EFFECTIVENESS MONITORING COMMITTEE (EMC)
Strategic Plan

Submitted to the California State Board of Forestry and Fire Protection

Revision: Month XX, 2022

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Cover photos (clockwise from the top left): Class II-Large water temperature study site on LaTour Demonstration State Forest; Montana weir at a gaging station in the South Fork of Caspar Creek watershed, Jackson Demonstration State Forest; Automated bird recorder installed on Boggs Mountain Demonstration State Forest (BMDSF); and plot-scale sediment fence installed as part of the BMDSF post-fire runoff and erosion study.

Commented [WK1]: Would anyone like to submit new photos for the front cover? If so, please provide photo credit and photo information.

Commented [WK2R1]: EMC Member Review
I have a request into Kevin and Catalina if they have something they can share from the Class II-L effectiveness study

Proposed photos and captions:

Measuring algal concentrations with a BentoTorch at a study site in a lower Klamath River tributary for the of Class II riparian prescription effectiveness study. Photo by Jonah Nicholas.

Conducting a stream survey at a study site in a lower Klamath River tributary for the Class II riparian prescription effectiveness study. Photo by Cedric Pimont.

EXECUTIVE SUMMARY

The California State Board of Forestry and Fire Protection (Board) formed the Effectiveness Monitoring Committee (EMC) in 2014 to develop and implement a monitoring program to address both watershed and wildlife concerns and to provide a better active feedback loop to policymakers, managers, agencies, and the public. Effectiveness monitoring is necessary to assess whether management practices are achieving the various resource goals and objectives set forth in the California Forest Practice Rules (FPRs), and associated regulations, including other natural resource protection statutes and laws, codes, and regulations (EMC 2013, MacDonald et al. 1991) and is a key component of Adaptive Management (AM). Effectiveness monitoring is also a crucial component for complying with the "ecological performance" reporting requirements outlined in Assembly Bill (AB) 1492 (Forest resource management 2012).

The EMC and the Board developed a suite of critical monitoring questions based on input from a variety of stakeholders and organized them into 11 themes. The EMC uses these themes and critical monitoring questions as guidance to solicit and evaluate effectiveness monitoring projects for funding support. The goal is to develop a process-based understanding of the effectiveness of FPRs and associated regulations in maintaining and enhancing water quality, and aquatic and wildlife habitats. In addition to laying out the critical monitoring questions, the Strategic Plan documents the ~~EMC ground rules, staffing and funding, connections to the AB 1492 Timber Regulation and Forest Restoration Program, an~~ AM framework utilized by the EMC and the Board to evaluate the impacts of the FPRs and associated regulations to new information based on the results of scientific research, and adapt these rules and regulations to new information. The Strategic Plan also describes ~~and~~ the processes for project solicitation, implementation, and evaluation. The EMC will review and update the Strategic Plan every three years and present it to the Board for approval.

Serving as a companion to the Strategic Plan, the EMC Annual Report and Work Plan documents yearly accomplishments by the EMC, tracks changes to EMC membership, documents the project selection process for the year, and provides updates on the status of previously funded monitoring projects. The work products and processes of the EMC include the following:

- Periodically update EMC Strategic Plan for Board consideration.
- Prepare an Annual Report and Workplan for Board consideration.
- Regularly meet in open, webcast public meetings to conduct its work.
- Annual distribution of a Request for Proposal (RFP) soliciting project proposals for monitoring research investigating the FPRs and associated regulations.
- Review and rank project proposals, and recommend projects for funding by ~~February~~ December of each year. Funding of projects occurs from an annual allocation of up to $425,000 each fiscal year from the Timber Regulation and Forest Restoration Fund (TRFRF).
- Review Committee membership as needed due to term expirations or resignations. A Call for Membership, if necessary, is widely distributed to encourage a broad spectrum of applicants that meet membership qualifications.

Commented [WK3]: Board Staff
Travel funds for EMC members are also pulled from this amount, so the EMC should decide how much they want to allocate to that, and release Project Solicitations with that amount.

Commented [WK4R3]: Board Staff
I reviewed the legal language on this, and it appears to me that those funds must be devoted entirely to research, and should not be used for anything else. Legal counsel and the EO agreed. Thus, the EMC travel funds need to come out of elsewhere. I am going to start working on a BCP of fund request perhaps from RM for travel. If each members can send me what they THINK they will need on average per trip, so I can do some calculations and provide supporting evidence, that would be very helpful. Other thoughts on this?

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LIST OF ABBREVIATIONS

Commented [WK5]: REVIEWERS:
All committee members to review for additions, deletions, or modifications

Board Staff to review list at end to refresh as needed.

~~ASP~~	~~Anadromous Salmonid Protection~~
~~BMPs~~	~~Best Management Practices~~
AM	Adaptive Management
Basin Plan	Water Quality Control Plan (WQCP)
Board	California State Board of Forestry and Fire Protection
CAL FIRE	California Department of Forestry and Fire Protection
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CGS	California Geological Survey
CRA	Completed Research Assessment
CNRA	California Natural Resources Agency
~~DSF~~	~~Demonstration State Forest~~
EMC	Effectiveness Monitoring Committee
ESA	Endangered Species Act
EX-EM	Exemption and Emergency Notices
FGC	Fish and Game Code
FGCom	Fish and Game Commission
~~FORPRIEM~~	~~FPRs Implementation and Effectiveness Monitoring Program~~
FPA	Forest Practice Act
FPC	Board Forest Practice Committee
FPP	Full Project Proposal
FPRs	California Forest Practice Rules
~~MC~~	~~Board Management Committee~~
~~NMFS~~	~~National Marine Fisheries Service~~
~~NOAA~~	~~National Oceanic and Atmospheric Administration~~
ICP	Initial Concept Proposal
PI	Principal Investigator
Plans	Timber Harvesting Plans and all other harvest documents as defined under 14 CCR § 895.1
RPF	Registered Professional Forester
THP	Timber Harvesting Plan
~~TMDL~~	~~Total Maximum Daily Load~~
TRFR	Timber Regulation and Forest Restoration Program
~~USFS~~	~~U.S. Department of Agriculture, Forest Service~~
~~Water Boards~~	~~State and Regional Water Quality Control Boards~~
WLPZ	Watercourse and Lake Protection Zone

Working Groups	AB 1492 program Working Groups: Ecological Performance Measures, Data and Monitoring, Administrative Performance Measures, and Interagency Information Systems.
WQCP	Water Quality Control Plan, commonly referred to as Basin Plan.

1.0 INTRODUCTION

The EMC was formed in 2014 to develop and implement an effectiveness monitoring program to address both watershed and wildlife concerns and to provide a better active feedback loop to policymakers, managers, agencies, and the public to better assist in decision-making and adaptive management (AM). Effectiveness monitoring is necessary for assessing whether forest management practices are achieving the various resource goals and objectives set forth in the California Forest Practice Act (FPA) and Forest Practice Rules (FPRs) (see CALFIRE 2020) and other natural resource protection statutes and laws, codes, and regulations (EMC 2013, MacDonald et al. 1991). Effectiveness monitoring is also a critical component in determining compliance with the "ecological performance" reporting requirements outlined in Assembly Bill (AB) 1492 (2012). The Timber Regulation and Forest Restoration Fund (TRFR) is directed by AB 1492 to develop ecological performance measures for state and private forestland management. Therefore, EMC-funded research projects are funded from the Timber Regulation and Forest Restoration Fund (TRFR) fund ~~(see Section 6.0 – Appendix A: Organizational Framework of AB 1492)~~.

A goal of the EMC is to develop a process-based understanding of the effectiveness of the California FPRs and other natural resource protection statutes and laws, codes and regulations, including the California Endangered Species Act (ESA), federal ESA, Porter-Cologne Water Quality Act, federal Clean Water Act, and Fish and Game Code (FGC). The EMC collectively refers to these as the **FPRs and associated regulations**, and evaluates their effectiveness by utilizing research results stemming from EMC-supported research. Findings are then presented in a formal AM process to inform the California Board of Forestry and Fire Protection ('Board') in its future policy development. This is a key component of AM, providing the basis for decision-making and faciltating adaptation to changing circumstances and unexpected outcomes in dynamic ecosystems.

Several documents guide the EMC's operations:

- The Board-approved Charter (EMC 2013) directs the EMC to implement a collaborative, transparent, and science-based monitoring effort. The Charter communicates the goals and objectives of the EMC; describes the membership and structure of the committee; and details meeting organization, rules of conduct, and how the committee takes action and communicates with the Board. EMC members represent a wide range of natural resource expertise from academia, state and federal agencies, private and state forestland owners, and the public. Expertise includes forest management and ecology, hydrology, geology, aquatic ecology, fisheries, wildlife management, and resource monitoring and sampling.
- The EMC's Annual Report and Workplan—most recently completed for 2021 (EMC 2022)—is updated each year to report on progress of individual projects and to document the Committee's ranking and selection of proposed monitoring projects. The annual allocation from the TRFR fund to the EMC for funding of monitoring research is detailed in the EMC Annual Report and Workplan. Current membership and updates on business conducted by the EMC over the course of the year are also reported in the Annual Report and Workplan. Additionally, the EMC receives priorities from Boards, Departments, and Agencies that are incorporated into

its annual priorities (EMC n.d.) (see https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-and-agencies.pdf; also see Appendix A).

- The approach described in the Strategic Plan (this document) is a necessary component of AM, and the Strategic Plan will be updated approximately every three years. Section 1.0 of the document provides a brief background of the EMC. Section 2.0 describes the Strategic Plan "road map," including the development of critical monitoring questions and associated research themes and the EMC and the Board's roles in the AM process. Section 3.0 provides guidelines for development of EMC-funded research, such as considerations of scale in study design, and how project results are utilized in the AM feedback loop to inform policy development. Section 4.0 provides a very brief description of the process utilized by the EMC to solicit, assess, and fund monitoring research projects, and describes expected outcomes of EMC-funded research, including general project deliverables.

~~Figure 1. Monitoring types.~~

- ~~**Implementation** — Assess whether management practices were conducted as designed and planned.~~
- ~~**Compliance** — Monitoring used to determine whether specific rule, regulation, code or policy is being met.~~
- ~~**Effectiveness** — Evaluation of whether a specific management practice had the desired effect.~~
- ~~**Project** — Assesses the impact of a specific management activity or project; can be a subset of Effectiveness Monitoring.~~
- ~~**Validation** — Evaluation of existing data sets or both numerical and conceptual models including management models.~~
- ~~**Baseline** — To identify temporal variability for planning and future comparison.~~
- ~~**Trend** — Conducted at regular, well-spaced intervals to determine long-term trend to evaluate management practices or evaluate models.~~

~~*(Adapted from MacDonald et al. 1991)*~~

Commented [WK6]: REVIEWERS:
Review this document to decide if the EMC wants to keep this reference to this Table in the Strageic Plan; please provide commentary on if:
1) you think it should still be included in this document., and why; and
2) you have suggestions for how to make the table more useful, and ideas on revising it.

Commented [WK7R6]: EMC Member Reviewer:
"This table was previously Appendix D of (at least) the 12/06/2017 revision of the EMC Strategic Plan (Plan) and summarizes the priorities and monitoring questions received from various stakeholders (see section 2.1). It was also available for use as a crosswalk between the rules and themes for project proponents, for example. During a later revision as we were attempting to reduce the size of the Plan we decided to move the table to the website and just provide a link.
That said, I think the link, as well as the Appendix A, can be removed from the document because it is cumbersome and really should be updated more frequently if applicable, if we want to include current priorities in the Annual Report and Workplan."

Commented [WK8R6]: EMC Member Reviewer:
Intent in creating the document was to provide a crosswalk and context to those unfamiliar with specific FPRs, regulations and policies associated with the critical questions and documenting input from various groups for updates. I suspect this document would be updated based on the latest round of input recently solicited. Perhaps there is another proposal to capture suggested additions, deletions or changes?

1.2 EMC Charter

Figure 2. EMC charter goals.

(a) Provide a framework and support to comply with the reporting requirements of AB 1492 (Appendix A).

(b) Support an adaptive management process by providing feedback to the Board regarding effectiveness of the FPRs and associated regulations.

(c) Facilitate and recommend monitoring practices to evaluate how well current practices restore and maintain riparian, aquatic, and terrestrial habitat on private and state forestlands for state and federally listed species and priority species of concern (aquatic and terrestrial).

(d) Ensure that the process is consistent with the goals of the Clean Water Act for water quality on private and state forestlands.

(e) Ensure that the process is consistent with the goals of the Federal and State ESAs on private and state forestlands.

(f) Ensure that appropriate scientific methods and statistical evaluation, when necessary, are used to evaluate effectiveness of the FPRs and associated regulations.

(g) Encourage dissemination of information through general public and scientific outlets.

(h) Support the Board in adjusting its regulations for protection of aquatic and terrestrial resources, and promotion of forest management creating fire-resilient landscapes for wildfire hazard reduction, based on the most current and best available scientific knowledge and technical information; and

(i) Promote use of State Demonstration Forests for effectiveness monitoring of the FPRs and associated regulations.

1.2.1 EMC Membership

In 2014 at the outset of the formation of the EMC, the Board appointed two Co-Chairs and 14 Committee members and identified five support staff. EMC members represent a wide range of natural resource expertise from academia, state and federal agencies, private and state forestland owners, and the public. Expertise can range from forest management, forest ecology, hydrology, geology, aquatic ecology, fisheries, wildlife management, and resource monitoring and sampling, depending on rotating membership. Co-chairs facilitate meetings to ensure all actions and recommendations are made by consensus whenever possible. If failure to reach consensus occurs, the record (i.e., meeting notes) shall specify the key differences and the reasons consensus could not be reached. The Co-Chairs and Executive Officer of the Board establish each Committee member's respective term duration. Current membership is updated in the EMC Annual Report and Workplan.

1.2.2 EMC Ground Rules

As described in the EMC Charter, EMC meetings shall be publicly noticed and will be open to all interested parties, following the Bagley-Keene Open Meeting Act requirements. Meetings are webcast to the extent that technical resources allow. Board-appointed EMC members are encouraged to follow meeting "ground rules" to foster a collaborative scientific-based approach to achieving the stated goals and objectives of the EMC (adapted from WFPB 1987). These ground rules include a commitment to:

(1) Attempt to reach consensus.
(2) Attend all scheduled meetings.
(3) Listen carefully and ask questions to better understand unclear issues.
(4) Have the EMC receive priority attention, staffing, and time.
(5) Have all EMC members clearly define the purposes and goals of their member organizations.
(6) Have all EMC members recognize the legitimacy of the goals and differing perspectives of other EMC member organizations.

1.3 EMC Reporting

The EMC formally reports its activities in three ways:

(1) The EMC Co-Chair or Board staff give verbal updates at Board meetings.
(2) The EMC updates its Annual Report and Workplan annually, and this is approved and finalized by the Board.
(3) The EMC is included in the Board's annual report to the Legislature. The EMC's portion of this report is extracted from the EMC Annual Report and Workplan.

1.4 EMC Personnel and Funding

Dedicated staff and funding are necessary to achieve EMC goals and objectives, and support projects reviewed and recommended by the EMC. Several public agencies and departments have committed personnel to participate in EMC meetings and other efforts, including CAL FIRE, California Department of Fish and Wildlife (CDFW), State and Regional Water Quality Control Boards (Water Boards), California Geological Survey (CGS), United States Forest Service (USFS), National Marine Fisheries Service (NMFS), and the California Natural Resources Agency (CNRA). Private landowners, conservation groups, and universities have also committed personnel. CAL FIRE provides specific personnel to provide technical support to the EMC. In fiscal year 2015/2016, the Board received the addition of one staff person funded by the Timber Regulation and Forest Restoration Fund (TRFR) to specifically support EMC efforts.

During development of the EMC Strategic Plan several critical needs for future personnel and funding were identified. These included:

- Literature review by technical expert(s).
- Study design or statistical review.
- Specialized statistical analysis or modeling.
- Sponsorship of graduate students or contribution to an existing university study(s).
- Ability to respond to and monitor rare and large events (see Section 4.3.1).

- EMC supported projects that require additional support for participation of university(s), specialized consulting or non-government organizations.
- Support for projects consistent with AB 1492 Working Groups (also see Section 2.3 for more information related to the TRFR program.
- Funding to reimburse EMC members for travel costs to/from meetings.
- Organizing and holding public outreach meetings to share EMC project information.
- Obtaining other sources of data or information for EMC sponsored projects (e.g., LiDAR, aerial photos).
- Research projects are funded from the TRFR fund, and allocation is detailed in the EMC Annual Report and Workplan.

2.0 EMC STRATEGIC PLAN ROAD MAP

To facilitate the AM process that informs proposed changes to forestry policy, the EMC supports research that evaluates the FPRs and associated regulations. This section describes the development of critical monitoring questions and related research themes that highlight gaps in knowledge related to the effectiveness of the FPRs and associated regulations; summarizes the critical monitoring questions and related themes, and their relationships to the policies, goals, and priorities of other Agencies, Departments, and Boards (also see https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-and-agencies.pdf); and describes the AM Framework, which is a process for utilizing research results to inform changes to the FPRs and associated regulations.

Figure 3. Primary objectives in developing critical monitoring questions.

(1) Seek, accept, and consider questions from stakeholders and the interested public.
(2) EMC members, in conjunction with the Board, should identify critical monitoring questions that address various EMC goals and objectives.
(3) Develop guidance for appropriate scientific methods and statistical evaluation used to evaluate effectiveness of FPRs and associated regulations.
(4) Increase understanding of the linkage between forest practices and the resource(s) of concern.
(5) Provide guidance for the acceptable level of scientific uncertainty across the broad spectrum of monitoring efforts from small-scale short-term monitoring to long-term replicated studies.
(6) Collaboratively develop methods to prioritize monitoring questions, and based on these methods, help select the highest priority projects to monitor.
(7) Promote collaborative fact-finding and understanding of scientific results at local, regional, and state levels.

2.1 Development of Critical Monitoring Questions

Critical monitoring questions guide and focus research funding, and were established by the EMC via a public process in which the EMC sought and accepted priorities from a wide variety of stakeholders including agencies, departments, boards, EMC members, and the interested public (see Appendix A). Based on a review of those priorities, gaps in scientific knowledge to inform management via the FPRs and associated regulations, and public concerns, the EMC developed a final list of critical monitoring questions, which was submitted along with a draft Strategic Plan in 2017. EMC members, in conjunction with the Board, reviewed priorities and monitoring questions and assessed how well they might achieve various EMC goals and objectives as they relate to the FPRs and associated regulations. The EMC has transformed the priorities into critical monitoring questions following a specific structure which is intended to improve understanding and allow better comparisons between multiple monitoring questions (see example in Figure 1). The Board approved the list of critical monitoring questions and initial Strategic Plan on December 6, 2017.

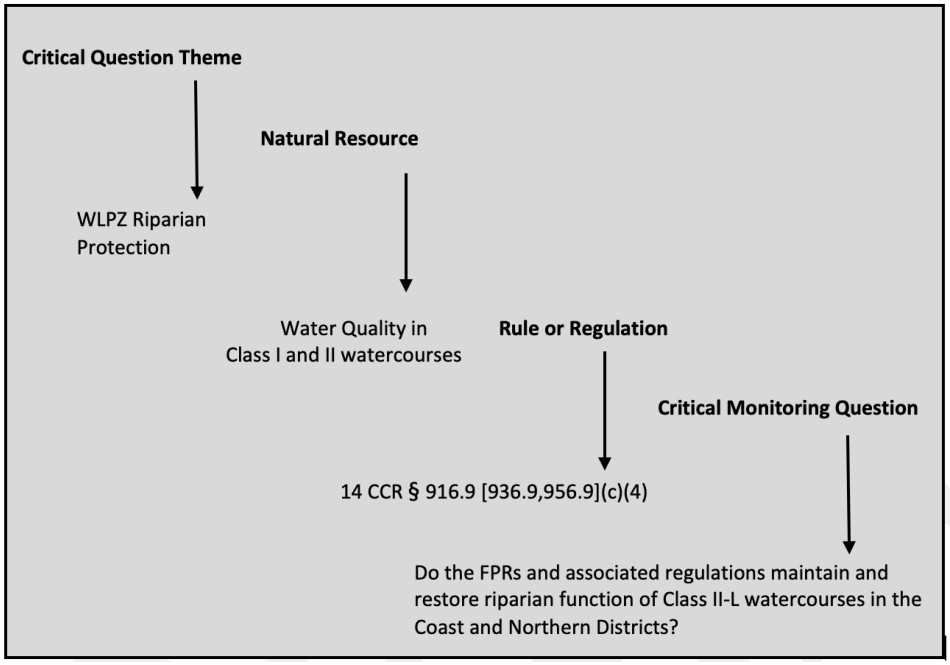

Figure 1. Example: Structure of relationships among the EMC critical monitoring questions, natural resources of concern, and the California Forest Practice Rules.

~~The EMC regularly evaluates proposed research projects that aim to address an EMC critical monitoring question(s), as described in the EMC Annual Report and Workplan. The final step is to select and initiate EMC sponsored projects.~~

~~The Th EMC third and final steps are an ongoing process. The third step includes regularly evaluatesion of proposed research projects, as described in the EMC Annual Report and Workplan, that aim to address an EMC critical monitoring question(s), as described in the EMC Annual Report and Workplan. The final step is to select and initiate EMC sponsored projects.~~

~~2.1.1 Cumulative Impacts~~

~~The Board identified cumulative effects as a priority in their 2014 Annual Report (Board 2014a). Cumulative impacts in the FPRs are defined as found in the California Environmental Quality Act (CEQA) guidelines (14 California Code of Regulations [CCR] § 15355). The EMC recognizes that management practices may produce either positive or negative cumulative impacts, and as such, the EMC refers to cumulative effects and cumulative impacts as interchangeable terms. A focus on cumulative impacts is consistent with the goals of the EMC, given that the proper implementation of best management practices (BMPs) is often cited as an approach for limiting negative cumulative effects from forest practice activities (Reid 2004). Cumulative impacts encompass a broad spectrum of natural processes, resources of concern, and linkages over time and space (MacDonald 2000, MacDonald et al. 2004, Reid 1993). As such, it is necessary to evaluate the effectiveness of these practices at multiple spatial and temporal scales. Therefore, EMC projects selected for funding generally implement an explicit strategy for monitoring and evaluating potential cumulative effects, if appropriate to the research.~~

~~The first element in a strategy monitoring of causal linkages between FPRs and associated regulations and the resource(s) of concern occurs at relatively small spatial and temporal scales, with special emphasis on understanding the management impacts on a particular resource and/or controlling natural process(es) (MacDonald and Coe 2007). The second element uses a nested approach for monitoring to identify linkages at larger spatial and longer temporal scales (see Box 1). This approach can limit confounding factors that have led to many previous attempts failing to evaluate cumulative impacts by monitoring discrete causal linkages between FPRs and associated regulations and resource(s) of concern (MacDonald 2000). Section 4.3 provides more guidance on choosing appropriate spatial and temporal scales for monitoring.~~

~~Box 1. Case Study of Cumulative Watershed Impacts: The Caspar Creek Experimental Watershed Study~~

Monitoring programs that implement hierarchical and nested sample designs can focus on multiple study objectives in an integrated manner. Cumulative impacts may manifest as the result of multiple interacting, localized impacts that only become apparent at greater spatial and temporal scales. Nested study designs that characterize processes and linkages across multiple scales are best suited to address the multiscale complexities of cumulative impacts (Ralph and Poole, 2001). The Caspar Creek Experimental Watershed Study provides a case study for illustrating these principles.

The Caspar Creek study is a cooperative project between CAL FIRE and the USFS Pacific Southwest Research Station located on the Jackson Demonstration State Forest. It is the only research study with long-term records of streamflow and sediment from nested small watersheds in northern California. Caspar Creek has been the subject of three separate watershed studies, with the first experiment conducted in the South Fork starting in 1962. The second experiment began in 1985, with the goal of investigating cumulative watershed effects resulting from clear-cut harvesting primarily using cable yarding in the North Fork. The extent of clearcutting in individual gaged tributaries ranged from 35% to nearly 100%. The cumulative impacts of logging and road construction on suspended sediment, storm runoff volume, and peak streamflow were documented using the modern FPRs in effect from 1989 to 1992.

Results produced from these first two experiments indicated that suspended sediment loads increased almost 3-fold from selection logging and road construction prior to implementation of the modern FPRs. Smaller, but statistically significant, increases in sediment were associated with clearcutting and road construction conducted under the FPRs in effect during the second experiment. The effects of multiple disturbances on suspended loads were found to be approximately additive, and increases in downstream suspended loads were no greater than would be expected based on the proportion of area harvested. Runoff-induced gully initiation and rejuvenation in low order watercourses was found to be a major sediment source during periods without large landslides.

The third experiment began in 2011 in the South Fork and is examining the influence of forest stand density reduction (25% to 75%) in gaged tributary watersheds on physical, chemical, and biological watershed processes. Six gaged sub-watersheds with varying levels of stand reduction were harvested in 2018, with 2 sub-watersheds serving as controls and 3 monitoring stations located on the mainstem of the South Fork. Results from the third experiment in the South Fork will provide additional information on cumulative watershed impacts with its innovative nested design, which includes nesting at the scale of the individual tree up to to the watershed.

~~2.3 Ecological Performance - Timber Regulation and Forest Restoration Program~~

~~The TRFR Program is directed by AB 1492 to develop ecological performance measures for state and private forestland management. Figure B-2 in Appendix A provides some context for the scale of these ecological performance measures. The TRFR Program has been making gradual progress in this work, with initial support from the University of California, Berkeley, to prepare a white paper on science, concepts, and potential approaches for ecological performance measures. A modified version of that white paper is currently under development by CNRA staff. The intent is that the white paper will provide a common basis of terms and concepts that the TRFR Program can use to engage agencies and the public in discussions toward the development of ecological performance measures for state and private forestland management. Completion of ecological performance measures is anticipated sometime in 2019. Ultimately, the ecological performance measures developed through this process will interconnect with the monitoring questions that the TRFR Program needs to answer.~~

~~Natural variability is an inherent characteristic of healthy ecosystems and plays a beneficial role in maintaining ecosystem functions and processes (Holling and Meffe 1996). This innate heterogeneity is an important measure of ecological performance; however, defining quantitative metrics for the natural range of variability is complex and not currently captured in the FPRs and associated regulations. For that reason, effectiveness monitoring projects are unlikely to address range of variability. Such concepts are more likely to fit under the aegis of the Ecological Performance Measures Working Group and will be discussed more thoroughly in the ecological performance measures white paper.~~

2.2 EMC Themes and Critical Monitoring Monitoring Questions

The EMC categorized the critical monitoring questions into eleven research themes, which are listed in no particular order in Table 1, with cross-references to related policies and priorities as received by other Boards, Departments, and Agencies (EMC n.d.) (https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-and-agencies.pdf~~s~~; also see Appendix A). The EMC regularly evaluates proposed research projects that aim to address an EMC critical monitoring question(s), as described in the EMC Annual Report and Workplan, which also reports on project progress, status, and results, and the selection of newly funded projects in that year.

Table 1. Relationships between Effectiveness Monitoring Committee research themes (and related Forest Practice Rules and associated regulations) and potential for contribution to the stated goals and objectives of regulatory policies or plans

Policy or Plan / Theme No.-§	Endangered & Threatened Species Policy +	Salmon Policy +	Water Policy	Joint Pacific Salmon & Anadromous Trout Policies ++	Water Quality Control Plan (Basin Plan)	Interim Joint Policy on Pre, During, & Post Fire Activities & Wildlife Habitat ++	Raptor Policy +
1	X	X	X	X	X		
2	X	X	X	X	X		
3	X	X	X	X	X		
4	X	X	X	X	X		
5	X	X	X	X	X		
6	X	X	X	X		X	
7	X						X
8	X						X
9	X						X
10	X						X
11							

* Board policy; † Fish and Game Commission (FGCom) Policy; ‡ Joint Board and FGCom Policy; § See Themes in numerical order, below, for more detailed descriptions; **if need more symbols ¶ ; # ; ** ; …**

Commented [WK9]: Board Staff:
This Table was added clarify relationships between the Themes and relevant plans and policies, rather than repeating that information in each of the 11 Themes, below, which allows for deletion of a lot of redundant and not particularly useful text.

Commented [WK10R9]: EMC Member Reviewer:
"I'm not a fan of the table, and am ok with the text, but we'll see what the committee says."

Commented [WK11R9]: EMC Member Reviewer:
"Do not like the table."

Commented [WK12R9]: EMC Member Reviewer:
"Good suggestion"

Commented [WK13]: REVIEWERS:
1) Believe all should be cited or at least linked in some way. Please provide links to pertinent documents of which you are aware.

2) Verify the relationships are identified correctly, and that others shouldn't be added, revised/updated, etc.

3) Lastly, clarify which policies were formulated by which agency.

Commented [WK14]: Board Staff:
Nothing indicated in Theme 11 about what Policies it applies to. Any of them? If we aren't keeping this table, we should possibly add that text to the theme 11, like it is in the previous 10 themes.

Commented [WK15R14]: EMC Member Reviewer:
"Theme 11 was added during previous revision to address stakeholder concerns. No policies that I am aware of, but related to FPRs, as stated in text."

Commented [WK16R14]: Board Staff:
If the table was retained, then perhaps a column for the FPRs should be added? Or add in the text for that theme?

Commented [WK17R14]: EMC Member Reviewer:
"From Table C1: FGCom T&E Species Policy; FGCom Raptor Policy; FGCom/Board Hardwoods Policy"

Theme 1 Watercourse and Lake Protection Zone Riparian Function

The Watercourse and Lake Protection Zone (WLPZ) FPRs were developed to ensure that timber operations do not potentially cause significant adverse site-specific and cumulative adverse impacts to the beneficial uses of water, native aquatic and riparian-associated species, functions of riparian zones or result in an unauthorized take of listed aquatic species (14 California Code of Regulations [CCR] § 916 [936, 956]). The primary objective of the FPRs is to maintain or restore riparian and aquatic functions in classified watercourses. Both passive and active management approaches may accomplish these objectives by incorporating options ranging from protection (passive, no touch) to active manipulation of stand structure (e.g., timber harvest) (14 CCR § 916.9 [936.9, 956.9](v)).

~~The WLPZ FPRs can contribute toward meeting goals of the Fish and Game Commission (FGCom) and/or Joint FGCom and Board policies, including those described in the the Endangered and Threatened Species Policy, Salmon Policy, Water Policy, and Joint Pacific Salmon and Anadromous Trout Policies. In addition, the WLPZ FPRs may also contribute to meeting Basin Plan objectives.~~

Commented [WK18]: If keep Table 1, will want to cite these policies in the References section and where appropriate in body of the paper.

Key functions of riparian zones include recruitment of large woody debris, watercourse shading, sediment filtration, nutrient input, microclimate control, streambank/hillslope stability, and habitat for terrestrial wildlife species. Riparian areas occur dynamically within watersheds adjusting to successional vegetation changes, annual hydrologic events, and other disturbances (e.g., wildfires, wind, insect damage, and diseases). The following critical monitoring questions focus on the natural processes and function of WLPZs and allow for the dynamic nature of these management areas.

Are the FPRs and associated regulations effective in …

(a) maintaining and restoring canopy closure?
(b) maintaining and restoring stream water temperature?
(c) retaining predominant conifers in WLPZs and large woody debris input to watercourse channels?
(d) retaining conifer and deciduous species to maintain or restore riparian shade, water temperature, and primary productivity?
(e) maintaining and restoring input of organic matter to maintain or restore primary productivity as measured by macroinvertebrate assemblages?*
maintaining and restoring riparian function of Class II-L watercourses in the Coast District?
(f) maintaining and restoring riparian function of Class II-L watercourses in the Northern District?
(g) managing WLPZs to reduce or minimize potential fire behavior and rate of spread?
(h) filtering sediment that reaches WLPZs?

** Monitoring may also be appropriate for the AB 1492 Working Groups*

Commented [WK19]: **Board Staff:**
Does this need to be here? Or in any of those where it shows up in the following themes?

I could see adding something in Table 1 cross referencing each theme to AB 1492 specifically, and we could delete these notes in the text, like I suggested for the text about relationships to other policies in this and the other themes

Commented [WK20R19]: **EMC Member Reviewer:**
"Not sure if relevant anymore. Are there any working groups?"

Theme 2 Watercourse Channel Sediment

The amount of hillslope erosion and sediment delivery that occurs following timber operations depends on numerous factors, including the site conditions present (e.g., slope, soil type, vegetative cover), soil disturbance, degree of proper FPR implementation, and intensity and number of large storm events following the completion of logging. Since the implementation of the modern FPRs in 1975, a primary goal of these regulations has been to limit management-related sediment delivered to watercourse channels

in California to address protection of water quality and fish habitat. The FPRs have been updated numerous times in the past 40 years to reduce management-related sediment delivery. Specifically, current silviculture practice regulations (14 CCR § 913 [933, 953]); harvesting practices and erosion control measures (14 CCR § 914 [934, 954]); watercourse and lake protection (14 CCR § 916 [936, 956]); and logging roads, landings, and logging road watercourse crossings rules (14 CCR § 923 [943, 953]) provide measures to ensure timber operations meet the goals and intent of the FPRs by limiting sediment delivery to stream channels.

~~These FPRs can contribute toward meeting goals of FGCom and/ or Joint FGCom and Board policies that address protection of water quality and fish habitat, including the Endangered and Threatened Species Policy, Salmon Policy, Water Policy, and Joint Pacific Salmon and Anadromous Trout Policy. In addition, these FPRs may also contribute toward meeting Basin Plan objectives.~~ The following critical monitoring questions address erosion and sediment monitoring at both the watershed (or sub-watershed) scale and project or Plan scale (see Section 2.4.2 for a discussion of appropriate scale).

Commented [WK21]: Delete if keep Table 1.

Are the FPRs and associated regulations effective in minimizing management-related sediment delivery from forest management activities to watercourse channels …

(a) at the watershed and sub-watershed level in managed watersheds?
(b) for individual Plans at the project level to evaluate channel response to forest management prescriptions and additional mitigation measures?*

** Monitoring may also be appropriate for the AB 1492 Working Groups*

Theme 3 Road and Watercourse and Lake Protection Zone Sediment

Similar to Theme 2, the Road and WLPZ Sediment theme has been developed to answer critical monitoring questions regarding management-related hillslope erosion and sediment delivery to watercourse channels in forested watersheds, but focuses on critical monitoring questions related to the effectiveness of FPR requirements included in the recently implemented Road Rules 2013 requirements (14 CCR § 923 [943, 953]). ~~These FPRs also contribute toward meeting goals of FGCom and/or Joint FGCom and Board policies that address protection of water quality and fish habitat listed above. In addition, these FPRs may also contribute toward meeting Basin Plan objectives.~~ The following critical monitoring questions address management-related sediment delivery from forest and road management activities to watercourse channels~~, which may impact water quality and adjacent fish habitat in forested watersheds~~.

Commented [WK22]: Delete if keep Table 1.

Are the FPRs and associated regulations effective in …

(a) reducing or minimizing management-related generation of sediment and delivery to watercourse channels?
(b) reducing generation and sediment delivery to watercourse channels when timber operations implement the Road Rules 2013 measures?
(c) reducing the effects of large storms on landslides as related to roads, watercourse crossings and landings?
(d) maintaining or improving fish passage through watercourse crossing structures?*

** also see Section 3.2.1 for discussion of appropriate scale*

Theme 4 Mass Wasting Sediment

To limit mass wasting sediment from anthropogenic sources, the FPRs require that timber operations be planned and conducted using mitigation measures that minimize sediment delivery from unstable geologic features (14 CCR § 923 [943, 953]). While considerable past monitoring efforts have addressed implementation and short-term effectiveness of FPRs designed to limit sediment entry related to surface erosion processes, less is known at a statewide scale about the success of the FPRs in preventing accelerated rates of management-related mass wasting features. This is particularly important in the California Coast Ranges and Klamath Mountains, where landslide features can be the primary mechanism of sediment delivery. ~~Limitation of mass wasting is consistent with the goals of FGCom and/or Joint FGCom and Board policies, including the Endangered and Threatened Species, Salmon, Water, and Joint Pacific Salmon and Anadromous Trout Policies. In addition, these FPRs may also contribute toward meeting Basin Plan objectives.~~ The following critical monitoring questions address specific mass wasting-related topics to determine if the current rules and regulations are effective in avoiding and limiting management-induced landslides.

Commented [WK23]: Delete if keep Table 1.

Are the FPRs and associated regulations effective in minimizing sediment delivery to maintain water quality from …

(a) existing chronic unstable geologic features?
(b) mass wasting during episodic rare events and/or large storms?*
(c) mass wasting from high risk geologic features?

** also see Section 3.2.2 for discussion of rare or large event monitoring*

Theme 5 Fish Habitat

Numerous FPR regulations relate to the protection of fish habitat features in forested watersheds, particularly those found in the WLPZ rule section [14 CCR § 916 (936, 956)]. Specifically, these FPRs require that timber operations be planned and conducted in a manner that provides protection for water temperature control, streambed and flow modifications by large woody debris, filtration of organic and inorganic material, upslope stability, bank and channel stabilization, and spawning and rearing habitat for salmonids [14 CCR § 916.4 (936.4, 956.4) (b)]. ~~As stated above for the other themes, these rule requirements contribute toward meeting the goals ofFGCom and/or FGCom and BOF (Joint) policies, including: Endangered and Threatened Species Policy, Salmon Policy, Water Policy, and Joint Pacific Salmon and Anadromous Trout Policy. In addition, these FPRs may also contribute toward meeting Basin Plan objectives.~~ The following critical monitoring questions relate to maintaining and/or restoring the quality and connectivity of foraging, rearing, and spawning habitat.

Commented [WK24]: Delete if keep Table 1.

Are the FPRs and associated regulations effective in …

(a) describing and mapping the distribution of foraging, rearing and spawning habitat for anadromous salmonids?
(b) maintaining and restoring the distribution of foraging, rearing and spawning habitat for anadromous salmonids?

** Monitoring may also be appropriate for the AB 1492 Working Groups*

Theme 6 Wildfire Hazard

A goal of the FPRs is the production and maintenance of forests which are healthy and naturally diverse (14 CCR § 897). Numerous studies have shown that creating these types of forests reduces the risk of high severity wildfire (Safford et al. 2012, North et al. 2009, Omi and Martinson 2004, Martinson and Omi 2003). Several FPRs address the theme of wildfire hazard, while also providing measures to ensure timber operations meet the goals and intent of the FPRs, including minimum stocking standards (14 CCR § 912.7 [932.7, 952.7]); special silvicultural methods and stocking requirements (14 CCR § 961); silvicultural objectives and regeneration methods (14 CCR § 913 [933, 953]); logging slash and hazard reduction (14 CCR § 917 [937, 957]); exemptions which facilitate removal of dead, dying or diseased trees (14 CCR § 1038); emergency notices which also facilitate removal of burned, dead, dying or diseased trees (14 CCR § 1052); and fuel hazard reduction (14 CCR § 1051).

~~These FPRs may contribute to meeting the goals of FGCom or Joint FGCom and Board policies, including the Endangered and Threatened Species Policy; Salmon Policy; Water Policy; Joint Pacific Salmon and Anadromous Trout Policy; and Interim Joint Policy on Pre, During, and Post Fire Activities and Wildlife Habitat.~~

To date, little effectiveness monitoring related to this theme has occurred on a statewide basis. Attention to this theme has recently been bolstered due to widespread and increasingly destructive wildand fires within the State. In 2018, Governor Brown Jr. decreed the formation of the California Forest Management Task Force (FMTF; formerly: Tree Mortality Task Force, or TMTF) via executive order (Brown Jr. 2018). The FMTF is built on a foundation of guiding land management to create healthier, more fire-resiliant landscapes. The following critical monitoring questions address specific topics related to wildfire hazard reduction~~, and may also contribute toward meeting water quality standards~~.

Are the FPRs and associated regulations effective in …

(a) treating post-harvest slash and slash piles to modify fire behavior?
(b) treating post-harvest slash and retaining wildlife habitat structures, including snags and large woody debris?
(c) managing fuel loads, vegetation patterns and fuel breaks for fire hazard reduction?

Theme 7 Wildlife Habitat - Species and Nest Sites

A goal of the FPRs is to maintain functional wildlife habitat in sufficient condition for continued use by existing wildlife communities within the planning watershed (14 CCR § 897). More specifically, the FPRs require that timber operations shall be planned and conducted to maintain suitable habitat for wildlife species (14 CCR § 919 [939, 959]) and protection of nest sites (14 CCR § 919.2 [939.2, 959.2]). ~~These FPRs are consistent with the goals of FGCom or Joint FGCom and Board policies, including the Endangered and Threatened Species Policy and the Raptor Policy.~~ Similar to Themes 4 and 6, extensive effectiveness monitoring on a statewide basis has not been conducted on non-federal timberlands for this or the following wildlife habitat themes. The critical monitoring questions that follow address wildlife habitat requirements related to species and nest sites.

Are the FPRs and associated regulations effective in protection of nest sites …

Commented [WK25]: Delete if keep Table 1.

Commented [WK26]: Board Staff
Is this still true?

Also, should that EO be referenced in Table 1?

Is this paragraph really necessary?

Commented [WK27R26]: EMC Member Reviewer:
"Update or delete"

Commented [WK28R26]: EMC Member Reviewer:
"Think add to table 1 and delete here."

Commented [WK29]: Delete if keep Table 1

(a) following general protection measures in 14 CCR § 919.2 [939.2, 959.2](b)?
(b) following species specific habitat and disturbance measures in 14 CCR § 919.3 [939.3, 959.3]?

Are the FPRs and associated regulations effective for the northern spotted owl in …

(a) ensuring take avoidance following 14 CCR § 919.9 [939.9] and 14 CCR § 919.10 [939.10]?
(b) ensuring take avoidance following 14 CCR § 919.9 [939.9](g)?
(c) maintaining adequate amounts of suitable habitat to protect and conserve owls?*

* *Monitoring may also be appropriate for the AB 1492 Working Groups*

Theme 8 Wildlife Habitat - Seral Stages

A goal of the FPRs is to maintain functional wildlife habitat [14 CCR §§ 897; 919 [939,959)], particularly in terms of late seral stage retention. The FPRs require Registered Professional Foresters (RPF) to provide habitat structure information for late succession forest stands proposed for harvesting that will significantly reduce the amount and distribution of late succession forest stands or their functional wildlife habitat value so that it constitutes a significant adverse impact on the environment as defined in Section 895.1 (14 CCR § 919.16 [939.16, 959.16]). Additionally, Technical Rule Addendum No. 2 of the FPRs (see CAL FIRE 2020) provides specific guidance that the assessment of biological habitat conditions should consider snags and den trees, downed trees, large woody debris, multistory canopy, road density, hardwood cover, late seral forest characteristics, and late seral habitat continuity (14 CCR § 912.9 [932.9, 952.9]). ~~These FPRs appear to contribute to the goals of FGCom policies, including the Endangered and Threatened Species Policy and Raptor Policy.~~ The following critical monitoring questions address wildlife habitat requirements related to seral stages.

Commented [WK30]: Delete if keep Table 1

Are the FPRs and associated regulations effective in …

(a) retaining and recruiting late and diverse seral stage habitat components in WLPZs for wildlife?
(b) maintaining or increasing the amount and distribution of late succession forest stands for wildlife?
(c) maintaining or recruiting adequate amounts of early- and mid-seral habitats?

** Monitoring may also be appropriate for the AB 1492 Working Groups*

Theme 9 Wildlife Habitat - Cumulative Impacts

The FPRs require that timber operations shall be planned and conducted to maintain suitable habitat for wildlife species (14 CCR § 919 [939, 959]). Moreover, the FPRs require a Cumulative Impacts Assessment (14 CCR § 898) be completed that includes, but is not limited to, the overall biological habitat condition within both the Plan and planning area. Technical Rule Addendum No. 2 of the FPRs (see CAL FIRE 2020) provides specific guidance for the assessment of cumulative impacts to biological habitat conditions, including snags and den trees, downed trees, large woody debris, multistory canopy, road density, hardwood cover, late seral forest characteristics, and late seral habitat continuity (14 CCR § 912.9 [932.9, 952.9]). ~~With respect to terrestrial species and their habitats, these FPRs may contribute to the goals of FGCom policies, including the Endangered and Threatened Species Policy and Raptor Policy.~~ The following

Commented [WK31]: Delete if keep Table 1

critical monitoring questions that follow address cumulative biological resources-related questions for species in terrestrial habitats.

Are the FPRs and associated regulations effective in …

(a) characterizing and describing terrestrial wildlife habitat and ecological processes?*
(b) avoiding significant adverse impacts to terrestrial wildlife species?

** Monitoring may also be appropriate for the AB 1492 Working Groups*

Theme 10 Wildlife Habitat - Structures

As previously stated other wildlife habitat themes, a goal of the FPRs is to maintain functional wildlife habitat in sufficient condition for continued use by existing wildlife communities within the planning watershed (14 CCR § 897). The FPRs require that timber operations shall be planned and conducted in a manner that maintains suitable habitat for wildlife species (14 CCR § 919 [939, 959]), and encourages retention of structural elements or biological legacies through the implementation of Variable Retention silviculture (14 CCR § 913.4 [933.4, 953.4] (d)). ~~With respect to terrestrial species and their habitats, these FPRs may contribute to the goals of FGCom policies, including the Endangered and Threatened Species Policy and Raptor Policy.~~ The following critical monitoring questions were designed to determine if the FPRs are effective in maintaining a proper level of structure required for wildlife habitat of terrestrial species.

Commented [WK32]: Delete if keep Table 1

Is Variable Retention silviculture effective in meeting …

(a) ecological objectives including co-benefits?
(b) social objectives?
(c) geomorphic objectives?

Are the FPRs and associated regulations effective in retaining …

(a) a mix of stages of snag development that maintain properly functioning levels of wildlife habitat?
(b) native oaks where required to maintain wildlife habitat (14 CCR § 959.15)?

Theme 11 Hardwood Values

Hardwoods are valued as ecological, economic, and cultural resources, and in this context, refers to trees within timberland that are not conifers, both commercial and non-commercial species, including but not limited to: tanoak (*Notholithocarpus densiflorus*), true oaks (*Quercus* spp.), alders (*Alnus* spp.), Pacific madrone (*Arbutus menziesii*), California bay (*Umbellularia californica*), golden chinquapin (*Chrysolepsis chrysophylla),* and aspen and cottonwoods (*Populus* spp.). The FPRs recognize hardwood ecological values in the Appendix to Technical Rule Addendum No. 2 of the FPRs (see CAL FIRE 2020), wherein hardwood cover is recognized as a significant biological factor in cumulative impacts assessments. More generally, the FPRs state that while growing trees for high quality timber, "the goal of forest management…shall be the production or maintenance of forests which are healthy and *naturally diverse,* with a *mixture of trees* and under-story plants [emphasis added]…" (14 CCR § 897 (b)(1)).

The FPRs also have special prescriptions and exemptions from normal Plan preparation for the purposes of restoring hardwood stands (14 CCR § 913.4 [933.4, 953.4] ~~(e)~~l, (f); § 1038 (l) ~~[recently approved by the Board of Forestry]~~). Additionally, the FPRs identify hardwoods as an important component of riparian vegetation in the WLPZ (14 CCR 916 [936, 956]). ~~With respect to hardwoods, the FPRs may contribute toward the goals of the Joint FGCom and Board Policy.~~ The following critical monitoring questions were developed to determine if the FPRs are effective in maintaining and restoring hardwoods on timberland.

Commented [WK33]: Delete if keep Table 1

Are the FPRs and associated regulations effective in retaining…

(a) diverse forests with a mixture of tree species that includes hardwoods (14 CCR § 897 (b)(1))?
(b) native oaks where required to maintain wildlife habitat (14 CCR § 959.15)?
(c) aspen stands (14 CCR § 913.4 [933.4, 953.4] (e))?
(d) California black oak (*Quercus kelloggii*) and Oregon white oak (*Quercus garryana*) woodlands (14 CCR § 913.4 [933.4, 953.4] (f); § 1038 (l)? 358

~~2.3 Exemption and Emergency Notice Monitoring~~

~~Exemption and Emergency (EX-EM) Notice monitoring results are directly applicable to the goals and objectives of the EMC. EX-EM Notice monitoring supports adaptive management, providing a feedback loop to the public trust agencies, the public, and the Legislature regarding FPR compliance and effectiveness. EX-EM Notices are documents containing strict operational prohibitions and requirements for use in exchange for ministerial review and rapid approval. Notices of Exemption are presumed to be compliant with the California Environmental Quality Act (CEQA) and not subject to discretionary review by the Review Team agencies. Notices of Exemption are only exempt from the requirement for a Timber Harvesting Plan (THP). Emergency Notices are intended to give a landowner a head start on timber salvage operations following tree mortality events related to fire, insect, or disease outbreaks while a THP is in development. However, timber operations conducted under either Notice type must still adhere to the operational provisions of the FPRs and be compliant with all other relevant laws and regulations for protection of natural resources. Therefore, while not EMC-supported projects, EX-EM Notice monitoring is an important task for the Review Team agencies.~~

~~Though considerable information has been collected on THP FPRs compliance and effectiveness, virtually no effectiveness monitoring data have been collected on activities related to EX-EM Notices prior to 2018. With expanded use of EX-EM Notices due to massive bark beetle tree mortality events in the interior of California from 2012 to 2016, along with numerous catastrophic timber fires in the last eight years, concern by the Legislature and the public has risen regarding the level of EX-EM Notice compliance with the FPRs and their effectiveness in protection of resource values. Prompted in 2016 by Assembly Bills 1958 (Wood) and 2029 (Dahle), with additional direction from Senate Bill 92 (Committee on Budget and Fiscal Review) in 2017, CAL FIRE and the Board initiated a long-term monitoring program for EX-EM Notices.~~

~~Initial testing of a pilot monitoring protocol took place on Boggs Mountain Demonstration State Forest in the spring of 2018. Representatives from the California Department of Fish and Wildlife (CDFW), California Geological Survey (CGS), and both the Central Valley and the North Coast Regional Water Quality Control Boards participated with CAL FIRE staff to complete monitoring in the summer of 2018. Small interagency teams evaluated 50 randomly selected EX-EM Notices that included at least one~~

~~winter period (Note: six EX-EM Notices were not harvested). Three types of EX-EM Notices were monitored in the field: 1) Exemption Notices 1038(k)—drought mortality; 2) 1038(j)—forest fire prevention pilot; and 3) Emergency Notice 1052.1b—fire damage. Field data protocols focused on measuring residual stand structure, relative intensity of harvesting, fuel characteristics, wildlife habitat elements, road drainage and associated erosion features, watercourse crossing impacts, and watercourse protection.~~

~~An EX-EM Notice pilot project report will be written before the end of 2018 pursuant to deadlines initially imposed by AB 1958 and 2029, and later extended by SB 92. Senate Bill 901 from the 2018 Legislative Session further modified the reporting requirement to make it an annual undertaking of the Department and Board beginning December 31, 2019. SB 901 also directs the Department and Board to report on linear distance of road construction or reconstruction, FPR violations and enforcement actions, and the number of post-treatment site inspections completed by the respective Review Team agencies.~~

2.3 Adaptive Management Framework

Due to relatively small sample sizes and lack of controls for both dependent and independent variables associated with "specific question" studies, statistically rigorous testing of water quality, aquatic habitat, and wildlife resource questions is often difficult. However, well developed resource monitoring questions can improve scientific monitoring designs so as to limit spurious results and enhance the range of inference. The Board recognizes there is scientific uncertainty in how forested ecosystems function within the framework of managed forestlands, and in how various ecosystem components and processes interact. Even with these known uncertainties, the EMC and Board will pursue a better understanding of the effectiveness of FPRs and associated regulations utilizing this AM Framework. The EMC therefore focuses on funding effectiveness monitoring research that feeds an information feedback loop to inform Board policy (Figure 2). Specifically, the Board reviews results of EMC-sponsored scientific studies to evaluate the effectiveness of the FPRs and associated regulations in meeting the goals of the Board.

Additionally, the Board may also consider the following four general goals—in alignment with the policies, goals, and priorities of other Agencies, Departments, and Boards (see Appendix A)—as part of the AM Framework:

(1) To provide compliance with the State and federal ESAs for species found on State and private forestlands.
(2) To maintain and restore forest-dependent species on State and private forestlands.
(3) To meet the requirements of the federal Clean Water Act and Porter-Cologne Water Quality Control Act on State and private forestlands.

Commented [WK34]: Board Staff:
Where do these come from, explicitly? We should cite it, or explain how they were developed.

Commented [ML35R34]: EMC Member Reviewer #1:
It's recognition that it's not just Board goals, we're concerned with ensuring species protection, water quality protection, etc. These goals listed are general, and aligned with Water Boards, CDFW et al mission statements and therefore incumbent upon EMC to also factor into effectiveness monitoring.

Commented [WK36R34]: Board Staff #1:
OK, does this belong here though? Do they add to or provide clarification to the story here? Have reordered and added some text to try to make it more clear, but still not sure if it is needed here. I think we could delete the entire paragraph and the 4 numbered items.

Commented [WK37R34]: EMC Member Reviewer #2:
"I don't recognize this version of the section Adaptive Management Framework as compared to the 2018 Strategic Plan. These goals are important in the context of the EMC and fit into the discussion of the previous version p.17."

Commented [WK38R34]: Board Staff #2:
These were in the previous version of the 2018 Strategic Plan, starting Line 795.

(4) To keep private forestlands economically viable in the State of California, by furthering regulatory streamlining efforts, while still enhancing California's timberland habitat.

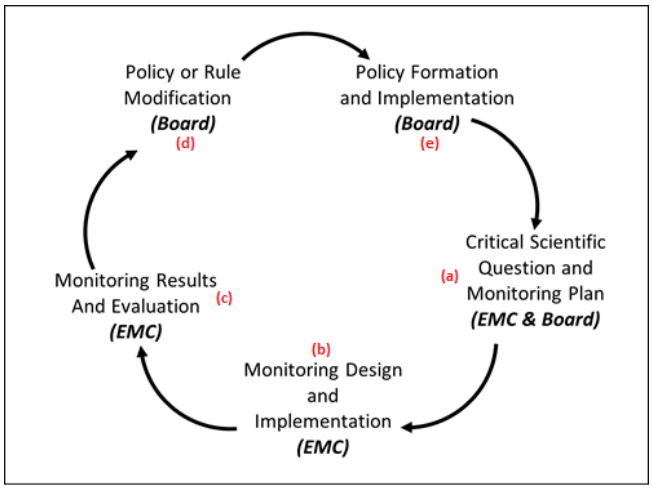

Figure 2. The Adaptive Management Framework using EMC-funded research to inform Board policy and regulations.

When the Board reviews scientific information from EMC-funded studies it is important for Board members to understand the overall context and implications of the research. ~~To achieve this objective the Board shall review information provided in any project scientific reports provided by the EMC that describe:~~

~~(1) The scientific or policy relevance of the study.~~
~~(2) The overall quality of the study design and results.~~
~~(3) Confidence in results explaining the effectiveness of the FPRs, Water Quality Objectives, FGC, or other associated regulations.~~

Therefore, as part of the AM feedback loop, the findings of the EMC-sponsored studies required a means for integrating research results into future forest management plans, either through changed policy, landowner outreach, or a combination of approaches. To address this, the EMC developed a protocol for such an assessment—approved by the BOF in 2021—to further assist in translation of scientific results to the Board, which will aid the Board in adapting policy and regulations to reflect new information gleaned from EMC-funded research. This Completed Research Assessment (CRA) (EMC 2021) (previously known as "Science to Policy Framework") (see https://bof.fire.ca.gov/media/lufd3n5t/emc-completed-research-assessment_final_ada.pdf) provides a step-by-step approach to guide EMC and Board members in verifying scientific integrity and validity of the research, and interprets the results of the scientific research as to the implications for management and policy. At least ~~T~~two EMC members work with the Principal Investigator(s) of a project to complete

Commented [ML39]: EMC Member Review:
This doesn't seem needed it's subsumbed in the BOF's existing goals and programs. Not sure it needs to be called out **given this section is about listing other relevant goals of other entities outside of but related to the BOF**

Commented [WK40R39]: Board Staff #1:
Is that what this section is about? That was not clear to me. This section to me is about how the EMC research utilizes an AM process, which is used by the Board to evaluate and adapt the FPRs based on EMC research results, among other sources of information/data. In terms of the alignment part with other agencies/orgs, I thought it just was to provide more context for how the EMC goals might fit within the other goals of the other agencies

Also, if we don't keep the last numbered item here (#4) one, is there a reason to also keep the other three? Or to even have any of this here? We already stated that the Board and EMC considers the priorities of other agencies, and provided a lot of detail on that in the appendix, and explained the public process breifly in 2.1 as well, so this seems potentially superfluous. **I think we could delete the entire paragraph and the 4 numbered items.**

Commented [WK41R39]: EMC Member Review:
"I believe the paragraph and 4 items can be removed without losing significant meaning and intent."

the required document, which is then presented to the EMC and amended as necessary prior to presentation to the Board.

This process provides an avenue for members to report to the Board with an objective assesssment of the trade-offs and outcomes of different management practices based on EMC-funded research results, as described in the CRA guidelines (EMC 2021). The role of the EMC is not to determine the "best" course of action for policymakers or managers; rather, it is to provide the Board details as to the strength of the science conducted and an assessent of possible policy implications based on science results. Thereafter, the Board determines whether rule changes and policy changes are merited given that information.

3.0 GUIDELINES FOR EMC-FUNDED RESEARCH

New research proposals are assessed by the EMC for scientific soundness and integrity, and the likelihood and ability of the proposed research in answering the critical monitoring questions. This section describes acceptable study designs and methods that EMC-supported research projects should generally follow, including content on: recommended protocols for field and laboratory methods; selection of appropriate temporal and geographic scale; statistical analysis~~, etc~~; reporting guidance and assessment; evaluation and utilization of project results~~ are evaluated and then utilized~~; ~~Resource Benefit Assessment and how that should be used;~~ how the AM framework may be utilized to evaluate the relationships between scientific research results and Board-developed policies; and how policy (i.e., the FPRs and associated regulations~~, rule-making~~) may need to be altered in response to project results.

~~4.1 Resource Benefit~~

~~To allow Board members to better evaluate cost of implementing the existing FPRs and associated regulations, the Board has requested the EMC to evaluate the resource benefit of EMC-sponsored projects. As an example, the Board has requested that the FPRs Road Rules 2013 be evaluated for effectiveness in providing resource benefit and an economic cost of rule implementation. The EMC reviewed this request by the Board and determined that, if appropriate, relevant, and feasible, EMC sponsored projects should include an evaluation.~~

~~For each individual EMC sponsored project an evaluation may be completed of the resource benefit and economic cost of implementing the specific existing FPRs and associated regulation. This evaluation may be completed by the principal investigator or the EMC. The evaluation can be completed using the following guidance:~~

~~(1) The amount of detail should be tailored to the overall potential economic cost to landowners (e.g., higher potential economic cost requires more detail).~~

~~(2) If relevant, the evaluation should attempt to distinguish between land owner types; state vs. private and large vs. small landowners.~~

~~(3) If relevant, the evaluation should attempt to distinguish among Plan types: THP, Modified THP, Nonindustrial Timber Management Plan, Working Forest Management Plan; or Emergency or Exemption Notices.~~

~~(4) The evaluation should describe geographically by Region or County, if appropriate, where resource benefits and economic cost of the existing FPRs and associated regulations may be different.~~

~~In summary, the purpose of evaluating economic costs is to enable analysis of resource benefits within the context of resulting landowner economic burdens.~~

3.1 Study Design within an Adaptive Management Framework

The goal of any EMC effectiveness monitoring study design is to determine if the FPRs and associated regulations related to natural resources management are maintaining and/or restoring desired ecological conditions. The goal of environmental monitoring studies is to detect changes from individual and cumulative effects of activities that are both spatially and temporally distributed across plan areas. Results will be used in an AM framework to determine the appropriateness of policies and practices, and to revise or craft new management practices, policies, or regulations when the current ones do not meet desired results.

Adaptive management "provides a framework for making good decisions in the face of critical uncertainties, and a formal process for reducing uncertainties so that management performance can be improved over time" (Williams et al. 2009). The AM process facilitates learning "not by trial and error, but by a structured process," resulting in reduced uncertainty (Allen and Gunderson 2011). To further account for the complexity and uncertainty surrounding natural resource management, EMC-sponsored study protocols, and EMC and Board responses to results, will be embedded within an adaptive resource management model (Williams et al. 2009), summarized as:

(1) Define research objectives and scope of management to be studied
(2) Develop operational plans to meet the objectives
(3) Implement plans
(4) Collect information about impacts of plans
(5) Evaluat collected information in light of stated objectives
(6) Adjusting plans as informed by new information

Each of the steps in the AM cycle, and its relevance for the EMC, is elaborated below.

(1) Define research objectives and scope of management to be studied.

Studies considered by the EMC must be designed to address: (1) existing or proposed forest management practices; and (2) objectives as defined through legislation (e.g., ESA, FPA), FPRs and associated regulations, and/or by stakeholders. Studies should state the management objectives being

Commented [WK42]: Board Staff:
Alternatively, we can have the steps correspond with Figure 2, which has five steps, and we can rewrite the sections below to reflect that. As it currently stands, it kind of seem like we have two different AM approaches going on here…

Commented [WK43R42]: EMC Member Reviewer:
"I agree, let's make it consistent with previous section."

Commented [WK44R42]: EMC Member Reviewer:
"I think this and items below should be reworked into the structure used in Fig 2 for continuity."

addressed, and include relevant research questions, which can include ecological, economic, and social metrics, as appropriate. Objectives should be attainable with the data collection and analysis methods described. This step in the AM cycle is paralleled by Step a (Critical Scientific Question and Monitoring Plan) in the Adaptive Management Framework (Figure 2).

(2) Develop operational plans to meet objectives -AND- (3) Implement plans.

The EMC will support evaluation of project impacts from forest management activities implemented by landowners, managers, and researchers, which may include any activities of interest described in the Plan (e.g., a THP). Research designs may be observational (e.g., testing existing management or conditions, or analyzing existing datasets) or experimental. In either case, anticipated outcomes of forest management and contributions toward achieving defined objectives will be described based on a thorough literature review outlining existing knowledge and research gaps.

Studies will develop sampling designs using peer-reviewed literature or pilot tests to determine population variability (if applicable), and will include statistical power analyses to determine adequate sample sizes and ensure that differences, if present, can be detected with the selected experimental and analytical methods. Scale may play an important role in detecting statistically significant differences, and can strongly impact variability (see Section 2.4.2 for a discussion of scale). The high natural variability commonly found in natural systems can make finding appropriate comparative groups difficult, as the goal is to have these groups as similar to each other as possible to allow for the detection of differences.

Monitoring studies must have valid study designs to ensure proper inference and application of study results to management. There are a variety of potential approaches to design effectiveness monitoring studies. For example, populations may be sampled by comparing response variables from one set of existing management practices with another set (e.g., treatment-control). A second approach is through the use of experiments where treatments are deliberately prescribed and randomly assigned to experimental units. The advantage of the experimental approach is that the treatments may be of greater or different forest management intensities than the current FPRs allow, and the results of an experiment can provide information that would not be available from a simple observational study. This step in the AM cycle is paralleled by Step b (Monitoring Design and Implementation) in the Adaptive Management Framework (Figure 2). ~~The results can be utilized to determine if changes in the FPRs and associated regulations outside the existing allowed practices might be advisable.~~

(4) Collect information about impacts of plans.

The EMC will rely on information collected through monitoring, which can take multiple forms, including baseline monitoring (measuring current conditions); trend monitoring (measuring attributes over time); effectiveness monitoring (measuring whether objectives of a project have been met); and validation monitoring (testing whether models are accurate). Results will be collected to answer critical monitoring questions about the impacts of the activities being evaluated. This step in the AM cycle is paralleled by a portion of Step c (Monitoring Results) in the Adaptive Management Framework (Figure 2).

Commented [ML45]: EMC Member Reviewer #1:
"the plans"?

Commented [WK46R45]: Board staff #1:
Research plans, that is why it is not capitalized. This follows the terminology used in the introductory text for these steps. Perhaps we should entertain different terminology?

Commented [WK47R45]: EMC Member Reviewer #2:
"I don't have a problem with the language as is."

(5) Evaluate collected information in light of stated objectives.

The EMC will evaluate the results for evidence of consistency with the project's identified objectives. Analysis of the data will frequently take the form of statistical analysis, using either frequentist or Bayesian statistical methods. However, data may take multiple forms and they should be analyzed according to the research questions posed. At times, analysis and subsequent inference may need to rely on expert opinion, especially when statistical analysis is inconclusive. This step in the AM cycle is paralleled by a portion of Step c (Evaluation) in the Adaptive Management Framework (Figure 2).

(6) Adjust plans as informed by new information.

~~The~~ Research results can be utilized to determine if changes in the FPRs and associated regulations outside the existing allowed practices might be advisable. Final project reports are ~~given~~presented to the EMC and the Board, and refined in an iterative and interactive process at publicly-noticed open meetings led by the EMC ~~and~~ , followed with review by the Board. If ~~indicated~~determined to be prudent, proposals for changes to regulations may follow as initiated by the Board and standing committees, and the Forest Practice Committee (FPC) in particular. This step in the AM cycle is paralleled by Step d (Policy or Rule Modification) and Step e (Policy Formation and Implementation) in the Adaptive Management Framework (Figure 2).

3.2 Additional Study Design Considerations

- *3.2.1 Appropriate Scale*

This section provides guidance for the selection of appropriate spatial and temporal scales when designing a monitoring study. The selection of appropriate scales for a monitoring study requires a review of current knowledge and professional judgment. Selection must correspond to the specific study objectives, which should define the resource of concern (e.g., water quality), the controlling factors affecting the resource, and the geoographic scope of those controlling processes (e.g., hillslope, reach, or watershed scale). Using an AM framework, experience and refinements made from initial study phases can be used to adjust temporal and spatial scales so that study objectives are achieved. To address more complex study objectives, a monitoring plan framework of nested and cross-referenced monitoring studies at a range of scales can be applied (MacDonald 2000). Such a framework can be used to identify linkages and increase certainty in cause and effect relationships for complex studies, as well as save on costs and resources over time (Cafferata and Reid 2013).

Spatial or Geographic Scale

Spatial scale defines the geographic area of a study such as a road segment, hillslope, or watershed. Typically, monitoring at large spatial or temporal scales increases the number and complexity of controlling processes, making it sometimes difficult to discern specific linkages between a controlling process and resource of concern. This can add uncertainty to study findings (MacDonald and Coe 2007). Consequently, monitoring projects should focus on the smallest spatial and temporal scales necessary to achieve the study objectives.

Temporal Scale

Temporal scale defines the time period of interest; in forest practice, this may be as short as one storm event, or could span several decades. Most FPR effectiveness monitoring studies to date have been conducted at the site scale (e.g., road segment, harvest unit, stream reach) and are directed at prescription effectiveness over one- to four-year periods (e.g., Brandow and Cafferata 2014). For studies conducted over time with repeated measures, controlling processes should be identified as deterministic or stochastic.

Deterministic processes are finite and produce the same result for a given set of input variables, whereas stochastic (i.e., probabilistic) processes are indeterminate—they produce a range of possible outcomes defined by a probability distribution. The temporal scale of a study should be at least as long as the duration (including lag times) of controlling processes relevant to the study objectives. Temporal and spatial scales are not effortlessly separated, and knowledge of variability over time and space is necessary to effectively allocate monitoring efforts (Bunte and MacDonald 1999).

- *3.2.2 Rare or Large Event Monitoring*

~~Monitoring in most forested areas is typically too short-lived to sample the variability of natural and disturbed hydrologic systems, and has a low probability of documenting environmentally significant episodic events such as large floods, landslides, and debris flows. Dispersed monitoring seldom captures the linkages between large natural disturbance events and the transitory effects of forest practice activities (Dunne 2001). A comprehensive monitoring program should address the intersection of management and disturbances so that the effectiveness of forest practices can be evaluated across the widest range of environmental conditions. These events are not just hydrologic, but can occur due to a variety of individual or combined natural phenomena, including:~~

- ~~Rain-on-snow events that cause rapid increase in stormwater runoff, which can overwhelm drainage systems.~~
- ~~A single storm or sequences of storms that saturate the soil and promote conditions where landslides can deliver sediment and woody debris to streams.~~
- ~~Earthquakes that trigger landslides, steepen slopes, and/or weaken hillslope materials such that instability is further aggravated in subsequent rainfall events.~~
- ~~Drought that causes significant low flow, which may compromise passage of aquatic organisms through estuaries and drainage structures, or can increase the likelihood of stream dewatering during water drafting operations.~~
- ~~Drought that leads to conditions where dense riparian areas have higher burn intensities within WLPZs, and increased fire spread occurs within watersheds.~~
- ~~Large wildfires that affect large components of a bioregion or watershed, affecting significant numbers of aquatic and terrestrial organisms.~~
- ~~Episodic forest pest and/or disease-induced tree mortality exacerbated by prolonged periods of drought and/or higher than normal temperature regimes.~~
- ~~Wind storm events causing loss of mature trees to windthrow across large areas.~~

An effectiveness monitoring program that relies on annual measurements may not capture the information necessary to determine the effectiveness of the FPRs relative to large, frequent, or rare

events. Kirchner et al. (2001) found that catastrophic erosion events are infrequent and of short duration, but can control long-term sediment yield, although they also noted that management activities may alter the probability or magnitude of catastrophic events.

Since these events are rare and can be difficult to capture with infrequent or short-term monitoring, they should be proactively targeted for effectiveness monitoring. Therefore, a different approach to standard monitoring is required to detect and respond to large or rare events immediately following occurrence and thereafter. This type of monitoring will require that a reserve of funds is set aside to respond immediately following the occurrence of such events to determine the effectiveness of the FPRs—an approach sometimes referred to as "post-mortem" monitoring (Stewart et al. 2013). ~~Examples of monitoring after large flood events include evaluations of watercourse crossing performance in Washington, Oregon, and northern California (Furniss et al. 1998), and a review of landslide impacts from large storms in western Oregon (Robison et al. 1999). In California, specific research questions could be addressed, such as:~~

~~Are unstable area prescriptions (e.g., canopy retention, leave areas within unstable landforms) effective for mitigating against mass wasting during high magnitude, low frequency storm events?~~

~~Did flows in culverts and outlets meet a minimum depth requirement for organism passage during low flows, or do flows become hyporheic, resulting in the culverts and outlets becoming a barrier?~~

A critical component of any monitoring or research design is to identify the potential for rare or large events that would trigger the need for "post-event" monitoring, and allocate needed resources should such an event occur. ~~Resources must be allocated prior to event occurrence so that resources can be deployed when a rare or large event occurs. The types of resources required will be determined by the pre-approved monitoring or research plan.~~ Timing can be critical, as much of the forestry monitoring or research evidence can quickly fade away or be lost during restoration activities or other management activities.

~~-~~Once a rare or large event has occurred, the following procedure should be implemented:

(1) The project proponent will notify the EMC as soon as possible regarding the event; the EMC will work with the project proponent to review the event and determine if the event qualifies as a rare or large event, as identified in the study plan.

(2) The pre-approved study plan will be reviewed and modified to best match the conditions that resulted from the rare or large event. Minor adjustments to the monitoring or research plan should be made and then executed without delay.

~~4.3 Anadromous Fish Monitoring~~

~~Anadromous fish reside most of their adult life in the ocean and return to freshwater to spawn; although, juveniles and adults of some species may hold in freshwater for extended periods while others spend more of time in the ocean. Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*), and steelhead trout (*Oncorhynchus mykiss*) in California have complex life cycles, not only among the different species, but also among the different runs (e.g., winter vs. spring run) of species.~~

~~Fisheries managers typically monitor adult escapement and juvenile outmigrants to determine the status and trends of fish populations. State, federal, and local agencies, tribes, and various private entities and landowners collect data on fish populations in California. Available data varies from long-term abundance to spatially- and temporally-limited data. Determining impacts to fish populations requires intensive, multi-year monitoring, as long-term trends may not be detectable for many years due to high natural variability, as well as the complexity and variation of life histories. This complexity, along with the quality and/or abundance of available data and other confounding factors (e.g., climate change, ocean conditions, predator-prey dynamics, etc.), may cause difficulties in identifying correlations between fisheries populations and timber harvesting practices or restoration projects, particularly at the reach or watershed scale.~~

~~Fisheries biologists and other natural resource professionals also monitor stream habitat parameters and indicators to investigate relationships to fish populations and potential impacts of project activities. Data are collected on metrics such as habitat type, benthic macroinvertebrate assemblages, spawning substrate, stream temperature, suspended sediment, flow regimes, turbidity, and riparian vegetation. As with monitoring fish populations, this type of monitoring is conducted across California by government agencies and private entities using accepted protocols. Habitat data are relatively easy to collect, less costly, and less intensive than monitoring for populations. It is also relatively easier to document changes—positive or negative—from timber harvesting practices or restoration projects at a reach or watershed scale within a short timeframe. Various types of stream habitat monitoring allow managers to make inferences on potential impacts to fish populations from timber operations. For these reasons, the EMC will focus primarily on stream habitat monitoring and, when available, will use fish population data as a basis to evaluate the effectiveness of specific FPRs and associated regulations.~~

~~4.5 Scientific Uncertainty~~

~~The Board recognizes there is scientific uncertainty in how forested ecosystems function within the framework of managed forestlands, and in how various ecosystem components and processes interact. Therefore, the EMC and Board recognizes that attempts to increase scientific understanding of ecosystem components or processes in managed state~~ State ~~and private forestlands may never fully provide a complete understanding of these processes. Even with these known uncertainties, the EMC and Board will pursue a better understanding of the effectiveness of FPRs and associated regulations.~~

4.0 EMC PROJECT DEVELOPMENT AND MANAGEMENT

4.1 Project Solicitation and Initial Review

The EMC generally awards effectiveness monitoring research projects on an annual basis~~, with~~. In fiscal year (FY) 2021/2022 and prior, projects were awarded as contracts. Beginning in 2022/23 FY, ~~Projects~~ projects will be solicited through a once-a-year Grant Solicitation~~Request for Proposal (RFP),~~. The solicitation for project proposuall ~~usually~~ is usually released ~~generated after~~ at the start of the ~~fiscal year~~ FY ~~on~~ (in July ~~1~~) (also see Figure 3 for general timeline), although the solicitation may be released sooner in future years.~~st~~. Prospective projects must be proposed to the EMC using the Initial Concept Proposal (ICP), which is a form that must be submitted electronically by a specified date and time (typically September) ~~(see~~. ~~The RFP and required forms can be found on the EMC website~~

Commented [WK48]: **EMC Member Review:**
"Why did we delete the Anadromous fish and scientific uncertainty sections?"

Commented [WK49R48]: **Board staff:**
Scientific Uncertainty was incorporated into Section 2.3 and how Adaptive Management can help with planning and decision making in the face of uncertainty (see SP 2022 DRAFT Line 649)

Deleted anadromous fish monitoring because there was no particular reason to call that out specifically, compared to any other types of monitoring.

~~(https://bof.fire.ca.gov/board-committees/effectiveness-monitoring-committee/) under the section titled "Project Applicants".~~ All ICPs that are not submitted by the specified deadline in the ~~RFP~~solicitation~~, or that~~ are not complete, or are outside the scope of the EMC will be rejected~~, and project applicants will be notified thereafter~~. All ICPs that are not submitted by the specified deadline in the RFP, are not complete, or are outside the scope of the EMC will be rejected.

~~Initial Concept Proposals (ICP) will be solicited with a specified date and time by which submissions must be received by the Board (typically September); ICPs must be submitted on the standard form that the Committee has developed and provided on the website. The EMC will conduct a preliminary technical review of all ICPs that are received by the due date. This review will consider the completeness of the proposals and whether they are within the scope of the Themes and Critical Monitoring Questions elaborated in the Strategic Plan in Section 2.2). The EMC may request the Principal Investigator to provide additional information within a reasonable period. When the EMC determines that an ICP is complete and within scope, it will invite the Principal Investigator to submit a Full Project Proposal (FPP) by a specified date (typically November or December); this form is also available on the EMC website. Project Applicants may reference the CRA, which provides information on how projects will be evaluated once complete, to further guide the kind and level of detail required in the ICP and FPP. All ICPs that are not submitted by the specified deadline in the RFP, or that are not complete or are outside the scope of~~

~~the EMC will be rejected, and project applicants will be notified thereafter.~~

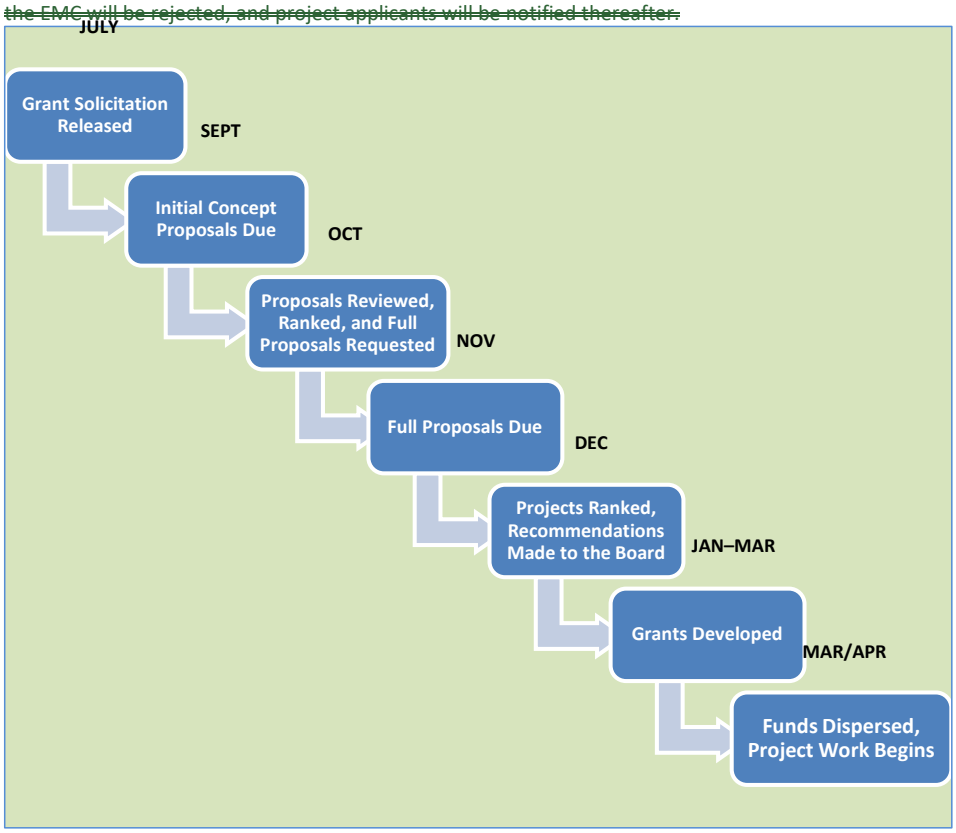

Figure 3. EMC Project Solicitation, Submission, Selection, and Funding General Timeline.

The EMC conducts a preliminary technical review at a publicly-noticed open meeting, considering the completeness of the proposals and whether they are within the scope of the Themes and Critical Monitoring Questions elaborated in Section 2.2). At this meeting, which typtically occurs in the late summer or fall, the EMC sends an email invitesation the Principal Investigator (PI) for ~~the~~ any ICPs ~~for~~ on which it ~~which it~~ would like to see a Full Project Proposal (FPP). Detailed instructions for completing and submitting the ICP are given in the ~~RFP~~solicitation, which can be found ~~the RFP and all required forms (i.e., ICP and FCP) can be found~~ on the EMC website (https://bof.fire.ca.gov/board-committees/effectiveness-monitoring-committee/) under the section titled "Project Applicants", along with other related documents (i.e., the ICP and FPP).~~53~~.2 ~~Conflict of Interest~~

~~As an advisory committee under the oversight of the Board, members of the EMC may be perceived as quasi-public officials, although though the committee lacks decision-making authority. As such, it is~~

~~important that the members be aware of and avoid potential conflicts of interest, or even the perception of a conflict of interest. Generally, members must avoid participating in or influencing any decision in which they have a direct or indirect financial interest or other personal interest. The California conflict of interest rules that may apply to a particular member, or in a particular situation, can be very complex. The EMC will work with Board staff to screen proposals for any conflicts of interest. EMC members who are the Principal Investigator or Collaborator on a project will recuse themselves from ranking their proposal. If any questions or concerns arise regarding a potential conflict of interest, EMC members will seek guidance from the Board's legal counsel.~~

4.2 Project Ranking and Selection

Applicants may reference the CRA (EMC 2021), which provides information on how projects will be evaluated once complete, which provides further guid ance as to the expectations of EMC-funded research. The EMC will conduct a thorough technical review of all FPPs that are received by the indicated due date. ~~This review will consider the completeness of the proposals and whether they are within the scope of the Themes and Critical Monitoring Questions elaborated in the Strategic Plan in Section 2.4. Principal Investigators will be invited to present and discuss their proposals at an EMC meeting. If needed, the EMC may request the Principal Investigator to provide additional information within a reasonable period.~~ When a ~~Full Project Proposal~~ FPP is deemed complete and ready for ranking, EMC members will individually rank each project and the average ranking score will be calculated for each project. No specific minimum average ranking score is required for support; rather, individual project scores will be considered relative to other project scores.

Once all ~~of the~~ FPPs ~~for the annual project cycle~~ have been ranked, the EMC members discuss the projects in detail, and vote whether or not to ~~will vote to make recommendations to the Board for~~ allocat~~e~~ion ~~of~~ available EMC funds to the ~~Proposals~~project proposed, taking into consideration the project ranking score, likelihood of effectively testing the effectiveness of the FPRs, and the requested budget. Ranking, discussion, and voting takes place during regular, publicly-noticed meetings of the EMC. The EMC may decide to recommend funding a proposal in full, in part, or not at all. The Board will make the final funding decision.

~~It is the intent of the EMC to ensure a transparent ranking process, with ranking conducted in an easily traced manner. Ranking will takes place during regular, public meetings of the EMC, which are noticed ten business days prior to each meeting.~~ Subsequent to ranking actions, both written notes of the meeting and ranking results are published on the ~~Board's~~ EMC's website. Principal Investigators will be notified of their project ranking, and any comments regarding their project referred to them from the Committee.

- *4.2.1 Ranking Metrics*

The metrics used for ranking proposed EMC projects were modeled on the Cooperative, Monitoring, Evaluation and Research Committee (CEMR) (established by the State of Washington Forest Practices Board) general method for ranking projects. This was deemed prudent during the intial formation of the EMC, as CEMR is roughly similar in scope and mission as the EMC, and is a well respected governmental advisory committee (see https://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board/cooperative-monitoring-evaluation-and-research). Proposals will be evaluated based on the

Commented [WK50]: **Per an EMC Member:**
This is not true.

Commented [WK51R50]: **Board staff:**
Per legal counsel, this IS correct. Rejecting the deletion.

guidelines described in Section 3.0, and ranked in five categories (see Figure 4).~~Metrics for ranking each project proposal are as follows:~~.

~~***Themes and Critical Question(s)***~~

~~Each year, the EMC decides on approximately five critical monitoring questions to prioritize for that year's funding cycle, and these are included in the RFP. Projects that prioritize research investigating these questions may be given priority over other, similarly ranked projects, although this does not exclude research into other compelling or critical monitoring questions.~~ ~~Projects that address multiple EMC critical themes and critical monitoring questions within a given theme will be ranked higher than those that only address a single theme and critical question. Additionally, projects must describe appropriate study design and methods to adequately address the proposed critical question(s), and approximate time frame to conclude results that may be used by the Board to use an evidence-based approach in rule revision(s).~~

~~***Scientific Uncertainty***~~

~~Projects will be ranked higher when the current scientific understanding of effectiveness in the FPRs and associated regulations is incomplete.~~

~~***Geographic Application***~~

~~Proposed projects that have broad application throughout California forestlands both public and private will be ranked higher than those with application limited to a specific geographic region or sub-region. Projects need not be physically located in California to produce findings that apply to multiple areas in the state~~State~~.~~

~~***Collaboration & Feasibility***~~

Projects will receive higher ranking when they have a broad array of collaborative partners involved with substantive expertise in the proposed study. This is to encourage multidisciplinary approaches in the proposals. Project proponents are encouraged to collaborate with state and federal agencies, universities, private industry, non-governmental organizations (NGOs), watershed groups, and others. Past performance in delivering timely, acceptable monitoring reports within available budgets will be considered.

• **Critical Question(s)**	Proposed monitoring project addresses one or more EMC critical monitoring questions with appropriate study design and experimental methods. Projects addressing multiple themes and critical monitoring questions will be ranked higher. Approximate time frame required for results that may be used by the Board in an evidence-based approach in rule revision(s) will also be considered.
• **Scientific Uncertainty**	Projects will be ranked higher when the current scientific understanding of effectiveness in the FPRs and associated regulations is incomplete or

	~~Current scientific understanding is~~ not ~~well-studied or~~ validated.~~-~~ This ranking is weighed twice (2 times) the weight of other rankings.
• **Geographic Application**	~~Critical question~~ ~~and p~~Proposed project has broad geographic application~~. Projects with broad~~to California ~~application in California~~ forestlands—both public and private—will be ranked higher than those with limited geographic applicability. Projects need not be physically located in California to produce findings that apply to multiple areas in the State.
~~**Application**~~	~~application.~~
• **Collaboration & Feasibility**	Projects with relatively more actively contributing collaborators with substantive expertise and ~~Number of active contributing collaborators~~ multi-disciplinary approaches ~~relative to the monitoring~~will rank higher.
	~~**& Feasibility** subject. Consider the magnitude and expertise of the collaborators.~~ Feasibility of monitoring project to meet stated goals and objectives within expected budget and timelines needed by the EMC, Board or stakeholders. ~~Projects will receive higher ranking when they have a broad array of collaborative partners involved with substantive expertise in the proposed study. This is to encourage multidisciplinary approaches in the proposals. Project proponents are encouraged to collaborate with state and federal agencies, universities, private industry, non-governmental organizations (NGOs), watershed groups, and others. Past performance in delivering timely, acceptable monitoring reports within available budgets will be considered.~~

On a categorical scale of 1 to 5, reviewers should refer to the following guidance when reviewing and ranking a proposal:

1 = Does not meet any portion of the Ranking

2 = Does not meet key portions of the Ranking

3 = May meet some portions of the Ranking, either key or ancillary

4 = Meets key portions of the Ranking and does not address ancillary portions

5 = Meets all portions of the Ranking

Commented [WK52]: Board Staff:
Well…. The EMC came up with the critical questions, so perhaps delete that….

Commented [WK53R52]: EMC Member Reviewer:
"Agree"

Figure 4. Ranking of proposed effectiveness monitoring projects.

- ***4.2.1 Consideration of Funding Request***

The EMC reports the amount of funding requested, but it is not a ranking criterion. The proposed monitoring projects need to describe existing collaboration and funding sufficient to ensure achieving the stated goals and objectives of monitoring. Proposals must clearly state the amount of funding requested from the EMC. Project proponents shall provide the information on the requested funding in proportion to the total project budget, and any sources, types, and amounts of matching funding or other resources.

4.3 Project Management

~~Board, agency, and EMC staff will work closely with Principal Investigators to manage the current and ongoing project workload.~~ The following describes the process of contract development, implementation, periodic management and assessment, and final reporting.

- ***4.3.1 Contract Development and Administration***

Contracts will be developed by Board staff under guidance of CAL FIRE contracting staff. It is critical that project selection be completed as early as possible in the fiscal year to ensure that contract deadlines can be met and funds encumbered in the appropriate fiscal year. The EMC is investigating a grant program as a means of distributing funding on future projects and will continue to evaluate the merits of instituting a such a program in FY 2022/23.

- ***4.4.2 Status Reports and ~~Reports~~Presentations***

EMC members and staff, as well as Board and agency staff as needed, will work closely with with Principal Investigators to manage the current and ongoing project workload. The EMC implemented a new communication system in 2020 in which individual committee members are assigned as Project Liaisons, and regularly check-in with PIs to ensure project progress and deliverables are on track for EMC and Board review. Project Liaisons or PIs ~~also~~ are also asked to ~~may~~ provide project updates at regularly scheduled EMC meetings., approximately four times per year. ~~Staff will report on progress at each EMC meeting.~~ Co-chairs will brief the Board during EMC updates as needed. Principal Investigators will provide at least bi-annual updates on project status and progress by no later than June 30th and December 31st of each year~~annual yearly updates on status and progress~~. ~~In person reports~~ Presentations may be requested by the EMC when key results have been collected, or events have occurred that impact the project, and PIs may also initiate project presentations ~~by the EMC~~ at committee meetings.

- *4.4.3 Final Reports, Presentations, and Publications*

Final deliverables will vary depending on the project proposal and agreed-upon deliverables. Any project presentations are given during open, publicly-noticed meetings of the EMC. In general, a final project report and a live presentation should be provided by the PI to the EMC~~, and shall include complete discussions of the statistical, physical, and biological relevance of the monitoring and results~~. Reports shall include descriptions of purpose and need, scientific methods, technical and/or statistical analysis, results, evaluation of implications for resources and forest management operations, and scientific uncertainties or possible limitations of results. Any publications, presentations, or other forms of project reporting given to other organizations, or published papers or reports, should also be shared with the EMC within 12 months of official publication date, and these will be posted to the EMC website.

Two ~~Members~~ members of the EMC ~~or~~ works with the ~~principal investigators~~ PI to ~~conducting monitoring will~~ synthesize ~~the~~ project results into the CRA ~~final reports~~ for translation of scientific results to the EMC~~.~~, and these ~~two EMC~~ members will present the results of the CRA to the EMC at an open, publicly-noticed meeting. ~~Reports shall include descriptions of purpose and need, scientific methods, technical and/or statistical analysis, results, evaluation of implications for resources and forest management operations, and scientific uncertainties or possible limitations of results.~~

~~Any publications, presentations, or other forms of project reporting given to other organizations, or published papers or reports, should also be shared with the EMC, and these will be posted to the EMC website. All final reports shall include descriptions of purpose and need, scientific methods, technical and/or statistical analysis, results, evaluation of implications for resources and forest management operations, and scientific uncertainties or possible limitations of results.~~

~~The r~~Reports ~~or~~ and presentations in any form shall not provide policy or regulatory recommendations, other than ideas for potential further refinement of study methods to address any significant limitations and remaining scientific uncertainty. All final reports will be made available to the public on the EMC webpage. Development of possible rule language changes based on results and findings of EMC reports, if necessary, shall be proposed by or brought before the Board's ~~Forest Practice Committee (~~FPC~~)~~ for review and comment prior to submittal to the full Board.

~~All reports shall include complete discussions of the statistical, physical, and biological relevance of the monitoring and results. Due to relatively small sample sizes and lack of controls for both dependent and independent variables associated with "specific question" studies, statistically rigorous testing of water quality, aquatic habitat, and wildlife resource questions is often difficult. However, well developed resource monitoring questions can improve scientific monitoring designs so as to limit spurious results and enhance the range of inference.~~

4.4 EMC Supported Monitoring Projects

Details on past and current EMC supported projects are available on the EMC Website (https://bof.fire.ca.gov/board-committees/effectiveness-monitoring-committee/), and include project proposals along with all other deliverables related ot the project, including presentations, videos, technical reports, or other products. The EMC Annual Report and Workplan, most recently published in

Commented [WK54]: EMC Member Reviewer:
"This seems like a very generous grace period. I would prefer to receive any of these items much sooner if they are available."

Commented [WK55R54]: Board Staff:
This was language suggested by the grants department because there was no written requirement in the past addressing this.

Commented [WK56]: EMC Member Reviewer:
"What about findings that could improve BMPs? For example, when one of the erosion studies found that slash placed at waterbar outlets reduced sediment concentrations? I'd think we would want to have the researchers provide that."

Commented [WK57R56]: Baord Staff:
The CRA does provide opportunity to address the implications of the research, but the researchers themselves should not be making explicit suggestions regarding policy changes; that is up to the Board.

January 2022 (EMC 2022) also provides detailed status updates on active or recently completed EMC-funded projects.

5.0 SUMMARY

In summary, the EMC supports and funds effectiveness monitoring research that seeks to answer or further clarify information about critical monitoring questions related to the impacts of the FPRs and related regulations (Section 2.2). Based on resultant scientific reports, presentations, publications, and a final assessment (i.e., CRA), the EMC translates the results of research to the Board, which utilizes an iterative Adaptive Management Framework to further refine forestry-related rules and regulations based on evidence-based effectiveness monitoring.

5.0 REFERENCES

Allen, C.R., and L.H. Gunderson. 2011. Pathology and failure in the design and implementation of adaptive management. *Journal of Environmental Management* 92:1379–1384. https://usgs-cru-individual-data.s3.amazonaws.com/allencr/intellcont/Allen%20and%20Gunderson%202011-1.pdf

~~Barber, T.J. and A. Birkas. 2006. Garcia River trend and effectiveness monitoring: Spawning gravel quality and winter water clarity in water years 2004 and 2005, Mendocino County, California. Final Report prepared for the Mendocino County Resource Conservation District. Ukiah, CA. 87 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/2006_supported_reports/garciacdf2006finalreportcdf2_.pdf~~

~~Battle Creek Task Force (BCTF). 2011. A rapid assessment of sediment delivery from clearcut timber harvest activities in the Battle Creek Watershed, Shasta and Tehama Counties, California. Final report prepared for the California Resources Agency. Sacramento, CA. 59 p.~~

Benda, L. ~~and~~ , D. Miller, K. Andras, P. Bigelow, G. Reeves, and D. Michael. 2007. NetMap: A new tool in support of watershed science and resource management. *Forest Science* 53(2~~)~~):206~~–~~218.

~~Board of Forestry and Fire Protection (Board). 1999. Hillslope monitoring program: Monitoring results from 1996 through 1998. Interim Monitoring Study Group Report prepared for the California State Board of Forestry and Fire Protection. Sacramento, CA. 70 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/bof_1999_hmp__interim_rpt_.pdf~~

Board. 2009. Monitoring study group meeting minutes from July 22, 2009. Redding, CA. 6 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/meeting_minutes/2009_meeting_minutes/msg_meeting_minutes_07-22-09__1_.pdf

~~Board. 2014a. The Board of Forestry and Fire Protection 2013 Annual Report. January 31, 2014. Sacramento, CA.~~

Board. ~~2014b~~2014. Cumulative effects assessment: Scope of review. Sacramento, CA. 14 p.

Brandow, C.A., and P.H. Cafferata. 2014. Forest practice rules implementation and effectiveness monitoring (FORPRIEM) program: Monitoring results from 2008 through 2013. Monitoring Study Group Report prepared for the California State Board of Forestry and Fire Protection. Sacramento, CA. 121 p. plus Appendix. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/forpriem_report_final_022715.pdf

~~Brandow, C.A., P.H. Cafferata, and J.R. Munn. 2006. Modified completion report monitoring program: Monitoring results from 2001 through 2004. Monitoring Study Group Final Report prepared for the California State Board of Forestry and Fire Protection. Sacramento, CA. 80 p.~~

Commented [WK58]: REVIEWERS:
All committee members should look at this list and be sure there is nothing missing (or extra), and make sure the most relevant and recent versions are here, and have functional weblinks.

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~~http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/mcrfinal_report_2006_07_7b.pdf~~

Brown, E.G., Jr. 2018. Executive Order B-52-18, 3 C.F.R. 4 (2018). State of California: Office of the Governor. May 10, 2018. https://www.gov.ca.gov/wp-content/uploads/2018/05/5.10.18-Forest-EO.pdf

Bunte, K., and L.H. MacDonald. 1999. Scale considerations and the detectability of sedimentary cumulative watershed effects. Technical Bulletin no. 776, National Council for Air and Stream Improvement (NCASI), New York, NY. 326 p.

California Department of Forestry and Fire Protection (CAL FIRE). 2020. California Forest Practice Rules 2020. Title 14, California Code of Regulations Chapters 4, 4.5, and 10. Prepared for California Licensed Timber Operators and California Registered Professional Foresters. Compiled by The California Department of Forestry and Fire Protection Resource Management, Forest Practice Program, Sacramento, CA. https://bof.fire.ca.gov/media/9478/2020-forest-practice-rules-and-act_final_ada.pdf

~~California's Forests and Rangelands 2017 Assessment. 2017. California Department of Forestry and Fire Protection Fire and Resource Assessment Program. Sacramento, CA. 318 p. http://frap.fire.ca.gov/assessment2017/FinalAssessment2017/Assessment2017.pdf~~

~~Cafferata, P.H. and J.R. Munn. 2002. Hillslope Monitoring Program: Monitoring results from 1996 through 2001. Monitoring Study Group Final Report prepared for the California State Board of Forestry and Fire Protection. Sacramento, CA. 114 p. http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/combodocument_8_.pdf~~

Cafferata, P.H., and L.M. Reid. 2013. Applications of long-term watershed research to forest management in California: 50 years of learning from the Caspar Creek experimental watersheds. California Forestry Report No. 5. California Department of Forestry and Fire Protection. Sacramento, CA. 110 p. http://calfire.ca.gov/resource_mgt/downloads/reports/California_Forestry_Report_5.pdf

Central Coast Regional Water Quality Control Board. 2011. Water Quality Control Plan (Basin Plan). State of California, San Luis Obispo, CA. http://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/

Central Valley Regional Water Quality Control Board (CVRWQCB). 2011. Water Quality Control Plan (Basin Plan). State of California, Rancho Cordova, CA. http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/

CVRWQCB. 2014. Central Valley Water Board timber harvest waiver for activities on federal and non-federal lands. Order No. R5-2014-0144, Conditional Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvesting Activities, adopted 4 December 2014, includes Attachment A (Categorical Waiver), Attachment B (Monitoring and Reporting Conditions) and

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Also, has been updated many times sine this. Last was 2019.

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Attachment C (Monitoring and Reporting Program).
http://www.waterboards.ca.gov/centralvalley/water_issues/timber_harvest/

~~Dietterick, B., C. Surfleet, D. Perkins, D. Loganbill, D. Theobald, and M. Crable. 2015. Post-harvest and post-fire watershed response: Observations, assessments, and evaluations. Final Report prepared for the California Department of Forestry and Fire Protection. Swanton Pacific Ranch. Cal Poly State University, San Luis Obispo, CA. 115 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/2015_supported_reports/calpoly_slo_2015_littlecreekwatershedstudy_summaryreport.pdf~~

~~Dunne, T. 2001. Introduction to section 2—Problems in measuring and modeling the influence of forest management on hydrologic and geomorphic processes. Pages 77-83 in: M.S. Wigmosta and S.J. Burges (eds.) Land Use and Watersheds: Human Influence on Hydrology and Geomorphology in Urban and Forest Areas. Water Science and Application Volume 2, American Geophysical Union, Washington, D.C.~~

Effectiveness Monitoring Committee (EMC). 2013. Charter of the effectiveness monitoring committee. California Board of Forestry and Fire Protection. August 12, 2013. 11 p. https://bof.fire.ca.gov/media/10115/effectiveness-monitoring-committee-charter-7120_ada.pdf

EMC. 2021. Completed Research Assessment. California Board of Forestry and Fire Protection. https://bof.fire.ca.gov/media/lufd3n5t/emc-completed-research-assessment_final_ada.pdf

EMC. 2022. 2021 Effectiveness Monitoring Committee Annual Report and Workplan. California Board of Forestry and Fire Protection. January 28, 2022. 22 p. https://bof.fire.ca.gov/media/0yipqkwn/emc-annual-report-and-workplan-2022_final_ada.pdf

EMC. n.d. Table C1. Priorities received from Boards, Departments and Agencies. . California Board of Forestry and Fire Protection. https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-and-agencies.pdf

~~Euphrat, F., K.M. Kull, M. O'Connor, and T. Gaman. 1998. Watershed assessment and cooperative instream monitoring plan for the Garcia River, Mendocino County, California. Final Report submitted to the Mendocino County Resource Conservation District and the California Department of Forestry and Fire Protection. Sacramento, CA. 112 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/1998_supported_reports/11_-_euphrat_et_al_1998_garcia_river_assessment_monitoring_plan.pdf~~

Fish and Game Commission (FGCom). 1973. Endangered and threatened species policy. Fish and Game Code. December 31, 2014:598. http://www.fgc.ca.gov/policy/p4misc.aspx#ENDANGERED

FGCom. 1993. Raptor policy. Fish and Game Code. December 31, 2014:596. http://www.fgc.ca.gov/policy/p3wild.aspx#RAPTORS

FGCom. 1994. Water policy. Fish and Game Code. December 31, 2014:618. http://www.fgc.ca.gov/policy/p4misc.aspx#WATER

Commented [WK67]: REVIEWERS:
Is now https://www.waterboards.ca.gov/centralvalley/water_issues/forest_activities/, and the document referenced here needs to be updated.

Someone else needs to review these (and other docs in the references, especially any policies referenced in text) to make sure they are cited in text and here as appropriate.

FGCom. 2008. Salmon policy. Fish and Game Code. December 31, 2014:588. http://www.fgc.ca.gov/policy/p2fish.aspx#SALMON

FGCom and Board of Forestry and Fire Protection (Board). 1994a. Interim joint policy on pre, during, and post fire activities and wildlife habitat. Fish and Game Code. December 31, 2014: 633–637. http://www.fgc.ca.gov/policy/p5joint.aspx#INTERIM

FGCom and Board. 1994b. Policy on hardwoods. Fish and Game Code. December 31, 2014:637–639. http://www.fgc.ca.gov/policy/p5joint.aspx#POLICY

FGCom and Board. 2009. Joint policy statement on pacific salmon and anadromous trout. Fish and Game Code. December 31, 2014:625–633. http://www.fgc.ca.gov/policy/p5joint.aspx#saltrout

~~Forest Climate Action Team. 2018. California forest carbon plan: managing our forest landscapes in a changing climate. Sacramento, CA. 178p. http://resources.ca.gov/wp-content/uploads/2018/05/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf~~

Forest Resource Management. Assembly Bill (AB) 1492. Chapter 289. Committee on Budget. 2012. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201120120AB1492

~~Furniss, M.J., T.S. Ledwith, M.A. Love, B. McFadin, and S.A. Flanagan. 1998. Response of road stream crossings to large flood events in Washington, Oregon, and Northern California. USDA Forest Service. Technology and Development Program. 9877 1806—SDTDC. 14 p. http://www.stream.fs.fed.us/water-road/w-r-pdf/floodeffects.pdf~~

~~Holling, C.S. and G.K. Meffe. 1996. Command and control and the pathology of natural resource management. *Conservation Biology* 10(2):328–337.~~Kirchner, J.W., R.C. Finkel, C.S. Riebe, D.E. Granger, J.L. Clayton, J.G. King, and W.F. Megahan. 2001. Mountain erosion over 10 yr, 10 k.y., and 10 m.y. time scales. *Geology* 29(7):591–594.

Lahontan Regional Water Quality Control Board. 2014. Water quality control plan (~~basin~~ Basin ~~plan~~Plan). State of California, South Lake Tahoe, CA. X p. http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/index.shtml#plan

~~Lee, G. 1997. Pilot monitoring program summary and recommendations for the long-term monitoring program. Final Rept. submitted to the California Department of Forestry and Fire Protection under CDF Interagency Agreement No. 8CA27982. Sacramento, CA. 69 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/pmpsarftltmp.pdf~~

~~Little Hoover Commission. 2018. Fire on the mountain: rethinking forest management in the Sierra Nevada. February 5, 2018. Sacramento, CA. 87 p. https://lhc.ca.gov/sites/lhc.ca.gov/files/Reports/242/Report242.pdf~~

~~Lewis, J., S.R. Mori, E.T. Keppeler, and R.R. Ziemer. 2001. Impacts of logging on storm peak flows, flow volumes and suspended sediment loads in Caspar Creek, California. Pages 85–125 in: M.S.~~

Commented [WK68]: **Board Staff:**
Update all?

REVIEWERS:
Someone needs to make sure the appropriate ones are referenced. I am not the right person to do that, at least not yet.

Commented [WK69R68]: **EMC Member Reviewer:**
"Agree, if there are updates."

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"If these are still relevant, they could be cited within the new Table 1 in a footnote."

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Commented [WK72R71]: **EMC Member Reviewer:**
"All the Regional Water Quality Control Board basin plans could be cites in text within the new Table 1 through a footnote."

Wigmosta and S.J. Burges (eds.) Land use and watersheds: human influence on hydrology and geomorphology in urban and forest areas. Water Science and Application, Volume 2. American Geophysical Union, Washington, D.C. http://www.fs.fed.us/psw/publications/lewis/CWEweb.pdf

Loganbill, A.W. 2013. Post-fire response of Little Creek watershed: evaluation of change in sediment production and suspended sediment transport. Master of Science Thesis. California Polytechnic State University, San Luis Obispo. 132 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/2013_supported_reports/loganbill_2013_ms_thesis_little_creek.pdf

Longstreth, D., A. Lukacic, J. Croteau, A. Wilson, D. Hall, P. Cafferata, and S. Cunningham. 2008. Interagency mitigation monitoring program pilot project final report. California Resources Agency, California Environmental Protection Agency, Central Valley Regional Water Quality Control Board, North Coast Regional Water Quality Control Board, California Department of Fish and Game, California Department of Forestry and Fire Protection, California Geological Survey. Sacramento, CA. 38 p. plus Appendices. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/immp_pilotprojectrpt_finalver.pdf

Maahs, M. and T.J. Barber. 2001. The Garcia River instream monitoring project. Final report submitted to the California Department of Forestry and Fire Protection. Mendocino Resource Conservation District. Ukiah, CA. 96 p. http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/2001_supported_reports/20_maahs_and_barber_2001_garcia_river_instream__complete_.pdf

MacDonald, L.H., A. Smart, and R.C. Wissmar. 1991. Monitoring guidelines to evaluate the effects of forestry activities on streams in the Pacific Northwest and Alaska. EPA/910/9-91-OO1, U.S. Environmental Protection Agency Region 10. Seattle, WA. 166 p. http://www.nrel.colostate.edu/assets/nrel_files/labs/macdonald-lab/pubs/MonitoringGuidelinestoEvaluateEffectsofForestryActivitiesonStreams.pdf

MacDonald, L.H. 2000. Evaluating and managing cumulative effects: Process and constraints. *Environmental Management* 26(3):299–315. http://www.nrel.colostate.edu/assets/nrel_files/labs/macdonald-lab/pubs/EvaluatingandManagingCumulativeEffectsProcessandConstraints.pdf

MacDonald, L.H., D. Coe, and S. Litschert. 2004. Assessing cumulative watershed effects in the Central Sierra Nevada: Hillslope measurements and catchment scale modeling. USDA Forest Service General Technical Report. PSW-GTR-193. p. 149–157. http://www.nrel.colostate.edu/assets/nrel_files/labs/macdonald-lab/pubs/AssessingCWEintheCentralSierraNevada.pdf

MacDonald, L.H., and D. Coe. 2007. Influence of headwater streams on downstream reaches in forested areas. *Forest Science* 53(2):148–168.

http://www.nrel.colostate.edu/assets/nrel_files/labs/macdonald-lab/pubs/MacDonald_Coe_Forest_Science.pdf

~~MacDonald, L.H. and C. James. 2012. Effects of forest management and roads on runoff, erosion, and water quality: The Judd Creek experiment. Abstract EP52C-08 presented at 2012 Fall Meeting. http://adsabs.harvard.edu/abs/2012AGUFMEP52C..08M~~

Martinson, E.J., and P.N. Omi. 2003. Performance of fuel treatments subjected to wildfires. pp. 7–13 in: Omi, P.N., and L.A. Joyce, eds. Fire, fuel treatments, and ecological restoration: Conference proceedings, April 16-18, 2002. RMRS-P-29. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO. https://www.fs.fed.us/rm/pubs/rmrs_p029/rmrs_p029_007_014.pdf

National Marine Fisheries Service (NMFS). 2012. ~~Final r~~Recovery plan for the evolutionary significant unit of central California coast coho salmon~~. Volumes I–III. evolutionary significant unit~~. National Marine Fisheries Service, Southwest Region. Santa Rosa, CA. https://www.fisheries.noaa.gov/resource/document/recovery-plan-evolutionarily-significant-unit-central-california-coast-coho

NMFS. 2014. Final recovery plan for the Southern Oregon/Northern California Coast evolutionarily significant unit of Coho Salmon (*Oncorhynchus kisutch*). National Marine Fisheries Service. Arcata, CA. https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/southern-oregon-northern-california-coast-coho-salmon ~~http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/southern_oregon_northern_california_coast/southern_oregon_northern_california_coast_salmon_recovery_domain.html~~

North, M., P. Stine, K. O'Hara, W. Zielinski, and S. Stephens. 2009. An ecosystem management strategy for Sierran mixed-conifer forests. Gen. Tech. Rep. PSW-GTR-220. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, CA. 49 p. https://www.fs.fed.us/psw/publications/documents/psw_gtr220/psw_gtr220.pdf

North Coast Regional Water Quality Control Board (NCRWQCB). 2015. Water quality control plan (basin plan). State of California, Santa Rosa, CA. http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/

North Coast Regional Water Quality Control Board (NCRWQCB). 2015. amendment to the water quality control plan for the north coast region to establish a policy for the implementation of temperature objectives and establish implementation plans for the Eel, Mattole, and Navarro TMDLs. State of California, Santa Rosa, CA. http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/temperature_amendment.shtml

Omi, P.N. and E.J. Martinson. 2004. Effectiveness of thinning and prescribed fire in reducing wildfire severity. Pages 87-92 in: Murphy, D.D., and P.A. Stine, eds. Proceedings of the Sierra Nevada science symposium: science for management and conservation. Gen. Tech. Rep. PSW-193. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, CA.

Commented [WK73]: If want to keep, need to reference in text and have someone make sure these are the docs we want to include/ref.

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http://www.fs.fed.us/psw/publications/documents/psw_gtr193/psw_gtr193_2a_04_Omi_Martinson.pdf

~~Reid, L.M. 1993. Research and cumulative watershed effects. PSW-GTR-141. USDA Forest Service. Albany, CA. 118 p.~~

~~Reid, L.M. 2004. Turning stumbling blocks into stepping stones in the analysis of cumulative impacts. Pages. 159–164 in Murphy, D. and P. Stine, eds. Proceedings of the Sierra Nevada Science Symposium. Gen. Tech. Rep. PSW-GTR-194, Pacific Southwest Research Station, United States Forest Service. Albany, CA.~~

Resolution 68-16, the "Statement of Policy with Respect to Maintaining High Quality of Waters in California". see: https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf and https://www.waterboards.ca.gov/plans_policies/antidegradation.html

~~Rice, R.M., F.B. Tilley, and P.A. Datzman. 1979. A watershed's response to logging and roads: South Fork of Caspar Creek, 1967–1976. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. Research Paper PSW-146. 12 p. http://www.fs.fed.us/psw/publications/rice/Rice79.pdf~~

~~RiverMetrics. 2011. South Fork Wages Creek turbidity and water discharge, hydrologic year 2011. Technical Report prepared for Campbell Timberland Management, Fort Bragg, CA. RiverMetrics LLC, Lafayette, OR. 45 p.~~

~~Robison, E.G., K.A. Mills, J. Paul, L. Dent, and A. Skaugset. 1999. Storm impacts and landslides of 1996: Final report. Forest Practices Technical Report Number 4. Oregon Department of Forestry. Salem, OR. 145 p.~~

Safford, H.D., J.T. Stevens, K. Merriam, M.D. Meyer, and A.M. Latimer. 2012. Fuel treatment effectiveness in California yellow pine and mixed conifer forests. *Forest Ecology and Management* 274:17–28. http://www.fs.fed.us/rm/pubs/rmrs_gtr292/2012_safford.pdf

San Francisco Bay Regional Water Quality Control Board. 2015. Water quality control plan (basin plan). State of California, Oakland, CA. http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml

~~Skaugset, A., C.G. Surfleet, and B. Dietterick. 2012. The impact of timber harvest using an individual tree selection silvicultural system on the hydrology and sediment yield in a coastal California watershed. GTR-PSW-GTR-238. USDA Forest Service Pacific Southwest Research Station. Albany, CA. http://cemarin.ucanr.edu/files/177065.pdf~~

State Water Resources Control Board. 2015. Regional board water quality control plans (basin plans). Plans and Policies webpage. State of California, Sacramento, CA. http://www.waterboards.ca.gov/plans_policies/

Stewart, G., J. Dieu, J. Phillips, M. O'Connor, and C. Veldhuisen. 2013. The mass wasting effectiveness monitoring project: An examination of the landslide response to the December 2007 storm in

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Commented [WK79R78]: **EMC Member Reviewer:** "All the Regional Water Quality Control Board basin plans could be cites in text within the new Table 1 through a footnote."

Southwestern Washington. CMER Publication 08-802. Olympia, WA. https://www.dnr.wa.gov/publications/fp_cmer_08_802.pdf

~~Tuttle, A.E. 1995. Board of Forestry pilot monitoring program: Hillslope component. Technical Report submitted to the California Department of Forestry and Fire Protection and the Board of Forestry and Fire Protection under Contract No. 9CA38120. Sacramento, CA. 29 p. Appendix A and B: Hillslope monitoring instructions and forms. http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/tuttle.pdf~~

~~Washington Forest Practice Board (WFPB). 1987. Timber/fish/wildlife agreement: A better future in our woods and streams. Final Report. Olympia, WA. 57 p.~~

Williams, B.K., R.C. Szaro, and C.D. Shapiro. 2009. Adaptive management: The U.S. Department of Interior Technical Guide. Adaptive Management Working Group, U.S. Department of Interior, Washington D.C. https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/TechGuide.pdf

~~Ziemer, R.R., technical coordinator. 1998. Proceedings of the conference on coastal watersheds: The Caspar Creek story. 1998 May 6; Ukiah, CA. General Tech. Rep. PSW-GTR-168. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 149 p. http://www.fs.fed.us/psw/publications/documents/psw_gtr168/~~

6.0 APPENDIX

APPENDIX A PRIORITIES RECEIVED FROM BOARDS, AGENCIES AND STAKEHOLDERS

- *Appendix A-1. Board of Forestry and Fire Protection*

The Board is required to develop and maintain a system of forest practice regulations (FPRs) applicable to timber management on State and private timberlands. Public Resource Code (PRC) § 4551 requires the Board to "…adopt district forest practice rules… to ensure the continuous growing and harvesting of commercial forest tree species and to protect the soil, air, fish, wildlife, and water resources…", while PRC § 4553 requires the Board to continuously review the rules in consultation with other interests and make appropriate revisions.

In order to assist the Board in the maintenance of its regulations, the Board distributes an Annual Call for Regulatory Review to the regulated public and agency representatives. This process allows the Board to accept written and oral comments from stakeholders on issues of interpretation, compliance, clarity, and inefficiency of the FPRs. The culmination of this process results in the Board's standing committees annually modifying their priorities depending on severity of issues and problems facing California's landscapes. For the most recent version of standing committee priorities, please see Appendix A of the Board Annual Report located here: http://www.bof.fire.ca.gov/.

In addition to the FPRs, the Board has established several joint policies with the California FGCom that should be considered when setting monitoring priorities. These joint policies include Pacific Salmon and Anadromous Trout (FGCom 2009); Hardwoods (FGCom 1994[b]); and Pre, During and Post Fire Activities and Wildlife Habitat (FGCom 1994).

The EMC is a relatively new addition to the Board's structure. EMC funding is directed at projects that directly test the FPRs and can inform the Board on the efficacy of their existing regulations. It is the Board's vision that the findings of EMC funded projects will assist in the future development and maintenance of both policy and regulatory schemes to further the mission of the Board.

The Board understands that natural processes are complex and highly variable over time and space, and also that the current knowledge of these processes and their linkages are imperfect. However, it is also known that on-site control of potential impacts offers the most direct and rapid mitigation of potential impacts, and monitoring the effectiveness of these controls provides the best opportunity to increase our understanding of cause-and-effect relationships (i.e. linkages) between management and potential impacts to public trust resources. If potential adverse impacts are minimized at the local scale, there should be reduced potential cumulative effects at a larger scale (MacDonald 2000). -To attempt to address cumulative effects the Board made three recommendations relevant to the EMC: (1) focus on effectiveness monitoring activities to support adaptive management approaches (MacDonald 2000), (2) research new computer modeling to improve analysis (Benda et al. 2007), and (3) improve collection of information from on-going analysis to create watershed databases for agencies and public use. The Board supports EMC efforts focusing upon project review, funding, tracking, and reporting to assist the Board in addressing Board and committee priorities.

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I believe that "Table C1" on the EMC website is what was produced from these priorities, which are shown in text here (but nowhere else on the EMC website).
https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-a\nd-agencies.pdf

Retain or strike this? History is important, but does it belong here? Seems like the Priorities and that process could actually be another standalone document that could be referenced…. (also note, this appears to have only been done once in 2017, and never again, although this SP says it will be done annually and those priorities would be incorporated into the Annual Report and Workplan… but that doesn't seem to have happened either. Thus far, the EMC priorities seem to have generally been recycled annually, and there also doesn't seem to have been an institutionalized process for pulling annual priorities from other Agencies to be incorporated or considered while developing the EMC's annual priorities.

REVIEWERS:
If retain, review text, update as needed and also edit for formatting (remove double spaces, etc).

Commented [WK81R80]: EMC Member Reviewer:
"I think that the table provides important and useful information (and was previously included as an appendix). This text can probably be deleted or summarized, or just have link to table."

Commented [WK82R80]: Board Staff:
This is the same table referenced in the earlier sections, that the same reviewer suggested we delete. Does that reviewer want it still included here? It was not included as an appendix in the 2018 SP.

Commented [WK83R80]: EMC Member Reviewer:
I support the removal of appendix A because these agency goals, as well as other agency's goals, can be easily found elsewhere online in a more comprehensive manner.

Commented [WK84R80]: EMC Member Reviewer:
"Each agency was asked to put together a brief blurb for this section on the priorities at the time of the development of the strategic plan. Depending on what is done with Table C1 these could be reviewed and updated by the respective agency representatives for their current agency's priorities."

- ***Appendix A-2. California Department of Fish and Wildlife***

CDFW suggests a number of FPRs have long warranted monitoring for their effectiveness in ensuring timber operations do not cause or aggravate significant direct or cumulative effects on the environment and help to conserve public trust resources. In particular, there is a paucity of information collected on the FPRs effectiveness regarding direct and cumulative effects on terrestrial wildlife resources. These include FPRs intended to protect sensitive and other special-status species, maintain and recruit key habitat elements (e.g., snags), maintain late-succession forest stands, and avoid habitat fragmentation and/or maintain habitat connectivity. The effectiveness of the FPRs, individually and cumulatively should be effective in meeting the objectives stated under 14 CCR § 897 "Implementation of the Act Intent", including:

"(B) Maintain functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed and, (C) Retain or recruit late and diverse seral stage habitat components for wildlife concentrated in the WLPZs and as appropriate to provide functional connectivity between habitats."

Additionally, many FGC statutes and FGCom policies apply to timber operations regulated by the FPRs. For example, FGC statutes that provide CDFW with authority over lake and streambed alterations (FGC § 1600 *et seq.*), over species designated as threatened or endangered under the California ESA (FGC § 2050 *et seq.*), and over pollution (FGC § 5650 *et seq.*) are commonly encountered during review of Plans. In addition, policies set forth by the FGCom, such as the Raptor Policy, guide CDFW activities and coincide with the intent of the FPRs (FGC § 703 et seq.). Overall, effective FPRs, FGC statutes, and FGCom policies related to fish and wildlife values should support forest ecosystem function, structure, and species composition within defined ranges that constitute properly functioning conditions.

- ***Appendix A-3. State and Regional Water Quality Control Boards***

The Water Boards' priorities are to participate in and support monitoring designed to increase our understanding of the effectiveness of FPRs and associated regulations in protecting the beneficial uses of water from existing and potential impacts of forest management. Monitoring studies should be designed to evaluate the effectiveness of specific FPRs and the associated regulations' effect on long-term watershed trends. Studies can also facilitate adaptive management to improve water quality protection provided by the FPRs and associated regulations.

While modern forestry practices have substantially improved since the passage of the Z'Berg-Nejedly FPA in 1973 (Board 2014~~b~~), the cumulative effects of past and ongoing land uses have degraded the ecological condtion of aquatic ecosystems and beneficial uses of water in forested watersheds throughout the State. In response, the Water Boards' priorities, as directed by the Porter Cologne Water Quality Control Act and policies such as the Anti-degratdation Policy (Resolution 68-16), are to restore impaired waterbodies and their watersheds and to protect those waterbodies that are not impaired.

To that end, it is necessary to evaluate the effectiveness of the FPRs and associated regulations in sustaining or improving aquatic ecosystem and watershed conditions, as measured through factors such as: preventing or minimizing sediment discharge; restoring impaired aquatic and riparian function; and preserving and restoring cold water for beneficial uses through retaining and enhancing effective shade on watercourses. In order to meet these needs, the spatial and temporal scale of monitoring will vary

from short-term site-specific or project-specific, to long-term watershed or regional scales. Additional studies and methods are needed to evaluate known or suspected water quality factors in timberland watersheds, such as fuel loading in WLPZs, changes to vegetation community diversity, effects of road system design alternatives and road density, effects of large scale canopy reduction on a catchment scale, fuel breaks encroaching into riparian zones, and management practices applied during and after timber harvest activities in wildfire-affected areas.

- ***Appendix A-4. California Natural Resources Agency***

The mission of CNRA is "To restore, protect and manage the State's natural, historical and cultural resources for current and future generations using creative approaches and solutions based on science, collaboration and respect for all the communities and interests involved." CNRA provides the primary leadership for the AB 1492 Timber Regulation and Forest Restoration Program, working in close collaboration with the timber harvest Review Team agencies and the California Environmental Protection Agency. Relevant to the functions of the EMC, AB 1492 includes:

- Legislative intent to "Promote transparency in regulatory costs and programs through the creation of performance measures and accountability for the State's forest practice regulatory program and simplify the collection and use of critical data to ensure consistency with other pertinent laws and regulations." [Public Resources Code § 4629.2(f)].
- A requirement for regular reporting to the Legislature that includes evaluating ecological performance. [Public Resources Code § 4629.9(a)(8)(F)]

Evaluation of the effectiveness of the Forest Practice Act (FPA) and Rules and other related timber harvesting statutes and regulations, the role of the EMC, is a very important element in achieving these directions from AB 1492. The EMC's creative, scientific, collaborative approach also is consistent with the CNRA mission statement.

- ***Appendix A-5. California Geological Survey***

California Geological Survey (CGS) priorities focus on increasing our understanding of the FPRs effectiveness with regard to mass wasting, erosion, fluvial processes, and the construction techniques used for facilities such as roads, landings, and watercourse crossings. Management activities that affect these geologic processes have the potential to create local and cumulative effects to resources, and in some cases public safety. Due to the diverse geologic, topographic, and climatic conditions across the State, forest management activities also have the potential to result in different levels of impact in specific terrain (e.g., steep convergent slopes vs. gentle convex slopes), in different portions of the State (e.g., areas with high rainfall and weak geologic materials vs. areas with lower rainfall and strong geologic materials), as well as when the activities are conducted (e.g., during the winter vs. the summer), and what activities are conducted (e.g., tractor vs. cable harvesting; road construction vs. no road construction; or, selection vs. clearcut silviculture). Where and when forest management activities are conducted, as well as the practices employed, are critical to FPRs effectiveness. Monitoring activities that evaluate the geologic and construction practices above must take into account the geographic and temporal conditions where they are employed, and recognize that stochastic events (such as significant storms, rain-on-snow events, large earthquakes, and large wildfires) often have profound effects on the landscape. These events will also have a significant effect on the results of

monitoring activities (e.g., monitoring during a drought vs. monitoring following a 20-year recurrence interval storm). Effective FPRs will address forest management activities such that geologic-related impacts are reduced to less than significant. To achieve this, geologic-related monitoring studies must include the range of short-term to long-term, of site-specific to regional scales, as well as response to episodic rare or large events.

Beyond geologic focused monitoring, aquatic and terrestrial effectiveness monitoring should also identify what appropriate temporal scale or specific rare and large events which may need identification as part of effectiveness monitoring. Identifying the appropriate temporal scale will assist in separating effectiveness of current FPRs versus potential impacts from forest management legacies (see Section 4.3). Additionally, identifying rare and large events like landslides and floods or impacts from drought, disease or wildfire can assist in separating effectiveness of current FPRs and associated regulations. Most importantly, some specific FPRs may need to be evaluated for effectiveness following both forest management operations and rare or large events (see Section 4.3.1).

- ***Appendix A-6. California Department of Forestry and Fire Protection***

CAL FIRE monitoring priorities are to evaluate the implementation (i.e., compliance) and effectiveness of the FPRs. High priority topics include monitoring impacts to water quality, as has been undertaken since 1996, wildlife habitat for Board-listed sensitive species, and adequacy of fuel treatments for reducing fire spread and intensity.

Specifically, CAL FIRE encourages the EMC to undertake specific projects to determine the FPRs effectiveness related to Watercourse and Lake Protection Zone (WLPZ), road, and watercourse crossing requirements in maintaining acceptable sediment entry, water temperature regimes, and nutrient inputs. Monitoring of roads and watercourse crossings following large hydrologic events is needed to test the effectiveness of contemporary forest practices. Additionally, monitoring of unstable area identification and unstable area prescription effectiveness is required. The effectiveness of the current FPRs for meeting Basin Plan water quality objectives should also be an EMC priority.

Interactions between riparian conditions and in-stream nutrient dynamics must be better understood to appropriately manage riparian zones. Improved understanding is needed on how differences in riparian stand structure and composition affect seasonal light levels and nutrient availability, which influence primary production and thus salmonid production. On-going debate over appropriate levels of timber harvest in riparian zones make this a high priority research item for CAL FIRE. Factors affecting headwater stream temperatures also need to be better understood, particularly related to effectiveness of FPR protection measures for Class II watercourses.

Wildlife habitat effectiveness monitoring should also be a high priority for the EMC. CAL FIRE encourages the EMC to develop monitoring projects to determine the effectiveness of measures used to ensure take avoidance and prevention of significant adverse impacts for Board-listed sensitive and other important species. CAL FIRE will work through the EMC to collaborate with the other agencies on current wildlife monitoring efforts and to develop new monitoring approaches for sensitive species.

With the Governor's recent (2018) goal of doubling the total statewide rate of forest treatments within five years to at least 500,000 acres per year for improving forest health and resilience, monitoring of fuel treatment practice compliance and effectiveness has become a high priority for CAL FIRE. This includes

monitoring both operations conducted with plans undergoing multi-agency review, and those undertaken with Exemption and Emergency (EX-EM) Notices. After leading a multi-agency EX-EM notice pilot monitoring project in 2018, CAL FIRE will develop an ongoing program to monitor the effectiveness of the resource protection provisions in the FPRs for EX-EM Notices.

- ***Appendix A-7. USDA Forest Service***

The USDA Forest Service Pacific Southwest Research Station (PSW) supports testing and monitoring the ability of the California FPRs to mitigate adverse effects on the environment from timber harvesting. As a world leader in natural resources research, PSW conducts and supports research in four key focus areas: (1) providing clean and reliable water resources, (2) enhancing benefits to urban communities from the natural environment, (3) sustaining ecological resources and services, and (4) creating landscapes that are resilient to disturbances such as timber harvesting and wildfire. Within an adaptive land management context, PSW supports EMC projects that evaluate if the FPRs are encouraging timber harvesting procedures that reduce post-harvest erosion, provide wildlife habitat for threatened and or endangered species including the Northern Spotted Owl, reduce adverse wildland fire behavior potential, and mitigate smoke emissions when harvest areas are burned by wildfire.

- ***Appendix A-8. National Marine Fisheries Service***

The National Marine Fisheries Service (NOAA Fisheries) supports the Board's EMC charter goal of ascertaining whether the FPRs and associated regulations maintain or enhance water quality and aquatic habitat, particularly habitat that supports salmon and steelhead listed under the federal ESA. NMFS also supports the overarching goal to create a unified effectiveness monitoring strategy to serve as a "road map" for focusing effort on the most urgent issues.

Seven species of salmon and steelhead are federally listed as threatened or endangered in California. Timber harvest is identified as a contributing factor that negatively impacts these listed species and their habitat. Recovery plans for these species recommend that the FPRs and associated regulations be evaluated and, if needed, modified to achieve sufficient habitat condition and population abundance necessary for recovery (NMFS 2012, NMFS 2014). NMFS encourages the Board to evaluate the effectiveness of FPRs and associated regulations addressing the rate of timber harvest and cumulative effects.

Examining a single FPR may not be the most effective approach in determining the effectiveness of regulating cumulative effects in all cases. Rather, examining a suite of FPRs and associated regulations which are intended, collectively, to contribute to controlling cumulative effects may be more informative. In addition, a proper examination of cumulative effects likely involves the study at site, watershed, and regional scales by tracking trends in important indicators of species population health and habitat condition. While cumulative effects may be avoided or minimized through site- or project-level controls (such as those found at FPRs within 14 CCR § 916 [936, 956]) validating whether such controls are effective at avoiding significant cumulative effects, or the degree to which they are minimized at various scales, is important for informed regulation of timber harvest in watersheds supporting listed salmonids.

- *Appendix A-9. Public Stakeholders*

For the purposes of this Strategic Plan, public stakeholders include members of the general public, Native American tribes, private landowners, academics from universities, and a wide variety of interest groups. Because no one person or entity can speak on behalf of all public stakeholders, this summary is intended to describe input received to date from public stakeholders on the Strategic Plan. Since the EMC welcomes continued input from public stakeholders, this section will be revised when the Strategic Plan is updated approximately every three years.

One consistent comment received from multiple conservation groups and individuals is to have work on the EMC Strategic Plan, committee discussions, and public meetings as open and transparent as possible. To meet this public expectation, all EMC meetings are publicly noticed with meeting agendas, and previous meeting notes and other EMC documents are posted on the Board's website under the EMC webpage. In addition, all EMC meetings are broadcast live via webinar with the goal of continuing to improve internet broadcast of meetings and interaction with the public.

Members of the public have encouraged the EMC to promote monitoring tools or protocols for landowner-based project scale monitoring. Use of project scale photo point monitoring (e.g., CVRWQCB 2014) has been a useful tool for water quality monitoring (Board 2009) and may be appropriate for specific EMC critical monitoring questions. In addition, the EMC is encouraged to pursue development of easy-to-implement project-scale monitoring protocols to answer specific EMC critical monitoring questions when such protocols do not exist.

In general, public stakeholders support monitoring efforts that are well designed, advance our scientific understanding of natural processes, and are re-integrated through adaptive management into the FPRs and associated regulations. Accordingly, the EMC Strategic Plan places a strong emphasis on identifying well designed scientific studies (Section 2.4) that will be able to inform review of existing FPRs through an Adaptive Management Framework (Section 2.3).

APPENDIX B CAL FIRE AND BOARD MONITORING AND REPORTING REQUIREMENTS

The following is a list of the FPRs and current statutes with specific monitoring requirements to be conducted by CAL FIRE and/or the Board.

- ***Appendix B-1. Class II Watercourses***

14 CCR §§ 916.9 [936.9, 956.9] (g) (1) (C)

The Department shall report to the Board at least once annually on the use and effectiveness of 14 CCR § 916.9 [936.9, 956.9] subsection (g) for as long as this rule section remains effective. This section has undergone the rulemaking process and pending approval by the Office of Administrative Law, the reporting requirement by the Department shall be struck from the regulation. This was done to allow pending and forthcoming scientific studies on the efficacy of the Class-II Large rules to come to fruition, to allow the Board decide whether to cancel or continue this rule sections when results show the relative efficacy of these rules. Additionally, this takes the burden off the Department that formerly required a yearly report to the Board, helping ease the heavy reporting requirement that the Department holds on Board actions.

- ***Appendix B-2. Maintenance and Monitoring of Logging Roads and Landings***

14 CCR §§ 923.7 [943.7, 963.7] (k)

… The Department shall also conduct monitoring inspections at least once during the prescribed maintenance period to assess logging road and landing conditions.

- ***Appendix B-3. Watercourse Crossings***

14 CCR §§ 923.9 [943.9, 963.9] (u)

… The Department shall also conduct monitoring inspections at least once during the prescribed maintenance period to assess watercourse crossing conditions.

- ***Appendix B-4. Aspen, meadow and wet area restoration***

14 CCR §§ 913.4 [933.4, 953.4] (e) (7)

The Department shall review post-harvest field conditions of the portions of plans using the aspen, meadow and wet area restoration silvicultural prescription and prepare a monitoring report every five (5) years for the Board. The monitoring report shall summarize information on use of the prescription including:

(i) The level of achievement of the measures of success as stated in the plan per 14 CCR §§ 913.4, 933.4, and 953.4, subsection (e)(5);
(ii) Any post-harvest adverse environmental impacts resulting from use of the prescription;
(iii) Any regulatory compliance issues; and
(iv) Any other significant findings resulting from the review. The review shall include photo point records.

Commented [WK85]: REVIEWERS:
1) Potentially need this to be updated, I assume.
2) Are there changes that would impact other portions of the text, e.g., critical monitoring questions?

Commented [WK86R85]: EMC Member Reviewer:
"Agree, would need to be updated for every revision, or maybe it can be deleted."

Commented [WK87R85]: EMC Member Reviewer:
I support the removal of appendix B because most of the California Forest Practice Rules monitoring requirements presented are not the Board of Forestry Effectiveness Monitoring Committee charge. I plan to be present at the August 2 meeting, and will be ready to discuss the draft Strategic Plan.

- ***Appendix B-5. Modified THP for Fuel Hazard Reduction***

14 CCR §§ 1051.7

… The Department shall report to the Board at least once annually on the use and effectiveness of 14 CCR §§ 1051.3-1051.7 for as long as these rule sections remain effective.

Commented [WK88]: ? why not include the others?

- ***Appendix B-6. Site-specific measures or nonstandard operational provisions***

14 CCR §§ 916.9 [936.9, 956.9] (v) (10)

Board staff and the Department shall work with agencies, stakeholders, and appropriate scientific participants (e.g., MSG, Technical Advisory Committee) in a transparent process to: (1) describe and implement two pilot projects, including monitored results, using site-specific or non-standard operational provisions; and (2) provide recommendations to the Board for consideration for adoption to provide detailed guidance for the application of site-specific or non-standard operational provisions. The pilot projects and guidance shall address cumulative and planning watershed impacts, and the guidance may address the appropriate standards the site-specific or non-operational provisions shall meet. A report on the progress of the pilot projects and implementation guidance shall be presented to the Board within 18 months of the effective date of this regulation.

- ***Appendix B-7. Forest Fire Prevention Exemption Pilot Project***

14 CCR § 1038(j) (15)

At least one inspection conducted by the Director shall be made after completion of operations.

14 CCR § 1038(j) (17)

The department shall maintain records regarding the use of the Forest Fire Prevention Exemption Pilot Project exemption in order to evaluate the impact of it on fuel reduction and natural resources in areas where it has been used.

Public Resources Code (PRC) § 4584 (j) (11) (F)

The department shall maintain records regarding the use of the exemption granted in this paragraph in order to evaluate the impact of the exemption on fuel reduction and natural resources in areas where the exemption has been used.

PRC § 4584 (j) (12)

After the timber operations are complete, the department shall conduct an onsite inspection to determine compliance with this subdivision and whether appropriate enforcement action should be initiated.

- ***Appendix B-8. Section 303(d) Listed Watersheds***

14 CCR §§ 916.12 [936.12, 956.12] (a)

The Department shall, in collaboration with the appropriate RWQCB and SWRCB, prioritize watersheds in which the following will be done: 1) conduct or participate in any further assessment or analysis of the watershed that may be needed, 2) participate in the development of TMDL problem assessment, source assessment, or load allocations related to timber operations, and 3) if existing rules are deemed not to

be sufficient, develop recommendations for watershed-specific silvicultural implementation, enforcement and monitoring practices to be applied by the Department.

14 CCR §§ 916.12 [936.12, 956.12] (b)

The Department shall prepare a report setting forth the Department's findings and recommendations from the activities identified pursuant to (a) above. The report shall be submitted to the Board and the appropriate RWQCB. The report shall be made available to the public upon request and placed on the Boards' website for a 90-day period.

- ***Appendix B-9. Protection of Habitable Structures Exemption, 2015***

14 CCR § 1038 (c) (6) (G)

The Department shall evaluate the effects of the exemption allowed under 14 CCR 1038(c)(6) including frequency and statewide distribution of use acres treated, compliance, professional judgment regarding post-treatment stand conditions observed relative to moderating fire behavior and actual performance in the event of a wildfire. The Department shall, annually report its findings based on this evaluation to the Board.

PRC § 4581 (i) (6)

The department shall evaluate the effects of this paragraph and shall report its recommendations, before the paragraph becomes inoperative, to the Legislature based on that evaluation. The report shall be submitted in compliance with Section 9795 of the Government Code.

- ***Appendix B-10. Drought Mortality Amendments, 2015***

14 CCR § 1038 (k) (8)

The Department shall monitor and report on the statewide use of the exemption, allowed under 14 CCR § 1038(k), including the number of harvest area acres, the areas of application and the degree of compliance. The Department shall, within 180 days of the date that these emergency regulations are filed with the Secretary of State, report its findings, to the Board.

- ***Appendix B-11. Forest Fire Prevention Exemption***

14 CCR § 1038(i) (14)

At least one inspection conducted by the Director shall be made after completion of operations. (This provision will likely be revised upon Board promulgation of regulation pursuant to SB 901).

PRC § 4584 (j) (12)

After the timber operations are complete, the department shall conduct an onsite inspection to determine compliance with this subdivision and whether appropriate enforcement action should be initiated. (This provision will likely be revised upon Board promulgation of regulation pursuant to SB 901).

- ***Appendix B-12. Emergency Notice for Outbreaks of Sudden Oak Death Disease***

14 CCR § 1052.5

The Department shall track the number of Emergency Notices for outbreaks of SOD, the acreage treated under the notices, and the WLPZ acreage treated under the notices, and report the results to the Board bi-annually.

- ***Appendix B-13. Conversion Exemptions***

14 CCR § 1104.1 (7)

The Department shall provide for inspections, as needed, to determine that the conversion was completed.

- ***Appendix B-14. Exemptions and Emergency Notice Monitoring***

PRC § 4589

During the 2016 Legislative Session, Assembly Bills 1958 (Wood) and 2029 (Dahle) were signed into law creating two new types of Exemptions from the THP requirements of the FPA. Additionally, the two bills directed CAL FIRE and the Board, with participation by the CDFW, RWQCBs, and the public, to provide the Legislature with a report on the various Exemptions and Emergency Notice permitting options authorized by the FPA and Rules. In the 2017 Legislative Session, the reporting requirements of AB 1958 and AB 2029 were modified by a budget trailer bill, Senate Bill 92. This budget bill specified a new report due date of December 31, 2018, and added the requirement for, "…an analysis of exemption use, whether the exemptions are having the intended effect, any barriers for small forest owners presented by the exemptions, and measures that might be taken to make exemptions more accessible to small forest owners."

During the 2018 Legislative Session, Senate Bill 901(Dodd) again revised the reporting requirements under Public Resources Code § 4589. The reporting timeline was clarified to continue through December 32, 2025, with an initial submittal of the report occurring on December 31, 2019. The requirement for identifying barriers to small forest owners for use of exemptions and recommended measures to make exemptions more accessible to small forest owners was repealed. The report shall now include recommendations to improve the use of those exemptions and emergency notice provisions, information on the linear distance of road constructed or reconstructed under notices of exemption by individual ownerships, within a representative sample of planning watersheds from each forest practice district. The report shall also contain the number of post-treatment onsite inspections that occur and whether those inspections were attended by a representative of the Department of Fish and Wildlife and a representative of the State Water Resources Control Board and the number and type of violations and enforcement actions taken. The final report due December 31, 2025, shall also include recommendations necessary for revisions to diameter limits at stump heights of harvestable trees for Small Timberland Owner and Forest Fire Prevention Exemptions.

Currently, data is being assimilated, and initial revisions of this report is underway with the first submittal expected in December of 2018.

- ***Appendix B-15. Required Inspections for Forest Fire Prevention Exemptions (Senate Bill 901, not yet in regulation)***

PRC § 4584 (k) (11)

After the timber operations are complete, CAL FIRE shall conduct an onsite inspection to determine compliance with the FPRs and whether enforcement action should be initiated. CAL FIRE shall notify the appropriate Regional Water Quality Control Board, the Department of Fish and Wildlife, and the California Geologic Survey seven days prior to conducting the onsite inspection. The Regional Water Quality Control Board, the Department of Fish and Wildlife, and the California Geologic Survey may conduct an inspection with CAL FIRE.