



*Western Edition* Episode 3  
"The West on Fire: Debris Flow"  
Released September 21, 2021

(MUSIC – ENVIRONMENTAL CHILDREN OF THE FUTURE)

BILL DEVERELL (HOST): Hi, I'm Bill Deverell, and this is *Western Edition*, season one: "The West on Fire." Fires can be a terribly destructive force within nature, wiping out entire communities, as we've seen so often these past few years. But the destruction doesn't stop when the fires go out. Fires can leave hillsides denuded. Foothill communities no longer have the trees and roots to protect them from the rocks and mud that flow down from the mountains after it rains.

JOSH WEST: These post-fire soils are really unique in that the water essentially beads up on the surface and wants to runoff.

DEVERELL: This week's episode is about the post-fire landscape, and what happened to the community of Montecito, next to Santa Barbara, in early January 2018. It lies between the Pacific Ocean to the south and the Santa Ynez Mountains to the north.

PETER WESTWICK: A wall of mud, about three or four feet high that was going probably 25, 30 miles an hour, basically hit the house like a freight train.

DEVERELL: My friend and longtime collaborator, Professor Peter Westwick, is a science historian and runs the Aerospace History Project at the Huntington-USC Institute on California and the West. He was born and raised in Santa Barbara.

WESTWICK: Santa Barbara, like a lot of places in California, has this long history interaction with wildfire. It's just part of the landscape here. And because we have these coastal ranges, which are covered in chaparral, and are very steep and are prone, like most of the coastal Southern California is to the kind of down slope Santa Ana sundowner winds, you know, we've had wildfires regularly in the foothills here, or in the hills behind town. And occasionally, those fires have been bad enough and the winds have been bad enough that they've actually come down and been blown down into the foothill communities and burned a bunch of houses. And this happens, you know, every five, 10 years and another part of the range behind town burns. And then that burn scar, you know, it gradually regenerates. But this one stretch of the coastal ranges, which are these, you know, really steep, kind of dramatic hillsides, they hadn't burned in several decades, many decades...

DEVERELL: So it's late 2017, and Peter and his wife, Medeighnia, are living in Montecito. The Thomas Fire erupts in December.

NEWS CLIP: "California's Thomas Fire. Already more than 270 square miles. That's bigger than Chicago, and intensifying tonight. Crossing into Santa Barbara County, racing across the hills, forcing families to evacuate. Families that had very little warning..."

DEVERELL: Peter's family evacuates several times. Firefighters manage to stop the fire from reaching his community, though.

WESTWICK: We've made it through, we go through that, but now they're talking about, we've got this giant burn scar up there above our hills now. And it's the rainy season. So now we've got the potential of rain, which is what is, you know, eventually happens.

DEVERELL: You're trained in history of science. You're a Santa Barbaran, you know the topography and landscape very well. So both in terms of your training and also just your upbringing, are you already by, let's say January 1, putting two and two together and realizing that the Thomas Fire burned really late into the rainy season, and now we've got potential for a big storm on the horizon? This could equal deep trouble.

WESTWICK: Yeah. So I mean the funny thing, well, not funny, but in retrospect, that spring term of 2018, I was teaching a new class called "Engineering California," and it's on, basically the history of technology in California. And one of the things I look at is infrastructure, technological infrastructure in California, including technological infrastructure for controlling environmental risks. And one of the things I look at is wildfires and debris flows. And on my

syllabus that spring, which I was just gearing up to teach, in fact, that was basically the first week of classes, I had the piece that you know well, the John McPhee, "Los Angeles Against the Mountains," where his whole subject is the cycle of wildfires followed by debris flows in the steep coastal ranges of Southern California. So I put that on the syllabus because this is a major environmental threat to communities around this area. So I was very wary of this risk, but at the same time, you know, we are further down in the flats. And I thought, you know, if, if I was, was thinking to myself, like, you know, if I lived in one of those houses that's up on the hillsides close to one of these creeks, you know, I would be really, really nervous. So I was worried about it, but not so much for where we are. And I thought like, if it gets down to where we are, you know, it might be a couple of feet, but nothing that's really life-threatening.

DEVERELL: I just want to get the mechanics here correct. So a wildfire denudes a hillside, and it's the loss of that vegetative matter that holds the hillside up and that, absent that, a heavy rain could just work against the hillside and with gravity and pull everything down.

WESTWICK: Yeah, so it's the combination of the terrain, the steepness of the terrain. And again, these, these mountains behind Santa Barbara are very dramatic, but they're also very steep. And it is this is kind of loose rocky geology because of the earthquake faults and stuff that, you know, raised them up to be so steep, but also kind of fractures them and makes the rocks prone to dislodging. And then also, as I understand it – as the McPhee piece describes actually - the heat of the fire kind of sears the top layer of the soil to make it almost like it's almost like wax where the water and then the mud and the dirt actually run off easier and faster. So what happens is you've got these hillsides that are denuded of the vegetation, which otherwise holds the dirt and stuff in place. And they've been basically baked at high temperatures by this fire to make them even more prone to run off, and then we get this rain event which was basically, it was a half inch of rain in five minutes. You had an inch of rain in about 15 minutes over these 3,000-foot peaks right behind the mountains. And that's how hard it was raining for this one stretch in the middle of the night, that night of January 9th.

DEVERELL: And you were commuting your job, your teaching job. I was with you on one of those afternoons where we, it was abundantly clear that Santa Barbara was facing torrential rainfall. And everyone knew about the Thomas Fire. So were we not together the very morning of the night where this all happened?

WESTWICK: Yeah, so I was teaching at USC that day, and definitely keeping a wary eye on the forecasts. So I talked to Medeighnia, my wife and I was like, "Hey, I better come back. This looks a little hairy." And she's like, "no, no, don't worry about it, just stay down in L.A. and save yourself the drive." But we have this weather forecast. So late that evening, I called Medeighnia

and I said like, "Hey, like, how's it look up there? I'm thinking maybe I should just come home." She said, "no, no, no. Don't worry about us. It's barely drizzling here. It's not even raining at all. We're fine." The County had issued an evacuation, but only for houses above a certain line in the foothills. But the idea is like any debris flows are just kind of, they're going to maybe come down the hills, but once they hit the flat part, they'll kind of lose their momentum and they'll kind of spread out, and then just kind of stop. Of course, that turned out to be the literally, unfortunately, fatal calculation by the authorities in the County.

DEVERELL: So Medeighnia says, "it's just drizzling. It's not that bad. Stay in L.A." Pick up the story from right there.

WESTWICK: The house where Medeighnia and the boys, where we were living has two levels to it. So I say just for the sake of safety, let's have everybody sleep up in the upper level. Bring the boys and the dog upstairs. You know, just in case. And just, you know, so they don't have like, you know, water come to their bedroom in the middle of the night or something like that. So we did, which turned out to be a good thing. Really good thing. So around 4:30 in the morning, so because of the Thomas Fire, they'd gotten everybody on this kind of disaster hotline network thing where you get these automated warnings over your phone, over your cell phone. So at about 4:30 in the morning, cell phone pings, 'alert, alert,' they were tracking the cell of rainfall that is tracking towards the burn scar and, you know, evacuations go into effect - you know, move to high ground basically. So I call up Medeighnia immediately and say like, "Everything okay, should I?" "Everything's fine. It's starting to rain here. Raining a little bit harder, but we're still good..." What happens next is my cell phone lights up again and a bunch of my buddies are saying, "what's going on here? It looks like the sun just rose at 4:45 in the morning here in town. There's a super bright light over the hillside, but it looks like a giant bomb went off or the sun is rising..." The mudslides had come down, taken out those houses and sheared off the gas lines. And there was this giant explosion of natural gas line of one of these houses up there, which is basically this giant fireball. But, meanwhile, it's also raining just like biblical proportions. And then Medeighnia calls and says, "the mudslide has hit the house" and, you know, she and the boys are, really scared. This wall of mud had come down, all the way down to where we were living and a wall of mud about three or four feet high that was going probably 25, 30 miles an hour, basically hit the house like a freight train, took out a lot of the bottom part of the house and it was really noisy. And the house is of course shaking a lot. And there's this kind of roar from the mud - the washer and dryer being squeezed through doors on their way out of the house at high speed and it's just, sounds like all hell is breaking loose.

DEVERELL: When this is happening, she's narrating this to you on the phone and is she...

WESTWICK: Well, she's narrating it to me and she says, "the mud's coming up the stairs. What should we do?" And then she's like, "hang on. I've got to call 911. Here, talk to Dane." I got Dane on the phone and Dane's sitting there going like, "okay, Dad, what are we doing here?" And I say, which was turned out to be incredibly dumb advice, I say, "see if you can get to the garage where the ladder is cause you might have to climb up onto the roof of the house from the outside balcony." So he kind of starts to walk out there and he's like, "yeah. You know, Dad, I don't think I should go out here because the balcony is actually dangling, appears to be dangling in midair." And, of course, the garage and the ladder in it were long gone. At that point, the ladder was probably miles away. So anyway, it's just, okay. We'll just stay put. A Sheriff's Deputy does arrive several minutes later and he can get to within halfway up the driveway. And he's got his flashlight and he kind of calls out, says, "are you okay?" And Medeighnia says, leans out. The one that kind of says "yeah, can you help?" And he says, "I can't help you. There's a million other people who need help right now. You guys look like you're good. Good luck." So he turns around and gets in his car because he was, there were a million other people who were in a way worse situation. So one of the buddies, one of my buddies who'd been on this kind of text string earlier, lived down at the end of my street. You know, he's a concrete contractor. So he's got a big 4x4 truck. And he's also got a big, 6'6" son who works for him; you know, it's the kid who's, you know, in his 20s, a big strong kid. So Mike and his son Blake get in one of their trucks and they've got these, these mucking suits that they wear for doing concrete jobs. So they pull on these suits and they wade through this mud, which is waist deep or so and bust out one of the doors and go in and, ok, they're all safe. So they, kind of, Medeighnia and the boys wade out through the mud. They carry the dog out and kind of evacuate down to Mike's house at the end of our street. So at that point, then, they call me up Mike's like, "Hey, you know, got your family out. They're good. They're safe." And that was one of, you know, my immediate concern for the family - I was like, "okay, I can breathe a sigh of relief now." And now it's just figuring out like, okay, what else has happened to Santa Barbara? By this time, 5:30, 6:00, the sun starts rising and that was when they realized that this was really, really bad.

DEVERELL: Yeah...

WESTWICK: So the other thing that had happened was the power was out. So all this is happening in the pitch dark and, yeah, you've got flashlights and stuff like that, but you're shining like a beam of a flashlight around and you can kind of picture, it's like one of these disaster movies and all you can see is this boiling, massive mud coming up the stairs at you.

(MUSIC – BARB WIRE)

DEVERELL: Peter is pretty freaked out at this point. He speeds toward Santa Barbara but is stopped in Ventura by the California Highway Patrol, who tell him the mudslides have closed all the roads into the city. He goes to a Starbucks to figure out his options.

WESTWICK: And that's when we started getting reports and you started seeing the pictures from like the news helicopters. And there was 10 feet of mud in the freeway. And you know, semi-trucks buried up to their cabs and stuff like that. And then also they started realizing like, okay, there's going to be major casualties from this. And, you know, hundreds of houses have gotten nailed by this thing. And it is, it's a disaster area, literally, in Santa Barbara. And it wasn't actually until the next day, when I managed to, you know, I ended up driving back down to L.A. going up I-5, coming around the north through Santa Maria, like a six-hour drive, coming into town from the north side of town and getting in front of the freeway closure that way, that I finally ended up getting back to town.

DEVERELL: Amazing. And, but you knew, you knew by then that there were a number of casualties and fatalities, and you knew that, by definition, those were in your neighborhood.

WESTWICK: Yeah. Yeah. It turned out that several families that were just within a couple hundred yards of our house, is where some of the fatalities occurred. And actually there was some open space, basically behind our house, where, they actually found some of the victims. But then also some unbelievable stories about people getting through, so one of - a neighbor about three or four houses away, whose kids grew up with my kids, he'd been on his roof while this is all happening and then he comes down, climbs down and he's kind of looking around his backyard just kind of surveying. And he sees what looks like a foot sticking out and he goes out and reaches out and pulls out this, I think it was a, six-month old kid - pulls it out of the mud and the kid was alive. And this is just a couple hundred yards away from our place.

(MUSIC – STEALING)

DEVERELL: The mudslides washed away most of Peter's belongings. Everything that had been downstairs washed away. He followed the flow of debris but couldn't find any of his things.

WESTWICK: This stuff ended up in the Pacific Ocean or something. But there was a couple of kind of spooky aspects to this. My friends got in and they were down walking on the beach a couple of days later and near a couple of the creek mouths, there's just giant mounds of debris. And this is where the cars are basically a three-foot ball of tinfoil. What had been a car was sitting there on the beach. But anyway, he's down there walking on the beach and he sees this picture of a kid, which is somehow, you know, half covered in mud, but he picks it up. He's

looking at this picture and it's like, kind of knowing, and then he flips it over. And on the back, it says, you know, "Caden, age 2." He's like "Caden?" and he flips it over and he takes a snapshot of it on his phone. And he sends it to me as like, "is this yours?" And he's like, "that's Caden." And this is one of the photos that had gotten washed out of the downstairs of the house. And it landed on the beach about a half mile, mile away from our place. And, at that point, I got a serious chill down my spine, and was very glad that it was just a photo that they found.

DEVERELL: Exactly.

(MUSIC – STEALING)

DEVERELL: In the days following the mudslide, the community came together to mourn the victims and support the survivors with offers of food, clothes, and places to stay.

WESTWICK: You know, as a historian, I'm kind of trained to be cynical about human nature. But it was really encouraging and kind of uplifting to see people kind of rally around each other. Especially in those first several months after the, after this happened. And also then, for us, part of it was, you know, pitching in ourselves to go out and help. So there's this thing organized in town called the Bucket Brigade, to basically go out with buckets and shovels and like "let's, we gotta dig out our town." So, you know, we would go out and we'd spend a Saturday getting muddy and digging out people's houses and digging out, you know, trees and then eventually getting to the point where we can start reconstructing some of the trails up in the foothills and up in the hillsides. So you can get back up and kind of recover the landscape a little bit. So there's that aspect to it, which is the kind of encouraging part. But then also we were still in the middle of the rainy season. They were still evacuating from all the communities below the burn scar every time it rained hard, the rest of that winter. So there's still this threat that lingers.

DEVERELL: And I just want to close with a question. With the increased frequency and size and catastrophic consequences of wildfire, we do have a narrative that we've begun to talk about more - I think - about perhaps those homes should not be built there in the path of the wildfire. Have you heard in Santa Barbara a similar kind of discussion and concern about placing homes in the path of debris flow?

WESTWICK: Well, yeah. And, it's funny. Cause I teach this. I teach these kinds of questions about and oftentimes the solution to these environmental hazards has been technology. So in this case, technological infrastructure in the form of these debris basins. And you've got them down in the hills behind you, down the San Gabriel Mountains, you know, the debris basin every few miles, there's a debris base. And some of these debris basins are like the size of the

Rose Bowl. They're like football stadiums carved into the hills to catch the mud and debris when it flows down from the mountain after fires. So they had those in Santa Barbara. Of course, the catch is that you build them, but then you also need to maintain them. So, you know, the Army Corps of Engineers will come along and build you a debris basin, but the Corps is not going to come along then and clean it out when it fills up with just the usual silt and tree branches and leaves and all that stuff. And, you know, it's tempting for local governments to kind of say like, "well, do we really need to clean those out? And we can spend that money better on preschools or whatever." And so there's the question of maintaining the infrastructure that you have. And now, even since then, there's been these solutions of, well, we're going to put up these ring nets up in the creek beds to catch the debris when it flows down. So there's some of that kind of standard knee-jerk resort to technology to solve these kinds of problems. But insurance companies are also just like, well, "Hey, we don't want to insure these places if we're going to be wiped out again in 10 or 20 years with another debris flow." So there's, you know, we can rebuild on the same spot, but you've got to raise it, you know, X number of feet above where FEMA says the worst possible debris flow is going to reach, these kinds of things. So rebuilding, but raising the houses, these kinds of things, maybe shifting them on the lots. There are some neighborhoods where they have actually said we're just going to go in and we're going to buy the people out and not let them rebuild, a couple of neighborhoods yet, really hit the hardest. But, you know, when there's hundreds of houses involved, is the government going to come in and buy out hundreds of lots? I mean, the policy issues are very complicated. But clearly you need to expect that this is going to happen again. Because it will. In fact, with climate change it's probably gonna happen even more frequently. More fires and more intense rainfall events. And that's a recipe for debris flows.

DEVERELL: Yeah. The childhood friends of Medeighnia's from whom you rented the home, did they rebuild it?

WESTWICK: They did. They haven't moved back into it themselves. Or they haven't allowed anybody else to move back in. They're still trying to figure out what to do with it, but they rebuilt it. Their grandfather had built it himself, designed it and built it himself, generations ago. And they, you know, had this attachment to the place and they rebuilt it.

(MUSIC – KEEP IT IN A BOTTLE)

DEVERELL: Peter Westwick is a professor of history at USC. There's more to debris flow than we might think. Josh West researches the conditions that cause them. He's a professor of earth sciences and environmental studies at USC.



WEST: And the question is why do the mudslides follow the fires, right? And the obvious answer is, well, there's no vegetation holding things on the, on the hillsides anymore. And, to some extent, that's certainly part of the answer. But it's sort of intriguing in how much more complexity there is in understanding where and why and what the, and therefore, what kind of fires and what kind of terrain and what kind of rainstorms are most likely to yield those post-fire debris flows, mudslides and so on.

DEVERELL: So, I appreciate very much that it's more complicated than simply denuded hillsides, but the causal effect of fires in steep terrain to then a debris flow event, that's been well-established, right? That's not in question?

WEST: Well, it's interesting you asked that. It's more of an open question than you might expect. During fires, obviously you're burning vegetation, and one of the effects of burning that vegetation is, is to produce a whole bunch of organic compounds. So, you know, chemical molecules that work their way into the soil and produce what's called a hydrophobic soil. So hydrophobic basically just means repellent to water or, you know, afraid of water. And so these post-fire soils are really unique in that the water essentially beads up on the surface and wants to runoff. One of the hypotheses has been that this water repellency, these hydrophobic soils are really a key part of producing these debris flows. And it kind of makes sense because one of the things that you need to sort of wash all that material off the hillsides is a lot of water building up and it creates kind of a, a mighty slurry and, and everything sort of rushes off and creates mudflows.

DEVERELL: I'm going to ask you to go on a limb here with your own intuition as a scholar of these processes. When the Thomas Fire burned outside of Santa Barbara in the fall of 2017 and burned with such intensity, and then it began to rain in early 2018, is there a predictive side to you that thought, 'look out'?

WEST: Yes, absolutely. Right after the Thomas Fire and during those first rains, as it started to rain, I hopped in the car to go try to collect samples cause we were interested in actually collecting some of the samples from these debris flow events. Obviously, there was a fine line and to walk there because they're extremely dangerous, right? So we have to be very careful when we try to do this, but we were very interested in actually collecting samples of the material that was being washed out after these fires. I didn't anticipate there'd be quite the devastation there was during the Montecito debris flows and that was in large part because the rainfall intensity during that storm was much higher than one would predict for even the most intense storm in a given average year. Right? So, the, the Montecito debris flows were as large and devastating as they were because the rains that happened to fall right on the hillslopes,

right above Montecito that had burned, that rain happened to be incredibly intense rain, you know, an incredible amount of water falling in 15 minutes to the extent that one wouldn't expect that except every several decades. Right? So it was incredibly bad luck in a sense that that happened right above, you know, an area that was so inhabited that happened to burn and that that rainfall happened right then - cause it could have happened 10 years later or 10 years earlier and wouldn't have had the same effect. So I expected something to happen, but not of that magnitude.

DEVERELL: And why did it happen down valley as it were? Why didn't it happen up top?

WEST: Right, I mean, what's so tough about debris flows and also so interesting about them is right they move. Right? So they start somewhere and they move downstream. And one of the features that we want to understand and try to understand about them is just how far, how far downstream can they go? They typically initiate up in the mountains and if they only - we'll call it the run-out, right?, if they only run out a short distance, then they usually end also up in the mountains, usually away from where people are living and so on. One of the challenges, of course, is that as, as people live and build homes closer and closer to that wildland urban interface, you know, we get closer and closer to the zones in which those debris flows tend to run out. So we, we build more homes right up in that, in that region sometimes. And I drive by new developments and I think, wow, those homes have put themselves really at risk.

DEVERELL: That's Josh West. Rebecca Miller is a postdoctoral researcher studying wildfire resistance and resilience policies in California with the Huntington-USC Institute on California and the West. And she agrees that building housing in the wildland urban interface has added fuel to wildfires.

REBECCA MILLER: Most wildfires in California are started by humans. About 95% are actually started by humans with the remaining 5% from lightning. And as we move into fire-prone ecosystems, we're most likely going to be the ones who strike that match, inadvertently in many cases, like a car backing up and starting a spark. Just in the past few years, we've already seen tens of thousands of structures destroyed by wildfires, including in the Camp Fire, which hit Paradise and the surrounding communities where over 18,800 structures were destroyed in just a few hours. And Paradise of course, is in the wildland urban interface.

DEVERELL: So, let's pull out to a longer view. We've seen, basically since the year 2000, across the entirety of the American West and California stands out here, the size and destructiveness of wildfires is really astonishing. And 2020, at least in California, jumps out of the historic

record. That's not an anomaly, is it? Aren't we seeing a pattern here that the curve is still on the rise?

MILLER: Unfortunately. Yes. Climate change estimates suggest that the entire burned area in North America could increase by two, to even five and a half times the size that we're seeing today in the next hundred years. We're seeing that the wildfire season itself has grown longer. It's grown by about two and a half months since the past few decades. And, the wildfire season in general, around the world is growing. And so what's scary is that we've seen these terrible fires, but they're the worst fires we've seen yet. They may not be the worst fires that we ever see. We know from other research that wildfires used to be a lot more common in California. Estimates indicate that between four and even 12 million acres burned California every year, that would be pre-1800 time period we're talking about. And for context, 4 million acres burned in California in 2020, which is about 4% of the entire state. And 2020 was a record-breaking wildfire year for California. But, decades of fire suppression across the state throughout the 20th century resulted in a rejection of the use of fire on the landscape and the rejection of natural fire on the landscape and resulted in an over-abundance of fuels today. Even though we recognize the value of having fire in California, we're still faced with this tremendous overgrown fuel load. There's about 20 million acres in California, about 20% of the whole state that needs some kind of fuel treatment. And that, combined with the fact that we're moving into areas that are prone to wildfires, plus of course, climate change exacerbating our drought conditions, and our temperature conditions, all of these together are contributing to the larger and more destructive wildfires that we've been experiencing in just the last few years.

DEVERELL: Tell us a little bit about your sense of this fire suppression ethos, or even fire suppression culture. Where's it come from? And do you mark it largely through the bulk of the 20th century?

MILLER: This fire suppression policies stemmed from beliefs among ecologists and timber companies in the early 20th centuries that fire was detrimental to the landscape. It caused bad air quality, bad water quality. It contributed to reduced timber. And when the goal in the U.S. Forest Service or on your National Forests or your timber companies is to maximize how much timber you can produce, fire seems like a big threat to that. There was an introduction in 1935 of a policy called the 10:00 AM Policy. And the 10:00 AM Policy, which remained in place for several decades, said that any fire that started had to be suppressed by 10:00 AM the day after it started. And if you miss that deadline, then you'd have to get it out by 10:00 AM the next day and the next day, and the next day with the goal of keeping these fires as small as possible. And it was really only in about the 1950s and 1960s that ecologists began recognizing that actually the exclusion of fire, those fire suppression policies that had been enforced was actually

reducing biodiversity and hurting the landscape over time. And of course, even though we learned many decades ago that excluding fire was bad for these ecosystems, there had still been so much overgrowth that now, even today, we're still facing the consequences of those decisions made over a century ago.

DEVERELL: Back to Josh West, who says that the changing climate is going to increase both extreme drought and extreme rainfall.

WEST: One of the general predictions of a warming climate is that extremes of precipitation are enhanced. Now it can be challenging to really understand at a very local level what that means. So it's a little challenging to predict. I don't know that we're going to get things that are, you know, ramped up another, you know, 10 times in scale compared to Montecito, right? Like I don't want to sort of suggest there is a Godzilla of debris flows out there. But, but I think, I think the risk more to my mind is, is that this happens more frequently, and that of course in its own right, is, is quite concerning.

(MUSIC – LAST ROUNDUP)

DEVERELL: Thanks to Josh West, Rebecca Miller, and Peter Westwick for speaking to me for this episode. I'm Bill Deverell. Next time on *Western Edition*:

PROMO CLIP FROM THE NEXT EPISODE: [VOICEOVER FROM THERESA GREGOR]

Traditional ecological knowledge teaches us that we need to do prescribed burns or cultural burns, right. To maintain the health of the land.

*Western Edition* is produced by Avishay Artsy, Katie Dunham, Elizabeth Logan, and Jessica Kim. Our music was written and recorded by I See Hawks in L.A. *Western Edition* is a production of the Huntington-USC Institute on California and the West. Please rate, review and subscribe to the show, and share it with a friend. Thank you and talk to you next time.

(MUSIC)