Southern Oregon Climate Action Now

SOCAN

Confronting Climate Change

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Southern Oregon Climate Action Now Comments to Wildfire Recovery Public Hearing for Southern Oregon

Climate History Notes

Our Mediterranean climate

Before exploring the global warming, climate change patterns, and fire implications, it is worth reminding ourselves that Southern Oregon experiences a winter wet / summer dry Mediterranean climate. This climate is experienced in 6 regions globally: the European Mediterranean, SW and SE Australia, Western S. Africa, Western South America, and Western North America. Wherever such conditions occur, soils and vegetation dry out annually during summer and fall. The primary result of such a climate is a high likelihood that fires once initiated will spread. The secondary result is that the natural ecosystems occupying such regions are generally fire prone, fire adapted and fire dependent (e.g. Rundel et al. 2018). This means that relatively frequent fire is a characteristic of such systems and is essential for maintaining ecosystem health.

Climate Trends

Recent climate trends for Jackson County from NOAA depicted in figures 1 and 2, are typical for Southern Oregon and, indeed, Oregon generally. The temperature trend (Fig. 1) through the 20th Century shows a rise at the rate of

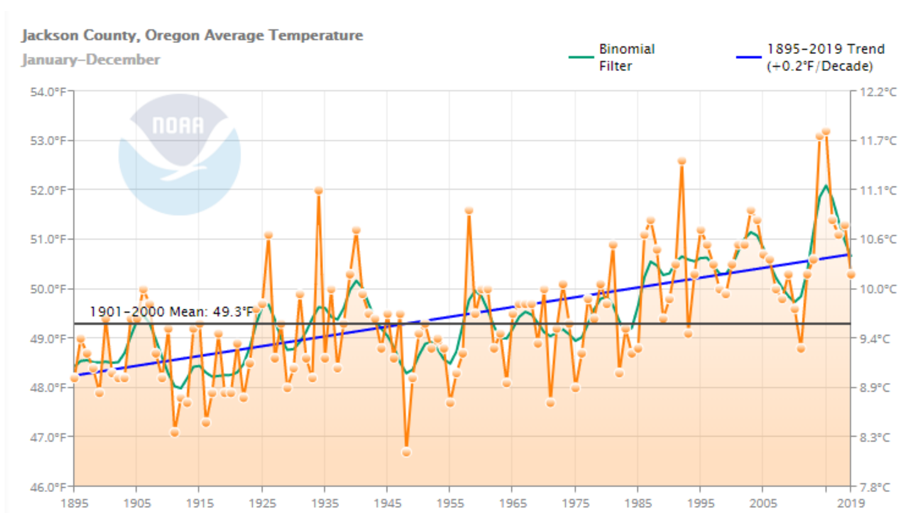

Figure 1 Mean annual temperature trend in Jackson County, SW Oregon

0.2°F per decade with an increase compared to the 1901-2000 average of about one degree F. Precipitation (Fig. 2), meanwhile, shows a mean annual trend that is essentially flat though with considerable variability among wet and dry years.

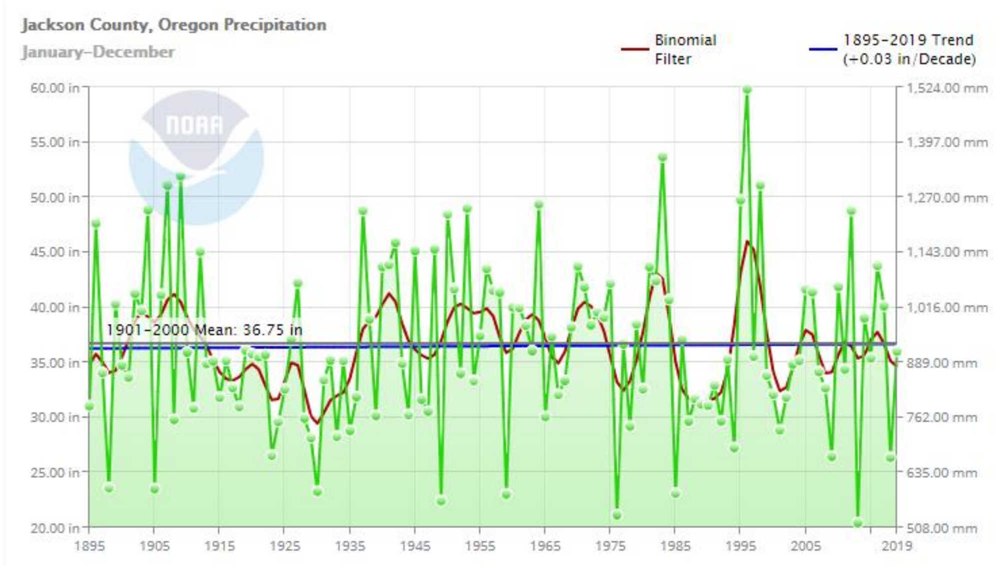

Figure 2 Mean annual precipitation trend in Jackson County, SW Oregon.

Climate Projections

Figure 3 from the USGS National Climate Change Viewer, based on some 30 simulation models, unsurprisingly depicts a similar historical trend (in grey) to the NOAA data discussed above. Projections for the remainder of the century are based on the Representative Concentration

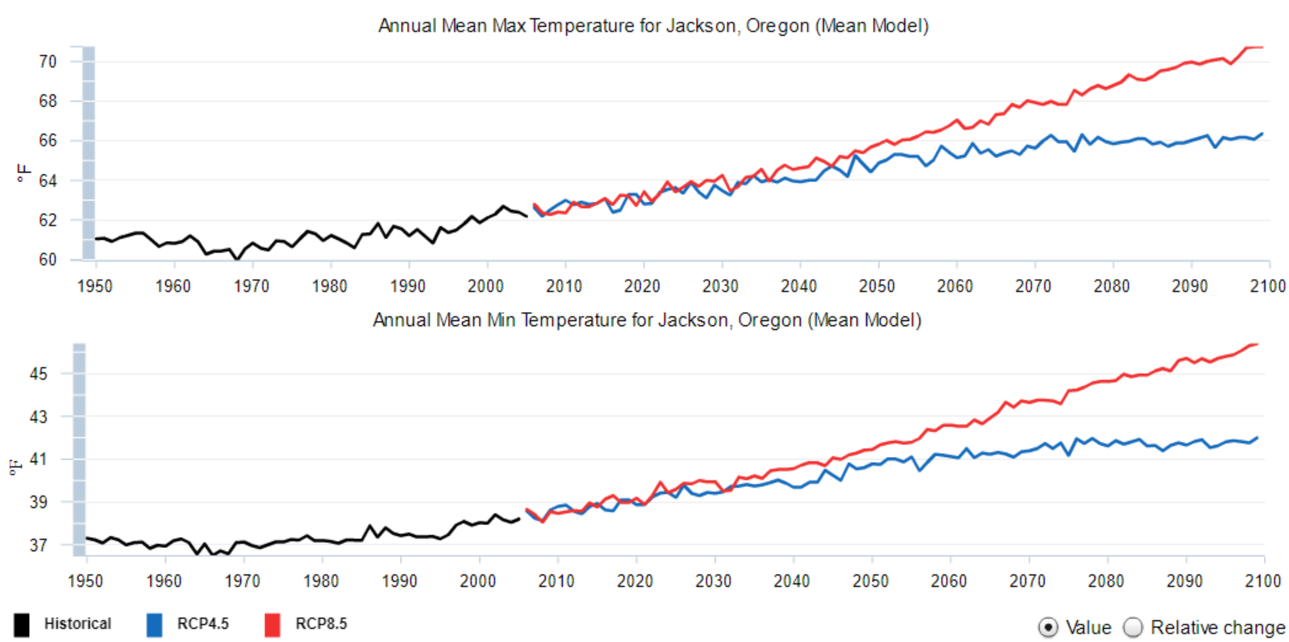

Figure 3 Mean max and mean min projected temperatures for Jackson County, SW Oregon.

Pathways (RCPs) of greenhouse gases in the atmosphere according to two scenarios employed by the Intergovernmental Panel on Climate Change (IPCC). RCP 8.5 scenario (red) was initially designated as the 'no-policy' scenario implying no regulations globally to reduce greenhouse gas emissions. Thus, this scenario anticipates fossil fuel use and greenhouse gas emissions increasing substantially. Though it was expected to be a 'worst case scenario,' observed trends suggest this is the trajectory we are following. It is thus often dubbed the Business as Usual (BAU) scenario. Meanwhile, the RCP 4.5 scenario (blue) assumes substantial curtailment of that trajectory in accelerating emissions. The projections of mean maximum and mean minimum temperatures indicate, on average, warming of some 7.3°F by 2100 compared to the 1981-2010 average for Jackson County.

Historic and projected precipitation trends for Jackson County from the USGS, based on the same models, are depicted in Figure 4. Again, the historical trend of a consistent annual precipitation with considerable annual variability is evident (grey). Meanwhile, the projections suggest that same essentially flat trend will remain through the century, though the variability will likely increase - with wetter wet years and drier dry years under both RCP 8.5 and 4.5 scenarios. Two additional precipitation trends, not depicted here are also worth noting: (1) the wet season is likely to become wetter, while the dry season becomes drier; (2) precipitation is likely to fall on fewer heavy-rainfall days rather than many light-rainfall days.

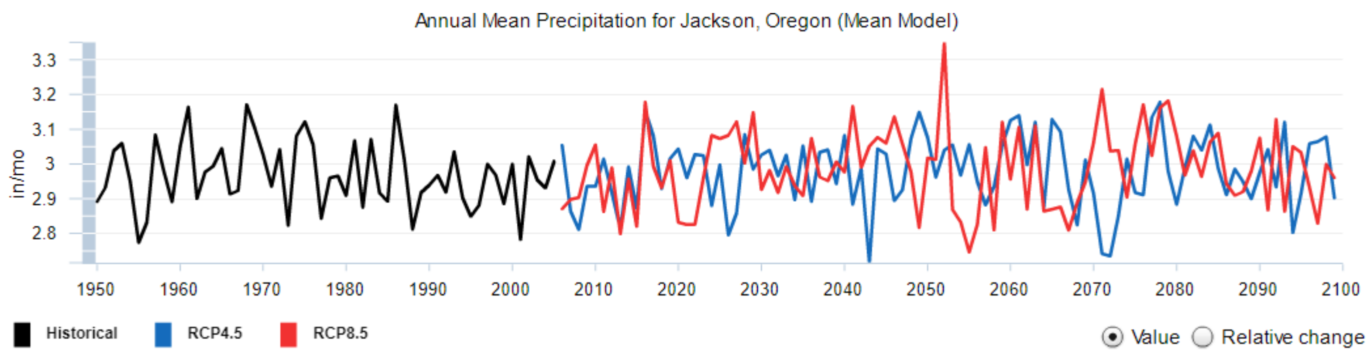

Figure 4 Precipitation projections for Jackson County, SW Oregon.

An additional trend that is critical to this discussion is that of snowfall, assessed in terms of its snow water equivalent (SWE) because this is what is important to ecosystems at high elevation and those downstream historically relying on summer and fall snowmelt. It is evident (Figure 5) that SWE in Jackson County is already declining and will likely continue to decline through the century, potentially dropping to some 10% or less of historic conditions by 2100.

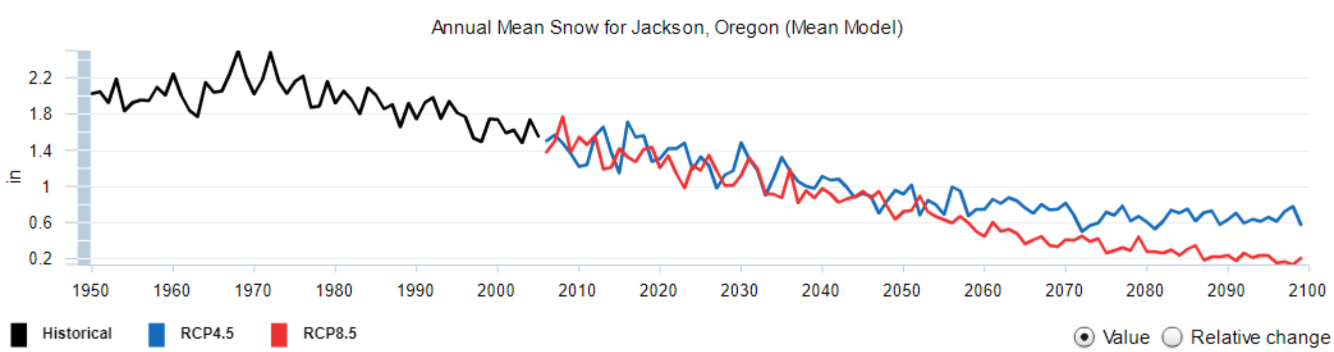

Figure 5 Snow Water Equivalent projections for Jackson County, SW Oregon.

The combined impact of the trends discussed above is increasing evaporation rate during late summer and early fall under conditions of reduced water availability. The first consequence of this is presented in Figure 6 depicting an increase in evaporative water deficit as evaporative potential rises and water availability falls. This trend is already occurring but is anticipated to become more severe through the century.

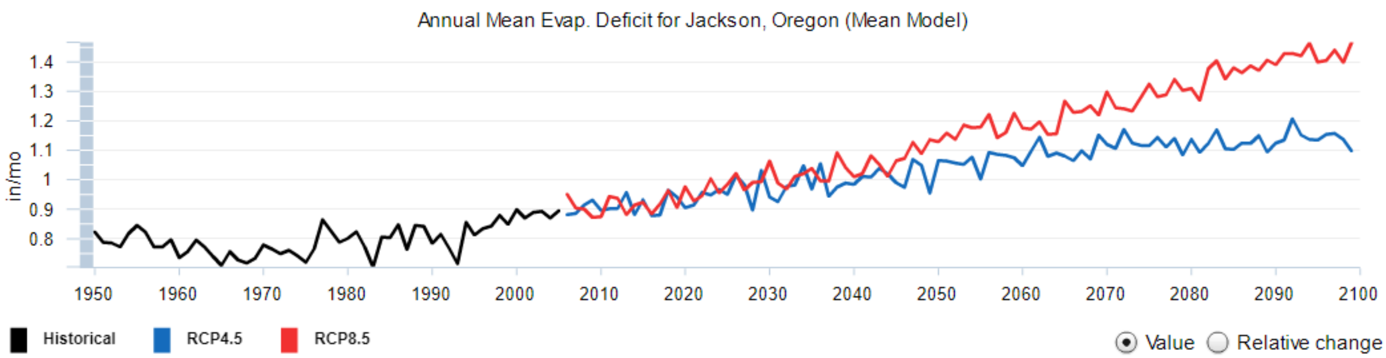

Figure 6 Evaporative water deficit projections for Jackson County, SW Oregon.

As evaporative potential increases and water availability decreases, the inevitable outcome is the reduction in soil moisture content-as depicted in Figure 7. As soils dry out annually more even than has historically been the case, vegetation will undoubtedly also dry out more.

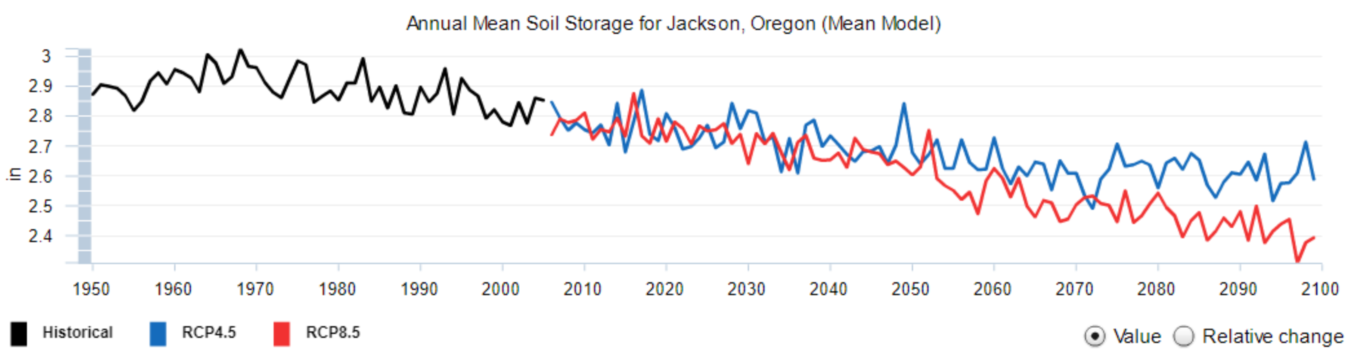

Figure 7 Soil moisture projections for Jackson County, SW Oregon.

Climate Implications

The implications of these trends are amply recognized in the Oregon Climate Change Research Institute's 2020 Oregon Climate Assessment Report: "A sensitivity analysis of historical climate data suggested that for every 1.8°F (1°C) of warming, peak SWE decreases up to 30%" (Cooper *et al.* 2016 in Dalton & Fleishman 2021). This trend leads to the conclusion that; "Over the last 20 years, the incidence, extent, and severity of drought has increased in both the western United States in general and the Northwest in particular compared to the twentieth century" (Dalton *et al.* 2017 and Williams *et al.* 2020 in Dalton & Fleishman 2021).

The implications of these trends for wildfire risk cannot be overstated. Data compiled and accumulated annually by Oregon's Department of Forestry for lands they manage are presented in Figure 8. This chart depicts several interesting trends:

- Area burned in 2020 was clearly way above anything experienced for a century.
- The general pattern in fire initiations (broad white line) indicated no substantial trend.
- The average for area burned (narrow brown line) shows a high during the early years of the last century followed by a low from the early 1940s to mid-late 1970s followed by the more recent increase.
- The horizontal axis is labeled with adjustments in the Pacific Decadal Oscillation (PDO) - which has the stated climate impact. Thus, the early years of last century experienced a warm dry phase facilitating fire, then the mid-century years experienced a cooler wetter phase suppressing fire. Finally, from the 1970s onwards, the PDO imposed a return to the warmer drier conditions evident several decades earlier again stimulating the spread of fire. Simultaneously the climatic impacts of global warming were being experienced to an ever-greater degree - superseding even the PDO in effect.

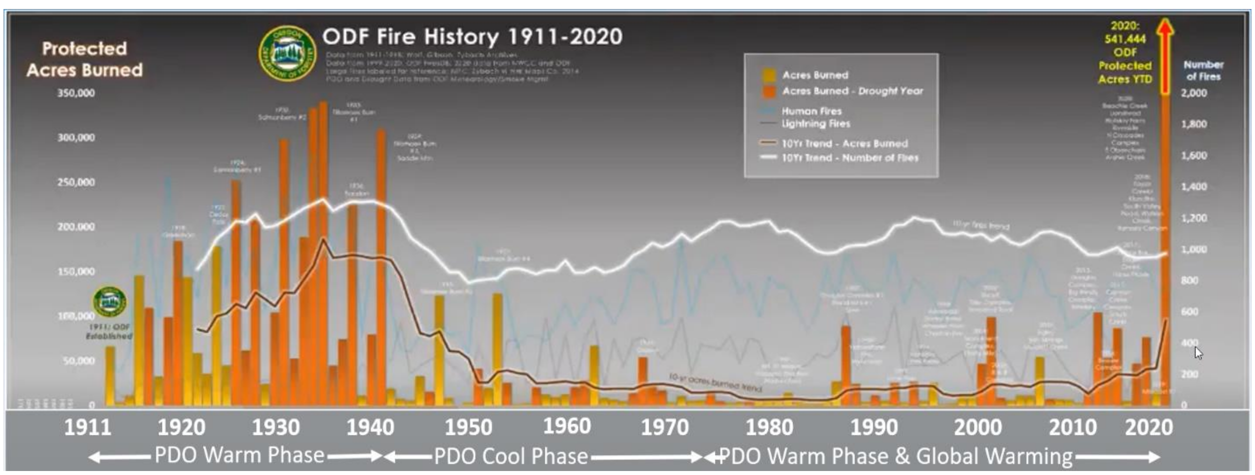

Figure 8 Wildfire History in ODF managed lands 1911- 2020. Modified from: https://digital.osl.state.or.us/islandora/object/osl%3A957101/datastream/OBJ/view

What Figure 8 fails to display is the imposition of fire suppression during the 1900s, especially with the Smokey Bear campaign established in the 1940s. Thus, the impact of climatic adjustments has been compounded by fire suppression allowing fire intolerant, shade tolerant species to invade the Southern Oregon dry forests and thus increase understory fuel density and the capacity for ground fires to climb into the canopy to produce crown fires.

The area of biomass burned in western states compared to what the models suggest climatic conditions should have stimulated over the last 1400 years are depicted in Figure 9. The records of biomass area burning are depicted in grey, with the 100-year trendline in red. Meanwhile, the dotted black line presents the area burning that the climatic models suggest should have occurred. It is evident that the models historically conform closely to the observed data. The most concerning aspect of this graph is the pattern evident in the last few decades where we can see the model area burned diverge markedly from the actual data leaving a vast fire deficit.

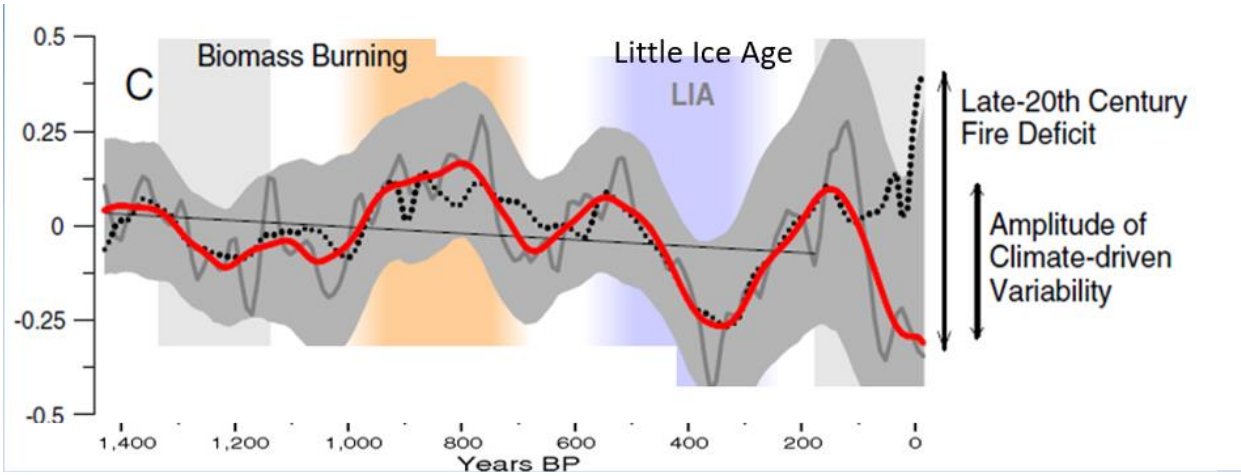

Figure 9. Fourteen-hundred-year history of climate and biomass burning in the western U.S. Marlon et al. 2012 https://www.pnas.org/content/109/9/E535

The troubling conclusion that this analysis offers is that we can expect a redress to this imbalance over coming fire seasons. This means increasing fire risk.

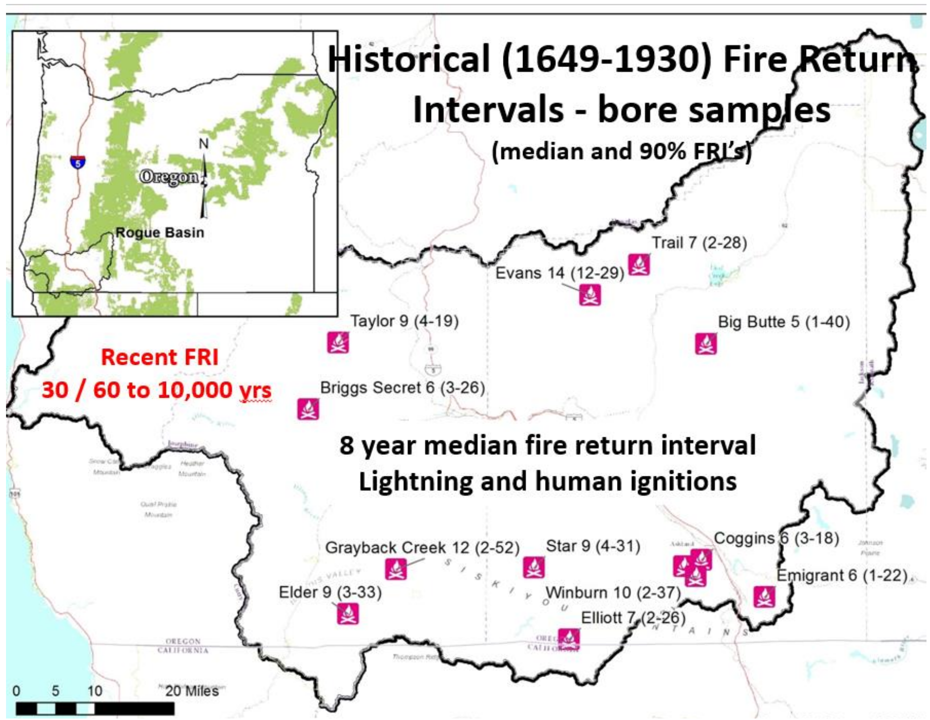

Figure 10 The frequency with which fire returned historically in dry forests of Southern Oregon (FRU - Fire Return Interval). Metlen and Borgias 2016 https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/oregon/forests/Documents/ODF%20Appendix%20Fire%20History%20RB%202015%20Final.pdf

Data on the historical frequency of fires in the dry forests of Southern Oregon, termed the Fire Return Interval (FRI) are presented in Figure 10. These data reveal that prior to fire suppression in the early 1900s, the median FRI in these forests was 8 years, meaning a fire occurred at any given location in the forest approximately every 8 years. We know that fire suppression has successfully but artificially extended the FRI in these forests to decades, further underlining the fire deficit problem indicated and discussed in relation to Figure 9.

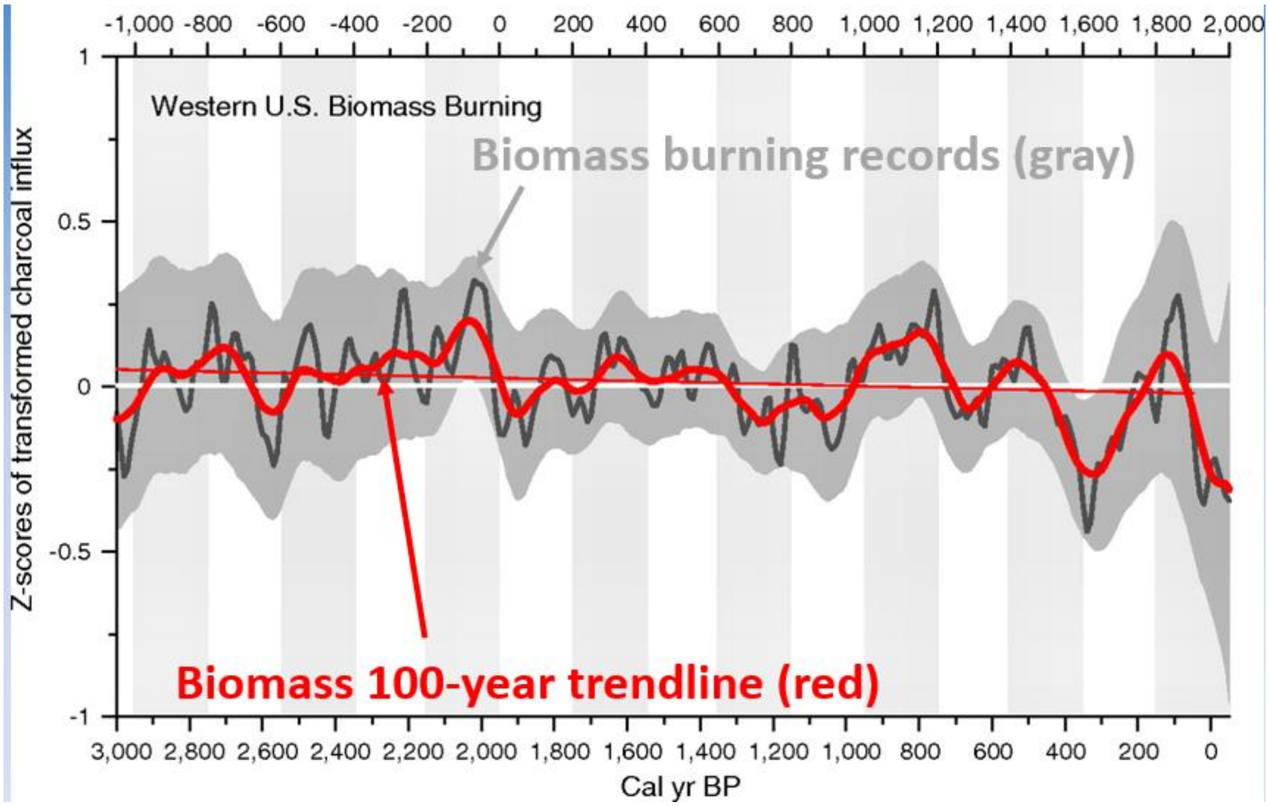

Figure 11. Three thousand years of biomass burning in the western U.S. Marlon et al. 2012 https://www.pnas.org/content/109/9/E535

That we are currently experiencing a relatively low level of biomass burning compared to historical values in the western United States is further underlined by the data presented in Figure 11 from the same study discussed above, but dating back 3,000 years.

The conclusion that I hope is drawn from these trends and projections is that historic patterns, particularly those from decades ago, are no longer relevant to the fire risk that confronts us today or will confront us onward through the century.

While there may have been a number of unusual factors conspiring to create the disastrous outcome of September 8th 2020, we should not delude ourselves into thinking that this is, as Governor Brown reportedly described it: a “once in a generation” fire (https://www.washingtonpost.com/nation/2020/09/09/oregon-wildfire-medford-evacuate/). Rather, when we follow the trajectories and projections for the relevant climate variables, we are forced to conclude that we face a future in the western United States of increasing risk of fire. Historic averages do not tell the story; we must look at trends and their projected trajectories.

Lest it be concluded that this discussion refers to Southern Oregon as though climate trends and consequences here are atypical for our state, Figure 12 presents statewide temperature and precipitation trends. Since the same trends in climatic factors discussed above are appropriate statewide, we can appreciate that the problem of ongoing fire risk is not peculiar to Southern Oregon. Indeed, Dalton and Fleishman (2021) warn us, in the Oregon Climate Assessment Report, that for Idaho, Montana, Oregon, and Washington area burned by wildfire will double or triple by the 2080s.

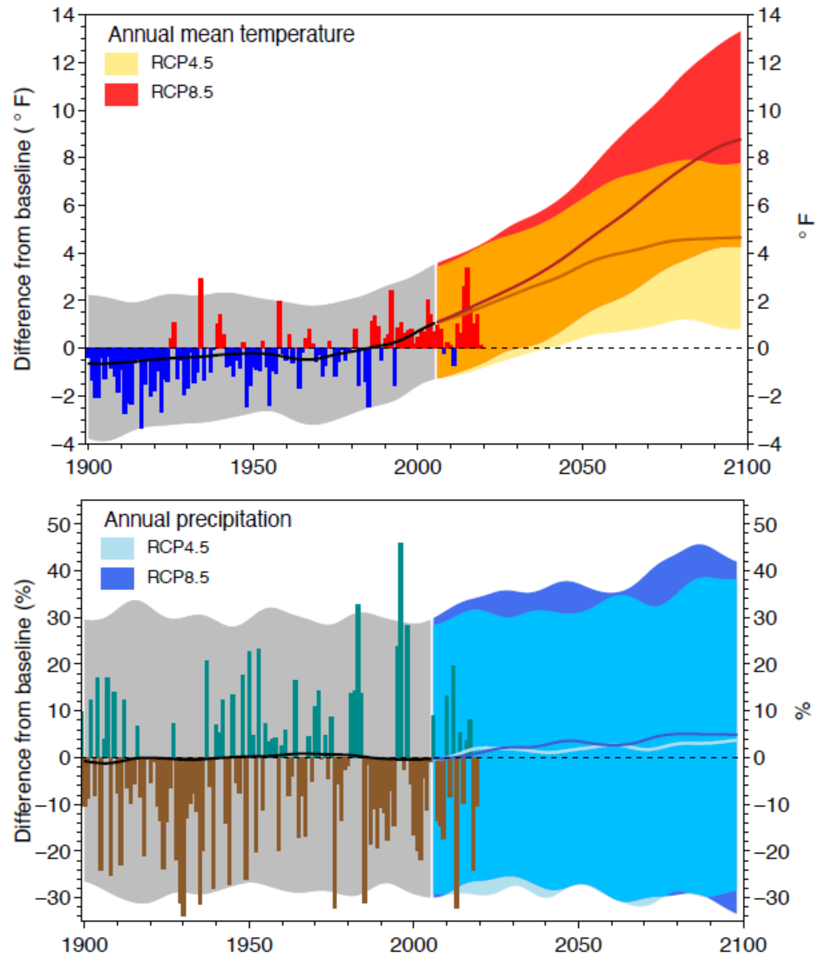

Figure 12 Temperature (above) and Precipitation (below) history and projections for Oregon from 1900 to 2100. https://www.oregon.gov/highered/about/Documents/Commission/COMMISSION/2021/Feb%2011/4.2%20Public%20Comment-Erica%20Fleishman%20OCAR5.pdf

In summarizing the risk, Dalton and Fleishman (2021) further offer: "Wildfire dynamics are affected by climate change, past and contemporary land management and human activity, and expansion of non-native invasive grasses. From 1984 through 2018, annual area burned in Oregon increased considerably. Over the next 50 to 100 years, area burned and fire frequency are projected to increase substantially, initially east of the crest of the Cascade Range and then in the western Cascade Range. Over the long term, depending on how vegetation and fire weather shift with climatic changes and fuel and fire management, fire severity also may increase."

The September 2020 Fires

In the general scheme of wildfire concern, we think of fire risks existing mainly for occupants of wilderness and wildland urban interface (WUI regions as we imagine fires sweeping into human habitations from the forest. The Almeda Fire was quite different in that it was initiated in Ashland and demolished substantial parts of Talent and Phoenix after traveling northwest along the Bear Creek Greenway. Thus, rather than occurring as a forest fire, it began and then flourished as a city fire.

However, we should not use this distinction to ignore the message that climatic factors, trends, and projections discussed above provide. Rather, we should remind ourselves that the same factors of warming, dry soils and vegetation, that increase forest wildfire risk, also increase the risk of fire spreading through the human infrastructure of our towns and cities.

As Figure 13 illustrates, climatic conditions facing Oregon on September 8th were the result of an unusual combination of strong winds and extremely dry conditions

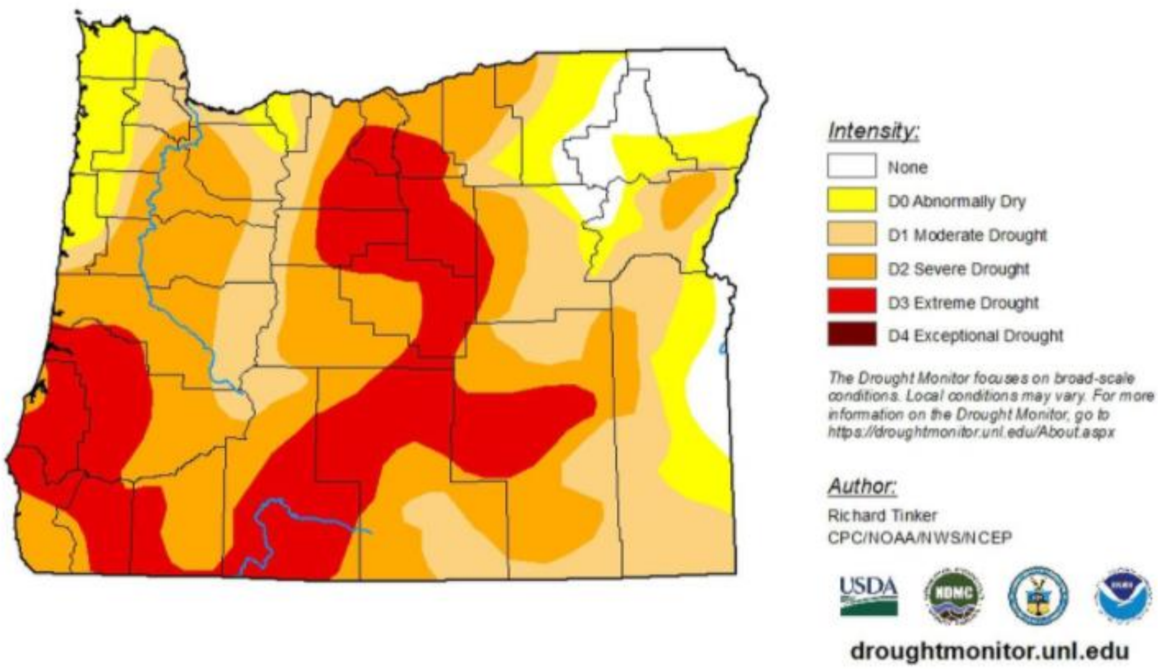

Figure 13. September 8th 2021 Drought Monitor map for Oregon depicting the region of severe drought coincident with Southern Oregon fires. Note that 60% of the state was at least abnormally dry. https://www.oregonlive.com/environment/2020/09/wind-fuel-heat-3-factors-combined-to-set-western-oregon-ablaze.html

(https://fox12weather.wordpress.com/historic-september-2020-fires-labor-day-windstorm/). However, it would be folly for us to fall into the delusion that such a combination of conditions could not happen again. Climate projections tell us the risk will only increase unless we (collectively and globally) address greenhouse gas emissions!

While the Alameda Fire, as noted above, was less a forest fire than a humaan infrastructure fire, we can take some lessons from forest fire resilience as we recover from the Alameda fire and strive to survive such events in the future.

Much of the inhabited region of Bear Creek Valley between Medford and Ashland, was initially occupied decades before we became aware of the danger confronting us from global warming and its climate change consequences. As a result, many buildings were constructed long before we understood how to resist the threats posed by these conflagrations. The same is true for landscaping. Whether through incentives and encouragement or zoning regulations, we need to be smarter this time.

There are several very obvious areas where we can be smarter:

1) Fires require fuel. While we all like vegetation and wildlife around our homes, whether we live in town or country, we should appreciate that landscaping is a critical issue. Residents of the WUI are well aware that defensible space is a key to surviving and escaping from fires. This means spacing buildings and reducing brush and combustible vegetation in the proximity of buildings.
2) Historically, wood was the primary construction material. Unfortunately, of course, wood is very combustible. The message is that we should reduce combustible materials, especially on exposed surfaces.
3) Sparks land on roofs and in gutters. A prime method for fire spreading is the sparks that land on roofs to ignite flammable roofing materials or in gutters to ignite the leaves and brush that have accumulated there.
4) In discussions of recovery, it is also critical to acknowledge the issues of social justice and community. It is essential to incorporate these issues and the relevant residents into developing and actualizing the recovery program.
5) Wildfire mitigation efforts need to incorporate landscape scale planning in order to increase fire resilience.
6) First responders need the resources to develop contingency plans that can anticipate a wide range of potential destructive events.

City governments and planning divisions should consider the extent to which it is advisable to encourage building back better via incentives or through zoning requirements.

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