

Transcript of California Burning Episode 4

The Wildland-Urban Interface

Matt: Okay. We are at the Hidden Villa in Los Altos Hills. This is California Burning, a co-production of North State Public Radio, made possible by generous funding from Sierra Nevada Brewing Company. My name is Matt Fidler.

Matt: This is the fourth episode of a five-part series exploring the wildfire problem we're having in California. Although the lessons go well beyond the state, the first three episodes of this series were focused on the management of our fire-prone forests and wild spaces, and that problem is real, as we addressed. But another part of this problem is that these fires are increasingly encroaching on our towns and our cities, at a place that we call the Wildland-Urban Interface, where our wild spaces meet our communities. And when a fire happens here, in the Wildland-Urban Interface, the actual fire is only one part of the disaster. Take the Thomas Fire as an example. The Thomas Fire was a complex of fires on the coast of Southern California, around the cities of Santa Barbara and Ventura.

Newscaster: In Ventura County, the massive Thomas Fire showing no signs of slowing, fueled by those fear fierce Santa Ana winds.

Matt: It ultimately burned over 280,000 acres, destroying over 1,000 buildings, killing one firefighter and one civilian. Not a small ordeal, but the ordeal became even bigger when the big rains came through.

Karen Thompson: Everybody's thinking: Great, now we're going to get rains. It's going to help with the fire 'cause it was still burning in the backcountry, but it was not going anywhere, you know, around the houses. And now everybody's thinking we need rain.

Matt: This is Karen Thompson.

Karen Thompson: But, we didn't need an intense storm that would also cause a reservoir to go. And yeah, it was because of the Thomas Fire the debris flow happened.

Matt: A debris flow is an epic avalanche of land that can be caused when badly burnt hillsides get extremely wet, extremely fast. But these debris flows that they're talking about were caused by more than just a big rainstorm hitting burnt soil.

Karen Thompson: There was a lightning strike, and it hit a transformer at the Montecito Reservoir, and it released all the water from the reservoir on top of all the water that was coming down with the rain.

Matt: This is Karen's husband Mark.

Mark Thompson: People have no idea how extremely large and powerful that debris flow was. It's like a snowball effect when that much force hits a downward slope like the Santa Barbara Hills. It loosens soil, removing vegetation, which further destabilizes it and basically liquifies the slope. The debris flow caused over \$200 million worth of damage, taking out entire homes and cars, hospitalizing 163 people and killing 23.

Mark Thompson: I've seen the destruction in person of what it did. You just can't fathom it until you see how god awful it is.

Karen and Mark: There are boulders the size of half-a-house. Yeah, my friend actually lost her husband and son in that debris flow and they never found her son. It took their whole house off the foundation, and it was like a 2,500 square-foot home. It looked like somebody came through with a couple of giant earth movers and just pushed the homes away, and the trees, the houses, everything . . . [Mark] Trees just disappeared. Like they weren't even there. They were, there was nothing that could withstand the strength of this mud flow, you know, with all the boulders. And yeah, it was horrible.

Matt: These hyper-intense catastrophic fires like the Thomas Fire, or a Carr Fire, or the Camp Fire; they often aren't under control until the rains come. It was the same way with the Tubbs Fire in 2017. The Tubbs Fire was the one that burnt through the suburban city of Santa Rosa in Sonoma County, which is just north of the San Francisco Bay area. The entire complex of fires burnt in three counties, and included in that destruction, 5,643 structures were destroyed. 5 percent of the housing stock, \$1.2 billion in damage. At the time it was California's most destructive fire ever. More than both the Oakland Hills Fire of 1991, and the 1906 San Francisco Fire that followed the earthquake. I reached out to some colleagues at KRCB public radio in Santa Rosa who covered the Tubbs fire. Steve Mencher is the News Director, and Adia White is the Assistant News Director.

Adia White: Cal Fire investigators found that the Tubbs Fire started on privately owned property on private electrical equipment near Bennett Lane, just outside of the town called Calistoga, which is about 18 miles driving from Santa Rosa.

Steve Mencher: The night before the fire started those of us from this area were hearing kind of eerie sounds. It was, you know --we had been having red flag warnings all summer -- but we start to hear these kinds of whistling eerie sounds and it turns out that this was the winds that were picking up all over the area. And these were the winds essentially that added to the catastrophe.

Adia White: There was a lot of unusual weather that night. First of all, these winds were over 50 miles per hour in some cases. And typically in Santa Rosa you'll get a lot of wind blowing towards the east. But this was actually wind blowing southwest, which is rather unusual. So, instead, you have a fire that starts in the hills, would blow directly towards the city of Santa Rosa. And that's why it ended up in the city limits so quickly, as opposed to other high-risk fire times, those fires might blow up towards the hills instead of towards the city.

Matt: I don't think of Santa Rosa as being this wooded area. It seems like it's more like a suburb of San Francisco than kind of a rural area. Why did Santa Rosa burn like it did?

Adia White: Santa Rosa actually is very rural. Sonoma County is pretty rural. We're the largest city in Sonoma County. We have about 200,000 people, somewhere around that. We're nestled in a valley. There's a lot of grassy hills around us, oak woodlands, manzanita. So, there's actually a lot of foliage to burn, and just outside of the city limits there's a lot of high-risk fire areas designated by Cal Fire. So, you'd be surprised by how many fires we do get out here in the hills. And another reason that the fire got into the city itself is that these embers actually can blow up to a mile away from the ignition point. So, you might think that you have to be near the woods for the house to catch fire; but even if you're a mile from an area that's burning, you can still have one single ember can catch a house on fire.

Adia White: So, you have to think about how quickly these embers can travel, especially during a night when winds are up to 50 miles per hour. That's a lot of hot material blowing directly onto houses and that's a lot of the reason why the Coffey Park neighborhood caught on fire so quickly. Because even though they're about five miles from the area that's designated as a high-risk fire zone, because there's so many embers blowing down towards the city, a lot of those houses caught as soon as a single ember hit the roof, which might've had, you know, foliage on top, or any sort of debris on the roof will catch fire very quickly.

Matt: We'll return to Adia and Steve a little bit later. Just 13 months after that record-breaking fire in Santa Rosa, the Camp Fire erupts in Butte County and burns 90 percent of the homes in Paradise, depleting over 10 percent of the entire county's housing stock. The official death toll is 86, but with the number of folks in Paradise that were living off the grid, isolated socially and geographically, the real numbers could actually be a lot higher. In the early days of the Camp Fire I lived in smoke, going days without seeing the sun. I did talk to some fire refugees living in the Walmart parking lot and heard some horrific stories from first and second responders. My wife, my dog, and I eventually sought refuge ourselves in the Bay Area, where we were to have Thanksgiving with my family. The day before Thanksgiving the rains finally came, helping get the fire under control. People could now stop panicking and could start assessing the damage.

Matt: I returned to Chico after Thanksgiving in time to attend a special summit of local Fire Safe Councils attended by community and business leaders, politicians, firefighters, and fire specialists. The meeting had a somber but grateful feel to it. Everyone was thankful that they were alive and you can feel the urgency in the room, but also shock, and horror, and just sadness. Over half the people there had just experienced a traumatic event just trying to escape the fire with their lives. They lost their homes, loved ones, pets, horses, and priceless family heirlooms. And all of us lost this forested community that we once knew and loved. But everyone came together at this meeting to share their knowledge and to help each other out, so we can move forward.

Calli-Jane DeAnda: Well, welcome to our 12th annual summit and our Camp Fire regrouping experience. We're so thankful to be able to see everyone. I'm Calli-Jane.

Matt: Calli-Jane DeAnda is the Executive Director of the Butte County Fire Safe Council. A Fire Safe Council is a nonprofit neighborhood organization that helps fire-prone communities keep safe. We're going to take a trip with Calli-Jane to see some of the work they're doing, and how it helps keep neighborhoods safe from fire, in just a bit. But, first I wanted to air some of the things that I learned at this Fire Safe Council Summit. And I think that's why we're here today is to help you understand what a Fire Safe Council can do for you, especially on the side of prevention. When you travel around through burned areas, such as going through Concow or Yankee Hill, not everybody was saved because they did everything right, but several were. You know, if you have the clearance, you have the right type of venting, you have the right type of maintenance, and you're prepared; you have a much better chance of survival. It's all about

education, of how to keep your home fire resistant and to organize prevention efforts and fire recovery efforts in your neighborhood. At this meeting were many community leaders, fire experts, firefighters, and local Fire Safe Council leaders from various communities in and around Paradise. This includes Jim Broshears from the Town of Paradise's Emergency Operation Center.

Jim Broshears: This is going to be over time about a lot of lessons learned, a lot of opportunities to, make a better future for a lot of people, not just us, but other people across the state and across the nation. I truly believe that we can make a difference out of this horrible event that occurred to us on November 8th and beyond. So, I saw this fire unfold from the ground-level. One of the things it reinforced to me was the message that Jack Cohen told us a long time ago. And look up Jack Cohen on the internet and you'll see preventing home ignitions, and you'll see how homes can survive a wildland fire. You'll see that the, keep this in your head, fires burn from ignition to ignition. This fire burned thousands of ignitions. Those ignitions had to have points to ignite. And when we look back on this I think we'll see that Jack Cohen's message is just as valid today as it was 20 years ago, and that we need to learn from those lessons and carry them forward so that not only Paradise when it's rebuilt will never have this happen again; but, other communities across the state and the nation can also benefit from the same experience we've had.

Matt: Fires travel from ignition to ignition, otherwise it just burns out. In the Paradise, Ventura and Santa Rosa fires, the fires made it to the neighborhoods through wild spaces, burning trees, leafy debris in brush. But a fire turns deadly when it burns house, basically made of dead trees, and when they're spaced closely together, now you have a perfect recipe for a neighborhood fire that burns from home to home. This Fire Safe Council summit was the first time that I met Zeke Lunder. He was in the last episode, available at californiaburning.net, but Zeke was here at this Fire Safe Council summit to express his concerns.

Zeke Lunder: At the landscape-scale, Concow and Paradise, and Bloomer Hill, and Cherokee; they have some of the most extreme fire weather in the entire country. But what it's brought up for me being out there is the access is terrible. Everyone's got a wire fence, there's gulleys from the creeks; you just can't get in there. And if we're going to manage fuels on any sort of meaningful scale to avoid killing people, the next time we have the fire, which we will, we can't rebuild Paradise on the same footprint. And if you look at this picture, just count how many one-way streets there are. You couldn't design a better urban layout to kill people and trap them.

Matt: This fire was more than just another California wildfire. It was a tipping point in how we live in this state. And what's that cliché? The definition of crazy is doing the same thing over and over again, but expecting different results. There are hundreds of communities in these fire-prone areas around California that could have the exact same thing happen to them that happened in Paradise, or Santa Barbara, or Santa Rosa. Unless these communities get ahead of the problem and take measures to mitigate the potential catastrophe, these fires will happen, causing other disasters and floods and landslides, killing more people, polluting our air and water and soil, and the cycle of catastrophic wildfires will continue.

Matt: You're listening to California Burning. We're going to take a quick break, and when we return we're going to join Calli-Jane and one of her colleagues at the Butte Fire Safe Council as they work on a project to maintain the forests around Magalia, right above Paradise.

Zeke Lunder: We can see this area did burn fairly heavily. Again, there was not enough space between the trees to slow that down and it ran into that area.

Matt: Stay with us.

Matt: Welcome back to California Burning. I'm Matt Fidler. All five episodes of the series can be heard for free in podcast form at californiaburning.net; but this episode is all about fire in our communities. Not way out in the forest, but where we live, in the area we refer to as the Wildland-Urban Interface.

Machine Noises: Wood Chipper Sounds

Matt: These are sounds from a forest thinning project around the Paradise Pines Property Owners Association just north of Paradise and Magalia, chipping up woody material removed from the forest and left on the ground as mulch. This helps improve water retention and general health of the forest soil, but the big goal is to thin the forest to a condition which more closely resembles the forest that pioneer-and-founder of the town of Chico, John Bidwell, knew.

Jim Hautman: I like John Bidwell, you know, and one of the things that I've read about him is that he rode his horse from Chico all the way over to the coast, to Manchester, I think it is, and he rode his horse there, from Chico, over there. And you think about doing that now and it's like there's no way somebody . . .

Matt: . . . over the Mendocino forest, basically. Exactly.

Matt: That's Jim Hautman. He's a former firefighter and now helps the Butte County Fire Safe Council. Jim drove me all around Magalia, sometimes getting rained on, showing me forest thinning projects along with his colleague Calli-Jane DeAnda, Director of the Butte County Fire Safe Council.

Calli-Jane DeAnda: We are trying to manage this forest. We're trying to set it up for survival, and it does require us to take some trees out.

Matt: I asked Calli-Jane and Jim to show me some of the Fire Safe Council's projects surrounding the Town of Paradise, to explain how they're done, and why this is important to do in a fire-prone area like Magalia, half of which burned in the Camp Fire.

Calli-Jane DeAnda: We did a forest management plan for the community of Magalia last summer and found that the forest was about 150 percent overgrown. Basically, you want to be able to move through the forest just the way the fire would. If you can touch a tree, then the fire would burn from one tree to the next. We want to break up that space so that there's a room for fire to come through and not ignite one tree to the next. So, one analogy is if you can ride through the forest on a horse at a full gallop and not run into a tree, that would be a picture of a healthy forest.

Matt: So you take out the small trees, the dying or sick trees and brush, leaving large healthy trees, creating a more resilient forest that has a much better chance of surviving a wildfire.

Calli-Jane DeAnda: What we've been doing is working with our partners for our Community Wildfire Protection Plan. So we bring together a bunch of partners and then design where do the projects need to take place. Where there is the most critical risk to fire danger in the communities. And then we wait for the right grant to come, and if it will fund fuels reduction or watershed health or forest thinning, then we write up a proposal based on what the grants criteria and limitations are.

Matt: We drove up to various sites they wanted to show me, including Camp Coutolenc, part of the Paradise Parks and Recreation District that was burned during the Camp Fire.

Calli-Jane DeAnda: And we can see this area did burn fairly heavily. Again, the intensity of the flames coming out of the canyon of, really, there was not enough space between the trees to slow that down and it ran into that area.

Matt: The area was severely burnt, with very few trees surviving. But, just a few hundred yards up the road we can see a line where suddenly the trees are barely burnt at all and are expected to survive.

Calli-Jane and Matt: And that's this line on the U.S. Forest Service, where last spring we came in and cleared out the vegetation fuels between these large healthy trees and what's . . . [Matt] So this road right here as part of that? . . . [Calli-Jane] Right. And so now we see these trees have a high survivability from the fire from the design of the project. We just saw directly next to each other one area burned very heavily, one area burned much, much less, and that was a direct result of that project.

Matt: We got out and looked around. It was about 70 percent covered by the forest canopy, like the prescription called for. And when the Camp Fire came through it worked as planned. Most of the larger trees survived and the forest became nice and open. We then continued on a bit further to a project that started as a timber harvesting operation from Sierra Pacific Industries. Then the Fire Safe Council took over from there.

Calli-Jane DeAnda: What we have here was a little bit of more open canopy than what we just saw on the U.S. Forest Service project. They were looking for a 30 percent canopy closure, whereas ours was a 70 percent canopy closure.

Matt: What that means is that only 30 percent of the sky was being blocked by tree canopy, letting in more sunlight than the 70 percent canopy in the U.S. Forest Service project.

Calli-Jane DeAnda: And in this case that worked very well for the design of the fuel break to help slow the fire intensity coming directly out of the canyon. They left a lot of oak, so you could see these nice large oaks, and there was a lot of species diversity, a lot of different types of trees. And what we're seeing are a lot of healthy trees that survived the fire.

Matt: But with more sunlight reaching the bare soil, undesirable brush and bushes can come back more rapidly and add to the forest fuel load.

Calli-Jane DeAnda: So, the nemesis is the Scotch broom plant. This plant can grow in the poorest of soils with the least amount of water, out competes the native vegetation, and here it is on the edge of this great fuels reduction just waiting to take over.

Matt: So, while a much more open canopy like this does slow a fire down, it can also require maintenance so certain invasive plants like the Scotch

broom and others don't come back when it gets direct sunlight. This is why a shaded fuel break is the most desirable.

Jim Hautman: Having these trees here helps shade the area, so not as much stuff wants to grow back as fast because you have a lot of shaded area, but you know, if there's no trees here then the brush would take over.

Matt: The shaded fuel break is a break in the ground fuel, while keeping the large trees to maintain the high canopy that blocks dry sunlight.

Jim Hautman: Another part of what you see here is that when they did do the thinning, they brought everything up. They took all the ladder fuels away. The whole design of this is to keep the fire low-intensity on the ground, not travel higher, higher up into the trees,

Matt: Which helps slow the spread of the fire, attempting to protect the most vulnerable parts of the community. Ingress and egress roadways, and just as important, protecting the communities water supply.

Calli-Jane DeAnda: We're standing at the bridge of Little Butte Creek on Coutolenc Road, and the water flows are very high right now, so all this water is going into Paradise Lake. The good news here is the fire did not reach this portion of the watershed and so the water coming into Paradise Lake doesn't have those concerns of the fire contamination.

Matt: The last stop of our tour was the Paradise Pines Property Owners Association in Magalia. Calli, Jim and I, got out of the car into the pouring rain so Jim could show me the Fire Safe Council's nearly finished project, thinning the forest that was so overgrown with burnable material you couldn't even see the beautiful hiking trail going through the middle.

Jim Hautman: So, before, you couldn't tell that there was a trail here. So once they got in, we were able to clean out all the, the smaller brush and trees and everything, you can actually use the trail, see the trail, and and move forward from here now and enjoy it.

Matt: Yeah, take a horse down here.

Matt: Maybe you're thinking this wouldn't be a problem if the electric company, PG&E, had better maintained its transmission lines. PG&E has been deemed liable for the Camp Fire. The winds were strong that day and a C-hook failed on a transmission line that caused a spark, igniting the fire. Fires do start from lightning strikes as well; but, natural lightning generated fires in California usually happen during the summer when the weather is calm. California gets hundreds of these every year, usually in

remote places, and few people actually notice. Most of these catastrophic urban fires, Ventura, Santa Rosa, Paradise, and even the deadly 1991 Oakland Hills Fire, these all occurred during the fall when it's windy and bone dry from a long summer. But again, no matter how dry or windy the weather is, fire only occurs when there's an ignition. This is why PG&E filed for Chapter 11 bankruptcy, because it became clear that they're going to be liable for the destruction caused by the Camp Fire. Here is Paul Moreno, spokesperson for PG&E.

Paul Moreno: Well, in this particular case, I don't know exactly why the C-hook failed, you know all that is being investigated by various parties, but when that did happen, it separated the tower from the insulators. The insulators are holding the powerline, which then came, appears to have come into contact with the metal tower and created sparks.

Matt: Now, one thing that surprised me was that apparently these transmission lines aren't insulated.

Paul Moreno: These high voltage transmission lines are not insulated. They are bare wires, or bare conductors, and they're supported by insulators, and they run over very great distances, and because they're a non-insulated, there are clearances to keep space between the towers and the power lines, and the trees and the ground. And those are, those space and distances are also all created by regulatory agencies.

Matt: Ultimately, if they're insulated, though, then even if a C-hook failed and it hit the metal tower, wouldn't that potentially stop sparks from happening and then lighting, I don't know, the grass I guess, on the ground or something?

Paul Moreno: Well, typically in a, with the electric transmission system, both for our system and systems around the world, they are built this way and the incidents of fires are actually much, are pretty low, especially when compared to the distribution system. So because of the clearances that are in place, and trees that are kept away from that, usually this has not been a big problem. But of course with the changing climate conditions and the changing fuel conditions we've had, as you know, just, you know, any fire, once it starts during those conditions, can go on and on.

Matt: So, yeah, on the distribution lines, do those tend to be insulated?

Paul Moreno: On the distribution side we have primary and secondary. The primary lines, if they're overhead, are going to be bare. And the secondary lines,

which are like the household voltage that runs directly to your home, those are covered and they're lower voltage.

Paul Moreno: And of course, if lines are placed underground, well of course, they're insulated and they're in conduit as well.

Matt: You know, after the Camp Fire, look, a lot of distribution lines were just completely burned. Of course, in Paradise and Magalia, in the areas around that area, new poles went up immediately. Was that just standard operating procedure, or why did that, that happened really fast.

Paul Moreno: Right. Immediately after the Camp Fire, our goal was to restore the electric and gas system so that the existing structures within the Camp Fire footprint could receive electricity and natural gas service. By about mid- December we were able to restore power to virtually all buildings that could accept power. And by mid-January we could get natural gas service to virtually all the buildings in Paradise that could accept natural gas service. Later on, in May, we announced that we would be rebuilding the electric system underground for Paradise and some other areas outside of the Camp Fire footprint.

Paul Moreno: So in the meantime, we're rolling that program out over about five years. So, we're still going to use that temporary overhead system that we put in place. It's built to the same standards as we would a permanent overhead system and we will have to expand that overhead in a few areas, until we can underground those particular neighborhoods.

Matt: Is that on the radar for other foothill towns like, you know, Forest Ranch or Quincy? I mean there's a lot of foothill, older foothill communities around here, perhaps that they could use that. Is that on the radar of PG&E?

Paul Moreno: Well, we can't commit to anything at this point, but certainly in the case of Paradise, because you know, (inaudible) 90 percent of the town is going to be rebuilt anyway. And it's mostly an urban area versus a rural area. We think of our towns as being rural, but they're really kind of urban or at least suburban. And that's where you often see underground utilities when you look at new suburban areas.

Matt: So, how are lines maintained and inspected for safety?

Paul Moreno: Our regulators have schedules that we follow for inspecting and maintaining our, all of our, overhead and underground power lines and equipment and substations. So typically, as part of our inspections, it's

mostly a visual inspection that gets underway. In urban areas we'll often do those patrols on foot because we have roads that we can follow along power lines. In rural areas we'll often use helicopters to patrol because power lines will take shortcuts across canyons and across mountains and forests. And it's a very good way to patrol those lines and look for that. And if an issue is spotted, it'll usually be followed up with an in-person on-ground inspection that we'll get up there and get up close for a confirmation of, is that a damage or is that a worn part that needs to be replaced? Now, following the Camp Fire, PG&E did do a complete inspection of our electric transmission system in high fire threat areas, and we brought in contractors to do very physical detailed. They also use equipment such as infrared imaging devices to look for hotspots, which could be an indication of potential failure. So there's a lot of technologies that go into the inspection process, as well.

Matt: What happens if they spot something? What's the procedure?

Paul Moreno: So, if they do spot something, they will radio that information into our Central Aerial Patrol Center, which in turn will relay the information to the appropriate fire agency, and they're even able to follow up, so if the fire agency wants additional information or additional flyover, that can be done at that time. Another program that we have is we've been installing more weather stations, and more high definition fire cameras throughout high fire risk areas.

Paul Moreno: In our San Francisco headquarters we have a Wildfire Safety Operation Center. It's open 24 hours during the fire season, and the staff there, their job is to follow fire conditions, monitor them closely, follow existing fires, and work with agencies and get data from our aerial patrol, from our cameras, and from our weather stations. The weather stations, we're going to have several hundred out by the end of this year, with the goal of a few thousand within a couple of years. That'll give us very granular data, real-time, temperature, wind speed, humidity, and wind direction. And this information is available online. I think it lags by maybe a minute, and anyone can go on and see that as well.

Matt: And maybe that information would be used for when you decide to have some of these power shutdowns that are kind of happening throughout the state? Could you talk a little bit more about that?

Paul Moreno: Yes. So, the idea of shutting off power in a certain area of the grid, is when we're forecasting weather conditions and fire conditions that indicate you could have very strong winds, low humidity, red flag warnings, dry fuel conditions that could very likely lead to tree branches,

you know, being blown into power lines and perhaps causing a wildland fire. And under those conditions, as you know, when fire starts it can spread very quickly. So we've implemented the Public Safety Power Shutoffs a couple of times in 2018, and once so far in 2019. You know, we can't predict how often or where these are going to occur each year because they're entirely weather dependent. But we, our goal is to give our customers 48 hours' notice that there could be a Public Safety Power Shutoff affecting them, and then update them again about 24 hours before the shutoff, and again immediately before we shut off power; and, once the weather conditions have passed we will go out and patrol every inch of powerline to ensure that there's no damage and it's safe to restore those areas. And then we'll restore power to our customers.

Matt: Paul Moreno, spokesperson for Pacific Gas and Electric, the power and gas company for most of California. You're listening to California Burning. We're going to take a quick break, and when we come back, we're going to learn several ways people are building safer houses and neighborhoods in California's Wildland-Urban Interface.

Brennan Byrd: They found in Laguna that when the firestorms were coming through, most often than not, the houses were burning from the inside out.

Matt: Stay with us.

Matt: Welcome back to California Burning. This is a five-part series available as a podcast at californiaburning.net. My name is Matt Fidler. I live in Chico, just 15 miles or so from where Paradise burned. And I was raised in the Bay Area, a town called Walnut Creek, just 15 miles from where the Oakland Hills burned in 1991. Although the burn area there was relatively small compared to the fires of the last couple of years -- it was only up about 1,500 acres -- it killed 25 people, injured 115, and destroyed nearly 3,300 homes. Decades later, I'm studying the progress of the Camp Fire and the Tubbs Fire that destroyed Santa Rosa, and a pattern emerges. Fires are burning neighborhoods faster than they're burning forests during these horrific firestorms, and Californians are rightfully scared.

Citizen Collage: Because, maybe we don't live in a fire zone, but a lot of our neighbors may. . . . So I actually would check the air quality maps globally and realize we had worse air than in the most industrial polluted places in India and China. . . . Right above us is a county park. There's a lot of fuel and so a lot of people in the neighborhood are really concerned about imminent threat of fire in our neighborhood Fire is always an issue and I'm here getting some more information and knowledge on

fire ecology, our ecosystem, how it works. . . .I think grassroots and community organization is the way to protect our neighborhoods. . . .I think the lack of knowledge on what fire does and what they can do to prevent it, and make themselves less susceptible to it; that's what I think is our biggest issue.

Matt: I talked to these people and many more at a fire response weekend in the Los Altos Hills. Over that weekend, we shared stories: talked about fire ecology, fire safety, and how to develop fire-resilient communities. One session took us outside with Brennan Byrd. Brennan, formerly of Cal Fire, was one of two folks talking to us about building techniques to improve fire resistance. Here he is, referencing a study on the 1993 Laguna Fire that destroyed and damaged nearly 1,000 homes and buildings in Laguna Beach, California.

Brennan Byrd: So, what they found is that the houses that were burning were most vulnerable that had entryways where the embers in the heat could enter the house. So, they found in Laguna that when the firestorms were coming through, most often than not, the houses were burning from the inside out. Meaning that if you have a single-pane window, or if you have vents, like an air vent at the top, this is allowing the heat, you know, these immense firestorms is what it is, you know, just kind of going with this intensity through the vents, through single-pane windows, through wood siding. These weak points are allowing the fire to enter. It could be combustion of the materials inside the house actually leads the house to burn. So, when we're talking about creating a fire-resistant shelter, the most important thing is that we're creating a well-insulated house with a sealed building envelope. And what I mean by that is we have double-pane windows. We've, you know, done a good job to design our vents. So, the heat of the fire is not able to get inside. What we're thinking about double-pane windows, we're thinking about what is that window framed with? Metal is going to be the best. Vinyl windows are going to be probably the worst. So, what they found here is that the houses that survived had a well-insulated wall-sealed building envelope, and then a high thermal mass on the outside.

Matt: Which basically means thick, well-insulated, walls. Something like adobe or concrete that not only doesn't catch fire but insulates from the heat.

Brennan Byrd: All right, so your house is only as fire resistant as its weakest link. So, if you have a wooden deck, then that could be its weakest link. And there were some cool instances in Laguna where they had 5/8-inch sheetrock below the deck, so that when the fire was going underneath that, in two instances, actually, helped prevent the deck from lighting on fire. I also

learned that LifeTime Lumber makes a fly ash composite decking board that is fireproof, and there's also some hardwoods that are more fire resistant. Some other interesting things that they found in Laguna, that one of the homes that survived had a 40-foot-wide strip of ice plant. So, ice plant is actually, you know, one of these non-native invasive plants, was brought from South Africa to, you know, lock in the sand dunes to prevent erosion. But in this case, with a cement tile roof and this like defensible space, in this case ended up being ice plant, the firestorm just passed over the house and survived. So maybe it doesn't need to be ice plant, but considering our defensible space and just looking here, right now, you know the mulch, you know the pathways, just kind of keeping that in mind as well. I know Jared's going to be talking more about defensible space.

Fire Safe Council: Does everyone understand what we mean when we say defensible space?

Matt: Defensible space. It was mentioned in the Fire Safe Council summit earlier in the episode. Defensible space is basically keeping flammable materials away from your home. The first five feet away from your home would ideally be irrigated gardens, because watered areas won't catch fire easily. It can also be gravel or concrete or mulch. Anything that won't burn. So, put away your wooden furniture and make sure your firewood pile isn't touching your home. Same goes with wooden fences. They shouldn't attach to your house. A fire will just crawl along the fence and catch your house on fire. The next 50 feet around your home should be free of large trees. Think of a flaming tree falling. Will it fall on your home? And flammable bushes in brush. Excess leaves in your yard. Keep your yard clear. Not just to keep flames out, but to give you an escape route out of your property.

Matt: Plus, if you have a large amount of space around your home, and maybe better yet, a water source like a well with a generator hooked up to it, you have just created a perfect space for a fire truck to park when defending your neighborhood, right in front of your house, giving your home the best chance of surviving this fire. In the next episode of California Burning, we're going to go deeper into this lesson and learn about alternative building methods and materials that can actually make your home stronger when a fire comes through. But building a new, more fire resilient home, may be out of your price range. It certainly is out of mine; but that's not stopping people from moving into these beautiful fire-prone forested communities.

Gary Hendrix: Yeah, it's incredibly expensive to manage a forest, even a small tract.

Matt: This is Gary Hendrix. He's a professional forester who has teamed up with the organization, My Sierra Woods, to help private land owners manage their land.

Gary Hendrix: A registered professional forester is going to come out. He's going to identify your different species. He's going to identify the health of those trees that are on your property. He's also going to be there to ensure that there is not environmental damage done to the property, and in terms of watercourses. He's going to be there to help you in every way that he can to have a healthy, sustainable forest.

Matt: Because, as we talked about in previous episodes, much of the forested land in California is not healthy and sustainable today. It has been neglected and much of it is ready to burn hot and spread fire fast. And most small land owners can't afford to hire a professional forester.

Gary Hendrix: This is where My Sierra Woods comes in, and helping assist the small land owner. And I would encourage anybody out there to reach out, you know, to get people to gather together and make our forests again, healthy and sustainable. This is a critical thing that we have to do. So anyway, that's kind of what we're doing on our property. We've managed our forests with biomass thinnings of several hundred acres. Where we biomass thinned we have healthy forests. Where we have not been able to at this point we've had at times catastrophic losses.

Matt: What do you recommend people do to keep their properties, you know, safe and their land more resilient?

Gary Hendrix: So, we need to get people involved in programs like this. They need to be able to go in and remove these ladder fuels, and it can be done in a couple of different ways. One is called mastification, in which the chips are all ground up and left on the ground. The advantage to a biomass operation, where they go in and remove all of this material and take it to a cogeneration plant then, it's even more economical for the taxpayer and the burden that the taxpayer . . . you can do the biomass thinning quite often and break even with it, which is a real advantage for the forest land owner; whereas, the mastification is just grinding it up and leaving it on the forest floor. We need to make forests a green energy source that is renewable. And through doing this we can have healthy, sustainable biodiversity within them.

Matt: Gary Hendrix, forest manager for the Phillips Family Trust and partner with My Sierra Woods, servicing small forest landowners in Northern California. You can learn more about what they do at mysierrawoods.org.

So, there are a lot of things we can do to harden the Wildland-Urban Interface and the communities within so they're more resilient to fires. Well managed forests that aren't ready to erupt in flames as soon as an ignition occurs. Good neighborhood design with multiple maintained escape routes. Fire resilient homes with defensible space around them. And a close relationship with your community so you can help each other out and keep each other safe. I want to end this episode with Adia and Steve from KRCB in Santa Rosa. At the time of this episode, October, 2019, it's been two years since the disastrous Tubbs Fire ravaged Santa Rosa. And I wanted to know, is Santa Rosa taking these lessons seriously? Here is Steve Mencher again.

Steve Mencher: There are a couple of factors that are important here. One of them is the insurance payment that folks got from their insurers. If their home burned down and all of the things in it were gone, they were being given an amount of money that would allow them to rebuild a home. But these homes are built in more or less the way that homes have always been built, with wood frames, with other materials that, yes, are in some sense prone to burning, but with much more attention to many of the details, with much more attention to some of the areas that are most problematic, like the roofs and the defensible space. Then the homes can be hardened in ways that are affordable. So there's a mix and there are many pros and cons and it was very carefully decided that, yes, there can be rebuilding in these areas and, yes, as long as they lived up to the current building codes, there would be a much better chance of survivability for these homes.

Adia White: I also attended a burning demonstration that was recently put on by some fire officials here in Sonoma County to help educate people about which materials are best to build with. And they had three different structures that they created. One was a wood paneled structure, and another one was a fiber cement structure. And they showed us how quickly it took each structure to burn and the wood structure went up almost immediately. Whereas, the fiber cement structure, it took about 30 to 40 minutes to catch. So, these are the kinds of things that officials are trying to do to teach the community that these materials are available and that they can drastically lessen the risk of their houses catching fire, and that fire or cement construction material was actually the cheapest of all three. So, I think there's a lot of new materials that are starting to get out there, that people are starting to consider. And there's also some other smaller things you can do to harden your home from wildfire. For example, a lot of the embers are sucked in through attic vents and they are now making screens that you can put over those vents that can help

prevent the embers from entering the home, which is more flammable than the outside of the home.

Matt: So, what are the big lessons that you've learned, either one of you or both of you, after covering this fire for the last two years and watching the recovery?

Steve Mencher: Well, I think both of us went to several meetings, which were interesting, where the emphasis was on science. So, there is a whole science of fire, as you know from doing the coverage that you're doing. And the people who are most knowledgeable about this look at a variety of factors. They look at the fuel load that's available. They look at the weather, the topography, and sources of ignition. And, you know, the fight against the fires has become multi-pronged, you see. Okay, how can we reduce these things that we know will cause fires? One of the ways, as I mentioned before, is to make sure that where possible, and where practical, that small fires are set on the land to burn off the fuel that might eventually cause bigger fires. And the other thing we heard in these meetings time and time again is that climate change is becoming a factor, and that the fire season in California, mostly because of climate change, has not been reduced, but has been expanded to include the entire year. So, the science of looking at the various factors, the ability to look at climate change and say how do we look at this large factor, perhaps the largest factor, and react and relate to that? Those are things that people in California, and especially in this area, are thinking about. Adia?

Adia White: Yeah. I'll also add that we also need to taper our expectations of which areas can't burn and which areas can. We tend to assume that if you live in an urban area that wildfires won't be a problem for you. And, as Steve mentioned, as climate change progresses this is no longer the case and we have to start realizing that the possibility of fires coming into urban areas is actually a lot more common, and a lot higher. So, we need to look at our building codes, at the infrastructure, and realize that there's a lot of work we have to do to harden homes from wildfires, not just in rural areas, but also in the cities.

Matt: Adia and Steve, thank you so much for the excellent coverage that you've done on these fires and I really appreciate you sharing this information with me.

Adia and Steve: Thanks Matt. It's been great to talk to you. Yeah, thank you.

Matt: Adia White and Steve Mencher from KRCB, Northern California Public Media, in Santa Rosa. A big thanks to our other guests in this episode: Karen Thompson, Mark Thompson, Jim Broshears, Calli-Jane DeAnda, Zeke Lunder. Jim Hautman, Paul Moreno, Gary Hendrix, and the people from My Sierra Woods. And, of course, Brennan Byrd and all the inspiring folks at the Hidden Villa fire response weekend, with a special shout out to Ellen Farmer for putting on the event and letting me record it. All five episodes of California Burning are available in podcast form wherever you get your podcasts, or directly at californiaburning.net. On the final episode we're going to be focusing on solutions. Not just big solutions that involve government and industry and million-acre plots of land; but the solutions that you and I can start doing immediately, that may seem small by themselves, but collectively can create real positive change.

Randall Hauser: It's not flames so much that we're concerned with in building fire resistance, it's resistance to penetration by embers.

Matt: California Burning is a co-production of North State Public Radio and was made possible by generous contributions from Sierra Nevada Brewing Company. The original music is by Stephen Larosa of Wonder Boy Audio. Thanks to our team, Sarah Bohannon, Gregg McVicar, and Jill Fincher. I'm the creator and host, Matt Fidler. See you next time on California Burning.