JOHN LIVINGSTON
April 27, 2015

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DRAFT
EFFECTIVENESS MONITORING COMMITTEE (EMC)
~~Monitoring~~ Strategic Plan

Comment [SLF1]: Pete C.

Submitted to the California Board of Forestry and Fire Protection

February 6~~January 26~~, 2015 ~~November 19, 2014~~ Draft

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Comment [SLF2]: Committee suggestion.

Comment [SLF3]: Pete C.

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2 not discussed in document.

3

relettered Appendixes as they are out of order

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 ~~aquatic~~ water quality related issues (Tuttle 1995, BOF 1999, Cafferata and Munn 2002, Brandow et al. 2006, Longstreth et al. 2008) with limited use as adaptive management. In 2014, the Effectiveness Monitoring Committee (EMC) was formed to develop and implement an effectiveness monitoring program that can provide an active feedback loop to policymakers, managers, agencies, and the public.

Comment [SLF4]: Pete C.

Comment [SLF5]: Pete C.

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).

Comment [SLF6]: Pete C.

Comment [SLF7]: Pete C.

Figure 1 EMC cCharter gGoals

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

(b) Support an adaptive management process by providing feedback to the Board regarding California 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 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 state demonstration forests for effectiveness monitoring of FPRs, water quality laws and Fish and Game codes, and other forestry-related laws and regulations.

1.1.1 EMC Current Membership

In 2014, the Board of Forestry and Fire Protection (Board) appointed 2 Co~~vice~~-Cehairs, 15 committee members and identified four~~4~~ 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~~vice~~-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 2014, the Co~~vice~~-Cehairs and Executive Officer of the Board ~~of Forestry and Fire~~ will be working with committee members to establish their respective term duration.

Comment [SLF8]: Co-Chair edit

Comment [SLF9]: Committee suggestion

Comment [SLF10]: Pete C.

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 ~~the~~ 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 o~~O~~bjectives in developing c~~C~~ritical m~~M~~onitoring q~~Q~~uestions

Comment [SLF11]: Pete C.

- 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

get on their email list

monitoring questions. A final list of critical monitoring questions along with a draft of the ~~Monitoring~~ 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 ~~Monitoring~~ Strategic Plan. The EMC will consider Board guidance or suggested changes and submit a final list of critical monitoring questions and ~~Monitoriong~~ 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. ?

Comment [SLF12]: Co-Chair. Further clarification as discussed on 12/8/14

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2.2.1 Board of Forestry and Fire Protection - Committee priorities

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

Comment [SLF13]: Drew C. and Co-Chair provided this section based on committee discussion on 12/8/14.

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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

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.

2.2.6~~5~~ California Department of Forestry and Fire Protection~~CALFIRE on-going Monitoring Questions~~

CAL FIRE and the Board~~BOF~~, through its Monitoring Study Group, have ~~has~~ been active in conducting both FPR~~orest Practice Rule~~s implementation (ie. compliance) and effectiveness monitoring related to water quality. ~~since the inception of the FPR's (Tuttle 1995, Board 1999, Cafferata and Munn 2002, Brandow et al. 2006, Longstreth et al. 2008).~~

~~These monitoring~~ Hillslope monitoring efforts have been conducted on ~~non-federal timberlands (primarily private forestlands, but also including the various~~ Demonstration State Forests and ~~on~~ private forestlands. These monitoring programs have included the Pilot Monitoring Program (Tuttle 1993, Lee 1997), Hillslope Monitoring Program (BOF 1999, Cafferata and Munn 2002), Modified Completion Report Monitoring Program (Brandow et al. 2006), Interagency Mitigation Monitoring Program (IMMP) (Longstreth et al. 2008), and the Forest Practice Rules Implementation and Effectiveness Monitoring (FORPRIEM) Program (Brandow and Cafferata 2014). ~~More recently CALFIRE has led several cooperative multi-agency monitoring effects including the Monitoring Study Group (MSG), Interagency Mitigation Monitoring Program (IMMP), Battle Creek Task Force, and FORPRIEM.~~ Monitoring data have been collected by qualified contractors, CAL FIRE Forest Practice Inspectors, and multi-agency teams. CAL FIRE also participated in the multi-agency Battle Creek Task Force monitoring project (BCTF 2011), which examined the impacts of clearcut logging on sediment production in Shasta and Tehama Counties.

In addition to these hillslope or upslope monitoring efforts, CAL FIRE has helped fund and participated in several cooperative instream monitoring projects to determine the impacts of contemporary logging practices on water quality and aquatic habitats. These projects have included the Caspar Creek watershed study (Rice et al. 1979, Ziemer 1998, Lewis et al. 2001,

Comment [SLF19]: Pete C. provided the following detailed description of CALFIRE efforts and priorities

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, Dietterick et al. 2015), the Judd Creek Watershed Study (MacDonald and James 2011), and the South Fork Wages Creek Watershed Study (RiverMetrics 2011).

~~Currently,~~ CALFIRE is continuing its FORPRIEM effort in 2015. The program will be modified in the near future to accommodate changes to the FPRs~~orest Practice Rules~~ (e.g., Road Rules 2013 rule package and earlier Anadromous Salmonid Protection Rule Package). NTMP-NTOs will continue to be monitored to build a more robust dataset. CAL FIRE will investigate using a stratified random sampling approach for the next iteration of FORPRIEM to better test the effectiveness of the FPRs on larger percentage of higher risk sites. Input will be sought from both the Effectiveness Monitoring Committee and the Monitoring Study Group on revisions to FORPRIEM, and CAL FIRE will attempt to better utilize the other Review Team agencies (i.e., DFW, CGS, and RWQCBs) for collecting collect field data.

The Caspar Creek and South Fork Wages Creek instream monitoring projects remain active in 2015; final reports have been or are actively being prepared for the other instream study areas. ~~either leading or participating in several monitoring efforts. The FORPRIEM effort data collection is complete and a report is being drafted.~~ A new five~~5~~-year contract with USFS – PSW ~~Arcata~~ has been approved ~~is being developed~~ and a post-doctoral position will be filled in January 2015 to design and implement a study plan for the third experiment in the Caspar Creek watershed. ~~complete a third experiment as part of the on-going Casper Creek studies. CALFIRE is working cooperatively within private forestland owners on the on-going Little Creek project and potential future Section V project, the South Fork Wages Creek project and the Judd Creek monitoring.~~ In the South Fork Wages Creek watershed, road upgrade work was completed in 2014 and Campbell Global anticipates timber harvesting will occur in 2017. CAL FIRE is actively investigating funding additional new cooperative instream monitoring projects documenting water quality-related impacts associated with contemporary timber operations.

CAL FIRE encourages the EMC~~ffectiveness Monitoring Committee~~ to undertake specific projects to determine the effectiveness of FPRs related to WLPZ, road, and watercourse crossing requirements. More rigorous and scientifically defensible tests of the effectiveness of individual practices are needed. For example, monitoring of unstable area identification and unstable area prescription effectiveness is needed. CAL FIRE supports continued monitoring of large wood enhancement projects undertaken in the Coast Ranges to improve habitat for listed anadromous salmonids. In addition, CAL FIRE also supports performing post-mortem monitoring specifically for roads and watercourse crossings after large hydrologic events have occurred (e.g., storm recurrence intervals exceeding 20 years covering a large hydrologic basin).

Additionally, CAL FIRE supports wildlife habitat effectiveness monitoring. For example, the Department encourages the EMC to develop monitoring efforts to determine the effectiveness of measures used to ensure take avoidance for Townsend's big eared bat (*Corynorhinus*

townsendii), Sierra Nevada yellow-legged frog (*Rana sierrae*) and mountain yellow-legged frog (*Rana muscosa*). CAL FIRE will work through the EMC to collaborate with the other agencies on current wildlife monitoring efforts, and to develop new monitoring for sensitive species.

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? what group?

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~~6~~ Public Agency(s) and Public Stakeholders ~~and EMC Member~~

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the

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

?

sprinkle throughout document

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]

Comment [SLF20]: New text provided by Co-Chair Russ H.

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~~ develop 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. Too long. ?

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2.~~4~~3 EMC Priorities and Critical Monitoring Questions

EMC members, in conjunction with the Board, have~~s~~ reviewed priorities and monitoring questions provided by a wide variety of stakeholders and how they may achieve various EMC goals and objectives. 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, CDFW Code or Regulation, (2) Management Practice, (3) Temporal or Geographic Scope or Scale, (4) Natural Resource, and (4) Public Resource (Figure 3).

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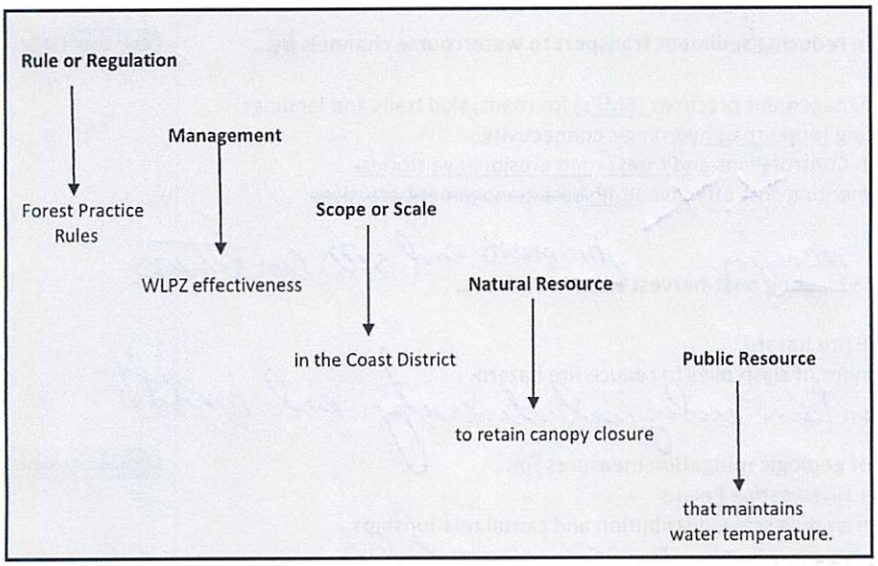
Figure 3 Example: EMC c~~C~~ritical m~~M~~onitoring q~~Q~~uestion structure

What does this 2.4 section have to do w/ Appendices D+E?



The following critical monitoring questions are proposed.

(1) The FPRs WLPZs and Water B~~b~~oard objectives effectiveness in…

(a) Maintaining canopy closure and stream water temperature~~,~~
(b) Minimizing blowdown of trees and impacts to water quality~~,~~
(c) Maintaining or restoring riparian function in Class II-L WLPZ. ~~and,~~
(d) Enhancement of surface erosion filtration.

simplify words.

Reduce sediment transport
soil movement

fire

(2) The FPRs effectiveness in reducing sediment transport to watercourse channels by...

Comment [SLF21]: Pete C.

(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~~best management practices~~.

managing biomass and site conditions

(3) The FPRs effectiveness in ~~treating~~ post-harvest ~~slash~~ to reduce...

(a) Overall fire hazard.
(b) Treatment of slash piles to reduce fire hazard.
c. maintain ecological diversity and health.

(4) The FPRs effectiveness of geologic mitigation measures for...

Comment [SLF22]: Pete C.

(a) Timber H~~h~~arvesting P~~p~~lans.
(b) Understanding scale, distribution and causal relationships.
Maintaining Existing Slope Stability
Preventing slides and massive sediment movement

(To Be Further Developed)

2.4 Catalog and Review of Past and Ongoing Monitoring

(To Be Developed)

2.5 EMC Proposed Monitoring Projects - 2015

(See Appendix E & F: 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)

3.3 Scientific Uncertainty

The Board recognizes there is ~~an~~ 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 understand how effective FPRs'~~'s~~ are in achieving goals and objectives of the FPRs'~~'s~~, water quality objectives and F~~f~~ish and Game~~wildlife~~ codes. ~~and regulations~~.

Comment [SLF23]: Pete C.

3.4 EMC Reports

Members of the EMC or principal ~~inv~~estigators 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~~are~~ 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 (s~~S~~ee 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.

Comment [SLF24]: Pete C.

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 FPR's are in meeting goals and objectives of the FPR's, water quality objectives, and Ffish and Gamewildlife Ccode and regulations. In addition to results of scientific studies, the Board will consider the following four goals as part of the Adaptive Management Framework:

Comment [SLF25]: Pete C.

(1) To provide compliance with the Endangered Species Act(s) for species on state and private forestlands.

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(2) To maintain and restore on state and private forestlands species that depend on them.

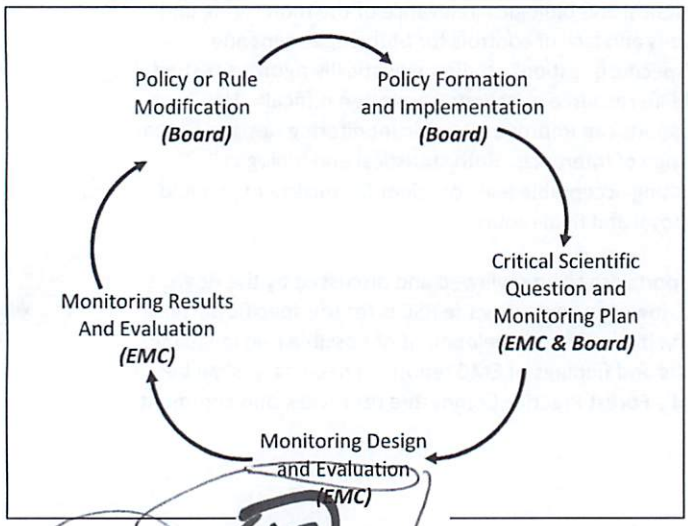
who are you talking about?

(3) To meet the requirements of the federal Clean Water Act and Porter-Cologne Water Quality Control Act ~~for water quality~~ on state and private forestlands.

Comment [SLF26]: Pete C.

(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.**



15

implementation

16

Board Review of EMC Studies

4.1 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 the 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 FPR's, water quality objectives, or F~~f~~ish and Game~~wildlife~~ code or regulations.

Comment [SLF27]: Pete C.

4.2 In addition, the Board has discussed a scientific report review checklist in more detail. Appendix C~~D~~ 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.

Scientific Report Review Checklist

5.0 REFERENCES

Comment [SLF28]: Many new or updated references from Pete C.

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. http://bofdata.fire.ca.gov/board_business/other_board_actions/battle_creek_report/final_battlecreek_taskforce_report.pdf

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

Comment [SLF29]: New citation by Drew C. and Co-Chair

Board of Forestry and Fire Protection (BOF). 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. (authored by P.H. Cafferata and J.R. Munn). http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/bof_1999_hmp_interim_rpt_.pdf

Board of Forestry and Fire Protection. 2014. The Board of Forestry and Fire Protection 2013 Annual Report. January 31, 2014.

Comment [SLF30]: New citation by Co-Chair

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.

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

Cafferata, P.H., D.O. Hall, and G.D. Gentry. 2007. Applying scientific findings to forest practice regulations in California. In: Proceedings of the NCASI 2007 West Coast Regional Meeting, September 26-27, 2007, Portland, Oregon. P. H-39 to H-46.

Coe, D. 2009. Water quality monitoring in the forested watersheds of California: status and future directions. Report prepared for the California State Board of Forestry and Fire Protection's Monitoring Study Group. Sacramento, CA. 37 p. plus Appendices. Available online at: http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/draft_monitoring_tracking_report_09nov09.pdf

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. Draft report. Swanton Pacific Ranch. Cal Poly State University, San Luis Obispo, CA.

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 Dist. 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

Gregory, R., D. Ohlson, and J. Arvai. 2006. Deconstructing adaptive management: criteria for applications to environmental management. Ecological Applications 16(6): 2411-2425.

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

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. Pgs. 85-125 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. 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://www.fire.ca.gov/CDFBOFDB/PDFS/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. 2000. Evaluating and managing cumulative effects: Process and contraints. Environmental Management. Vol. 26, No. 3, p 299-315.

MacDonald, L.H. and D. Coe, 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

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

MacDonald, L.H. and C. James. 2012. Effects of forest management and roads on runoff, erosion, and water quality: the Judd Creek experiment. AGU Fall Meeting Abstract. http://abstractsearch.agu.org/meetings/2012/FM/sections/EP/sessions/EP52C/abstracts/EP52C-08.html

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

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.

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. USDA Forest Service Pacific Southwest Research Station GTR PSW-GTR-238. http://cemarin.ucanr.edu/files/177065.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

Comment [SLF31]: Drew C. and Co-Chair added

Comment [SLF32]: Drew C. and Co-Chair added

Comment [SLF33]: Drew C. and Co-Chair added

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. Available online at: http://www.dnr.wa.gov/Publications/fp_tfw_agreement_19870217.pdf

Washington Forest Practice Board (WFPB). 2005. Guidelines for adaptive management program. Section 22. Olympia, WA. 31 p. Available online at: http://www.dnr.wa.gov/Publications/fp_board_manual_section22.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/

List of acronyms, abbreviations.

APPENDIX A: EMC APPOINTED MEMBERS

Name	Specialty	Affiliation
Russ Henly	Co~~Vice~~-Chair	Resources Agency
Stuart Farber	Co~~Vice~~-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
Nick Kunz	Watersheds	SWQCB
Bill Short — present	Geology/Watersheds	California Geological Survey~~Services~~ glasses
Brian McFadden/Fowler	Watersheds	NCRWQCB
Monitoring Community		
Kevin Boston	Forestry/Engineering (RPF)	Oregon State
Erin Kelly	Forest Policy/Economics	Humboldt State University~~SU~~
Brian Dietterick	Watersheds	Cal Poly SLO
Tom Engstrom	Wildlife/Botany (RPF)	Sierra Pacific Industries~~PI~~
Matt House	Hydrology/Aquatic	Green Diamond Resources
Sal Chinnici	Wildlife	Humboldt Redwood Company
Ed Smith		The Nature Conservancy~~TNC~~
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

Comment [SLF34]: Various edits to Appendix A by Co-Chair and comments from EMC members

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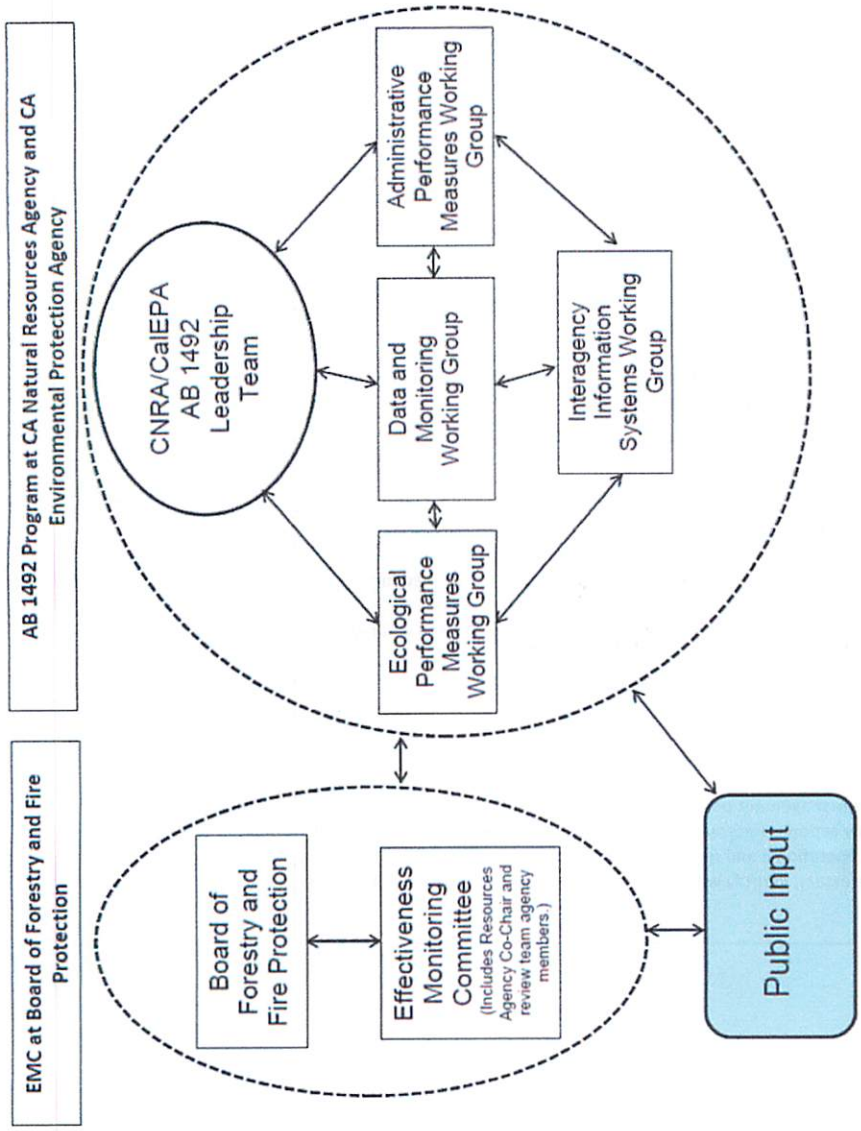
APPENDIX B~~C~~: ORGANIZATIONAL FRAMEWORK OF AB1492



Comment [SLF35]: Russ H. provided an updated framework

Comment [SLF36]: Co-Chair moved order of Appendix based on 12/8/14 EMC comments

APPENDIX C~~D~~: ADAPTIVE MANAGEMENT FRAMEWORK CHECKLIST

Framework Responsibility	Adaptive Management Checklist
EMC	**Overall Scientific or Policy Relevance** 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 by Agencies or Departments?
EMC	**Overall quality of the study design and results** 1. Was the study design and analysis of results consistent with EMC recommendations? 2. Are study results scientifically relevant and significant?
EMC	**Confidence in results explaining effectiveness of FPR's** 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 others 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	**Review scientific results and additional EMC information** 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.

Monitoring Questions

what about the public,

APPENDIX D~~B~~: PRIORITY RECEIVED FROM BOARDS, DEPARTMENTS & AGENCIES

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

Monitoring Subject	Priority or Monitoring Question	Submitted by and Year
Watercourse	WLPZ effectiveness in maintaining canopy closure and water temperature?	MSG (2009)
Watercourse	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)
Watercourse	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.	State and Regional Water Boards (2015)
Watercourse	WLPZ tree blowdown and impacts to water quality.	MSG (2009)
Watercourse (Sediment)	Is excess sediment decreasing, on a regional basis, on a watershed or subwatershed basis?	State and Regional Water Boards (2015)
Watercourse (Sediment)	Is there a trend of recovery from excess sediment impairment occurring in managed watersheds?	State and Regional Water Boards (2015)
Watercourse (Sediment)	What extent are management practices under current rules generating excess sediment (i.e., canopy removal, log skidding, and road construction and use)?	State and Regional Water Boards (2015)
Watercourse (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 *some* increase in sediment production due to changes in peak flows)?	State and Regional Water Boards (2015)
Watercourse (Sediment)	How effective are the new road rules in preventing or minimizing sediment discharge?	State and Regional Water Boards (2015)
Watercourses	Effect of hillslope prescriptions on fluvial geomorphology, such as scour, down-cutting, and channel complexity.	CGS (2015)
Watercourses	Effect of crossing structure design on fluvial geomorphology such as sediment routing.	CGS (2015)
Roads	Sediment transport to watercourse channels from roads, skid trails and landings.	MSG (2009)

Comment [SLF37]: Co-Chair put Appendix D, E and F sequentially for better flow based on discussions on 12/8/14

Comment [SLF38]: Priority and Questions from Nick K. and Jim B. and Water Board staff

Comment [SLF39]: Provided by Bill S. CGS

Roads	Effectiveness of reducing road hydrologic connectivity.	MSG (2009)
In-Lieu	Effectiveness of additional plan mitigation measures and in-lieu practices.	MSG (2009)
Roads	Erosion Control Plan effectiveness	MSG (2009)
Mass Wasting	Effectiveness of plan geologic mitigation measures	MSG (2009)
Mass Wasting	Review of landslide dimension and causal relationships.	MSG (2009)
Mass Wasting	Effect of large storms on landslides as related to hillslope management prescriptions.	CGS (2015)
Mass Wasting	Effect of large storms as related to roads and landings (e.g. landslides and erosion).	CGS (2015)
Mass Wasting	Effect of large storms on landslides (debris flows) and crossings.	CGS (2015)
Fisheries	Monitoring anadromous fish abundance	MSG (2009)
Roads	FORPRIEM - watercourse crossings	CALFIRE (2014)
Watercourse	FORPRIEM - WLPZ shade	CALFIRE (2014)
Slash Treatment	Effectiveness of fuel treatment to reduce fire hazard reduction	BOF-FPC (2014)
Watercourse	Effectiveness of Class II-L rules to protect, maintain and restore riparian function	BOF-FPC (2014)
Crossings	Effectiveness of crossing construction practices with regard to long-term sustainability and resilience to episodic events.	CGS (2015)
Roads	Effectiveness of road and landing construction practices with regard to long-term sustainability and resilience to episodic events.	CGS (2015)
Roads	Effectiveness of Road Rules to reduce sediment delivery and hydrologic disconnection	BOF-FPC (2014)
Roads	Comparison of Road Rules economic costs versus ecological benefit of implementing rules	BOF-FPC (2014)
Wildlife	Effectiveness of Northern spotted owl rules and regulations in protecting and conserving the species	BOF-FPC (2014)
Wildlife	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)
Wildlife	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)
Wildlife	The effectiveness of Section 913.1(a)(3) in avoiding forest habitat fragmentation.	CDFW (2015)
Wildlife	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."	CDFW (2015)

Comment [SLF40]: Provided by Bill S. CGS

Comment [SLF41]: Provided by Bill S. CGS

Comment [SLF42]: Wildlife Priority and Questions provided by Bill C.

Wildlife	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)
Wildlife	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)
Wildlife	The effectiveness of Section 919.2, General Protection of Nest Sites, "...for the protection of Sensitive species..."	CDFW (2015)
Wildlife	The effectiveness of Section 919.9(g) in avoiding take of Northern Spotted Owls	CDFW (2015)
Wildlife	The effectiveness of Section 919.3, Specific requirements for Protection of Nest Sites.	CDFW (2015)
Wildlife	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)
Wildlife	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)
Wildlife	The effectiveness of Rules in reducing and/or treating invasive plants for both fire threat reduction and sensitive plant habitat protection and restoration.	CDFW (2015)
Wildlife	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)
Wildlife	The effectiveness of Section 1052 Emergency Notice, with respect to retention of habitat structural elements and biological legacies.	CDFW (2015)
Slash Treatment	Effectiveness of residual slash pile treatment in comparison to fire hazard reduction or fire behavior	BOF-FPC (2014)
Watercourse	Monitoring effectiveness of WLPZ canopy closure in Demonstration State Forests harvest plans.	BOF-MC (2014)
Watercourse	Monitoring effectiveness of WLPZ surface erosion filtration in Demonstration State Forests harvest plans.	BOF-MC (2014)
Watercourse	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)
Watercourse	The effectiveness of Rules in retaining predominant conifers in all WLPZs as recommended in Section 916.9(g)(2)(B), such as focusing practices on thinning from below.	CDFW (2015)

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

Comment [SLF43]: Two Watercourse Priority and Monitoring Questions provided by Bill C.

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 (*Oncorhynchus kisutch)* 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			

Comment [SLF44]: Inserted column based on 12/8/14 EMC discussion.

Comment [SLF45]: Provided by Jim B.

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 XXXXXXXXX 10/29/14
Note: Rule or Regulation = Forest Practice Rule, Water Quality Objective or Fish and Wildlife Code or Regulation.

Project Number: EMC-2014-007
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

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APPENDIX D: PRIORITY RECEIVED FROM BOARDS, DEPARTMENTS & AGENCIES

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

How big is the impact of sediment from non-forest practices on water quality.

Priority	Sub-Priority	Management Subject	Natural Resource	Priority or Monitoring Question	Submitted by and Year
1	1	WLPZ	Canopy closure	WLPZ effectiveness in maintaining canopy closure and water temperature?	MSG (2009)
	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)
	23	WLPZ	Canopy closure	FORPRIEM - WLPZ shade	CALFIRE (2014)
	46	WLPZ	Canopy Closure	Monitoring effectiveness of WLPZ canopy closure in Demonstration State Forests harvest plans.	BOF-MC (2014)
2	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)
	25	WLPZ	Riparian function	Effectiveness of Class II-L rules to protect, maintain and restore riparian function	BOF-FPC (2014)
	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.	State and Regional Water Boards (2015)
3	4	WLPZ	Stand Structure	WLPZ tree blowdown and impacts to water quality.	MSG (2009)
	49	WLPZ	Stand Structure	The 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.	CDFW (2015)
4	5	Watercourse Channel	Sediment	Is excess sediment decreasing, on a regional basis, watershed or subwatershed basis?	State and Regional Water Boards (2015)
	6	Watercourse Channel	Sediment	Is there a trend of recovery from excess sediment impairment occurring in managed watersheds?	State and Regional Water Boards (2015)

p80, 93, 90

Water temperature is easest to monitor but it is directed toward ~~water~~ aquatic health. Terrestrial health ~~is also~~ needs to be addressed.

RFP Registered Professional Forester

lack of women/minorities in study group is bad

	10	Watercourse Channel	Sediment	Effect of hillslope prescriptions on fluvial geomorphology, such as scour, down-cutting, and channel complexity.	CGS (2015)
5	7	WLPZ	Sediment	What extent are management practices under current rules generating excess sediment (i.e., canopy removal, log skidding, and road construction and use)?	State and Regional Water Boards (2015)
	8	WLPZ	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 *some* increase in sediment production due to changes in peak flows)?	State and Regional Water Boards (2015)
	47	WLPZ	Sediment	Monitoring effectiveness of WLPZ surface erosion filtration in Demonstration State Forests harvest plans.	BOF-MC (2014)
6	9	Roads	Sediment	How effective are the new road rules in preventing or minimizing sediment discharge?	State and Regional Water Boards (2015)
	11	Roads	Sediment	Effect of crossing structure design on fluvial geomorphology such as sediment routing.	CGS (2015)
	12	Roads	Sediment	Sediment transport to watercourse channels from roads, skid trails and landings.	MSG (2009)
	13	Roads	Sediment	Effectiveness of reducing road hydrologic connectivity.	MSG (2009)
	28	Roads	Sediment	Effectiveness of Road Rules to reduce sediment delivery and hydrologic disconnection	BOF-FPC (2014)
	29	Roads	Sediment	Comparison of Road Rules economic costs versus ecological benefit of implementing rules	BOF-FPC (2014)
	19	Roads	Sediment	Effect of large storms as related to roads and landings (e.g. landslides and erosion).	CGS (2015)
	20	Roads	Sediment	Effect of large storms on landslides (debris flows) and crossings.	CGS (2015)
	22	Roads	Sediment	FORPRIEM - watercourse crossings	CALFIRE (2014)
	26	Roads	Sediment	Effectiveness of crossing construction practices with regard to long-term sustainability and resilience to episodic events.	CGS (2015)
	27	Roads	Sediment	Effectiveness of road and landing construction practices with regard to long-term ~~sustainability~~ stability and resilience to episodic events.	CGS (2015)
	14	Roads In-Lieu	Sediment	Effectiveness of additional plan mitigation measures and in-lieu practices.	MSG (2009)
	15	Roads	Sediment	Erosion Control Plan effectiveness	MSG (2009)
7	16	Mass Wasting	Sediment	Effectiveness of plan geologic mitigation measures	MSG (2009)
	17	Mass Wasting	Sediment	Review of landslide dimension and causal relationships.	MSG (2009)
	18	Mass Wasting	Sediment	Effect of large storms on landslides as related to hillslope management prescriptions.	CGS (2015)

post drought erosion intensity

Monitoring Study Group

Fires, post fire logging and new logging near fires
Costs — what role does cost have in environmental protection?
Rules for post fire logging need to be stricter

logging kills fish?
What about resident fish/frogs/bird populations
protect rearing/spawning habitat.

8	21	Fisheries		Monitoring anadromous fish abundance	MSG (2009)
9	24	Silviculture Slash Treatment	Slash Treatment	Effectiveness of fuel treatment to reduce fire hazard reduction.	BOF-FPC (2014)
	45	Silviculture Slash Treatment	Slash Treatment	Effectiveness of residual slash pile treatment in comparison to fire hazard reduction or fire behavior	BOF-FPC (2014)
	42	Silviculture	Invasive Plants	The effectiveness of Rules in reducing and/or treating invasive plants for both fire threat reduction and sensitive plant habitat protection and restoration.	CDFW (2015)
10	37	Wildlife Habitat	Nest Sites	The effectiveness of Section 919.2, General Protection of Nest Sites, "...for the protection of Sensitive species..."	CDFW (2015)
	39	Wildlife Habitat	Nest Sites	The effectiveness of Section 919.3, Specific requirements for Protection of Nest Sites.	CDFW (2015)
	38	Wildlife Habitat	Nest Sites	The effectiveness of Section 919.9(g) in avoiding take of Northern Spotted Owls	CDFW (2015)
	30	Wildlife Habitat	Nest Sites	Effectiveness of Northern spotted owl rules and regulations in protecting and conserving the species 919.10 look up — NSO Take not in Table of Cuts p114,15	BOF-FPC (2014)
11	31	Wildlife Habitat	Late-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)
	40	Wildlife Habitat	Late-seral habitat	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	32	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)
	33	Wildlife Habitat	Cumulative Effects	The effectiveness of Section 913.1(a)(3) in avoiding forest habitat fragmentation.	CDFW (2015)
13	34	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."	CDFW (2015)
	36	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)
	41	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,	CDFW (2015)

Stocking standards what fires severity

should this list be expanded?

19

Cumulative effects at THP scale
" " " Blue line stream watershed level < 50 cfs
" " " " level >
large watershed level.

			large platform limbs and others.	
44	Wildlife Habitat	Structures	The effectiveness of Section 1052 Emergency Notice, with respect to retention of habitat structural elements and biological legacies.	CDFW (2015)
43	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)
35	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*

Add Virginia's comment on pollinator studies that should be done on private lands.

133 trees.

3 | 400

374 trees per 40 AC.

14" oak

$A = \frac{14^2 \pi}{4} = 154 \square'' \text{ ft}^2$

12 in^2

$= 1.07 \text{ ft}^2$

$A = \frac{\pi}{4} d^2$

.75

Pete Rude R. Bluff

Virginia - Russ Henry summary of EWC Forestry

Susan ?

next mtg. in 6 weeks. end of April.

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

Comment [SLF16]: New text provided by Nick K., Jim B. and other state and regional water board staff.

Comment [SLF17]: For consistency edited by Co-Chair and referred to management practices as "FPRs and regulations"

8

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.

State or Regional?

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

Comment [SLF18]: New text provided by Bill S. CGS

Bill please

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

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).

FPR Forest Practice Rules

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, nest approach to monitoring would help elucidate important linkages between site and project scale manipulations and ecological response at the watershed and regional scale ~~at larger~~. 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.

2.2.3 California Department of Fish and Wildlife

Bill

Comment [SLF14]: New text provided by Bill C. and CDFW

Comment [SLF15]: Co-Chair minor edits for clarity and consistency

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-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