

Monitoring in the Next Round of Collaborative Forest Landscape Restoration Projects

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Purpose and Objectives

The first ten years of CFLRP showed that multi-party monitoring was a critical factor for project success and stakeholder trust. It also identified challenges in field capacity, striking the right balance between national standardization and local flexibility and developing effective landscape scale metrics. In order to further improve monitoring moving forward, Forest, Range Management and Vegetation Ecology Staff has worked with the Regions and multiple programs to develop a new common CFLRP monitoring strategy for new projects coming online. The strategy is designed to reflect lessons learned from the first ten years of the program, address limited field capacity, and improve landscape scale monitoring.

This strategy will include a limited set of core monitoring questions and associated indicators. These questions have been drawn from monitoring plans from the existing set of 23 CFLRP projects and were selected for their commonality and focus on CFLRP core objectives.

- **By common agreement, use of these core questions will be mandatory for all new projects (and extensions) and standardized across all CFLRPs. Use of the indicators associated with these questions will also be mandatory, but standardized within each Region.**
- **We are asking all CFLRP Regional coordinators to document and report on how they plan to implement indicators within 6 months of the official letter rolling out this strategy. Regions should follow indicators**

in the accompanying table as closely as possible. As an example we have included notes on the table (in red) to illustrate how the Pacific Northwest Region (Region 6) will use the indicators.

- Similarly, we are asking all Regions to define landscape extents and use these consistently within your Regions. Landscape extents should be large enough to support fire regimes.
- The emphasis for monitoring will be actual conditions compared with ecologically sustainable/resilient conditions, not desired conditions. This is to move towards absolute rather than relative accomplishments.
- The Forest Service has a long record and strong capacity for monitoring at project scale. This is less so at the landscape scale (Esch and Waltz 2019). Our emphasis in this round of monitoring will be on the landscape scale, although project-scale monitoring will still continue, particularly in the CFLRP annual reports. This emphasis is intended both for better, more meaningful monitoring, but also to foster training and understanding of landscape ecology at all levels. It is also intended to spark discussion on sources of long-term change on landscapes.
- The strategy is designed to dovetail with the CFLRP five-year reports on Ecological Indicators. The attachment with specific questions and indicators shows where questions can be used to report on ecological departure (fire regime), wildlife habitat, aquatic, and invasives indicators. The strategy also fulfills reporting for the community benefits, collaboration, and leverage national indicators.
- We emphasize CFLRPs are free to develop monitoring questions and indicators beyond this core set, and to examine the core questions in greater detail if they wish.
- Data for these core indicators should be contained in a single Regional database, and made available on line to all. Summary reports should be prepared and distributed at least annually. This institutionalization, if successful, will reduce the burden on individual CFLRPs, and help alleviate turnover concerns.

Background

Overview of CFLRP monitoring

The [CFLRP statute](#) requires multi-party monitoring. Collaboratives develop and implement multi-party monitoring plans to examine questions of collective interest to their stakeholders, and to inform a project's progress towards or away from collaborative goals. Additionally, every 5 years collaboratives report on a consistent set of five national indicators - ecological outcomes, economic impact, fire risk and costs, leveraged funds, and collaboration.

For ecological outcomes, each collaborative selected ecological indicators to track progress related to fire regimes, fish and wildlife habitat, invasive species, and watershed condition. The indicators track progress towards desired conditions for the landscape area (landscape scale monitoring) as a whole and for individual project areas (project scale monitoring).

Monitoring plans to date have been developed by individual CFLRPs with limited Regional oversight. The 24 CFLRPs to-date across the country reflect very diverse ecosystems and socio-economic settings. Local governance and determination have been features of the CFLRP effort.

Successes in the First Round of CFLRP

CFLRP results from 2010-2019 showed many successes, including:

- Monitoring generally **worked well at the project scale**. Forest Service staff and partners reported the monitoring was crucial in the collaborative process.

- **Monitoring** was critical support to adaptive management, **supporting improvements to project implementation over time**.
- **Social license and social contracts are built and maintained** in part by multi-party monitoring.

Lessons Learned

- Challenges faced in monitoring in the first round include **turnover** in personnel, both within the Forest Service and among stakeholders; **lack of capacity** in some cases; and **severe disturbance events** (fires and a hurricane).
- **Use of monitoring results by decision-makers in a truly adaptive management process remains a challenge.** Line officer engagement can be encouraged by stressing multi-party monitoring as a way to build social license with and ownership by stakeholders, and by providing frequent reporting on monitoring results.
- The record of monitoring at the landscape scale was mixed. A study by [Esch and Waltz \(2019\)](#) indicated a **need to improve landscape metrics**, capacity, and training in this area.
 - The survey only found evidence of assessing landscape-scale change in 9 out of the 23 projects that were in place between 2010-2019.¹
 - Staff review of ecological indicator reports found a gap between the project scale and landscape scale monitoring as far as datasets, tools, methods, etc. Sometimes it was assumed that adequate project monitoring meant adequate landscape monitoring.
 - Of the subset of projects that did effective outcome-based landscape-scale monitoring, approaches included:

Project	Landscape monitoring approach
Missouri Pine-Oak Woodland Restoration Project	Plots extrapolated to landscapes
Southwest Jemez Mountains	Changes in fire behavior, in turn affecting fire regimes
Colorado Front Range	Moving towards natural range of variation (NRV)
Deschutes	Moving towards NRV
4FRI	Fragmentation metrics

- Common challenges included:
 - Landscape ecology technical expertise is limited
 - Guidance on landscape monitoring approaches is limited
 - Project-level monitoring has been prioritized over landscape-level monitoring
 - Tools and approaches for implementing landscape level monitoring are still in development
 - The need for balance between locally-driven collaborative projects and regional or nationally consistent approaches.

Guidance Going Forward

Guidance is in response to concerns from field CFLRP projects regarding capacity and efficiency. We further stress this monitoring strategy has been developed collaboratively and honors the local and place-based spirit of the CFLRP approach.

¹ Esch and Waltz surveyed 17 out of 23 CFLRP projects. It's possible those not surveyed conducted landscape scale monitoring, but no evidence was provided either way.

To respond to field requests for additional guidance and help with capacity concerns, we are collectively **centralizing and standardizing some aspects** of the monitoring process, **improving how we store data**, and **encouraging frequent reporting to be used by decision makers**. These changes will help us advance our collective monitoring practice, improve adaptive management, and tell a more complete story of our results at a socially and ecologically meaningful scale. Regions will therefore find it necessary to strengthen their data management and reporting capacity in order to find efficiency of scale, and to address lack of capacity at the local level.

Centralizing and standardizing indicators within Regions should take some capacity burden off the Forests. It will also promote consistency and comparability across landscapes. It will also favor institutionalization, which would help alleviate turnover concerns.

Specific features of the revised approach:

- **Keep it simple.** Monitoring questions and data collected should be as simple as possible. Questions should be developed by stakeholders and screened with criteria to emphasize need, practicality, and efficacy (DeMeo et al. 2015, Markus et al. 2015). Experience with the first round suggests even when monitoring questions were designed to be simple, the results were more complicated to manage and report on than was expected.
- **Institutionalize data management and reporting.** Each Region should provide a structure for long-term data management and reporting, to avoid problems with turnover and continuity. A single point of contact for this dataset should be maintained, although individual components of the dataset could be maintained by a team or even a network. Data should be posted to a website available to all. Maintain this for a core set of questions and not all possible questions. Monitoring questions outside the core set would still be managed locally.
- **Standardize core monitoring questions nationally and standardize indicators within each Region:** Indicators to address the core set of questions will be standardized within each Region. Data will be collected following established protocols offering the opportunity to potentially analyze data at varying scales.
- **Piloting of nationwide metrics:** As a test, we will use the Terrestrial Condition Assessment (TCA), a method of assessing resilience to disturbance. This set of metrics is already in place nationwide and will be updated at regular intervals (1 to 5 yrs). Doing so in the context of CFLRP would pilot the TCA and its implementation in a new setting. These specific TCA metrics will be used: 1) Vegetation departure², 2) Uncharacteristic fuel buildup; and 3) fire regime fire severity and frequency, measured by missed fire cycles.
- **Continuing role for locally-developed monitoring questions and approaches:** While the CFLRPs would use a common approach to address core monitoring questions, each CFLRP will continue to have space

² We have received a recommendation to use the current LANDFIRE vegetation departure metric in place of TCA vegetation departure.

to use CFLRP resources and funds to address locally-relevant multi-party monitoring questions that may fall outside of the scope of the standardized questions.

With this standardized approach, CFLRP results would be more easily accessible to stakeholders and therefore more available to stakeholders and used by decision makers. We will also identify additional best practices and options to encourage decision makers to consider this information.

Building Ownership Together

To emphasize the deliberate, collaborative approach in developing this strategy, we plan on continuing engagement and discussion including and not limited to the following communities of practice and subject matter contacts:

- Regional Ecologists, Wildlife, Fishery, and Botany staffs
- Regional Inventory and Monitoring Coordinators
- Washington Office Fire and Aviation Management staff
- CFLRP Regional and Project Coordinators
- Partners, stakeholders, and practitioners engaged with CFLRP monitoring at the national, regional, and local scale
- Subject matter experts within and outside of the Agency

Development of a core set of metrics

In order to support capacity needs and streamline data management and reporting out, this monitoring strategy features a core set of metrics that all CFLRPs will be bound to use. Methods to obtain these metrics would be standardized within each Region. This will facilitate a common dataset for these metrics within each Region. This dataset should be maintained by a dedicated person within each Region, with the oversight of the Regional CFLRP coordinator and Regional CFLRP monitoring coordinator.

Each CFLRP will have the option to add additional monitoring metrics if they wish, but they must include this core set. The goal is to get a set of questions/metrics we all agree on and own, not something that is imposed on CFLRPs—or ignored.

List of standardized core monitoring questions

We emphasize these are being developed collectively. Projects could select additional questions as they wish.

Agreement on the value of standardized questions and indicators is found across CFLRPs. This standardization could also help address the turnover issue.

We need continued work on these questions to get them specific and meaningful enough to implement. We also heard consensus across Regions and program areas that these questions are on the right track. If a quantitative way is developed to address these core questions, they could be very useful to a better-informed and more efficient NEPA process.

There is also general consensus that projects need an ecological departure metric in addition to a fire behavior/risk related metric. Implementing this more effectively and consistently will take Regional coordination and some building of Regional capacity.

In developing regionally specific indicators, we recommend looking for opportunities to work with the states under Shared Stewardship. In general, look for linkages of CFLRP monitoring to other monitoring like forest plan monitoring.

Emphasis in the next round should also include expecting the unexpected. Monitoring plans should indicate what the CFLRP will do if there is a major disturbance (wildfire). How will things change? Collaboratives need to anticipate this and have a plan for it.

FOR CORE QUESTIONS AND ASSOCIATED INDICATORS SEE ATTACHMENT

Additional Supporting Material

Use of Terrestrial Ecological Unit Inventory (TEUI)

We recommend use of TEUI (Winthers et al. 2005) to provide a framework to define and describe landscapes. The landtype association (LTA) scale is probably most appropriate in this context.

Potential standards and menu of choices for landscape metrics:

Following are a suggested set of simple criteria for landscape monitoring:

1. Quantify the current terrestrial condition of landscapes in **one of four ways**:
 - a. Predicted fire behavior.
 - b. Ecological departure based on compared current to historic set of seral stages by potential vegetation type.
 - c. Current set of fragmentation metrics. Justify the metrics selected
 - d. Current condition of adequate plot sample across the landscape, extrapolated to make inferences about landscapes. Understood desired condition of the landscape that will approximate sustainable conditions.
2. Quantify how the landscape will be changed based on proposed treatments.

The following are implementation metrics as opposed to effectiveness monitoring therefore they are *not* acceptable methods for showing improvements at the landscape scale:

1. Sum of acres treated
2. Assuming treatments at project scale will mean improvements at landscape scale
3. Reduction in fuel hazard (unless tied to fire behavior metric(s))

Testing of nationwide metrics:

The Terrestrial Condition Assessment (TCA; Cleland et al. 2017) offers a set of landscape departure metrics calculated nationally:

1. Vegetation departure
2. Uncharacteristic fuel buildup
3. Fire regime fire severity and frequency—measured by missed fire cycle

Missed fire cycle is reported annually through work at GTAC and the others every 5 years.

The advantages of this approach are that the work has been done to set it up and that it is standardized across the country. The disadvantage (and perhaps also a strength) is that few if any CFLRPs including partners have much experience with it. We could see implementing this as a test to see how well it works, while also encouraging Regional landscape assessment approaches.

This would be in addition to metrics developed at regional or local scale.

It should be a light lift for the projects.

We would need the FS Geospatial Technology and Applications Center (GTAC) or someone in the WO to analyze the information.

We'd approach it as a learning experience to see the value of this type of approach for various levels of the agency.

Discussion on Core National Socioeconomic Indicators for Monitoring CFLRP

Socioeconomic Monitoring To Date (2010-2020):

- To date, the *national "core" reporting* on social and economic monitoring has been limited to:
 - The **Treatment for Restoration Economics Analysis Toolkit** ([TREAT](#)), which uses inputs from CFLRPs and IMPLAN to estimate direct and indirect jobs and local labor income supported through CFLRP investments and work.
 - [Annual reports](#): Each year, CFLRPs select ~3 **socioeconomic indicators from a menu** of options to speak to progress and outcomes for that indicator that year. (Contact Lindsay.buchanan@usda.gov for summarized results of 2018 and 2019 indicators.)
 - The most common indicators were:
 - *Relationship building/collaborative work*
 - *Partnerships created/maintained/sustained*
 - *Locally retained contracts*
 - *Job training opportunities*
 - *Expanding market development*
- Working with FS staff and partners, the WO has submitted multiple *survey instruments for OMB Paperwork Reduction Act clearance*, which would allow CFLRPs to administer surveys to more than 10 non-federal employees with Agency funds. None of the blanket surveys (with the intent that any CFLRP could use and adapt it) were approved. One survey instrument was approved for use by the Southwestern Crown of the Continent.

Framework for Updated Indicators:

- In developing/updating socioeconomic indicators, goals include:
 - Importance of being mindful of current **socioeconomic monitoring capacity** across CFLRP projects, some of which are already connected to high-capacity social and economic researchers or support and others are not (yet) connected and struggle with their perceived capacity to do this work.

- As national “core” monitoring questions, the intent is for the information to be relevant to – and useful for – CFLRPs in **varying socioeconomic contexts across the country**. Communities in and around which the CFLRPs operate have varying economic contexts and drivers.
- Feasibility of requiring the **use of surveys** to be administered by the Forest Service or with FS funds, in regard to the paperwork reduction act.
- We asked 2020 CFLRP applicants to select from a menu socioeconomic metrics that would be most important for their CFLRP:
 - **Most common metrics CFLRP projects selected in their annual reports:**
 - Maintain or increase acceptance of frequent, low intensity wildfire or prescribed fire
 - Maintain or increase the number and diversity of wood products that can be processed locally
 - Maintain or increase the number and/or size of contracts offered each year to do restoration work
 - Maintain or increase perceived benefits of restoration activities
 - Maintain or increase acres protected from fire through creation of defensible space, fuel breaks, and other fuels reduction projects (*may be included under Fire metrics*)
 - **Common:**
 - Maintain or increase number of workers employed by the project area each month, season, or year
 - Maintain or increase number and/or type of trainings related to restoration completed by project work
 - Maintain or increase the number of jobs/shifts/amount paid to workers
 - Maintain or increase the quality and timeliness of communication among all project partners
 - Maintain or increase the partner contributions (in kind time and funding) committed to shared project goals
 - Maintain/increase extent which stakeholders previously in conflict are now working together
 - Maintain or increase tourism employment and income related to recreation visits

Glossary

Adaptive management - A planning process that uses monitoring as collective learning on the effects of ground activities and adjusts decisions based on what is learned.

Departure - The difference in landscape condition between its current state and a modeled estimate of its natural, sustainable range of variation. 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 (landfire.gov, Haugo et al. 2015, DeMeo et al. 2018)

Desired conditions—In a planning context, these are the ultimate goals of management actions, reflecting both the ecological and socio-economic wishes of society. They are not necessarily the same as ecologically sustainable or resilient conditions.

DRM—Data Resource Management staff. An FS Regional level unit charged with managing GIS and other data. Organization of this work may vary from Region to Region.

EMDS- Ecosystem Management Decision Support system. Uses knowledge-based reasoning with a Geographic Information System (GIS) to display the outcomes of potential management treatments. See <https://www.fs.usda.gov/treesearch/pubs/2972>

FACTS - The Forest Service Activity Tracking System. A database to record treatment accomplishments, including the reduction of invasive species

Fire cycle - See fire return interval

Fire intensity - Fire intensity describes the energy released from the fire or characteristics of the fire behavior such as flame length and rate of spread. It is closely related to the amount of fuel available. (Keeley 2008)

Fire return interval - The average time between fires in a fire regime functioning within the natural range of variation. If fires now are less (or more) frequent than this it is an indicator of a less resilient and sustainable landscape. See landfire.gov.

Firesheds- National Forest Service initiative to organize landscapes in terms of fire behavior and hazard reduction need. Based on the work of Alan Ager and Michele Day. See <https://www.fs.usda.gov/rmrs/keywords/fireshed>

Fire transmission risk - The likelihood of fire spreading to a community or land ownership based on fuel loadings and topography (Ager et al. 2014)

Habitat—For the purposes of this monitoring strategy, habitat is the vegetation structure, function, and composition needed to support needs of a species at risk

Habitat Suitability Index (HSI) - a numerical index that represents the capacity of a given habitat to support a selected species. (See <https://www.science.gov/topicpages/h/habitat+suitability+indices>)

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. See iftdss.firenet.gov.

IMPLAN – IMPLAN is a software platform combining databases, economic factors, multipliers, and demographic statistics with customizable modeling. The modeling shows direct effects, indirect effects, and induced effects. <https://blog.implan.com/what-is-implan>

Landscape - A landscape is "a mosaic of heterogeneous landforms, vegetation types, and land uses" (Urban et al. 1987). Similarly, Forman and Godron (1986) defined a landscape as "a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout." For the purposes of assessing CFLRPs, landscapes should be relevant to each CFLRP, and large enough to encompass the disturbance processes of the area involved. Because of the great diversity of ecosystems across the US, Regions should define landscapes appropriate to their setting, but these should also be scientifically defensible.

Monitoring - Tracking the ecological, social, or economic aspects of the landscape over time, in this case to see the effects of CFLRP treatments. An integral part of adaptive management.

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 socio-economic systems

Sustainability- The capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. “Ecological sustainability” refers to the capability of ecosystems to maintain ecological integrity (2012 Planning Rule, 36 CFR 219.19)

SWERI- Southwest Ecological Restoration Institutes—A consortium of three university based research groups supporting CFLRP monitoring. See <https://sweri.eri.nau.edu/>

TPO – Timber Products Output. Forest Inventory and Analysis (FIA) conducts TPO studies to estimate industrial and non-industrial uses of roundwood across the United States. Primary wood-using mills are sampled, by state, to estimate roundwood usage. Historically, the TPO study was a periodic 100 percent canvass of all primary mills and is moving to an annual sample design Nationwide. <https://www.fia.fs.fed.us/program-features/tpo/>

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. The User Guide explains the methodology and functionality of TREAT as applied to Collaborative Forest Landscape Restoration Program projects: <https://www.fs.fed.us/restoration/documents/cflrp/TREAT/TREAT-UserGuide-October2018.pdf>

Watershed Condition Framework (WCF) - A National Forest assessment of aquatic values using a six-step process and 12 indicators (Potyondy and Geier 2011)

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