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We developed this Collaborative Adaptive Management framework in the Dinkey Landscape Restoration Process to specify how the group would link information from field visits and monitoring efforts directly back to subsequent planning.

COLLABORATIVE ADAPTIVE MANAGEMENT FRAMEWORK

DLRP DINKEY COLLABORATIVE

Recommended to Sierra National Forest on April 17, 2014

This document identifies the major activities in the collaborative adaptive management process, including associated timelines. It focuses on where, when, and how the members of the Dinkey Collaborative will engage in the adaptive management process as related to ecological restoration. Scientific and technical issues associated with monitoring and adaptive management are addressed in the Collaborative's ecological monitoring plan, not in this document.

1. Types of Adaptive Management

The Collaborative has identified several types of adaptive management (AM) activities that it seeks to utilize in its landscape restoration projects. These include:

A. Field-Based AM

The purpose of this type of AM is to improve implementation of treatments in the immediate term. It involves land managers and Collaborative members making on-the-ground adjustments to treatments based on specific field conditions and dynamics. The details of the adjustments are based on the observations, readily available data, and the land managers', specialists', and Collaborative members' knowledge of the intent of the projects, and their own professional experience and familiarity with the landscape. This kind of Collaborative input occurs typically during field visits, like with visits to the Dinkey South project after treatment.

B. Project Planning AM

The purpose of this type of AM is to regularly and systematically integrate information learned from completed and ongoing projects into subsequent implementation activities and project planning and design. It is derived from the Collaborative's annual review of monitoring information and recommendations (Forest staff may also be reviewing monitoring information on a more frequent basis). The goal is to make the results of monitoring efforts directly relevant to and supportive of improved project planning. The Ecological Monitoring Plan established questions the Collaborative wanted monitored to review project effects on various aspects of the landscape. For example, did project treatments significantly alter canopy cover beyond the management trigger point? If management trigger points were surpassed, the Collaborative would discuss with Forest Service staff how to improve future project implementation. The Socioeconomic Monitoring Plan will ask questions about how projects benefitted surrounding forest communities.

C. Species-Specific AM

The purpose of this type of AM is to review and integrate the results of large-scale and/or long-term species studies into project planning and design (e.g., Fisher Conservation Strategy and California Spotted Owl Demography project) as well as forest stand scale studies (e.g., changes in local occupancy of sensitive species). This is similar to Project Planning AM. However, this type of AM is called out separately because its timing depends on the milestones of species-specific management efforts, rather than an annual review of all relevant monitoring information. The timeframe for

associated actions are also based on the species-specific ecology (e.g., reproductive periods, dispersal, or lifespans), which may differ from vegetative or other planning and management timeframes.

D. Landscape AM

The purpose of this type of AM is to review conditions and trends on the landscape as a whole. The aim is to monitor the effects of multiple projects over time and synthesize how this information should modify project planning and design. Several landscape-scale indicators exist in the Dinkey Collaborative's Ecological Monitoring Plan, and form a starting point for this kind of adaptive management. This periodic, comprehensive, integrative kind of adaptive management will correspond with a science and monitoring symposium held every five years (i.e., 2015 and 2020).

2. Review of Monitoring Information and AM Decision-Making

A. Annual Monitoring Review

i. Timing of Annual Monitoring Review

- a. The Dinkey Collaborative's Annual Monitoring Review will be held in October or November of every year. In 2014, this would be either October 16 or November 20.
- b. This timing is based partly on the annual reporting requirements of the Dinkey Collaborative. Reviewing monitoring information at this time will allow any conclusions and recommendations to be included in the annual reports that describe lessons learned from the year and outline anticipated changes/recommendations in planning directions.
- c. This timing is also based on the annual work schedule of the USFS Sierra National Forest (SNF) staff. They conduct project treatments and collect monitoring data March – August, depending on snow levels. Their findings are compiled into numerous annual reports they are required to complete by the end of their fiscal year, 31 September. NEPA project identification typically begins in the autumn or early winter. Therefore, holding the Annual Monitoring Review in October or November will allow SNF staff time to focus on this effort while ensuring their conclusions and recommendations are available during the project planning period. The gathering of Socioeconomic Monitoring Plan information could also be aligned with this timeline.
- d. To adhere to this timeline, the Monitoring Work Group and Monitoring Coordinator could compile and conduct an initial review of these annual reports in September and October. The Work Group could then present materials and highlight concerns or proposed recommendations to the full Collaborative in October or November. By December, the Collaborative could present recommendations to SNF.

ii. **Types of AM Included in Annual Monitoring Review**

- a. The Annual Monitoring Review will focus primarily on information from Field-Based AM and Project Planning AM. To the extent that the timing of the annual review is conducive with milestones from Species-Specific AM, it could also include this type of information. The Landscape AM is linked specifically to the five-year science and monitoring symposium.
- b. **Regarding Field-Based AM**, this activity occurs during project implementation. For the purpose of AM, staff implementing treatments will track any significant treatment modifications made in the field, make this information available to the Monitoring Work Group and Coordinator, who in turn will present these to the Dinkey Collaborative during the Annual Monitoring Review.
- c. **Regarding Project Planning AM**, this is based on the Collaborative's Ecological Monitoring Plan, and focuses on projects currently being implemented, as well as projects whose implementation was completed by 2010. It includes standard USFS monitoring protocols as well as additional protocols included to address priority concerns regarding implementation and effectiveness of project designs from the Collaborative. For the purpose of AM, Forest staff will make this monitoring information available to the Monitoring Work Group and Coordinator. This type of AM will also be based on the Collaborative's Socioeconomic Monitoring Plan, which will focus on projects being implemented after the plan is finalized.

iii. **Preparation for the Annual Monitoring Review**

- a. Given the extensive information collected as part of the Monitoring Plan, in preparing for the review the Monitoring Coordinator will work closely with SNF staff and the Monitoring Work Group to identify what information merits being highlighted for and discussed with the full Collaborative. This includes socioeconomic information.
- b. Overall, the Monitoring Coordinator will help to focus the review process. The Monitoring Coordinator and Monitoring Work Group will work with the facilitator to develop an appropriate agenda for the review.
- c. As part of the preparation, SNF staff, the Monitoring Coordinator, and the Monitoring Work Group will identify any questions and indicators for which triggers have been met, or significant socioeconomic issues of concern. They will also prepare draft recommendations to the full Collaborative regarding appropriate next steps, based on a comparison of the monitoring results with the desired conditions and indicators for a given question. Therefore, the recommendations for what to do in response to a trigger being met will be on a case-by-case basis.
 - a. Examples of recommendations are: 1) a treatment and project should be a priority to review in the coming year, 2) treatments should have some type of immediate modification, 3) treatments should be deferred, or 4) a new monitoring question should be added.

iv. Roles during the Annual Monitoring Review

- a. During the Review, Collaborative members and SNF staff will jointly review the available information, discuss potential implications for existing or upcoming projects, and develop recommendations to SNF managers regarding how to modify or improve these projects.
- b. The Monitoring Work Group may also choose to invite appropriate subject matter experts for participation in the review. Experts may include SNF and regional staff as well as scientists from Pacific Southwest Research Station, academia, and other public agencies.

B. Science and Monitoring Symposium

i. Timing of Science and Monitoring Symposium

- a. The Dinkey Collaborative's Science and Monitoring Symposium is a major event that will be held in 2015 and 2020. The rationale for this timing is based on the time needed for the Collaborative to plan, implement, and gather a few years of information from restoration projects, and the recognition that it may take a few years for changes in the status and trends of ecological conditions to manifest. Similarly, it takes time for socioeconomic shifts or trends to become apparent.
- b. It is likely that the Symposium will be held in November, before the Thanksgiving holiday. This is for the same reasons that the Annual Monitoring Review is held around this time, and holding the event in November would also allow some additional planning time after the field season to prepare for this major event.
- c. Given the potential breadth of the symposium, and the desire to have scientists intensively engage the material with the attendees, this effort will require the formation of a small Symposium Work Group and development of a project management timeline late in 2014 or early in 2015. This Symposium Work Group will be drawn from the larger Monitoring Work Group, and charged with everything from scheduling to meeting venue logistics, contacting scientists, agenda design and materials development. It will stay in regular communication with the entire Monitoring Work Group, and periodically brief the full Collaborative on its preparations.

ii. Types of AM Included in Science and Monitoring Symposium

- a. The symposium will focus specifically on the large-scale, long-term status and trends of the ecology of the Dinkey Landscape. It will include and build upon the Field-Based and Project Planning AM information gathered and analyzed during the Annual Monitoring Reviews, including socioeconomic information. Given the long-term duration of many of the species-specific studies, it will also be important to integrate Species-Specific AM information as appropriate.

iii. Preparation for the Symposium

- a. In preparing for the symposium, the Symposium Work Group will work closely with the Monitoring Coordinator to review the outcomes and outstanding issues from the Annual Monitoring Reviews.
- b. Next, the Monitoring Coordinator, in coordination with the Symposium Work Group, will prepare a series of draft Science & Monitoring Synthesis reports, including at least one on socioeconomic monitoring outcomes. The purpose is to provide a concise foundational reference for discussions during the symposium.
 - i. Each Science & Monitoring Synthesis report will focus on a topic of concern to the Collaborative. Each synthesis will provide a review of recent scientific literature on the topic; the status and trends associated with the topic; a summary of adaptive management recommendations and modifications made to the associated project treatments; and a list of proposed questions and recommendations for deliberation at the symposium. The time period covered by each synthesis will either be since the Collaborative convened in October 2010, or since the previous symposium in 2015.
- c. The Monitoring Coordinator will then share the draft Science & Monitoring Synthesis reports with appropriate subject matter experts, for feedback and improvement. Experts will include SNF staff as well as scientists from Pacific Southwest Research Station, academia, and other public agencies.
 - ii. The goal of engaging external experts at this time is to ensure the reports include major scientific developments, and also identify questions that have both management and scientific merit. As with all of the Collaborative's monitoring and adaptive management activities, the overall aim is to improve restoration projects.
- d. As with the annual review, any questions and indicators for which triggers have been met, or where there are significant concerns about socioeconomic findings, will constitute an important focus of the symposium. These should be included in the appropriate Science & Monitoring Synthesis report, including draft recommendations regarding appropriate next steps.
- e. The Symposium Work Group and Monitoring Coordinator will work with the facilitator to draft an agenda that optimizes the use of monitoring information and subject matter expertise, for review by the full Collaborative.

iv. Roles during the Symposium

- a. During the Symposium, Collaborative members, SNF staff, and guest experts will jointly review the available information, discuss potential implications for existing or upcoming projects, and develop recommendations to SNF management regarding how to modify or improve these projects.

3. Application of Review and Symposium Outcomes

A. Goals of Adaptive Management

- i. Practical Application for Planning and Implementation**
 - a. The overarching goals of the Dinkey Collaborative’s ecological and socioeconomic monitoring and adaptive management activities are to improve restoration projects and to advance restoration of the Dinkey Landscape as a whole. This means that the outcomes of these efforts must be readily applicable to planning and implementation efforts.
 - b. A derivative goal involves better understanding the ecology of the landscape.

- ii. Improving Management Knowledge, Skills and Tools**
 - a. It is important to understand the status and trends of desired conditions, especially when they are moving toward a trigger point. Therefore, an important aspect of the annual monitoring reviews and science & monitoring symposia will be to discuss the potential reason(s) for observed departures from desired conditions. These may include:
 - i. Accuracy of implementation guidelines
 - ii. Experience of marking crews with using certain guidelines
 - iii. Appropriateness of project design features and treatments
 - iv. Accurate representation of stand conditions
 - v. Understanding of ecological systems and landscape processes
 - vi. Effectiveness of treatments at achieving desired conditions
 - b. Understanding the source of a departure will then allow the Dinkey Collaborative and Forest staff to focus their efforts on improving specific aspects of the planning and implementation process.

- iii. Improving Monitoring Activities**
 - a. Adaptive management involves the improvement of monitoring activities, as well as management activities. In this regard, the regular review and periodic synthesis of monitoring information should consider whether:
 - a. There are gaps in the monitoring plan and/or protocols
 - b. There are new monitoring questions to be addressed in response to new ideas, information, strategies, and/or old monitoring questions that can be removed; and/or
 - c. There are improvements needed for the adaptive management process itself.