Effectiveness Monitoring Committee Meeting Notes
August 02, 2022 9:30 AM

Hybrid Meeting

1. Participants (28)

Members Present - Loretta Moreno (Co-Chair), Elizabeth Forsburg Pardi (Co-Chair), Bill Short, Jim Burke, Clarence Hostler, Ben Waitman, Jessica Leonard, Drew Coe, Justin LaNier, Matt House, Sal Chinnici, Dr. Matt O'Connor, Dr. Stacy Drury, and Peter Freer-Smith
Members Absent - Dr. Leander Love-Anderegg
Staff - Dr. Kristina Wolf, Curtis Yee, and Andrew Lawhorn
Participants – Dave Fowler, Nicholas Fetherston, Cheryl Hayhurst, Alicia Kinoshita, Jeremy Kobor, Roberta Lim, Pete Roffers, Izaac Russo, Justin Fitt, and Richard Gienger

2. Report by the Co-Chairs

a. Membership Updates

Dr. Wolf provided an update on recruitment of EMC applicants. Information on the open seats on the EMC is as follows: two (2) vacancies in the monitoring community, and the specialties and affiliations on where those seats were previously occupied; and up to three (3) agency representative seats (1 - US Fish and Wildlife Service open now; 2 – CAL FIRE, Drew Coe will be vacating his seat; and 3 - optional seat representing the US Forest Service, which is currently filled by Dr. Stacy Drury who will be vacating his seat, but note that representation from this agency is mandated on the EMC). A current list of EMC members, specialties, and affiliations is online: https://bof.fire.ca.gov/media/vygclsab/2a-emc-member-roster_ada.pdf

Applicant Dr. Michael Jones from U.C. Cooperative Extension was referred by Member Coe but will not be taking member Coe's seat since he does not work for CalFire; rather, he will be representing the Monitoring Community. The applicant will be reviewed later during the meeting.

A Call for Applications was released, and can be found online: https://bof.fire.ca.gov/media/m4ul1hwt/2b-request-for-emc-applicants-2022_ada.pdf

Action items: Send contact information for potential candidates, or a letter of interest and CV from the applicant, to Dr. Wolf at Kristina.Wolf@bof.ca.gov.

b. Grant Solicitation Updates and Timeline:

Co-chair Forsburg-Pardi indicated the EMC will be moving from the contract process to a grant solicitation in hopes of an improved process for processing project funding agreements.

Dr. Wolf presented the EMC grant guideline's with a timeline showing Initial Concept Proposals being due Wednesday, September 14th. These will be reviewed at the meeting at the end of September. After the September 14th deadline, Dr. Wolf will have applications redacted within a couple of days and sent out to the EMC members to review. Members will have about a week and a half to review them before the meeting at the end of September. The grant guidelines are online: https://bof.fire.ca.gov/media/4zfj5vnq/2c-emc-grant-guidelines-2022-23-final_ada.pdf and https://www.grants.ca.gov/grants/effectiveness-monitoring-committee-request-for-research-proposals/

There is $130,091 to fund new projects available for this fiscal year (FY) 2022/23, $376,125 for FY 2023/24, and $425,000 for FY $2024/25, totaling $931,216.00 over the course of three years.

3. Project Updates

- Sarah Bisbing was the project liaison for two projects and as she is no longer on the EMC, those will need to be filled by another member.
    - EMC-2016-003: Repeat LiDAR Surveys to Detect Landslides
    - EMC-2017-006: Tradeoffs among riparian buffer zones

- Member Coe provided an update on EMC-2017-001 (Effects of Forest Stand Density Reduction on Nutrient Cycling and Nutrient Transport at the Caspar Creek Experimental Watershed). Dr. Helen Dahlke presented findings at the Casper Creek annual meeting in May 2022, and he will ask her to present at the next EMC meeting. The report is available on the Casper Creek website under publications.

- Member Coe indicated that rule revisions that had been proposed based on findings and results of EMC-2015-001 (Class II Large Watercourse Study: Multiscale Investigation of Perennial Flow and Thermal Influence of Headwater Streams into Fish Bearing Systems) were passed.

- Dr. Wolf presented a table that listed EMC member roles in relation to each EMC-sponsored project, along with the most recently reported project status in terms of deliverables. This document is online: https://bof.fire.ca.gov/media/ivje5c21/3-emc-project-assignments-and-status_ada.pdf
    - Member O'Connor provided a correction to the Project Status list, as he is the liaison to project EMC-2018-003 (Alternative Meadow Restoration) and not the Principal Investigator.

- Member Short gave an update on EMC-2019-005 (LWD Impacts on Channel Morphology and Salmonid Habitat), which was affected by the CZU wildfire. Work has resumed to setup equipment, including basic surveys with stream monitoring. A revised proposal will be submitted, but this will not require any amendments to the contract.

4. Research Presentation: Forest Management Effects on Evapotranspiration and Implications for Streamflow and Salmonid Species Recovery – Member Matthew O'Connor, O'Connor Environmental, Inc.

Member O'Connor gave a presentation "Stand Age & Forest Evapotranspiration; Implications for Forest Management, Streamflow and Salmonid Recovery". (https://bof.fire.ca.gov/media/djsdd2wk/4-stand-age-m-o-connor-presentation_ada.pdf)

Dr. O'Connor modeled forest evapotranspiration using (LiDAR modeling, Hydrologic monitoring, Fish population/habitat monitoring and Hydrologic/Hydraulic modeling) by summarizing the findings of recently published experimental watershed studies from northern California and Oregon and performing a case study using in the Russian River watershed to evaluate the sensitivity of streamflow and salmonid habitat to hypothetical reductions in forest ET. The hydrological models conducted in the past ten years were from several tributaries (Dutch Bill Creek, Mark West Creek, Mill Creek and Green Valley & Atascadero Creek) of the Russian River.

The Calibrated Numerical Hydrologic Model that was used to represent the entire water cycle and able to also integrate all kinds of man-made effects on water use and management. The model gets composed of various layers of information precipitation about the transpiration data.

The modeling study completed May 2021, the actual evapotranspiration, lacked any variation from wet year to dry year. This concluding that forest evapotranspiration plays an important role in the water balances of coastal salmonid streams. Further, the study concludes that improved understanding of stand age composition and forest management effects can be a tool to enhance streamflow critical to species recovery.

Member O'Connor's presentation is online: https://bof.fire.ca.gov/media/djsdd2wk/4-stand-age-m-o-connor-presentation_ada.pdf

5. Project Update: EMC-2016-003 – Repeat LiDAR Surveys to Detect Landslides – Dr. Bill Short, Department of Conservation and presentation from Michael Fuller

Member Short provided an introduction for Michael Fuller who gave a presentation on "Lidar Differencing Eldorado National Forest and Nearby Private Lands" (https://bof.fire.ca.gov/media/apwdsg2b/5-emc-2016-003-project-update_ada.pdf).

This project investigates LiDAR effectiveness in looking at landslides following stochastic events. They acquired high quality LiDAR data (Level 1 resolution) in managed and unmanaged forests where stochastic events had occurred to compare to some older LiDAR datasets. Landslides and related mass wasting are driven by stochastic events, such as rain storms, fire, and earthquakes. To evaluate if the Forest Practice Rules (FPRs) are effective long-term at not exacerbating slope instability, researchers need to be able to compare different datasets of different ages. LiDAR is a tool that they hope will facilitate that and look at differences in mass wasting before and after stochastic events in managed and unmanaged (managed far in the past, or not actively managed at all) forests. LiDAR may be an efficient tool for this, as compared to site visits, which may have safety and liability concerns.

Mike Fuller has conducted the majority of the work on project, and today they shared some limited results, as the actual work just started due to delays fires, inability to fly safely due to smoke cover, and other stochastic events that introduced difficulties into acquiring the LiDAR dataset; thereafter, the dataset also had to go through a quality control and assurance process. Combined delays resulted in this taking many more years than originally anticipated.

In general, the project intended to assess erosion processes following stochastic events, and the relationships to FPRs, using LiDAR to investigate any differences on a landscape scale. Past studies had to rely on aerial photography, and were limited by site access issues and the inference of rapid assessment methods. They hope LiDAR will provide a tool to efficiently and accurately detect changes across large regions at improved resolutions.

The project data were collected by the USFS in 2015 on four sites in the Placerville and Amador Ranger Districts. These four locations were chosen based on the availability of recent LiDAR datasets, the presence of recent mass wasting events, the presence of both public and private timberland, and their representative nature of Sierra timberlands. The El Dorado National Forest in this study has a history of varied stochastic events, 2017 regional storm damage, and 4 years of LiDAR data before and after the 2017 storm event.

LiDAR-derived terrain models were extracted from the datasets, and they are early in the process of comparing the different methods and sites. They will then overlay other variables such as ownership, topography, vegetation types, fire history, geology, and forest management. They will present a small portion of this information at the upcoming California Geological Survey (CGS) conference, in a presentation titled "Storm Induced Mass Wasting on Disturbed Slopes Across a Thirty-Four Year Timeline". The goal of this portion of the study is to improve understanding of potential long-range effects of climate change, drought, forest health, and increased wildfire severity on mass wasting rates on managed timberlands; to investigate the relationship between forest health and slope instability including relationships between soil moisture and triggering events; and to better understand potential site-specific protection measures (as indicated in the FPRs) in burned areas that may be increasingly prone to landslides in order to protect slop stability, reduce sediment delivery to channels, and promote Large Woody Debris (LWD) delivery to channels.

Timeline of the project:
Project submitted and approved in 2016
Stressing atmospheric rivers hit the forest in early 2017
Funding to support LiDAR acquisition was approved in 2019
LiDAR was flown in 2020
Final LiDAR data was delivered in 2021
Caldor fire limited access in 2021 as well
Sierra Pacific Lands (SPI) are also currently closed

Historical Disturbances:
Study uses LiDAR datasets from 2015 and 2017, and another survey is under way in the same areas. Fred's and Power fires occurred in 2004, as well as other major stochastic events dating back to the early 1980's. While the primary focus is on the 2017 storm damage, these additional events have added more detail and perspective to the dataset.

The precipitation from the 2017 storm damage set a record, with four atmospheric storms converging in the El Dorado National Forest. A series of four distinct storms spanned from early January 3 to February 22nd, 2017, with four to ten days in between. Storm damage was recorded well beyond the forest to the entire western slope of the Sierra Nevada up into the Klamath Mountains and into the Modoc Plateau. Precipitation was 215% and 185% higher than average in the American River and Cosumnes River Basins, respectively, with 114 USFS reports of storm damage.

Three areas were identified using the LiDAR differences and are suspected landslides stemming from 2017 storm-damage in three distinct generations of burn scars from past fires: the 2014 King Fire, the 2004 Fred's and Power's Fires, and the 1992 Cleveland Fire. In the 2004 Fred's Fire, the amount of vertical change in elevation that could be reliably determined from the LiDAR dataset was 2 feet, despite the method having a nominal 4" accuracy; sources of error will be investigated, and there is room for improvement. Deposition of 2 feet can be laterally significant if deposited by a mudflow. Areas A and B revealed interesting differences. Both areas are moderately steep. Red and blue colors indicate areas that slumped, bulged, or deposited in the four-year period around 2017. Thin red lines in B suggest channel changes at fine resolution were detected but don't indicate the source of the changes (e.g., geological, vegetational, storm-

induced). Area A shows land sliding as well. Areas around Granite Springs Road were highly deformed by slope movements and buckled ground.

The 1992 Cleveland Fire went through two areas marked C and D. Two landslides are shown outlined in dotted black lines, which closed Highway 50 and temporarily blocked the American River near Whitehall. The Mill Creek landslide in Area C occurred in 1997 ~5 years after the fire; the "Pony Express Lake" landslide in Area D occurred in 1983. LiDAR differencing shows little movement in the 1997 landslide compared to the 1983 landslide. The LiDAR method can help with future mitigation efforts by providing better projections around mass wasting using 3-D modeling, as opposed to 2-D photographs from aerial photography methods.

Future work will include comparison of point clouds to improve model resolution, selection of new sites to improve the modeling, and once they are satisfied with the model, they will layer on other datasets to account for factors such as vegetation and harvesting methods. This preliminary work shows an estimated vertical resolution of 2 feet; these results will inform future LiDAR differencing projects. The intention is to test the process of LiDAR differencing in a timberland that has recently experienced a broad range of storm damage and landslide activities in order to determine upper and lower detection limits, accuracy, and reliability. The lower detection limits are of special interest as they may provide an early warning system for hazards to the public and public resources.

The project presentation is online: https://bof.fire.ca.gov/media/apwdsg2b/5-emc-2016-003-project-update_ada.pdf

6. Project Update: EMC-2019-003 – Fuel Treatments and Hydrologic Implications in the Sierra Nevada – Dr. Terri Hogue, Colorado School of Mines, Kate Boden, and Dr. Alicia Kinoshita

Kate Boden provide a PowerPoint presentation titled "EMC- 2019-003 Fuel Treatments and Hydrologic Implications in the Sierra Nevada" (see: (https://bof.fire.ca.gov/media/tebleryj/6-emc-2019-003-project-update_ada.pdf), and discussed the impact of forest treatment on water yield in a Sierra Nevada watershed.

Research Questions, with a focus on 1, 2, 5, and 6:

1. How will variability in forest treatments affect sub-basin and basin scale discharge?
2. What key variables determine hydrologic response to differing mitigation strategies?
3. How will downstream aquatic habitat be impacted by upstream forest treatments?
4. To what degree does sediment flux vary due to upstream forest mitigations?
5. To what degree can remote sensing information quantify treatment impacts on forest structure?
6. What key metrics best quantify system change and can be easily integrated into a predictive framework for evaluating habitat and hydrologic response in California watersheds?

Research Goals:

They established in past research the potential for an increase in water yield after a large disturbance, but what about forest treatments? In the context of the Sagehen experimental watershed in the Sierra Nevada, researchers in this project investigated:

1. Do forest treatments impact annual runoff (water yield), and if so, at what spatial scales?

2. Do forest treatments impact annual evapotranspiration (ET), and if so, at what spatial scales?

Experimental Design:

- **Site Description:** the Sagehen Watershed is located outside of Truckee, California, and is a relatively small 30 km^2, snow-dominated watershed. Elevation varies from roughly 1900 m to 2700 m, and stream gauges were placed throughout to measure flow. Annual precipitation is 800mm, 80% of which falls as snow. Peak flows are in May on average, and minimum flow is after the summer in September. Sagehen has a conifer forest of Jeffrey pine (*Pinus jeffreyi*) and lodgepole pine (*P. contorta*) at lower elevations, and white pine (*P. monticola*) and red fir (*Abies magnifica*) at higher elevations.
- **Treatments:** Proposed treatment areas were selected in 9 nested sub-basins, and treatments are confirmed with LiDAR and a photo dataset that documents the timing and type of treatment. The main treatment at Sagehen was thinning, which includes both variable thinning and plantation thinning. Sub-basin 2 has the most treatment at 56%, followed by sub-basin 10 with 41%.
- **Methods:**
    - Annual water budgets were extracted at the basin and sub-basin scale, and linear regressions were performed for precipitation and water yield at both scales. In a pre-treatment scenario, runoff and ET are generally evenly balanced; in the post-treatment scenario many the trees have been removed leading to a decrease in evapotranspiration and an increase in runoff. This is the theoretical framework for this research.
    - A pixel analysis conducted at a 100 m x 100 m scale was conducted to compare the change in forest density pixel data to the change in ET pixel data from 2014–2018. Pixels were grouped into treated and untreated categories, and linear regressions were performed to investigate the relationship between changes in forest density and changes in ET within each treatment group.

Results:

Data for yearly total precipitation, runoff depth, and evapotranspiration were displayed for Water Years (WY) 2001-2020 at Sagehen. The figure shows that precipitation and runoff depth are covarying, which is consistent with the linear regression analysis. Evapotranspiration (ET) (from 30m SSEBop data showing mean over all pixels across the watershed) is relatively constant despite the variability in precipitation, and this trend is consistent even after treatment begins in 2014. Finally, ET exceeds precipitation for many of the WYs; nine of the 20 years shown have ET values greater than precipitation. The conclusion is that there is likely another source of water that ET is drawing from to account for this.

A 3x3 plot shows results for each sub-basin, with precipitation on the x-axis and runoff depth on the y-axis, with a graphic in each upper left corner of each subplot to give reference to the size and location of the sub-basin within Sagehen. Sub-basin 9 is the headwater to Sagehen creek and has the steepest slope. The regressions show that 90% (most R^2 values are >= 0.9) of the variability in runoff was explained by variability in precipitation; the RMSE (root mean square deviation) was relatively low at ~100 mm relative to flows of 2000mm (although note that sub-basin 7 has a low R^2 value of 0.01 which is most likely because this sub-basin had very little flow during the study). There was no measurable increase in water yield due to forest treatment.

Therefore, variability in runoff was mostly predicted by precipitation, which is consistent with basin scale analysis of the last 67 years. But to understand how forest treatments may lead to a possible change in ET, which may impact runoff. To answer this, researchers need to investigate what is **not** predicted by precipitation; that is, they need to look at the residual from the regression. This was done by runoff attribution analysis (the second analysis, described in methods, above).

When comparing the relative forest density change as measured by LiDAR to the relative ET change, the resultant maps are visually similar, and appear to show that there is a negative change in forest density in sub-basin 2 that corresponds to a negative change in ET. At pixel scale, forest treatment reduced ET across ~50% of sub-basin SGH 02 but only 10% of the overall Sagehen watershed. The largest treatment plan, 56% of total sub-basin area, did correspond with a 15% reduction in sub-basin ET but this did not translate into an increase in water yield and the decrease in ET was not observed on basin scale. This scale of impact was too small to influence water yield.

Continued work:
To investigate EMC Science Questions 1 and 2, above in Research Questions, ongoing work will evaluate the diel (24-hour) cycle. Researchers will use hourly stream stage data to understand watershed scale behavior, and quantify daily stream stage variability using the Diel Cycle Index to see how climate change may influence this variable. Hourly and daily average water level data from 2018 was measured at gauge SGH 06 in the middle of the Sagehen watershed. Viewed on a daily average time scale the hydrograph represents a typical snow dominated watershed signal with a fast-rising limb during the melting months of March to May, followed by a slow falling limb in the dry months of June to October. This ongoing work will focus on the hourly time scale; the magnitude and timing of this cycle changes with the season. In the melt season (Mar–May, the rising limb) the amplitude of the diel cycle is large with peak water level in the evening; in the growing season (June–August, the falling limb), the amplitude of the diel cycle is small with peak amplitude in the morning.

The researchers developed a conceptual figure for the processes in the melt and growing seasons, breaking the day up into 6-hour increments, with arrows showing whether the stream is gaining or losing water, the number and size of which represents the strength of loss or gain. In the melt season there is a rapid rise in stream stage starting around noon and continuing until nightfall (6:00pm) In the growing season there is a rapid loss of stream stage starting around 6:00am and continuing until about noon. Key differences between seasons include whether there is rapid rise or rapid loss of stream stage, and where water is coming from and going to. In the melt season it is likely that increased stream stage comes from overland flow (after soil saturation) and aquifer recharge. In the growing season water exchange seems to occur entirely between the stream bed and the near surface aquifer, the hyporheic zone. However, the researchers want to know if water is moving laterally in the melt season.

An overview figure was shared showing the diel cycle index (DCI) plotted for 3 melt season months (March–May) and 3 growing season months (June–August). Each point in the figure represents the correlation between hourly rise or fall of stream stage and temperature. There is a statistically significant positive correlation in the melt season represented by a red asterisk. In the transition time in late May and early June the correlation is not statistically significant and is represented by a black X. In the growing season there is a statistically significant negative correlation. This gives us information about whether the daily water balance in the watershed is

controlled by snowmelt (addition of water) or ET loss and is useful because DCI can be compared across space and time. The bars on the x-axis of the figure gives perspective on the amplitude difference between the melt season and the growing season: in the melt season the fluctuation in stream stage is on average larger (up to 250 mm) than in the growing season, when the fluctuation in stream stage is lower (~50 mm) and consistent through time.

Future research will investigate:

1. What can we learn about watershed hydrology by studying the DCI signal?
2. How does the DCI signal vary across space?
3. How does the DCI signal vary across time?

Additionally, high-resolution models will be developed and parameterized to represent a range of fuel treatment options to investigate the interactions of vegetation with the hydrologic process. Researchers would like to determine how much of the forest needs to be treated to start seeing hydrologic changes (impacts on runoff). A MIKE SHE model is a 3-D, physics-based and fully distributed hydrologic modeling framework that has been used in numerous applications to address eco-hydrologic problems in public and private sectors. Key features that make this model ideal for this forest-hydrology work in Sagehen are a snow accumulation and melt module; subsurface flow processes modeled in saturated and unsaturated zones; and quantitative accounting for vegetation through input of leaf area index and rooting depth layers. The flexibility in MIKE SHE's process-based framework allows each process to be solved at relevant spatial and temporal scales by utilizing a physics-based code that solves partial differential equations describing mass flow and momentum transfer. At Sagehen they are focusing on runoff and ET as the dominant hydro-processes.

The project presentation is online: https://bof.fire.ca.gov/media/tebleryj/6-emc-2019-003-project-update_ada.pdf

7. Review EMC Member Application – Dr. Kristina Wolf

Dr. Wolf provided a letter of interest, CV, and a criterion ranking form for applicant Dr. Michael Jones. These documents were sent out to all EMC members prior to the meeting for their review. Dr. Jones' application materials are available online:
https://bof.fire.ca.gov/media/lgkhvm33/7a-jones-emc-app-redacted_ada.pdf
The Ranking Criteria template, which is used to break ties and ensure quality candidates are appointed, is online: https://bof.fire.ca.gov/media/n0ff5hkt/7b-ranking-criteria_template_ada.pdf
No other applications were received by this meeting date, and Dr. Jones was reviewed as a stand-alone applicant. Ranking results are available online at:
https://bof.fire.ca.gov/media/fegbronj/7c-i-ranking-criteria_emc-member_ada.pdf,
https://bof.fire.ca.gov/media/mbebi3bp/7c-ii-ranking-criteria_emc-member_ada.pdf, and
https://bof.fire.ca.gov/media/d3nnb45n/7d-emc-applicant-m-jones-rankings_ada.pdf

EMC Members present at the time of review provided universally positive feedback and support for the appointment of Dr. Jones to the EMC. Member Chinnici motioned that the EMC recommend Dr. Michael Jones be appointed to the Effectiveness Monitoring Committee with the Boards' approval. Member Drury second the motion.

Roll Call Vote

Freer-Smith	**Aye**
O'Connor	**absent at time of vote**
Chinnici	**Aye**
House	**Aye**
Burke	**absent at time of vote**
Short	**Aye**
Holster	**absent at time of vote**
LaNier	**Aye**
Coe	**Aye**
Leonard	**Aye**
Waitman	**Aye**
Drury	**Aye**
Love-Anderegg	**absent**
Moreno	**Aye**
Forsburg-Pardi	**Aye**

Motion passes unanimously.

The recommendation for Dr. Michael Jones to be appointed to the EMC as a representative of the monitoring community for a term of four years will be sent to the Board for their review at the August Board meeting.

8. Final project presentation: EMC-2019-002 – Evaluating Fuel Treatment Longevity and Maintenance Needs for Fuel Reduction Projects Implemented in the Wildland Urban Interface in Plumas County, California – Jason Moghaddas, Spatial Informatics Group

Jason Moghaddas reported on Project EMC-2019-002, "Evaluating Treatment Longevity and Maintenance Needs for Fuel Reduction Projects Implemented in the Wildland Urban Interface of Plumas County, CA" (https://bof.fire.ca.gov/media/xqwp5z5p/8a-emc-2019-002-final-presentation_ada.pdf), providing information on treatments which had been designed to reduce immediate fire risk to structures, reduce fire severity, and over time, improve overall community fire resilience. Treatments included treatments of slash and stand density on projects the Plumas County Fire Safe Council has implemented over several decades.

The Council has been active since about 1999 and has conducted a lot of fuels treatments over several years, including mechanical treatments, hand thinning, prescribed, fire, and whole-tree harvesting.

Methods came from numerous state data sources. Researchers compiled treatment locations and history using digital and paper files, and built a single treatment map for the entire treatment dataset. Two locations were emphasized: the Genesee Valley, which was in the Dixie Fire; and a treatment area along La Porte Road, which was on the eastern edge of the North Complex. Treatments were used by landowners to defend property in Indian Valley.

Key findings:

- In terms of logging slash and hazard reduction, all projects met or exceeded standards described for (14 CCR 917).
- All projects met minimum stocking standards (14 CCR 932.7) after completion.

- Projects were completed using whole tree harvest, with post treatment slash generally minimized or removed compared with traditional lop and scatter.
- It is recommended that investments be made in maintenance of existing treatments, and outreach to landowners occur to tout the benefits of utilizing 360-degree images from a GoPRO, which can be more helpful to visualizing impacts than aerial photography.

Mr. Moghaddas demonstrated use of an online tool with data imported from GoPro images collected using a drone; this method can be used to better visualize impacts than aerial photographs (https://gsal.sig-gis.com/mapURL/PCFSC_Treatments.html)

Co-chair Moreno: What science was used as far as controlling for other factors? Did the team look at the firefighting campaign on the ground and aerially?

- Mr. Moghaddas stated the dataset least influenced by other variables was the burn severity dataset.
- The researchers also tried to look at differences between treatment types for mastication versus hand thinning, but that was challenging to distinguish.
- The researchers investigated the relationship of distance from treatment area to treatment effectiveness, and found that fire severity was higher as distance increased from fuels treatments.

Member Drury: What metrics were used for evaluating whether a treatment was effective or not? Could he elaborate on what the fuel's treatment effectiveness monitoring system the Forest Service (FS) uses, and what their three criteria were for whether or not they were affected?

- Mr. Moghaddas is unfamiliar with the three criteria from the FS methods; however, they used severity and flame length as criteria to monitor effectiveness of fuel treatments.
- In the North Complex, an entire neighborhood survived, and the residents actively protected it using certain fuels treatment.

Member Coe: Does Mr. Moghaddas have the ability to get data from canopy closure or canopy cover and its ability to mitigate against excessive brush growth?

- Mr. Moghaddas indicated that you can get canopy data through LiDAR, but it is challenging to get shrub cover, especially in a forest, with LiDAR or aerial work.

Co-chair Moreno: We always look for a broader application of the study to other parts of the state; what statement would you make as far as applications outside of the Plumas area?"

- Mr. Moghaddas recommended more extensive slash treatment requirements—at least in the wildland-urban interface (WUI) with agencies managing lands adjacent to landowners.

Co-chair Moreno: inquired about future research and applications of the findings to other counties or areas of the state, or if there are limitations to its application in some areas.

- Mr. Moghaddas was unaware of additional findings in other counties or statewide where applications could be applied.

Dr. Wolf mentioned that the final project report for this project was submitted in December 2021. A Completed Research Assessment (CRA) will need to be developed; Co-chair Moreno is the liaison on this project, and will work with Member Drury to complete the CRA.

9. Review of Strategic Plan Draft, and Presentation of comments received on Research Themes and Critical Monitoring Questions – Co-Chairs Moreno and Forsburg-Pardi and Dr. Wolf, Board staff

Dr. Wolf presented the Research Themes and Critical Monitoring Questions (CMQs) that were outlined in the 2018 Strategic Plan (https://bof.fire.ca.gov/media/b5vdivfj/9a-2018-emc-strategic-plan_ada.pdf), and which were developed in 2017 as part of a collaborative process with a variety of Boards, agencies, departments, interested stakeholders, and the public. The strategic plan for the EMC is meant to be updated every three years; however, due to COVID and changes to an EMC co-chair, it was agreed to wait to complete this effort until the new co-chair appointment was made. The current draft of the Strategic Plan (https://bof.fire.ca.gov/media/cubch1kp/9b-2022-emc-strategic-plan-draft-for-review-2022-08-02.pdf) has been reduced from its prior length of 29 pages to about 22, not including appendices and leading content. Dr. Wolf requested members provide comments on the Strategic Plan, including the Research Themes and CMQs, by September 14th.

Dr. Wolf referenced a table that is referred to in the 2018 version of the Strategic Plan (https://bof.fire.ca.gov/media/dqxggvjd/priorities-received-from-boards-departments-and-agencies.pdf) to describe how the Effectiveness Monitoring Committee solicited and incorporated priorities from the board's departments and agencies and other interested stakeholders.

EMC members provided feedback suggesting:

- The table should be removed from the document because it is outdated.
- The table needs to be updated and included in the Annual Report and Work Plan as priorities are received and updated on an annual basis.
- The document could be updated via another outreach effort to capture additional suggestions, deletions, and changes.

EMC member and public comment was taken at the meeting, and stakeholder and public input on the Research Themes and CMQs will continue to be accepted through the end of August. Comments received in the meeting are summarized here:

1. Co-Chair Forsburg-Pardi: A larger theme, or set of multiple questions, are needed related to the topic of how to think about resilience, how to define resilience, and how to incorporate resilience into management objectives.
2. Member Coe: regarding the Central Valley Water Board comments and proposed questions, some of them will be answered with data collected by the end of this year, which includes two years of post-fire salvage monitoring data.
3. Co-Chair Moreno: on the theme of Wildfire Hazard, the preamble talks about production and maintenance of naturally healthy, diverse forests and their contributions to wildfire resilience and reductions in risk, and includes language about effectiveness monitoring on a state-wide basis being needed and currently insufficient; we might want to talk about how modifying wildfire behavior, maintaining heterogeneity, and retaining species diversity, and how they contribute to naturally diverse stands. How are forests benefited from reduced fire severity and related outcomes, and on the wildlife side, are the FPRs sufficient to describe ecological habitat and processes and terrestrial wildlife species, etc? She feels that this question could be tightened up or clarified. Moreover, questions regarding cumulative impacts, beyond just wildlife impacts, could also be improved.
4. Public comment, Richard Gienger: What was supposed to be removed?

    a. Dr. Wolf: There is a question as to whether or not the referenced crosswalk table regarding research themes and CMQs should be retained or removed. This table which provides a crosswalk between priorities received from the different boards, departments, and agencies to the research themes and critical monitoring questions that the EMC funds for research.
5. Co-Chair Moreno: Are the critical monitoring questions redundant, and do we need to include this table, or can we should just cross-reference the monitoring question?
    a. Member Chinnici: The table was put together originally to provide a crosswalk between critical monitoring questions and forest practice rules and related regulations, and it was originally an appendix to the Strategic Plan. To reduce the size of the plan, it was decided to put it on the EMC website and include a link so people could reference it. He agrees it may need to be updated but suggests the information contains a valuable historical resource for project proponents to use and follow to see if their projects align with the EMC's priority research themes and critical monitoring questions.
    b. Member Short agrees with member Chinnici and supports the idea that the table be linked in the Strategic Plan, but not included.
6. Dr. Wolf: Do we need to reach out to each of the entities referenced in the table in the second to last column (submitted by and year) for updated information? What would the process be to make sure that everything is accurate and updated if we were to retain this table?
    a. Member Waitman, isn't opposed to a new revised version to make sure that the information presented is updated.
    b. Member Chinnici iterated that the information contains a valuable historical resource for project proponents to use and follow to see if their projects align with the EMC's priority research themes and critical monitoring questions.
    c. Member House agrees with member Chinnici's statement from above.

Dr. Wolf confirmed a consensus among the members that we can potentially have updates provided by the various stakeholders, but if not reasonable to do so, then we keep the table as is. She may add some information to update certain sections, if feedback is received to do so or if any of the critical monitoring questions or themes change; otherwise, the table would be included as is as a link in the Strategic Plan, and also provided on the EMC website.

Action items: Send suggested revisions to the Research Themes, CMQs, and Strategic Plan draft by September 14th to Dr. Wolf at Kristina.Wolf@bof.ca.gov. Ultimately, the deadline was changed to 8/31 to receive comments.

10. Public Forum
None.

11. Future Meeting Locations, Dates, and Agenda Items
Dr. Wolf stated the EMC will review the Initial Concept Proposals in its September meeting and follow up on business from today's meeting at the next meeting. The next meeting date was scheduled for September 28th (member Chinnici was the only member who noted they will be unable to make that date).

12. Announcements: Scientific Conferences, Symposiums, and Workshops

- Richard Gienger announced the 24th Annual Coho Confab on September 9-11, 2022. Additional information can be found at https://www.calsalmon.org/programs/coho-confabs/24th-annual-coho-confab
- Dr. Wolf announced the EMC's Research Grant Proposal solicitation is online on the EMC website and asked all attendees to widely disseminate the information. Almost a million dollars is available over the next three years to fund research and monitoring. The Grant Guidelines can be found online at https://bof.fire.ca.gov/media/4zfj5vnq/2c-emc-grant-guidelines-2022-23-final_ada.pdf and https://www.grants.ca.gov/grants/effectiveness-monitoring-committee-request-for-research-proposals/.

13. Adjourn