
DRAFT
EFFECTIVENESS MONITORING COMMITTEE (EMC)
Strategic Plan



Submitted to the California Board of Forestry and Fire Protection

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1.0 INTRODUCTION

Effectiveness monitoring is a key component of adaptive management and is necessary for assessing if management practices are achieving the various resource goals and objectives set forth in the California Forest Practice Act and Rules (EMC Charter 2014). Monitoring is also a crucial component for complying with the “ecological performance” reporting requirements outlined in AB 1492. Over the past 20 years on California’s state and private forestlands implementation and limited short-term effectiveness monitoring has focused primarily on water quality related issues (Tuttle 1995, BOF 1999, Cafferata and Munn 2002, Brandow et al. 2006, Longstreth et al. 2008) with limited use ~~for as~~ adaptive management. In California, long-term cooperative monitoring that has studied potential impacts from contemporary harvesting practices on water quality and aquatic habitats have included: the Caspar Creek watershed study (Rice et al. 1979, Ziemer 1998, Lewis et al. 2001, Cafferata and Reid 2013), the Garcia River Instream Monitoring Project (Euphrat et al. 1998, Maahs and Barber 2001, Barber and Birkas 2006), the Little Creek Watershed Study (Skaugset et al. 2012, Loganbill 2013, Dieterick et al. 2015), the Judd Creek Watershed Study (MacDonald and James 2011), and the South Fork Wages Creek Watershed Study (RiverMetrics 2011). In 2014, the Effectiveness Monitoring Committee (EMC) was formed to develop and implement an effectiveness monitoring program that can provide ~~a~~ better active feedback loop to policymakers, managers, agencies, and the public.

Comment [SLF1]: Added by co-chair from previous CALFIRE text

1.1 EMC Charter

The charter directs the EMC to be a collaborative, transparent, and science-based monitoring effort and process-based understanding of the effectiveness of the California Forest Practice Rules (FPRs) and other forestry-related laws and regulations on maintaining or enhancing water quality, aquatic habitat, and wildlife habitats (Figure 1).

1.1.1 EMC Current Membership

In 2014, the Board of Forestry and Fire Protection (Board) appointed 2 Co-Chairs, 15 committee members and identified four support staff (Appendix A). The members represent a wide range of natural resource expertise from academia, state and federal agencies, private and state forestland owners, and the public. Their expertise includes forest management, hydrology, geology, aquatic ecology, fisheries, wildlife management, and resource monitoring and sampling. The committee has held initial meetings to develop the committee structure and tasks for 2015. Currently the Co-chairs are facilitating meetings to ensure all actions and recommendations are made by consensus whenever possible. If failure to reach consensus occurs, the record (ie. meeting notes) shall specify the key differences and the reasons consensus could not be reached. In 2015⁴, the Co-Chairs and Executive Officer of the Board ~~established will each be working with~~ committee members ~~to establish their~~ respective term duration (Appendix A).~~:-~~

Comment [SLF2]: Feb 19 meeting EMC discussion.

Figure 1 EMC charter goals

- (a) Provide a framework and support to comply with the reporting requirements of AB 1492 (Appendix C).
- (b) Support an adaptive management process by providing feedback to the Board regarding California ~~FPRs~~ Forest Practice Rules effectiveness.
- (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 Endangered Species Acts on private and state forestlands.
- (f) Ensure that appropriate scientific methods and statistical evaluation, when necessary, are used to evaluate effectiveness of California ~~FPRs~~ Forest Practice Rules and other forestry-related laws and regulations.
- (g) Encourage dissemination of information through general public and scientific outlets.
- (h) Promote use of ~~s~~State ~~d~~emonstration ~~f~~orests for effectiveness monitoring of FPRs, water quality laws and Fish and Game codes, and other forestry-related laws and regulations.

1.1.2 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. 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. 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 organizations.
- (6) Have all EMC members recognize the legitimacy of the goals and differing perspectives of other EMC member organizations.

1.2 EMC Annual Reporting

The EMC will periodically report milestones and accomplishments to the Board. This periodic reporting will typically occur as an annual report to the Board, stakeholders and the public. Annually, the Board provides a report to the Legislature which documents Board and Department progress toward attainment of their previous goals and allows for public input on the direction of future Board goals. It is anticipated that in the first years of the EMC this annual report will be part of the Boards annual report to the Legislature. As significant accomplishments are achieved, the EMC annual report will be a standalone report to the Board.

2.0 EMC STRATEGIC PLAN OR "ROAD MAP"

The EMC Strategic Plan is the committee "road map" that will guide how the committee intends to achieve the EMC goals and objectives. It is the intent of the EMC to use the Strategic Plan as a living document that is periodically updated. The overall Strategic Plan is guided by seven primary objectives described in the EMC Charter which, for the purposes of developing critical monitoring questions, has been edited and summarized in Figure 2.

Figure 2 Primary objectives in developing critical monitoring questions

- Seek, accept and consider questions from stakeholders and the interested public.
- EMC members, in conjunction with the Board, should identify critical monitoring questions that address various EMC goals and objectives.
- Develop guidance for appropriate scientific methods and statistical evaluation used to evaluate effectiveness of California Forest Practice Rules.
- Increase understanding of the linkage between forest practices and the resource(s) of concern.
- 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.
- Collaboratively develop methods to prioritize monitoring questions, and based on these methods, help select the highest priority projects to monitor.
- Promote collaborative fact-finding and understanding of scientific results at local, regional, and state levels.

2.2 Development of Critical Monitoring Questions

The first step in developing critical monitoring questions is seeking and accepting priorities and monitoring questions from a wide variety of stakeholders including Agency(s), Department(s), Board(s), EMC members and identifying key areas of concern of the interested public. The EMC will review the various proposed priorities and monitoring questions and develop critical monitoring questions. A final list of critical monitoring questions along with a draft of the Strategic Plan will be submitted to the Board for review. As part of their review the Board may provide guidance or suggested changes to the draft Strategic Plan. The EMC will consider Board guidance or suggested changes and submit a final list of critical monitoring questions and Strategic Plan. Appendix D summarizes priorities and monitoring questions received, to date, from various stakeholders. Once priorities and critical monitoring questions are identified, specific monitoring projects described in Appendix E will be initiated. The following summaries are intended to be a brief summary of the priorities and monitoring questions listed in Appendix D.

2.2.1 Board of Forestry and Fire Protection - Committee priorities

For 2014, the Forest Practice Committee and Management Committee provided six and two priorities, respectively. The Forest Practice Committee priorities focus, not necessarily in order of importance, on roads, cumulative effects and slash treatment. The Management Committee priorities focus on WLPZ effectiveness emphasizing use of Demonstration State Forests as potential sites for monitoring.

2.2.2 Board of Forestry and Fire Protection - Cumulative Effects

The Board identified Cumulative Effects as a priority in their Annual Report (Board 2014). The Board recognizes that natural processes are complex and highly variability over time and space. In addition, our understanding of these processes and linkages are imperfect. However, it is recognized that on-site control of potential impacts offers the most direct and rapid mitigation of potential impacts and offers the best opportunity to increase our understanding of cause-and-effect relationships (ie. linkages) between management and resources of concern. Also, 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 this priority the Board made three recommendations relevant to the EMC : (1) Focus on effectiveness monitoring activities to provide adaptive management approaches (MacDonald 2000), (2) Research new computer modeling to improve analysis (Benda 2007), and (3) Improve collection of information from on-going analysis to create watershed databases for agencies and public use.

The EMC also recognizes that cumulative effects encompass a broad spectrum of natural processes and their linkages over time and space (MacDonald 2000, MacDonald et al. 2004, Reid 1993). The EMC has developed two compatible frameworks regarding how to monitor and evaluate potential cumulative effects. One, to monitor at relatively smaller spatial and temporal scales the causal linkages between FPRs and regulations and the resource(s) of concern, with special emphasis on understanding the management effects on a particular resource and/or controlling natural process(es) (MacDonald and Coe 2007). Also, improved study designs that identify appropriate spatial and temporal scales and identify potential variable interaction and indirect effects can greatly reduce spurious monitoring results (MacDonald 2000). This approach would limit problems that have confounded many previous attempts to manage cumulative effects by monitoring discrete causal linkages between FPRs or regulations and resource(s) of concern (MacDonald 2000).

Many aquatic resources including public trust resources can also occupy habitat in larger watersheds and terrestrial resources at large spatial scales. Accordingly, monitoring and evaluating potential cumulative effects is also needed at these relatively larger spatial and longer temporal scales. However, at larger spatial and temporal scales understanding of potential cumulative effects are limited by wide variation in study site conditions, forest management effects on different site conditions, limited ability to isolate indirect effects, difficulty in validating predictive models that are typically used at larger scales, and uncertainty of future environmental events over longer temporal scales (MacDonald 2000). To minimize these potential limitations, we propose a second compatible framework that uses a nested approach for monitoring, so that a hierarchy of information can be used to untangle the complexities that are inherent at larger spatial and longer temporal scales (MacDonald 2000). In other words, a hierarchical, nested approach to monitoring would help elucidate important linkages between site and project scale manipulations and ecological response at the watershed and regional scale. With this second compatible framework we can begin to better link causal linkages between FPRs and regulations and the ecological performance of resources and public trust resources of concern.

(To Be Developed: Additional discussion of Cumulative Effects - Wildlife Habitat)

2.2.3 California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) suggests a number of FPRs have long warranted monitoring for their effectiveness in helping to ensure 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 has been a paucity of information collected on the effectiveness of FPRs regarding direct and cumulative effects on terrestrial wildlife resources. These include FPRs intended to protect, in particular, sensitive and other special-

Comment [SLF3]: Additional text will be provided in future versions of this plan.

Comment [SLF4]: Feb 19th EMC discussion. Bill C. may provide additional edits to this section.

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 collectively should be demonstrated as meeting the objectives stated under Section 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. (C) Retain or recruit late and diverse seral stage habitat components for wildlife concentrated in the watercourse and lake zones and as appropriate to provide functional connectivity between habitats”. Overall, effective FPRs related to wildlife values should support forest ecosystem function, structure and species composition within defined ranges that constitute properly functioning conditions.

2.2.4 State and Regional Water Quality Control Boards

The State and Regional Water Board’s priorities are to participate in and support monitoring studies designed to increase our understanding of the effectiveness of FPRs and regulations in protecting the beneficial uses of water from the potential impacts of forest management, and facilitate adaptive management to improve those FPRs and regulations, as necessary. The cumulative effects of past and ongoing land uses have degraded the health and proper function of aquatic ecosystems and beneficial uses of water in forested watersheds throughout the state. Monitoring studies should be designed to evaluate the effectiveness of specific FPRs or regulations and evaluate long-term watershed trends to help inform and guide the overall FPRs and regulations. Monitoring should be designed with clear objectives and goals, posing clear questions and study methods that can reasonably be expected to answer specific questions. An important component of the monitoring efforts should be a well-defined process for adaptive management based on study results. To establish reliability and enhance the confidence in the results, studies should utilize existing data collection standards or protocols linked to accessible data repositories appropriate for the type of data collected.

Comment [SLF5]: Feb 19th EMC discussion requested further explanation regarding current practices vs. legacy issues. Jim B. and Water Board staff would work on text.

Due to the prevalence of water bodies listed as impaired by excess sediment and elevated water temperatures under Clean Water Act Section 303(d), the Water Board’s priorities are studies evaluating the effectiveness of FPRs and regulations designed to prevent or minimize sediment discharge, preserve and restore impaired aquatic and riparian function, and preserve and restore cold water through effective shade on watercourses. The spatial and temporal scale of monitoring studies may vary from short term site or project-specific to long-term watershed or regional-scales.

2.2.5 California Geological Survey

The California Geological Survey’s (CGS) priorities focus on increasing our understanding of the effectiveness of the FPRs 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 impacts to resources and in some cases public safety. Due to the diverse geologic, topographic, and climatic conditions across the state, 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). Where and when management activities are conducted, as well as the practices employed, are critical to the effectiveness of any particular FPR. 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 storm). Effective FPRs will address management activities such that geologic related impacts are reduced to less than significant. To achieve this, geologic related monitoring studies must envelop the range of short term to long term, of site specific to regional, as well as response to episodic events.

Also, beyond geologic focused monitoring, aquatic and terrestrial effectiveness monitoring should also identify what appropriate temporal scale or specific natural events 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. Also, identifying episodic natural events like landslides and floods or impacts from drought, disease or wildfire can assist in separating effectiveness of current FPRs. Most importantly, some specific FPRs may need to be evaluated for effectiveness following both forest management operations and episodic natural events (See Section 3.2).

Comment [SLF6]: Feb 19th EMC discussion suggestion by Kevin B. on large episodic events vs. current FPRs

2.2.6 California Department of Forestry and Fire Protection

The California Department of Forestry and Fire Protection (CAL FIRE) monitoring priorities are to evaluate the implementation (i.e., compliance) and effectiveness of the FPRs in protecting water quality, as has been undertaken for the past 20 years (see Section 2.4), and also to evaluate the effectiveness of the FPRs in protecting wildlife habitat for Board-listed sensitive species and other important species.

Based on the results of previous monitoring programs, CAL FIRE encourages the EMC to undertake specific projects to determine the effectiveness of FPRs related to WLPZ, road, and watercourse crossing requirements in maintaining acceptable water temperatures and nutrient inputs, as well as reducing management-related sediment inputs. More rigorous and scientifically defensible tests of the effectiveness of individual practices are needed. For

Comment [SLF7]: Updated CALFIRE text provided by Pete C. Did not keep previous text under track change.

example, monitoring of unstable area identification and unstable area prescription effectiveness is needed. Post-mortem monitoring specifically for roads and watercourse crossings following large hydrologic events (e.g., storm recurrence intervals exceeding 20 years covering a large hydrologic basin) is needed to test the effectiveness of contemporary forest practices. The effectiveness of current FPRs for meeting Basin Plan water quality objectives also should be an EMC priority. Further information is needed on chronic turbidity durations and spatial distributions at a watershed scale, and on their impacts to anadromous salmonid growth and survival.

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 debates 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. Additionally, the effectiveness of aquatic restoration projects needs more rigorous testing. Habitat restoration is critical for the survival of listed anadromous fish species in the Coast Ranges and CAL FIRE supports continued effectiveness monitoring of large wood enhancement projects undertaken to improve habitat for salmonids.

CAL FIRE believes that wildlife habitat effectiveness monitoring should be a high priority for the EMC. For example, the Department encourages the EMC to develop monitoring efforts to determine the effectiveness of measures used to ensure take avoidance 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.

Finally, CAL FIRE supports effectiveness monitoring efforts in watersheds selected as pilot projects under AB 1492. CAL FIRE is beginning work with the other Review Team agencies to test a pilot approach for assembling available data on the planning watershed level to assess cumulative impacts and identify opportunities for restoration of habitat for listed anadromous salmonids. Implementation of a proposed 'Watershed Pilots Program' will be used to develop strategies for data assembly and sharing for consistent THP preparation and review, to identify needs and opportunities for restoration, and to enable the development of forest practice ecological performance measures.

2.2.7 Public Agency(s) and Public Stakeholders

The U.S. Forest Service (USFS), our state university system(s) and public have a mutual interest in supporting monitoring efforts that are well designed, advance our scientific understanding of

natural processes and are re-integrated through adaptive management into the FPR's. Also, the USFS is embracing an "all-lands" approach - working with adjacent landowners to reach common management goals. Several of the environmental factors that the USFS are required to monitor occur across administrative and ownership boundaries. The appropriate scale for monitoring will often include adjacent public and private lands. The EMC has an opportunity to develop shared monitoring between public and private lands.

In addition, the 2012 U.S. Forest Service Planning Rule (<http://www.fs.usda.gov/planningrule>) requires that National Forests to create a monitoring program as part of new Land and Resource Management Plans. Each plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following: (i) The status of select watershed conditions. (ii) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. (iii) The status of focal species to assess the ecological conditions required under § 219.9. (iv) The status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern. (v) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives. (vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area. (vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. (viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)). [36 CFR § 219.12]

2.2.8 Anadromous Fish Monitoring

Chinook and coho salmon and steelhead trout in California have complex life cycles, not only among the different species, but also among the different runs of species. As anadromous fish, meaning that adults rear in the ocean and return to freshwater to spawn, adults and juveniles of some species may hold in freshwater for extended periods while others spend more of their life history in the ocean. 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 have collected and some are currently collecting fish population data in California. Available data varies from long-term, abundant data to data that is limited spatially and temporally. Determining impacts to fish populations requires intensive, multi-year monitoring, as trends may not be determined for many years due to high natural variability as well as the complexity of fish life cycles. For example coho typically have a 3-year life cycle so a minimum of 9 years of population data would be required to capture a minimum 3-year trend for each cohort. Also due to the complexity of fish life cycles, the quality and/or abundance of available data, and other

Comment [SLF8]: This text provided by the sub-committee of Stacy, Matt H. and Bill C.

confounding factors (such as climate change, ocean conditions, predator-prey dynamics, etc) it may be difficult to make any correlations from timber harvesting impacts or restoration projects to fisheries populations, particularly at a reach or watershed scale.

Similarly, fisheries managers use stream habitat, spawning substrate, stream temperature, and riparian vegetation data to make determinations of project impacts on fish populations. As with fish population data, this type of monitoring is widely conducted across California by government agencies and private entities using accepted protocols. Habitat data is relatively easy to collect, less costly, and less intensive than fish population monitoring. It is also easy to document any changes, either positive or negative, from timber harvesting or restoration projects on a reach or watershed scale within a short time frame. Sediment filling in pools and increases in stream temperature can rapidly document negative impacts from projects and similarly increases in pool-riffle ratios and macroinvertebrate assemblages can provide quick results to determine project success. This type of monitoring allows managers to make inferences on impacts to fish populations. For these reasons, EMC will focus primarily on fisheries habitat monitoring and, when available, will use fish population data as another line of evidence to document any changes.

2.3 Ecological Performance - Timber Regulation and Forest Restoration Program

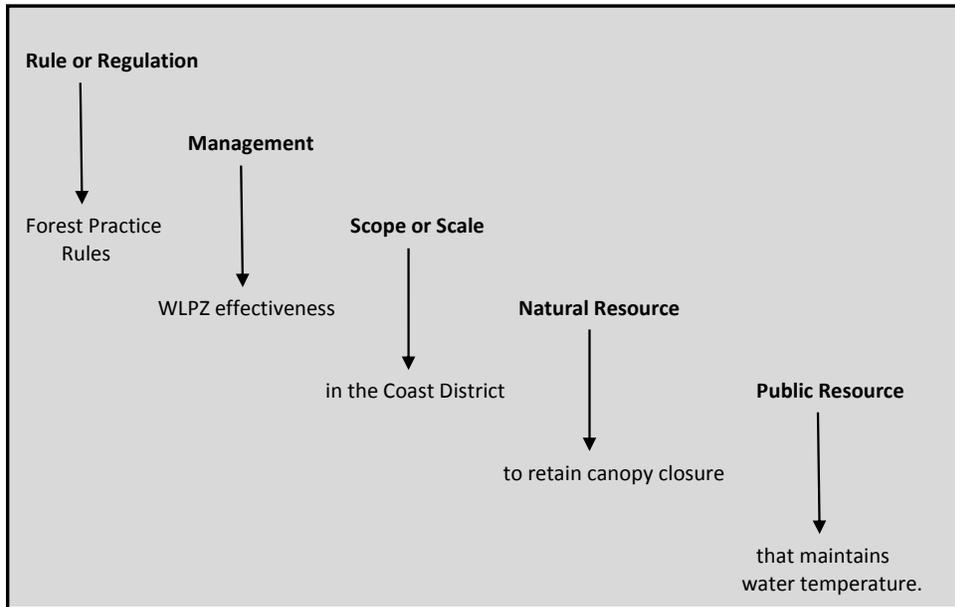
The Timber Regulation and Forest Restoration (TRFR) Program is directed by AB 1492 to develop ecological performance measures for the management of state and private forestlands. The program is at only the very initial stages of this work, having released draft charters in late 2014 for several working groups, including the Ecological Performance Measures Working Group and the Data and Monitoring Working Group. Ultimately, the ecological performance measures will drive the monitoring questions that the TRFR Program needs to answer. In addition to relying on monitoring data currently being collected by a wide range of entities, the TRFR Program may be able to tap resources in the TRFR Fund to fund additional monitoring that may be needed to support the ecological performance measures. Per the timelines in the draft working group charters, it will be some time in the future—mid-2016 at the earliest—that the working set of ecological performance measures will have been developed.

2.4 EMC Priorities and Critical Monitoring Questions

EMC members, in conjunction with the Board, have reviewed priorities and monitoring questions provided by a wide variety of stakeholders and how they may achieve various EMC goals and objectives ([Appendix D](#)):- 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. Each critical monitoring question is structured to identify: (1) Forest Practice Rule, Water Quality Objective, [Fish and Game](#) CDFW Code or Regulation, (2) Management Practice, (3) Temporal or Geographic Scope

or Scale, (4) Natural Resource, and (4) Public Resource (Figure 3). The following critical monitoring questions are proposed and summarized by categories.

Figure 3 Example: EMC critical monitoring question structure



Category 1: WLPZ Canopy Closure

The FPRs and WLPZs and Water Board objectives effectiveness in on private forestlands and Demonstration State Forests in all Districts to

- (a) Maintain canopy closure (Implementation and Compliance)
- (b) Maintain stream water temperature (Effectiveness)

Category 2: WLPZ Riparian Function

WLPZs occur dynamically within watersheds adjusting to successional vegetation changes and annual hydrologic events and other disturbances (eg. Wildfires, wind, insect, diseases). Accordingly, the following critical questions should focus on the natural processes and function of WLPZs and have allowances for the dynamic nature of these management areas.

Comment [SLF9]: Feb 19th EMC discussion on context of WLPZs. This may require additional text in Section 2.0.

The FPRs, WLPZs, and Water Board objectives effectiveness on private forestlands and Demonstration State Forests in all Districts to

- (a) retain predominant conifers in WLPZs (Implementation and Compliance) and monitor large woody debris input to watercourse channels (Effectiveness)
- (b) retention of conifer and deciduous species to maintain riparian shade to maintain water temperature and maintain primary productivity.
- (c) maintain input of organic matter to maintain primary productivity as measured by macroinvertebrate assemblages.
- (d) protect, maintain and restore riparian function of Class II-L in Coast District.
- (e) protect, maintain and restore riparian function of Class II-L in Northern District.
- ~~(b) Minimizing blowdown of trees and impacts to water quality.~~
- ~~(c) Maintaining or restoring riparian function in Class II-L WLPZ~~
- ~~(d) Enhancement of surface erosion filtration.~~

Category 3: Watercourse Stand Structure (moved to Category 2)**Category 4: Watercourse Channel Sediment**

The FPRs, WLPZs, and Water Board objectives effectiveness on private forestlands and Demonstration State Forests in all Districts in reducing sediment transport to and through watercourse channels by...

- (a) monitoring at watershed and sub-watershed level in managed watersheds.
- (b) monitoring individual THPs to evaluate channel response to forest management prescriptions and mitigation measures.
- (Note: Monitoring may also be appropriate for the AB1492 Ecological Performances Data Group).
- ~~(a) Best management practices(BMPs) for roads, skid trails and landings.~~
- ~~(b) Reducing forest road hydrologic connectivity.~~
- ~~(c) Erosion Control Plans and forest road erosion inventories~~
- ~~(d) Implementing cost effective BMPs.~~

Comment [SLF10]: Feb 19th EMC committee comment

Category 5: Road Sediment

The FPRs Road Rules 2014 effectiveness on private forestlands and Demonstration State Forests in providing an ecological benefit versus economic cost of implementing the rules.

Category 6: Road and WLPZ Sediment

The FPRs, WLPZs, and Water Board objectives effectiveness on private forestlands and Demonstration State Forests in all Districts ...

- (a) to minimize generation of sediment and transport to watercourse channels.
- (b) for WLPZs to filter sediment.
- (c) of Road Rules 2014 to reduce generation and transport of sediment to watercourse channels.
- (d) to reduce effects of large storms on landslides as related to roads, landings and road crossings
- (e) to maintain or improve fish passage of road crossing structures.

Category 7: Mass Wasting Sediment

The FPRs effectiveness on private forestlands and Demonstration State Forests in all Districts to minimize sediment delivery from...

- (a) existing chronic geologic features to maintain water quality.
- (b) episodic events and/or large storms to maintain water quality (See Section 3.2.1)

Category 8: Fisheries

The FPRs effectiveness on private forestlands and Demonstration State Forests in all Districts in describing and mapping distribution of foraging, rearing and spawning habitat for anadromous salmonids (Implementation and Compliance).

The FPRs effectiveness on private forestlands and Demonstration State Forests in all Districts in maintaining a distribution of foraging, rearing and spawning habitat for anadromous salmonids (Effectiveness).

Category 9: Silviculture

The FPRs effectiveness in fire hazard reduction on private forestlands and Demonstration State Forests in all Districts of...

- (a) treating post-harvest slash and slash piles to reduce fire behavior.
- (b) treating post-harvest slash and retaining wildlife habitats structures including snags and large woody debris.
- (d) management of vegetation patterns and fuel breaks for fire hazard reduction.
- (e) WLPZ management to reduce potential fire behavior and spread.
- (a) Overall fire hazard.
- (b) Treatment of slash pile to reduce fire hazard.

Category 10: Wildlife Habitat Species and Nest Sites

The FPRs effectiveness to protect nest sites on private forestlands and Demonstration State Forests in all Districts that provide...

- (a) general protection measures following 919.2(b)
- (b) species specific habitat and disturbance measures following 919.3

The FPRs and guidance effectiveness for Northern spotted owl on private forestlands and Demonstration State Forests in Northern District to...

- (a) ensure take avoidance of Northern spotted owls following 919.9 and 919.10.
- (b) ensure take avoidance of Northern spotted owls following 919.9(g).
- (c) maintain adequate amounts of suitable habitat to protect and conserve owls.
(Note: Monitoring (c) may also be appropriate for the AB1492 Ecological Performances Data Group).

Category 11: Wildlife Habitat Seral Stages

The FPRs effectiveness in maintaining functional wildlife habitat on private forestlands and Demonstration State Forests in all Districts by...

- (a) retaining and recruiting late and diverse seral stage habitat components in WLPZs for wildlife.
- (b) maintenance or increase of the amount and distribution of late succession forest stands for wildlife.
- (c) maintaining or recruiting adequate amounts of early- and mid-seral habitats.
(Note: Monitoring may also be appropriate for the AB1492 Ecological Performances Data Group).

Comment [SLF11]: Feb 19th EMC committee comment

Category 12: Wildlife Habitat Cumulative Effects

The FPRs Technical Rule Addendum No. 2 effectiveness on private forestlands and Demonstration State Forests in all Districts in...

(a) characterizing and describing terrestrial wildlife habitat and ecological processes.

(b) avoiding significant adverse impact to terrestrial wildlife species.

(Note: Monitoring for (a) may also be appropriate for the AB 1492 Ecological Performances Data Group).

Comment [SLF12]: Feb 19th EMC committee comment

Category 13: Wildlife Habitat Structures

The FPRs Variable Retention (913.4(d)) effectiveness on private forestlands and Demonstration State Forests in all Districts to retain structural elements or biological legacies to meet...

(a) ecological objectives including co-benefits.

(b) social objectives.

(c) geomorphic objectives.

The FPRs snag retention effectiveness (919.1) on private forestlands and Demonstration State Forests in all Districts to retain a mix of stages of snag development that maintain properly functioning levels of wildlife habitat.

The FPRs effectiveness on private forestlands and Demonstration State Forests in all Districts to retain native oaks (959.15) where required to maintain wildlife habitat.

2.4 Catalog and Review of Past and Ongoing Monitoring

(To Be Developed)

2.5 EMC Proposed Monitoring Projects - 2015

(To Be Developed)

3.0 APPROPRIATE SCIENTIFIC METHODS AND REPORTS

3.1 Scientific Study Design

(To Be Developed)

3.2 Appropriate Temporal and Geographic Scale

(To Be Developed)

3.2.1 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 events such as large floods, landslides and debris flows. Dispersed monitoring seldom captures the linkages between large natural disturbance events with the transitory effects of forest practice activities (Dunne, 2001). A comprehensive monitoring program should have a component that addresses the intersection of management and stressing events so that the effectiveness of forest practices can be evaluated across the widest range of environmental conditions. These events are not just hydrologic events, but can be from a variety of natural phenomena or may be from a combination of natural events such as those listed below:

- (1) Rain-on-snow events that cause rapid increase in stormwater runoff, which can overwhelm drainage systems.
- (2) Sequences of storms that saturate the soils that promote conditions where landslides can deliver a variety of sizes of sediment and woody debris to streams.
- (3) Earthquakes which can steepen slope and decrease slope stability when coupled with significant amounts of rainfall can result in increased stability problems.
- (4) Drought that can cause significant low flow that may compromise passage of aquatic organism through estuaries and drainage structures, or can increase the likelihood of stream dewatering during water drafting operations.
- (5) Drought may lead to conditions where dense riparian conditions can result in higher burn intensities within WLPZs.
- (6) Very large wildfires that affect large components of a bioregion or watershed, affecting significant numbers of aquatic and terrestrial organisms.
- (7) Episodic forest pest and/or disease-induced tree mortality exacerbated by prolonged periods of drought and/or higher than normal temperature regimes; and

Comment [SLF13]: EMC sub-committee of David B., Drew C. and Bill C. This sub-committee may have additional edits to this based on continued discussion and consideration of different options.

- (8) Wind storm events causing loss of mature tree to windthrow across very large areas.
- (9) While these events might be temporally or spatially episodic, their short- and long-term effects on forest species structure, function and composition nevertheless can result in conditions within a range of natural variability for the forest ecosystem (Swanson et al. 1994). An effectiveness monitoring program should evaluate the effectiveness of regulatory regimes and conservation programs in maintaining forest ecosystems within ranges of natural variability when large events occur.

An effectiveness monitoring program that relies on annual measurements may not capture the information necessary to determine the effectiveness of these practices relative to the larger events. Kirchner et al., (2001) found that catastrophic erosion events are infrequent and of short duration, but can control long-term sediment yield. They also noted that land use activities may alter the probability or magnitude of catastrophic events. Since these events are rare they should be proactively targeted for effectiveness monitoring.

Therefore, a different approach to standard monitoring is needed that will be able to respond to the large or rare events immediately following their occurrence and for some period of time after. This type of monitoring will require that a reserve of funds be set aside to respond immediately to the sites following the occurrence of a rare or large event to determine the effectiveness of the modern practices – an approach referred to as “post-mortem” monitoring (Stewart et al., 2013). Examples of past monitoring after large flood events include Furniss et al.’s (1998) evaluation of watercourse crossing performance in Washington, Oregon and northern California, and Robison et al.’s (1999) review of landslide impacts from large storms in western Oregon. In California, specific research questions can be addressed, such as (1) 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; or (2) are flows in culverts and their outlets meeting their minimum depth requirement for organism passage during low flows or flows become hyporheic that results in the culverts and their outlets becoming a barrier. These are examples of using infrequent events to determine the effectiveness of FPRs and regulations. Categories of rare events need to be created so that when they occur in California, a pre-approved effectiveness monitoring or research plan will be enacted to study the performance of the FPRs and regulations.

We recommend that effectiveness monitoring or research plans be prepared in advance of these events. A critical component of any monitoring or research design is to identify the rare or large event that triggers “post-event” monitoring. 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. The goal is to immediately respond to the opportunities as they arise to maximize the ability to detect the performance of the FPRs and regulations during these rare or large events. 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 will be implemented:

- (1) Determine that the rare event has occurred; the authority to make this determination will be the EMC.
- (2) Notify the appropriate response team and deploy other necessary resources, (i.e., a road failure, a landslide, or a post-fire assessment will require specific sets of skills). These will be preselected and could be available on an on-call contractual basis.
- (3) After review of the rare or large event, a 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 can be made and then executed without delay.

3.3 Scientific Uncertainty

The Board recognizes there is overall scientific uncertainty concerning how forested ecosystems function within the framework of managed forestlands. There is also uncertainty in how various ecosystem components and processes might relate to one another. Therefore, the EMC and Board recognize that while we will attempt to increase our scientific understanding of ecosystem components or processes in managed state and private forestlands, we may never fully understand these processes. Even with these known uncertainties, the EMC and Board will pursue a better understanding of how effective FPRs are in achieving goals and objectives of the FPRs, water quality objectives and Fish and Game codes and regulations.

3.4 EMC Reports

Members of the EMC or principal investigators conducting monitoring will synthesize the results into final reports for the EMC. The reports shall include descriptions of purpose and need, scientific methods, results and technical analysis, evaluation of implications for resources and forest management operations, and disclosure of any possible limitations of results and any scientific uncertainty. The reports 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 internet.

All reports shall discuss 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 that limit spurious results and enhance the range of inference. Both statistical and biological relevance of the monitoring and the resulting acceptable level of scientific uncertainty should be clearly stated in each monitoring proposal and final report.

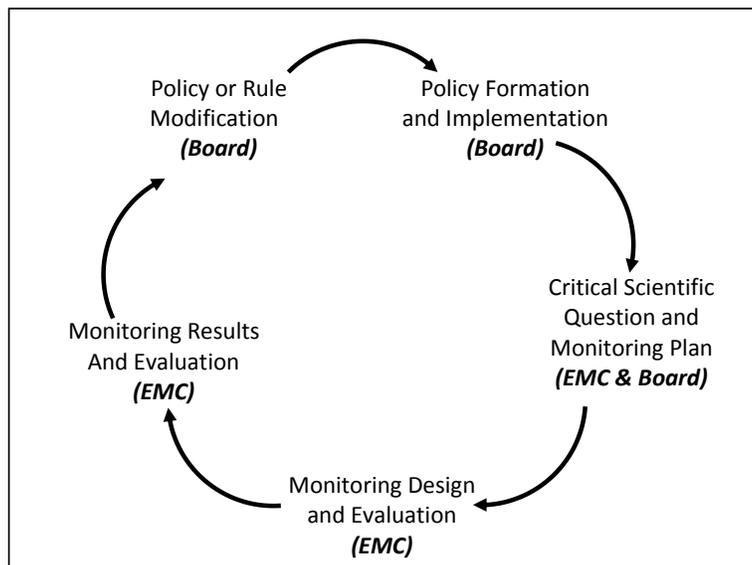
Results and findings of individual EMC reports are to be reviewed and discussed by the Board's Research and Science Committee (RSC). However, review by the RSC is for the specific purpose of developing long-term strategic planning by the RSC. Development of possible rule language options (see Section 4.0) based on results and findings of EMC reports, if necessary, shall be proposed by or brought before the Board's Forest Practice Committee for review and comment prior to submittal to the full Board.

4.0 BOARD - ADAPTIVE MANAGEMENT FRAMEWORK

The Board has previously discussed an Adaptive Management Framework. The Adaptive Management Framework is designed to consider scientific information provided by the EMC to better inform Board policy (Figure 4). Specifically, the Board will review results of EMC sponsored scientific studies to determine how effective the FPRs are in meeting goals and objectives of the FPRs, water quality objectives, and Fish and Game Code and regulations. In addition to results of scientific studies, the Board will consider the following four goals as part of the Adaptive Management Framework:

- (1) To provide compliance with the Endangered Species Act(s) for species on state and private forestlands.
- (2) To maintain and restore on state and private forestlands species that depend on them.
- (3) To meet the requirements of the federal Clean Water Act and Porter-Cologne Water Quality Control Act on state and private forestlands.
- (4) To keep private forestlands economically viable in the State of California.

Figure 4 Adaptive management using EMC sponsored monitoring to better inform Board policy and regulations.



When the Board reviews scientific information from EMC sponsored studies it is also 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 either the scientific report or additional information 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 FPRs, water quality objectives, or Fish and Game Code or regulations.

In addition, the Board has discussed a scientific report review checklist in more detail. Appendix C contains a more detailed description of this checklist. One portion of the checklist refers to more scientific questions appropriate for the EMC while the Board portions of the checklist refers to more policy based questions.

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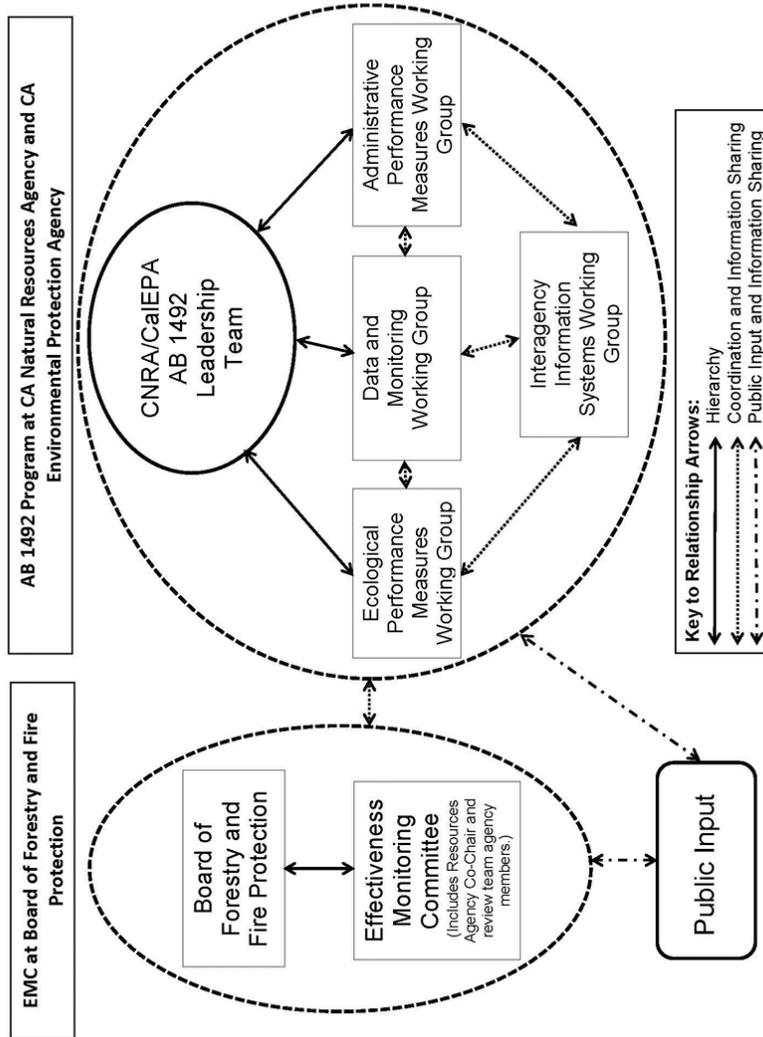
APPENDIX A: EMC APPOINTED MEMBERS

Name	Specialty	Affiliation	Term Expiration
Russ Henley	Co-Chair	Resources Agency	
Stuart Farber	Co-Chair	Board of Forestry and Fire Protection	
Agency Representatives			
Matthew Bokach	Wildlife	USFS	
Bill Condon	Wildlife	CDFW	
Drew Coe	Hydrology	CAL FIRE	
René Leclerc	Geology/Hydrology	CVRWQCB	
Dan Wilson	Fisheries	NOAA/NMFS	
Bill Stephens			
Nick Kunz	Watersheds	SWQCB	
Bill Short	Geology/Watersheds	California Geological Survey	
Jim Burke	Watersheds	NCRWQCB	
Fred Blatt			
Monitoring Community			
Kevin Boston	Forestry/Engineering (RPF)	Oregon State	7/1/2017
Erin Kelly	Forest Policy/Economics	Humboldt State University	7/1/2017
Brian Dieterick	Watersheds	Cal Poly SLO	7/1/2016
Tom Engstrom	Wildlife/Botany (RPF)	Sierra Pacific Industries	7/1/2016
Matt House	Hydrology/Aquatic	Green Diamond Resources	7/2/2017
Sal Chinnici	Wildlife	Humboldt Redwood Company	7/2/2017
Ed Smith		The Nature Conservancy	7/1/2016
Support Staff			
George Gentry	Executive Officer	Board of Forestry and Fire Protection	
Pete Cafferata	Hydrology	CAL FIRE	
Stacy Stanish	Biologist	CAL FIRE	
Bill Solinsky	Forestry (RPF)	CAL FIRE	
Dave Fowler	Watersheds	NCRWQCB	

Comment [SLF20]: Feb 19th EMC insert terms as presented

APPENDIX B: ORGANIZATIONAL FRAMEWORK OF AB1492

Comment [SLF21]: Russ provided this updated organizational chart with further clarification .



APPENDIX C: ADAPTIVE MANAGEMENT FRAMEWORK CHECKLIST

Framework Responsibility	Adaptive Management Checklist
EMC	<p>Overall Scientific or Policy Relevance</p> <ol style="list-style-type: none"> 1. Does the study better inform understanding of effectiveness of FPR's? 2. Does the study better information understanding of water quality objectives and fish and wildlife code or regulations? 3. Does the study contribute to understanding achievement of numeric or performance targets set Agencies or Departments?
EMC	<p>Overall quality of the study design and results</p> <ol style="list-style-type: none"> 1. Was the study design and analysis of results consistent with EMC recommendations? 2. Are study results scientifically relevant and significant?
EMC	<p>Confidence in results explaining effectiveness of FPR's</p> <ol style="list-style-type: none"> 1. What is our previous scientific understanding and how have the results better informed our current scientific understanding? 2. What scientific uncertainty remains in our current understanding? 3. What is the relationship between this study and other that may be planned, underway or recently completed? 4. Feasibility of obtaining additional information to better inform policy and what will the additional information provide? 5. What will additional information or studies cost and timelines for completion?
BOARD	<p>Review scientific results and additional EMC information</p> <ol style="list-style-type: none"> 1. Develop appropriate management policy to information provided by EMC. 2. If management policy action is necessary, identify options and determine how feasible each option is from an operational and regulatory perspective. 3. If Board action is necessary, identify whether appropriate for Committee development or full Board review.

APPENDIX D: PRIORITY RECEIVED FROM BOARDS, DEPARTMENTS & AGENCIES

(Priorities received have been grouped by natural resource subject).

Category	Sub-Category	Management Resource	Natural Resource	Priority or Monitoring Question	Submitted by and Year
1	1.1	WLPZ	Canopy closure	WLPZ effectiveness in maintaining canopy closure and water temperature?	MSG (2009)
	1.2	WLPZ	Canopy closure	Evaluate adequacy of FPR canopy retention standard in preserving pre-harvest effective shade; in particular, whether the minimum canopy retention provided on Class I and II-L watercourses preserves or restores site specific potential effective shade.	State and Regional Water Boards (2015)
	1.3	WLPZ	Canopy closure	FORPRIEM - <u>Implementation and compliance of WLPZ shade</u>	CALFIRE (2014)
	1.4	WLPZ	Canopy closure	Monitoring effectiveness of WLPZ canopy closure in Demonstration State Forests harvest plans.	BOF-MC (2014)
2	2.1 48	WLPZ	Riparian function	The effectiveness of implementing Section 916.4(a) and Section 916.4(b) in protecting, maintaining and/or restoring the functions set forth in Section 916.4(b).	CDFW (2015)
	2.2 25	WLPZ	Riparian function	Effectiveness of Class II-L rules to protect, maintain and restore riparian function	BOF-FPC (2014)
	2.3 3	WLPZ	Riparian Function	Evaluate how effectively the ASP Class II-L definition breaks out watercourses with summertime flow (to put it another way, how many standard Class II watercourses have water during summer months so that compliance with the Basin Plan temperature objective may be an issue.	<u>MSG (2009)</u> State and Regional Water Boards (2015)
3	2.4 4	WLPZ	<u>Riparian Function Stand Structure</u>	WLPZ tree blowdown and <u>potential impacts or benefits</u> to water quality.	MSG (2009) <u>EMC (2015)</u>
	2.5 49	WLPZ	<u>Riparian Function Stand Structure</u>	Effectiveness of FPRs in retaining predominant conifers in all WLPZs as recommended in Section 916.9(g)(2)(B), such as focusing practices on thinning from below <u>and maintaining large woody debris input to streams.-</u>	CDFW (2015)
	2.6	<u>WLPZ</u>	<u>Riparian</u>	<u>Effectiveness of FPRs in maintaining both</u>	<u>EMC (2015)</u>

			<u>function</u>	<u>conifer and deciduous species in WLPZs to maintain riparian shade and primary productivity.</u>	
	<u>2.7</u>	<u>WLPZ</u>	<u>Riparian function</u>	<u>Effectiveness of FPRs in maintaining input of organic matter into watercourses to maintain primary productivity measured by distribution and abundance of macroinvertebrate assemblages.</u>	<u>EMC (2015)</u>
4	<u>4.1</u> <u>5</u>	<u>Watercourse Channel</u>	<u>Sediment</u>	<u>Is excess sediment decreasing, on a regional basis, watershed or subwatershed basis?</u>	<u>State and Regional Water Boards (2015)</u>
	<u>4.2</u> <u>6</u>	<u>Watercourse Channel</u>	<u>Sediment</u>	<u>Is there a trend of recovery from excess sediment impairment occurring in managed watersheds?</u>	<u>State and Regional Water Boards (2015)</u>
	<u>4.3</u> <u>10</u>	<u>Watercourse Channel</u>	<u>Sediment</u>	<u>Effect of hillslope prescriptions on fluvial geomorphology, such as scour, down-cutting, and channel complexity.</u>	<u>CGS (2015)</u>
5	<u>5.1</u> <u>14</u>	Roads	Sediment	Effectiveness of additional plan mitigation measures and in-lieu practices <u>within WLPZs.</u>	MSG (2009)
	<u>5.2</u> <u>15</u>	Roads	Sediment	Erosion Control Plan effectiveness	MSG (2009)
	<u>5.3</u> <u>29</u>	Roads	Sediment	Comparison of Road Rules <u>2014</u> economic costs versus ecological benefit of implementing rules	BOF-FPC (2014)
5 6	<u>6.1</u> <u>7</u> <u>12</u>	<u>Roads and WLPZ</u>	Sediment	What extent are management practices under <u>FPR</u> current rules generating excess sediment (i.e., canopy removal, log skidding, and road construction and use) <u>and transporting to watercourse channels.</u>	State and Regional Water Boards (2015) <u>MSG (2009)</u>
	<u>6.2</u> <u>8</u>	<u>Roads and WLPZ</u>	Sediment	To what extent can excess sediment generated from management practices be further minimized by improving those practices and to what extent is sediment production unavoidable (for example, does canopy removal always result in <i>some</i> increase in sediment production due to changes in peak flows)?	State and Regional Water Boards (2015)
	<u>6.3</u> <u>47</u>	<u>Roads and WLPZ</u>	Sediment	Monitoring effectiveness of WLPZ surface erosion filtration <u>on private forestlands and in</u> Demonstration State Forests harvest plans.	BOF-MC (2014)
6	<u>6.4</u> <u>9</u>	Roads <u>and WLPZ</u>	Sediment	How effective are the <u>Road Rules 2014</u> new road rules in preventing or minimizing sediment discharge?	State and Regional Water Boards (2015)
	<u>6.5</u> <u>11</u>	Roads <u>and WLPZ</u>	Sediment	Effect of crossing structure design on fluvial geomorphology such as sediment routing <u>and fish passage of all life stages.</u>	CGS (2015)

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Comment [SLF22]: Feb 19th EMC discussion to group.

Comment [SLF23]: As discussed on Feb 19th EMC Category 5 was merged with Category 6

	12	Roads		Sediment transport to watercourse channels from roads, skid trails and landings.	MSG (2009)
	13	Roads	Sediment	Effectiveness of reducing road hydrologic connectivity.	MSG (2009)
	6.6 28	Roads and WLPZ	Sediment	Effectiveness of Road Rules 2014 to reduce hydrologic disconnection and sediment transport to a watercourse channel delivery and hydrologic disconnection	BOF-FPC (2014) EMC (2015)
	6.7 20	Roads and WLPZ	Sediment	Effect of large storms on landslides (debris flows) and as related to roads, landings and crossings.	CGS (2015)
	6.8 22	Roads and WLPZ	Sediment	FORPRIEM - watercourse crossings and fish passage of all life stages.	CALFIRE (2014)
	6.9 26	Roads and WLPZ	Sediment	Effectiveness of crossing construction practices with regard to long-term sustainability and resilience to episodic events.	CGS (2015)
	6.10 27	Roads and WLPZ	Sediment	Effectiveness of road and landing construction practices with regard to long-term sustainability and resilience to episodic events.	CGS (2015)
7	7.1	Mass Wasting	<u>Sediment</u>	Effectiveness of plan geologic mitigation measures <u>to minimize sediment delivery from existing chronic geologic features</u>	MSG (2009) EMC (2015)
	7.2	<u>Mass Wasting</u>	<u>Sediment</u>	<u>Effectiveness of plan mitigation measures to minimize sediment delivery from potential episodic geologic events</u>	EMC (2015)
	7.3	Mass Wasting	<u>Sediment</u>	Review of landslide dimension and causal relationships.	MSG (2009)
	7.4	Mass Wasting	<u>Sediment</u>	Effect of large storms on landslides as related to hillslope management prescriptions.	CGS (2015)
8	8.1	Fisheries	<u>Habitat</u>	Monitoring anadromous fish abundance-The FPRs effectiveness in describing and mapping distribution of foraging, rearing and spawning habitat for anadromous salmonids.	MSG (2009) EMC (2015)
	8.2	<u>Fisheries</u>	<u>Habitat</u>	<u>The FPRs effectiveness in maintaining a distribution of foraging, rearing and spawning habitat for anadromous salmonids.</u>	EMC (2015)
9	9.1 24	<u>Silviculture</u> <u>Slash Treatment</u>	<u>Slash Treatment</u>	Effectiveness of fuel treatment to reduce fire hazard reduction.	BOF-FPC (2014)
	9.2 45	<u>Silviculture</u> <u>Slash Treatment</u>	<u>Slash Treatment</u>	Effectiveness of residual slash pile treatment in comparison to fire hazard reduction or fire behavior	BOF-FPC (2014)
	9.3	<u>Silviculture</u>	<u>Slash Treatment</u>	Effectiveness of <u>treating post-harvest slash and retaining wildlife habitats structures including snags and large woody debris.</u>	EMC (2015)
	9.4	<u>Silviculture</u>	<u>Slash Treatment</u>	<u>Effectiveness of treating post-harvest slash piles to reduce fire behavior to better understand</u>	EMC (2015)

Comment [SLF24]: See 6.1

Comment [SLF25]: See 6.6

Comment [SLF26]: Feb 19th EMC discussion

Comment [SLF27]: 9.3 to 9.8 are based on Feb 19th EMC discussions of priorities.

				ignition and spread using a variety of pile sizes.	
	9.5	Silviculture	Slash Treatment	Effectiveness of vegetation management and construction and maintenance of fuel breaks for fire hazard reduction.	EMC (2015)
	9.6	Silviculture	Slash Treatment	Effectiveness of WLPZ management to reduce potential fire behavior and spread under a variety of fuel matrix(s).	CVRWQCB and EMC (2015)
	9.7	Silviculture	Slash Treatment	Effectiveness of treating post-harvest slash piles to reduce fire behavior under a variety of slash pile locations within a stand and impacts to adjacent untreated stands.	EMC (2015)
	9.8	Silviculture	Slash Treatment	Effectiveness of treating post-harvest slash using control burning treatment versus chipping on soil dynamics and vegetation response.	EMC (2015)
	9.9 42	Silviculture	Invasive Plants	The effectiveness of FPRs in reducing and/or treating invasive plants for both fire threat reduction and sensitive plant habitat protection and restoration.	CDFW (2015)
10	10.1	Wildlife Habitat	Nest Sites	The effectiveness of Section 919.2, General Protection of Nest Sites, "...for the protection of Sensitive species..."	CDFW (2015)
	10.2	Wildlife Habitat	Nest Sites	The effectiveness of Section 919.3, Specific requirements for Protection of Nest Sites.	CDFW (2015)
	10.3	Wildlife Habitat	Species	The effectiveness of Section 919.9(g) in avoiding take of Northern Spotted Owls	CDFW (2015)
	10.4	Wildlife Habitat	Species	Effectiveness of Northern spotted owl rules and regulations in protecting and conserving the species	BOF-FPC (2014)
	10.5	Wildlife Habitat	Species	Effectiveness of FPRs and guidance to ensure take avoidance of Townsend's big-eared bat.	CALFIRE (2015)
	10.6	Wildlife Habitat	Species	Effectiveness of FPRs and guidance to ensure take avoidance of Sierra Nevada yellow-legged frog.	CALFIRE (2015)
11	11.1	Wildlife Habitat	Seral habitats	The effectiveness of the Rules per Section 897, in retaining and recruiting late and diverse seral stage habitat components for wildlife in WLPZs and as appropriate to provide for functional connectivity; including individuals and patches of trees.	CDFW (2015)
	11.2	Wildlife Habitat	Seral habitats	The effectiveness of Section 919.16, Late Succession Forest Stands, with respect to maintenance of the amount and distribution of late succession forest stands or their functional habitat values on forestland ownerships.	CDFW (2015)
12	12.1	Wildlife Habitat	Cumulative Effects	The effectiveness of Section 912.9 and Technical Rule Addendum No. 2 in characterizing and avoiding significant adverse impacts to terrestrial wildlife species, their habitats and ecological processes.	CDFW (2015)

	12.2	<u>Wildlife Habitat</u>	<u>Cumulative Effects</u>	<u>The effectiveness of Section 913.1(a)(3) in avoiding forest habitat fragmentation.</u>	<u>CDFW (2015)</u>
1 3	13.1	Wildlife Habitat	Structures	The effectiveness of Section 913.4(d), Variable Retention, in the retention of structural elements or biological legacies” ...to achieve various ecological, social and geomorphic objectives.”and other co-benefits.	CDFW (2015)
	13.2	Wildlife Habitat	Structures	The effectiveness of Section 919.1, Snag Retention, “...to provide wildlife habitat....” and to retain a mix of (decay) stages of snag development and restoring snag densities towards “properly functioning” levels.	CDFW (2015)
	13.3	Wildlife Habitat	Structures	The effectiveness of various Rules in retaining and recruiting late and diverse seral stage habitat components with characteristics such as basal hollows, broken tops, multiple tops, furrowed bark, large diameter, reiterative limbs, large platform limbs and others.	CDFW (2015)
	13.4	Wildlife Habitat	Structures	The effectiveness of Section 1052 Emergency Notice, with respect to retention of habitat structural elements and biological legacies.	CDFW (2015)
	13.5	Wildlife Habitat	Oak	The effectiveness of Section 959.15, Protection of Wildlife Habitat, in retaining and protecting 400 sq. ft. basal area of oak per 40 acres, “...on areas designated by DFG as deer migration corridors, holding areas, or key ranges when consistent with good forestry practices.”	CDFW (2015)
	13.6	Wildlife Habitat	Aspen	The effectiveness of Section 913.4(e), Aspen, meadow and wet area restoration,“....to restore, retain, or enhance...for ecological or range values.”	CDFW (2015)

* BOF-FPC = Forest Practices Committee, BOF-RPC = Resource Protection Committee, BOF-MC = Management Committee, MSG = Monitoring Study Group

APPENDIX E: SUMMARY OF EMC REVIEWED PROJECTS

The following summary table is a catalog of proposed monitoring projects received or developed by the Effectiveness Monitoring Committee. Following the summary table are individual Project Summary(s) that provide more detailed project information.

Project Number	Project Title	Current Status	Principal Investigator(s)
EMC-2014-001	Class II-L Monitoring		D. Coe
EMC-2014-002	FORPRIEM - Watercourse Crossing Monitoring		P. Cafferata, C. Brandow
EMC-2014-003	FORPRIEM - WLPZ Total Canopy Monitoring		P. Cafferata, C. Brandow
EMC-2014-004			
EMC-2014-005	Road Rules - effectiveness of reducing mass wasting		D. Coe
EMC-2014-006	Road Rules - effectiveness of reducing hydrologic disconnection and surface erosion.		D. Coe
EMC-2014-007	Effectiveness of Class II headwater WLPZ for water temperature, near stream humidity and stream flow		NCRWQCB
EMC-2014-008	Post-harvest effectiveness of WLPZ measures to maintain or enhance coho (<i>Oncorhynchus kisutch</i>) in forested watersheds		Public Comment
EMC-2014-009	Redding THP Review Pilot Project		CALFIRE
EMC-2014-010	Monitoring relative abundance of anadromous species in forested watersheds		MSG (2009)
EMC-2014-011	Stream water and habitat quality monitoring - Pilot Project		C. James, J. Harrington
EMC-2014-012	Railroad Gulch In-Stream Effectiveness of THP Implementation		A. Stubblefield
EMC-2014-013	Landscape-level long-term water temperature monitoring of forested watersheds		B. McFadin, R. Fadness
EMC-2014-014	Long-term trend monitoring of SWAMP sites		J. Burke NCRWQCB State Board
EMC-2014-015			
EMC-2014-016			
EMC-2014-017			
EMC-2014-018			
EMC-2014-019			

APPENDIX F: INDIVIDUAL EMC REVIEWED PROJECT(S)

Project Number: EMC-2014-001
Project Name: Class II-L Monitoring

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation: 14 CCR 916.9 (936.9, 956.9)(c)(4)

EMC Critical Question or Priority:

Collaborators:

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: Drew Coe, CALFIRE

Submitted by XXXXXX XXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-002
Project Name: FORPRIEM watercourse crossing monitoring

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CGS

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: Pete Cafferata, CALFIRE

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-003
Project Name: FORPRIEM - WLPZ Total Canopy Monitoring

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CGS

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: Pete Cafferata, CALFIRE

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-004

Project Name:

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators:

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact:

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-005
Project Name: Road Rules - Effectiveness of reducing mass wasting

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CGS

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: D. Coe, CALFIRE

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-006
Project Name: Road Rules - Effectiveness of reducing hydrologic disconnection and surface erosion.

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CGS

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: D. Coe, CALFIRE

Submitted by XXXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-007
Project Name: Effectiveness of Class II headwater WLPZ for water temperature,
near stream humidity and stream flow

Background and Justification:

*Suggested sub-topics:
Initial Stakeholder concern,
Conservation or Recovery Plan objectives
Board, Agency or Department Priority*

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, Private forestland owners

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact:

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-008
Project Name: Post-harvest effectiveness of WLPZ measures to maintain or enhance coho (*Oncorhynchus kisutch*) in forested watersheds.

Background and Justification:

*Suggested sub-topics:
Initial Stakeholder concern,
Conservation or Recovery Plan objectives
Board, Agency or Department Priority*

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators:

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact:

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-009
Project Name: Redding THP Review Pilot Project

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CGS, CDFW

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact:

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-010
Project Name: Monitoring relative abundance of anadromous species in forested watersheds.

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: Monitoring Study Group (MSG)

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact:

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-011
Project Name: Stream water and habitat quality monitoring - Pilot project

Background and Justification: The intent of this project is to establish a monitoring framework to support collaborative monitoring for applying California’s SWAMP ecological performance measures to evaluate water and habitat quality in streams on private forest lands. Direct collaborators include SWRCB, DFW, CALFIRE, CFA, and private forest owners. This project will also collaborate with US Forest Service scientists currently developing a similar probability based monitoring program with SWAMP on California public forest lands.

Objective(s) and Scope: This project will use the SWAMP Protocol which is a well-tested, standardized method for direct site assessment of channel hydrologic and geomorphic conditions, stream and riparian habitat type, water chemistry, and benthic macro invertebrate and algal community composition. Sites will be assessed using the full SWAMP protocol and additional measures relevant to forestry such as riparian canopy cover, vegetation and species stand type will be included. All sample locations will be permanently marked by monument to help field crews locate the exact stream site for future monitoring events performed. Sampling will be conducted by experienced SWAMP field crews, biological and chemical samples will be processed by certified laboratories. SWAMP bioassessment data provide direct measures of ecological condition and can be used to compare stream reaches across space and time.

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: SWRCB, DFW, CALFIRE, California Forestry Association, private landowners

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: Cajun James, Sierra Pacific Industries
Jim Harrington, DFW

Submitted by XXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulations.

Project Number: EMC-2014-012
Project Name: Railroad Gulch In-Stream Effectiveness of THP implementation

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: Humboldt State University, Humboldt Redwood

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: A. Stubblefield

Submitted by XXXXXXXXX 10/29/14

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-013
Project Name: Landscape-level long-term water temperature monitoring of forested watersheds.

Background and Justification:

*Suggested sub-topics:
Initial Stakeholder concern,
Conservation or Recovery Plan objectives
Board, Agency or Department Priority*

Objective(s) and Scope:

Rule or Regulation:

EMC Critical Question or Priority:

Collaborators: CALFIRE, NCWQCB, CDFW-SWAMP

Existing or Needed Funding:

Timeline and Fiscal year (s):

Principal Investigator or Contact: Bryan McFaddin, Rich Fadness

Submitted by XXXXXXXXX

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation

Project Number: EMC-2014-014
Project Name: Long-term trend monitoring of SWAMP sites

Background and Justification:

Suggested sub-topics:

Initial Stakeholder concern,

Conservation or Recovery Plan objectives

Board, Agency or Department Priority

This project involves the addition of continuous temperature monitoring in the warmer months (May to September) at a subset of sites routinely monitored as part of the SWAMP Status and Trend Monitoring Program. The Regional SWAMP Program rotates through watersheds on a planned basis as resources allow. The Regional Board believes this approach allows for the best use of resources given available resources.

Objective(s) and Scope:

The approach focuses on a few watersheds at a time, cycling back through them every four years as funding allows. The Regional SWAMP Program began the Status and Trend Monitoring Program in Fiscal Year (FY) 2000-01. The original monitoring design utilized a two-component approach to address regional monitoring: 1) long-term “permanent” monitoring sites for trend analysis, and 2) rotating “temporary” sites for basin surveys. The original rotation schedule was closely coordinated with the TMDL development schedule to provide additional current information on water quality parameters to the TMDL development process.

Rule or Regulation:**EMC Critical Question or Priority:**

Collaborators: CALFIRE, NCWQCB, CDFW-SWAMP

Existing or Needed Funding:

Timeline and Fiscal year (s): The current SWAMP workplan for Calendar ((CY) 2012 through CY 2015 identifies 28 of the original long-term sites and 38 of the rotating basin sites for monitoring, while also adding 12 new sites. The Regional Temperature Monitoring Program will monitor temperature at a subset of these sites to monitor temperature status and trends at key locations.

Principal Investigator or Contact: J. Burke, NCRWQCB, State Board

Submitted by XXXXXXXXX

Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation