

DRAFT

Klamath-Lake Forest Health Partnership All-Lands Monitoring Plan

To guide monitoring efforts within the Lakeview Stewardship Collaborative Forest Landscape Restoration Project (CFLRP) and Klamath-Lake Forest Health Partnership (KLFHP) All-Lands Projects in Klamath and Lake Counties

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INTRODUCTION

The Lakeview Collaborative Forest Landscape Restoration Project (CFLRP) was selected for funding in 2012. Multiparty monitoring, evaluation, and accountability are required for CFLRP-funded collaboratives to assess the positive or negative ecological, social, and economic effects of the implementation of projects. In 2014, the [Lakeview CFLRP Monitoring Plan](#) was developed through a collaborative process and has guided monitoring within the Lakeview Stewardship CFLRP from 2014-2021. With the advancement of all-lands restoration through the [Klamath-Lake Forest Health Partnership](#) (KLFHP) and the potential for continued CFLRP funding, the KLFHP felt it was prudent to write a new monitoring plan to guide monitoring for the next 10-15 years.

BACKGROUND

With great success, the Lakeview Stewardship Group forest collaborative (LSG) has been collaborating with the Fremont-Winema National Forest since 1998 to implement restoration and monitor the effects within the Lakeview Federal Sustained Yield Unit. For the past decade, restoration of the Lakeview Stewardship CFLRP area was guided by the LSG's [Long-Range Strategy](#) and monitoring was guided by the [Lakeview CFLRP Monitoring Plan](#). The Chewaucan Biophysical Monitoring Team (CBMT), employed by Lake County Resources Initiative (LCRI), collected the ecological data. The Rocky Mountain Research Station (RMRS) collected white-headed woodpecker data. The Fremont-Winema National Forest personnel collected soil disturbance, fish habitat, and watershed condition data. The University of Oregon Ecosystem Workforce Program (EWP) addressed the social-economic monitoring questions.

In 2021, an ArcGIS online web app platform was set up for the Lakeview Stewardship CFLRP monitoring program. This website provides a clearinghouse to access all data, maps, and information about the monitoring program for partners or the public. This web app can be accessed here: <https://usfs.maps.arcgis.com/apps/MapSeries/index.html?appid=c932f3db61b6432eb42727ac7d08393f>. This web app will be updated with data, maps, and reports on an annual basis.

Several monitoring reports have been completed that provide summaries and results of the Lakeview Stewardship CFLRP monitoring efforts:

- [Lakeview Stewardship CFLRP Ecological, Social, and Economic Monitoring Report 2012-2019](#)
- [Social and Economic Monitoring for the Lakeview Collaborative Forest Landscape Restoration Project fiscal years 2012 and 2013](#)
- [Social and Economic Monitoring for the Lakeview Collaborative Forest Landscape Restoration Project fiscal years 2014 and 2015](#)
- [Social and Economic Monitoring for the Lakeview Collaborative Forest Landscape Restoration Project fiscal years 2016 and 2017](#)
- [Social and Economic Monitoring for the Lakeview Collaborative Forest Landscape Restoration Project fiscal years 2018 and 2019](#)

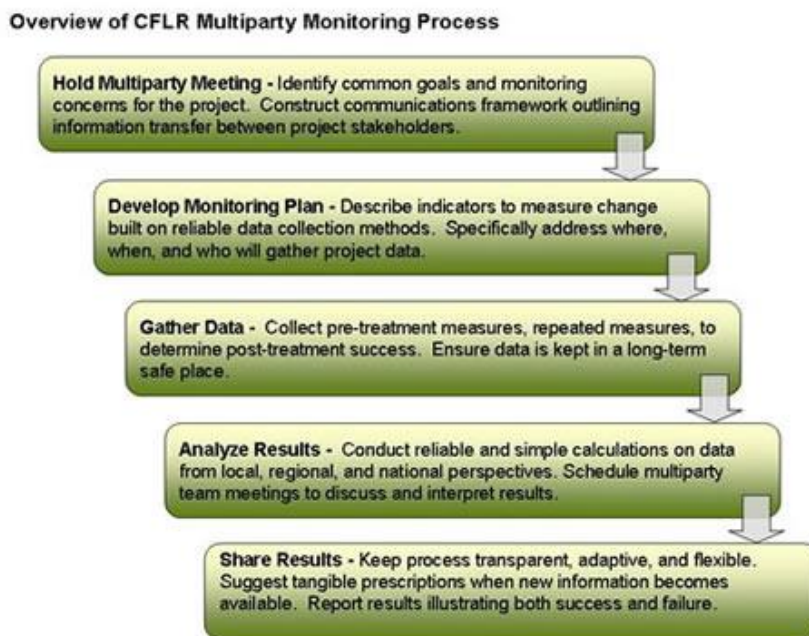
In 2020, the LSG merged with the KLFHP with the intent to expand the geographic scale of restoration to include the entire FWNF, while emphasizing all-lands restoration and monitoring through shared stewardship. The KLFHP has the necessary partners and collaborative capacity to help the FWNF plan and implement restoration actions across public and private land, engage with communities, monitor treatments, and leverage funds to increase the pace and scale of restoration across ownership boundaries. As a long-time member of the KLFHP, Lake County Resources Initiative (LCRI) will continue to lead the forest collaborative efforts associated with the Lakeview Stewardship CFLRP Extension and oversee the monitoring program.

GOAL OF THE MONITORING PLAN

The goal of this monitoring plan is for the KLFHP to outline a monitoring strategy for Klamath and Lake Counties for the next 10-15 years while building on the existing efforts described above. There is a strong commitment and proven track record of completing all-lands restoration with adjoining private landowners through shared stewardship coordinated through the KLFHP, with which the LSG merged in 2020. Ongoing restoration across public and private lands brings an opportunity to monitor across ownerships at landscape scales.

This plan has been developed through a collaborative process with the KLFHP and is guided by the multiparty monitoring process outlined in Figure 1. This plan will outline the questions, indicators, methods, and assigns responsibility for analysis and interpretation of the data. Lastly, this plan outlines how the results will be shared and incorporated into an adaptive management or learning-based framework. The monitoring plan will be reviewed and updated on an annual basis as new information becomes available or new questions are identified.

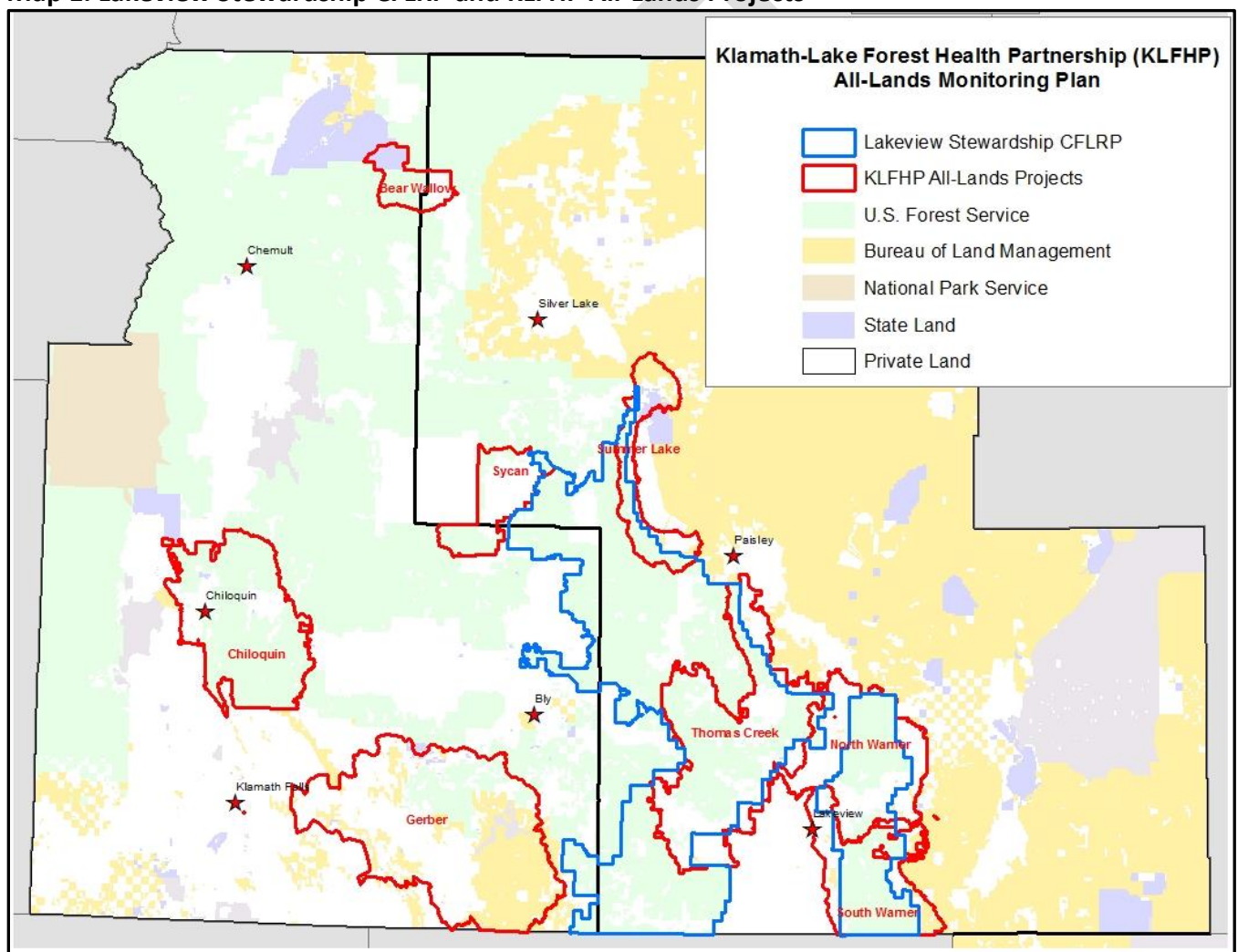
Figure 1. Overview of the CFLR Multiparty Monitoring Process



IMPLEMENTATION OF THIS MONITORING PLAN

If the Lakeview Stewardship CFLRP Extension proposal is selected for funding, this monitoring plan would guide monitoring efforts within the Lakeview Stewardship CFLRP and would be funded through CFLRP. This plan will also guide monitoring efforts within KLFHP All-Lands Projects. The level of monitoring and funding would be determined by KLFHP key partners (Forest Service, LCRI, Oregon Department of Forestry, Lake County Umbrella Watershed Council, and Klamath Watershed Partnership) on an annual basis and contingent on grant funding and approval from private landowners. LCRI would oversee the overall monitoring program. Map 1 shows the boundary of the Lakeview Stewardship CFLRP and the current KLFHP All-Lands Projects across Klamath and Lake Counties.

Map 1. Lakeview Stewardship CFLRP and KLFHP All-Lands Projects



QUESTION DEVELOPMENT AND PRIORITY

The KLFHP held a workshop in June of 2021 to identify questions of interest to the group. Approximately 150 questions were expressed by the group. In addition, questions identified in the CLRP [Common Monitoring Strategy](#) were included in the list of questions. To narrow down these questions, the KLFHP also identified filtering criteria. These are concepts the KLFHP felt were important in deciding whether a question becomes part of the final monitoring plan. The criteria are:

1. Does the question seek to contribute to the best available science, either by evaluating or corroborating previous monitoring results or research efforts, or by addressing unanswered questions?
2. Does the question address the need to evaluate social, economic, and/or ecological values?
3. Does the question provide potential answers that may influence future management direction; potentially leading to adaptive management?
4. Is the question applicable to other landscapes? Is it applicable on this landscape and can it be applied to a broader landscape?
5. Can cost-effective, implementable, and sustainable monitoring techniques be developed to answer the question?
 - a. Are the monitoring techniques sustainable, i.e. independent of software license, agency ownership, and data/storage platforms that cannot be readily shared or transferred?
 - b. Is the question realistic to monitor given the available resources (i.e., personnel, funding, time), or if not, is the question important enough that a plan for extensive funding/time should be developed?
6. Does the question address the goals and needs of individual or group land management interests?
 - a. Is this question valid on only one ownership type; a group of ownerships; or all ownerships?
 - b. In the first screening, this question should be answered relative to the interests of each individual or group represented.
7. Does the multiparty monitoring group have ownership in the question?

After the above criteria were applied to each question, each key partner (Forest Service, Lake County Resources Initiative, Oregon Department of Forestry, Lake County Umbrella Watershed Council, and Klamath Watershed Partnership) identified the questions that were a priority for their own agency. If a question was identified as “yes” for all the criteria above and a priority for all agencies, it was carried forward as a priority question for monitoring. Through this process, the list of priority questions was narrowed down to 18 ecological, social, and economic questions that would be carried forward in this KLFHP All-Lands Monitoring Plan. The final questions were reviewed and approved by the KLFHP in May of 2021. The questions are:

Ecological

1. What is the reduction in fuel hazard based on our treatments?
2. 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?
3. Are treatments in upland and riparian areas meeting project objectives for forest health, wildfire risk reduction, wildlife habitat, or livestock forage production?
4. Are silvicultural prescriptions meeting project objectives for spatial heterogeneity?
5. What is the extent of forest cover loss or conversion?
6. What are the specific effects of restoration treatments on focal species and species at risk habitat across the landscape?
7. What is the status and trend of watershed conditions in area, with a focus on the physical and biological conditions that support key soil, hydrologic and aquatic ecosystem processes?
8. What is the trend in invasive species within the project area?

Social and Economic

9. How has the social and economic context changed in Lake County?
10. How does work associated with the CFLRP or All-Lands Projects affect local jobs, labor, and communities?
11. What are the overall economic impacts of the CFLRP and related investment activities?
12. Did CFLRP and related investments maintain or increase the number and/or diversity of wood products that can be processed locally? Did CFLRP increase economic utilization of restoration byproducts?
13. How well is the project encouraging an effective and meaningful collaborative approach? Who is involved in the collaborative and if/how does that change over time?
14. Have CFLRP and other investments attracted partner investments across the landscapes?
15. What are the social and economic changes for private landowners by engaging in All-Lands Projects?
16. What other impacts to local communities have occurred from youth engagement opportunities?

LESSONS LEARNED

Lessons learned from the past 8 years of CFLRP monitoring have been captured in the newly published [Lakeview Stewardship CFLRP Ecological, Social, and Economic Monitoring Report 2012-2019](#) (page XX). These lessons learned and how the lessons were incorporated into the KLFHP All-Lands Monitoring Plan are identified in the Table 2 below.

Table 2. How lessons learned were incorporated into this monitoring plan

Recommendations and Lessons Learned	Response
For each question, be specific about the indicator and how it will be measured.	Methods and metrics are identified for each indicator.
For each indicator, consider the feasibility of gathering and reporting the data.	One of the criteria applied to each question to narrow down the high priority questions was: Can cost-effective, implementable, and sustainable monitoring techniques be developed to answer the question?
Establish desired conditions and benchmarks to define what constitutes success, and what constitutes trigger points for adaptive management.	Desired conditions and triggers were identified for each indicator if appropriate.
Establish a monitoring oversight committee that meets regularly.	A monitoring sub-committee has been identified through the KLFHP.
National Indicators such as WCF and FRCC can be beneficial in that they involve minimal resources and expense on the part of individual collaboratives. However, they are subject to change, or may be discontinued entirely. If one of these indicators is used, it is important to keep track of the status so adjustments can be made as necessary.	Watershed Condition Framework is an indicator for Question #12. The plan identifies the need to stay updated with this National framework and updating status.
Analysis and reporting are more difficult when questions with similar themes are not grouped together.	Questions were simplified and grouped into similar themes.
Analysis and reporting would be easier if indicators, not just overall questions, are given consideration in terms of order and organization.	The order of the final list of questions and indicators were reorganized for easier analysis and reporting.
Develop a comprehensive sampling plan with appropriate stratification and sufficient landscape coverage to draw reliable conclusions.	LCRI or R6 Forest Service will employ a data analyst who will determine sampling plans on an annual basis.
Field data-gathering protocols should not be so time-consuming as to prevent a sufficient number of plots from being observed.	Data collection methods for ecological monitoring is narrowly focused on vegetation sampling (FIREMON and Aspen vegetation plots).
Electronic field data collection would help prevent conversion and transcription errors.	Data collection will be exclusively electronic starting in 2021.
Field visits have always been a critical component of forest collaboration. These field visits allow stakeholders to see first-hand the results of restoration activities. The LSG has traditionally conducted field visits at each annual meeting. Field visits, however, were not specified in the original LSG monitoring plan. Field visits to restoration project sites should be identified as a form of ecological monitoring.	KLFHP evaluation in the field is incorporated as an indicator in Question #3.

MONITORING QUESTIONS AND INDICATORS

Table 1. Questions, Indicators, and Relevance to CFLRP and All-Lands Restoration

Questions	Monitored Previously	CFLRP Core or Local	All-Lands Public and Private	Indicators
Ecological				
1. What is the reduction in fuel hazard based on our treatments?	Yes	Core	Yes	Modeled fire intensity and flame length
	No	Core	Yes	Probability of crown fire
2. 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?	Yes	Core	Yes	Vegetation departure
	Yes	Core	Yes	Acres burned by wildfire and prescribed fire
3. Are treatments in upland and riparian areas meeting project objectives for forest health, wildfire risk reduction, wildlife habitat, or livestock forage production?	Yes	Local	Yes	Fuel loading
	Yes	Local	Yes	Conifer vigor, mortality, structure, regeneration
	Yes	Local	Yes	Aspen vigor, mortality, structure, regeneration
	No	Local	Yes	Understory shrub, grass, and forb diversity (richness and abundance)
	No	Local	Yes	KLFHP evaluation of treatments in the field
4. Are silvicultural prescriptions meeting project objectives for spatial heterogeneity?	Yes	Local	No	Tree spatial patterns
5. What is the extent of forest cover loss or conversion?	No	Local	Yes	Total forest cover
	No	Local	No	Area reforested by fire severity
	No	Local	No	Assessment of reforestation success
6. What are the specific effects of restoration treatments on focal species and species at risk habitat across the landscape?	Yes	Core	Yes	Habitat Suitability Index (HSI) for white-headed woodpecker (WHWO) as a focal species for dry ponderosa pine and mixed conifer; Resource Utilization Function (RUF) model for mule deer

				summer range as a focal species for a socially important species
	Yes	Local	No	Continue WHWO monitoring as determined by RMRS
7. What is the status and trend of watershed conditions in area, with a focus on the physical and biological conditions that support key soil, hydrologic and aquatic ecosystem processes?	Yes	Core	No	Assess Watershed Condition Framework 12 indicators
	Yes	Core	No	Watershed improvement projects completed within and outside Watershed Restoration Action Plans (WRAP)
8. What is the trend in invasive species within the CFLRP project area?	Yes	Core	Yes	Effective invasive acres treated; number of new infestations successfully controlled
Social and Economic				
9. How has the social and economic context changed in Lake County?	Yes	Core	Yes	Employment in various sectors, labor force; median household income; unemployment rate; number of individuals receiving SNAP benefits; number of students eligible for free and reduced lunch; K-12 school enrollment; dropout rates; average age of population
10. How does work associated with the CFLRP or All-Lands Projects affect local jobs, labor, and communities?	Yes	Core	Yes	Number, value, type of work being done and amount; operator or cooperator location; operator or cooperator size and type; local capture
11. What are the overall economic impacts of the CFLRP and related investment activities?	Yes	Core	No	Job creation and retention, labor income, business sales, direct/indirect/induced economic activity resulting in the local impact area
12. Did CFLRP and related investments maintain or increase the number and/or diversity of wood products that can be processed locally? Did CFLRP increase	Yes	Core	Yes	Changes in related byproducts that can be processed locally; new, local economic opportunities for wood products manufacturing and other businesses associated with forest restoration

economic utilization of restoration byproducts?				
13. How well is the project encouraging an effective and meaningful collaborative approach? Who is involved in the collaborative and if/how does that change over time?	Yes	Core	Yes	Participants in the collaborative and partnership, roles, and changes over time; perceptions by partners of effectiveness of collaboration; collaborative processes being used, changes in process
14. Have CFLRP and other investments attracted partner investments across the landscapes?	Yes	Core	Yes	Funds invested by each collaborator/partner, including in-kind and leveraged; types of investments
15. What are the social and economic changes for private landowners by engaging in All-Lands Projects?	No	Local	Yes	Increase in economic opportunities by working together; perceptions and acceptance of low intensity fire; changes in private landowner awareness
16. What other impacts to local communities have occurred from youth engagement opportunities?	No	Local	Yes	Type, amount, and impacts of youth opportunities through summer employment

DEFINITIONS AND ACRONYMS

FACTS - Forest Service Activity Tracking System. A Forest Service (FS) database for managing information about activities related to fire/fuels, silviculture, Trust Funds, range vegetation improvement, and invasive species used by all levels of the Forest Service.

FFI (FEAT/FIREMON Integrated) – A software tool developed in the United States and designed to assist managers with collection, storage, and analysis of ecological monitoring information. FFI provides software components for: data entry, data storage, data query summary reports and analysis tools. In addition to a large set of standard FFI protocols, the protocol manager lets users define their own sampling protocol when custom data entry forms are needed. FIREMON stands for Fire Effects Monitoring and Inventory Protocol.

GNN - Gradient Nearest Neighbor imputation methods have proven to be an effective tool for characterizing vegetation structure and species composition in forested landscapes across large regions. All GNN predictions are based on relations between ground (response) data and mapped (explanatory) data.

HSI - Habitat Suitability Index. A numerical index that represents the capacity of a given habitat to support a selected species.

IFTDSS - [Interagency Fuels Treatment Decision Support System](#). This is a web-based application designed to make fuels treatment planning and analysis more efficient and effective.

INFRA – Infrastructure. A FS database to manage information on national resources, such as buildings, trails, roads, wilderness areas, and water systems.

LANDFIRE - Provides 20+ national geo-spatial layers (e.g. vegetation, fuel, disturbance, etc.), databases, and ecological models that are available to the public for the US and insular areas. LANDFIRE produces a comprehensive, consistent, scientifically based suite of spatial layers and databases for the entire United States and territories.

LCMS – [Landscape change monitoring system](#). LCMS is a remote sensing-based system for mapping and monitoring landscape change across the United States. LCMS provides a “best available” map of landscape change that leverages advances in time series-based change detection techniques, Landsat data availability, cloud-based computing power, and big data analysis methods.

RAVG - The RAVG program, managed by the USDA Forest Service Geospatial Technology and Applications Center (GTAC), provides a rapid initial assessment of post-fire vegetation condition following large wildfires on National Forests. This website provides general information about RAVG, as well as access to RAVG data for individual fires, data summaries based on user-defined queries, and annual data compilations.

MTBS – Monitoring Trends in Burn Severity is a multi-year project designed to consistently map the burn severity and perimeters of large fires across all lands of the United States since 1984. The majority of fires mapped under the MTBS program are extended assessments--based on post-fire imagery acquired near the following peak of green, usually from the year after the fire--allowing the products to capture the effects of delayed vegetation mortality.

RAWS – Remote Automatic Weather Stations. These stations monitor the weather and provide weather data that assists land management agencies with a variety of projects such as monitoring air quality, rating fire danger, and providing information for research applications. Fire managers use this data to predict fire behavior and monitor fuels; resource managers use the data to monitor environmental conditions.

TREAT – [Treatment for Restoration Economic Analysis Tool](#). TREAT is a modeling tool used to assist in the estimation of the economic effects (jobs and labor income) of restoration activities tied to the CFLRP.

WCF – [Watershed Condition Framework](#). WCF establishes 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. Primary emphasis is on aquatic and terrestrial processes and conditions that Forest Service management activities can influence.

WIT - Watershed Improvement Tracking. A FS database to manage data, observations, and planning details about sites that need to be (or have been) restored or improved with the intent of benefitting watershed, wildlife and aquatic ecosystems health and function.

QUESTION #1: WHAT IS THE REDUCTION IN FUEL HAZARD BASED ON OUR TREATMENTS?

Indicator: Modeled fire intensity and flame length

Data source: LANDFIRE, RAWS, FIREMON field plots

Who collects the data: CBMT collects the field data

Scale: Landscape

Methods: Run fire behavior model in IFTDSS

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Fire intensity (BTU/ft-sec), flame length (ft)

Where the data is stored: FS Regional database and/or LCRI ArcGIS online web app

Who analyzes the data: FS Regional Database Coordinator/Analyst or LCRI Data Analyst

Desired Condition: A decrease in fire intensity and/or flame length

Trigger Point: Evaluate and adjust the type or scale of treatments if models do not show a significant decrease in fire intensity and/or flame length

Indicator: Probability of crown fire

Data source: LANDFIRE, RAWS, FIREMON field plots

Who collects the data: CBMT collects the field data

Scale: Landscape

Methods: Generate FLAMMAP fire behavior modeling runs and then create patch size distribution of resulting predicted crown fire activity using FragStats

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Mean and area-weighted mean patch area and core area, largest patch index

Where the data is stored: FS Regional database and/or LCRI ArcGIS online web app

Who analyzes the data: FS Regional Database Coordinator/Analyst or LCRI Data Analyst

Desired Condition: A decrease in the probability of crown fire

Trigger Point: Evaluate and adjust the type or scale of treatments if models do not show a significant decrease in fire intensity and/or flame length

QUESTION #2: 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?

Indicator: Vegetation Departure

Data source: Gradient Nearest Neighbor (GNN)

Who collects the data: Data is provided

Scale: Landscape

Methods: Departure analysis conducted as described in [Haugo et al., 2015](#) and [DeMeo et al., 2018](#) at five-year intervals. Change in restoration need is determined by calculating the difference and is then compared to the actual restoration (including wildland fire) occurring “on-the-ground” over the same time-period.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Acres of restoration need, acres of restoration completed

Where the data is stored: FS Regional database or LCRI

Who analyzes the data: FS Regional Database Coordinator/Analyst or LCRI Data Analyst

Desired Condition: A decrease in the number of acres needing restoration consistent with biophysical setting and potential natural vegetation

Trigger Point: Evaluate and adjust the scale of treatments if departure analysis does not show a significant improvement in total acres of restoration need compared to restoration completed

Indicator: Acres burned by wildfire and prescribed fire

Data source: MTBS/RAVG, LANDFIRE, FACTS

Who collects the data: NA

Scale: Landscape

Methods: LANDFIRE BpS layer provides fire regime groups; MTBS/RAVG can be used to calculate the percentage of area burned by severity; and FACTS will provide data on prescribed fire implementation. Total area burned in wildland and prescribed fire is compared to the predicted area burned under the historical fire regime, and the percentage of area burned by severity is compared to the predicted area burned by severity under the historical fire regime.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Acres burned (wildfire and prescribed fire) by fire severity

Where the data is stored: Regional database and/or LCRI

Who analyzes the data: FS Regional Database Coordinator/Analyst or LCRI Data Analyst

Desired Condition: To move towards the historical fire regime for the percentage of area burned by severity class

Trigger Point: Evaluate and adjust the scale of treatments if analysis shows we are not moving closer to the historic fire regime for area burned and area burned by severity class

QUESTION #3: ARE TREATMENTS IN UPLAND AND RIPARIAN AREAS MEETING PROJECT OBJECTIVES FOR FOREST HEALTH, WILDFIRE RISK REDUCTION, WILDLIFE HABITAT, OR LIVESTOCK FORAGE PRODUCTION?

Indicator: Fuel Loading

Data source: [FIREMON tree data sampling](#), [FIREMON fuel load sampling](#), [FIREMON line intercept](#), and [FIREMON point intercept](#) field plots and RAWS

Who collects the data: CBMT collects the field data

Scale: Project

Methods: [FFI database/software](#), Microsoft Excel, or other statistical analysis software/programming language such as R or Python; [BehavePlus](#) fire modeling software; and [FireFamily+](#) fire weather software

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Live crown base height, crown fuel base height, fine woody debris, coarse woody debris, litter, duff, live woody fuel, and live herbaceous fuel

Where the data is stored: LCRI ArcGIS online web app and local LCRI database

Who analyzes the data: LCRI Data Analyst

Desired Condition: A decrease in overall fuel loading

Trigger Point: Evaluate and adjust the prescriptions if analysis does not show a significant decrease in a decrease in overall fuel loading

Indicator: Conifer vigor, mortality, structure, regeneration

Data source: [FIREMON tree data sampling](#) field plots

Who collects the data: CBMT collects the field data

Scale: Project

Methods: [FFI database/software](#), Microsoft Excel, or other statistical analysis software/programming language such as R or Python

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Diameter at breast height (DBH), survival and mortality by DBH class, basal area, tree distribution by DBH class, natural regeneration (seedlings/saplings), growth index

Where the data is stored: LCRI ArcGIS online web app and local LCRI database

Who analyzes the data: LCRI Data Analyst

Desired Condition: Increased vigor and health of the stand

Trigger Point: Evaluate and adjust prescriptions if the analysis does now show a significant improvement or meet project objectives for each metric (i.e. residual BA is above objectives identified in the prescription)

Indicator: Aspen vigor, mortality, structure, regeneration

Data source: CBMT aspen vegetation plots including [aspen plot establishment](#), [aspen canopy protocols](#), and [aspen vegetation and ground cover protocols](#)

Who collects the data: CBMT collects the field data

Scale: Project

Methods: Calculations to be done in Microsoft Excel or other statistical analysis software/programming language such as R or Python

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Vegetation species composition, bare ground and ground cover, riparian and streamside vegetation cover, age class, extent of riparian vegetation

Where the data is stored: LCRI ArcGIS online web app and local LCRI database

Who analyzes the data: LCRI Data Analyst

Desired Condition: Increased vigor and health of the aspen stand

Trigger Point: Evaluate and adjust the prescriptions if analysis does not show a significant improvement in stand health and vigor

Indicator: Understory shrub, grass, and forb diversity (richness and abundance)

Data source: [FIREMON point intercept](#) field plots

Who collects the data: CBMT collects the field data

Scale: Project

Methods: Diversity/abundance of shrub, grass, and forbs: [Shannon-Wiener diversity index](#), [Gini-Simpson diversity index](#) which can be calculated in Microsoft Excel or other statistical analysis software/programming language such as R or Python

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Diversity of shrub, grass, and forbs; abundance of shrub, grass, forbs

Where the data is stored: LCRI ArcGIS online web app and local LCRI database

Who analyzes the data: LCRI Data Analyst

Desired Condition: Increased diversity and abundance of grass and forbs and maintaining a mosaic of shrubs

Trigger Point: Evaluate and adjust the prescriptions if analysis does not show a significant increase in the diversity and abundance of grass and forbs and maintenance of a mosaic of shrubs

Indicator: KLFHP evaluation of treatments in the field

Data source: KLFHP members and stakeholders

Who collects the data: LCRI takes notes at KLFHP field meetings and requests feedback from participants

Scale: Project

Methods: KLFHP annual field tours on public and private land

Data collection frequency: Annually

Data reporting frequency: Annually

Metrics: Documentation of KLFHP evaluations of treated areas

Where the data is stored: LCRI

Who analyzes the data: LCRI

Desired Condition: General consensus that treatments are meeting project objectives

Trigger Point: Evaluate and adjust prescriptions if the KLFHP feels treatments are not meeting project objectives

QUESTION #4: ARE SILVICULTURAL PRESCRIPTIONS MEETING PROJECT OBJECTIVES FOR SPATIAL HETEROGENEITY?

Indicator: Tree spatial patterns

Data source: NAIP imagery

Who collects the data: Data is provided

Scale: Landscape

Methods: As described in Technical Brief CFRI-TB-1401 https://cfri.colostate.edu/wp-content/uploads/sites/22/2017/12/2014_Aerial_Imagery_Monitoring_Protocol_CFRI_TB_1401.pdf

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Patch analysis in FragStats

Where the data is stored: LCRI local database

Who analyzes the data: LCRI Data Analyst

Desired Condition: Consistent with natural range of variability while considering climate change

Trigger Point: Gap/clump distributions consistently not achieved

QUESTION #5: WHAT IS THE EXTENT OF FOREST COVER LOSS OR CONVERSION

Indicator: Total forest cover

Data source: [Landscape Change Monitoring System \(LCMS\)](#)

Who collects the data: Data is provided by LCMS

Scale: Landscape or project

Methods: Upload a zipped shapefile of the area of interest (AOI) to LCMS interactive viewer tool, download graphs/csv data for land cover. Compare measurements across time. If the entire unit cannot be uploaded at once, it should be broken down into smaller AOIs.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Acres/percentage of forested land cover

Where the data is stored: LCRI local database

Who analyzes the data: LCRI Data Analyst

Desired Condition: Forest cover returns following disturbance

Trigger Point: Conversion of forest to non-forest following disturbance at levels that are significantly departed from pre-fire levels

Indicator: Area reforested by fire severity

Data source: FACTS and MTBS/RAVG

Who collects the data: Data is provided

Scale: Project

Methods: GIS analysis of reforestation completed by fire severity

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Percent of area reforested by fire severity

Where the data is stored: LCRI local database

Who analyzes the data: LCRI Data Analyst

Desired Condition: To complete reforestation on the majority of moderate and high severity post-fire

Trigger Point: Increase reforestation if desired conditions are not met

Indicator: Assessment of reforestation success

Data source: FS field plots

Who collects the data: FS personnel as part of their regular duties

Scale: Project

Methods: Stocking survival and survival stake row surveys

Data collection frequency: Annually

Data reporting frequency: Every 5 years

Metrics: Trees per acre of planted trees and natural regeneration

Where the data is stored: FS

Who analyzes the data: FS

Desired Condition: Successful stocking of 100+ tree per acre

Trigger Point: Stocking of <100 trees/acre

QUESTION #6: WHAT ARE THE SPECIFIC EFFECTS OF RESTORATION TREATMENTS ON FOCAL SPECIES AND SPECIES AT RISK HABITAT ACROSS THE CFLR PROJECT AREA?

Indicator: HSI for WHWO as a focal species for dry ponderosa pine and mixed conifer; RUF model for mule deer summer range as a focal species for a socially important species

Data source: GNN and other GIS based datasets

Who collects the data: Data is provided

Scale: Landscape

Methods: FS will re-run the HSI model and project nest densities for white-headed woodpeckers using [FIREBIRD](#); FS will re-run the RUF model using GIS model builder

Data collection frequency: Every 3 years

Data reporting frequency: Every 3 years

Metrics: Amount of low, moderate, and high suitable habitat and projected nest densities for white-headed woodpeckers; and amount of low, moderate, and high suitable habitat for mule deer summer range

Where the data is stored: LCRI local database

Who analyzes the data: LCRI Data Analyst

Desired Condition: An increase in the amount of suitable habitat and projected nest densities for WHWO; and an increase in the amount of suitable habitat mule deer summer range

Trigger Point: Evaluate and adjust the type or scale of treatments if models do not show an increase in suitable habitat and projected nest densities for white-headed woodpeckers or suitable habitat for mule deer summer range

Indicator: Continue WHWO monitoring as determined by RMRS

Data source: Field data

Who collects the data: RMRS

Scale: Landscape

Methods: WHWO field detection surveys

Data collection frequency: To be determined

Data reporting frequency: To be determined

Metrics: RMRS will be developing and analyzing existing nest density, nest survival, occupancy, productivity, and home range size data within an integrated population model (IPM); assessing study design effort for each data source in relation to monitoring objectives (i.e., how much additional effort would be needed to meet objectives related to population persistence with respect to forest treatments); and incorporating the initial IPM into a formal adaptive management framework with feedback to assess if the right quantities are being monitored, if the monitoring design is being implemented appropriately, and if the project objectives have been met.

Where the data is stored: RMRS database

Who analyzes the data: RMRS

Desired Condition: TBD

Trigger Point: TBD

QUESTION #7: 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?

Indicator: Assess Watershed Condition Framework 12 indicators

Data source: Watershed Condition Framework (WCF)

Who collects the data: USFS personnel update WCF as part of their regular duties

Scale: Landscape

Methods: Per [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

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Priority watersheds moved to improved condition class

Where the data is stored: WCF database

Who analyzes the data: FS reports on number of watersheds in improved condition class

Desired Condition: To see a positive change in the condition class rating for priority watersheds

Trigger Point: If there is not a positive change in the condition class after restoration, evaluate 12 separate indicators to assess whether additional restoration is needed

Indicator: Watershed improvement projects completed within and outside Watershed Restoration Action Plans (WRAP)

Data source: FACTS, INFRA, and WIT

Who collects the data: FS personnel gathers the information as part of their regular duties

Scale: Landscape

Methods: Report implementation status of essential projects in existing WRAPs and projects outside of WRAPs; pre/post photos of restoration projects

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Active restoration projects successfully completed

Where the data is stored: FS

Who analyzes the data: FS Regional Database Coordinator/Analyst

Desired Condition: Improved aquatic habitat conditions

Trigger Point: Adjust treatments methods if desired conditions are not met as depicted in pre/post photos

QUESTION #8: WHAT IS THE TREND IN INVASIVE SPECIES WITHIN THE CFLRP PROJECT AREA?

Indicators: Effective invasive acres treated; number of new infestations successfully controlled

Data source: FACTS and Lake County Cooperative Weed Management Area (CWMA)

Who collects the data: FS and Lake County CWMA

Scale: Project

Methods: Summary of invasive treatments and number of infestations controlled

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Metrics: Acres treated, and number of infestations controlled

Where the data is stored: FS

Who analyzes the data: FS and Lake County CWMA

Desired Condition: Continued treatments and effective control of invasive plants

Trigger Point: Reconsider funding levels if acres of invasive treatments are decreasing; evaluate methods of treatment if some weed sites are not effectively controlled each year

QUESTION #9: HOW HAS THE SOCIAL AND ECONOMIC CONTEXT CHANGED IN LAKE COUNTY?

Indicators: Employment in various sectors, labor force; median household income; unemployment rate; number of individuals receiving SNAP benefits; number of students eligible for free and reduced lunch; K-12 school enrollment; dropout rates; average age of population

Data source: Oregon Department of Education, the US Census, and Oregon Labor Market Information System

Who collects the data: EWP

Scale: County and school district

Methods: Data will be downloaded and stored in Excel. It is descriptive data and does not require analysis.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server

Who analyzes the data: EWP for data presentation and synthesis

QUESTION #10: HOW DOES WORK ASSOCIATED WITH THE CFLRP OR ALL-LANDS PROJECTS AFFECT LOCAL JOBS, LABOR, AND COMMUNITIES?

Indicators: Number, value, type of work being done and amount; operator or cooperator location; operator or cooperator size and type; local capture

Data source: FS databases, SAM.beta.gov

Who collects the data: EWP

Scale: Project

Methods: Secondary data collection, cleaning and analysis including mapping locations of businesses and cooperators

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server

Who analyzes the data: EWP for data presentation and synthesis

QUESTION #11: WHAT ARE THE OVERALL ECONOMIC IMPACTS OF THE CFLRP AND RELATED INVESTMENT ACTIVITIES?

Indicators: Job creation and retention, labor income, business sales, direct/indirect/induced economic activity resulting in the local impact area

Data source: U.S. Forest Service calculations using TREAT

Who collects the data: EWP

Scale: Project

Methods: TREAT estimates are created by Forest Service economists based on inputs from CFLR project coordinator(s) on the funding spent on different aspects of the project and considerations such as: the amount of funding used for Forest Service employees and for contracts with private businesses, estimates of how much of the contract dollars went to local versus nonlocal contractors, and commercial timber volume harvested and processed for different wood products as a result of project activities during each year. Job and labor income impacts are estimated for two different scenarios: those supported by direct CFLR/CFLN funds only, and those that are supported when full project funds, including matching funds, are considered.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server and FS

Who analyzes the data: EWP for data presentation and synthesis

QUESTION #12: DID CFLRP AND RELATED INVESTMENTS MAINTAIN OR INCREASE THE NUMBER AND/OR DIVERSITY OF WOOD PRODUCTS THAT CAN BE PROCESSED LOCALLY? DID CFLRP INCREASE ECONOMIC UTILIZATION OF RESTORATION BYPRODUCTS?

Indicators: Changes in related byproducts that can be processed locally; new, local economic opportunities for wood products manufacturing and other businesses associated with forest restoration

Data source: Project coordinator tracking sheet (which could track where wood products go and that types), mill processing data, other quantitative and qualitative methods described in methods

Who collects the data: EWP

Scale: Local and County

Methods: Secondary data collection, then triangulation and verification of available data to identify gaps. Team will then determine what qualitative and/or quantitative methods would be most effective, such as a survey, or structured interviews with individuals representing wood products and restoration byproducts, local businesses.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server and project coordinator

Who analyzes the data: EWP

QUESTION #13: HOW WELL IS THE PROJECT ENCOURAGING AN EFFECTIVE AND MEANINGFUL COLLABORATIVE APPROACH? WHO IS INVOLVED IN THE COLLABORATIVE AND IF/HOW DOES THAT CHANGE OVER TIME?

Indicators: Participants in the collaborative and partnership, roles, and changes over time; perceptions by partners of effectiveness of collaboration; collaborative processes being used, changes in process

Data source: Project coordinator tracking sheet, collaborative meeting notes and attendance records, other quantitative and qualitative primary data collection

Who collects the data: KLFHP, LCRI, EWP

Scale: Local

Methods: Compile secondary data collected by coordinator and other document review (meeting notes), then triangulation and verification of available data to identify gaps. Team will then determine what qualitative and/or quantitative approaches would be most

effective, such as administering a survey or semi structured interviews with collaborative members.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server, LCRI, KLFHP

Who analyzes the data: EWP

QUESTION #14: HAVE CFLRP AND OTHER INVESTMENT ATTRACTED PARTNER INVESTMENTS ACROSS THE LANDSCAPES?

Indicators: Funds invested by each collaborator/partner, including in-kind and leveraged; types of investments

Data source: FS, other partner databases or records tracking, project budget reporting

Who collects the data: KLFHP, LCRI, EWP

Scale: Project

Methods: Compile all data on direct or in-kind investments within the project area

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server, LCRI, KLFHP

Who analyzes the data: EWP

QUESTION #15: WHAT ARE THE SOCIAL AND ECONOMIC CHANGES FOR PRIVATE LANDOWNERS BY ENGAGING IN ALL-LANDS PROJECTS?

Indicators: Increase in economic opportunities by working together; perceptions and acceptance of low intensity fire; changes in private landowner awareness

Data source: Project coordinator tracking sheet, primary data collection

Who collects the data: KLFHP, LCRI, EWP

Scale: Local

Methods: Compile coordinator tracking sheet and any related secondary data (meeting or workshop notes or technical assistance notes or assessments). Team will then determine what qualitative and/or quantitative methods would be most effective, such questionnaires on related topics for private landowners to take pre and post events (e.g., workshops), as well as a survey on perceptions and acceptance with different forest health approaches.

Data collection frequency: Every 5 years, with baseline assessment of perceptions and awareness

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server, LCRI, KLFHP

Who analyzes the data: EWP

QUESTION #16: WHAT OTHER IMPACTS TO LOCAL COMMUNITIES HAVE OCCURRED FROM YOUTH ENGAGEMENT OPPORTUNITIES?

Indicators: Type, amount, and impacts of youth opportunities through summer employment

Data source: Information from employers and employees from LCRI, Northwest Youth Corp (NYC), Step-up, or YCC (Youth Conservation Corp)

Who collects the data: KLFHP, LCRI, EWP

Scale: Local

Methods: Synthesize and summarize employment and project tracking. Team will then determine what qualitative and/or quantitative approaches would be most effective, such as administering a questionnaire to, or semi structured interviews with youth and employers pre- and post-employment.

Data collection frequency: Every 5 years

Data reporting frequency: Every 5 years

Where the data is stored: EWP's University of Oregon server, LCRI, KLFHP

Who analyzes the data: EWP