

THE CALIFORNIA TREE MORTALITY DATA COLLECTION NETWORK

**THIRD WORKSHOP
MARCH 10-11, 2021**

Organizing Committee

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Summary Report
April 8th - 2021

Background:

Since 2017, the [California Tree Mortality Data Collection Network](#), led by academics at UC Berkeley and UC Agriculture and Natural Resources, and supported by the California Department of Forestry and fire protection (CALFIRE) has worked to bring together scientists from various agencies who are conducting field and remote-sensing studies across the Sierra Nevada with a focus on tree mortality and its effects on wildfire risks, carbon, and more broadly on ecosystem services across this important region. A key element of these workshops has always been to create space to present results quickly to a diverse audience of resource decision makers, policy makers, practitioners, and private landowners. Due to public health restrictions our third in-person workshop was canceled in March 2020, but in 2021 we were excited to hold [this meeting](#) in a virtual format between **March 10-11, 2021**.

Workshop Goals:

After the 2020 fire season, in which large severe wildfires burned across most of the Sierra Nevada region, our aim was to conduct an active science-based meeting to present the latest and most updated information on tree mortality, estimation of fuels and its potential relationships with wildfires. In addition, we were interested in discussing the reforestation and management practices that should be put in place to increase forest resilience in the future.

Format:

Online via Zoom. We had two-half day (9 am – 12:30 pm) sessions with two plenary presentations and several short talks in a webinar format. On day 1 we focused on tree mortality, fuels and wildfires, and on day 2 the focus was on reforestation and post-mortality management. We had a maximum of 187 participants registered with a final participation of **147 attendees on Day 1 and 120 for Day 2**.

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Agenda Day 1: March 10th: Fuels and wildfires

8:45-9:00	Early access to the meeting link. Give the chance for people to introduce themselves and where they are coming from.	
9:00-9:15	Welcome, workshop objectives, brief summary of the DX project, past workshops and updates. General housekeeping rules (good practices for zoom, questions in chat, etc.)	Jodi Axelson – UCANR Presentation slides Presentation video
9:15-9:45 (30 min)	<u>Plenary Talk 1</u> : <i>Listening to the trees: what global tree mortality observations tell us about the fates of earth’s historical forests under further hotter drought.</i>	Craig Allen - USGS NM Bill Hammond - OK State Presentation video + Q&A
9:45-10:00	Q&A	
10:00-10:05	Break	
10:05-10:20	<u>Talk 1</u> : <i>Characterizing ground and surface fuels shortly after the 2012-2016 drought across Sierra Nevada forests.</i>	Emilio Vilanova - UC Berkeley Presentation slides Presentation video
10:20-10:35	<u>Talk 2</u> : <i>Bark beetle-killed ponderosa pine snag demography: initial changes in fuel loads, and examination of cross-scale interaction of drivers following severe tree mortality in the central and southern Sierra Nevada.</i>	Leif Mortenson – USFS Presentation slides Presentation video + Q&A
10:35-10:45	Q & A	
10:45-11:00	<u>Talk 3</u> : <i>Tracking tree mortality and fire risk to giant sequoias and their ecosystems: an overview if on-going efforts at Sequoia and Kings National Parks.</i>	Christy Brigham - Sequoia & Kings Canyon National Park Presentation slides Presentation video
11:00 – 11:15	<u>Talk 4</u> : <i>The 2020 California fire season in context: was it a disaster?</i>	Crystal Kolden - UC Merced Presentation slides Presentation video + Q&A
11:15-11:25	Q&A	
11:25-11:30	Break	
11:30-12:30	Panel discussion – Moderator: John Battles Panelists: William Hammond (Univ. of Oklahoma) Craig Allen (USGS) Crystal Kolden (UC Merced) Joe Restaino (CALFIRE) Video of the panel discussion	QUESTION 1 (Science-Knowledge) Given the expected increase in tree mortality across the world and the Sierra Nevada in particular, what are the main knowledge gaps? What information is needed to better plan for and address issues around tree mortality, fuels and fires? QUESTION 2 (Policy and Management) How can available science be used to inform management decisions? What are the OPPORTUNITIES and CHALLENGES to use available information to develop relevant management strategies and actions? How can we prioritize limited resources to deal with a future of dead trees, higher fuels and fires?

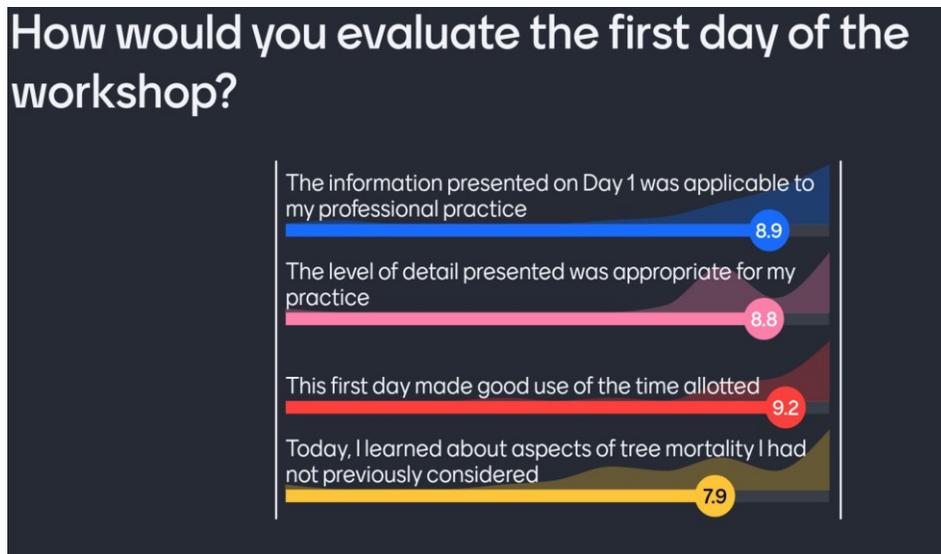
Summary Day 1:

The main topic of this first day was to discuss how the current state of tree mortality in California, especially in the Sierra Nevada region, might be driving the amount of fuel loads across different landscapes and how increasing rates of mortality can affect the severity of wildfires. For this, the plenary presentation led by Dr. Craig Allen (University of New Mexico) and Dr. William Hammond (University of Oklahoma State) served as an excellent starting point in which the current state of tree mortality at global scales was addressed. It is not clear yet how pervasive these increasing rates of tree mortality are, but a growing body of scientific literature indicates that current warming trends are threatening the stability of forest systems in many parts of the world. Thus, **understanding the ecosystem dynamics and management challenges created by extensive tree mortality is a major priority of resource scientists and managers from across the globe and certainly in the state of California.**

At global scale, there are reasons to believe that with more severe and frequent droughts, large trees of many species, some of which are unique to the Sierra Nevada such as Giant Sequoias, might be disproportionately at risk from water stress. The loss of these large individuals has multiple impacts on ecosystem structure and functioning and in terms of carbon storage across multiple scales. Thus, with the recent effects of severe wildfires of 2020 in which many large trees were killed, speakers discussed the need to evaluate climatic (e.g., drought, higher temperature) vs. management (e.g., fire suppression, prescribed fire, logging) fingerprints and their effects on tree mortality. Because a mortality 'event' can vary substantially from locale to locale, one important conclusion of this session is **how scientists and managers should better communicate what these climate and human-driven fingerprints mean and how to manage the uncertainty about their impacts.** Communication between these groups is important when characterizing mortality events. For instance, a great deal of time was spent on discussing the current state of evaluation when it comes to fire events. In this regard, Dr. Crystal Kolden (University of California Merced) addressed the 2020 fire season in California aiming at understanding the conditions that enable these extreme fires to be considered **both catastrophes and opportunities.** Recent studies show that a climatic-driven signal (i.e., warming, and drying trends) affected the nature of a great proportion of the most recent wildfires across California and the western US. However, while these fires indeed affected ~ 2 million ha across California in 2020, preliminary data suggest that within this area many fires burnt at low- to mid-severity. There is an increasing recognition of the importance of "good-fire" on the landscape and these low- to -mid severity fires were an important part of the fire-disturbance regime characteristic of many forest types in California. With the ongoing rates of warming and predicted increasing rates of tree mortality, **managers need to address the fact that with a reduced amount of prescribed fire being used, in cases where is possible, some of these natural-driven fires can serve as a mechanism to reduce fire risks by consuming high fuel loads.**

Stress on trees and forests due to climate change moving forward is profound and high levels of uncertainty remains. **An adaptive learning framework is therefore needed but increasing efforts for networking and collaboration are essential for this.** This includes better monitoring approaches to accurately quantifying fuel loads for which field sites and modeling studies needs to be better connected. There seems to be a general consensus that managers need more flexibility to change plans after unplanned disturbances but there are many barriers linked to available science, legislation and policy that need to be addressed. The need for restoration treatments has never been more urgent in California, and the topics covered during this first day helped informing the opportunities and limitations that exist to scale-up prescribed burning, forest treatments to promote resilience, and more nuanced wildfire management.

Evaluations: The general evaluation of Day 1 was overwhelmingly positive with regards to the quality of presentations, organization, and discussion. The two most important evaluation polls are shown below. One important aspect for future meetings, according to participants, is that the time allotted for short talks could be longer to allow for additional discussions. **Many participants indicated that a focus on the topic of tree mortality beyond California was useful to get a global perspective.** There was an overall agreement that the facilitation during the sessions, question and answers, and the panel discussions, greatly helped accomplish the goals of the workshop.



Agenda Day 2: March 11th: Post-mortality management – Reforestation in California

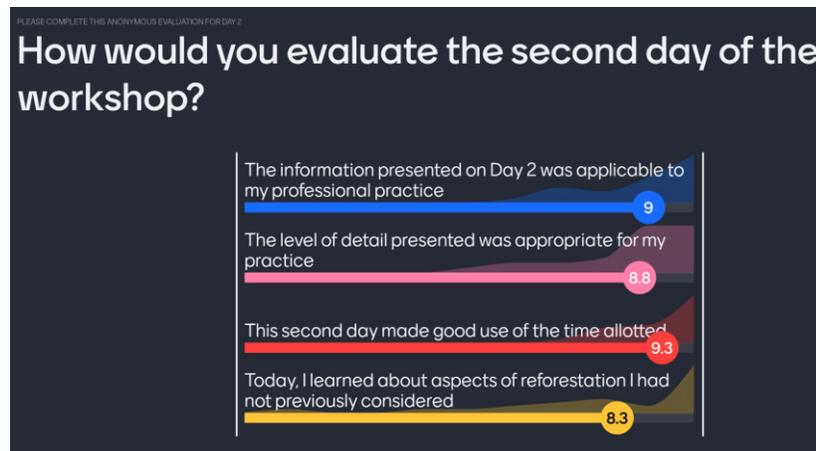
8:45-9:00	Early access to the meeting link. Give the chance for people to introduce themselves and where they are coming from.	
9:00 - 9:15	Quick welcome to new participants, quick summary of Day 1 and intro to Day 2. General housekeeping rules (good practices for zoom, questions in chat, etc.)	Emilio Vilanova – UC Berkeley Presentation slides Presentation video
9:15-9:45	<u>Plenary Talk 2</u> : <i>The collective pipeline to climate-smart reforestation</i>	Britta Dyer – American Forests Presentation slides Presentation video + Q&A
9:45-10:00	Q&A	
10:00-10:05	Break	
10:05-10:20	<u>Talk 1</u> : <i>Using assisted gene flow during reforestation to establish climate-adapted forests</i>	Derek Young - UC Davis Presentation slides Presentation video
10:20-10:35	<u>Talk 2</u> : <i>The California seed zone map and post-fire reforestation in a warming future</i>	Jessica Wright – USFS Presentation slides Presentation video + Q&A
10:35-10:45	Q&A	
10:45-11:00	<u>Talk 3</u> : <i>Reforestation for resilience: the climate-wise reforestation toolkit</i>	Amarina Wuenschel – USFS Presentation slides Presentation video
11:00-11:15	<u>Talk 4</u> : <i>Replanting strategies under changing wildfire, climate and budget conditions</i>	Malcolm North - UC Davis Presentation slides Presentation video + Q&A
11:15-11:25	Q&A	
11:25-11:30	Break	
11:30-12:30	<p>Panel discussion – Moderator: John Battles</p> <p>Panelists: Britta Dyer (American Forests) Eric Sprague (American Forests) Jessica Wright (US Forest Service) Stewart McMorrow (CalFire)</p> <p>Video of Panel Discussion 2</p>	<p>QUESTION 1 (Science-Knowledge) Given the expected increase in tree mortality across the world and the Sierra Nevada in particular, what are the main knowledge gaps to address reforestation actions? Is “leaving nature do its work” a reasonable action?</p> <p>QUESTION 2 (Policy and Management) How can available science be used to inform management decisions? What are the OPPORTUNITIES and CHALLENGES to use available information to develop relevant management strategies and actions? Can we ‘plant’ ourselves out of the problem of a future of more fires and climate change?</p>

Summary Day 2:

Given the increasing scale of forest disturbances in the age of climate change, a major question is if many forests in the western U.S. will eventually cross a resilience threshold that may lead to unpredictable alterations in vegetation structure and composition, potentially shifting to novel ecological states. Thus, in restoring forest resilience, especially after large wildfires or mortality events such as those experienced in California in the last decade, reforestation efforts have become a central component. **The issues of how to conduct reforestation actions, or when, where and what to plant were among the central topics discussed on Day 2 of the workshop.** The work and perspective of [American Forests](#) as a leading organization in the US to promote better practices of reforestation was shown during the plenary presentation. While the interest of planting trees aiming at tackling climate change mitigation has grown exponentially in the last few years a series of barriers still exist. **Sufficient workforce and nursery capacity were highlighted as major limitations to increase the pace of reforestation in the US. Perhaps more importantly, there is an urgent need to collect information about how seedlings will perform under novel environmental conditions.** For that reason, continuous research on climate adaption and common garden studies, and performance of different seed provenances were highlighted during this session.

A great portion of this session focused on the different tools that currently exist to analyze how to prioritize and plan reforestation practices in the current conditions of a changing climate and limited resources. For instance, Amarina Wuenschel (US Forest Service) presented the [Climate-wise Reforestation Toolkit](#) that includes three resources (i.e., reforestation prioritization, post-drought stand condition, best management practices) that can be used individually or together to inform reforestation decisions in context of tree mortality and climate change. Similarly, Jessica Wright (US Forest Service) introduced the [Climate-Adapted Seed Tool](#) to help ecosystem managers identify seed sources that are pre-adapted to local climate conditions at their planting sites. Nevertheless, **there was a general agreement among all participants that there is a need to integrate all tools available within a common standard and hosting site**, for which the [USDA CA Climate Hub](#) has been suggested as a potential option. Creating such a “collaborative hub” for researchers and managers to support the analysis of reforestation in the wake of severe disturbances will greatly facilitate information transfer via outreach specifically on management recommendations moving forward. Furthermore, a common framework in which these tools can be included will enhance current efforts that help family forest landowners access the risks posed by drought-induced mortality on their property and make recommendations on how to manage for resilience. It is important to highlight, in connection with the topics discussed during the first day (i.e., tree mortality) that any **approach for reforestation in California needs to include the expanded use of “good fire”** as a tool to reduce and to maintain low levels of surface fuel. Research efforts should consider additional experimentation for operational trials to advance how we manage California’s forests in the future.

Evaluations: The general evaluation of Day 2 was tremendously positive with regards to the quality of presentations, organization, and discussion. The two most important evaluation polls are shown below. One important aspect for future meetings, according to participants, **is that a greater emphasis on the perspective of managers should be considered**. Many participants indicated that a focus on the topic of tree mortality beyond California was useful to get a global perspective. There was an overall agreement that the facilitation during the sessions, question and answers, and the panel discussions, greatly helped accomplish the goals of the workshop.



Next steps:

The California Tree Mortality Data Collection Network is an important project aiming at connecting multiple initiatives that focus on the science and management of California forests in an era of great complexity. **In the short term, for 2022, we expect to organize a new workshop where the perspectives from the scientific and management communities can be combined with that from indigenous communities that have been largely ignored in the discussion about how better tackle the problems of forest ecosystems in California.** We firmly believe that these meetings are the main vehicle by which we translate our science into dialogue, dialogue that delivers our results into the hands of forest decision-makers and planners. This translation is critical to inform science-based policy in California.