Wildfire Presser Quotes
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Panelists

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Dr. Linda Rudolph, MD, MPH– Director of the Center for Climate Change and Health at the Public Health Institute in Oakland, CA

Dr. Bill Stewart – Cooperative Extension Forestry Specialist at UC Berkeley in the Department of Environmental, Science and Policy Management and Co-Director of UC Center for Forestry & Center for Fire Research and Outreach

Moderated by Emma Stieglitz, Co-Director of Communications, Climate Nexus

Dr. LeRoy Westerling

There's a shifting range of perspectives to look at in terms of a time horizons for thinking about climate fire. In the really short run, [California has] a Mediterranean climate at this time of the year, following a long summer dry season, and can get these winds, these Diablo winds in Northern California—as well as the Santa Ana winds in Southern California—that can fan fires once ignited. Coastal regions with a lot of chaparral and grass have plenty of fuel. It's usually pretty dry by this time of year [in mid-October], and given the proximity to lots of population centers, there are a lot of human fire ignitions. When you combine that all together, this is a peak opportunity time, in October, for some of these big fires to occur. And they can have a lot of impacts on people, because they're close to where a lot of people live in California.

. . . For decades now, we've had average temperatures in the long run that have been warmer than the historic temperatures that we use as our baseline for comparison. And warmer temperatures means more evaporation, more evaporation from the soils, more evaporation from the fuel. And cumulatively over time, it can have a profound effect on the landscape, and on the flammability of fuel, and on the availability of fuel. So when you think about, in wet years, you have warm temperatures, such as this year when we had very warm temperatures in the spring and summer. [Warm temperatures] mean more evaporation in the wet years, which means less moisture. It also means that fuels after a very wet winter can dry out, especially in these coastal counties like Napa and Sonoma, by the time you get to the fall fire season. But it also means that droughts are more significant, because you have less moisture carrying over from the wet years, and you have warmer temperatures during the drought. So all of that

together really turns up the dial a notch on the extremes that we can experience in terms of drought and in terms of wildfire in the region."

Dr. Linda Rudolph, MD, MPH

This has been a really tragic wildfire. And along with all the recent hurricanes it's another demonstration of the fact that climate change is already threatening our health and safety. We certainly need to prepare for the impacts of climate change but it's also critical that we act to reduce emissions of climate pollutants so that we prevent even more devastating climate change impacts on our health and the wellbeing of our communities and our children.

[W]ildfire smoke is a complex mixture of gases and particulate matter. The particulate matter in smoke, especially the very small particles known as PM2.5, can get deep into the lungs, and it can cause exacerbations of asthma, bronchitis and cardiovascular disease. Wildfire smoke exposure has been associated in numerous studies with increased premature deaths and with increased hospitalizations for asthma and chest pain. And smoke can cause breathing problems even in healthy people. The plumes of wildfire smoke can travel very long distances so thousands of people, even quite distant from a wildfire may be affected by the smoke. The risks of mental health problems especially depression and post-traumatic stress disorder after a wildfire are also high and often not discussed as much as the respiratory effects, so they are important to keep in mind. And for people that are in burned areas, I think it's important to note that ash and debris can contain a lot of toxic substances such as asbestos and heavy metals.

Dr. Bill Stewart

California has a real wide mix of grasslands, shrub lands and forest, and they've always burned and they've burned at very different rates. But in our research, we've been seeing clearly that the rates of these areas have gone up by 25-50% in the last three or four decades. So there are a number of causes, and climate change is definitely one of them across all types, but there's also a lot more vegetation on a lot of slopes. And that's also increasing the burning, especially on federal lands . . .

[W]hen we talk about the fires in the wine country and the ones in Santa Cruz, the most costly fires in terms of financial cost and public health are the ones that are burning in private lands around where we have lots of houses and businesses. And a lot of those are not, you know, the forest fires that might get on the television when we look at Idaho and Montana, but it's really grasses, shrubs, and trees that are all dried out and they're all burning, and they're going to be burning differently. Probably the trees are what created the embers that were able to fly across 101 and burn down the subdivisions, but clearly all the vegetation, grass, shrubs, and trees are all burning, and that's what's making this fire very difficult to put out, and it's producing lots of smoke that's impacting the public health of everyone in that area.

Clips from the Question and Answer Portion

Dr. Westerling: The forest area burned has been increasing over the 1970s-early 1980s baseline, that's when the dataset starts, 390% per decades over that that original baseline, and the non-forest area has been increasing by about 65% per decade.

Looking at forest areas, this last decade the northern Rockies increase over

the baseline is close to 3000%, whereas, in the Sierra Nevada, it's more like a 300% increase. In the Northwest, there was just under a 5000% increase over the 70s and early 1980s. So there have been very dramatic increases in areas burned, but it's been highly variable across the forests, depending on what their background climate looks like before we started warming it up.

As for the length of the fire season, it's a very similar sort of thing. We've had, over the whole western U.S., the fire season length increase from 138 days back in the 1970s to 222 days in the last decade. And the Sierra Nevada, by comparison, went from 65 days to 140 days. So the fire season has been increasing everywhere, but the length has changed quite a bit more in some places like say the Rockies than it has in, say, the Southwest.

Dr. Stewart: For California residents, it's the shrub lands that have always been the most prone to fire. They burn an average of one to two percent a year, as a probability. And I think what we're seeing is that Northern California, as it dries out, is acting more like Southern California. These fires we're having would not be that unusual for Los Angeles or San Diego County, but it's becoming more and more common here that we're having fire weather, hot fire weather, going way into the fall. [C]limate change is making it seem like we're living one or two counties south every decade in terms of fire behavior and the weather.

Dr. Stewart: [In the study we] looked at basically the probability decade by decade of fires in grasslands, shrub lands, and forests, and so right now they are somewhere between 1 and 2% for grasslands, and so a few decades ago it was more in the 0.5 to 0.75% a decade, and so we did that by each type because grasslands can burn a lot faster, because the fuel is always dry. But it isn't nearly as severe and as dangerous as when a forest or a shrub land is

burning, because there is just less fuel per acre that catches on fire.

Dr. Stewart: [In a study we're working on getting published] we looked at grasslands, shrub lands, and forests, and [rates of burning] varies, but the rains in every one of those types was somewhere between 25 and 50% more fires whether it's private shrub plans, federal forests, private forests, all of them all of them have increased. And there's a variation, but the pattern has been consistent across all the vegetation types we have in California. And that was just looking at the acres burned from the historical fire perimeter record we have that goes back to the 1950s.

Dr. Westerling: One of the biggest changes that we see with with climate change projections for wildfires is that, historically, the biggest source of wildfire emissions that might affect a populated areas of the state were from Santa Ana wind, driven by wildfires in the fall in Southern California. But the Sierra Nevada forests, and the fires in this region, come to dominate the statewide particulate budget in the summertime by mid century, far exceeding what was projected for Southern California.

Dr. Westerling: The majority of the housing stock say mid-century has already been constructed, or will be constructed in the near term, so the more we control how new development is done, but also how people retrofit existing developments, can really shape the state's economic vulnerability to changes in wildfire in the coming decades. And that's an important aspect of this outside of attempts to mitigate climate change by reducing the its rate of change.

Dr. Stewart: The fire behavior of the wine country fire is actually very similar to the Oakland Hills fire, but that was a much smaller fire in terms

of acres. If we had the wine country fire, hundreds of thousands of acres, we'd be talking about a fire that go from Richmond to Hayward, and that is possible we have more grasslands than those areas, but yeah, I think the Oakland Hills fire showed that it is not inconceivable to have a very, very large fire. If you have many starts, which they had up there, that was the big difference, the Oakland Hills fire we had one start, this wine country fire might have had . . . twenty, and that's the big difference."

Dr. Westerling: I think it's quite similar to the Witch Fire and the Cedar Fire down in San Diego in 2004 and 2007, both of those were in October too.

Dr. Westerling: [C]limate change makes our precipitation more variable, and so under some of the future scenarios, we see that there are fewer storms in some years and they might start later in the year, so if you don't get significant precipitation until November or December, you really greatly expand the period when that wind is blowing, and the fuels are still dry, and the relative humidities are still pretty low. And so, even if the winds didn't change significantly, if our precipitation in the fall becomes more variable, for some years we don't get any quite late in the year, then these winds could have a much bigger impact in the sense of extending a fire season further into the fall and winter.

Emma: Great. Alright, our next question is another one from Alastair Blant. This is a question for Bill. He writes, "Bill, you said warming trends are creating an effect where it seems like we're living one or two counties south every decade. What does that look like in terms of vegetation? Are plant communities in northern California beginning to thin out and become more desert like? What is happening in Southern California? Will the landscape eventually resemble something more like Mexico's?"

Dr. Stewart: [W]hat we're seeing is not a shift towards more desert like conditions; we're actually just seeing a lot more shrubs, which are outcompeting trees. . . [Forest shifting to shrub lands] one thing that seems could be increasing the fire risk in some of these landscapes. And I do think Southern California probably is going to have hotter conditions. Shrubs do great in hotter conditions . . . [shrubs are] the most flammable vegetation we have in California, so warmer shrub lands does not portend well for us.

Dr. Westerling: [W]hile climate is shifting steadily, especially temperatures warming, and over time that might change sort of what the reference vegetation would look like, the vegetation that we have on the ground now, and that we look at as our record to associate what types of vegetation go with what kinds of climate, came about over a relatively stable climate regime that lasted thousands of years. Climate change introduces unprecedented rates of change for anything that we've been able to measure or recreate from the Holocene. So we're looking at two problems: one is that it's things like wildfire and drought and beetles that really drive the change that we perceive. Even though climate change is progressing basically all the time, the landscape gets reorganized in steps, or sudden shifts, as we have these big intense disturbances. Not just these increases in wildfire that we've seen around the West, but also the beetle and drought dieback. We lost a huge fraction of our canopy, our forest canopy here in the Sierra Nevada because of the recent drought.

And two, when the ecosystem starts to recover after these the disturbances, they're recovering under a new climate regime, compared to what formed before, and so they may not go back and reset to what they looked like before. [I]t's really hard for us to predict what's going to happen in the intermediate term, because instead of climate change being a one step thing,

and then everything adjusts to where the new climate spaces are on the landscape, instead what we have is accelerating change projected for the rest of this century. If we stabilize our emissions and reduce our emissions to stabilize atmospheric concentrations there are still a lot of climate feedbacks in the global earth system that would keep temperatures increasing and climate changing for a while, as a response to what we we've triggered.

And that makes it very hard to predict what this complex system of interactions is going to do in the immediate term. So, we have a lot of fluctuations in vegetation ahead of us. And we're trying really hard to understand how that is going to evolve over time. It's easier to think about what it would look like 500 years from now than it is to tell you what it's going to look like 50 years from now.

Dr. Westerling: [T[he fire season is getting earlier and earlier, decade by decade, but you have to look at the averages over multiple years. I could point to specific events. More than a decade ago, we had a fire in January. So it's not that it couldn't happen before it's just that it's more likely now.

Dr. Westerling: Increased evaporation intensifies drought. How much moisture you have in the landscape is partly the input, so how much was carried over previous years and how much precipitation you get in the current year. And then there's the outflow, the runoff and evaporation. Warmer temperatures mean more evaporation. Climate change also mean enhanced variability in the precipitation, so more extreme wet and dry events. The combination of that high background variability that's getting exacerbated by climate change and the warmer temperatures that increase evaporation means that your droughts get enhanced and become more severe. We're also seeing more drying out over time.

One way to think about it is like it's a bathtub: how much moisture is in the bathtub? And you have two dials: one controls how much precipitation is going in and that's getting more variable and maybe slightly increasing over time on average, and the other is the temperature, and that's mostly going in one direction. It's getting warmer, and that's increasing the evaporation coming out. And the thing is you would need way more of an increase in precipitation than anything that's being projected or that's being observed for our region to counteract the cumulative drying of year after year of warmer temperatures. So, overall, that means our landscape is drying out. And that is driving, ultimately, shifts in vegetation, perhaps more shrub land and less forest.

Dr. Rudolph: Heat is the extreme event that has the most significant health impacts that we're experiencing in California and the U.S. right now, both in terms of mortality and other impacts. And we know that cardiovascular disease deaths increase with extreme heat events in addition to hospitalizations and deaths from acute heat illness and heat stroke. But we also know from studies that have been done by my colleagues at the California Office of Environmental Health Hazard Assessment that higher temperatures are associated with more emergency room visits for heart disease stroke, diabetes and renal failure. So we should be very concerned about what increasing temperatures and greater extreme heat events are doing in terms of the public health impacts.

Dr. Westerling: I think it's good to keep in mind that this is part of a broader shift going on in our climate system, and it's going to continue for some time. For the foreseeable future, forest fires are going to continue to increase until fuel becomes more of a limitation. Chaparral can regenerate fuels pretty quickly. So this is really part of what we have to learn to adapt

to live with as it intensifies with climate change.