The Use of Effectiveness Monitoring and Reporting for Fish and Wildlife Habitat Restoration Within the Collaborative Forest Landscape Restoration Program 2010-2018

by

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A case study submitted to

Oregon State University

in partial fulfillment of

the requirements for

the degree of

Master of Natural Resources

Presented April 25, 2019

Commencement June 2019

Abstract

The Collaborative Forest Landscape Restoration Program (CFLRP) is a collection of large-scale restoration projects across the United States that are striving to improve many economic, social, and ecological sustainability issues, including the condition of fish and wildlife habitat. Effectiveness monitoring is a specific type of monitoring that is critically important in restoration because it is how managers and stakeholders discover the extent to which the outcomes of a project meet the intended goals, which forms the basis for adaptive management. The purpose of this case study is to create a baseline status assessment on the use of effectiveness monitoring and reporting for fish and wildlife habitat restoration in the CFLRP in order to help begin a discussion about how these processes might be improved. The objective of this case study is to synthesize the projects' responses from the 2014 Ecological Indicator Report and the 2018 Annual Report to answer the following three questions: (1) Do the projects believe they have made good progress towards their fish and wildlife habitat restoration goals, and what information have they used to make this determination? (2) What are the projects' specific habitat restoration goals and focal animal species? (3) How many of the projects have used effectiveness monitoring? Approximately half of the projects believe they are making good progress towards their fish and wildlife habitat restoration goals, and most of the rest believe they are making fair progress. The projects have used a variety of information to make these determinations, but they've depended most heavily on FACTS and WIT, two Forest Service databases that track forest and watershed improvement activities. Across the program, the projects have declared a variety of different habitat restoration goals and focal animal species, with the most common emphasis placed on open forest habitat, special status species, and birds. According to the information in the reports, 65% of projects are accomplishing or on their way to accomplishing effectiveness monitoring for wildlife habitat and 22% of projects are accomplishing or on their way to accomplishing effectiveness monitoring for fish habitat. However, it is unclear from these reports whether 13% of the projects are doing effectiveness monitoring for wildlife habitat and whether 22% of the projects are doing effectiveness monitoring for fish habitat. This uncertainty points to a weakness at the interface between monitoring and reporting. In 2018, I worked with the Forest Service to develop a more detailed and standardized reporting template to gather accurate information on the use of effectiveness monitoring for fish and wildlife habitat in the CFLRP. I provide a copy of this revised reporting template, describe the process of how it was developed, and describe how it will help improve restoration outcomes in the CFLRP. I recommend that this new template be completed by all the projects in 2019, and that response data be subsequently analyzed and shared with the public.

Introduction

In recent decades, national forest management has shifted its emphasis from the commodities extracted to the resources left behind (Schultz, Jedd, & Beam, 2012). The USDA Forest Service has promoted the use of ecosystem management since 1992 (Phillips & Randolph, 1998) and restoration since 2009 (Franklin & Johnson, 2012). The call for restoration has occurred in response to the many ecological and social pressures that are taking place simultaneously in forests. These pressures include the increasing frequency and cost of large fires, climate change, insect and disease outbreaks, the loss of species diversity, litigation from environmental groups, struggling rural economies, increasing urbanization in the wildland-urban interface, and the desire of citizens to be meaningfully involved in public land management.

Forest landscape restoration is a process that seeks to restore stand structure, ecological function, biological communities, and human well-being in areas that have been degraded by human activities such as road creation, grazing, mining, invasive species, intensive timber harvest, and fire suppression. Restoration is a relatively new practice (DeLuca, Aplet, & Wilmer, 2010) and a rapidly developing field of research in which the outcomes of projects are of significant interest (Wortley, Hero, & Howes, 2013). Many scientific uncertainties remain, and natural resource managers still have much to learn about whether proposed restoration activities are truly beneficial to the landscape (DellaSala et al., 2003). To address uncertainties and improve restoration activities, new applied learning must be acquired through robust ecological monitoring of abiotic and biotic characteristics (DeLuca, Aplet, & Wilmer, 2010). The process of combining this ecological monitoring information with research findings and stakeholder guidance for integration into management plans is recommended for successful restoration and is the basis for adaptive management (Besseau, Graham, & Christophersen, 2018). Adaptive management is a process that involves the purposeful selection of goals and objectives, the production of knowledge through deliberately planned monitoring and evaluation, the distribution of that knowledge among various interests, and the use of that knowledge in subsequent decisions (Stankey, Clark, & Bormann, 2005). Although the adaptive management process is genuinely difficult, it is presently the best framework we have available for cost-effective and efficient natural resource management (Westgate, Likens, & Lindenmayer, 2013).

Unfortunately, ecological monitoring is often seen as a luxury, especially as land management agency budgets continue to decline (Davis, Belote, Williamson, Larson, & Esch, 2016). Regardless of the

exact budget, the amount of funding available for implementing restoration and monitoring is never unlimited. Therefore, one of the most important issues in natural resources management is how to most effectively and efficiently use funding to contribute to a sustainable future (World Commission on Environment Development, 1987). Ecological monitoring that is well-planned and well-executed can create a valuable source of scientific evidence to assess progress towards ecological sustainability. This evidence helps strategically plan and accelerate the achievement of urgently needed restoration outcomes, increase return on investment, mitigate negative impacts before they are applied across larger scales, uphold actions under scrutiny, and maintain public and political support for the concept of restoration in the long-term.

Monitoring is defined as "the periodic and systematic collection and evaluation of data to track changes over time" (Moote, 2011). When it comes to discussions about monitoring, it is fundamentally important to recognize that there are a wide variety of activities that fall under this umbrella term. These activities each correspond to different motivations, expectations, goals, methods, and capacity requirements (Moote, Abrams, & Krasilovsky, 2007). Monitoring questions and approaches must be developed based on the social values of stakeholders in order to avoid alienating them and increasing conflict in the collaborative decision-making process (Urgenson et al., 2017). Not every monitoring question can be given a high level of scientific rigor, and instead questions must be prioritized based on the level of stakeholder interest, controversy, and needed reliability (DeMeo, Markus, Bormann, & Leingang, 2015).

The four most common types of monitoring are process monitoring, implementation monitoring (also called compliance monitoring), effectiveness monitoring, and validation monitoring (Moote, 2011). Process monitoring is used to track perspectives on things like inclusiveness, communication, mutual learning, and relationships (Moote, 2011). Implementation monitoring is used to provide accountability that treatments have been completed as planned and targets are being met (Moote, 2011), for example, by tracking the number of acres or miles treated according to a prescription. Effectiveness monitoring is used for evaluating the extent to which desired outcomes have been achieved (Moote, 2011). Validation monitoring is used to test underlying assumptions about what caused observed changes in a system, using a careful research design that controls for potentially influential variables (Moote, 2011). While each of these types of monitoring builds trust and provides learning, only effectiveness monitoring and validation monitoring provide the basis for adaptive management (Moote, 2011; Moote & Dubay, 2013).

Effectiveness monitoring consists of measuring conditions before and after treatment using reliable, replicable methods and then comparing changes in specific conditions relative to the desired conditions (Moote, 2011; Moote & Dubay, 2013). Detailed monitoring protocols must be used to confirm that any changes detected in nature are not a result of variation in the human observers, their data collection timing, or their data collection techniques (Oakley, Thomas, & Fancy, 2003). Effectiveness monitoring is easier and less expensive to conduct than validation monitoring (Moote, 2011). However, it sometimes incorporates some elements of validation monitoring, such as the use of non-treatment control plots, to ensure that observed changes are the result of the treatment and not natural variation or chance (Larson et al., 2013). Quantitative data collection methods are used to measure changes in indicators, and qualitative data collection methods (such as field trip reviews) may be incorporated as an additional component (Moote & Dubay, 2013). According to Moote and Dubay (2013) there are five general steps of effectiveness monitoring, which are as follows: "(1) developing monitoring questions based on project objectives and potential undesirable effects of management actions, (2) choosing indicators and methods to answer the questions, (3) developing a monitoring plan, including where and when data will be gathered and how and when it will be analyzed, (4) gathering data, and (5) analyzing data and reporting conclusions."

The Collaborative Forest Landscape Restoration Program (CFLRP) has increased the nation's attention on all types of monitoring through its high-profile projects that began in 2010 (Schultz, Coelho, & Beam, 2014). The CFLRP is unique because it requires that collaborative efforts occur not only during planning but also during implementation and monitoring. Therefore, this program is seen as "one of the most innovative and significant forest policy experiments to take place in recent decades" (Schultz et al., 2012). However, a review of the program found that within the first two to four years of implementation it was challenging for the CFLRP projects to successfully implement monitoring and adaptive management, and that many projects were instead pursuing informal learning by doing (Schultz et al., 2014). Monitoring shortcomings are not specific to the CFLRP, and reviews of other collaborative ecosystem management efforts have found that there are many technical and political challenges inherent to monitoring, including funding, tensions over the level of scientific rigor, differing perspectives and expectations, inclusiveness, and integrating social and ecological factors (Gray, Enzer, & Kusel, 2001). In addition, monitoring efforts can struggle with objectives that are poorly defined and a lack of prompt reporting on results to agency leadership and the public (DeMeo et al., 2015).

Foundational research on monitoring in the CFLRP conducted by Schultz et al. (2012, 2014) investigated the factors driving the choice of objectives, the structural decision-making processes, and the specific challenges of designing monitoring programs in the CFLRP. These challenges relate to the large spatial scales, long temporal scales, lack of monitoring time and expertise, and confusion surrounding the definitions of monitoring and research (Schultz et al., 2014). They concluded that figuring out how to execute a successful monitoring approach in a collaborative context is one of the foremost challenges in forest management today, and that it remains to be seen how and whether the CFLRP projects will demonstrate the degree to which restoration activities are achieving objectives (Schultz et al., 2012, 2014). Additional research by Butler, Monroe, and McCaffrey (2015) found that multiparty monitoring was the central focus of many collaborative groups in the CFLRP, but that practitioners in the CFLRP were still struggling with how to make adaptive management a reality. They concluded that further examination of the effectiveness of collaborative implementation activities in forest management is needed. The conclusions of these researchers set the stage for tracking effectiveness monitoring approaches and outcomes as the CFLRP matured.

As the first cohort of CFLRP projects approaches the completion of their original 10-year projects in 2020, there is an opportunity for researchers to begin synthesizing, summarizing, and evaluating information about the many social and ecological aspects of this ambitious program. Two important sources of program-wide information exist. These are the annual progress reports, which contain social, economic, and ecological information, and the five-year ecological indicator reports. The specific focus of this case study is to use the most recent submissions of these two reports to evaluate the use of effectiveness monitoring for fish and wildlife habitat. The insights and recommendations from this case study can help the Forest Service continue to improve communication, guidance, and expectations related to fish and wildlife habitat monitoring for the next cohort of CFLRP projects.

Background on the CFLRP

Congressional Legislation:

The Collaborative Forest Landscape Restoration Program (CFLRP) was enacted through the Forest Landscape Restoration portion (Title IV) of the Omnibus Public Lands Management (OPLM) Act of 2009 (16 U.S.C. § 7301 et seq). The program is administered by the USDA Forest Service. It was modeled after an earlier smaller-scale federal program called the Community Forest Restoration

Program that was enacted in 2000 (CFRP; 16 U.S.C. 7101 et seq). The purpose of Title IV of the 2009 OPLM Act is "to encourage the collaborative, science-based ecosystem restoration of priority forest landscapes" (16 U.S.C. §7301). It requires that,

> *"The Secretary [of Agriculture] shall, in collaboration with the Secretary of the Interior and interested persons, use a multiparty monitoring, evaluation, and accountability process to assess the positive or negative ecological, social, and economic effects of projects implementing a selected proposal for not less than 15 years after project implementation commences"* (16 U.S.C. §7303 [g][4]).

In addition, this federal statute includes requirements for annual reporting to the Forest Service Washington Office on each project's progress and five-year reporting to Congress on the program's progress. The annual reports must include the following five things:

> *"(A) a description of all acres (or other appropriate unit) treated and restored through projects implementing the strategy, (B) an evaluation of progress, including performance measures and how prior year evaluations have contributed to improved project performance, (C) a description of community benefits achieved, including local economic benefits, (D), the results of the multiparty monitoring, evaluation, and accountability process, and (E) a summary of the costs of treatments and relevant fire management activities" (16 U.S.C. §7303 [g][3]).*

The five-year reports must include "an assessment of whether, and to what extent, the program is fulfilling [its] purposes" and must be delivered to the House and Senate natural resources committees and appropriations committees (16 U.S.C. §7303 [h]). The last five-year report was delivered to Congress in 2015 and the next one is due in 2020.

The CFLRP was reauthorized through fiscal year 2023 by the Agricultural Improvement Act of 2018 (PL 115-334). In this reauthorizing legislation, the CFLRP was amended to allow one-time extensions made on a case-by-case basis to existing projects that continue to meet eligibility criteria and that would like more time to complete the work outlined in their original 10-year proposals. The CFLRP was also amended to increase the maximum possible appropriations for the program from $40 million to $80 million for each fiscal year.

Indicators and Sub-indicators:

In 2011, the National Forest Foundation convened a workshop with CFLRP partner organizations and Forest Service representatives from the Washington Office, Regional Offices, and National Forests to develop a set of national indicators for monitoring that would supply information for the five-year reports to Congress. The five categories of indicators that were approved at this workshop were Fire Risk and Costs, Leveraged Funds, Economic Impacts, Collaboration, and Ecological Condition (USFS, 2015). Monitoring for all these indicators except the ecological indicator is covered through standard Forest Service annual reporting or existing software-reporting applications (Schultz et al., 2014).

In 2012, the Deputy Chief of the National Forest System issued direction that the ecological indicator category would be made up of four ecological sub-indicators: Fire Regime, Watershed Condition, Invasive Species, and Fish & Wildlife Habitat (USFS, 2014). It is the Fish & Wildlife Habitat ecological sub-indicator that is the focus of this case study. Accomplishments for these sub-indicators must be reported on for both the project and landscape scales to the Forest Service Washington Office. Individual projects are given the flexibility to set their own desired conditions and monitoring questions for these sub-indicators based on local stakeholder interests and site-specific needs (Schultz, 2014). In the 2014 five-year progress report template, each project was required to score their progress for each of the four ecological sub-indicators as either "good," "fair," or "poor" based on their judgement about the percentage of implemented treatments that resulted in measurable progress toward project-level objectives (project-level progress) and the proportion of the landscape that was moved toward desired conditions (landscape-level progress) (USFS, 2014; see Appendix 6).

Choices About Fish & Wildlife Habitat Monitoring:

Choices about fish and wildlife habitat monitoring efforts in the CFLRP are influenced by Congressional mandates, Forest Service policy-making, funding, ecological complexity, and the collaborative group. The CFLRP enacting legislation states that monitoring must be (1) multi-party, (2) take place at both the project and landscape scales, (3) report data on the number of acres and miles treated, (4) conduct monitoring activities for 15 years after project implementation commences, and (5) assess the positive or negative ecological effects of implementing a proposal. The legislation does not include the phrase "effectiveness monitoring" or explicitly state that this must be the type of monitoring used. Therefore, the minimum, standardized reporting for all CFLRP projects does not include a

requirement for effectiveness monitoring. The Forest Service Washington Office recognizes how challenging effectiveness monitoring is and has purposefully given the CFLRP projects the flexibility to determine the type of monitoring and level of monitoring rigor that they use (L. Buchanan, personal communication, March 6, 2019; see diagram in Appendix 3). This means that the decision to pursue effectiveness monitoring is currently an optional choice left up to each project's collaborative group. Although effectiveness monitoring offers many benefits, the technical, economic, and political challenges it entails causes some collaboratives to pursue implementation monitoring and process monitoring but not effectiveness monitoring.

There is undeniably a progression of difficulty from implementation monitoring to effectiveness monitoring and adaptive management. If a collaborative group is interested in pursuing effectiveness monitoring and adaptive management, they may benefit from previewing a set of critical steps in the process and the appropriate responsible party for each step (see diagram in Appendix 5). Projects must also understand that they will face an array of ideological and methodological choices about monitoring that arise when developing a fish and wildlife habitat effectiveness monitoring plan (see diagram in Appendix 3), including the following: Will the methods include aspects of validation monitoring? Will habitat data, population data, or both be gathered? Will fish, or wildlife, or both be monitored? Will data be gathered for a specific species or for a guild of species? Will remote sensing data be used to develop habitat suitability models? Will habitat suitability models be ground truthed with field data? Will data be quantitative, qualitative, or both?

Structure of the Monitoring Efforts:

The structure of each CFLRP project's monitoring effort is a large and complicated network that includes the following players: Congress, the Forest Service Washington Office's "Forest Management Rangelands Management and Vegetation Ecology" (FMRMVE) staff, the CFLRP national coordinator, CFLRP regional coordinators, CFLRP project coordinators (which may include dedicated monitoring coordinators), Forest Service National Forest staff, project implementers, the collaborative group, the monitoring committee, specialized sub-committees (also called working groups or working teams), technical experts, volunteers, and youth groups (see diagram in Appendix 4).

It is the wildlife monitoring sub-committee that typically develops protocols to answer specific wildlife monitoring questions, interprets monitoring results, and regularly reports back to the larger

committee and collaborative group to share information and gain input and approval (Monroe & Butler, 2016). The decision regarding who should do the data collection and analysis work depends on the capacity and interests of agency personnel and collaborative participants (Butler et al., 2015). It has been suggested by the Forest Service that external contractors should be used to meet monitoring objectives when expertise or capacity is unavailable within the agency (Rowland & Vojta, 2013). Agency and stakeholder interviewees in the CFLRP have pointed to the value of partners that increase science capacity and help stakeholders conduct monitoring (Schultz et al., 2017). Some scholars have also recognized that agencies may have a disincentive to monitor because the resulting information could show negative impacts of their actions (Doremus, 2008). Therefore, having external contractors in charge of monitoring activities may be more satisfying to some stakeholders who question whether the Forest Service, including the research branch of the agency, is playing an unbiased role in the collaborative process.

External contractors such as universities, non-governmental organizations, and consulting firms have been used to accomplish monitoring in many of the projects in the CFLRP. Alternatively, some projects have chosen to hire a monitoring coordinator and use citizen scientists, school students, and/or youth corps members to accomplish monitoring field work. To aid this approach, the University of Montana has developed a set of simple and scientifically defensible monitoring protocols called the Rapid Forest Assessment tool (Davis et al., 2016). Some projects have chosen to use a combination of citizen science protocols and external contractors to accomplish their monitoring goals.

Study Areas

From 2009-2012, approximately 50 projects competed for inclusion in the CFLRP (Schultz et al., 2012). A Federal Advisory Committee reviewed these proposals and made recommendations to the Secretary of Agriculture. A total of 23 projects were selected by the Chief of the Forest Service acting on behalf of the Secretary of Agriculture. Ten projects were selected in 2010, another ten projects were selected in 2012, and three additional projects were selected in 2012 using Forest Service funding approved outside of Title IV of the OPLM Act (Schultz et al., 2012). Each project requested between $5 million and $35 million in CFLRP funding spread over the course of its 10-year proposal (USFS, 2015). So far, the projects in the program have spent over $235 million of CFLRP funding across 8 years (CFLRP Annual Reports FY2010-FY2018). These CFLRP funds are required to cover no more than 50% of the costs of implementation and monitoring (not planning) on Forest Service lands (16 U.S.C. §7303[f][1]).

The additional sources of funding for CFLRP work include Forest Service funds, partner funds, and goods for services through stewardship contracts.

The geographic distribution of the 23 projects includes eight western states and six eastern states with representation in all Forest Service Regions except Alaska (see map in Appendix 1). There is at least one CFLRP project in Montana, Idaho, Colorado, Arizona, New Mexico, California, Oregon, Washington, Oklahoma, Arkansas, Missouri, Mississippi, Florida, and North Carolina, and there are 31 National Forests with land that is a part of the CFLRP projects (CFLRP Map Viewer, 2019). In addition to land owned by the Forest Service, CFLRP projects also include some land owned by BLM, U.S. Fish & Wildlife Service, National Park Service, and state, tribal, and private entities (Schultz et al. 2012).

Each CFLRP project must be at least 50,000 acres in size (16 U.S.C. §7303 [b][1B][i]). The boundaries of the CFLRP projects (also called "landscapes") range from 130,000 to 2.4 million acres (USFS, 2015) and collectively encompass over 17 million acres, which is an area larger than the state of West Virginia (CFLRP Map Viewer 2019; US Census Bureau 2010). The vegetation types represented in the CFLRP include Ponderosa pine, mixed conifer, hardwood & chaparral, mountain meadow, pine-oak woodlands, longleaf pine, and shortleaf pine-bluestem grass, etc. (Project Proposals 2010 & 2012). Common areas that are targeted for restoration are areas with high fuel loading, old-growth stands, rare species, streams that provide drinking water, and adjacency to homes and communities (Project Proposals 2010 & 2012).

Objectives

The purpose of this case study is to create a baseline status assessment on the use of effectiveness monitoring and reporting for fish and wildlife habitat restoration in the CFLRP in order to help begin a discussion about how these processes might be improved. The objective of this case study is to synthesize the projects' responses from the 2014 Ecological Indicator Report and the 2018 Annual Report to answer the following three questions:

Question 1: Do the projects believe they have made good progress towards their fish and wildlife habitat restoration goals, and what information have they used to make this determination?

Question 2: What are the projects' specific habitat restoration goals and focal animal species?

Question 3: How many of the projects have used effectiveness monitoring?

Question 1 investigates how each CFLRP project views its fish and wildlife habitat progress, and what datasets or databases their views are based on. Each CFLRP project determined if they had made "good" progress between the start of implementing their proposal through December 2014 based on the percentage of implemented treatments that resulted in "measurable progress toward individual project-level objectives" and the percentage of the landscape area across which "expected progress is being made toward desired conditions" (USFS, 2014; see Appendix 6). Question 1 is important for revealing the opinions and thought processes of the project participants. This information may yield insights when compared to assessments by the Forest Service Washington Office or third-party researchers.

Question 2 investigates what specific fish and/or wildlife species the CFLRP projects are focused on and what associated habitat goals they have articulated for these species. This question is important for having a clearer understanding of what different CFLRP projects mean when they discuss monitoring and progress relative to the broad phrase "fish and wildlife habitat". The term *wildlife* was traditionally used by natural resource managers to denote vertebrates, especially birds and mammals, but in recent years it has expanded to include invertebrates (Rowland & Vojta, 2013). The term *habitat* has been defined as "the set of resources necessary to support a population over space and through time" and therefore "the term *wildlife habitat* has little real meaning" (McComb, 2007) because "habitat for one species rarely if ever represents habitat for another species" (McComb, Zuckerberg, Vesely, & Jordan, 2010).

Question 3 is important for having a clearer understanding of how many CFLRP projects have chosen to use effectiveness monitoring. This question helps to indicate the level of scientific rigor that has been used in each CFLRP project's fish and wildlife habitat monitoring approach. It also helps indicate the number of CFLRP projects that have set themselves up to be able to pursue the goal of adaptive management.

Methods

The method of analysis in this case study was a synthesis of pre-existing response data from 46 documents. These data include a combination of closed-ended responses and open-ended responses

pertaining to fish and wildlife habitat and monitoring. These data were collected through two reporting requirements, which are listed below along with the questions asked in each reporting template.

Data Source 1:

2014 Ecological Indicator Progress Report, Fish and Wildlife Habitat section

(standardized format; covering the period from 2010 through 2014; see Appendix 6)

- *One to five quantifiable desired condition statements.*
- *Datasets and/or databases of records used for current project-scale evaluation.*
- *Datasets and/or databases of records used for current landscape-scale evaluation.*
- *Are you achieving your project-scale CFLRP objectives? (Yes/No)*
- *Are you achieving your landscape-scale CFLRP objectives? (Yes/No)*
- *Self-assigned score for project-scale progress towards desired conditions. (Good/Fair/Poor)*
- *Self-assigned score for landscape-scale progress towards desired conditions. (Good/Fair/Poor)*
- *Optional narrative section to discuss project-scale and landscape-scale progress.*

Data Source 2:

2018 Annual Report, Monitoring section (narrative style; covering fiscal year 2018)

"Based on your project monitoring plan, describe the multiparty monitoring process. What parties (who) are involved in monitoring, and how? What is being monitored? Please briefly share key broad monitoring results and how results received to date are informing subsequent management activities (e.g. adaptive management), if at all. What are the major positive and negative ecological, social and economic shifts observed through monitoring? Any modifications of subsequent treatment prescriptions and methods in response to these shifts? What are the current weaknesses or shortcomings of the monitoring process? Please provide a link to your most up-to-date multi-party monitoring plan and any available monitoring results from FY18."

The narrative responses from the monitoring section of the 2018 Annual Report ranged in length from a single paragraph to seven pages, with most responses being one to two pages. The responses that were longer in length did not necessarily include more specific information or answer all the original questions. Approximately half the projects did not include any links to their monitoring plans or monitoring results. The 2018 Annual Reports were submitted to the Forest Service Washington Office on December 7, 2018 and will soon be made publicly available on the Forest Service's CFLRP website (L. Buchanan, personal communication, March 6, 2019).

Although monitoring is one of the most popular topics in CFLRP research (Bixler & Kittler, 2015), to my knowledge, there have been no other past studies that have synthesized annual reports and ecological indicator reports across projects while asking the same questions as those in this case study.

Methods for Question 1:

> "Do the projects believe they have made good progress towards their fish and wildlife habitat restoration goals, and what information have they used to make this determination?"

For the closed-ended responses (i.e. yes/no and good/fair/poor), the process of tallying responses in a spreadsheet was objective and straight-forward with only a few minor complications. The first minor complication was that four projects split their scoring determination into two self-created categories (i.e. fish/wildlife, terrestrial/aquatic, and vegetation/disturbance). In these cases, I weighted each half of the score equally by tallying each split score as 0.5 instead of 1. The second minor complication was that two projects reported the percentages of the project area that received a good, fair, and poor score rather than reporting one overall score. In these cases, I assigned the score that corresponded to the largest percentage. For example, this means for the project that scored their progress as "27% good, 42% fair, and 30% poor" I assigned the overall score of "fair." The third minor complication was that one project chose not to assign themselves any score and instead replied "N/A" noting that for the project scale "data is being collected as of 2014" and for the landscape scale "preliminary data is still being analyzed." In this case, I assigned their response to a new category I created called "unknown."

For the open-ended responses to the datasets/databases question in the 2014 Ecological Indicator Report, responses came predominantly in the form of agency acronyms. I looked up the definitions of these acronyms online using the agency's Acronyms and Abbreviations document (USFS, 2005) and keyword internet searches. I tallied these responses verbatim and did not attempt to subjectively group them into categories because I do not have any experience with these datasets/databases, nor the ability to access them.

Methods for Question 2:

> "What are the projects' specific habitat restoration goals and focal animal species?"

I copied and pasted all the projects' responses into one document. Next, I used separate colors to highlight the goals/desired conditions, the fish and wildlife habitat monitoring methods, and the animal species or animal groups that each project mentioned. Then I organized all the unique responses in a spreadsheet. Finally, I grouped responses into broader categories. I identified 20 distinct categories of goals for fish and wildlife habitat restoration in the CFLRP. This grouping process was subjective. I used my knowledge of ecological concepts and vocabulary to attempt to do it as accurately as possible in order to reveal trends across the program. I also compiled a complete table and a ranked list of the animal species and animal groups mentioned by the CFLRP projects in the context of fish and wildlife habitat restoration and monitoring.

Methods for Question 3:

"How many of the projects have used effectiveness monitoring?"

The projects were not asked in past reporting templates what types of monitoring they were conducting. Therefore, I attempted to interpret whether each project was conducting effectiveness monitoring for fish habitat and for wildlife habitat based on their open-ended responses in the 2014 Ecological Indicator Report and the 2018 Annual Report using categories and criteria. My categories were "effectiveness monitoring," "baseline," "no effectiveness monitoring," and "unclear." My criteria were (1) data used for monitoring came from within the CFLRP boundary, (2) data were collected in a standardized way rather than in a haphazard or incidental way, (3) pre-treatment data were collected, and (4) post-treatment data were collected.

I categorized a project's habitat monitoring activities as "effectiveness monitoring" if all four of these criteria were met. I categorized a project's habitat monitoring activities as "baseline" if all these criteria were met except post-treatment data. I categorized a project's habitat monitoring activities as "no effectiveness monitoring" if data was collected outside the CFLRP boundary, was collected in a haphazard or incidental way, or was not collected pre-treatment. The "no effectiveness monitoring" category encompasses CFLRP projects that are doing process monitoring, implementation monitoring, no monitoring, or that do not have wildlife habitat objectives or fish habitat objectives as part of their landscape restoration strategy. This grouping within the "no effectiveness monitoring" category exists because it was often not possible to parse apart more specific categories based on the reporting response data.

I categorized a project's habitat monitoring activities as "unclear" if there was not enough information provided about these criteria for me to determine whether the project was doing effectiveness monitoring.

Results

Answer to Question 1:

> "Do the projects believe they have made good progress towards their fish and wildlife habitat restoration goals, and what information have they used to make this determination?"

Nearly all the projects said that they were achieving their project-scale objectives (22 out of 23; 96%) and landscape-scale objectives (21 out of 23; 91%) for fish and wildlife habitat as of 2014 (Figure 1). The only project that said they were not achieving their landscape-level objectives for fish and wildlife habitat said that this was because "large landscape fires are constantly modifying planned treatment areas, either by being affected by high-severity fire, or by changes required to adjust to relocate Protected Activity Centers for spotted owls and goshawks" (Burney-Hat Creek Basins Project, 2014). The only project that said it was unknown whether they were achieving their project-scale and landscape-scale objectives for fish and wildlife habitat said that this was because "preliminary data is still being analyzed" (Colorado Front Range Project, 2014).

Figure 1: The number of CFLRP projects that responded "yes" or "no" to the question, "Are you achieving your CFLRP objectives for Fish and Wildlife Habitat?" with regards to project-scale progress (left) and landscape-scale progress (right), based on the 2014 Ecological Indicator Progress Report. One project's response was categorized as "unknown" because they did not respond "yes" or "no" and instead wrote, "preliminary data is still being analyzed."

Approximately half of all projects said that they had made good progress towards desired conditions for fish and wildlife habitat as of 2014 (Figure 2; Table 1). Slightly more projects said they had made good progress at the project scale (13 out of 23; 57%;) than at the landscape scale (12 out of 23; 52%). The only project that scored their progress as "poor" said this was because "only 21% of the total desired condition miles have been closed or decommissioned" (Deschutes Skyline Project, 2014). The only project that said their progress was unknown said that this was because "preliminary data is still being analyzed" (Colorado Front Range Project, 2014).

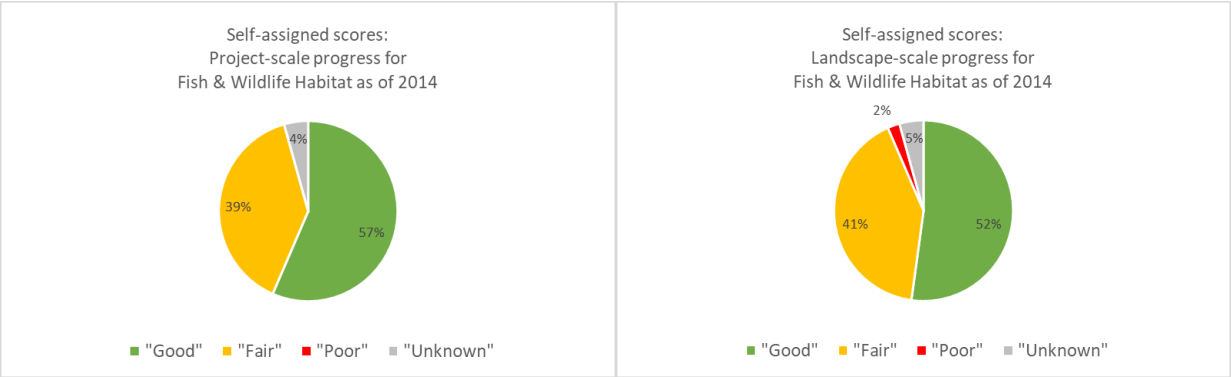


Figure 2: The number of CFLRP projects that assigned themselves a score of "good," "fair," or "poor" for expected progress towards desired conditions for fish and wildlife habitat in the first five years of the CFLRP, with regards to project-scale progress (left) and landscape-scale progress (right), based on the 2014 Ecological Indicator Progress Report. One project's response was categorized as "unknown" because they did not self-assign a score and instead wrote, "preliminary data is still being analyzed."

In total, the projects across the program reported using 31 different datasets/databases for evaluating progress toward fish and wildlife habitat desired conditions (Figure 3). The most common databases were two of the Forest Service's Natural Resource Manager (NRM) applications, the Forest Service Activity Tracking System (FACTS) and the Watershed Improvement Tracking (WIT) system. This is interesting information, but without a description of each project's methods, it is impossible to know how these datasets/databases were used for evaluating progress and if they were a part of an effectiveness monitoring plan. It is important to note that three projects explicitly stated that they duplicated progress assessments from other ecological indicators for assessing progress for fish and wildlife habitat. Two projects said they used the fire regime indicator as a proxy for assessing progress for wildlife habitat (Southern Blues Project and Tapash Project, 2018) and one project said they used the watershed condition indicator as a proxy for assessing progress for fish habitat (Tapash Project, 2018).

Table 1: Status of fish and wildlife habitat monitoring for the 23 CFLRP projects, based on the projects' self-assigned scores in the 2014 Ecological Indicator Report. Four projects split their scoring determination into two self-created categories (i.e. fish/wildlife, terrestrial/aquatic, and vegetation/disturbance) within the project-scale and/or landscape-scale categories; in these cases, each half of their split score was tallied as 0.5 instead of 1. Two projects provided a percentage in each good/fair/poor category rather than a single score; in these cases, the category with the largest percentage was assigned as the overall score. Responses of "N/A" were assigned as "unknown".

How do the CFLRP projects score their own progress towards fish and wildlife habitat goals?		
Project Name	**Project-scale**	**Landscape-scale**
Accelerating Longleaf, FL	GOOD	FAIR
Amador-Calveras	FAIR	GOOD
Burney-Hat Creek Basins	FAIR	FAIR
Colorado Front Range	UNKNOWN	UNKNOWN
Deschutes Skyline	GOOD	FAIR/POOR
Dinkey Landscape	FAIR	GOOD
Four Forest Restoration	GOOD	GOOD
Grandfather	GOOD	FAIR
Kootenai Valley	GOOD/FAIR	FAIR
Lakeview Stewardship	GOOD	FAIR
Longleaf Pine, MS	GOOD	FAIR
Missouri Woodland	FAIR	GOOD
NE WA Forest Vision	GOOD	GOOD
Ozark Highlands	FAIR	GOOD
Selway-Middle Fork	FAIR	GOOD
Shortleaf Bluestem	GOOD	GOOD
Southern Blues	GOOD	GOOD
SW Crown	GOOD	GOOD
SW Jemez Mnts.	GOOD/FAIR	GOOD/FAIR
Tapash	GOOD	FAIR
Uncompahgre Plateau	GOOD	GOOD
Weiser-Little Salmon	FAIR	GOOD/FAIR
Zuni Mountain	FAIR	FAIR
Total "Good" = 13 projects (project-scale), 12 projects (landscape-scale)		
Total "Fair" = 9 projects (project-scale), 9.5 projects (landscape-scale)		
Total "Poor" = 0 projects (project-scale), 0.5 projects (landscape-scale)		
Total "Unknown" = 1 project (project-scale), 1 project (landscape-scale)		

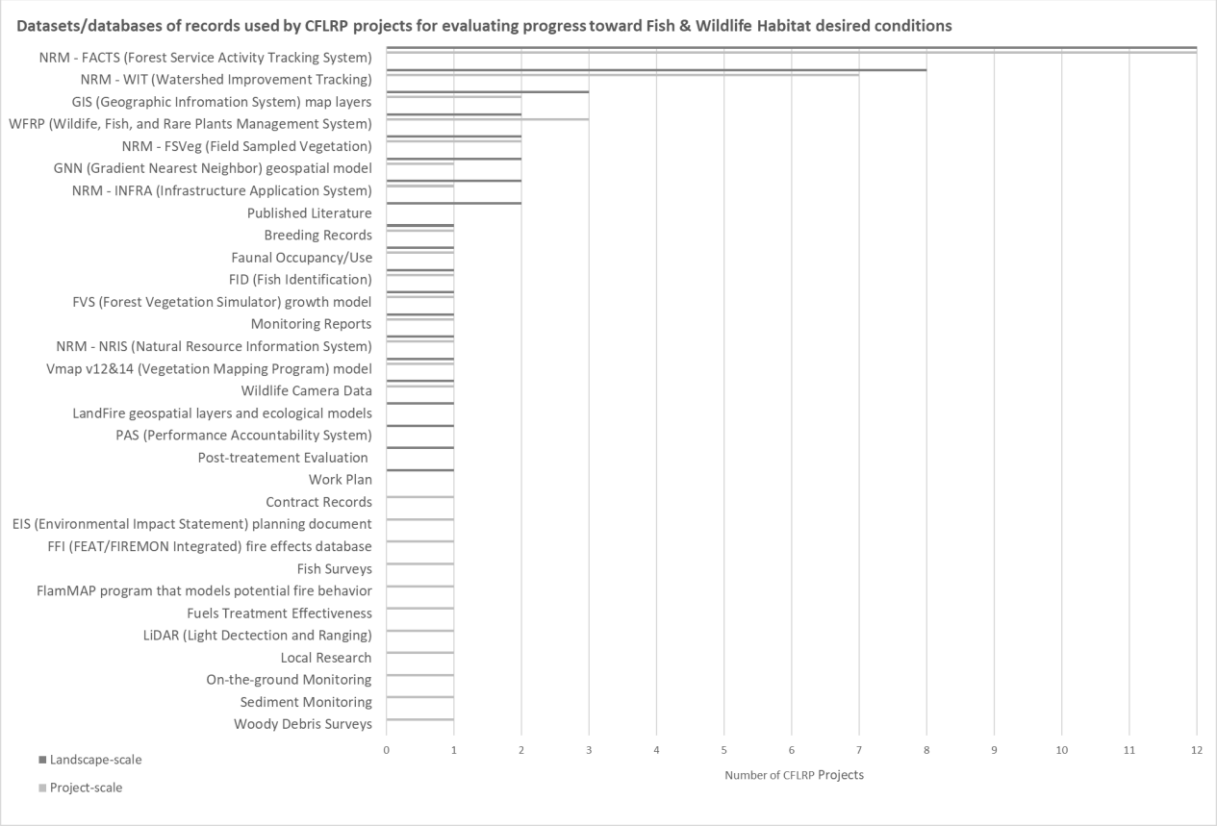


Figure 3: All of the databases and datasets of record used by CFLRP projects to evaluate their project-scale and landscape-scale progress for fish and wildlife habitat, based on project responses in the 2014 Ecological Indicator Progress Report. Each project listed zero or more databases and/or datasets.

Answer to Question 2:

"What are the projects' specific habitat restoration goals and focal animal species?"

It was reported that there is a wide diversity of goals for fish and wildlife habitat that different CFLRP projects are trying to achieve (Figure 4). Not surprisingly, the most common goal for fish and wildlife habitat across the CFLRP is improving or maintaining habitat for species with special legal status, including federally-listed, state-listed, and Forest Service special status species. The second most common goal is increasing the area of "open" stands, which are stands with reduced canopy cover and/or mid-story structure. In addition, many projects in the CFLRP are focusing on improving foraging habitat for big game (including elk and deer); maintaining, accelerating, or enhancing old-growth trees and stands; reducing the density of roads and motorized routes; and restoring sensitive habitat types such as aspen stands, riparian areas, and streams.

The most common focal animal groups in fish and wildlife habitat monitoring are birds, followed by mammals, fish, invertebrates, unspecified "wildlife," and finally, amphibians and reptiles (Figure 5). This ranking appears to show a trend towards focusing restoration and monitoring on large, charismatic, or game animals. In addition, birds may be the most frequently selected focal animal group because they are responsive to environmental change, are relatively easy to detect, and have well-established monitoring protocols available (Rosenberg et al., 2016). The most common focal animal species is white-headed woodpecker. Northern goshawk, spotted owl, and Canada lynx tied for second most common focal animal species (for a complete list, see Appendix 2).

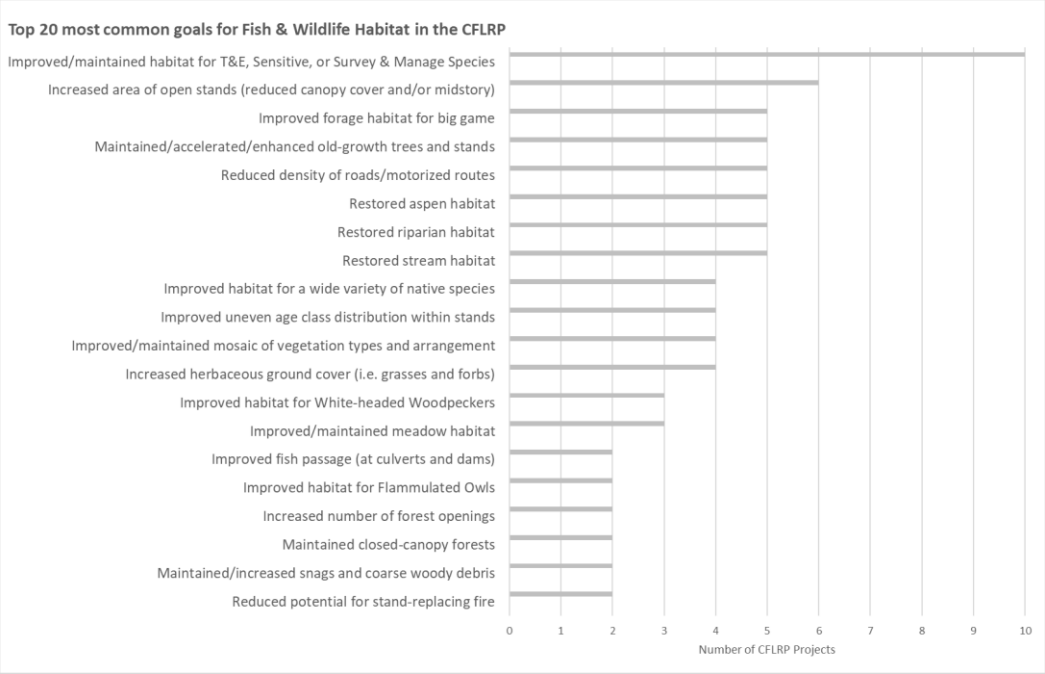


Figure 4: The top 20 most common goals for fish and wildlife habitat in the CFLRP, based on project responses in the 2014 Ecological Indicator Report and the 2018 Annual Report. Each project described zero or more goals and/or desired conditions for fish and/or wildlife habitat.

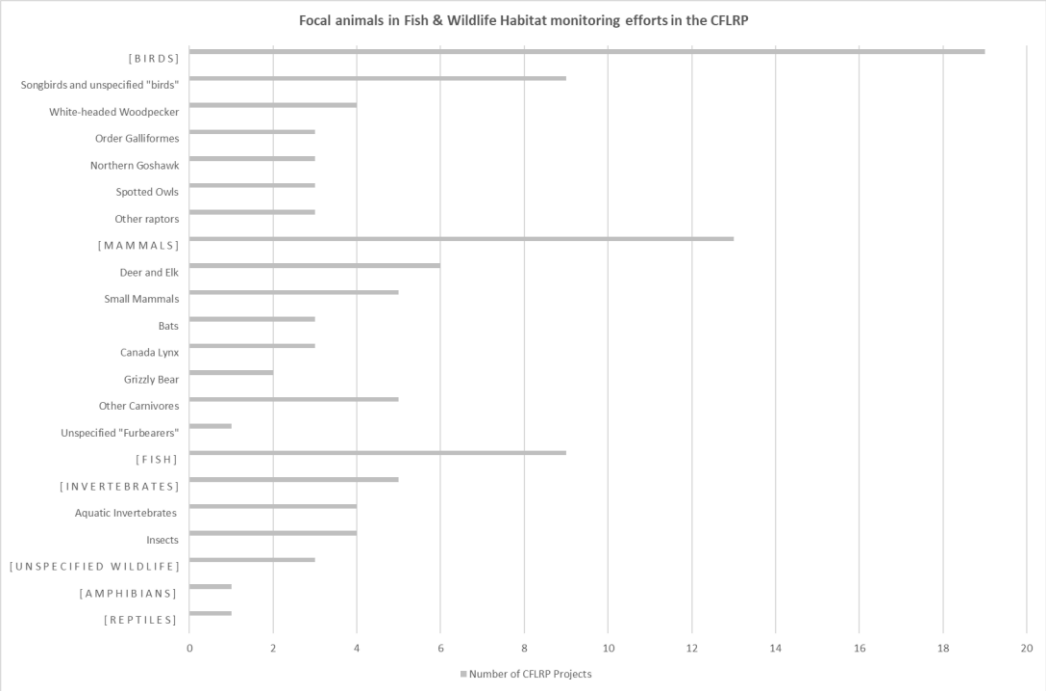


Figure 5: All of the focal animals mentioned in fish and wildlife habitat monitoring efforts in the CFLRP, based on project responses in the 2014 Ecological Indicator Report and the 2018 Annual Report. Each project listed zero or more species or groups of fish and/or wildlife. For a project by project list of focal animals, see Appendix 2.

Answer to Question 3:

"How many of the projects have used effectiveness monitoring?"

As of 2018, over half of the projects (13 projects; 56%) are doing effectiveness monitoring for wildlife habitat (Figure 6; Table 1). In addition, a few projects (2 projects; 9%) have only collected pre-treatment ("baseline") data at this point but are on their way to effectiveness monitoring. About a quarter (5 projects; 22%) of the projects are not doing effectiveness monitoring. The remaining projects (3 projects; 13%) have not included enough information in their reporting documents to determine whether they are doing effectiveness monitoring.

In contrast, the percentage of projects doing effectiveness monitoring for fish habitat is four times lower (3 projects; 13%) than for wildlife habitat (Figure 6; Table 2). Over half (13 projects; 56%) of the projects are not doing effectiveness monitoring for fish habitat. The same percentage (2 projects; 9%) of projects have collected baseline data as have done for wildlife habitat. The remaining projects (5

projects; 22%) have not included enough information in their reporting documents to determine whether they are doing effectiveness monitoring.

Figure 6: The number of CFLRP projects doing effectiveness monitoring for wildlife habitat (left) and for fish habitat (right) as of 2018, based on E. Kitayama's interpretation of the projects' optional narrative responses in the 2014 Ecological Indicator Report and required narrative responses in the monitoring section of the 2018 Annual Report. Projects were categorized as "yes" if they conveyed the ideas that data were collected within the CFLRP area, in a standardized way, both pre-treatment and post-treatment. Projects were categorized as "baseline" if they conveyed the ideas that data were collected within the CFLRP area in a standardized way, but so far only for pre-treatment conditions. Projects were categorized as "no" if they conveyed the ideas of process monitoring, implementation monitoring, no monitoring, or a landscape restoration strategy with no wildlife habitat objectives or fish habitat objectives. Projects were categorized as "unclear" if they did not provide enough information to determine whether data were collected within the CFLRP area, in a standardized way, both pre-treatment and post-treatment.

Table 2: Status of effectiveness monitoring for the 23 CFLRP projects, based on E. Kitayama's interpretation of the projects' optional narrative responses in the 2014 Ecological Indicator Report and required narrative responses in the monitoring section of the 2018 Annual Report.

Are the CFLRP projects doing "Effectiveness Monitoring"?		
Project Name	**Wildlife Habitat**	**Fish Habitat**
Accelerating Longleaf, FL	YES	NO
Amador-Calveras	YES	NO
Burney-Hat Creek Basins	BASELINE	NO
Colorado Front Range	YES	NO
Deschutes Skyline	NO	NO
Dinkey Landscape	YES	NO
Four Forest Restoration	YES	NO
Grandfather	UNCLEAR	NO
Kootenai Valley	NO	UNCLEAR
Lakeview Stewardship	YES	NO
Longleaf Pine, MS	YES	NO
Missouri Woodland	YES	NO
NE WA Forest Vision	YES	NO
Ozark Highlands	YES	UNCLEAR
Selway-Middle Fork	NO	BASELINE
Shortleaf Bluestem	NO	NO
Southern Blues	UNCLEAR	UNCLEAR
SW Crown	BASELINE	YES
SW Jemez Mnts.	YES	YES
Tapash	YES	UNCLEAR
Uncompahgre Plateau	UNCLEAR	UNCLEAR
Weiser-Little Salmon	YES	YES
Zuni Mountain	NO	BASELINE
YES = *effectiveness monitoring* , meaning data was collected within the CFLRP area, in a standardized way, pre-treatment and post-treatment		
BASELINE = data was collected within the CFLRP area, in a standardized way, but so far only for pre-treatment conditions		
NO = *process monitoring, implementation monitoring,* no monitoring, or no wildlife habitat objectives or fish habitat objectives in their landscape restoration strategy		
UNCLEAR = not enough information to determine if monitoring data was collected within the CFLRP area, in a standardized way, pre-treatment and post-treatment		

Discussion

It is outwardly positive to see that almost all the CFLRP projects have reported that they are achieving their objectives for fish and wildlife habitat and that they are making good or fair progress toward their goals related to fish and wildlife habitat at the project and landscape scales. At the same time, it is important to understand that many of these projects are not making their assessments about progress and success through the use of effectiveness monitoring. Based on the 2014 Ecological Indicator Report and the 2018 Annual Report, it appears that 22% of projects are not doing effectiveness monitoring for wildlife habitat and that 56% of projects are not doing effectiveness monitoring for fish habitat. According to the legal interpretation and policy position of the Forest Service Washington Office, only implementation monitoring is currently required in the CFLRP, therefore, these projects are still in full compliance with the program (L. Buchanan, personal communication, March 6, 2019).

The most important result in this case study is that the 2014 Ecological Indicator Report and the 2018 Annual Report, both individually and combined, leave it unclear whether effectiveness monitoring is being conducted for wildlife habitat in 13% of the projects and for fish habitat in 22% of the projects (see "unclear" projects in Figure 6 and Table 2). This points to a shortcoming not with the monitoring itself, but with the written questions that are asked about monitoring by the Forest Service Washington Office in required reporting templates and the associated written responses that are provided by the CFLRP projects.

The large scale and collaborative nature of the CFLRP projects means that information about each individual project's monitoring efforts is scattered across a multitude of digital platforms. Searching for answers to specific questions about a project's monitoring efforts by sifting through long documents, websites, databases, and published papers would be a time-consuming process that would still be unable to yield information that is usable for the Washington Office's purposes. Gathering information that is usable for the Washington Office's purposes requires the use of specific closed-ended questions and a response to each question from each of the projects.

When it comes to required reporting, there are opposing concerns between the Forest Service national-level staff and the CFLRP project-level staff. The national-level staff desires to have comprehensive, up-to-date, standardized information from all the projects so that comparisons and

summaries can be made across the program. The project-level staff desires to maintain their project's uniqueness and bottom-up autonomy and to minimize the amount of time they must dedicate to national reporting. These opposing concerns must be acknowledged and balanced.

In the 2015 five-year report to Congress, the Forest Service stated that the CFLRP will "improve the ways in which we collaborate, implement, and monitor" (USFS, 2015). Monitoring is the essential basis for learning from our actions in order to improve the planning and implementation of future restoration treatments. However, monitoring is incomplete if it is not accompanied by reporting (Gray et al., 2001). If the CFLRP strives to improve the way it monitors, it should also consider ways to improve how it reports. This includes preparing reporting templates in a way that allows extraction of key information that can be synthesized across reports to allow program-scale evaluation.

Reporting is important for having a clear understanding at the national level about the type of monitoring each project is doing and for showcasing each project's hard-fought monitoring efforts with a wider audience. There is a need to learn what works and what doesn't for fish and wildlife habitat monitoring just like there is a need to learn what works and what doesn't for fish and wildlife habitat restoration treatments. This effort can be thought of as "monitoring of monitoring" or "meta-monitoring." Reporting about monitoring may also be a way to help increase attention and esteem for monitoring within the CFLRP projects, the Forest Service, and beyond. The emerging consensus and urgency to create sustainable, resilient landscapes is occurring world-wide (Besseau et al., 2018), which will necessitate developing and sharing exemplary models of both monitoring and reporting.

Recommendations

I believe it would be valuable for the Forest Service Washington Office to gather reporting data about the voluntary use of effectiveness monitoring for fish and wildlife habitat that is occurring within the CFLRP. An assessment of trends in the use of effectiveness monitoring over time would help guide learning, recommendations, and expectations for monitoring in future CFLRP projects. This could be done through the introduction of a standardized and detailed reporting template that asks a combination of important closed-ended and open-ended questions about monitoring. I recommend that new questions about monitoring be incorporated into the five-year ecological indicator reports, rather than the annual reports, in order to minimize the burden on the project-level staff.

I have provided my recommended version of a revised fish and wildlife habitat reporting template in Appendix 7. This version was included in the 2019 Ecological Indicator Report that was sent out to the field in February 2019, with completed reports due back in December 2019. I recommend that this revised reporting template be completed by all the projects, and that response data be subsequently analyzed and shared with the public.

I developed this nine-page revised fish and wildlife habitat reporting template in partnership with the CFLRP national coordinator in my role as a student trainee working for the Forest Service Washington Office. The template development process involved reviewing the projects' responses to the Fish & Wildlife Habitat sub-indicator section of the 2014 Ecological Indicator Report to look for patterns and information gaps. In addition, it involved incorporating input derived from email and phone meetings with fish and wildlife specialists at the Forest Service Washington Office, the University of Montana, and The Nature Conservancy (see acknowledgements in Appendix 8). The revised template asks questions about the type(s) of monitoring used (including a checkbox option for effectiveness monitoring) as well as the following topics: changes in desired conditions, changes in monitoring methodologies, changes in baseline data, unanticipated developments, difficult challenges, their approach to including the effects of treatments on adjacent areas, quantifiable desired conditions, broad goals for habitat, evaluation metrics for habitat, broad goals for populations, evaluation metrics for populations, species of interest, methodologies for assessing progress, databases, datasets, web links, Forest Service performance measures, justification for their use of performance measures, how they set their progress thresholds, and how they calculated their final scores. Overall, the revised reporting template creates an organized way for the projects to think about and communicate their fish and wildlife habitat monitoring choices. The good/fair/poor scoring and project-scale/landscape-scale structure that existed in the 2014 Ecological Indicator Report was maintained for continuity in the revised reporting template.

This revised reporting template will reduce confusion for the projects about what information is desired at the national level. It does not ask the projects to change their monitoring approaches, it only asks them to share specific existing knowledge about their monitoring approaches. It allows the projects to respond to questions by selecting checkbox categories based on their in-depth knowledge; this will create a more accurate synthesis than the previous method of leaving it up to national-level staff or researchers to subjectively group responses into post hoc categories. The revised template was

created as an Adobe fillable form. This form allows infinite scrolling within response boxes for open-ended questions. It also recognizes each project's uniqueness by offering an "other" option for all closed-ended questions, along with a space for an open-ended description of this choice. The digital format will enable automatic collation and tallying of each question's responses which will make analyzing and summarizing response data from all projects easier, more accurate, and more efficient.

Conclusion

This case study fulfilled its purpose by creating a baseline status assessment on the use of effectiveness monitoring and reporting for fish and wildlife habitat restoration in the CFLRP, which helped begin a discussion about how these processes might be improved. This was accomplished by synthesizing the projects' responses from the 2014 Ecological Indicator Report and the 2018 Annual Report to answer the following three questions: (1) Do the projects believe they have made good progress towards their fish and wildlife habitat restoration goals, and what information have they used to make this determination? (2) What are the projects' specific habitat restoration goals and focal animal species? (3) How many of the projects have used effectiveness monitoring?

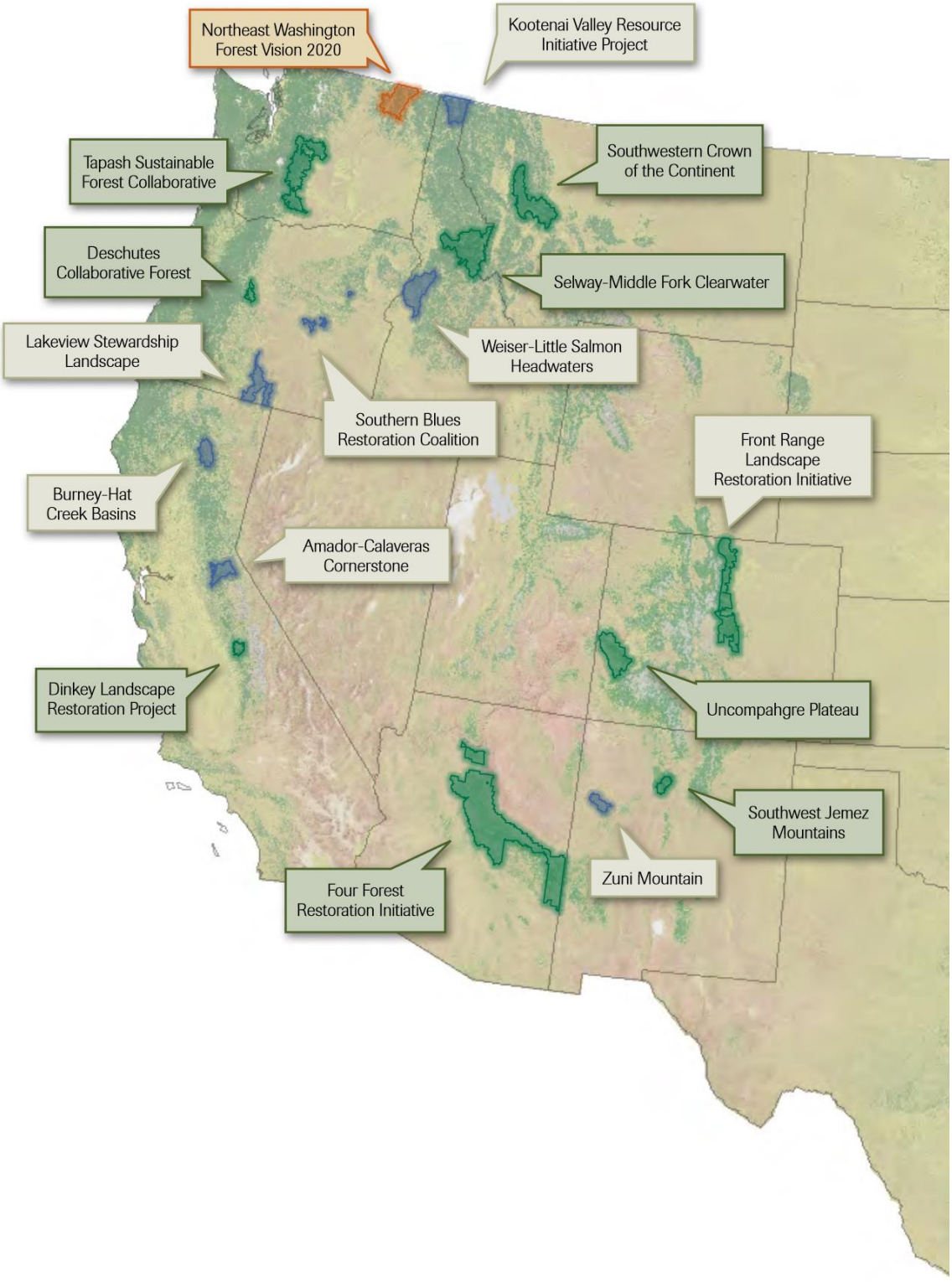
This case study found that approximately half of the projects believe they are making good progress towards their fish and wildlife habitat restoration goals, and most of the rest believe they are making fair progress. The projects have used a variety of datasets/databases to make this determination, but they have depended most heavily on the Forest Service's Forest Activity Tracking System (FACTS) and the Watershed Improvement Tracking (WIT) system. Across the program, the projects have declared a variety of different habitat restoration goals and focal animal species, with the most common emphasis placed on open forest habitat, special status species, and birds. It appears that 65% of projects are accomplishing or on their way to accomplishing effectiveness monitoring for wildlife habitat and that 22% of projects are accomplishing or on their way to accomplishing effectiveness monitoring for fish habitat.

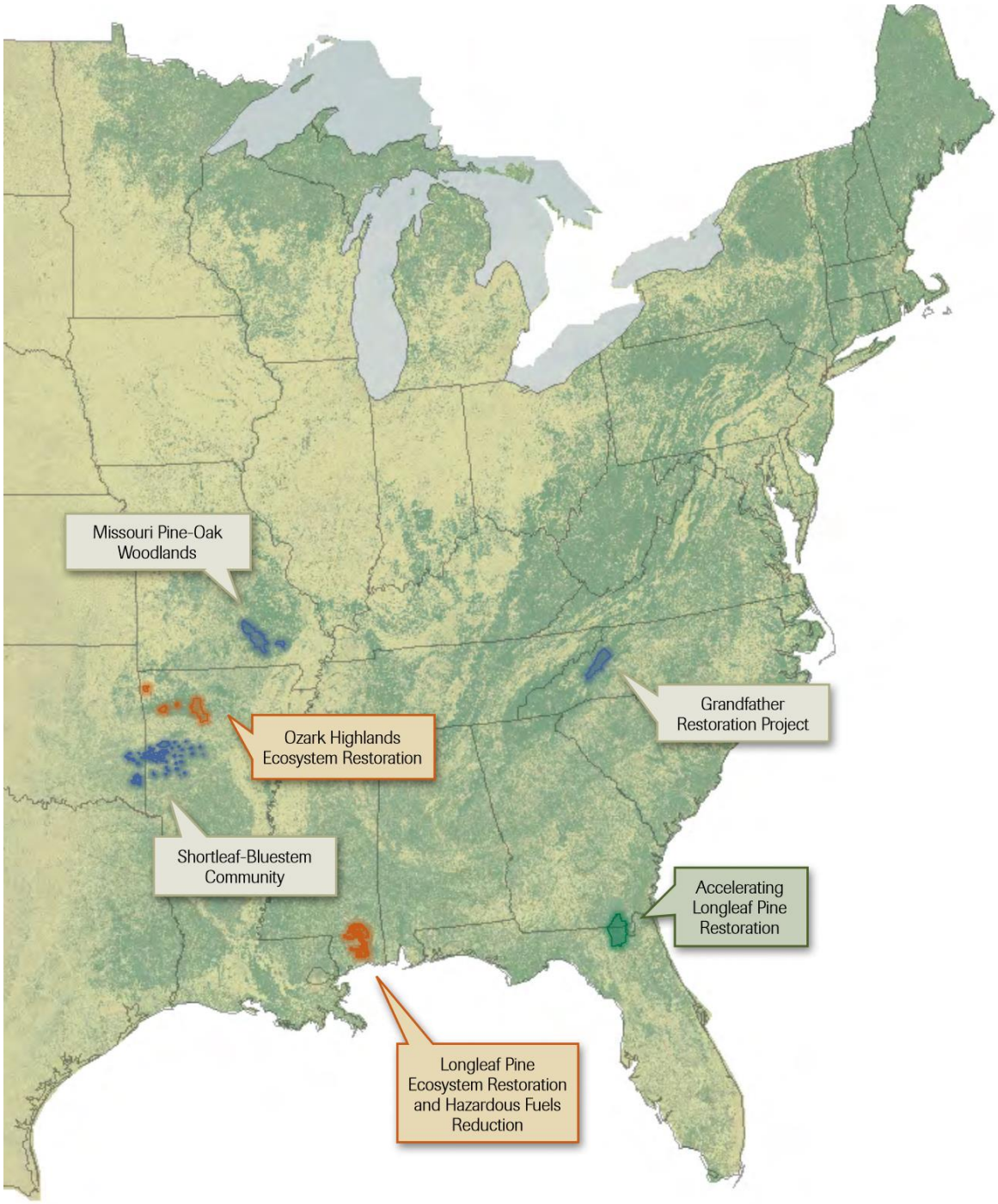
It is unclear from these past reports whether 13% of the projects are doing effectiveness monitoring for wildlife habitat and whether 22% of the projects are doing effectiveness monitoring for fish habitat. This uncertainty points to a weakness at the interface between monitoring and reporting. In recognition of this shortcoming, I recommended that the Forest Service Washington Office staff improve the five-year reporting template, and in 2018 I worked with them to develop the fish and

wildlife habitat section of the revised 2019 Ecological Indicator Report. The goal of this revised reporting template is to improve national-level understanding about the approaches that are being used for assessing fish and wildlife habitat in the CFLRP. This revised reporting template offers an opportunity to collect important information about fish and wildlife habitat monitoring, in a standardized way, across the entire CFLRP, at the 10-year milestone since the program began. By participating in meaningful monitoring and reporting processes in the CFLRP, the project-level and national-level Forest Service staff both have an excellent opportunity to demonstrate to the public the agency's commitment to transparency, ecological learning, and fish and wildlife habitat sustainability within the Collaborative Forest Landscape Restoration Program.

Appendix 1: Map of the 23 CFLRP Projects

Map by Liz Rank at The Nature Conservancy, published in "People Restoring America's Forests: 2012 Report on the CFLRP"




Missouri Pine-Oak Woodlands
Ozark Highlands Ecosystem Restoration
Shortleaf-Bluestem Community
Grandfather Restoration Project
Accelerating Longleaf Pine Restoration
Longleaf Pine Ecosystem Restoration and Hazardous Fuels Reduction

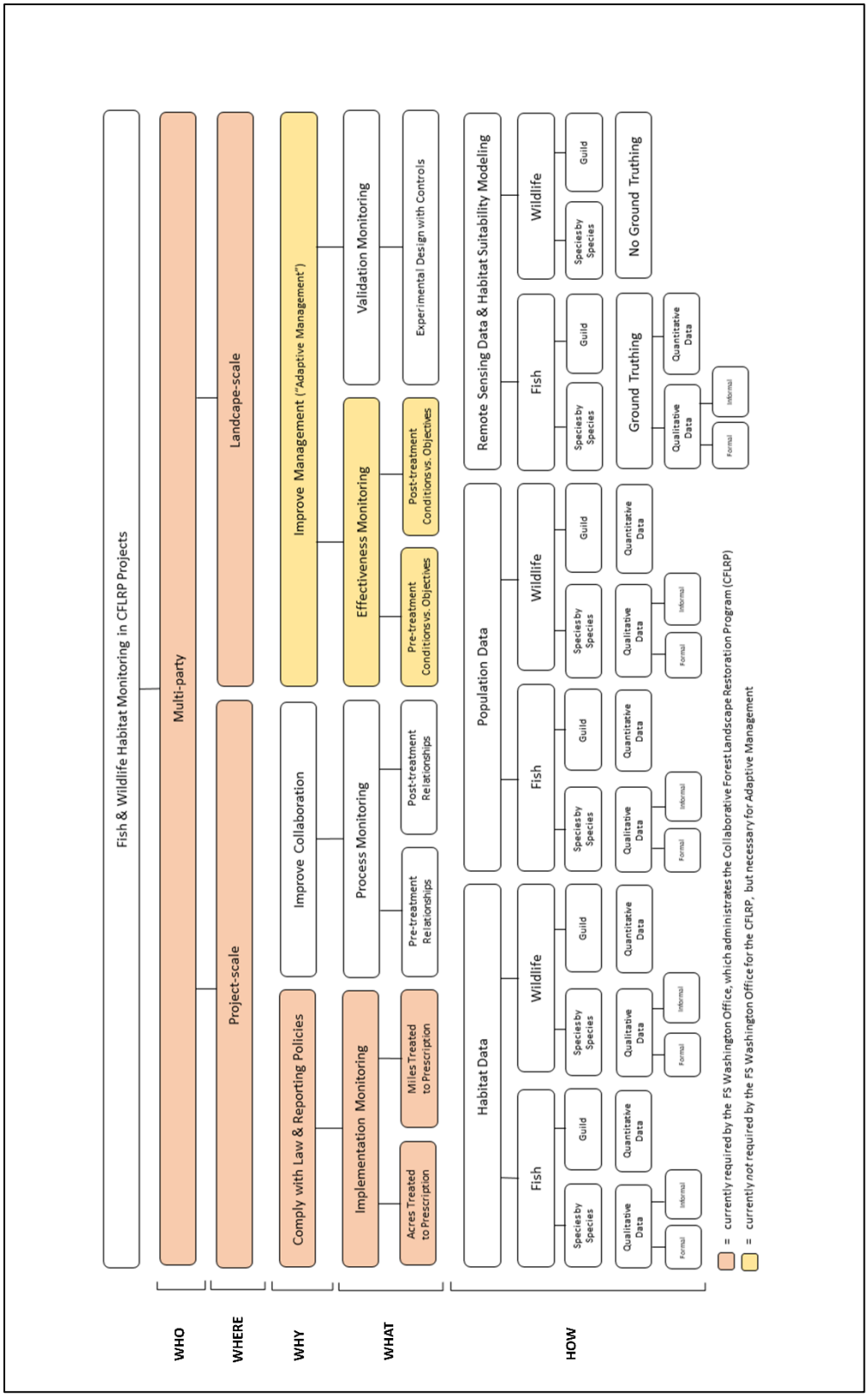
Appendix 2: List of CFLRP Projects and Their Focal Animals for Habitat Restoration

Source: E. Kitayama's review of the 2014 Ecological Indicator Reports and the 2018 Annual Reports.

CFLRP Project Name	State(s)	Year Selected	Focal Species for Habitat Restoration
Selway-Middle Fork Clearwater	Idaho	2010	flammulated owl and American marten
Southwestern Crown of the Continent	Montana	2010	elk, lynx, snowshoe hare, grizzly bear, bull trout, and invasive mussels
Colorado Front Range	Colorado	2010	unspecified "birds"
Uncompahgre Plateau	Colorado	2010	sage-grouse, Colorado river cutthroat trout, lynx, snowshoe hare, ungulates, and unspecified "big game"
Four Forest Restoration Initiative	Arizona	2010	Mexican spotted owl, and unspecified "songbirds"
Southwest Jemez Mountains	New Mexico	2010	mule deer, elk, black bear, cougar, prairie dogs, mice, voles, tree squirrels, aquatic invertebrates, moths, trout, native non-game fish, and unspecified "forest birds," "grassland birds," and "pest/beneficial insects"
Dinkey Landscape Restoration Project	California	2010	California spotted owl and Pacific fisher
Deschutes Skyline	Oregon	2010	unspecified "wildlife"
Tapash	Washington	2010	white-headed woodpecker, Northern spotted owl, Mardon skipper, Townsend's big-eared bat, Cascade red fox, peregrine falcon, bald eagle, elk, and deer
Accelerating Longleaf Pine Restoration	Florida	2010	Bachman's sparrow, brown-headed nuthatch, and Northern bobwhite
Burney-Hat Creek Basins Project	California	2012	Southern long-toed salamander and other unspecified "amphibians," California spotted owl, Northern goshawk, and unspecified "furbearers"
Pine-Oak Woodlands Restoration Project	Missouri	2012	"birds," especially pine warbler, prairie warbler, Eastern towhee, blue-winged warbler, and yellow-breasted chat
Shortleaf-Bluestem Community Project	Arkansas/Oklahoma	2012	red-cockaded woodpecker
Weiser-Little Salmon Headwaters Project	Idaho	2012	white-headed woodpecker, Northern Idaho ground squirrel, and bull trout
Kootenai Valley Resource Initiative	Idaho	2012	grizzly bear, flammulated owl, and unspecified "fish"
Southern Blues Restoration Coalition	Oregon	2012	white-headed woodpecker, pileated woodpecker, Northern goshawk, deer, elk, unspecified "neotropical birds" and "fish"
Lakeview Stewardship Project	Oregon	2012	white-headed woodpecker
Zuni Mountain Project	New Mexico	2012	Zuni bluehead sucker and unspecified "wildlife"
Grandfather Restoration Project	North Carolina	2012	unspecified "wildlife"
Amador-Calaveras Project	California	2012	Western bumble bee, and unspecified "bats" and "birds"
Northeast Washington Forest Vision	Washington	2012*	Northern goshawk, mule deer, white-tailed deer, elk, Canada lynx, snowshoe hare, wolf, wolverine, pine marten, red-tailed chipmunk, and unspecified "fish"
Ozark Highlands Ecosystem Restoration	Arkansas	2012*	Indiana bat, Eastern wild turkey, aquatic invertebrates, wasps, and unspecified "birds," "migratory birds," and "fish"
Longleaf Pine Ecosystem Restoration	Mississippi	2012*	red-cockaded woodpecker, gopher tortoise, black pine snake, Camp Shelby burrowing crayfish, and unspecified "birds"

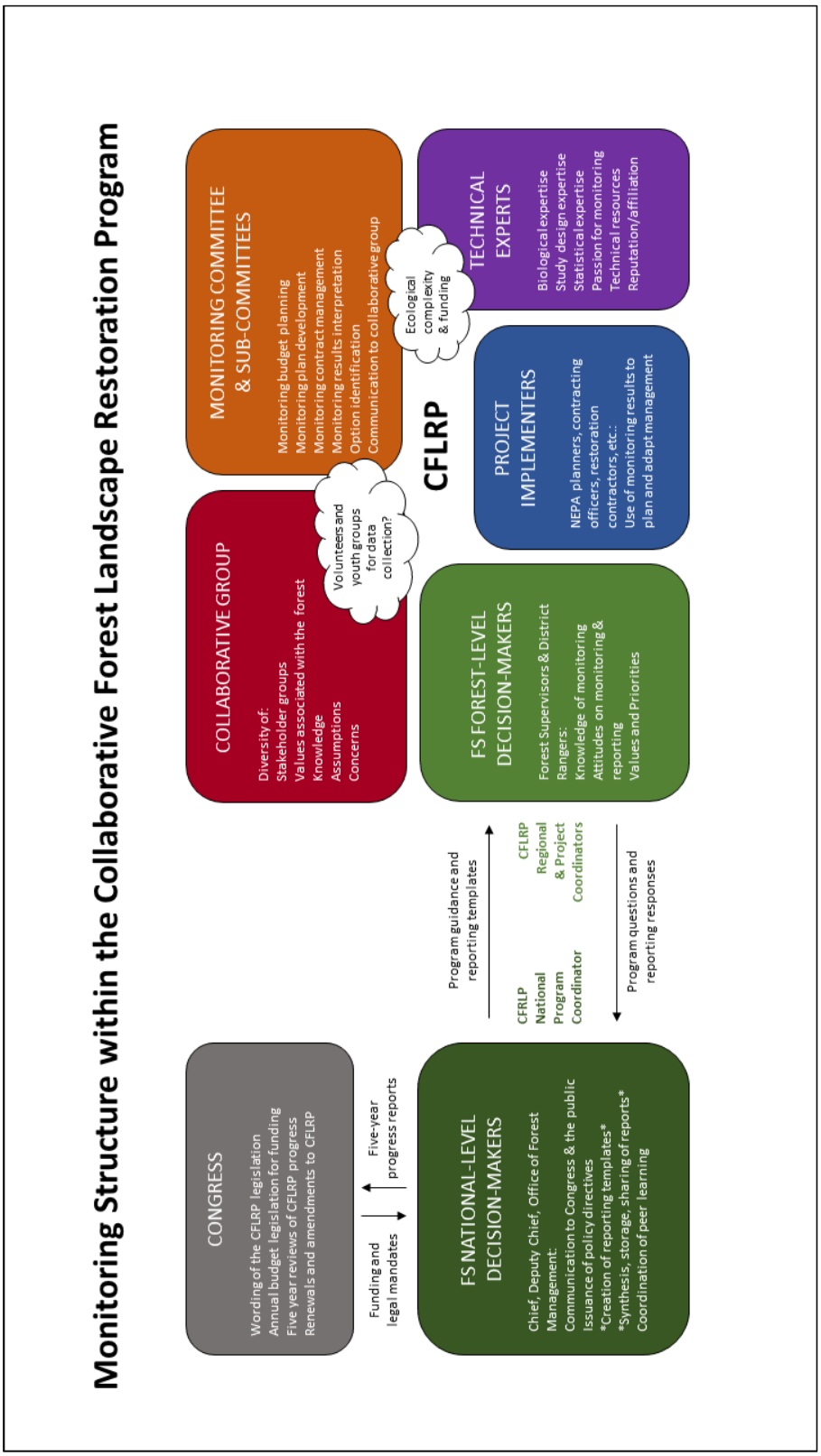
Appendix 3: Types of Fish & Wildlife Habitat Monitoring in CFLRP Projects

Source: Diagram by E. Kitayama 2019



Appendix 4: Monitoring Structure within the CFLRP

Source: Diagram by E. Kitayama 2019



Appendix 5: Steps for Fish & Wildlife Habitat Monitoring that Lead to Adaptive Management

Source: Table by E. Kitayama 2019

Steps	Desirable Tasks in the CFLRP Fish & Wildlife Habitat Monitoring Process	Responsible Party	Role of Responsible Party
#1	**Identify and prioritize the most controversial questions about fish & wildlife habitat that would strengthen consensus if answered**	Collaborative Group	Decision Maker
#2	**Decide the goals for monitoring** (What species or ecosystem qualities do you want to commit to monitor? Why? What is your desired level of risk or certainty? How long do you want monitoring to last? Who should do the monitoring work?)	Collaborative Group	Decision Maker
#3	**Decide who will be invited to be a member of the Fish & Wildlife Working Team** (composed of representatives with relevant education and technical experience from variety of organizations)	Collaborative Group	Decision Maker
#4	**Secure funding specifically for fish & wildlife habitat monitoring** (combined from multiple agencies' funds, revenues, grants, etc.)	Fish & Wildlife Sub-committee	Logistical Planner
#5	**Create a budget specifically for fish & wildlife habitat monitoring**	Fish & Wildlife Sub-committee	Logistical Planner
#6	**Allocate monitoring work using official contracts/agreements** (usually with universities, consultancies, or Forest Service research stations)	Fish & Wildlife Sub-committee	Logistical Planner
#7	**Collect pre-treatment data to use as a baseline for future comparison**	Field Technicians or Volunteers	Data Collector
#8	**Implement the restoration treatments** (e.g. thinning, prescribed burning, culvert installation, road decommissioning, etc.)	Forest Service, Treatment Contractors/Partners	Treatment Implementor
#9	**Report treatments implemented to the FS Washington Office** (i.e. number of acres or miles treated)	Forest Service	Treatment Reporter
#10	**Conduct implementation monitoring and report results to the FS Washington Office** (Did treatments get implemented according to the prescription?)	Forest Service	Treatment Overseer
#11	**Design and write an Effectiveness Monitoring Pilot Study** (usually a 2-year duration)	Fish & Wildlife Sub-committee in consultation with Statistician(s)	Ecological Expert, Statistical Expert, Science Communicator
#12	**Collect data according to the Effectiveness Monitoring Pilot Study**	Field Technicians or Volunteers	Data Collector
#13	**Analyze the Effectiveness Monitoring Pilot Study data**	Statistician(s)	Statistical Expert
#14	**Report the results of the Effectiveness Monitoring Pilot Study to the Collaborative Group**	Fish & Wildlife Sub-committee	Science Communicator
#15	**Complete a Final Effectiveness Monitoring Plan**	Fish & Wildlife Sub-committee	Logistical Planner
#16	**Approve the Final Effectiveness Monitoring Plan**	Collaborative Group	Decision Maker
#17	**Collect data according to the Effectiveness Monitoring Plan**	Field Technicians or Volunteers	Data Collector
#18	**Analyze effectiveness monitoring data routinely** (ideally every year it is collected)	Statistician(s)	Statistical Expert
#19	**Report effectiveness monitoring results and recommendations routinely using clear language** (to the public, stakeholders, partners, funders, and FS Washington Office)	Fish & Wildlife Sub-committee	Science Communicator
#20	**Make raw monitoring data publicly available via an interactive web interface** (may require contract or agreement with web design partner or consultant)	Fish & Wildlife Sub-committee	Logistical Planner
☆	**Decide whether and how to adapt treatments based on the effectiveness monitoring results** (then return to Step #1)	Collaborative Group	Decision Maker

CFLR Ecological Indicator Progress Report

Project Name: Burney-Hat Creek Basins Project **State: CA**

Initial Landscape-scale Desired Conditions for the life of the project as defined by the Collaborative[1]

The "landscape" should be the landscape identified in project proposals or subsequently approved proposal edits. See page three of the original guidance for further information.

Landscape area: 396,036 acres
NFS land: 200,003 acres (50.5% of total landscape)
Treatment Ac Planned: 69,239 acres (17.5% of NFS lands within CFLR landscape)
Treatment to date (FY14): 13,442 acres (14% of proposed treatments accomplished)

Desired Conditions Target for Fire Regime Restoration: 21% change (relative to the desired condition) occurs across 15% of the landscape area by FY14.

1. Please include 1-5 quantifiable desired condition statements upon which the above target is based. These statements should reflect the initial project goals as outlined in project proposals. Further guidance on what should be included in these statements is available in **the original Ecological Indicator Guidance** on page 4.

Project Goal: Treat WUI and non-WUI land to decrease the amount of hazardous fuels. In WUI areas, treatments will be oriented towards "stand-alone" defensible space, where as non-WUI treatments strive to moderate fire behavior to allow for tactical engagement or slow fire spread. Additionally, future desires of non-WUI treatments will allow for the implementation of future "fire use" fires, when appropriate.

Desired Conditions – 10 yr:

a. Treat 24,000 acres with thinning and surface fuels treatments that results in <4' flame lengths.
b. Treat 15,000 acres with thinning and surface fuels reductions so fire can be reintroduced in rotation based on pre-settlement return intervals (4-37 years).

Expected Progress towards Desired Condition in 5 years

- **Good**= Expected progress is being made towards DCs across (combined) 19% or more of the CFLR landscape area.
- **Fair=** Expected progress is being made towards DCs across (combined) 14-18% of the CFLR landscape area.
- **Poor**= Expected progress is being made towards DSs across (combined) less than 14% of the CFLR landscape area.

Desired Conditions Target for Fish and Wildlife Habitat Condition: 34% change (relative to the desired condition) occurs across 1% of the landscape area by FY14.

1. Please include 1-5 quantifiable desired condition statements upon which the above target is based. These statements should reflect the initial project goals as outlined in project proposals. Further guidance on what should be included in these statements is available in **the original Ecological Indicator Guidance** on page 5.

Project Goal: Restore brushfields, meadows and aspen stands and secure habitat for spotted owls, goshawks, and furbearers

[1] Desired condition targets should be written in the above format. Desired conditions that feed each "desired condition target" may vary widely and may not apply to every project in the landscape. Keep in mind the above "desired conditions targets" and desired conditions are outcomes, not outputs. Each desired condition target should be over the same landscape. For example, if the Fire Regime Restoration desired condition target is over all of the National Forest System lands within the landscape, the other three desired conditions target should be as well. If the Fire Regime Restoration desired condition target is over all ownerships in the landscape, the others should be as well.

Desired Conditions – 10yr:

a. Treat 960 acres of meadow habitat (enhancement), brush, and aspen habitat
b. Treat 700 acres of sensitive species habitat in the CFLR Landscape for spotted owls, goshawks and furbearers by changing the CWHR class to 4M, 4D, 5M, or 5D.

Expected Progress towards Desired Condition in 5 years

- **Good**= Expected progress is being made towards DCs across (combined) 29% or more of the CFLR landscape area.
- **Fair** = Expected progress is being made towards DCs across (combined) 20-28% of the CFLR landscape area.
- **Poor**= Expected progress is being made towards DCs across (combined) less than 28% of the CFLR landscape area.

Desired Conditions Target for Watershed Condition: 0 % change (relative to the desired condition) occurs across 100% of the landscape area by end of FY22.

Please include 1-5 quantifiable desired condition statements upon which the above target is based. These statements should reflect the initial project goals as outlined in project proposals. Further guidance on what should be included in these statements is available in **the original Ecological Indicator Guidance** on page 7.

Project Goal: Water quality and watershed function are maintained throughout the duration of the project.

Desired Condition Statement: Maintain all 6 HUC6 watersheds at their current rating of "Good"

1. All 6 HUC6 watersheds hold a WCATT rating of "good" and will remain in that condition for the duration of the CFLR project.
2. Good = No change (watersheds are maintained) across **90%** or more of the CFLR landscape area.
3. Fair = WCATT score decreases in **11-20%** of the CFLR landscape area
4. Poor = WCATT score decreases in **more than 21%** of the CFLR landscape area

Desired Conditions Target for Landscape Scale Invasive Species Severity: <1 % of the CFLR landscape area was restored by reducing invasive species severity (preventing, controlling, or eradicating targeted invasive species) to meet desired conditions by date.

Please include 1-5 quantifiable desired condition statements upon which the above target is based. These statements should reflect the initial project goals as outlined in project proposals. Further guidance on what should be included in these statements is available in **the original Ecological Indicator Guidance** on page 8.

Project Goal: Treat noxious and invasive plants in known infestations and use all practical BMPs for prevention in new projects.

Desired Condition Statement:

1. Confirm the implementation of standard Integrated Design Features (IDF) in project-specific NEPA in all new projects.
2. Survey previous eradicated/treated areas to determine necessary follow up.

Scoring for National Reporting

Landscape-scale scoring

Few (if any) CFLR-funded Landscapes propose to meet every proposed desired condition on every acre or achieve landscape scale objectives through the mechanical treatment of every acre within their landscape boundary. Rather, multiple projects with multiple objectives (fire risk reduction, wildlife habitat improvement, stream restoration, etc.) should facilitate meeting these broader objectives. Scoring at this level reflects the degree to which individual Landscapes are moving towards Desired Conditions at broader spatial extent. Landscape-scale scoring is conducted by the multi -party monitoring group at each Landscape.

- Good = Expected progress is being made towards Desired Conditions across 19% or more of the CFLR landscape area.
- Fair = Expected progress is being made towards Desired Conditions across 10-18% of the CFLR landscape area
- Poor = Expected progress is being made towards Desired Conditions across less than 10% of the CFLR landscape area

"Expected progress" will be defined using 5 year benchmarks for FY2010 projects and 3 benchmarks for FY2012 for each DC based on a percentage of the lifetime outcome specified in each Landscape's proposal.

Current Landscape-scale Evaluation (Based on the Collaborative's landscape-scale monitoring)

Ecological Indicators	Datasets and/or databases of records used	Good, Fair, Poor and (%) landscape across which progress is being made towards desired conditions	Are you achieving your CFLRP objectives? (Y/N)	If NO, briefly explain…
Fire Regime Restoration	FACTS	Good (20%)	Yes	
Fish and Wildlife Habitat Condition	FACTS/WIT	Fair (11%)	No	Large landscape fires are constantly modifying planned treatment areas, either by being affected by high-severity fire, or by changes required to adjust to relocated PACs for spotted owls and goshawks.
Watershed Condition	WCATT	Good (all watersheds)	Yes	
Invasive Species	NRIS-FACTS	Poor (<1%)	Yes	Landscape level fires and forest closures limited the crew's ability to accomplish treatments in some portions of the CFLR area. Limitations on treatment methods severely limit efficacy of treatments. New projects may allow for more effective treatment methods, including herbicides.

Narrative (optional):

Project-scale scoring[2]

Each management action funded through CFLR will have its own project-level objectives that are designed to contribute to achieving Desired Conditions at larger scales. Project-scale scoring should reflect how well the results of an individual management activity met the objectives for that project. Individual projects may not meet every desired condition of the CFLRP project. Project-scale scoring is conducted following completed management activities by the multi -party monitoring group at each Landscape.

- Good = 75% or more of implemented treatments result in measurable progress towards individual **project-level** objectives.
- Fair = 26% - 74% of implemented treatments result in measurable progress towards individual **project-level** objectives.
- Poor = 25% or less of implemented treatments result in in measurable progress towards individual **project-level** objectives.

Current Project-scale Evaluation (Based on an aggregation of the Collaborative's project-level monitoring)

Ecological Indicators	Datasets and/or databases of records used	Project Level Good, Fair, Poor and (%) treatments resulting in measurable progress as defined above	Are you achieving your CFLRP objectives? (Y/N)	If NO, briefly explain…
Fire Regime Restoration	FACTS	Good (80%)	Yes	
Fish and Wildlife Habitat Condition	FACTS/WIT	Fair (65%)	Yes	
Watershed Condition	WCATT	Good (100%)	Yes	
Invasive Species	NRIS-FACTS	Fair (70%)	Yes	

Narrative (optional):

[2] An individual activity might not need to lead to a fully restored acre (for example), but if it sets the landscape up for the next treatment it may still get a good rating. For example if a successful thinning doesn't restore a fire regime, but it sets up landscape for subsequent burns that might, it could still receive a "good" rating.

2019 CFLRP Ecological Indicator Progress Report

Project Name: _____ State: _____

FISH & WILDLIFE HABITAT

Narrative - *Note: All boxes in this template will scroll, so you have as much space as you need.*

☐ If wildlife habitat is not part of your CFLRP proposal and landscape restoration strategy, please let us know by checking this box.
☐ If fish habitat is not part of your CFLRP proposal and landscape restoration strategy, please let us know by checking this box.

1. Did you make any changes to your desired condition(s) for fish & wildlife habitat as compared to the 2014 Ecological Indicator Report? Please briefly describe: **Yes** ☐ **No** ☐

2. Did you make any changes to your monitoring methodologies for fish & wildlife habitat as compared to the 2014 Ecological Indicator Report? Please briefly describe: **Yes** ☐ **No** ☐

3. Did you use any new or updated baseline data for evaluating your fish & wildlife habitat progress for the purposes of this report? Please briefly describe: **Yes** ☐ **No** ☐

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Appendix 7: "2019 CFLRP Ecological Indicator Progress Report" Revised Template

Source: https://www.fs.fed.us/restoration/CFLRP/guidance.shtml

4. Did your projects experience any unanticipated developments that positively or negatively affected expected progress towards your desired conditions for fish and wildlife habitat? (e.g. wildfire in the project area, litigation outcome, change in collaborative participation, etc.)

5. What were the most difficult barriers or challenges you experienced in progressing towards your desired conditions for fish and wildlife habitat? If you adapted to address these challenges please provide a brief description of how.

6. Did you include the effects of treatments on areas adjacent to the active treatment area? Yes ☐ No ☐
If yes, please briefly describe your methodology for including these adjacent acres, and describe any work conducted across land ownership in support of fish & wildlife habitat.

Desired Conditions

*In this report, the term "**desired conditions**" refers to landscape and resource conditions (as defined collaboratively by stakeholders and land managers) that you are seeking to achieve and maintain for your CFLRP landscape over the next 10+ years. Desired conditions are outcome-driven not output-driven, and should link to your project's CFLRP proposal while being measurable. (Note: The term "desired condition" is used somewhat differently in the Forest Service's Land Management Planning Process. In that context, it is not time bound, and often represents long-term social, economic and ecological goals, while the term "objective" is used to represent specific, measurable and time-bound benchmarks to be achieved while working toward desired conditions in a forest plan area.) In this report, the term "**landscape**" refers to the landscape identified in your CFRLP project proposal or in subsequently-approved proposal edits. See cover page for links to guidance.*

7. Project-scale Desired Conditions Target for Fish & Wildlife Habitat:

[ ] % change (relative to the desired condition) occurs across [ ] % of the project areas by [ ]

[ ] % change (relative to the desired condition) occurs across [ ] % of the project areas by [ ] *(OPTIONAL. Use if separate, additional target is needed for aquatic habitat)*

Please include 1-5 *quantifiable* desired condition statements upon which the above target is based:

[ ]

Example: 50 miles of inaccessible salmon spawning habitat is made accessible by removing one dam.
Example: Stands have a basal area of 50-80 square feet/acre, which is ideal for red-cockaded woodpecker.
Example: Stands between 5,000-8,000 ft elevation are dominated by ponderosa pine, with 5-10 trees per group, and openings 0.25- 1 acre.

8. Landscape-scale Desired Conditions Target for Fish & Wildlife Habitat:

[ ] % change (relative to the desired condition) occurs across [ ] % of the landscape area by [ ]

[ ] % change (relative to the desired condition) occurs across [ ] % of the landscape area by [ ] *(OPTIONAL. Use if separate, additional target is needed for aquatic habitat)*

Please include 1-5 *quantifiable* desired condition statements upon which the above target is based:

[ ]

Example: Slash pine is replaced by longleaf pine ecosystem across 5,000 acres of our CFLRP landscape.
Example: Coniferous forests across the CFLRP landscape have an average canopy cover at or above 50%.
Example: All identified inventoried aquatic organism passages at road/stream crossings that were found to be a barrier (10) are accessible for identified aquatic species at all life stages.

Habitat

9. Please select the categories of the broader goals related to fish & wildlife habitat that you are trying to achieve through your quantifiable desired condition(s):

- ☐ Open forest habitat (e.g. wider tree spacing, less mid-story vegetation)
- ☐ Grass/forb/shrub abundance and/or diversity (e.g. native or desired)
- ☐ Wildlife security (e.g. reduced disturbance and/or mortality to fish or wildlife)
- ☐ Rare or sensitive ecosystem protection and/or restoration (e.g. longleaf, bluestem, riparian, meadow, aspen or wetland habitat)
- ☐ Horizontal Complexity (e.g. "mosaic"/diversity of habitat types, patch sizes, and/or patterns)
- ☐ Vertical complexity (e.g. number of canopy layers)
- ☐ Forest structures (e.g. snags, downed wood, den trees)
- ☐ Mast-producing plant abundance and/or diversity (e.g. acorns, nuts, fruits, or berries eaten by wildlife)
- ☐ Sustainable flow of habitat age-classes through time (e.g. planning the proportion of early-, mid-, and late-seral stands)
- ☐ Habitat connectivity/availability (e.g. increased access to or availability of desired habitat)
- ☐ Aquatic habitat connectivity (e.g. culverts are passable to all aquatic organisms, no dams, stream diversions)
- ☐ Aquatic habitat complexity (e.g. downed wood, pools, riffles, etc)
- ☐ Aquatic sedimentation levels (e.g. suspended sediment or fine sediment in spawning gravels)
- ☐ Other. Please describe:

10. Please state the evaluation metric(s) you are using to monitor progress towards your desired conditions for fish & wildlife habitat for this report. Note: This evaluation metric is something you are measuring or counting to monitor habitat change. It has a unit of measurement attached to it.

Examples of habitat evaluation metrcs: basal area in square feet per acre (for tree density), number of trees per acre (for tree density), quadratic mean diameter in inches (for tree sizes), litter and duff depths in centimeters (for fire hazard), percent canopy cover (for openness), percent ground cover (for forage), seedling survival per acre per year (for reforestation), number of woody debris pieces in a specific size class per stream mile (for fish habitat), grass dry weight clippings used to calculate grass pounds per acre (for forage abundance)

Populations

11. Please select the categories of broader goals related to fish & wildlife populations that you are trying to achieve through your quantifiable desired condition(s). Then list the specific species of interest related to each category you select.

- ☐ Maintain abundance/density:
- ☐ Increase abundance/density:
- ☐ Decrease abundance/density:
- ☐ Maintain native species diversity:
- ☐ Increase native species diversity:
- ☐ Translocation/reintroduction:
- ☐ Optimal sustained yield of game species:
- ☐ Ecosystem function/food webs:
- ☐ Spatial extent of population:
- ☐ Other. Please describe:

12. If relevant for your CFLRP project, please state the evaluation metric(s) you are using to monitor progress towards your desired conditions for fish & wildlife populations. Note: This evaluation metric is something you are measuring or counting to monitor population change. It has a unit of measurement attached to it.

Examples of population evaluation metrics: number of wildlife encounter events per unit area via point counts or remote cameras (for wildlife usage), number of pellet groups along transects used to calculate animal density per unit area (for mammal usage), presence/absence of a plant community-associated wildlife species in the project area, presence of aquatic species as indicated by eDNA

☐ Please check this box if you are not evaluating fish & wildlife populations.

Data and Methodology

13. Select the type(s) of monitoring you used to assess Project-scale (P) and Landscape-scale (L) progress towards fish & wildlife habitat desired conditions for this report. Select all that apply.

P	L	
☐	☐	**Baseline Data Collection** (i.e. was data collected prior to treatment to be used for later comparison?)
☐	☐	**Accomplishment Reporting** (i.e. was progress tracked using acres and miles reported?)
☐	☐	**Implementation Monitoring** (i.e. were the treatments implemented as prescribed?)
☐	☐	**Effectiveness Monitoring Pilot Study** (i.e. was a trial run conducted to assess considerations of crafting an effectiveness monitoring plan?)
☐	☐	**Effectiveness Monitoring** (i.e. were treatments effective at meeting the stated objectives?)
☐	☐	**Ecological Impacts Monitoring** (i.e. were there any unforeseen ecological consequences that could compromise treatment success?)
☐	☐	**Other.** Please describe:

14. Select the methodologies used to assess Project-scale (P) and Landscape-scale (L) progress towards fish & wildlife habitat desired conditions for this report. Select all that apply and provide a brief description for each:

P	L	
☐	☐	Common Stand Exams (USFS procedures):
☐	☐	Understory vegetation plots or transects:
☐	☐	Fish or Wildlife occupancy/use surveys:
☐	☐	Stream surveys:
☐	☐	Remote motion-capture cameras:
☐	☐	Ground-based photo points or photo plots:
☐	☐	Aerial surveys, aerial photography, or remote sensing:
☐	☐	Treatments implemented (e.g. acres or miles accomplished):
☐	☐	Modeling (include type and whether ground-truthed):
☐	☐	GIS analysis:
☐	☐	Other:

15. Where is the the data that is being used for monitoring Project-scale (P) and Landscape-scale (L) progress toward fish & wildlife habitat desired conditions being stored? Select the database categories that apply and provide a description of the specific datasets being used. Include links if available:

P	L	
☐	☐	GIS database:
☐	☐	County database:
☐	☐	State database:
☐	☐	Tribal database:
☐	☐	Citizen Science database:
☐	☐	FSVeg:
☐	☐	NRIS:
☐	☐	Other USFS database of record: *please select performance measure from the table below*
☐	☐	Other:

Performance Measure Shorthand	Description	Database	P	L
BIO-NRG	Green tons from small diameter and low value trees removed from NFS lands and made available for bio-energy production	TIM	☐	☐
FOR-VEG-EST	Acres of forest vegetation established	FACTS	☐	☐
FOR-VEG-IMP	Acres of forestland vegetation improved	FACTS	☐	☐
FP-FUELS-NON-WUI	Acres of hazardous fuels treated outside the wildland/urban interface (WUI) to reduce the risk of catastrophic wildand fire	FACTS	☐	☐
FP-FUELS-WUI	Acres wildland/urban interface (WUI) high-priority hazardous fuels treated to reduce the risk of catastrophic wildland fire	FACTS	☐	☐
HBT-ENH-LAK	Acres of lake habitat restored or enhanced	WIT	☐	☐
HBT-ENH-STRM	Miles of stream habitat restored or enhanced	WIT	☐	☐
HBT-ENH-TERR	Acres of terrestrial habitat restored or enhanced	WIT	☐	☐
INVPLT-NXWD-FED-AC	Highest priority acres treated annually for noxious weeds and invasive plants on NFS lands	FACTS	☐	☐
INVSPE-TERR-FED-AC	Highest priority acres treated for invasive terrestrial & aquatic species on NFS lands	FACTS	☐	☐
RD-DECOM-NON-SYS	Miles of road decommissioned (non-system)	WIT	☐	☐
RD-DECOM-SYS	Miles of road decommissioned (system)	ROADS	☐	☐
RD-HC-IMP	Miles of high clearance system roads improved	ROADS	☐	☐

Performance Measure Shorthand	Description	Database	P	L
RD-HC-MAIN	Miles of high clearance system roads receiving maintenance	ROADS	☐	☐
RD-PC-IMP	Miles of road reconstruction and capital improvement	ROADS	☐	☐
RD-PC-MAIN	Miles of system roads receiving maintenance	ROADS	☐	☐
RG-VEG-IMP	Acres of rangeland vegetation improved	FACTS	☐	☐
S&W-RSRC-IMP	Acres of water or soil resources protected, maintained or improved to achieve desired watershed conditions	WIT	☐	☐
SP-NATIVE-FED-AC	Number of priority acres treated annually for native pests on Federal lands	FAD	☐	☐
STRM-CROS-MITG-STD	Number of stream crossings constructed or reconstructed to provide for aquatic organism passage	WIT	☐	☐
TL-IMP-STD	Miles of system trail improved	TRAILS	☐	☐
TL-MAINT-STD	Miles of system trail maintained	TRAILS	☐	☐
TMBR-SALES-TRT-AC	Acres of forestlands treated using timber sales	FACTS	☐	☐
TMBR-TRT	Acres of forestlands treated to achieve healthier conditions	FACTS	☐	☐
Other:			☐	☐
Other:			☐	☐

16. Please describe why the datasets or performance measures you selected in Question 15 above are <u>appropriate for assessing progress</u> towards your fish & wildlife habitat desired condition(s).

Project-scale scoring

From the beginning, CFLRP intended to shift towards desired conditions at the landscape-scale. As the disturbances and processes of interest occur at a landscape-scale, we need a landscape-scale assessment. It's a challenge to look at the impacts at that scale, given the scale itself as well as time delays (e.g. it takes more time to shift outcomes at landscape-scale than project-scale). While landscape-scale is the focus, project-scale assessments allow projects to bring in their monitoring data and look at treatment outcomes.

Each management action funded through CFLRP will have its own project-level objectives that are designed to contribute to achieving desired conditions at larger scales. Project-scale scoring should reflect how well the results of an individual management activity met the objectives for that project. Individual projects may not meet every desired condition of the CFLRP project. Project-scale scoring is conducted by the multi-party monitoring group following completed management activities.

An individual activity might not need to lead to a fully restored acre, but if it sets the landscape up for the next treatment it may still get a good rating. For example if a successful thinning doesn't restore a fire regime, but it sets up landscape for subsequent burns that might, it could still receive a "Green" rating. There may be many reasons for not scoring a "Green," including ecological and sociological considerations beyond the scope of the CFLRP project as well as recognition of unanticipated barriers or challenges. Note that scoring a "Yellow" or "Red" does not necessarily mean that work was not accomplished.

If you need to summarize scores across different desired condition targets, please refer to Guidance Document for additional instruction.

- **Green** = Expected progress is being made towards desired conditions across 75% or more of our CFLRP project areas.
- **Yellow** = Expected progress is being made towards desired conditions across 26% - 74% of our CFLRP project areas.
- **Red** = Expected progress is being made towards desired conditions across 25% or less of our CFLRP project areas.

Ecological Indicator	Green, Yellow, or Red score and % of the CFLRP project areas resulting in measurable progress as defined above	Are you achieving your CFLRP objectives? Yes or No? If "no", briefly describe why in the box below and use the narrative section as needed.
Fish and Wildlife Habitat		

Please briefly describe how you calculated your score.

Scoring for National Reporting

Landscape-scale scoring

Few (if any) CFLRP-funded Landscapes propose to meet every proposed desired condition on every acre or achieve landscape-scale objectives through the mechanical treatment of every acre within their landscape boundary. Rather, multiple projects with multiple objectives (fire risk reduction, wildlife habitat improvement, stream restoration, etc.) should facilitate meeting these broader objectives. Scoring at the landscape-scale reflects the degree to which individual Landscapes are moving towards Desired Conditions at broader spatial extent. Landscape-scale scoring is conducted by the multi -party monitoring group at each Landscape.

"Expected progress" will be defined using 10-year benchmarks for FY 2010 projects and 8-year benchmarks for FY 2012 projects for each desired condition based on a percentage of the lifetime outcome specified for the landscape in each proposal. There may be many reasons for not scoring a "Green," including ecological and sociological considerations beyond the scope of the CFLRP project as well as recognition of unanticipated barriers or challenges. Note that scoring a "Yellow" or "Red" does not necessarily mean that work was not accomplished.

If you need to summarize scores across different desired condition targets, please refer to Guidance Document for additional instruction.

- **Green** = Expected progress is being made towards desired conditions across ☐ % of our CFLRP landscape area.
- **Yellow** = Expected progress is being made towards desired conditions across ☐ % of our CFLRP landscape area.
- **Red** = Expected progress is being made towards desired conditions across ☐ % of our CFLRP landscape area.

Ecological Indicator	Green, Yellow, or Red score and % of the landscape across which progress is being made towards desired conditions	Are you achieving your CFLRP objectives? Yes or No? If "no", briefly describe why in the box below and use the narrative section as needed.
Fish and Wildlife Habitat		

Please briefly describe how you decided on the percentage thresholds used above for the scoring categories and how you calculated your score.

Appendix 8: Acknowledgements

I would like to thank the following people for providing input on the fish and wildlife habitat section of the revised 2019 Ecological Indicator Report template:

L. Buchanan (USFS National CFLRP Coordinator), C. Davis (University of Montana and the Southwestern Crown of the Continent Collaborative), C. Bienz (The Nature Conservancy and the Lakeview Collaborative), S. Boyce (USFS WO National Wildlife Ecologist), D. Shively (USFS WO National Fisheries Program Manager), N. Gillepsie (USFS WO Assistant National Fisheries Program Leader), B. Roper (USFS WO Fisheries Biologist), B. Logan (USFS WO National Wildlife Program Leader), and K. Phillips (USFS WO Wildlife, Fish & Rare Plants).

I would like to thank the following people for providing input on my case study manuscript:

J. Hagar (USGS and courtesy faculty at Oregon State University), B. McComb (Professor Emeritus at Oregon State University), J. Creighton (Associate Professor and Director of the Master of Natural Resources degree program at Oregon State University), L. Buchanan (USFS National CFLRP Coordinator), and J. D. Chastain (supportive spouse).

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