2020 EFFECTIVENESS MONITORING COMMITTEE ANNUAL REPORT AND WORKPLAN

## STATE BOARD OF FORESTRY AND FIRE PROTECTION

December 31, 2020

EXECUTIVE SUMMARY

The Effectiveness Monitoring Committee (EMC) Annual Report and Workplan is a living document which is updated and approved by the Board of Forestry and Fire Protection annually and is intended to catalogue the yearly accomplishments and status of ongoing EMC efforts. The Annual Report and Workplan summarizes EMC accomplishments, details EMC funding actions for the year, and provides an update of current EMC membership and staffing. Funding details include information on all projects submitted to the EMC. For fiscal year[1] 2019/2020, the EMC selected three proposed effectiveness monitoring projects to fund and support. No new projects were solicited for the 2020/2021 year because of budget uncertainties due to the pandemic. Ongoing projects from prior years continue to be funded.

EMC PROCESS SUMMARY

Project Submission Timeline (approximate)
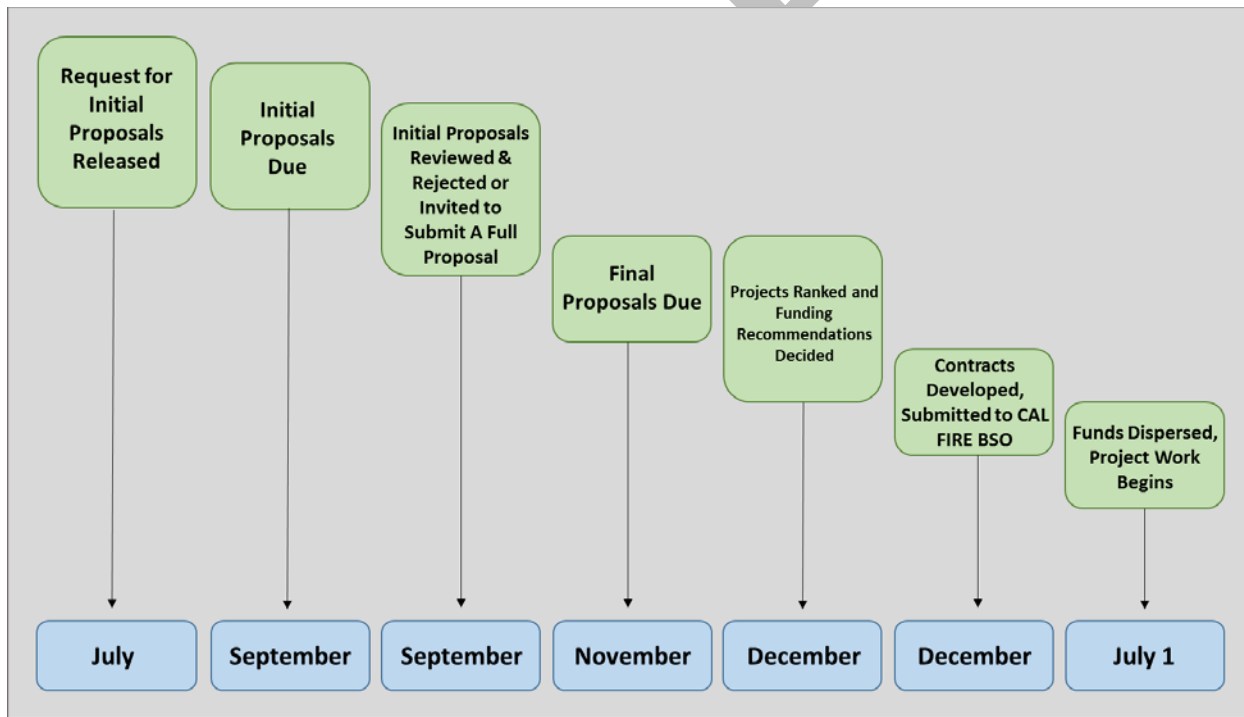
The EMC Strategic Plan will be updated approximately every three years and the EMC Annual Report and Work Plan will be updated every calendar year. This linked approach, including a longer more static document and a shorter more fluid document, was developed in response to Board member suggestions.

---

[1] Fiscal year denotes from the July 1st of one year to June 30th of the next. California uses this time frame for tax and accounting purposes.

EMC projects are solicited through an annual Request for Proposals (RFP) which is released following the start of the new fiscal year. Initial Concept Proposals are typically received in September and the EMC conducts a preliminary technical review of all Initial Concept Proposals that are received by the deadline (established annually in the RFP). This review considers the completeness of the proposals and whether they are within the scope of the Themes and Critical Monitoring Questions elaborated in the Strategic Plan. The EMC also works with Board staff to screen proposals for any conflicts of interest and may request that the Principal Investigator provide additional information within a reasonable period.

When the EMC determines that an Initial Concept Proposal is complete and within scope, the Principal Investigator is invited to submit a Full Project Proposal by the deadline specified in the RFP. The EMC then conducts a thorough technical review of all Full Project Proposals that are received and a formal ranking is conducted per the procedures outlined in the EMC's Strategic Plan. EMC members individually rank each project and the average ranking score is calculated for each project. No specific minimum average ranking score is required for support; rather, individual project scores will be considered relative to other project scores. Once all Full Project Proposals have been ranked, EMC members vote to make recommendations for allocation of available EMC funds, taking into consideration the project ranking score, how well the project tests the effectiveness of the Forest Practice Rules (FPRs), and the reasonableness of the requested budget. Utilizing the EMC's funding recommendations, Board staff will make the final funding decisions, as delegated by the Board. It is the intent of the EMC to keep the ranking process transparent, with the ranking done in an easily trackable manner. The EMC receives periodic updates on the projects that have received funding and presentations on findings from completed projects.

EMC FUNDING

For fiscal year 2020/21, the EMC has been allocated ongoing funding of $267,841.12 from the Timber Regulation and Forest Restoration Fund (TRFRF),[2] established by AB 1492 (2012). This funding is being used to support EMC projects and is granted through the Board/CAL FIRE contracting process.

EMC ACCOMPLISHMENTS

During 2020, the EMC accomplished the following:

- Received an ongoing allocation of $267,841.12 from the Timber Regulation and Forest Restoration Fund.
- Regularly met in open, webcast public meetings to conduct work.
- The EMC charter was updated by the committee and approved by the Board of Forestry.
- Strategic Plan themes and critical questions for 2019 were reviewed and retained. No additions or alterations were made to the priorities for 2020. The EMC committed to examining the research already funded and setting priorities by themes and critical questions in 2021.

---

[2] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB1492.

- The EMC recommended that a grant program be considered as a means of distributing funding for future projects and the BOF approved a recommendation to ask Board staff to explore this option.

Table 1. EMC Projects With Continued Funding (2020/2021)

Project	Project Title	Primary Investigator & Project Collaborators	Funding Allocation
EMC-2016-003	Repeat LiDAR Surveys to Detect Landslides	Bill Short & Dr. Matt O'Connor	$33,333.00 FY 2020/2021
EMC-2018-003	Alternative Meadow Restoration	Dr. Christopher Surfleet	$25,104.000 FY 2020/2021
EMC-2018-006	Effect of FPRS on Restoring Canopy Closure, Water Temperature, & Primary Productivity	Dr. Kevin Bladon, Dr. Catalina Segura, Matthew House, & Drew Coe	$151,006 FY 2020/2021
EMC-2019-003	Fuel Treatments and Hydrologic Implications in the Sierra Nevada	Dr. Terri Hogue and Dr. Alicia Kinoshita	$58,397.79 FY 2020/2021

EMC SUPPORTED MONITORING PROJECTS – 2015 to 2020

The comprehensive list of current EMC-supported monitoring projects can be found on the Board's EMC webpage (https://bof.fire.ca.gov/board-committees/effectiveness-monitoring-committee/).

EMC PRIORITIES

EMC priorities are developed by the Committee, but as an advisory body to the Board, the Board can also request prioritization of items by the EMC. The current EMC priorities are as follows:
- Support projects related to the EMC themes and critical questions.
- Monitor progress on previously funded or supported EMC monitoring projects.
- Meet in the field at least once per year to observe active or proposed monitoring projects.

CURRENT APPOINTED EMC MEMBERS AND STAFF

For FY 2020/2021, the Committee has two Co-Chairs, eight agency representatives, seven EMC Members, and six support staff positions.

Table 4. Current EMC Membership and Support Staff

Name	Specialty	Affiliation	Term Expiration
Co-Chairs			
Loretta Moreno	Co-Chair, Forest Ecology	California Natural Resources Agency	7/5/2023
Susan Husari	Co-Chair, Forestry/Fire Management	Board of Forestry and Fire Protection	11/6/2023
Agency Representatives			
Stacy Drury, Ph.D.	Fire Ecology	USDA Forest Service Pacific Southwest Research Station	n/a
Elliot Chasin	Wildlife	California Department of Fish and Wildlife	n/a
Drew Coe	Hydrology/Forestry, RPF 2981	CAL FIRE	n/a
Jessica Leonard	Watershed Management	State Water Resources Control Board	n/a
Justin LaNier	Geology/Hydrology/Water Quality	Central Valley Regional Water Quality Control Board	n/a
Clarence Hostler	Fisheries	NOAA National Marine Fisheries Service	n/a
Bill Short	Engineering Geology/ Hydrogeology	California Geological Survey	n/a
Jim Burke	Geology/Water Quality	North Coast Regional Water Quality Control Board	n/a
Monitoring Community			
Greg Giusti	Forestry, RPF 2709	University of California Cooperative Extension Advisor Emeritus-Lake and Mendocino counties	7/1/2021
EMC Members			
Matt House	Hydrology/Fisheries	Green Diamond Resource Company	8/31/2024
Sal Chinnici	Wildlife	Humboldt Redwood Company	7/1/2024
Matt O'Connor, Ph.D.	Geology/Geomorphology	Public	11/6/2023
Sarah Bisbing, Ph.D.	Forest Ecology/Forestry	Academic, University of Nevada, Reno	7/5/2023
Leander Anderegg, Ph.D.	Forest Ecology/Forestry	Academic, University of California, Berkeley	7/5/2023

Name	Specialty	Affiliation	Term Expiration
Peter Freer-Smith, Ph.D.	Plant Ecology and Environmental Policy	Academic, University of California, Davis	7/5/2023
Support Staff			
Matt Dias	Forestry, RPF 2773	Board of Forestry and Fire Protection Executive Officer	n/a
Pete Cafferata	Hydrology/Forestry, RPF 2184	CAL FIRE	n/a
Stacy Stanish	Biology/Fisheries, RPF 3000	CAL FIRE	n/a
Dave Fowler	Geology/Water Quality	North Coast Regional Water Quality Control Board	n/a
Vacant	Forestry	Board of Forestry and Fire Protection	n/a
Vacant	Biology/Environmental Science	Board of Forestry and Fire Protection	n/a

EMC PROJECT UPDATES

- **EMC-2015-001: Class II-Large Monitoring:** Oregon State University Master of Science (MS) student Adam Pate selected three main areas to implement the regional scale component of the Class II Large Watercourse Study, which assessed the effectiveness of rule criteria for identifying Class II watercourses susceptible to thermal loading. Field work took place during the summer of 2018 in three Jackson Demonstration State Forest watersheds, two upper Klamath River basins, and the Cow Creek watershed (South Cow Creek on LaTour Demonstration State Forest). At least 100 sites were being studied. Adam Pate defended his thesis in the summer of 2019 and his thesis was published in Hydrologic Processes in August of 2020 (Pate et al., 2020). PhD student Austin Wissler will be analyzing the thermistor data from Caspar Creek and Latour Demonstration State Forest as the first part of his dissertation research. This portion of his research will be submitted for publication in January 2021.

- **EMC-2016-002: Post-fire Effectiveness of the Forest Practice Rules in Protecting Water Quality on Boggs Mountain Demonstration State Forest:** Data collection is continuing for a 6th post-fire season. Ryan Cole defended his MS thesis in the spring of 2020. Findings of his research were published in a manuscript in Hydrologic Processes titled, "Hillslope sediment production after wildfire and post-fire forest management in northern California" in October 2020 (Cole et al., 2020). Dr. Sergio Prats published a manuscript in Hydrologic Processes titled, "Compaction and cover effects on runoff and erosion in postfire salvage logged areas in the Valley wildfire, California" (Prats et al., 2020). Dr. Joe Wagenbrenner presented a preliminary

analysis of data from the post-fire skid trail BMP demonstration study and presented it at the American Geophysical Union Fall Meeting in December 2020. Drew Coe, Dr. Joe Wagenbrenner, and others are currently drafting a guidance document on post-fire salvage logging to be released in 2021.

- **EMC-2016-003: Road Rules Effectiveness at Reducing Mass Wasting (Repeat LiDAR Surveys to Detect Landslides):** The CAL FIRE/CGS contract has been augmented to purchase LiDAR. Once completed, the LiDAR data will be publicly available from the USGS. The pilot project data has been reviewed and final LiDAR data is expected in early 2021. The processing of the LiDAR data by the USGS and its contractors was delayed due to COVID-19 response and by prioritizing processing of LiDAR data from areas affected by wildfires.

- **EMC-2017-001: Caspar Creek Nutrient Study:** UC Davis MS student Seanna McLaughlin presented a PowerPoint presentation on the project at the annual Caspar Creek watershed meeting in August 2020. Over 1,950 water samples have been collected to date from four gaged sub-watersheds with varying harvest intensity, and at the South Fork Caspar Creek weir. Nutrient analyses have been completed comparing pre- and post-logging periods, wet and dry years, and hydrologic years. Post-harvest total nitrogen and nitrate flux were highest for the Ziemer sub-watershed, which had the highest density removal (75%). Seanna McLaughlin has nearly completed her MS thesis on the project and will graduate in March 2021. Dr. Helen Dahlke and Seanna are finishing analyzing post-logging nutrient samples from the winter of 2019/2020 following laboratory closures during the spring and summer due to COVID-19, and they will produce a final report by June 30, 2021.

- **EMC-2017-002: Boggs Mountain Demonstration State Forest (BMDSF) Post-Fire Automated Bird Recorders Study:** The third and final year of bird recordings were made in the late spring of 2019 and the bird call interpreter completed the recording analysis in January 2020. Stacy Stanish is working with a CDFW statistician to analyze the data.

- **EMC-2017-006: Tradeoffs among Riparian Buffer Zones, Fire Hazard, and Species Composition in the Sierra Nevada:** This project remains ongoing, with the Project Agreement set to expire 6/30/21. This project has been impacted significantly by COVID-19. The commercial timber harvests that were planned for this project were completed, but the post-harvest fuel treatments were not. Specifically, CAL FIRE inmate crews were unavailable to assist with the fuel treatments in 2020, as was planned. Additionally, there were long delays in hiring field crews to collect data during the 2020 field season; consequently, there is not sufficient data to analyze. Thus, the project is approximately one year behind schedule. We are currently planning to use the remaining funds to conduct fuel treatments (work that was planned for CAL FIRE inmate crews) in case a no-cost extension is not possible. Post-treatment data collection will be supported to the extent possible with funds from other sources. The updated schedule of work for next year includes:
  - Completing fuel treatments in areas that have been harvested,
  - Measuring control plots not measured in 2020,
  - Collecting post-treatment data (measuring critical data first) in the summer of 2021, using other funding sources to the extent possible, and
  - Data analysis and reporting in the fall/winter of 2021.

This new schedule does not require a contract extension for funding because we are assuming this will not be possible. Rather, it requests an extension for the deliverables, which were planned to occur at the end of Phase 1 of the project. The culmination of Phase 1, as planned, was a report that followed treatments and data collection. Phase 2 involves leveraging results from Phase 1 to replicate the study at other locations around the state. This is still the plan. We have been contacted by CAL FIRE regarding replicating the study at LaTour Demonstration Forest. This and other potential replication sites will be explored during Phase 2.

- **EMC-2017-007: The Life Cycle of Dead Trees and Implications for Management:** Dr. John Battles, UC Berkeley, has completed the development of an annual snag tracking protocol at Blodgett Forest Research Station. This project is in a 24-ha stand at Blodgett Forest (identified as Compartment 160) where snags have been tracked for almost four decades. The first annual inventory using the new snag monitoring protocol was completed in 2020. The coarse search of the stand-wide 40-m grid proved to be a good compromise between efficiency and precision. The effort required 98 crew hours and missed less than 3% of the snags. Moreover, most of the "missed" snags were highly decayed and short incense-cedar stubs. We also completed a retrospective study of log decay to complement the long-term study of downed wood decay rates. We used a 37-year record of snag fall to obtain a first approximation of log decay rates for cedar, other conifer, and hardwood logs in the Sierra mixed conifer forest. Finally, we completed the "fresh" wood density estimates for all the samples in the eight log decay sites (e.g., "log cemeteries") co-located in Compartment 160.

- **EMC-2017-008: FPRs to Minimize Fir Mortality from Root Diseases:** The Heterobasidion disease control study is nearing completion. We expect results and developed manuscripts before the end of the next reporting period. Preliminary data based on a laboratory trial suggest urea and borate treatments effectively reduced Heterobasidion establishment on freshly cut wood (blocks up to 400g), but do not fully eliminate infection. Disease was also effectively controlled when blocks had been previously infected by *Phlebiopsis gigantea*, a common biological control fungus used in Europe and the southeastern US. However, we found that treatment timing appears to play a role in treatment efficacy, with urea and borates effective when applied a week or a week after addition of Heterobasidion inoculum. *Phlebiopsis gigantea* appears to be effective in reducing disease when applied prior to Heterobasidion.

- **EMC-2018-003: Alternative Meadow Restoration:** Soil moisture, shallow groundwater wells, and sap flow instrument installation occurred in July 2019 at the Rock Creek meadow. Monitoring of hydrologic instruments has been ongoing. Soil cover and bulk density information was collected in the Watercourse and Lake Protection Zone (WLPZ) of the Rock Creek meadow restoration site prior to alternative treatment during the summer of 2019. Stream sediment data including pebble counts, pool/riffle ratios, and residual pool depths were collected prior to treatment in summer 2019. Pre-restoration vegetation transects, identifying all plant species in 10 1-square meter plots for 4 transects was collected in the summer of 2019 and repeated in 2020.

  The alternative riparian treatment of encroached conifer removal for meadow habitat restoration occurred at Rock Creek meadow in late summer and early fall 2020. Approximately 75% of the proposed meadow area was treated; the remainder of the removal will occur in 2021. In fall

2020, we collected soil bulk density samples in the WLPZ of the alternative treatment. This represented soil compaction conditions directly after tree yarding by ground-based equipment, prior to first winter post-restoration. The sap flow instruments were removed from the lodgepole pine trees prior to alternative riparian treatment in August 2020. The sap flow instruments were moved to lodgepole pine trees directly adjacent to the alternative treatment in November 2020. Post-restoration vegetation surveys will be collected in summer 2021. Data analysis has been ongoing and will be completed in spring 2022.

Maintenance and download of soil moisture and groundwater instruments at Marian and its control meadow have been ongoing. We now have 5 years of hydrologic measurements following alternative riparian treatment at these sites. Filtering of the data and analysis is ongoing. Data collection will continue through 2021.

A Master of Science (MS) thesis will be completed analyzing the pre-treatment lodgepole pine sap flow and pre-treatment statistical analysis of the hydrologic instruments in June 2021. An MS thesis on the Rock Creek vegetation response and Rock Creek and Marian Meadow post-treatment hydrologic response of 1-year and 6-years post treatment, respectively, will be completed by spring 2022. An MS project on the soil disturbance and stream habitat response the first year following alternative treatment at Rock Creek will be completed in September 2021.

- **<u>EMC-2018-006: Class II Watercourse and Lake Protection Zone:</u>** Drs. Kevin Bladon and Catalina Segura launched this four-year project in collaboration with Green Diamond Resource Company during the summer of 2019. There are 18 watersheds included in the study—six reference watersheds and four of each of the three riparian treatments. Treatment watersheds were all harvested in 2020 with one of the three treatments: (a) Coastal Anadromy Salmonid Protection Zone Class II-L Prescription (30-ft core zone, 70-ft inner zone with 80% overstory canopy cover), (b) Green Diamond Resource Company Habitat Conservation Plan Prescription (30-ft inner zone with 85% overstory canopy, 70-ft outer zone with 70% overstory canopy cover), or (c) an alternative prescription resembling pre-ASP (100-ft zone with 50% overstory canopy). In 2020, we finished our pre-treatment data collection phase and initiated the post-harvest data collection. We have six circular fixed-area plots in the riparian area of each watershed to quantify pre- and post-harvest tree condition, species, diameter at breast height, basal area, and canopy closure (from hemispherical photographs). At the outlet of each of the 18 streams is a pressure transducer (measures stream elevation to calculate continuous discharge), a dissolved oxygen sensor, and a photosynthetically active radiation sensor. Longitudinally, along each of the 18 streams are four air temperature sensors and 12 stream temperature sensors (288 total sensors). We also maintain two centrally located meteorological stations to quantify precipitation, air temperature, wind speed, radiation, soil moisture, and relative humidity across the region. All automated sensors have been set up to collect data at 15-minute intervals. These data will provide key knowledge on the comparative response of streamflow, physical water quality, and whole stream metabolism to the three riparian treatments. PhD student Austin Wissler has been working on the project since August 2019. Austin has completed QA/QC of the 2019 data and has begun QA/QC of the remaining pre-harvest data. He has also begun preliminary QA/QC of post-harvest data for sites that were harvested early in 2020. We also recruited a Master's student, Jonah Nicholas, to the project in fall 2020 to focus on the analysis

of streamflow. Despite the challenges that the COVID-19 pandemic has presented, Austin and Jonah have continued to make several trips to Northern California to maintain the data collection effort during the 2020 treatment year and coordinate closely with the timber harvest operations. Drs. Kevin Bladon and Catalina Segura plan to provide an update to the EMC committee in early 2021 on the progress of the research project, including a virtual field tour of the study sites.

- **EMC-2019-002: Evaluating Treatment Longevity and Maintenance Needs for Fuel Reduction Projects Implemented in the Wildland Urban Interface of Plumas County, CA:** An online geodatabase of completed Fire Safe Council Projects is being completed with review by the Plumas County Fire Safe Council (PCFSC). Using this data, and in coordination with PCFSC, six parcels were examined for the quality and condition of a previously treated parcel in the La Porte Road area. Several of the parcels burned and were used during Claremont Fire firefighting operations, giving a unique opportunity to assess treatment effectiveness in terms of burn severity and facilitation of fire suppression actions. Measurements were taken of crown cover, diameter at breast height, basal area, species composition, and fire effects, when applicable. Photographs of the treatment were taken in the four cardinal directions with a GPS point taken at the sampling point. Planning is underway to visit parcels in Whitehawk, East Quincy, and Clio, weather permitting. All subsequent visits will incorporate drone flights and 360° photographs. When possible, older pre- and post-treatment photographs taken at the time of treatment will be repeated in the exact location.

- **EMC-2019-003: Fuel Treatments and Hydrologic Implications in the Sierra Nevada:** Streamflow data was acquired and reset on November 12-14, 2020. This data will be quality controlled and added to our existing long-term dataset. Leaf Area Index and MODIS FPAR 4-day global dataset have been acquired using Google Earth Engine. Ongoing work includes acquisition of additional remote sensing products: fractional snow-covered area, evapotranspiration, and NDVI. Statistical evaluation will begin in late December to early January. LiDAR data available for Sagehen will be acquired in spring 2021 and interpreted to quantify canopy change at a high resolution. COVID-19 delayed the start date of our project by several months and our proposed timeline.

- **EMC-2019-005: Sediment Monitoring and Fish Habitat – San Vicente Accelerated Wood Recruitment:** During winter/spring 2020, initial site characterization activities commenced. Full site characterization and study reach selection efforts were put on hold initially due to COVID-19 shelter-in-place orders and subsequently due to the CZU Fire, which burned the majority of the study watersheds. In fall 2020, pressure transducers and a rain gauge were installed to begin monitoring post-fire hydrologic response in the study watersheds. CGS will work with San Vicente Redwoods as they re-assess site conditions and potential forest treatments in 2021. This project will be adapted to include post-fire conditions.

EMC PROJECT RESULTS AND PRODUCTS

EMC-2015-002 Forest Practice Rules Implementation and Effectiveness Monitoring (FORPRIEM) ver. 2.0.: A final statistical consultation report for EMC-2015-002 and EMC-2015-

[004](#) was written by Dr. Ashley Steel and Pat Cunningham, USFS Pacific Northwest Research Station (PNW) and submitted to the EMC.

EMC-2015-004 Effectiveness of Road Rules in Reducing Hydrologic Connectivity and Significant Sediment Discharge: A [final statistical consultation report for EMC-2015-002 and EMC-2015-004](#) was written by Dr. Ashley Steel and Pat Cunningham, USFS Pacific Northwest Research Station (PNW) and submitted to the EMC.

EMC-2016-002: Post-fire effectiveness of the Forest Practice Rules in protecting water quality on Boggs Mountain Demonstration State Forest: A manuscript titled "Hydrologic and erosive responses of compaction versus cover in post-fire logged areas Part I: Isolating the key factors" was submitted to the Journal of Hydrology by Drs. Sergio Prats and collaborators. The study used soil collected from BMDSF and replicated post-fire salvage logging conditions and practices in a laboratory setting.

Two reports have been produced for this project:
- [Will Olsen's 2016 Master of Science Thesis, Michigan Tech, is titled: "Effects of Wildfire and Post-Fire Salvage Logging on Rill Networks and Sediment Delivery in California Forests."](#)
- [Drew Coe's presentation abstract for the 2016 Geological Society of America Cordilleran Section 112th Annual Meeting titled "Post-Fire Erosion and Sediment Delivery Rates to Headwater Streams in the California Coast Ranges."](#)

EMC-2017-001 Caspar Creek Nutrient Study: UC Davis MS student Seanna McLaughlin and Drs. Helen Dahlke and Randy Dahlgren prepared a final report for pre-harvest biogeochemical analysis of four Caspar Creek sub-watersheds for the Save the Redwoods League, one of the project funders.

EMC-2017-001 Caspar Creek Nutrient Study: McLaughlin, S.G., Dahlke, H.E., and Dahlgren, R.A. 2019. December. Impacts of timber harvest treatments on stream biogeochemistry in a northern California redwood forest. In *AGU Fall Meeting 2019*. AGU, abstract #H43G-2073. https://ui.adsabs.harvard.edu/abs/2019AGUFM.H43G2073M/abstract.

EMC-2017-002 Boggs Mountain Demonstration State Forest (BMDSF) Post-Fire Automated Bird Recorders Study: A poster and poster abstract were prepared for the Western Section of the Wildlife Society Meeting held in February 2018.

EMC-2017-006: Tradeoffs among Riparian Buffer Zones, Fire Hazard, and Species Composition in the Sierra Nevada: In 2019, presentations were given at the Blodgett Forest Research Station to the EMC and to the Green Teens urban youth program. In 2020, presentations included: the California Licensed Forester's Association (CLFA) 2020 annual conference in Redding, CA; the 2020 CLFA field trip at Blodgett Forest Research Station; and an online Landowner Forest Management workshop.

POTENTIAL EMC PROJECT IMPACTS TO REGULATIONS

The EMC provides valuable insight to the Board on testing the effectiveness of their rules and regulations by way of science-based research projects. EMC-funded studies may show that regulatory modifications, either minor or major, need to occur to ensure the effectiveness of the Forest Practice Rules (14 CCR § 895 et seq.). EMC funded projects have not identified any rulemaking needs.