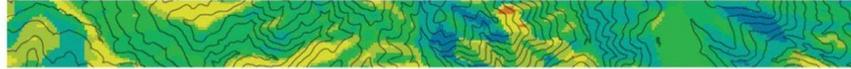


TBC3 Terrestrial Biodiversity Climate Change Collaborative



Fire, Vegetation, and Resilience in the Mayacamas

Workshop Proceedings

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a product of the
Terrestrial Biodiversity Climate Change Collaborative (TBC3.org)

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Presenters: Arthur Dawson, Sasha Berleman, David Ackerly, Allison Schichtel, Mark
Tukman, & Caitlin Cornwall



A Dwight Center for Conservation Science **Technical Report**

ACKNOWLEDGEMENTS

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Sonoma County Forest Conservation Working Group

Steering Committee

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Facilitator

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INTRODUCTION

The October 2017 Northern California wildfires were, at the time, the largest wildfires in California history. They burned 245,000 acres in six counties. The fires forced 90,000 people to evacuate their homes and killed at least 45 people. An estimated 8,900 structures were destroyed (the majority of them homes), causing \$9.4 billion in insured damage.

As the human community experienced shock and trauma from the stunning level of destruction in developed areas, many ecological scientists and land managers moved quickly to assess the impact of the fires on natural lands and communicate with the public about the role of fire in this bioregion. They also sought to lay the groundwork for public acceptance of the type of land management necessary to reduce the risk of future catastrophic fires.

The Sonoma County Forest Conservation Working Group regularly holds brown-bag lunches to enable scientists and landowners to exchange information on best practices in forest management. It decided to dedicate one of its brown-bags to fire impact assessment and public education on the fire-adapted landscape. Interest in the event was so high that what was intended originally as a small collegial discussion became a half-day mini-conference with 80 attendees.

OVERVIEW AND OBJECTIVES

The forum presentations were designed to focus on the past and present—how the land responds to fire and its current condition. The discussion was guided to focus on the future—what is our plan of action (or inaction)? What additional information do we need to develop to guide us moving forward?

During her welcome and remarks, Dr. Micheli stated these objectives for the forum:

- Think as a team about how we can and should respond to the impact of the fires on natural lands
- Strategize on preserving and conserving our forests over the long term
- Deal with the overwhelming as a team
- Identify how to engage the private landowners of Sonoma County

She stated that the efforts of the Working Group are intended to be complementary to the work of the Watershed Collaborative, which is advising the County Board of Supervisors.

It is worth noting that at least one of the speakers and several audience members lost their homes in the fires. The Tubbs Fire burned 2,800 of the 3,200 acres of Pepperwood Preserve, which hosted the forum. At the time of the forum, regular water and telephone service had not yet been restored to the Dwight Center for Conservation Science, where the event was held.

DESIGN AND STRUCTURE

The forum was originally conceived as a small working group conversation. But there was so much interest (enrollment was cut off when we reached the room's capacity of 80 people) that more structure was required.

The meeting opened with three presentations on historical and scientific perspectives on fire ecology. Attendees then broke into two groups and went outside with Pepperwood staff to observe firsthand how the fire progressed through the preserve.

The group then reassembled for presentations of observational data on fire impacts. The final presentation was on communicating with the public (especially forest landowners) about the fires.

In the final session, the facilitator asked several questions of the group. The responses were recorded. Participants then used stickers on the sheets where ideas were recorded to indicate what they saw as the highest priorities under each topic.

PANEL PRESENTATIONS

1. Arthur Dawson, Baseline Consulting – *A Historical Context of the Mayacamas*

- a. Presentation on video begins at 7:54
- b. Slides: at this [link](#) and in Appendix
- c. Summary of presentation:

How can history inform our response to the recent fires in Sonoma County?

- Is this unprecedented?
 - Footprints that Tubbs Fire and the 1964 Hanly Fire are similar
 - There was also a 1964 Nuns Fire with a similar footprint to the 2017 Nuns Fire
 - 1923: Fire described as worst in California history. Main fire was same footprint as Nuns; also fires burning in Healdsburg, Cazadero, Guerneville, Berkeley
 - Descriptions of earlier fires strikingly similar to 2017—“wind so strong it was hard to stand up” (1923); “it seems like the Pacific Ocean wouldn’t have stopped the fires” (1964)
 - Fires were of similar size

- 2017 fires were unprecedented in terms of human costs, but not ecologically and environmentally. Rare event, but not unprecedented.
- How has the land come back in the past?
 - In both 1923 and 1964, it didn't take long for the land to green up again
 - Chemise looks like hell after it's burned, but in the next rain chemicals in the bark leach into soil and encourage roots to spread from base.
 - Basing his comments today on information from 5 sites in Mayacamas: Secret Pasture, Calabazas Creek, Headwaters Preserve, Pepperwood, Modini Mayacamas
 - History shows manzanita, chemise, and live oak are the most fire-hardy
 - Chaparral and chemise serve as a nursery for the trees like Douglas-fir, which then overtop them and chaparral dies
- How has the landscape changed over time?
 - Land survey data shows that current vegetation distribution at Pepperwood is similar to what it was in 1875
 - About 10% of grassland at Pepperwood has been lost in past 75 years; not as dramatic as loss of oakland shrub
 - Northern Mayacamas: increase in forest, decrease in shrubs, grasslands about the same
- Implications:
 - Most severe burns were in the forest, very little in chaparral, virtually none in grassland
 - Vegetation distribution shifting from chaparral to forest means we are going to get more severe, hotter fires in the future
- What was the landscape like when fire was a more regular occurrence?
 - When fire was in a more regular occurrence, the vegetation mosaic was different
 - 1870 survey recorded "holly prairie," what we would call toyon grassland; currently found only in the Sierras
 - Early surveys also recorded juniper in Sonoma County. It's not found here now, but it is found in Napa.
 - Few Douglas-fir, very few bays recorded in early surveys

2. **Sasha Berleman, Ph.D., Audubon Canyon Ranch – *Fire Ecology and Land Management***

- a. Presentation on video begins at 28:32
- b. Slides: at this [link](#) and in Appendix
- c. Summary of presentation:

Science-focused background on fire ecology in our region

Fire behavior triangle

- Topography – how steep is the slope?
- Aspect – which direction slope is facing. More fire-adapted vegetation like chaparral and knobcone pine will grow on slopes facing south.
- Weather – wind, temperature, humidity

Mediterranean climate: dry summers and cool, wet winters

Katabatic winds: high-pressure systems blowing hot, dry air toward the shore

About 4.5 to 8 million acres burned annually in California prehistorically

Skies were likely smoky during much of the summer and fall in pre-1800 California

Lightning was not the cause of those fires: we don't get lightning in this region commonly, and when we do, most of it is cloud-to-cloud

This region had one of the most dense prehistoric native American populations

Frequent fire made:

- It easy to move around
- Deer hunting easier because it created browse and you knew you would find deer in the area that you most recently burned
- Basket weaving materials – straight, pliable

Scientists have not found a link between fire and climate change. They have found a link between fire and socio-cultural human behavior.

Fire regime: a set of classifications for the type of fire that a plant community likes to have

- Fire severity
- Fire intensity
- Patch sizes
- The season of fire
- Fire return interval
- Percent crown burned

Research shows that fires in the Sierra Nevada used to be self-limiting. Fires were so frequent that a new fire could only go a limited distance before running into an area that had been burned recently enough that it left no fuel for the new fire. Frequent, self-limiting fires have the potential to eliminate megafires, even under extreme weather conditions.

Our forests are not meant to burn at high severity

Douglas fir encroachment can be managed with prescribed burning up until the trees are 12 years old or a little above head height. After that, you can't manage the firs without damaging the oak woodlands with which they are coexisting.

When Bouverie Preserve did a prescribed burn last year, firefighters from many local departments, including volunteer departments, and the National Park Service joined CAL FIRE in order to learn about and gain experience with prescribed burns.

Once the October fires hit the parts of Bouverie that had been controlled-burned, they lost momentum, so they had only six-inch flame lengths as they passed through the adjacent oaks.

3. David Ackerly, Ph.D., UC Berkeley – *Observations on Fire History and Current Recovery*

- a. Presentation on video begins at 48:27
- b. Slides: at this [link](#) and in Appendix
- c. Summary of presentation:

It's profound to contemplate how much of the Northern California landscape has burned at least once

Regional perspective: Looked at 5 Northern California counties – Sonoma, Mendocino, Lake, Napa, and Marin – east of Highway 101

When do fires occur? Primarily an August, September, October phenomenon - much less fire historically along the coast

Peak in number of fires in the 1940s and 1950s, then the big fire years starting in the 2000s

Area (size) of fires peaks once per decade; those decadal peaks have been rising. 2017 doubles that trend

Mediterranean climate primes the landscape for fires

Maximum daytime temperatures over the years have been relatively stable

Minimum nighttime temperatures have been trending up

- Correlates with reports of unusual fire behavior – fires are not laying down at night

Climate change trends in California

- Temperatures will continue to rise
- Uncertain weather - rain will increase or decrease
- Clear that rain will continue to be variable – wet years and dry years
 - Combination of wet winter and dry summer may be the most potent for fires
- Conditions that leave landscape more vulnerable to fire are going to become more intense

Observations at Pepperwood after Tubbs Fire

- Tubbs can be thought of as two fires – what happened the night of October 8 and what happened over the next four days
- High-severity areas include Douglas-fir (complete canopy burn) and chaparral
- Oak woodlands fared relatively well – a fire can go under the canopy
Great opportunity to study fire behavior in oak woodlands
- Grasslands were high severity (burned completely) but not as intense (with a low amount of fuel, fire can't build up much energy)
- The fine twigs on the oaks did not burn - this means the fire and the wind burned off the leaves, but did not consume much wood
- Thin-barked madrones had a lot of overstory damage, but they are vigorous resprouters
- Four weeks out from the fire, madrone, soap plants, grasses, and coast live oak were re-sprouting

4. Allison Schichtel, M.S., Sonoma County Agricultural Preservation and Open Space District, and Mark Tukman, M.S., Tukman Geospatial LLC, – *Pre- and Post-Fires Georeference Data Report*

- a. Presentation on video begins at 1:04:26
- b. Slides: at this [link](#) and in Appendix
- c. Summary of presentation:

Watershed Collaborative: 150 participants representing land managers, nonprofits, Regional Parks, RCDs have come together to discuss natural and working lands in Sonoma County: both short-term response and longer-term priorities, on-the-ground action, and analyses needed to inform future land management.

Collaborative is divided into working groups, including the data assessment and planning group. Its priorities:

- Identify short-term threats to waterways and public safety
- Evaluate the response of natural and agricultural lands to fire
- Ensure equal access to the best available information
- Strengthen and coordinate data collection and analysis
- Develop long-term vision for restoring lost ecosystem services

Collaborative will provide its recommendations to the Board of Supervisors for adoption.

Organizing and curating post-fire data sets:

- Imagery
- Soil burn severity
- Debris flow likelihood
- Fire perimeters
- Viewers and apps

- Watershed Emergency Response Team reports
- Publications, post-fire assessment guidelines

All available on SonomaVegMap.org/fires – clearinghouse location for fire information

District is collecting data to create photogrammetric point cloud (PhoDAR), which will produce

- New post-fire digital surface model
- Post-fire canopy height model

Will help us understand impact of the fires on forest structure

In collaboration with other organizations, the District intends to standardize protocols and use ortho-imagery as well as digital surface model to

- answer questions around how much carbon was lost during the fires
- assess vegetation mortality
- assess fine-scale burn severity
- see how existing vegetation conditions contributed to fire severity
- see how forest management and land use practices affect burn severity

5. Monica Delmartini, Sonoma County Agricultural Preservation and Open Space District – *Site Assessments on District Preserves Affected by the Fires*

- a. Presentation on video begins at 1:15:13
- b. Slides: at this [link](#) and in Appendix
- c. Summary of presentation:

Observations from two properties that the Open Space District owns

Calabazas Creek – 1200 acres between Kenwood and Glen Ellen, south of Sugarloaf Ridge State Park

- A lot of topographic and vegetation variation – ridge to valley; grasslands, chaparral, different forest types
- Highest fire severity: south-facing ridge with a lot of chaparral
- Rest of preserve shows patchy, low-to-moderate intensity fire

Mark West properties

- Future Mark West Regional Park and Open Space Preserve
- Mosaic of vegetation communities, but conifer dominated with a lot of Douglas-fir
- Most of the property incurred moderate to high severity burn with high mortality
- Highest severity was among conifers

Currently doing a rough, rapid assessment using modified version of National Park Service's Fire Monitoring Handbook protocol

- Looking at both substrate and vegetation in ranking fire impact

- First priority was identifying areas with significant erosion potential, then hazard tree removal
- Now laying groundwork for long-term monitoring
- Fire severity is a measure of how much heat was in the fire at a particular time and place; field proxy for this is how much vegetation was consumed and what diameter of vegetation is left
- In high-severity burn, vegetation is taken down to the ground, soil has become loose and unconsolidated, and fine roots holding the soil together have been destroyed. This is where significant erosion and debris flows are possible. Not much of this has been seen in Sonoma County.
- Burned chaparral can look like a moonscape, but there still can be a lot of life in that landscape
- Forests have been self-mulching in some areas – burned leaves are falling on scorched soil and protecting it from erosion
- Fire provided good Douglas-fir encroachment control in some areas
- Ecological function for high-severity fire: can feed into biodiversity and habitat structure for wildlife

6. Caitlin Cornwall, Sonoma Ecology Center – *Communicating with Landowners About the Fires*

- a. Presentation on video begins at 1:26:21**
- b. Slides: at this [link](#) and in Appendix**
- c. Summary of presentation:**

How Sonoma Ecology Center has been communicating with the heavily-impacted Sonoma Valley community, especially private landowners

Helpful to point people in the direction of a long-term vision of what we want: wildlands that do not experience catastrophic fires and floods, are healthful for the environment, promote biodiversity, create jobs, support the local economy

Bin up messages into three categories:

- Fires were a human catastrophe – convey the sympathy and empathy it deserves
- In general, on the land, it was an ecologically beneficial event
- There are places where it was an ecological disaster on the land – where things that people built (roads, ditches, structures) are having a significant negative impact on the environment
 - Structures burned at much hotter temperatures than wildland, so trees near them are completely fried

Conveying to people what happened

- Diablo winds – normal in this area
- Topography, weather, climate
- Effects of fire suppression: what happens with no fire, intentional prescribed burns, and catastrophic wildfires
- Maps showing how fire progressed, burn severity according to vegetation type
- Nuns Fire burned at low severity, but covered nearly a third of the watershed
- Warning of potential severe degree flows down Adobe, Pythian, and Yulupa canyons

Working to educate people that

- These areas want to burn on a pretty frequent basis
- The extent of fire that supports healthy ecosystems in our area is vastly larger than people living today have experienced: get ready for change
- Most people don't know that fire has been where we live for centuries
- Trying to lay the groundwork for people being more accepting of planned fire and mechanical thinning
- Need to think of higher recovery in terms of annual water cycle—we're moving into the flooding season

As soon as the grass came up, people's level of anxiety plummeted

- Showing lots of pictures of what's happening on the landscape, trying to move people's minds from horror to curiosity

SEC taking action to protect streams near burn sites that have not been cleaned up – each building is a mini-Superfund site

- Wants to use high-tech spray mulch called Posi-Shell, but Army Corps is reluctant to clear areas that have been mulched

Keep talking to people about the vision of healthy wildlands

DISCUSSION QUESTIONS AND PRIORITIES

WHAT IS MOST IMPORTANT TO DO NOW AND IN THE IMMEDIATE FUTURE?

Suggestion	Participant	Votes
Neighborhood communication system	McKnight	2
Social awareness – living in ecosystems that burn	Euphrat	10.5
Leverage attention – put educational, political, financial systems into place for action	Cornwall	7
Clean up toxic messes	Linney	3.5
Prioritization for funding private landowners	Dee S.	7
Plan for wildfire: get existing structures retrofit for fire, make sure new structures are firesafe		2
Work with Air Resources Control Board to allow for more burn days		1
Educate team on fire regime (Sasha) - Six components - definition and measuring		3
Water course concerns - sediment transport monitoring. Monitor specific reaches: canyon vs bedrock vs confluence and areas of disturbance (springs, etc.)		2
Promote community connectivity; work together more with neighbors		1

WHAT ADDITIONAL INFORMATION DO WE NEED?

Suggestion	Participant	Votes
Common language – burn severity vs. intensity and ecological impacts	Miller	2
Get monitoring data out to community	Krauss	2
Effectiveness of fuel loads reduction	Drew	16
Prioritization (what/how) by FEMA/USACOE?	Dale	1
What is the next best management option (e.g. grazing, chainsaws)?	Bret	0
Burn severity information; compare field observations with distance monitoring		0
<ul style="list-style-type: none"> - What is the most effective way to deal with toxic burn sites? - What are the pollutants (metals, hydrocarbons, nitrates, phosphates)? - What is in the water? - Are the right tests being done? 		0
How much of the county would need to be burned annually? (8 million acres statewide)		8
Map of private landowners’ parcels – best lists to contact landowners		0
How do structures contribute to intensity and spread of fire?		2

WHAT ARE RECOMMENDED PRACTICAL LONG-TERM GOALS AND MANAGEMENT?

Suggestion	Participant	Votes
Limiting factor is \$\$ - need funding management mechanism (e.g. fee/surcharge on fire policies)	Krauss	6
Survivability of structures – need both defensible space and hardened structures - Educate, support, inspire people to do the work - County programs/rules/guidelines to retrofit existing structures - Strategies to overcome obstacles of cost – possibly drop in insurance rates - Firesafe Sonoma needs more financial support		12
Low impact development	Warmerdam	2
Engage the banks	Krauss	2
Get involved with general plan update process; look at Board of Forestry rules for permits		1
Look at bridges/culverts		0
Reorganize fire departments; consolidate and fund		1

HOW CAN EXISTING POLICIES BE ADAPTED AND CHANGED?

Suggestion	Participant	Votes
How do we build hardened structures? - Change building codes - WUIs in CalFire jurisdiction code is already in place – need enforcement?	Michelle	1
Demonstration of hardened housing – via county?	Dale	6
General plans: - What is our vision? - What/how to rebuild? Assist your local leaders - Pooling information – where? Rebuild Northbay?	Cornwall	7
Bond measures – coastal cons./change policy. Allow landowners to sell at pre-fire \$\$ to nonprofit for open space undeveloped land	Dee S.	1
Get banks and insurance companies engaged to help incentivize hardening		7
Analyze current policies/programs worldwide to see what works and what can be duplicated. County lead effort.		3
Study what works in Australia – they are ahead of us dealing with fire.		0
Why are we rebuilding in fire areas?		0
Fees: Colorado example – tax break and payment for managing forests		4