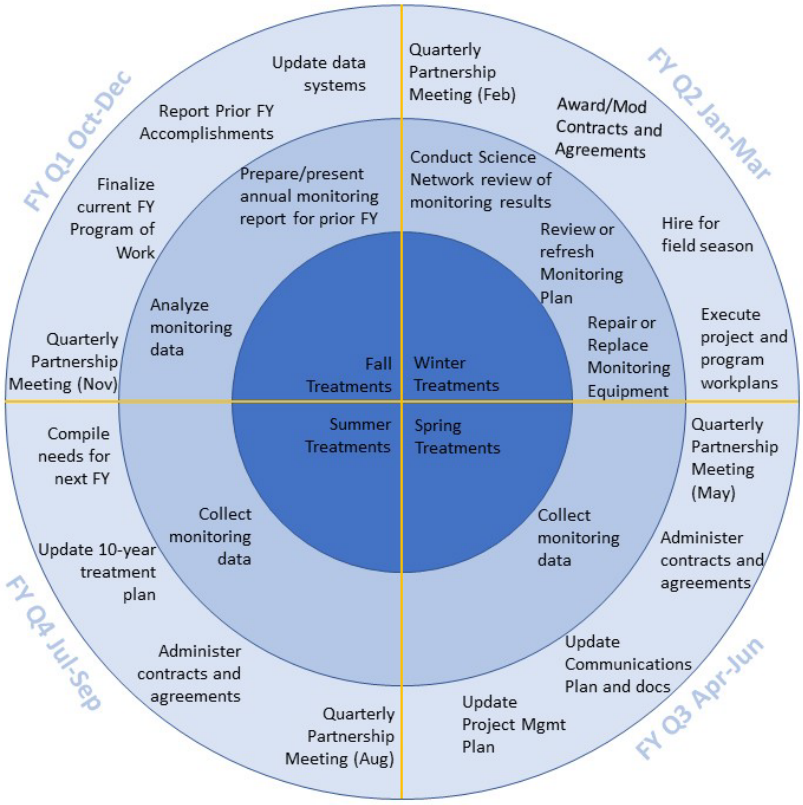
To be reviewed and updated yearly.

Year	Time of Year	Task	Steps
2022	Sept. - Dec.	- MPM Draft development - MPM in-person meetings - Collaborative Survey	- MSI/Guild Internal Review - USDA Forest Service review - Monitoring Committee review - Executive Committee review - Survey to 2-3-2 Partners
2023	Jan. - Mar.	- Prepare for MPM implementation - Develop MPM Protocols - Refine Data Management Strategy - MSI/Guild staff training (modeling)	- MPM plan full 2-3-2 Partnership - Site selection, MPM training, obtain access to monitoring sites - Model trainings and runs
	Apr. - Jun.	- MPM	- Landscape modeling - Forest plot implementation - Stream sensor deployment
	Jul. - Sept.	- MPM - Data summary and reporting	- Landscape modeling - Forest plots - Gather list of USDA Forest Service awarded contracts - SE Baseline Data Collection - SE Surveys - Data analysis and report prep - PROMOTe pilot runs
	Oct. - Dec.	- MPM - Lessons learned from MPM (adjustments to MPM plan) - Adjust monitoring protocols for continuity and success	- SE Surveys - Input TREAT data - Organize MPM data for reporting and public sharing - Update MPM plan
2024-2030	Jan. - Mar.	- Prepare for MPM implementation	- Annual data report and MPM plan updates to Science Network and full 2-3-2 Partnership - Site selection, MPM training, obtain access to monitoring sites
	Apr. - Jun.	- MPM	- Landscape modeling - Forest plots
	Jul. - Sept.	- MPM - Data summary and reporting	- Landscape models - Rapid assessment plots - SE Baseline Data Collection - SE Surveys - Data analysis and report prep
	Oct. - Dec.	- MPM - Lessons learned from MPM (adjustments to MPM plan) - Data summary and reporting	- SE Surveys - Input TREAT data - Organize MPM data for reporting and public sharing - Update MPM plan - Data analysis and report prep
2031	TBD	- CFLRP funded treatments completed - MPM Continues	
2032-2036	TBD	- MPM and reporting	

Multiparty monitoring will occur concurrently with treatments (operational work) and Collaborative Forest landscape Restoration Program administration (program administration) as outlined below.

Annual Work Cycle





Appendix B: Monitoring Protocols

This section describes the specific monitoring protocols outlined in the 2-3-2 Cohesive Strategy Partnership multiparty monitoring plan. Note: Protocols are in pilot phase and may change. Some protocols are still being determined.

Table of Contents

Ba. 2-3-2 Restoration Activity Tracking Summary (RATS)

Overview: The 2-3-2 Restoration Activity Tracking Summary (RATS) will be a central database to document all-lands treatments within the 2-3-2 Partnership footprint. RATS will pair with the Forest Service Activity Tracking System (FACTS) to collect similar data and provide for easier reporting.

Who: The Forest Stewards Guild and Mountain Studies Institute will lead RATS development and maintenance with support from 2-3-2 Partners.

Where: Non-USDA Forest Service managed lands within the 2-3-2 Partnership footprint.

Data management: RATS is being created and will include mapping software as well as excel data storage.

Protocol(s): To be determined.

Bb. Aerial Surveys

Overview: Existing aerial surveys for tree mortality and insect/disease detection will be reviewed and incorporated where appropriate. Aerial surveys are conducted at the forest and state level.

Who: USDA Forest Service conducts annual aerial surveys. New Mexico Energy, Minerals and Natural Resources Department reports on forest health conditions annually (https://www.emnrd.nm.gov/sfd/forest-health/). Colorado State Forest Service reports on annual Insect and Disease conditions (https://csfs.colostate.edu/forest-management/forest-health-report/insects-and-diseases/).

Where: All forested areas.

Data management: Reports will be saved on the shared Pinyon drive.

Protocol(s): Determined by USDA Forest Service and each state.

Bc. Community Site Visits

Overview: Quantitative monitoring will rely on coordinated field visits by 2-3-2 Partners, school groups, and people who live within the 2-3-2 Partnership footprint. Field visits are an opportunity to see first-hand the effects of forest and watershed treatments.

Who: The 2-3-2 Partnership.

Where: Planned and completed treatment sites.

Data management: Trip/discussion summaries will be saved on the shared Pinyon drive.

Protocol(s): Notes from every field visit will be captured, summarized, and shared with the 2-3-2 Partnership Monitoring Committee for annual review.

Bd. Environmental DNA (eDNA)

Overview: “Environmental DNA originates from cellular material shed by organisms (via skin, excrement, etc.) into aquatic or terrestrial environments that can be sampled and monitored...such methodology is

important for the early detection of invasive species as well as the detection of rare and cryptic species" (https://www.usgs.gov/special-topics/water-science-school/science/environmental-dna-edna).

eDNA will be analyzed to determine the presence/absence of Rio Grande cutthroat trout, Colorado River cutthroat trout, rainbow trout, brown trout, and American beaver to support habitat/population monitoring of species of collaborative concern.

Who: The Forest Stewards Guild and Mountain Studies Institute will work with USDA Forest Service wildlife and fisheries leads, as well as the Rocky Mountain Research Station (RMRS), Trout Unlimited, and community scientists to collect and analyze samples.

Where: Sampling locations will be based on existing eDNA sample coverage and planned treatment areas.

Data management: Samples will be stored following RMRS protocols for potential future use. All analysis and reports will be saved on the shared Pinyon Box drive.

Protocol(s): To be determined.

Be. Fire Effects Monitor (FEMO) Observations

Overview: A Fire Effects Monitor (FEMO) is responsible for collecting status information from personal observations at a wildfire or prescribed fire (https://www.nwcg.gov/positions/femo). The information may include but is not limited to fire perimeter location, onsite weather, fire behavior, fuel conditions, smoke, and fire effects information needed to assess firefighter safety and whether the fire is achieving established objectives and requirements. FEMO reports supplement forest plots and landscape/fire modeling with real-time observations of fire behavior.

Who: USDA Forest Service FEMOs and/or qualified 2-3-2 Partners.

Where: On prescribed fires within the 2-3-2 Partnership.

Data management: Reports will be stored on shared project Pinyon Drive.

Protocol(s): Determined by National Wildland Coordinating Group (NWCG).

Bf. Forest Inventory Analysis (FIA)

Overview: "The Forest Inventory and Analysis (FIA) program of the U.S. Forest Service provides the information needed to assess America's forests.

The long history of scientifically credible FIA data provides critical status and trend information to resource managers, policy makers, investors, and the public through a system of annual resource inventory that covers both public and private forest lands across the United States.

FIA reports on status and trends in forest area and location; in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest; in wood production and utilization rates by various products; and in forest land ownership." (https://www.fia.fs.usda.gov/)

FIA reports will be used to inform baselines and overall landscape conditions, and will compared to results obtained from 2-3-2 rapid assessment plots.

Who: USDA Forest Service FIA Program

Where: There are ~635 FIA plots distributed across all-lands within the Rio Chama CFLRP boundary. The specific locations of plots are kept confidential by the USDS Forest Service FIA program.

Data management: Completed FIA reports will be stored on the shared Pinyon drive.

Protocol(s): https://www.fs.usda.gov/rm/ogden/data-collection/pdf/V910_RMRS_Field_Manual_Feb22_2022.pdf

Bg. Forest Plots

Overview: Forest plots will inform the 2-3-2 Partnership Multiparty Monitoring Plan through data collection for project analysis and landscape model inputs. The plots are designed to complement existing Common Stand Exam (CSE) and Forest Inventory Analysis (FIA) plots within the landscape through simpler, more localized data collection.

Who: The Forest Stewards Guild and Mountain Studies Institute will lead forest plot implementation, with support from CFLRP and 2-3-2 leadership.

Where: Forest plot locations will be determined by an intensified FIA grid and secondary plot clustering. In more detail, a systematic sampling grid (one site per 3000 acres) will cover the CFLRP footprint. Anywhere a grid site overlaps with a planned treatment, a cluster of forest plots will be randomized and tailored to measure the given treatment. This approach supplements existing FIA plots and supports adding future treatments that are not yet identified. The clustered plots will provide efficiency for field crews and capture pre- and post- treatment data. After two-three years, a plot network analysis should be conducted to determine if the hybrid landscape grid and clustered plot approach is sufficient.

Data management: Plot data will be collected on standardized data sheets and recorded on paper while in the field. Data sheets will be scanned and uploaded to the Rio Chama CFLRP data storage system (Pinyon Box) and monitoring technicians will transfer field data into designated spreadsheets. Data collected on USDA Forest Service managed lands will be uploaded into FSVeg. In addition, repeat photo points will be captured, georeferenced, and catalogued using Survey123 – with a copy of all photos saved on the Pinyon Box drive.

Wild bee monitoring will follow established curation and documentation standards, in partnership with research institutions and the United States Geological Survey (USGS). A copy of all documentation and reporting will be saved to the Pinyon Box drive.

Protocol(s): 2-3-2 Partnership forest plots consist of a single $1/10^{th}$ acre plot with a nested $1/100^{th}$ acre subplot, two 74.4ft transects, and four 10.2 ft^2 quadrats. The $1/10^{th}$ acre plot guides data collection on overstory trees and, in combination with the two transects, coarse woody fuels estimates, invasive species cover, and disturbance presence. The $1/100^{th}$ acre subplots guide seedling and sapling tree counts. The two transects are used to delineate plot quadrants, record canopy and shrub cover, and locate quadrat locations. The four quadrats are used to collect fine woody debris, ground cover, and

vegetation functional group estimates. Two georeferenced photographs will document plot overall plot conditions, with additional photos taken of each quadrat and invasive plant species. ******Plot design may be revisited with consideration for differing plot size based on forest type – to sufficiently measure stand condition.******

In addition, a subset of the forest plots will incorporate wild bee monitoring and collection. Thirty pantraps, alternating white, blue, and yellow, will be arranged in an "X" covering ~2.5 acres, with the 1/10th acre plot located in the center. Photographs will be taken of flowering plants at the time of bee monitoring.

Bh. Forest Service Activity Tracking System (FACTS)

Overview: FACTS is a national database that "links tabular data with geospatial maps displaying where specific forest resource activities occur nationwide. It standardizes the data collection processes for diverse forest resource activities, such as fuels reduction, reforestation, and rangeland vegetation improvements." (https://data.fs.usda.gov/nrm/briefingpapers/FACTS.pdf)

FACTS will be used to track treatment activities and locations on USDA Forest Service lands within the Rio Chama CFLRP.

Who: USDA Forest Service District Offices

Where: National Forest System managed lands.

Data management: Excel data will be stored on the shared Pinyon drive and spatial data stored on shared ArcGIS Online site following predetermined organizational structure.

Protocol(s): Spatial and descriptive data will be uploaded by USDA Forest Service employees across the nine ranger districts within the Rio Chama CFLRP. Annually, USDA Forest Service Rio Chama CFLRP staff will compile and map all completed and proposed treatments to be shared with partners.

Bi. FragStats

Overview: "FRAGSTATS is a spatial pattern analysis program for categorical maps representing the landscape mosaic model of landscape structure…The landscape subject to analysis is user-defined and can represent any spatial phenomenon. FRAGSTATS simply quantifies the spatial heterogeneity of the landscape as represented in the categorical map; it is incumbent upon the user to establish a sound basis for defining and scaling the landscape in terms of thematic content and resolution and spatial grain and extent. Importantly, the output from FRAGSTATS is meaningful only if the landscape as defined is meaningful relative to the phenomenon under consideration." (https://fragstats.org/index.php/user-guidelines/overview/what-is-fragstats)

Who: To be determined.

Where: On IFTDSS outputs produced for Rio Chama CFLRP.

Data management: Results will be stored on shared project Pinyon Drive.

Protocol(s): https://fragstats.org/index.php/tutorial

Bj. Interagency Fuel Treatment Decision Support System (IFTDSS)

Overview: Excerpt from IFTDSS Webpage (https://iftdss.firenet.gov/landing_page/about.html):

> "The Interagency Fuels Treatment Decision Support System (IFTDSS) is a web-based application designed to make fuels treatment planning and analysis more efficient and effective. IFTDSS provides access to data and models through one simple user interface. It is available to all interested users, regardless of agency or organizational affiliation.
>
> IFTDSS is designed to address the planning needs of users with a variety of skills, backgrounds, and needs. A simple and intuitive interface provides the ability to model fire behavior across an area of interest under a variety of weather conditions and easily generate downloadable maps, graphs, and tables of model results. Additionally, the application provides a step by step process for testing a variety of fuels treatment impacts (thin, clear cut, prescribed burn) on fire behavior and comparing results to determine which modeled treatment best achieves desired results in terms of reduced fire behavior potential. It can be used at a variety of scales from local to landscape level.
>
> IFTDSS hosts a complete set of reference data available for the entire US including LANDFIRE fuels information, SILVIS Wildland Urban Interface, Agency Ownership, as well as a modern map interface allowing users to create or upload their own data."

IFTDSS can model treatment influence on fire behavior throughout the Rio Chama CFRLP and 2-3-2 footprint.

Who: The Forest Stewards Guild and Mountain Studies Institute will lead IFTDSS runs with support from regional and forest fire ecologists, and 2-3-2 leadership.

Where: IFTDSS analysis will be run for the entire 3.81+ million acre Rio Chama CFLRP to inform PROMOTe modeling and at the HUC12 level to pair with other monitoring interests.

Data management: IFTDSS reports will be stored on the USDA Forest Service Pinyon drive and organized by year.

Protocol(s): https://iftdss.firenet.gov/landing_page/index.html

Bk. Monitoring Trends in Burn Severity (MTBS)

Overview: An interagency program to consistently map burn severity on all lands of the United States. In the western United States, all fires over 1000 acres are mapped.

Who: Forest Stewards Guild and Mountain Studies Institute will work with the USDA Forest Service CFLR GIS manager to analyze how burn severity overlays with forest treatments.

Where: Anywhere within Rio Chama CFLR boundary where a wildfire over 1000 acres occurs.

Data management: MTBS maps with coverage in the 2-3-2 Partnership footprint will be stored on USDA Forest Service AcrGIS Online account.

Protocol(s): When a fire over 1000 acres occurs within the 2-3-2 Partnership footprint, monitoring leads will download and store MTBS severity maps.

Bl. Repeat Photo Points

Overview: Valuable for qualitative review and project communications, repeat photo points will incorporate ground and aerial photographs to capture forest and watershed changes.

Who: The Forest Stewards Guild and Mountain Studies Institute will coordinate repeat photo point collection, with support from community scientists and CFLRP and 2-3-2 leadership.

Where: Planned and completed treatment sites.

Data management: Ground and aerial photography will be georeferenced and stored on the Pinyon Box drive, and backed-up on a secondary non-USDA Forest Service drive.

Protocol(s):

Ground photos: See Forest Plot protocols.

Aerial photos: To be determined.

Bm. Region 3 Analysis Framework

Overview: "A system for the consistent assessment, monitoring, and management of landscapes for ecological integrity, climate adaptation, and the continued delivery of services to communities. The framework provides a streamlined and defensible approach to support Forest Management Plan revision and implementation, and is built upon a set of upland, riparian, aquatic, climate, and socioeconomic indicators. State-and-transition models assist in analysis and monitoring along with standard map products for landscape stratification mapping (Ecological Response Units or LANDFIRE Biophysical Settings) and existing vegetation mapping (INREV). By applying coefficients, the models can be augmented for some indicators including snag density, coarse woody debris, and carbon stocks" (see main multiparty monitoring plan glossary).

The Region 3 Analysis Framework will model vegetation change over time to address questions about landscape resilience and wildlife habitat.

Who: USDA Forest Service regional ecologists and data leads, with support from the Forest Stewards Guild and Mountain Studies Institute.

Where: Wall-to-wall coverage of the Rio Chama CFLRP footprint.

Data management: To be determined.

Protocol(s): To be determined.

Bn. Specialist Panel

Overview: Outlined by the CFLRP Common Monitoring Strategy, a regional specialist panel will review habitat monitoring data to determine how CFRLP treatments are impacting species of collaborative concern. This may happen in conjunction, or with significant overlap, with the 2-3-2 Partnership Monitoring Committee's annual review of monitoring data.

Who: Local wildlife experts.

Where: Rio Chama CFLRP footprint.

Data management: Specialist panel assessment and feedback will be included in CFLRP reports and stored on the Pinyon Box drive.

Protocol(s): To be determined.

Bo. State Water Assessments

Overview: The states of Colorado and New Mexico monitor and report on water quality to varying degrees. State water quality reports will be reviewed as available.

Who: The Forest Stewards Guild and Mountain Studies Institute with support from CFLRP and 2-3-2 leadership.

Where: To be determined.

Data management: A copy of state water quality data will be saved to Pinyon Box drive as available.

Protocol(s): To be determined.

Bp. Terrestrial Condition Analysis (TCA)

Overview: TCA is being piloted nationwide by a team external to the Rio Chama CFLRP. TCA relies on Lad Type Associations (LTAs) to make assessments of departure. Given LTAs are newly defined units and are not defined for non-USDA Forest Service lands, TCA will not be a primary source of information for this monitoring plan. As TCA and this monitoring plan build over time, there may be the opportunity for better integration.

Who: A national team, external to the Rio Chama CFLRP.

Where: USDA Forest Service lands within Rio Chama CFLRP.

Data management: Unknown requirements from Rio Chama CFLRP. As data is shared with Rio Chama CFLRP and 2-3-2 Partnership, it will be uploaded to either the Pinyon box drive or AGOL as appropriate.

Protocol(s): https://www.fs.usda.gov/research/treesearch/55800

Bq. Treatment for Restoration Economic Analysis Toolkit (TREAT)

Overview: TREAT is an important component of the socioeconomic monitoring process and is completed on an annual basis. TREAT provides a standard interface to estimate employment and labor income impacts from current and/or proposed restoration activities. TREAT output supports CFLRP proposals, work plans, annual and five-year reports. Having a single modeling approach for all CFLRPs allows for easier comparison across CFLRPs over time. For the Rio Chama CFLRP, TREAT modelling provides a way to evaluate how CLFRP investment and leveraged funding from partner organizations affects the economies within the project area (see *Defining Local* section).

Who: The Forest Stewards Guild will lead survey implementation and input TREAT data for the Washington Office economists to analyze.

Where: Taos, Rio Arriba, Santa Fe, Sandoval, Los Alamos, San Miguel, Bernalillo, Mora, and San Juan Counties in New Mexico and Conejos, Archuleta, La Plata, Rio Grande, Costilla, Alamosa, Montezuma, Dolores, Montrose, and Saguache Counties in Colorado

Data management: Data collected through surveys will be stored by the Forest Stewards Guild to protect the confidentiality of survey respondents. Yearly TREAT reports from the Washington Office Economists will be stored on the shared Pinyon drive.

Protocol(s): Each year, after the end of the Federal Fiscal year in October, the Rio Chama CFLRP monitoring team will fill out tabs 1 and 2 of the TREAT excel spreadsheet. The data we input into these tabs is based off of surveys of project partners, surveys of wood processing partners, and data pulled from USDA Forest Service databases like Timber Information Manager (TIM). Data points include the amount of leveraged funding from partner organizations, the breakdown of contracts awarded locally vs. leaked, the type of employment involved in various contracts, volume of wood to processing partners, and volume of products created by wood processing partners. Additionally, the Guild helps to calibrate the model by providing information about the amount and type of employment observed from partner surveys in tab 4. We then return TREAT spreadsheet to the WO economist to complete the model runs. We receive model output from the WO economist for use in the annual report and other monitoring. TREAT output provides information about wages, amount of employment (FTE), and type of employment by sector generated by the project.

To support consistent analysis through the TREAT model, we have established a set of standard operating procedures to be used and expanded upon for TREAT data entry each year.

Standard operating procedures include:

How to address out of state firms that hire operators locally?

Think about portion of proprietor income post-hoc. With Tennessee contractor doing road work in NM with out of state labor and equipment, we split expenses in half and included 50% as local costs and 50% as leaked.

Do we include other R3 funding codes or "BLIs" that are specific to the CFLRP in tab 1 (e.g. HFDS)

No, these funds should be included in the all lands tab.

How do we approach overlap in contracts between SW Colorado CFLRP and the RC CFLRP?

Ask contractor to report which work they did within each project area in rough percentage or acres treated.

How do we navigate expenditures vs. obligated with partner contributions?

We ask for information about spending timelines and percentages of spending each year. If we cannot get this data, divide the award evenly across all years.

On Forest Service TIM data how do we apply ranger district data that may not be completely within the project area?

We divide the total number by the percentage of the district that is within the project area

How do you crosswalk the categories from TIM into the categories in TREAT?

Table 4 is the breakdown of the type of facility that is receiving the wood. In our case, much of the wood is being received by a sawmill, so the majority of our wood will end up in the first two rows that relate to "sawmills."

Rows 1 and 2 include pellets.

Br. Vegetation Treatment Geodatabase

Overview: "The NM Vegetation Treatment geodatabase was created by the New Mexico Forest and Watershed Restoration Institute (NMFWRI) for the state's Forest and Watershed Health Coordinating Group…The geodatabase currently contains polygon feature classes for completed projects (2012-present), historical projects (pre-2012), ongoing (in progress) projects and planned projects. It also contains point feature classes which contain centroids for the corresponding polygon feature classes." (https://nmfwri.org/gis-projects/nm-vegetation-treatment-mapping/)

The NM Vegetation Treatment geodatabse will be used to update vegetation layers within the 2-3-2 Partnership footprint. There are plans for geodatabase expansion in southern Colorado.

Who: Maintained by the New Mexico Forest and Watershed Restoration Institute. The Forest Stewards Guild, Mountain Studies Institute, and USDA Forest Service will support data maintenance and use.

Where: Entire 2-3-2 Partnership and Rio Chama CFLRP footprints.

Data management: An annual copy of the Vegetation Treatment Geodatabase will be stored on the USDA Forest Service ArcGIS Online account and compared with information collected from the FACTS and RATS databases.

Protocol(s): https://nmfwri.org/gis-projects/nm-vegetation-treatment-mapping/

Please send corrections, comments, and additional data for inclusion to Katie Withnall at NMFWRI, kwithnall@nmhu.edu or 505-454-3586.

Bs. Watershed Condition Framework (WCF)

Overview: Designed to establish "a nationally consistent reconnaissance-level approach for classifying watershed condition, using a comprehensive set of 12 indicators that are surrogate variables representing the underlying ecological, hydrological, and geomorphic functions and processes that affect watershed condition" (https://www.fs.usda.gov/sites/default/files/Watershed_Condition_Framework.pdf; Executive Summary)

Who: USDA Forest Service program leads.

Where: Priority watersheds within the Rio Chama CFLRP.

Data management: WCF results are stored on USDA Forest Service corporate databases and a copy of WCF scores will be saved to the Pinyon Box drive.

Protocol(s): https://www.fs.usda.gov/sites/default/files/Watershed_Condition_Framework.pdf

Due to the size and scale of the Rio Chama CFLRP, "priority" watersheds will be replaced with "focal" watersheds to ensure each of the four forests, as well as non-USDA Forest Service lands are accounted for. Focal watersheds may be existing priority watersheds or watersheds of interest where treatments are expected to occur as part of the Rio Chama CFLRP.

Bt. Water Temperature Measures

Overview: Monitoring water temperatures around CFLRP treatments (particularly riparian treatments) is important to inform water quality and aquatic habitats within the 2-3-2 Partnership. Stream temperature and intermittency sensors will be strategically placed above and below stream reaches where active restoration will occur. Specific locations will be determined to supplement the existing network of stream temperature sensors (deployed by Trout Unlimited, each national forest, and the state of NM).

Who: The Forest Stewards Guild and Mountain Studies Institute with support from 2-3-2 Partners and USDA Forest Service program leads.

Where: Above and below select treatments - prioritizing treatments in the Rio Chama CFLRP focal subwatersheds.

Data management: Data will be uploaded to NorWest stream temperature database and saved to Pinyon Box drive.

Protocol(s): To be determined.

Bu. Wild Bee Surveys

Overview: Pollination is a key ecosystem service that is strongly affected by landscape composition and wild bee monitoring in the Rio Chama Collaborative Forest Landscape Restoration Program (CFLRP) landscape will inform how forest treatments are impacting the resiliency of pollinator networks, including wild bees. Wild bees fulfill essential roles such as connecting ecosystems and buffering disturbance effects on vegetative communities. Forest treatments have a positive effect on bee diversity and abundance due to changes in understory habitat characteristics that influence bee nesting and foraging. Given the current hesitancy of using prescribed burns in NM, there is an apparent shift toward other forest treatment types which may have differing outcomes related to important bee habitat characteristics such as amount of bare soil, downed woody debris, extent of invasive species, and forest basal area. Wild bee monitoring can be effectively incorporated into planned forest monitoring plots to expand data gathering with limited additional resources. Wild bee monitoring across the Rio Chama CFLRP landscape is beneficial for tracking how various treatment types alter bee diversity and forest pollination, both important components of forest resilience.

Although the effects of forest treatments on ecologic characteristics is a large component of multiparty monitoring, there are powerful social benefits as well. Wild bee monitoring promotes the all-lands approach of multiparty monitoring with potentials for cross-boundary project match, increased opportunities for community science relative to other wildlife species, and relationship building with New Mexico universities that have budding pollinator research labs.

Who: The Forest Stewards Guild and Mountain Studies Institute with support from CFLRP and 2-3-2 leadership.

Where See Forest Plot protocols.

Data management: See Forest Plot protocols.

Protocol(s): See Forest Plot protocols.

Appendix C: Survey Materials

Table of Contents

Ca. Collaboration Survey

Managed by the Colorado Forest Restoration Institute.

Cb. Wood utilization Survey

rev 8.30.22

This survey is designed to capture information about wood product economics of CFRP/CFLR projects on the local community. It is meant to be filled out by companies or individuals who have received contracts or entered agreements for collection and/or utilization of wood products from the CFLR/CFRP area. Your cooperation with this process will lead to improved economic analysis of CFLR/CFRP projects and a more accurate representation of how these projects affect the communities in which they occur. If you have question on the survey or require assistance in determining how best to fill it out given your specific circumstances, please contact Gabe Kohler (gabe@forestguild.org)

Contact Name:	Phone:	email:	
Organization Name:			
Project(s):			
Restoration Site(s):			
Reporting Period:			

1. **Project Scope**

Project Name	**Forest/Ranger District/County**	**Date Work Started**	**Acres**
		Total :	

2. **Harvest Profile**

Please indicate what percentage of harvested material is available for value--added use, piled and burned, or left for wildlife. Answers can be provided either in percentage of total material harvested OR tons/acre.

**value--added use includes sawtimber, vigas, POL, biomass, etc*

Acres treated	Tons/acre
Available for value--added use*	
Piled and burned	
Left for wildlife habitat	
TOTAL	

3. **What businesses purchased material from you (specifically related to this project)?**

Using the table below, please provide names and locations of businesses that purchased material from you.

Business Name	State	County

4. **Material Types**

Please use the table below to categorize materials sold to sawmills and other wood processors from the project site. Indicate the project source(s) and destination(s) of the materials.

Total material sold from all project sites (in green tons): _____

Average haul weight (please specify unit, such as pounds): _____

Number of truckloads: _____

Type of Material	Amount (green tons)	Project Location -- Material Source (%, County/State)	Sold To Location (%, County/State)	Purchaser
EXAMPLE	*240*	*100% Sandoval NM*	*25% Sandoval NM; 75% Santa Fe NM*	
Sawtimber (provide spec#@ right------>)				
Small diameter timber				

Blue Stain (Beetle kill)				
Fire Salvage				
Vigas				
Products Other than Logs (POL)				
Limbs/Brush (slash)				
Bark Fines				
Firewood				
Other (please specify)				
TOTAL:				

5. **Product Categories**

If known, please indicate below the percentage of total material sold that was used in the given product categories. Also provide the source and destination county/counties if possible.

Products	**% of Total Material Sold**	**Product Value (low, medium, high)**	**Project Location -- Material Source (%, county/state)**	**Sold To Location (%, county/state)**	**$ value of sale**
EXAMPLE	*34.0%*	*medium*	*50% Cibola NM, 50% Sandoval NM*	*25% Bernalillo NM, 35% Arizona, 40% Texas,*	
Lumber					
Bolts					
Woodchips					
Pallets					
Pressure and creosote-treated lumber					
Veneer					
Plywood					
Particle board, fiber board, hard board, OSB					
Pulp paper, paper board, paper boxes,					

containers, cardboard cartons, tubes					
Biomass energy, wood pellets (?)					
Posts and poles					
Wood pellets (?)					
Logs and beams					
Commercial firewood					
Firewood for home use					
TOTAL:					

!should sum to 100%

6. **Was the above material harvested and sold in the same fiscal year?**

Yes _____
NO_____ (if no, please explain below)

7. **Did your business make any capital investments in equipment or provide training to employees to support work on the Rio Chama CFLRP?**

Yes _____(if yes, please explain below)
NO_____

Cc. Restoration and Monitoring Contractor Survey

rev 8.30.22

This survey is designed to capture information about social and economic effects of CFRP/CFLR projects on the local community. It is meant to be filled out by anyone who has worked on the project or on an associated project in CFLR/CFRP area, either in a paid or voluntary capacity. Your cooperation with this process will lead to improved economic analysis of CFLR/CFRP projects and a more accurate representation of how these projects affect the communities in which they occur. If you have questions on the survey or require assistance in determining how best to fill it out given your specific circumstances, please contact Gabe Kohler (gabe@forestguild.org).

Contact Name:		Phone:		email:	
Organization Name:					
Project(s):					
Restoration Site(s):					

Reporting Period:	

1. **Please list all work associated with the project(s) during the reporting period:**

Include names of projects, as well as the National Forest, Ranger District, and County in which they occur. Indicate the types of labor conducted in association with that project, and the amount of restoration or monitoring completed with respect to area or distance.

Project Name	Forest / Ranger District / County	Area or Distance Covered (please include units!)	Date Work Started

2. **Type of restoration work conducted by your organization on this project (check all that apply):**

Ag/grazing		Bird habitat/populations	
Air quality		Fish habitat/populations	
Fresh surface water		Mammal habitat/populations	
Groundwater		Reptile/amphibian habitat/populations	
Sediments		Other:	
Shoreline		Other:	
Wetland/marsh		Other:	
Woodland/forest		Other:	

3. **Role of your organization on this project (check all that apply):**

Project management		Other project implementation	
Management consulting		Monitoring	
Restoration planning/design		Product vendor	
Site Surveying		Other:	
On--site construction		Other:	

4. **Please describe your organization's role in the project in greater detail:**

5. **Did you subcontract labor for this project? This includes paid subcontracting as well as voluntary or in--kind labor.**

YES_____ (If yes, please fill out sub-contractor form at end of survey)
NO_____

6. **Locations and Direct Labor**Please list any onsite project locations and up to two offsite company locations where work for this project was conducted. For each location, please provide estimates of project--associated labor hours (including employees, managers, volunteers, and in--kind contributors) at that site.

Location Name	Location Description (if applicable)	State	County	Number of people employed	Number of people that were laid off, fired, or quit	Total Labor Hours (including sub-- contractors) @ Location
			TOTALS:			

7. **Labor Demographics**

a. Approximately what percentage or your employees are in the following age groups?

_____Younger than 18
_____18 to 44 years old
_____45 to 64 years old
_____65 years and older

b. Please estimate the percentage of your employees with the following levels of education:

_____Elementary school
_____High school diploma or GED
_____Associate's degree
_____Technical or trade school
_____Bachelor's degree or other four-year degree
_____Master's degree
_____Professional degree
_____Doctorate degree

c. Please estimate the percentage of your employees in the following race/ethnicity categories:

_____American Indian or Alaskan Native
_____Asian
_____Black or African-American
_____Hispanic or Latino
_____Native Hawaiian or other Pacific Islander
_____White/Caucasian
_____Other

d. Please estimate the average commute time of your employees in miles _____

8. **Total Costs**

Please provide estimated or actual total labor and non--labor costs for the entire CFLR/CFRP for your organization. Labor costs include benefits, wages, and proprietor's income, and well as ***voluntary and in--kind contributions.*** Non--labor costs include all other expenses including overhead, administration and subcontracting.

Expenditure Category	Total Cost ($)	% of Total		
Labor Costs (including voluntary and in--kind):			Notes:	
Non--Labor Costs:			Notes:	
TOTAL:				

9. **Non--Labor Costs**

Please use the table below to provide information about non--labor cost breakdowns. In the first column, indicate the percentage of total non--labor costs made up by that line item. In the second column, indicate the percentage of costs for that line item that were expended within the LOCAL AREA**

**THE LOCAL AREA IS DEFINED AS REASONABLE COMMUTING DISTANCE

*Note: Equipment refers to durable goods such as vehicles and machinery. Materials refer to goods purchased as inputs specifically for this project (e.g. gravel, nets, sampling/testing supplies, fencing, office supplies, etc.)

Non-Labor Costs	Total Costs	Percentage of Total Non-Labor Expenses	Percentage Spent Within Local Area**	Location of purchase	Description of other expenses (if necessary):
Equipment rental / leasing / daily use rates					
Equipment maintenance and repair					
Materials/Supplies					
Travel (further breakdown below in question #10)					
Overhead /Administration					
Other (please describe at right--->)					
TOTAL					

% should sum to 100

10. **Travel Costs**

If you listed travel costs in the table above, please use this space to further break down these costs.

Travel Costs	Total Costs	Percentage of Total Travel Costs	Percentage Spent Within Local Area**
Per diem			
Car/truck rental (for travel)			
Fuel (for travel)			
Other (including airfare)			
Total			

11. **Breakdown of Labor Costs**

Please provide a breakdown of the types of job categories represented in the total labor costs.

Type of Worker	Total labor hours	Total cost	Percentage of total labor costs
Project Managers:			
Forester/ Biologists/Ecologists/Other:			
Engineers and other planners/designers:			
Mechanics:			
Administrative Staff:			
Machine and Equipment Operators:			
Truck drivers:			
Manual Laborers:			
Technicians:			
Graduate Students:			
Others (please describe at right-->):			
Total:			

12. **What type of trainings and/or outreach did you complete, if any, as part of your contract work within the Rio Chama CFLRP landscape this year?**

13. **How did your work in the Rio Chama CFLRP landscape affect low-income and/or minority communities, if at all?**

Appendix D: Other Monitoring Approaches Considered

The 2-3-2 Cohesive Strategy Partnership is devoted to collaborative planning and decision making. As such, the MPM plan aims to be transparent and incorporate the diverse values of 2-3-2 Partners. However, implementing a MPM plan across the 5.1+ million acre 2-3-2 Partnership footprint and Rio Chama CFLRP's 3.81+ million acres is difficult given limited financial resources and personnel capacities, and therefore not all approaches were able to be included in Edition 1 of this plan. The following non-exhaustive list highlights additional 2-3-2 Partnership monitoring interests that can be incorporated into the MPM plan as resources allow.

Amphibians

Authenticity of partner relationships

Big Game

Birds

Implementation of Best Management Practices (BMPs)

Implementation of cutthroat trout conservation strategies

Carbon Balance and Offsets

Community Perceptions (of treatments, fire risk, etc.)

Environmental Justice

Post-wildfire effects

Qualitative Monitoring

Recreation

Riparian Vegetation

Shallow Well Sampling

Smoke

Snowtography (i.e., snow-forest-watershed function)

Stream Gauges

Soils

Treatment Lifespan

Wildlife Game Cameras

Appendix E: USDA Forest Service Desired Conditions

Tables are copied from forest management plans and include desired conditions directly related to Rio Chama CFLRP project goals. For complete list of desired conditions for the San Juan, Carson, Santa Fe, and Rio Grande National Forests, refer to appropriate forest management plan (citations included in each section below).

Table of Contents

Ea. San Juan National Forest

Jiron, D. 2021. *Volume II: Final San Juan National Forest Land and Resource Management Plan.* USDA Forest Service, Region 2.

Table 11. Desired Conditions for the San Juan National Forest.
Table includes all desired conditions listed in the San Juan National Forest Land and Resource Management Plan that are related to Rio Chama CFLRP project goals and associated treatments. Identification (ID) system is taken directly from Land and Resource Management Plan.

ID	Desired Condition	SJNF Indicator	Reporting Frequency
2.2.2	Non-climate ecosystem stresses (e.g., high road densities, water depletions, air and water pollution) are reduced to improve the resilience and resistance of ecosystems to the future dynamics of a changing climate.	Forest road density Species composition reports Stand exams	2-4 Years
2.2.6	All development stages of the forested terrestrial ecosystems are well represented at the landscape scale and occur within the ranges identified in Table 2.2.1.	Trends in fire and insect and disease mortality Acres of natural regeneration Trends in habitat structural stages	2 Years (aerial detection surveys) 5 Years (habitat structural stage)
2.2.7	Old growth ponderosa pine, old growth pinyon-juniper and old growth warm-dry mixed conifer forests are more abundant, occupy more acreage, and are well distributed on SJNF lands.		
2.2.9	Terrestrial ecosystems, including habitat for special status plant species, are productive, sustainable, and resilient, and provide goods and services over the long-term.		
2.2.15	Forested terrestrial ecosystems have stand structures and tree species compositions that offer resistance and resilience to changes in climate, including extreme	Extent of insect and disease outbreaks	Annually

	weather events or epidemic insect and disease outbreaks.		
2.2.16	Non-forested terrestrial ecosystems have community structure and species composition that offer resistance and resilience to changes in climate, including extreme weather events or epidemic insect and disease outbreaks.	Vegetation monitoring Tree line monitoring	3 Years 10 Years
2.2.35	Soil productivity is maintained at site potential, or is trending towards site potential.	Soil penetrometer readings Soil chemistry Soil carbon	5 Years
2.2.36	Long-term levels of soil organic matter and soil nutrients (including soil carbon) are maintained at sustainable levels.		
2.2.38	Management-induced soil erosion, soil compaction, soil displacement, puddling, and/or severely burned soils are rare on terrestrial ecosystems of the SJNF lands.		
2.2.39	Upland soils exhibit infiltration and permeability rates that minimize surface run-off and allow for the accumulation of the soil moisture necessary for plant growth and ecosystem function.		
2.3.1	Wildlife populations are viable on SJNF lands. Wildlife populations are self-sustaining, connected, and genetically diverse across SJNF lands.	Number of conservation actions or recovery actions completed for TES Number of projects implemented with overall beneficial effect to TES Number of TES species occurring and trends Number of AML projects implemented to reduce heavy metals Number of mine closure projects that implement effective bat access Number of lynx screens used for project analysis Reporting as required by Southern Rockies Lynx Amendment	Annually and 2 Years
2.3.5	Large predator species contribute to ecological diversity and ecosystem functioning.		
2.3.12	Populations are conserved by maintaining or improving habitat availability and quality through the incorporation of conservation strategies and species' habitat needs during project development and implementation.		
2.3.14	Disturbances from management activities occur at levels that support critical life functions and sustain key habitat characteristics for wildlife special status species.		
2.3.15	Areas identified as critical habitat or proposed critical habitat for special status wildlife species have the characteristics to support sustainable populations, promoting recovery of the species.		
2.3.16	The alpine and subalpine willow (*Salix sp*.) dominated riparian areas, providing crucial winter habitat for white-tailed ptarmigan (*Lagopus leucura*) and snowshoe hare (*Lepus americanus*), do not bioaccumulate heavy metals above historically occurring background levels which enter the food chain. Areas of contamination do not become limiting factors for wildlife population sustainability.		
2.3.17	Management actions maintain or improve habitat conditions for special status species, contributing to the stability and/or recovery of these species.		
2.3.20	Abert's squirrel (*Sciurus aberti*) - Ponderosa pine habitats provide interconnected structure in mature conifer stands that produce abundant foraging (cone	Status of focal species	2 Years

	crops and above- and belowground fungi) and reproductive habitat.	Acres of live ponderosa pine treated Acres of live mature spruce-fir and cool-moist mixed conifer treated	
2.3.21	American marten (*Martes americana*) - Habitat connectivity for spruce-fir and cool-moist mixed conifer forests is maintained at broad spatial scales. These forests contain a diverse array of structural stages (including mature and old growth) and habitat attributes (snags and downed logs) to provide effective foraging, breeding and dispersal habitat for marten.		
2.3.22	Hairy Woodpecker (*Picoides villosus*) - Snags occur in numbers, size, and quality in and adjacent to aspen, ponderosa pine, and mixed conifer forests to provide effective habitat for foraging and reproduction.		
2.4.9	Soil productivity is intact on all riparian area and wetland ecosystems.	BMPs implemented and effective	5 Years
2.4.12	Management-induced soil erosion, soil compaction, soil displacement, puddling, and/or severely burned soils are rare on all riparian and wetland ecosystems of the SJNF. Long term impacts to soils (e.g. soil erosion, soil compaction, soil displacement, puddling and/or severely burned soils) from management actions are rare on all riparian area and wetland ecosystems of the SJNF.		
2.5.5	An adequate range of stream flow provides for the long-term maintenance of physical habitat features. Channel features, including bank stability, width-to-depth ratio, pool/riffle ratio, pool depth, slope, sinuosity, cover and substrate composition, are commensurate with those expected to occur under natural ranges of stream flow.	Number of regulated or flow-impacted streams evaluated for consistency with standard 2.5.18	2-3- Streams per Year
2.5.6	Water flow conditions in streams, lakes, springs, seeps, wetlands, fens, and aquifers support functioning habitats for a variety of aquatic and semi-aquatic species and communities.		
2.5.12	Threats to Colorado River cutthroat trout and its habitat are eliminated or reduced to the greatest extent possible.	Miles of stream habitat enhanced Number of self-sustaining metapopulations established Number of threats reduced or eliminated	2 Years
2.5.13	The distribution of Colorado River cutthroat trout is increased where ecologically, sociologically, and economically feasible.		
2.6.1	State water quality standards and anti-degradation rules are met and State-classified water uses are supported for all water bodies	Acres restored. TMDLs completed. BMPs implemented and effective. WRAP essential projects completed.	5 Years
2.6.2	Water quality for impaired water bodies on the State's 303(d) list move toward fully supporting State-classified uses.		
2.6.3	State "Outstanding Waters" within the planning area maintain the high levels of water quality necessary for this status.		

2.6.5	Water from SJNF lands will meet applicable drinking water standards when given adequate and appropriate treatment. Management activities throughout the planning area protect and/or enhance the water quality of municipal supply watersheds (as defined in FSM 2542). Enhancement may be achieved by watershed restoration or by other activities.	Number of streams removed from 303D list.	
2.8.3	Invasive species, both terrestrial and aquatic, are absent or rare within the planning area, and are not influencing native populations or ecosystem function	Acres of noxious weeds inventoried, treated, and monitored Acres treated for Class A and Class B species Distribution and spread of quagga mussel	Annually
2.9.1	Forest vegetation management supports, at least, the current level of economic activity in the local timber industry; provides economic or social support to local communities; ensures current and future needs for Native American tribal use, including that associated with special forest products (e.g., teepee poles)	Sales data for timber products	Annually
2.11.3	Wildland fire management maintains a balance between fire suppression and use of wildland fire (including both prescribed fire and natural ignitions) to regulate fuels and maintain forest ecosystems in desired conditions.	Number of naturally ignited wildfires managed for resource benefit Number of acres of prescribed fire	Annually
2.11.7	Planned and unplanned fire ignitions are used to increase resiliency and diversity across all forest and rangeland vegetation types.		
2.13.8	Roads and trails within the SJNF that are identified for closure are decommissioned and reestablished with native vegetation cover.	Miles of roads decommissioned	Annually
3.17.24	Tribal traditions are valued by the Forest Service and the public. When appropriate, these traditions are incorporated into the interpretation of the monument to help provide visitor experiences that foster cultural understanding. Tribes are encouraged to participate in the development of interpretive materials and to assist in the training of tour guides/interpreters.		Annual consultation meetings
3.17.25	Tribal consultation regarding management, interpretation, traditional uses and other issues of tribal concern within the monument is an on-going process and is fostered to maintain open communications with tribes.		
3.17.63	Vegetative communities within the Monument from which traditional cultural materials are gathered are resilient and self-perpetuating.	Presence and extent of unique vegetative features	10 Years
3.17.64	Ground cover within the Monument is maintained at levels necessary to prevent accelerated rates of erosion, and provide protection to archaeological sites and soils	Riparian health and stream channel stability	5 Years

3.17.72	Wildlife habitat across the monument continues to support the terrestrial wildlife species considered objects of the Monument.	Big game use (ground counts)	Annually
3.17.73	Peregrine falcons continue to occupy breeding habitat on Companion Rock or Chimney Rock	Peregrine falcon presence	5 Years
3.17.74	Migrating mule deer and elk continue utilizing winter concentration areas and severe winter range habitat across the monument.	Big game use (ground counts)	Annually
3.28.22	Natural and manmade barriers to upstream fish migration adequately protect CRCT populations while allowing for stream reaches large enough to support long term population viability.	Number of CRCT stream segments with no non-native trout	3-5 Years
3.28.23	Manmade barriers to upstream fish migration within CRCT habitat are maintained to ensure effectiveness.		

Eb. Carson National Forest

Duran, J. 2021. *Land Management Plan.* USDA Forest Service, Southwestern Region, Carson National Forest, MB-R3-02-11.

Table 22. Desired Conditions for the Carson National Forest.
Table includes all desired conditions listed in the Carson National Forest Land Management Plan that are related to Rio Chama CFLRP project goals and associated treatments. Identification (ID) system is taken directly from Management Plan.

ID	Desired Condition	CANF Indicator	Reporting Frequency
VEG-DC-1	Ecosystems comprise a mosaic of vegetation conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds, reflecting the disturbance regimes that naturally affect the area. Natural ecological cycles (i.e., hydrologic, energy, nutrient) facilitate the shifting of plant communities, structure, and ages across the landscape over time.		
VEG-DC-2	Ecosystems are resilient or adaptive to the frequency, extent, and severity of disturbances (e.g., human impacts, fire in fire-adapted systems, flooding in riparian systems, insects, pathogens, and climate variability). Natural disturbance regimes, including fire, predominate where practical and are allowed to function in their natural ecological role. Wildfire maintains and enhances resources, including wildlife habitat for species associated with fire-adapted systems. Uncharacteristic wildland fire behavior is minimal or absent on the landscape.	Proportion of surveyed habitat in which species is detected Veg. composition, size class, and canopy cover Acres of Mixed-Con with Frequent Fire treated Acres of Ponderosa Pine treated Acres and locations of insect and disease infestations and tree mortality Departure	As necessary (habitat) 10 years (veg. characteristics) Annually (acres; climate trends; soil trends) 5-10 Years (departure)
VEG-DC-3	Ecosystems maintain or recover all of their essential components (i.e., plant density, species composition, structure, coarse woody debris, and snags), processes (i.e., disturbance and regeneration), and functions (i.e., nutrient cycling, water infiltration, and carbon		

	sequestration) despite changing and uncertain future environmental conditions.	NOAA Climate trends Soil moisture trends	
VEG-DC-4	Old growth is well distributed, dynamic in nature, and shifts on the landscape over time, as a result of succession and disturbance. Old growth attributes (e.g., multistory structure, large old trees, large trees with sloughing and exfoliating bark, snags, large downed logs, and other indicators of decadence) are present in all forest and woodland vegetation communities and provide habitat for associated species.		
VEG-DC-5	Ecological conditions affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of native and desirable nonnative plants and animals that are healthy, well distributed, genetically diverse, and connected (on NFS lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.	Proportion of surveyed habitat in which species is detected	As necessary
VEG-DC-6	Vegetation conditions allow for gradual transitions between vegetation communities. Transition zones shift in time and space, due to ecological processes affecting site conditions (i.e., fire and climate).		
VEG-DC-7	Vegetation characteristics (e.g., tree density, litter depth) support favorable water flow and quality.		
VEG-DC-8	All age classes of deciduous trees (e.g., aspen, cottonwood, and Gambel oak) are well represented on appropriate ecological settings and provide habitat for wildlife and rare plants.	Ground cover Soil condition rating	5 Years
VEG-DC-9	Organic ground cover and herbaceous vegetation protect soils, facilitate moisture infiltration, and contribute to plant and animal diversity and ecosystem function.		
VEG-DC-10	Vegetation connectivity and abundance provide for genetic exchange, daily and seasonal movements of animals, and predator-prey interactions across multiple spatial scales, consistent with existing landforms and topography. Habitat configuration and availability and species genetic diversity allow long distance range shifts of plant and wildlife populations, in response to changing environmental and climatic conditions.		
VEG-DC-11	Native plant communities dominate the landscape, while invasive species are nonexistent or low in abundance and do not disrupt ecological function.		
VEG-DC-12	Native insect and disease populations are generally at endemic levels with occasional outbreaks. The scale of		

	insect and disease outbreaks is usually restricted by variation of vegetation structure and composition.		
VEG-DC-13	The transition from NFS lands to adjacent lands where similar desired conditions are being met is seamless and does not exhibit abrupt changes in visual or ecological integrity.		
VEG-DC-14	Habitats and refugia for rare, endemic, and culturally important species are intact, functioning, and adequate for species' persistence and recovery of self-sustaining populations.		
VEG-DC-15	Overall plant composition similarity to site potential averages more than 66% but can vary considerably at fine- and mid-scales owing to a diversity of seral conditions.		
VEG-DC-16	Diverse cool and warm season grasses, forb species, and litter are abundant and contiguous enough to support natural fire regimes, consistent with site potential. Herbaceous vegetation amount and structure (e.g., plant density, height, litter, and seed heads) provide habitat to support wildlife and prey species.		
VEG-DC-17	The composition, density, structure, and mosaic of vegetation conditions reduce the threat of uncharacteristic wildfires to ecosystems and local communities.		
VEG-DC-18	Native plants provide nectar, floral diversity, and pollen throughout the seasons when pollinator species are active.		
VEG-DC-20	The structure and function of the vegetation and associated microclimate and special features (e.g., snags, logs, large trees, interlocking canopy, cliffs, cavities, talus slopes, bogs, fens, rock piles, specific soil types, and wet areas) exist in adequate quantities within the capability of the Carson, to provide habitat and refugia for at-risk species or species with restricted distributions.	#, distribution, and recruitment of snags	5 Years
VEG-DC-21	Ecological conditions, as described in these desired conditions, provide habitat to support, sustain, and recover rare, endemic, or at-risk species.	#, distribution, and recruitment of snags	5 Years
VEG-MCW-DC-1	Desired seral stage proportions for the mixed conifer with aspen vegetation community at the landscape scale: see pg. 44 of CANF LMP.		
VEG-MCW-DC-2	The mixed conifer with aspen vegetation community comprises variable species of differing ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably sized and aged trees and other vegetation. A range of seral states, each characterized by distinct dominant species composition and biophysical conditions, are distributed across the landscape, such that each state adequately supplies the subsequent states progressively through time.	Proportion of surveyed habitat in which hermit thrush is detected	As Necessary

	Canopies in older seral stages are generally more closed than in dry mixed conifer.		
VEG-MCW-DC-3	Mixed severity fire (fire regime III) is characteristic at the lower elevations of this type (every 50 to 100 years). High-severity fires (fire regimes IV & V) occur less frequently and are more likely to occur at higher elevations.		
VEG-MCW-DC-4	Old growth structure generally occurs over large areas as stands or patches.		
VEG-MCW-DC-5	Vigorous trees dominate, but older, declining, top-killed, lightning-scarred, and fire-scarred trees are a component. Declining trees are well-distributed throughout the landscape and provide for snags, and coarse woody debris. Generally, there are an average of 20 snags greater than 8 inches in diameter per acre and 1 to 5 of those snags are 18 i nches or greater in diameter. Lower snag densities are associated with early seral stages and higher densities are associated with late seral stages. Coarse woody debris, including downed logs, ranges from 5 to 20 tons per acre for early-seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages.	Proportion of surveyed habitat in which hermit thrush is detected	As Necessary
VEG-MCW-DC-6	Dwarf mistletoe occurrences may be present in stands with a Douglas-fir or spruce component, but rarely in other tree species. Occurrence size, severity, and amount of mortality varies among infected stands. Witches' brooms may be scattered throughout the infection, providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, such as small mammals (e.g., tree squirrels) and raptors (e.g., goshawks and red-tailed hawks).		
VEG-MCW-DC-7	An understory consisting of native grass, forbs, and shrubs is present. Mosses and lichens are prevalent and function to recycle soil nutrients.		
VEG-MCW-DC-8	At the mid-scale, the distribution of groups and patches varies in the mixed conifer with aspen vegetation community, depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, and variable in size, species composition, and age is present. Disturbance-created grass, forb, shrub openings may compose 10 to 100 percent of the mid-scale area, depending on the local disturbance history.		
VEG-MCW-DC-9	Tree density ranges from 20 to 180 square feet of basal area per acre, depending on disturbance history and site productivity.		

VEG-MCW-DC-10	In certain places basal area is 10 to 20 percent higher than in the general forest. Examples include mid- to old-age tree groups in goshawk post-fledging family areas and north-facing slopes. Goshawk nest areas have forest conditions that are multi-aged, but are dominated by large trees with relatively denser canopies than other areas in the wet mixed conifer type.		
VEG-MCW-DC-11	The prevalence of aspen is dependent on seral stage, but it is occasionally present in large patches, providing habitat for organisms (e.g., cavity-nesting birds, fungi, and microorganisms) that depend on it. Where they naturally occur, all age classes of aspen are present in even-aged groups or patches and are regenerating and vigorous. A diverse understory of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.		
VEG-MCW-DC-12	Fire behavior is often characterized by smoldering low-intensity surface fire, with single tree and isolated group torching. Due to the presence of ladder fuels, when environmental conditions align fires transition rapidly into the canopy as passive or active crown fire behavior with conifer tree mortality up to 100 percent across mid-scale patches (10 to 1,000 acres). High-severity fires generally do not result in areas of mortality exceeding 1,000 acres. Other more frequent disturbances affect smaller areas.		
VEG-MCW-DC-13	Uneven-aged groups and patches, comprising about 20 percent of the mixed conifer with aspen vegetation community, provide habitat for species (e.g., black bear and bobcat) that need multi-storied canopies with dense low- to mid-canopy layers.		
VEG-MCW-DC-14	The wildland-urban interface is dominated by early-seral fire-adapted species growing in a more open condition than in the surrounding general forest. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire.		
VEG-MCW-DC-15	In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages.	Proportion of surveyed habitat in which hermit thrush is detected	As Necessary
VEG-MCW-DC-16	Small openings (gaps) are present as a result of disturbances and provide wildlife and plant species habitat.		
VEG-MCW-DC-17	Moist soil conditions (e.g., thick litter layers, wet areas, coarse woody debris, and decaying debris) are maintained and well distributed, commensurate with the capacity of the vegetation community for at-risk species.		
VEG-MCD-DC-1	Desired seral stage proportions for the mixed conifer with frequent fire vegetation community at the landscape scale: see page 48 of CANF LMP.		

VEG-MCD-DC-2	The mixed conifer with frequent fire vegetation community comprises multiple species of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably sized and aged trees and other vegetation. Portions of the forest may be in various stages of development (including temporary openings or groups of very young trees) providing a source of future old growth structure on the landscape. Even-aged structure may be present on up to 10 percent of the landscape to provide structural diversity.		
VEG-MCD-DC-3	Frequent, low-severity fires (fire regime I) occur across the entire landscape, including throughout goshawk home ranges, with a return interval of 14 to 24 years. Fires burn primarily on the forest floor and typically do not spread between tree groups as crown fire.		
VEG-MCD-DC-4	Old-growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth may be intermixed with groups of younger trees or discrete groups of mostly old trees.		
VEG-MCD-DC-5	Vigorous trees dominate, but older, declining, top-killed, lightning-scarred, and fire-scarred trees are a component that provide for snags and coarse woody debris and are well-distributed throughout the landscape.		
VEG-MCD-DC-6	Dwarf mistletoe occurrences may be present on ponderosa pine and Douglas-fir, but rarely in other tree species. Dwarf mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Infection size, severity, and amount of mortality varies among infected trees. Witches' brooms may be scattered throughout the infections, providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, such as small mammals (e.g., tree squirrels) and raptors (e.g., goshawks).		
VEG-MCD-DC-7	The majority of soil cover comprises native grasses and forbs, as opposed to needles and leaves, but all contribute to the fine fuels that maintain a natural fire regime.		
VEG-MCD-DC-8	At the mid-scale, appearance is variable, but generally uneven-aged and open. Openness typically ranges from 50 percent in more productive sites to 90 percent in less productive sites. Depending on past disturbance events and subsequent regeneration establishment small patches (generally less than 60 acres) of even-aged forest structure are occasionally present. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site		

	conditions that favor mixed-severity and stand-replacement fire and other disturbances. Disturbances sustain the overall variation in age and structural distribution.		
VEG-MCD-DC-9	Tree density ranges from 30 to 125 square feet of basal area per acre, with the majority coming from larger trees.		
VEG-MCD-DC-10	Trees are arranged in small clumps and groups interspersed within variably sized openings of grass/forb/shrub vegetation associations similar to historic patterns. Size, shape, number of trees per group, and number of groups per area are variable across the landscape, depending on elevation, soil type, aspect, and site productivity. More biologically productive forested sites contain more trees per group and more groups per area.		
VEG-MCD-DC-11	Snags are typically 18 inches diameter (DBH) or larger, and average 3 per acre. Smaller snags, 8 inches and larger at DBH, average 8 snags per acre. Downed logs (over 12 inches diameter at mid-point, over 8 feet long) average 3 per acre in forested areas. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.		
VEG-MCD-DC-12	In certain places basal area is 10 to 20 percent higher than in the general forest. Examples include mid- to old-age tree groups in goshawk post-fledging family areas, north-facing slopes, and canyon bottoms. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer type.		
VEG-MCD-DC-13	Groups of aspen are present in the mixed conifer with frequent fire vegetation community where they naturally occur.		
VEG-MCD-DC-14	Where the potential exists, Gambel oak thickets with various diameter stems and low-growing, shrubby oak are present. These thickets provide forage, cover, and nesting habitat for wildlife species(e.g., small mammals, birds, deer, and elk). Gambel oak mast (acorns) provides food for wildlife species (e.g., black bear). The distribution and abundance of oak balances wildfire hazard fuels reduction and tree regeneration with wildlife habitat, grazing conditions, age class diversity, and soil condition.		
VEG-MCD-DC-15	The wildland-urban interface comprises smaller and more widely spaced groups of trees and lower numbers of snags and coarse woody debris than surrounding general forest. Crown base heights may be higher than in areas outside the wildland-urban interface. Within the wildland-urban interface, fires burn primarily on the forest floor and rarely spread as crown fire.		

VEG-MCD-DC-16	Tree groups are typically less than 1 acre and consist of 2 to 50 trees per group, but are sometimes larger, such as on north-facing slopes. Regeneration openings occur as a mosaic and are similar in size to nearby groups.		
VEG-MCD-DC-17	Interspaces between groups are variably shaped, comprised of a native grass-forb-shrub mix and may contain individual trees or snags.		
VEG-MCD-DC-18	Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlocking or nearly interlocking.		
VEG-MCD-DC-19	Density is variable, with canopy cover ranging from very open to closed.		
VEG-MCD-DC-20	Groundcover consists primarily of perennial grasses and forbs capable of carrying surface fire. Fires generally burn as surface fires, but single-tree torching and isolated group torching is not uncommon.		
VEG-MCD-DC-21	Moist soil conditions (e.g., thick litter layers, wet areas, coarse woody debris, and decaying debris) are maintained and well distributed, commensurate with the capacity of the vegetation community for at-risk species.		
VEG-PPF-DC-1	Desired seral stage proportions for the ponderosa pine forest vegetation community at the landscape scale: see table on page 53 of CANF LMP.		
VEG-PPF-DC-2	The ponderosa pine forest vegetation community comprises trees of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably sized and -aged trees. Forest appearance is generally uneven-aged and open; occasional areas of even-aged structure may be present. Denser stand conditions exist in some locations, such as north-facing slopes and canyon bottoms.		
VEG-PPF-DC-3	The majority of soil cover is comprised of native grasses and forbs, rather than needles and leaves, but all vegetative cover contributes to the fine fuels that maintain a natural fire regime.		
VEG-PPF-DC-4	Frequent, low-severity fires (fire regime I) occur across the entire landscape, including throughout the range of northern goshawks, with a return interval of 4 to 18 years. Fires burn primarily on the forest floor and typically do not spread between tree groups as crown fire.		
VEG-PPF-DC-5	Old growth structure (large, old ponderosa pine trees with reddish-yellow, wide platy bark; flattened tops; moderate to full crowns; and large drooping or gnarled		

	limbs) occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth is generally intermixed with groups of uneven-aged trees, but may occasionally occur in larger even-aged patches.		
VEG-PPF-DC-6	Vigorous trees dominate, but older, declining, top-killed, lightning-scarred, and fire-scarred trees are a component that provide for snags and coarse woody debris that are irregularly distributed across the landscape and may not exist in some patches.		
VEG-PPF-DC-7	Isolated dwarf mistletoe occurrences may be present. Dwarf mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent of host trees in even-aged forest structures. Infection size, severity, and amount of mortality varies among infected trees. Witches' brooms may be scattered throughout the infections providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, including small mammals (e.g., tree squirrels), raptors (e.g., goshawks and owls), and invertebrate species.		
VEG-PPF-DC-8	At the mid-scale, forest appearance is variable but generally uneven-aged and open. In general, all age classes are represented and evenly distributed. Seedlings and saplings are maintained at sufficient levels to provide a reliable source of replacement. Occasionally patches of even-aged forest structure are present, based upon disturbance events and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand-replacement fire and other disturbances. Disturbances sustain the overall variation in age and structural distribution.		
VEG-PPF-DC-9	Tree species composition is relatively homogeneous. Trees may be isolated individuals or arranged in small clumps and groups interspersed within variably sized openings of grass/forb/shrub vegetation associations similar to historic patterns. Size, shape, number of trees per group, and number of groups per area are variable across the landscape, depending on elevation, soil type, aspect, and site productivity. More biologically productive forested sites contain more trees per group and more groups per area.		
VEG-PPF-DC-10	Snags are typically 18 inches diameter (DBH) or larger and average 1 to 2 per acre. Downed logs (greater than 12 inches diameter at mid-point, greater than 8 feet long) average 3 per acre. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.		

VEG-PPF-DC-11	Where the potential exists, Gambel oak thickets with various diameter stems and low-growing, shrubby oak are present. These thickets provide forage, cover, and nesting habitat for species (e.g., small mammals, birds, deer, and elk). Gambel oak mast (acorns) provides food for wildlife species (e.g., black bear). The distribution and abundance of oak balances wildfire hazard fuels reduction and tree regeneration with wildlife habitat, grazing conditions, age class diversity, and soil condition.		
VEG-PPF-DC-12	Interspaces typically range from 52 percent in more productive sites to 90 percent in less productive sites. In areas with high fine-scale aggregation of trees into groups, mid-scale openness ranges from 78 to 90 percent. Tree density within forested areas generally ranges from 22 to 89 square-foot basal area per acre.		
VEG-PPF-DC-13	In certain places, basal area is 10 to 20 percent higher in mid-aged to old tree groups compared to the rest of the forest (i.e., goshawk post-fledging areas). Goshawk nest areas have forest conditions that are multi-aged but dominated by large trees with interlocking crowns and a canopy that is denser relative to other ponderosa pine areas.		
VEG-PPF-DC-14	In the wildland-urban interface, the density of snags, downed logs, coarse woody debris, live trees, and Gambel oak may be at the low range of desired conditions, to reduce fire intensity and assist the control of fire. Groups of trees may be smaller, more widely spaced, or may have fewer trees per group (but still within desired condition) compared to areas outside the wildland-urban interface. Crown base heights may be higher than in areas outside the wildland-urban interface to reduce the potential for fire spreading to the tree canopy.		
VEG-PPF-DC-15	Trees typically occur in irregularly shaped small groups of less than one acre—though they may be larger, such as on north-facing slopes. Some groups form tight clumps or trees may occur as isolated individuals, depending on soils, plant associations, climate, and disturbance.	Proportion of surveyed habitat in which Grace's warbler is detected	As necessary
VEG-PPF-DC-16	Groups range in size from 2 to approximately 40 trees and may contain species other than ponderosa pine. Trees within groups may be of similar or variable ages. Crowns of trees are interlocking or nearly interlocking in groups that are mid-aged to old.	Proportion of surveyed habitat in which Grace's warbler is detected	As necessary
VEG-PPF-DC-17	The interspaces between groups are variably shaped, comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.		

VEG-PPF-DC-18	Groundcover consists primarily of perennial grasses, forbs, shrubs, and needle cast capable of carrying surface fire. Generally, fires burn as surface fires, but single-tree torching and isolated group torching are not uncommon and contribute to a mosaic across the landscape.		
SL-DC-1	Soil productivity, function, and inherent physical, chemical, and biological processes remain intact or are enhanced. Soils can readily absorb, store, and transmit water vertically and horizontally; accept, hold, and release nutrients; and resist erosion.	Monitor BMPs # acres treated to improve watershed condition	5 Years
SL-DC-2	Logs and other woody materials are distributed across the soil surface to maintain soil productivity and key habitat features.		
SL-DC-3	Vegetation, woody debris, and litter are distributed across the soil surface in adequate amounts to limit accelerated erosion and contribute to soil deposition and development.		
SL-DC-4	Relatively undisturbed biological soil crusts (i.e., soil consisting of cyanobacteria, lichens, mosses, microfungi, and algae) are present or reestablished where the potential exists.		
SL-DC-5	Soil productivity is not inhibited by nonnative invasive plant species.		
WSW-DC-1	Watersheds are functioning properly or trending toward proper functioning condition and resilient in that they exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.	% of watersheds in proper functioning condition # acres treated to improve watershed condition Miles of road decommissioned	Annually
WSW-DC-2	Ecological components (e.g., soil, vegetation, and fauna) are resilient or adaptive to disturbances, including human activities, changes in climate patterns, and natural ecological disturbances (e.g., fire, drought, flooding, wind, grazing, insects, disease, and pathogens) and maintain or improve water quality and riparian and aquatic species habitat.		
WSW-DC-3	Soils, riparian areas, and watersheds sustain groundwater quantity and quality and recharge in aquifers. The water table is maintained at a level that sustains native riparian and aquatic vegetation, high productivity, and soil moisture characteristics.		
WSW-DC-4	Aquatic habitats are connected and free from alterations (e.g., temperature regime changes, lack of adequate streamflow, and constructed barriers to aquatic organism passage) to allow for species migration, connectivity of fragmented populations, and genetic exchange. A constructed barrier to movement exists only to protect native aquatic species from nonnative aquatic species or for agricultural benefit (e.g., headgates).	# fish passage barriers removed or created # roads decommissioned within riparian zone #culverts removed or upgraded	Annually

		# activities with stream miles of habitat improve. Stream miles treated for nonnative invasive species	
WSW-DC-5	Aquatic and riparian habitats support self-sustaining populations of native fish, as well as other aquatic and riparian species. Ecosystems provide the quantity and quality of aquatic and riparian habitat commensurate with reference conditions.		
WSW-DC-6	Watersheds support multiple uses (e.g., timber, recreation, grazing, and traditional uses by tribal communities and acequia associations) with no long-term decline in ecological conditions. Short-term impacts occur only when they serve to improve conditions over the life of the plan.		
WSW-DC-7	Surface water and groundwater quality meet State water quality standards for designated uses.		
WSW-RMZ-DC-1	Riparian ecosystems are not fragmented or constrained, and are properly functioning, commensurate with their type and capability, riparian ecosystems have vegetation, landform, large coarse woody debris, litter, and root masses to capture sediment, filter contaminants, dissipate stream energy and overland flow from uplands to protect and enrich soils and stabilize banks and shorelines.	Acres of impaired riparian restored Stream miles treated for nonnative invasive species Miles of aquatic habitat restored # beneficial barriers created/# barriers removed to reduce undesired frag. Amount of large woody debris in streams 303d turbidity exceedance 303d temp. exceedance	Annually
WSW-RMZ-DC-2	Riparian vegetation, particularly native species, support a wide range of vertebrate and invertebrate animal species. There is adequate recruitment and reproduction to maintain diverse native plant species composition indicative of the soil moisture conditions for the site and desired conditions for the vegetation community.		
WSW-RMZ-DC-3	Native obligate wetland species dominate herbaceous bank cover.		
WSW-RMZ-DC-4	Riparian vegetation (density and structure) provides site-appropriate shade to regulate water temperature in streams.		
WSW-RMZ-DC-5	Riparian ecosystems exhibit connectivity between and within aquatic, riparian, and upland components that reflect their natural linkages and range of variability. Stream courses and other links provide habitat and movement that maintain and disperse populations of riparian-dependent species, including beaver. Riparian areas are connected vertically between surface and subsurface flows.	Miles of aquatic habitat restored # beneficial barriers created/# barriers removed to reduce undesired frag. Amount of large woody debris in streams	

WSW-RMZ-DC-6	Floodplains and adjacent upland areas provide diverse habitat components (e.g., vegetation, debris, logs) necessary for migration, hibernation, and brumation (extended inactivity) specific to the needs of riparian-obligate species.		
WSW-RMZ-DC-7	Compared to surrounding uplands, riparian corridors have characteristics (e.g., surface water and saturated soils) that reduce the frequency and severity of fire. Fire is limited or absent. Fire that occurs is typically smoldering and of low intensity. High to mixed severity fire occurs very infrequently.		
WSW-RMZ-DC-8	Natural disturbances (e.g., flooding and scouring) promote a diverse vegetation structure necessary for the recruitment of riparian-dependent species. The ecological function of riparian areas is resilient to other disturbance, including animal and human use, drought, and changes in climate patterns.		
WSW-RMZ-DC-9	Commensurate with the capability of individual riparian types and consistent with the hydrologic cycle, riparian vegetation provides life-cycle habitat needs for native and desirable nonnative, obligate riparian, and aquatic species and supports other wildlife.		
WSW-RMZ-STM-DC-1	Stream ecosystems, riparian zones, and associated stream courses are functioning properly and are resilient to human and natural disturbances (e.g., flooding) and changes in climate patterns. Fluctuations in flow promote movement of water, sediment, and woody debris that is within the natural range of variability. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning and sites for germination and establishment of riparian vegetation.		
WSW-RMZ-STM-DC-2	Stream ecosystems, including ephemeral watercourses, provide connectivity that is important to at-risk species—for dispersal, access to new habitats, perpetuation of genetic diversity, seasonal movement, as well as nesting and foraging.		
WSW-RMZ-STM-DC-3	Aquatic species are able to move throughout their historic habitat, including opportunities for seasonal and opportunistic movements. Barriers to movement only exist to protect native aquatic species from nonnative aquatic species or for agricultural benefit (e.g., headgates).		
WSW-RMZ-STM-DC-4	Streams and their adjacent floodplains are connected and capable of filtering, processing, and storing sediment; aiding floodplain development; facilitating floodwater retention; withstanding high flow events; and increasing groundwater recharge.		
WSW-RMZ-STM-DC-5	Water quality meets or surpasses State of New Mexico water quality standards for designated uses.	Monitoring of BMPs # new waterbodies listed by NM as impaired for designated uses	5 Years

WSW-RMZ-STM-DC-6	The quantity and timing of stream flows are sustained at levels that maintain or enhance essential ecological functions, including channel and floodplain morphology, groundwater recharge, water quality, and stream temperature regulation.		
WSW-RMZ-STM-DC-7	Channel type (width/depth ratio, sinuosity, gradient, etc.) is appropriate for the landscape setting (i.e., landform, geology, bioclimatic region). Stream channels are vertically stable.		
WSW-RMZ-STM-DC-8	Woody and herbaceous overstory and understory regulate stream temperatures and maintain soil moisture in the riparian zone.		
WSW-RMZ-STM-DC-9	Habitat conditions, as described in stream desired conditions, are capable of supporting self-sustaining native aquatic species populations. These habitat conditions include stream characteristics (i.e., riffles, runs, pools, and channel meandering) that allow for natural processes to occur (e.g., floodplain connectivity and organic matter and sediment transport). Quality aquatic habitat is provided by overhanging banks, woody and herbaceous overstory, and instream large woody debris, which regulate stream temperatures; maintain soil moisture; create structural and compositional diversity; and provide cover, food, and water for riparian species along streams.		
WSW-RMZ-STM-DC-10	In forested streams, large woody debris consists of more than 30 pieces per mile; pieces are greater than 12 inches in diameter, and greater than 35 feet in length.		
WSW-RMZ-STM-DC-11	Ungulate trampling does not significantly increase soil bulk density between years, change the structure of the plant community, or impede geomorphological development of streambank-channel geometry.		
WSW-RMZ-WR-DC-1	Necessary soil, hydrologic regime, vegetation, and water characteristics of wetland riparian vegetation communities sustain the system's ability to support unique physical and biological attributes and the diversity of associated species (e.g., shrews and voles). Soils' ability to infiltrate water, recycle nutrients, and resist erosion is maintained and allows for burrowing by at-risk species.		
WSW-RMZ-WR-DC-2	Upland vegetation is not encroaching, and the extent of wetlands is widening or has achieved its maximum potential and is within the natural range of variability. Development of fens continues.		
WSW-RMZ-WR-DC-3	Wetlands have groundcover and species composition (richness and diversity) indicative of site potential with vegetation comprised mostly of sedges, rushes, perennial grasses, and forbs. Meadows with the potential for hardwood shrubs contain a diversity of		

	age classes (at least 2) along the banks of perennial streams.		
WSW-RMZ-WR-DC-4	To maintain the persistence of at-risk species, microhabitat conditions supporting bog violet (soggy soils under shrubs and willows) are present, commensurate with site potential .		
WSW-RMZ-WR-DC-5	Nectar sources (e.g., thistle, horsemint, and Joe-pye weed) are available for at-risk species.		
WSW-RMZ-FSR-DC-1	Desired seral stage proportions for forest and shrub riparian–cottonwood group at landscape scale: see table on page 86 of CANF LMP.		
WSW-RMZ-FSR-DC-2	Desired seral stage proportions for forest and shrub riparian–montane-conifer willow group at landscape scale: see table on page 87 of CANF LMP.		
WSW-RMZ-FSR-DC-3	Desired seral stage proportions for forest and shrub riparian–cottonwood evergreen group at landscape scale: see table on page 87 of CANF LMP.		
WSW-RMZ-FSR-DC-4	Riparian forest vegetation provides nesting and foraging habitat for neotropical migrant birds, raptors, and cavity-dependent wildlife.		
WSW-RMZ-FSR-DC-5	Woody riparian species are reproducing and are structurally diverse with all age classes present at the landscape scale. Diverse vegetation structure, including mature trees, snags, logs, and coarse woody debris, is present to provide habitat for riparian-dependent species.		
WSW-RMZ-FSR-DC-6	Coarse woody debris provides habitat and is being adequately recruited to provide a reliable source of replacement.		
WSW-RMZ-FSR-DC-7	Upland, dry-site vegetation is not encroaching, and the extent of riparian communities is widening or has achieved it potential and is within the natural range of variability.		
WSW-RMZ-FSR-DC-8	Bebb, coyote, red and Arizona willows are reproducing with a range of age classes present where the potential for these species exists.		
WSW-RMZ-FSR-DC-9	To maintain the persistence of at-risk species, microhabitat conditions supporting bog violet (soggy soils under shrubs and willows) are present, commensurate with site potential.		
WSW-RMZ-FSR-DC-10	Nectar sources (e.g., thistle, horsemint, and Joe-pye weed) are available for at-risk species.		

WSW-RMZ-FSR-DC-11	Moist soil conditions (e.g., thick litter layers, wet areas, coarse woody debris, and decaying debris) are maintained and well distributed, commensurate with the capacity of the vegetation communityfor at-risk species.		
WSW-RMZ-FSR-DC-12	Dense willow conditions (70 percent cover or greater) are retained for at-risk species habitat.		
WSW-RMZ-FSR-DC-13	Beaver are present and play a role in wetland development and riparian dynamics.		
WFP-DC-1	Sustainable populations of terrestrial and aquatic plant and animal species, including at-risk species,are supported by healthy ecosystems, as described by vegetation and watersheds and water desired conditions.		
WFP-DC-2	Ecological conditions (vegetation and watersheds and water desired conditions) affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial and aquatic plant and animal species, including at-risk species, that are healthy, well distributed, genetically diverse, and connected (on NFS lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions as described in vegetation and watersheds and water desired conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.	# water features maintained, improved, or installed Acres of terrestrial habitat restored or enhanced Focal Species presence	Annually
WFP-DC-3	Ecological conditions (vegetation and watersheds and water desired conditions) provide habitat that contribute to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern; and sustain both common and uncommon native species.		
WFP-DC-4	Habitat conditions (vegetation and watersheds and water desired conditions) provide the resiliency and redundancy necessary to maintain species diversity and metapopulations.		
WFP-DC-5	Habitat connectivity and distribution provide for genetic exchange, daily and seasonal movements of animals, and predator-prey interactions across multiple spatial scales, consistent with existing landforms and topography.		
WFP-DC-6	Habitat configuration and availability and species genetic diversity allow long-distance range shifts of plant and wildlife populations, in response to changing environmental and climatic conditions. Barriers to		

	movement may exist to protect native species and prevent movement of nonnative species (e.g., a fish structure to protect Rio Grande cutthroat trout from nonnative invasion).		
WFP-DC-7	To the extent possible, wildlife and fish are free from harassment and human disturbance at a scale that impacts vital functions (e.g., seasonal and daily movements, breeding, feeding, and rearing young) and could affect persistence of the species.		
WFP-DC-8	To provide foraging habitat for native pollinator species, plant communities are a mix of native grass, wildflowers, forb, shrub, and tree species, with diverse structure (including snags and large down woody material) and multiple seral stages and pattern as described in vegetation and watersheds and water desired conditions.		
WFP-DC-9	Habitats in the forest allow for the maintenance and promotion of interspecific relationships (e.g., predator-prey relationships and keystone species relationships).		
WFP-DC-10	All aquatic and riparian habitats are hydrologically functioning and have sufficient emergent vegetation (as described in watersheds and water desired conditions or by site potential), as well as macroinvertebrate populations that support resident and migratory species.		
NIS-DC-1	Nonnative invasive plant and animal species are absent or exist at levels where they do not disrupt ecological function or affect the sustainability of native and desirable nonnative species.	Acres of nonnative invasive inventoried Acres of nonnative invasive treated	Annually
FRT-DC-1	The uniqueness and values of the tribal cultures in the Southwest and the traditional uses important for maintaining these cultures are recognized and valued as important.		
FRT-DC-2	The long history of tribal communities and uses (e.g., livestock grazing, fuelwood gathering, traditional water use, and hunting) on NFS lands and resources is understood and appreciated.		
FRT-DC-3	Forest resources important for cultural and traditional needs (e.g., osha, piñon nuts, okote [pitch wood], and micaceous clay), as well as for subsistence practices and economic support of tribal communities, are available and sustainable.		
FRT-DC-7	The Carson National Forest provides a setting for educating tribal youth in culture, history, and land stewardship, and for exchanging information between tribal elders and youth.		
RHC-DC-1	The uniqueness and values of rural historic communities and the traditional uses important for maintaining these cultures are recognized and valued as important.	# and type of educational programs, events, activities, and employment # of youth participating in programs	2 Years
RHC-DC-2	The long history and ties of rural historic communities and traditional uses (e.g., livestock grazing, fuelwood		

	gathering, acequias, and hunting) to NFS lands and resources is understood and appreciated.		
RHC-DC-3	Forest resources important for cultural and traditional needs (e.g., osha, piñon nuts, okote [pitch wood], medicinal herbs, and micaceous clay), as well as for subsistence practices and economic support of rural historic communities (e.g., livestock grazing, acequias, firewood, vigas, latillas, gravel, soils, and other forest products) are available and sustainable.		
RHC-DC-6	The national forest provides a setting for educating youth in culture, history, and land stewardship and for exchanging information between elders and youth.	# and type of educational programs, events, activities, and employment # of youth participating in programs	2 Years
FFP-DC-1	Forest products (e.g., fuelwood, latillas, vigas, Christmas trees, herbs, medicinal plants, and piñon nuts) are available to businesses and individuals in a sustainable manner (e.g., forest products recover between collections) that also effectively contributes to watershed health and the restoration and maintenance of desired vegetation conditions.	Amount of timber harvested relative to annual amount allowed for sustainable yield	Annualy
FFP-DC-2	Forest products are available for traditional communities and culturally important activities and contribute to the long-term socioeconomic diversity and stability of local communities.		
FFP-DC-3	Forest products that are a byproduct of management activities are available for personal use (e.g., fuelwood) by the public.		
FFP-DC-4	Private and commercial timber harvest supplements other restoration and maintenance treatments at a scale that moves toward landscape desired conditions and contributes to watershed restoration, function, and resilience; enhances wildlife habitat; creates opportunities for small and large businesses and employment; and provides wood products.	Amount of timber harvested relative to annual amount allowed for sustainable yield	Annualy
FFP-DC-5	Harvest of dead and dying trees for economic value is consistent with the desired conditions of wildlife habitat, soil productivity, and ecosystem functions.		
FFP-DC-7	Native seed stock is available to supply reforestation needs.		
FIRE-DC-1	Wildland fires burn within the range of severity and frequency of historic fire regimes for the affected vegetation communities. High-severity fires rarely occur where they were not historically part of the fire regime.	Acres burned, by ecological response unit Range of fires by ecological response unit	5-10 years
FIRE-DC-2	Naturally ignited and planned wildland fires protect, maintain, and enhance resources and move ecosystems toward desired conditions. Fire functions in its natural ecological role on a landscape scale and across administrative boundaries, under conditions where safety and values at risk can be protected. In frequent fire systems, regular fire mitigates high-	% of acres burned by severity class, by ecological response unit Burned acres managed for resource objectives	

	severity disturbances and protects social, economic, and ecological values at risk.	# of multijurisdictional fires	
FIRE-DC-3	Planned and natural ignitions predominate. Unplanned human-caused ignitions are rare.		
FIRE-DC-4	Wildland fires do not result in the loss of life, investments, infrastructure, property, or cultural resources, or create irreparable harm to ecological resources.		
FIRE-DC-5	Wildland fires in the wildland-urban interface are predominantly low to moderate intensity. Residents living within and adjacent to the national forest are knowledgeable about wildfire protection of their homes and property, including providing for defensible space.		
FIRE-DC-6	Wildland fire is understood, both internally and by the public, as a necessary disturbance process integral to the function and sustainability of ecosystems.		

Ec. Santa Fe National Forest

Cress, D. 2021. *Santa Fe National Forest Land Management Plan.* USDA Forest Service, Southwestern Region, MB-R3-10-30.

Table 33. Desired Conditions for the Santa Fe National Forest.
Table includes all desired conditions listed in the Santa Fe National Forest Land Management Plan that are related to Rio Chama CFLRP project goals and associated treatments. Identification (ID) system is taken directly from Land and Resource Management Plan.

ID	Desired Condition	SFNF Indicator	Reporting Frequency
Watersheds	Watersheds are functioning properly. Water quality across the forest meets or exceeds the State's water quality standards and provides for the attainment of designated uses.	% of forest watersheds in proper functioning condition # of acres treated that improve watershed condition and ecological function (e.g., watershed health in WCC Framework) # of fully implemented and fully effective bmp evaluations versus unimplemented and ineffective bmp evaluations Miles of decommissioned or improved roads.	5 Years
Soils	Soil productivity, function, and inherent physical, chemical, and biological processes remain intact or are enhanced. Soils can readily absorb, store, and	Soil Condition Rating	3-5 Years

	transmit water vertically and horizontally; accept, hold, and release nutrients; and resist erosion. Vegetative cover and litter are distributed across the soil surface in adequate amounts to limit erosion and contribute to soil deposition and development. Soil cover and herbaceous vegetation protect soil, facilitate infiltration, and contribute to plant and animal diversity and ecosystem function.	Ground cover % and plant species composition Watershed condition framework soil indicator – % improving	
Riparian Areas	Vegetation composition and structure within riparian areas consists of appropriate plant species and seral state proportions.	WCF: condition class, biota, and habitat. Plant species composition and structure Acres of impaired riparian vegetation restored Residual vegetation	Annually
Riparian Habitat	Aquatic habitats and water bodies (e.g., lakes, ponds, reservoirs) support a complete assemblage of native aquatic species and are resilient to natural and human disturbances including projected warmer and drier climatic conditions.	Management activity impacts on abundance and distribution of riparian obligate focal species: cutthroat trout, northern leopard frog, plumbeous vireo (below 7,500 feet) and Cordilleran flycatcher (above 7,500 feet).	2-3 Years
Aquatic Habitat	Aquatic habitats are distributed across the forest in sufficient quantity and with appropriate habitat components to support self-sustaining populations of native fish and other aquatic species.	Miles of aquatic habitat restored Stream temperature # of beneficial barriers created and # of harmful barriers removed Large woody debris Presence of endemic, at-risk, or appropriate indicator species	2-3 Years
Terrestrial Habitat	Terrestrial ecosystems are composed of appropriate assemblages of sustainable populations of plant and animal species that are supported by healthy ecosystems. Habitat configuration, connectivity, and availability allow wildlife populations to adjust their movements in response to major disturbances (e.g., climate change or uncharacteristic fire) and promote genetic flow between wildlife populations.	Vegetation species structure, density, and composition Acres of terrestrial habitat restored or enhanced; range vegetation improved # of water features maintained, improved, or installed for wildlife benefit Presence of endemic, at-risk, or appropriate indicator species	2-3 Years

Wildlife Connectivity	Aquatic habitats are connected and free from alterations (e.g., temperature regime changes, lack of adequate streamflow, or barriers to aquatic organism passage) to allow for species migration, connectivity of fragmented populations and genetic exchange. Barriers to movement are located where necessary to protect native fish from nonnative species. Habitat configuration, connectivity, and availability allow wildlife populations to adjust their movements in response to major disturbances (e.g., climate change or uncharacteristic fire) and promote genetic flow between wildlife populations.	Distribution of American beaver	2-3 Years
Forested Ecosystems	Vegetative conditions (composition, structure, and function) are broadly resilient to disturbances of varying frequency, extent, and severity. The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, fire, and wind), including old trees, downed logs, and snags. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.	Vegetation species structure, density, and composition Acres of Insect and Disease Infestations Acres of fuel and restoration treatments	2-5 Years
	Ecosystems are productive, sustainable, resilient, and adaptive to disturbances and provide goods and services over the long term, despite changing and uncertain future environmental conditions.		
	Restoration and fuel treatments result in ecological resources that are adaptable to changing climate conditions.		
Ponderosa Pine	The PPF vegetation community is composed of trees of varying ages in a mosaic of seral stages and structures. The forest arrangement on the landscape is similar to historic patterns, with groups and patches generally of variably-sized and aged trees (uneven-aged) and occasional patches of even-aged structure, interspersed within variably-sized openings of grass/forb/shrub vegetation associations. Denser stand conditions exist in some locations, such as north-facing slopes and canyon bottoms. (See FW-PPF-DC-1a for detailed seral states)	Management activity impacts on abundance and distribution of focal species northern goshawks in upland forests.	2-3 Years

Piñon-juniper woodlands	Persistent piñon-juniper woodlands consist of even-aged patches of piñons and junipers that at the landscape level form multi-aged woodlands. Very old trees (more than 300 years old) are present. (Table with detailed seral state included.)	Management activity impacts on abundance and distribution of focal species juniper titmouse in piñon-juniper.	2-3 Years
Invasive Species	Invasive species are nonexistent or exist at population levels that do not disrupt ecological functioning, affect the sustainability of native species, cause economic harm, or negatively impact human health.	Acres of invasives treated Acres of invasives inventoried BAER report findings	Annually
Fire and Fuels	Wildland fire protects, maintains, and enhances resources and moves ecosystems toward desired conditions on a landscape scale. It is allowed to function in its natural ecological role on a landscape scale and across administrative boundaries, under conditions where safety and values at risk can be protected. Wildland fires burn within the range of severity and frequency of historic fire regimes for the affected vegetation communities. High-severity fires rarely occur where they were not historically part of the fire regime.	# and acres of fires managed for multiple objectives by vegetation community and severity Acres of mixed conifer-frequent fire treated Acres of ponderosa pine forest treated Burn severity mapping following fires (prescribed and natural starts)	1-2 Years
Species Conservation	Ecological conditions contribute to the survival and recovery of federally listed, proposed, and candidate species; preclude the need for listing new species; and allow for the recovery and persistence of species of conservation concern.	Endangered species-specific habitat requirements Management actions completed to improve habitat (acres improved)	2-3 Years
Cultural Resources and Traditional Uses	Forest resources important for cultural and traditional needs as well as for subsistence practices and economic support of rural historic communities are available and sustainable.	# of permits sold for: Fuelwood Vigas Collection of plants Latillas Christmas trees Trends in satisfaction Consultations with tribes	Annually
Forest Products	Forest products are available to businesses and individuals in a sustainable manner that also effectively contributes to watershed health and restoration or maintenance of desired vegetation conditions. Private and commercial timber harvest supplement restoration and maintenance treatments at a scale that achieves landscape desired conditions and contribute to watershed restoration function and resilience, wildlife habitat enhancement, small and	CCF provided for industry CCF for fuelwood Sales to be offered % of regeneration harvests restocked in 5 years Amount of timber harvested relative to annual amount allowed	5 Years

	large business and employment opportunities, and provide wood products.	for sustainable-yield, and according to PTSQ/ PWSQ.	

Ed. Rio Grande National Forest

Dallas, D. 2020. *Rio Grande National Forest Land Management Plan.* USDA Forest Service, MB-R3-10-30.

Table 44. Desired Conditions for the Rio Grande National Forest.
Table includes all desired conditions listed in the Rio Grande National Forest Land Management Plan that are related to Rio Chama CFLRP project goals and associated treatments. Identification (ID) system is taken directly from Land and Resource Management Plan.

ID	Desired Condition	RGNF Indicator	Reporting Frequency
DC-NNIS-1	Populations of aquatic and terrestrial nonnative invasive species do not occur or are low in abundance. Those that do occur do not disrupt ecosystem function. (Forestwide)	Presence/distribution of nonnative aquatic invasive species and pathogens	2 Years
DC-NNIS-2	Native ecosystems are resilient to invasion by nonnative invasive species. (Forestwide)	Presence and extent of nonnative species and noxious weeds Acres noxious weeds treated	2 Years
DC-FIRE-1	Wildland fire and fuels reduction treatments are used to create vegetation conditions that reduce threats to real property and infrastructure from wildfire. Fuel loads on lands adjacent to developed areas and communities are reduced. Lands adjacent to private property and infrastructure have defensible space and dispersed patterns of fuel conditions that would favorably modify wildfire behavior and reduce the rate of spread in and around communities at risk. (Forestwide)	Acres and location of fuel management and restoration treatments	2 Years
DC-FIRE-2	Natural ignitions play a natural role in ecosystem dynamics when and where there is no threat to human life or property. (Forestwide)		
DC-SOIL-1	Occasional, intermittent, small-scale soil disturbance occurs, allowing propagation of plant species including some species of conservation concern. (Forestwide)	Type, degree, and extent of soil disturbance and risk rating to determine the effect of soil disturbance on soil productivity and hydrologic function	4 Years
DC-SCC-2	Structure, composition, and function of coniferous forests, including late seral forests, meet the needs of associated species, including species of conservation concern. (Forestwide)	% cover of different forest ecosystems % of different structural classes in major forest ecosystems	5-10 Years

		Mortality - # snags per acre; net volume live vs. dead Regen - # saplings per acre; species composition of saplings in all ecosystems CWD Change in fire regime condition class Size and severity of fires >1000 acres # and acres of all fires	
DC-SCC-3	Structure, composition, and function of riparian areas, including streams, willow thickets, and cottonwood galleries, meet the needs of associated species, including species of conservation concern. (Forestwide)	Status of Rio Grande cutthroat trout, Rio Grande sucker, and Rio Grande chub conservation populations	5 Years
DC-SCC-4	Structure, composition, and function of aspen-dominated forests meet the needs of associated species, including species of conservation concern. (Forestwide)	% cover of different forest ecosystems % of different structural classes in major forest ecosystems Mortality - # snags per acre; net volume live vs. dead Regen - # saplings per acre; species composition of saplings in all ecosystems CWD Change in fire regime condition class Size and severity of fires >1000 acres # and acres of all fires	5-10 Years
DC-SCC-6	Snags and decaying wood processes meet the needs of associated species, including species of conservation concern. (Forestwide)	# live and dead trees per acre % live crown cover # snags per acres # of CWD Tree mortality – net volume and % of dead vs. live	2 Years

DC-SCC-8	Improve or maintain habitat for bighorn sheep. (Forestwide)	Elk, Pronghorn, Mule deer, and bighorn sheep populations Acres/location impacted by disturbance and management actions Distribution of old-forest/late-successional conditions Acres and extent of Gunnison prairie dog colonies # live and dead trees per acre % live crown cover # snags per acres # of CWD Tree mortality – net volume and % of dead vs. live	2 Years
DC-TEPC-1	Maintain or improve habitat conditions that contribute to either stability or recovery, or both, for threatened, endangered, proposed, and candidate species. (Forestwide)	Acres/location impacted by disturbance and management actions Distribution of old-forest/late-successional conditions Acres and extent of Gunnison prairie dog colonies	2 Years
DC-VEG-2	Habitat structure in Gambel oak communities provides for the needs of associated species. (Forestwide)	Acres and location of fuel management and restoration treatments	2 Years
DC-VEG-3	All development stages of the forested terrestrial ecosystems are well represented at the landscape scale and occur forestwide within the ranges identified in Table 6. (Forestwide)	Elk, Pronghorn, Mule deer, and bighorn sheep populations # live and dead trees per acre % live crown cover # snags per acres # of CWD Tree mortality – net volume and % of dead vs. live	2 Years

		Employment, income, and contribution to GDP Board feet of timber sold or harvested Acres treated	
DC-WLDF-1	Habitat conditions are suitable for resident and migratory birds and accommodate key life history requirements. (Forestwide)	Acres/location impacted by disturbance and management actions Distribution of old-forest/late-successional conditions Acres and extent of Gunnison prairie dog colonies # live and dead trees per acre % live crown cover # snags per acres # of CWD Tree mortality – net volume and % of dead vs. live Bird guilds (BCR)	2 Years
DC-WLDF-2	Habitat conditions for bats are suitable for reproduction and roosting. (Forestwide)		
DC-WLDF-3	Habitat connectivity is provided to facilitate species movement within and between daily home ranges, for seasonal movements, for genetic interchange, and for long-distance movements across boundaries. (Forestwide)	Elk, Pronghorn, Mule deer, and bighorn sheep populations Forage availability Acres of habitat maintained or improved Acres of cover and security habitat in mapped winter range affected by disturbance/mortality Changes in crown cover in mapped winter range Acres/location impacted by disturbance and management actions Distribution of old-forest/late-successional conditions	2 Years (populations, old-forest conditions, prairie dogs) 4 Years (forage, habitat maintenance) As necessary (cover)
DC-WLDF-4	Winter range habitat conditions provide the quantity, quality, and spatial arrangement of forage, cover, and security needed to support population objectives for mule deer, pronghorn, Rocky Mountain bighorn sheep, and Rocky Mountain elk. (Forestwide)		

		Acres and extent of Gunnison prairie dog colonies	
		# live and dead trees per acre % live crown cover # snags per acres # of CWD Tree mortality – net volume and % of dead vs. live	2 Years
DC-WLDF-6	Suitable nesting habitat for ground-nesting or low-level shrub-nesting birds is provided by dense, interior riparian willow habitat. (Forestwide)		
DC-FISH-1	Connectivity of habitat for native and desired nonnative fish and aquatic species is maintained or enhanced by the design and implementation of management actions. Populations are expanding into previously occupied habitat, and interconnectivity is maintained within metapopulations. To maintain sustainable populations, critical life stages are distributed and abundant. Habitat conditions are not a primary factor in species being proposed or listed under the Endangered Species Act or for adding species as a species of conservation concern.	Stream temp. # of fish barriers removed/improved Macrobenthic invertebrates Beaver presence/absence Presence/distribution of nonnative aquatic invasive species and pathogens Acres/miles treated Trends in streamflow # of impaired streams (303d)	2-4 Years
DC-FISH-2	Habitat and water quality in lakes and streams allow fish populations to thrive, and habitat is not fragmented by management activities.		
DC-RMZ-1	Riparian areas and wetlands are healthy, fully functioning ecosystems that are resilient and able to withstand natural and human disturbances that include flood, fire, drought, changes in frequency and timing of weather events, recreation, and herbivory. Aquatic ecosystems, riparian ecosystems, and watersheds exhibit high ecological integrity. The vegetation consists of desirable native species and age classes and meets the needs of resident amphibians, fish, and migratory birds. Populations of riparian vegetation are diverse, vigorous, and self-perpetuating. Invasive species, including plants and animals, in riparian and wetland ecosystems are rare. There is sufficient vegetative cover to provide bank stability, trap and retain sediment, regulate temperature, and contribute to floodplain function. Riparian ecosystem	Acres restored Beaver	2 Years

	composition, structure, and function can generally be restored and enhanced by beaver habitat. (Forestwide)		
DC-RMZ-2	Hydrologic regimes of riparian and wetland ecosystems contribute to appropriate channel and floodplain development, maintenance, and function. (Forestwide)	Stream temp. \# of fish barriers removed/improved Macrobenthic invertebrates Beaver presence/absence Presence/distribution of nonnative aquatic invasive species and pathogens Acres/miles treated Trends in streamflow # of impaired streams (303d)	2-4 Years
DC-WA-1	Physical channel characteristics are in dynamic equilibrium and are commensurate with the natural ranges of discharge and sediment load provided to a stream. Streams have the most probable form and the expected native riparian vegetation composition within the valley landforms that they occupy; they function correctly without management intervention. Historically disturbed and degraded stream channels recover through floodplain development and establishment of riparian vegetation, and demonstrate stable channel geomorphic characteristics. Beaver reintroduction, and the persistence of beaver habitat, can contribute to channel recovery and floodplain function. Upland areas function properly and do not contribute to stream-channel degradation. Roads, trails, and impervious surfaces minimally affect hydrologic processes within watersheds. The sediment regime within water bodies is within the natural range of variation. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport. (Forestwide)	# of projects completed in priority watersheds BMP monitoring	2 Years
		Stream temp. \# of fish barriers removed/improved Macrobenthic invertebrates Beaver presence/absence Presence/distribution of nonnative aquatic invasive species and pathogens Acres/miles treated Trends in streamflow # of impaired streams (303d)	2-4 Years
DC-WA-2	Within the constraints of existing water rights decrees, the timing and magnitude of flood events is within the natural range of variation. Floodplains are accessible to water flow and sediment deposits. Overbank floods allow floodplain development and support healthy riparian and aquatic habitats. Floods also allow the propagation of flood-associated riparian plant and animal species. (Forestwide)		

DC-WA-3	State water quality standards are met, and State-classified water uses are supported for all federal water bodies. Water quality for those water bodies listed as impaired on the Stateof Colorado 303(d) list move toward fully supporting State-classified uses. (Forestwide)		

Appendix F: Data Management Plan

Numerous conversations with USDA Forest Service representatives and Southwest Ecological Restoration Institute (SWERI) employees, as well as review of previous CFLRP documents, note the complexity of managing data across organizations and over time. The comprehensive data management plan outlines our current approach and will be updated as challenges are identified, and potential solutions are implemented.

NOTE: In progress. To be updated as data sources and management needs are made more clear.

Table of Contents

Tables

Figures

Glossary

Category: Derived from ArcGIS Online, like a folder in a group.

Feature: (layer type) Web feature layers support vector feature querying, visualization, and editing. They are most appropriate for visualizing data on top of basemaps.

Feature layer: A layer that references a set of feature data. Feature data represents geographic entities as points, lines, and polygons.

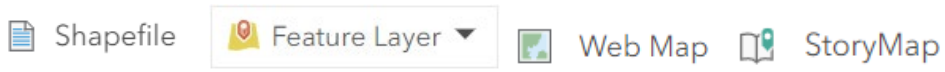
Geodatabase: A database or file structure used primarily to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioral rules for data. Various types of geographic datasets can be collected within a geodatabase.

Group: In ArcGIS Online, a way to collaborate with other ArcGIS users and to exchange content related to a specific project or common activity.

Hosted feature layer: A hosted feature layer view is similar to a copy of a layer but is more powerful because it allows you to control more than how the layer is displayed. For example, you can create a hosted feature layer view when you need to support different editing capabilities for different groups of people.

Hosted imagery layer: Hosted imagery layers allow access to the imagery or raster data, including the pixel or cell values across multiple bands, and multidimensional data.

Items: Items are the contents made available through ArcGIS Online. Items include content such as files, layers (services), maps, scenes, apps, tools, and templates. View this list of items that can be added to AGOL. Common items stored in this Group will appear with these icons:



Layer: In ArcGIS, a reference to a data source that defines how the data should be shown on a map. Layers can also define additional properties, such as which features from the data source are included.

PII: Personally Identifiable Information. Information that can be used to distinguish or trace an individual's identify, either alone or when combined with other personal or identifying information, that is linked or linkable to a specific individual. PII should be evaluated on a case-by-case basis to determine the specific risk that an individual can be identified (https://www.gsa.gov/reference/gsa-privacy-program/rules-and-policies-protecting-pii-privacy-act).

Shapefile: A vector data storage format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

Raster tile layer: Raster tile layers support visualization of imagery and raster data, but they do not support analysis.

Service credits: Credits are the currency used across ArcGIS and are consumed for specific transactions and types of storage, such as storing features, performing analytics, and using premium content.

Tag: A keyword used to describe a map in ArcGIS Online.

Tile: (layer type) Web tile layers support fast map visualization using a collection of pre-drawn map images, or tiles. They are appropriate for basemaps that give your maps geographic context.

Vector tile: (layer type) Vector tile layers are a collection of vector tiles and style resources that can adapt to any display resolution and be customized for multiple uses. They are appropriate as operational or basemap layers.

Web map: In ArcGIS Online, a web-based, interactive map that allows you to display and query the layers on the map. A web map contains one or more ArcGIS Server map services that are referenced to ArcGIS Online.

*See the GIS Dictionary for more definitions

Overview

Information sources pertaining to multiparty monitoring (MPM) within the Rio Chama CFLRP will be managed according to USDA Forest Service Records Policy and the Federal Data Strategy, including the integrity, completeness, and accuracy of documents, geospatial data, and non-geospatial data. The MPM plan relies on model runs, observations, and document review. All associated data and final reports will be stored on a Box drive (Pinyon) and ArcGIS Online (AGOL) site co-managed by the USDA Forest Service and non-USDA Forest Service partner organizations (Forest Stewards Guild and Mountain Studies Institute). To maintain consistency and clarity, data edits, uploads, and downloads should go through these entities.

Data Collection

Data will be collected through multiple modeling programs, field assessments, socio-economic surveys, and downloaded from existing databases. Specific collection standards are outlined in the protocols for each monitoring methodology (Appendix B).

Data Storage

Data storage will require coordination between USDA Forest Service personnel and non-USFS Partners. Some data (such as USDA Forest Service corporate data systems) will be housed on the USDA Forest Service internal T-Drive and some data (such as wood industry surveys) will be housed on the Forest Stewards Guild box drive. When possible[1], the data from these two storage systems will be uploaded to a central, shared storage site (Figure 1) – either a USDA Forest Service led Pinyon Box drive and/or a USDA Forest Service led ArcGIS Online (AGOL) site. The Pinyon Box drive will store the majority of project data, including “final versions”, raster based spatial data, and data requiring minimal to no edits. AGOL will house frequently edited vector data and/or data for Web Maps to promote data exploration.

Pinyon Box Drive

The Pinyon Box drive will serve as the primary space for data storage and sharing. To limit unintentional data alterations, data should not be used or edited directly from Box. Box should serve as a data library to store up-to-date data (and past versions) for users to download.

ArcGIS Online (AGOL)

AGOL should not be used for general data storage. AGOL should be used for frequently edited data, data requiring geospatial reference locations, or data being used by a communication tool such as a Web Map. When possible, avoid storing shapefiles on AGOL and create Geodatabases and Feature Services instead.

[1] Not all USDA Forest Service data can be shared in raw form and USDA Forest Service employees will assist with creating reports and/or downloading shareable versions. In addition, wood industry and contractor surveys contain proprietary information and will only be reported and/or shared in aggregate (to protect PII).

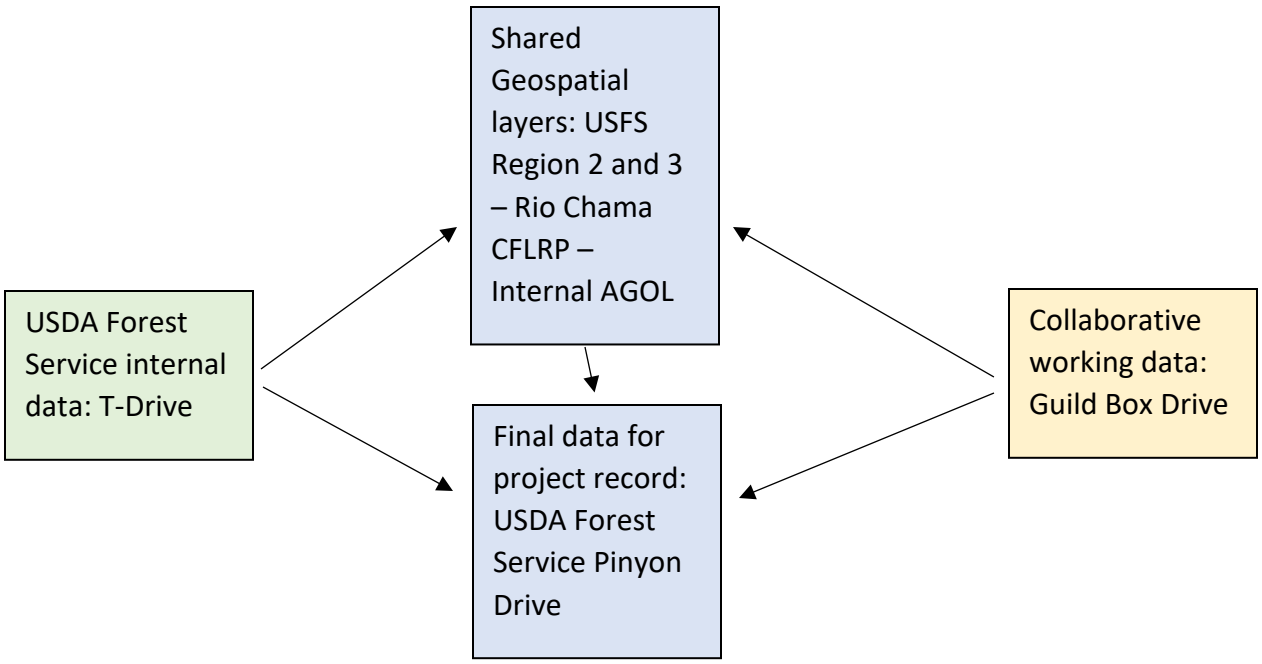


Figure 1. Overview of data storage locations and workflow.

Metadata

AGOL data management will meet the metadata requirements of U.S. Forest Service Handbook 6609.15 and the Federal Geographic Data Committee. In particular, all data should include the following:

- **Summary:** a brief statement describing the purpose and intended use of the dataset.
- **Description:** a detailed description of the dataset, including what the resource is about, why it was created, and who created it. If the data is actively being edited and updated, the description should explain how and when the data will be updated. If the dataset is a snapshot or selection from a larger dataset, the description should provide the date when it was created or copied and the parameters used to select the data.
- **Terms Of Use:** Any special restrictions, disclaimers, terms and conditions, or limitations on using the item's content.
- **Categories:** categories and subcategories used to organize datasets by topic. Each dataset can be assigned one or more category. Categories can be customized within an AGOL group (see table 1).
- **Tags:** Keywords specific to a dataset, used to boost search results and assist in finding items of interest (see Table 2).
- **Credits:** Acknowledgement of the datasets source.

Data Types

This section will be built out once specific protocols are finalized and piloted (Appendix B).

Quality Assurance and Control

This section will be built out once specific protocols are finalized and piloted (Appendix B).

Field Collection

Field data collection will follow set protocols outlined in appendix B. Field Crews and Volunteers will be trained to the appropriate level for a given set of protocols and standardized data collection forms will be used.

Monitoring coordinators from Forest Stewards Guild and Mountain Studies Institute will conduct "hot" (evaluator watching crew collect data) and "cold" (secondary plot measures conducted for comparison) checks of plot data collection as time and resources allow.

Data Upload

Data will be uploaded by USDA Forest Service CFLRP GIS Manager and/or Forest Stewards Guild and Mountain Studies Institute staff following the guidance of this document. All field-based/paper collected data should be uploaded to the Pinyon Box Drive within 7-days of returning to the office (or WiFi enhanced setting). When possible, data sheets and written notes should be input in computer database by a different person than the field recorder to identify potential errors. All hand written notes/data sheets shall be scanned and saved on the Pinyon Box Drive.

Data Backup

Data will be backed-up using a variety of means depending on the data source and type. All data should be stored in at least two ways/locations. Figure 1 outlines how data will have one location on the shared project AGOL or Pinyon Drive and one on the USDA Forest Service T-Drive/Guild Box Drive. Plot data will be input into excel spreadsheets and original data sheets will be scanned and hard copies stored.

Data Review

Annually, a Rio Chama CFLRP data management working group will review the shared Pinyon Box Drive and AGOL sites to remove unnecessary or redundant data, reorganize folders as needed, and mitigate potential data management hiccups.

Data Access

The USDA Forest Service has established an external shared Pinyon Box Drive for Rio Chama shared documents. The agency will manage the permissions of personnel and partner access to the site.

Naming Conventions

1. Separate data by origin (USDA Forest Service, External, Rio Chama CFLRP[2]) with subfolders separated by collection source (e.g., external_data, field_collection, model_outputs, document_review), year, and with additional subfolders as needed.

2. Every folder/subfolder should have an archive folder titled **0_Archive**. Everything but the current version of the dataset goes in the archive folder and a date (**_YYYYMMDD**) should be added at the end of file name.

3. Avoid acronyms and abbreviations in folder, file, and field names (unless very commonly understood).

4. External data shall be kept in original format with original file names. All extracted or filtered datasets or databases should be appended with the filter/extraction parameters (e.g., HUC12**_CFLRP_YYYYMMDD**)

5. Standardized naming conventions will be used for all data originating from the Rio Chama CFLRP (**RC_Category_Subcategory_Name_Status_YYYYMMDD**).

- **RC:** Data may move through individual accounts and this will help users keep their own data organized.
- **Category:** Should match a category outlined in Table 1.
- **Subcategory:** Should match a subcategory outlined in Table 1.
- **Name:** Short and clear description of item (e.g., TrailGulchPlots)
- **YYYYMMDD:** Date of data collection, retrieval, or edit.

Table 1. Overview of data categories, subcategories, and additional information to include in data naming conventions.

Category	Sub-category	Items/additional categories
Basemaps	Hydrography	Watershed boundaries, rivers and streams
	Land ownership	
Boundaries	Administrative	USFS (admin boundaries, ranger districts, regions)
		States and counties
		Tribal
	Collaboratives	2-3-2, SJHFHP, SJCWP
	Initiatives	CFLRP, RGWF
Infrastructure	Transportation	Roads
	Structures	WUI
	Utilities	Power lines, water infrastructure
Projects	USFS	Completed projects: one category for each FY
	All lands	Create one folder for each fiscal year inside All lands
Socioeconomic	TBD	
Ecological	Vegetation	
	Wildlife	
	Water	
	Fire	
PROMOTe	TBD	Rasterized versions of data

[2] Rio Chama CFLRP folder contains data created and managed by and for the CFLRP.

ArcGIS Online

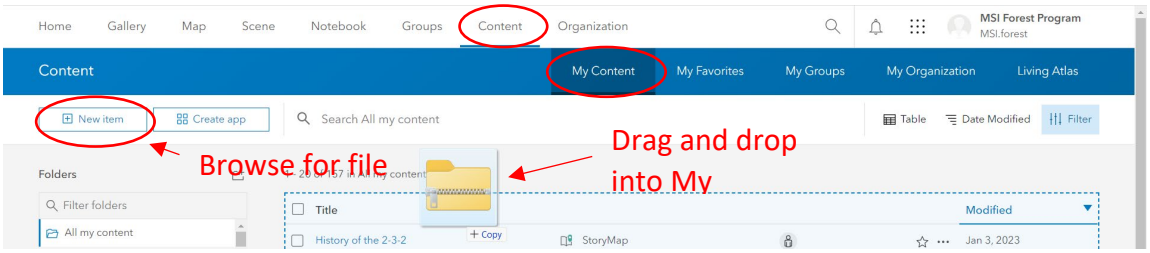
In addition to using the naming convention outlined above, data on the AGOL Group site will be tagged for added efficiency (Table 2). Tags provide further description of an item and can be added at anytime. Use only relevant tags to describe an item, and use tags to query searches (link to ArcGIS Blog about using tags effectively).

Table 2. List of tags to be used for AGOL data to provide additional information and ease searching the group site.

Tag Type	Specific Tag
Year:	2022 2023 2024 2025 2026 2027 2028 2029 2030 2031
Managed by:	San Juan National Forest, SJNF Carson National Forest, CANF Santa Fe National Forest, SFNF Rio Grande National Forest, RGNF Bureau of Land Management, BLM Jicarilla Apache Nation, JAN Santa Clara Pueblo, SCP Ohkay Owingeh, OO Southern Ute Indian Tribe, SUIT State of New Mexico, SNM State of Colorado, SCO Private, PRI
State:	Colorado, CO New Mexico, NM
Core restoration treatment type:	Hazardous fuels WUI, FP-FUELS-WUI Hazardous, FP-FUELS-NON-WUI Prescribed fire, FP-FUELS-RX-FIRE Wildlife habitat restoration, HBT-ENH-TERR Stream enhancement, HBT-ENH-STRM Stream crossings, STRM-CROS-MITG-STD Soil improvement, S&W-RSRC-IMP Timber sales, TMBR-SALES-TRT-AC Timber volume, TMBER-VOL-SLD Biomass for bioenergy, BIO-NRG Invasive species, INVPLT-NXWD-FED-AC Forest vegetation improvement, FOR-VEG-IMP Rangeland vegetation improvement, RG-VEG-IMP Road improvement, RD-IMP Trail improvement, TL-IMP

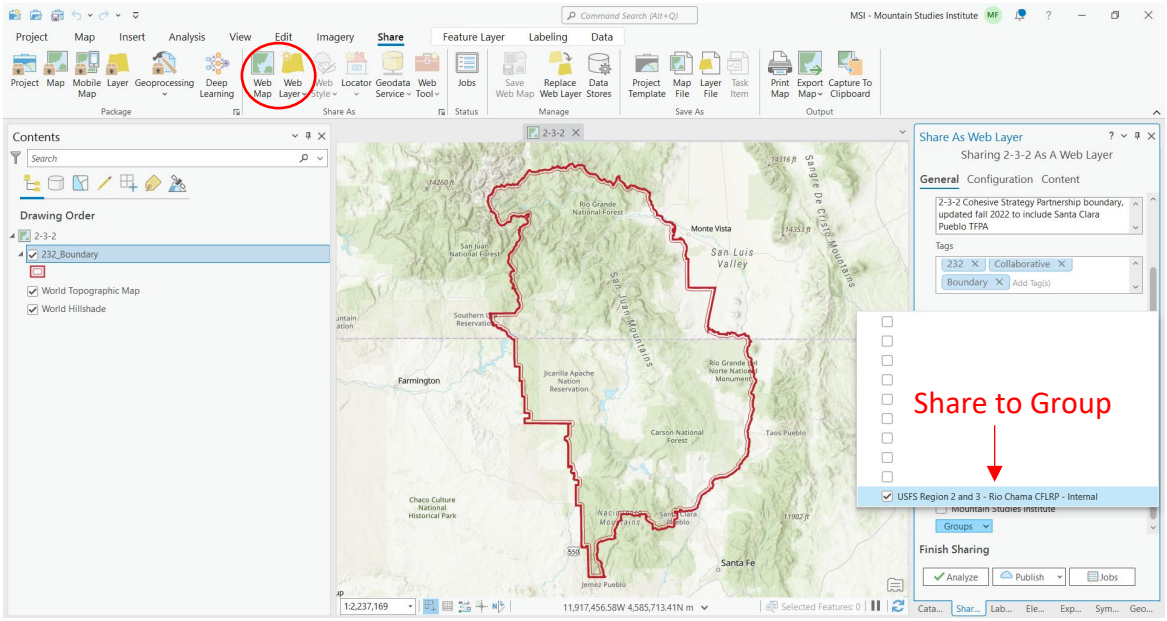
There are two ways to upload data to AGOL:

1. Within AGOL, drag and drop a zipped folder to My Content, or browse for the file on your device.



   a. The file must be zipped and contain shapefile(s). **For best practice, each folder should only include one shapefile.** Uploading multiple shapefiles in a single folder will combine them into a single item within AGOL.
      i. **Raster data must be uploaded as a hosted imagery layer or a raster tile layer.** Caution: hosted imagery layers use a lot of credits to upload and maintain.
   b. After identifying the file to upload, identify the file type (likely a Shapefile or Geodatabase) and select **Add *file name* and create a hosted feature layer.**
   c. This will create a hosted feature layer (for displaying on web maps) and a Shapefile (to download from AGOL).
   d. For more information about adding items to AGOL, view these step-by-step instructions.

2. Publish from ArcGIS Pro



   a. Click on an item in the contents pane, and then choose **publish as web layer**.
   b. Choose a relevant name, provide a description, add tags, and select the layer type.
      i. **Feature:** web feature layers support vector feature querying, visualization, and editing. They are most appropriate for visualizing data on top of basemaps.

ii. **Tile:** web tile layers support fast map visualization using a collection of predrawn map images, or tiles. They are appropriate for basemaps that give your maps geographic context.

iii. **Vector tile:** vector tile layers are a collection of vector tiles and style resources that can adapt to any display resolution and be customized for multiple uses. They are appropriate as operational or basemap layers.

c. **Share to the USFS Region 2 and 3 – Rio Chama CFLRP – Internal Group.**

d. *For more information about publishing a web layer from ArcGIS Pro, view these step-by-step instructions.*

Sharing levels

All data shared with the Group will be visible to members of the Group. However, sharing permissions will need to be updated if data is going to be shared outside of the Group. For example, each data layer will need to shared with the Public if you are making a story map or web map that is publicly available. There are three levels of sharing permissions:

Owner: the owner of the item(s) has access

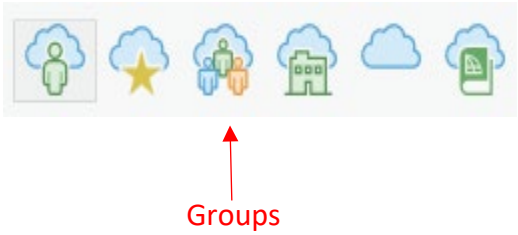
Organization: all members of your organization have access (i.e., MSI, Guild or USFS)

Public: people outside your organization have access

Downloading data

There are two ways to access or download data that is stored on AGOL:

1. Within the Group, select an item to download. Click download to save it to your device.
2. Access data from AGOL on ArcGIS Pro.
   a. In the Catalog pane, select Portal. Access data from the Group by selecting the following button:



Data Sharing

Final reports will be shared on the 2-3-2 Partnership website (https://232partnership.org/) with an option to request raw data. Data requests will be reviewed by the 2-3-2 Partnership Executive Committee. Decisions will be made in accordance with USDA Forest Service policy surrounding data restrictions. To maintain consistency and clarity, data edits, uploads, and downloads should go through the USDA Forest Service Rio Chama CFLRP GIS Manager and/or the non-USDA Forest Service Partners active in data management (Forest Stewards Guild and Mountain Studies Institute).

Sensitive Data

Sensitive data will be collected through the surveys used in socioeconomic monitoring. This sensitive data includes Personally Identifiable Information and will only be reported in aggregate. These data sets will be maintained by the Forest Stewards Guild and will not be stored on the USDA Forest Service led AGOL or Pinyon Box Drive.

Sensitive data pertaining to specific plot locations will be handled on a case by case basis through conversations with the 2-3-2 Partnership Monitoring and Executive Committees.

Data Schema

This section will be built out once specific protocols are finalized and piloted (Appendix B).

A conceptual data schema for the 2-3-2 Partnership's Multiparty Monitoring Plan for the Rio Chama CFRLP is presented in Figure 2.

Logical Data Schema Here.

A logical database schema describes the constraints applied to the data and defines fields, tables, relations, views, etc. The rules or constraints that are defined in this logical model help determine how the data in different tables relate to each other.

Regional Data Dictionaries are being reviewed to inform how data in different formats relate to each other.

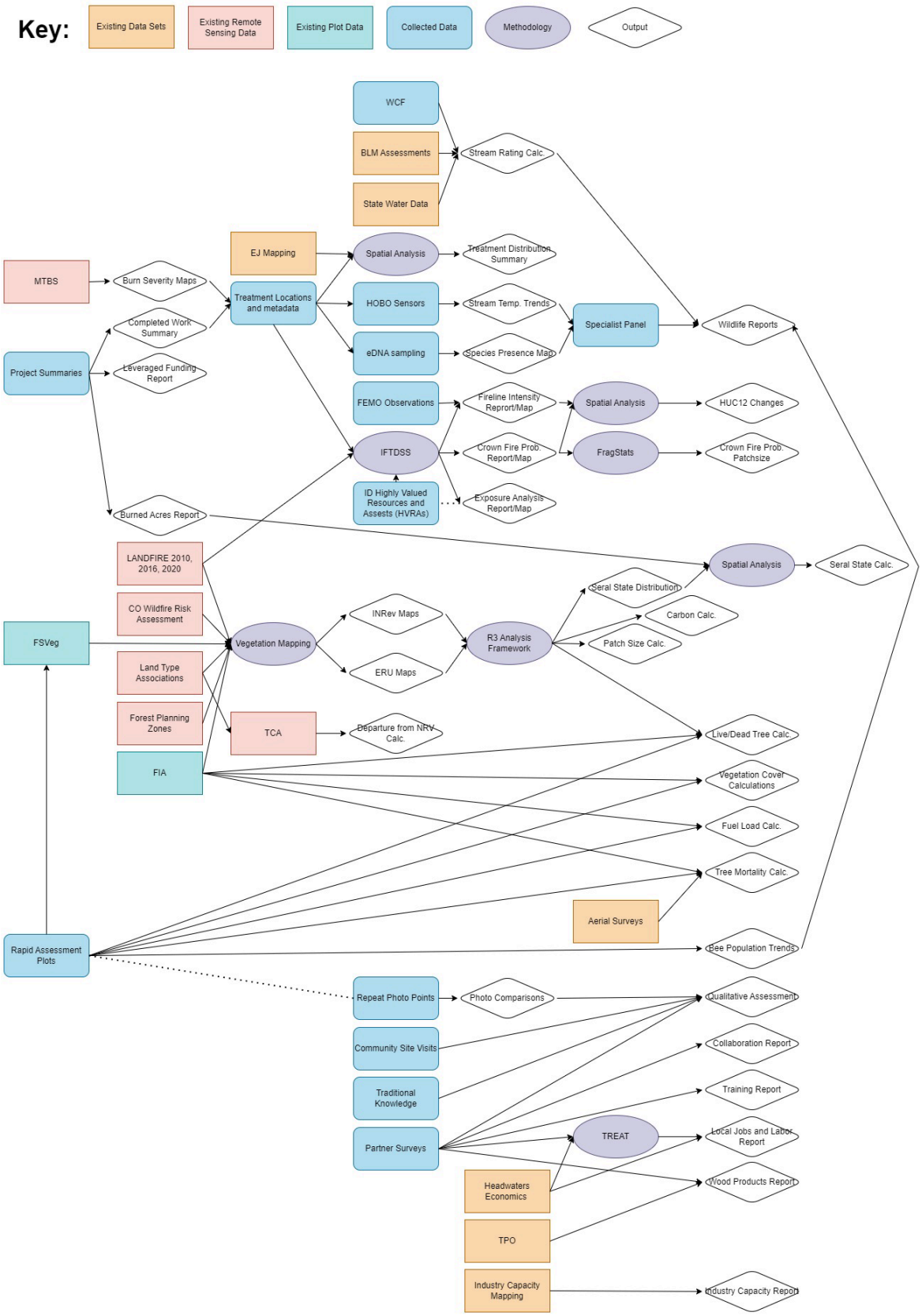


Figure 2. Conceptual data schema for the 2-3-2 Partnership's Rio Chama CFLRP multiparty monitoring plan.

Physical Data Schema Here.

A physical database schema describes how data will be stored and the form of storage used (files, key-value pairs, indices, etc.).

Regional Data Dictionaries are being reviewed to inform how data in different formats relate to each other.

Data Preservation

Raw and final data will be stored in project record.

Appendix G: Yearly Plan Evolution

The 2-3-2 Cohesive Strategy Partnership Multiparty Monitoring Plan was designed to be adaptive to new technologies and information, as well as adjust to changes in resource allocations, project personnel, and landscape disturbances such as wildfire, flooding, pest and disease outbreaks, and drought. The monitoring plan and collected data will be reviewed yearly to determine when and how changes are made. This "living" plan allows for improvements over time, however, should not be stripped of its initial goals and focus. The objective is to summarize monitoring changes to demonstrate project evolution and response to challenges.

All changes to Edition 1 of the 2-3-2 MPM plan will be approved by the 2-3-2 Partnership Monitoring Committee by majority decision and tracked in this document appendix. Changes recorded below should include the MPM page and section; what changed; why the change occurred (new scientific findings, change in available monitoring resources, etc.); and a summary of the deliberation and decision-making process.

-INSERT TABLE/DESCRIPTION AFTER FIRST YEAR REVIEW-

Appendix H: Informing Adaptive Management

The 2-3-2 Cohesive Strategy Partnership Multiparty Monitoring Plan's Adaptive Management Strategy is outlined in the body of this document. Appendix I documents when adaptive management watch-outs are met, the review that followed, and associated changes to treatment implementation. The objective is to summarize how the Rio Chama Collaborative Forest Landscape Restoration Project evolved and responded to monitoring data.

-INSERT TABLE/DESCRIPTION AFTER FIRST YEAR REVIEW-

Attachment: Core CFLRP Monitoring Questions and Indicators

Questions are standardized across all CFLRPs nationally. Indicators are standardized within each Region.

Region 6 specific indicators in red as example of one Region's approach. Ecological indicators for 5, 10, 15-year reports in blue.

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
What is the reduction in fuel hazard based on our treatments?	1. Fire intensity (predicted flame lengths) from IFTDSS 2. Probability of crown fire based on Firesheds work. Generate FLAMMAP runs and then create patch size distribution of resulting probabilities of crown fire. As listed here.	These two indicators are metrics of the effectiveness of our treatments. Using FLAMMAP to see before and after treatments is a useful metric.	Regional database coordinator/analyst	1. IFTDSS 2. Firesheds technique: Use FLAMMAP run to get probability of crown fire, then patch size distribution with probabilities	Landscape (Project scale accomplishments reported in annual reports.)	Short term	Annually
What is the effect of the treatments on moving the Forest landscape toward a more sustainable condition that includes scale and intensity of historical disturbances?	1. Vegetation departure OR Missed fire cycle OR Fragmentation metric OR extrapolation from plots. *This is the ecological departure metric.* 2. Tally acres burned by wildfire and by prescribed burning annually. Report by fire regime and compare to what would be expected in the natural range of variation. Ecological indicator for fire regime.	TCA metrics will be a pilot of this nationally, but an effort within Regions is also needed. Discussions with the CFLRPs show much training and education on landscape ecology is still needed.	Regional capacity to determine for all CFLRPs For TCA pilot, need GTAC to run this for all CFLRPs, so some funding will be necessary.	To be standardized within each Region	Landscape	1. Medium term 2. Sort term	Indicator 1: Every five years, to coincide with Ecological Indicator report. Indicator 2: Keep running tally and report annually.

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
	Departure metric (acres treatment needed) from Haugo/DeMeo method.	Using LANDFIRE is an option for indicator #1. R6 will provide Regional capacity to run the metric (for R6).					
What are the specific effects of restoration treatments on focal species and species at risk habitat across the CFLR Project Area?	1. Acres treated to move towards desired condition (HRV/current departure) for focal species and species at risk. Panel lead by Regional wildlife ecologist and other Regional technical specialists as necessary to verify acres being treated are benefiting these species AND/OR 2. HSIs for focal species and species at risk identified through the Forest monitoring plan Ecological indicator for habitat. As listed here.	Acres-focus on desired vegetation condition for focal species and species at risk. HSI: focus on focal species and species at risk to answer questions identified in forest monitoring plans	Local wildlife expertise, Regional panel. Same as above, plus research/academia, GIS/DRM	Tally of acres, value verified by Regional panel. Will need some kind of metric to show how HSI is informing monitoring question. Is it acres of suitable acres that have either been improved or maintained as defined through the model or what?	Landscape (Project scale accomplishments reported in annual reports.) Planning Unit	Short term Short to medium	Annually Every two years

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
What is the status and trend of watershed conditions in the CFLR area, with a focus on the physical and biological conditions that support key soil, hydrologic and aquatic ecosystem processes?	1. For all subwatersheds • per Watershed Condition Framework (WCF) Step A, assess the status and trend of overall watershed condition class and of each of the 12 separate indicators that compose that classification (every 5 years); • summarize active restoration accomplishments, including miles of streams/acres of lakes enhanced; number of fish passage barriers removed or remediated; miles of roads decommissioned or closed roads; miles of road with durable, long-term improvements (not annual maintenance) in drainage and erosion control; and other soil and water resource improvements (annually and every 5 years).	Follow the 6-step WCF process (Steps A-F), specified in this document. For Step A (assessment and classification), follow detailed technical guidance specified in this document. Shared Stewardship opportunity	Local hydrology, soils and fisheries expertise and familiarity with Watershed Condition Framework. Broader interdisciplinary capacity in silviculture, botany/invasives, engineering, etc.	Watershed Classification and Assessment Tracking Tool (WCATT). Watershed Improvement Tracking (WIT) database. FACTs.	Project, Subwatershed and Landscape	Outcomes are expected over short, medium, and long-term. Annual accomplishments, for example, are short-term outcomes. Improvements in watershed conditions are medium to long-term outcomes.	For all subwatersheds across the CFLR area: • every 5 years, for WCF assessment . • Annually and every five years for annual accomplishments For WCF Priority Subwatersheds • Annually and every five years for status of essential projects in WRAPs.

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
	2. For areas identified as Priority Subwatersheds per WCF Step B: • conduct a watershed assessment and develop a watershed restoration action plan (WRAP, WCF Step C) that documents all essential projects needed to protect and restore the key watershed processes and conditions that support soil, hydrologic and aquatic ecosystem functioning (as needed). • monitor and report implementation status of essential projects in the WRAP (annually and every 5 years). • per WCF, monitor and report all watersheds "improved" once all essential projects in a WRAP have been implemented (as needed). Ecological indicator for aquatic habitat. As described here.						• As needed, for Priority Subwatersheds moved to an improved condition class.

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
What is the trend in invasive species within the CFLRP project area?	1. Effective invasive acres treated from FACTS. Value of treatments pre-determined by risk assessment and EMDS expert panel model (provided). 2. Number of new infestations successfully controlled. (This is outside FACTS.) Ecological indicators for invasives. As described here.	Improve training and quality control so that numbers entered into FACTS are quality data.	Capacity to do risk assessment and EMDS expert panel modeling. Model and training will be provided. Some time from EMDS developer Keith Reynolds to get started. Keith's time will be needed for each Region OR we could have a common training session..	FACTS (or data entry that populates FACTS)	Both project and landscape	Short term	Annually
How has the social and economic context changed, if at all, from the beginning of CFLRP to the end?	Regions/CFLRP Projects can select from the menu of indicators which will be of most value to them in tracking the socioeconomic context. Data sources will be provided to assist in tracking. **NOTE:** It is likely that trends identified are *correlational, not causal*. However, tracking these changes over time will provide key context for other socioeconomic monitoring data provided. ***Initial indicator menu:***	**Easily accessible data sources will be provided for each "menu" option.** Headwaters can provide key data sources, census data, etc. The Washington Office EMC can provide data related to IMPLAN. **Scale:** While each CFLRP collaborative will have space to define the local area for their own context, the default provided is	Support for CFLRP projects, ideally at regional level, to assist in selecting indicators and reporting on socioeconomic condition. Washington Office can assist in developing a simple, adaptable template with	Every 5 years, describe changes in economic context in order to provide that key context for economic monitoring, following the menu of options provided.	Landscape	Medium to Long-term	Baseline; every 5 years

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
	Demographic trends - Population demographic trends (age, ethnicity, etc.) **Economic Opportunity** - Trends related to the most "connected" sectors (e.g., what are the sectors most important to local economy?) - What sectors do you expect CFLRP implementation to have an impact on? - Unemployment rate - Poverty rate - Average annual wage **USFS capacity** - Total annual budget - Total FTE's **Recreation and Visitation** - NVUM data; Forest-level visitation **Other context-specific options** - Outreach and training #'s - Forest products capacity - Students eligible for free lunch - School enrollment - School dropout rate - Residents vs visitors - Second homeownership	counties within and adjacent to CFLRP, at minimum. Projects may provide additional data if desired.	options for users to complete.				

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
How have CFLRP activities supported local jobs and labor income?	Taking local data provided by the CFLRP project regarding local contract capture, forest products generated, and other inputs, Washington Office economists will use IMPLAN data to model the local jobs (direct, indirect, and reduced) and labor income supported by CFLRP each year. Job and labor income creation and retention; direct/indirect/induced effects (TREAT)	Additional support will be provided to CFLRP staff and partners regarding the local inputs to the Treatment for Restoration Economics Analysis Toolkit (TREAT), which Forest Service economists can use to model local jobs and labor income and gather data to address the other indicators (see row below). EMC economists in the Washington Office can provide qualitative context relative to indicators CFLRP projects chose (see row above) in the template to better provide the "so what?" of the results.	In addition to ideally regional-level guidance and support for local data entry, capacity support for defining the "local" area, and providing a "so what?" of the TREAT results. Washington Office EMC economists who run TREAT data can provide support.	Complete TREAT spreadsheet annually. Define "local" collaboratively with guidance provided; can change over time if needed.	Landscape	Short term	Annually
How do sales, contracts, and agreements associated with the CFLRP affect local communities?	These are actionable indicators that projects have control over to an extent – with the data trends leading to offering different kinds of contracts, agreements, or tools, additional outreach, and capacity building. **Local contract capture**	Each CFLRP, as part of their TREAT data entry, will provide the local vs. "leaked" contracts let related to CFLRP, with guidance provided by the Washington Office and Region.	Regional and Washington Office support to access and interpret existing data. In alignment with the rows above, this indicator requires a	Narrative description	Project/Landscape	Medium term	Baseline; 2-3 years

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
	- What % of timber sales, contracts, and agreements are captured by local businesses vs leakage outside local area? - Expenditures by location **Type of work captured** - Technical/equipment-intensive/labor-intensive/supplies **Type of local business** - What kinds of businesses benefit from local contract capture? (Size, Minority-owned, Woman-owned, etc.)	Further information will be provided by Regional and/or Washington Office staff from existing databases to support monitoring: - Timber sales: Timber Information Management (TIM) database (operator size, location) - Service contracts: Federal Procurement Data System (FPDS) (type of work, county) - Grants and Agreements database See examples: Lakeview Stewardship Northeast WA Forest Vision 2020 Shortleaf Bluestem	definition of what "local" should include.				
Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally?	Number, size, and types of mills in an and around the CFLRP area	Can be obtained at Regional level from TPO	Regional support for pulling and accessing data from TPO. Washington Office	Provide information from TPO database	Landscape	Medium to Long Term	Baseline; 3-5 years

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
	Volume and type of wood products generated in mills in and around the CFLRP area.		available to support.				
Did CFLRP increase economic utilization of restoration byproducts?	Track utilization over time, with Forest Service data	Currently track only biomass utilized for bioenergy and timber volume sold. Additional tracking with data already entered into TIM. Data also available: - Harvest by county for WA, OR, CA, ID, MT (http://bber.umt.edu/FIR/H_Harvest.asp) - Timber processing capacity for CO, MT, ID (http://bber.umt.edu/FIR/H_Capacity.asp)	Regional support for projects in accessing data in TIM. Washington Office available to support.	WO/RO pulls information from FACTS/TIM; CFLRP project reports as part of performance measure tracking	Landscape	Short term	Baseline; Annually
Who is involved in the collaborative and if/how does that change over time?	Individuals, organizations, and sectors represented in the collaborative over time	This has been tracked in annual reports since 2018. See description of how this has been reported here: https://www.fs.fed.us/restoration/documents/cflrp/AnnualReportWorkPlan/2019/FY2019CFLRPAnnualReportInstructions.docx	CFLRP projects include in annual reports – start with proposal list (Attachment D of proposal), and report on changes if any.	Annual report	Landscape	Short term	Baseline; Annually

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
How well is CFLRP encouraging an effective and meaningful collaborative approach?	Assessment instrument (for either group or individuals to complete) will be developed and disseminated nationally for use across CFLRP projects. Indicator questions to include collaborative health, function, and resilience as well as perceived outcomes of collaborative work.	In first ten years of Program, National Forest Foundation developed and disseminated collaborative survey (see NFF CFLRP Collaborative Survey) SWERI collaborative resilience worksheet also available (see for reference: https://cfri.colostate.edu/wp-content/uploads/sites/22/2020/08/CFLRP-Developing-and-sustaining-collaborative-resilience.pdf)	Instrument will be developed nationally. Results will be provided at project-level. Regional support for providing the "so what?" of the instrument responses encouraged.	Instrument administered to CFLRP collaboratives to complete.	Landscape	Medium	Every 2-3 years
If and to what extent has CFLRP investments attracted partner investments across the landscapes?	Use of direct CFLRP funds; matching funds provided by the agency; contributed funds by partner organizations (both funding and in-kind); leveraged funds	This has been tracked in annual reports since 2010. See description of how this has been reported here: https://www.fs.fed.us/restoration/documents/cflrp/AnnualReportWorkPlan/201	Washington Office and Regional support for ongoing tracking/reporting with partners, especially in-kind contributions.	Annual report	Project/Landscape	Short term	Annually

Question	Indicator	Discussion	Capacity Needed	Reporting Mechanism/Tool	Scale	Short term (1-5 years), Medium term (5-10), or Long term (10+) outcomes?	Frequency of reporting
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