



Fast and Furious: Fires in California



From the news and my conversations with relatives in California, the fires there seem to be getting worse. I wanted to dig deeper: What story does the data tell?

Questions

1. Are the fires getting worse over time in terms of acres burned, dollar damage, and number of fires?
2. Are acres burned and dollar damage distributed uniformly over the state, or are they clustered in some areas?
3. Are the causes of acres burned and dollar damage distributed similarly?

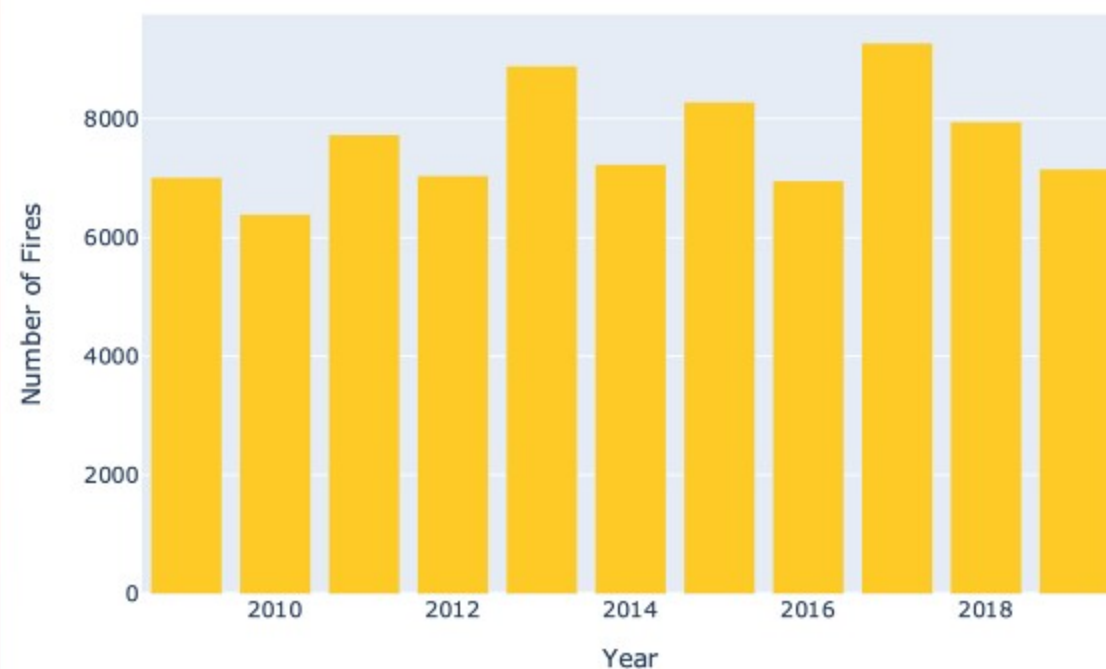
Hypotheses

1. Fires are getting worse over time. There will be an upward trend in acres burned, dollar damage, and number of fires over the years.
2. Acres burned and dollar damage will be proportional to the size of the county but will otherwise be distributed uniformly over the state.
3. Distribution of causes of acres burned and dollar damage will be similar.

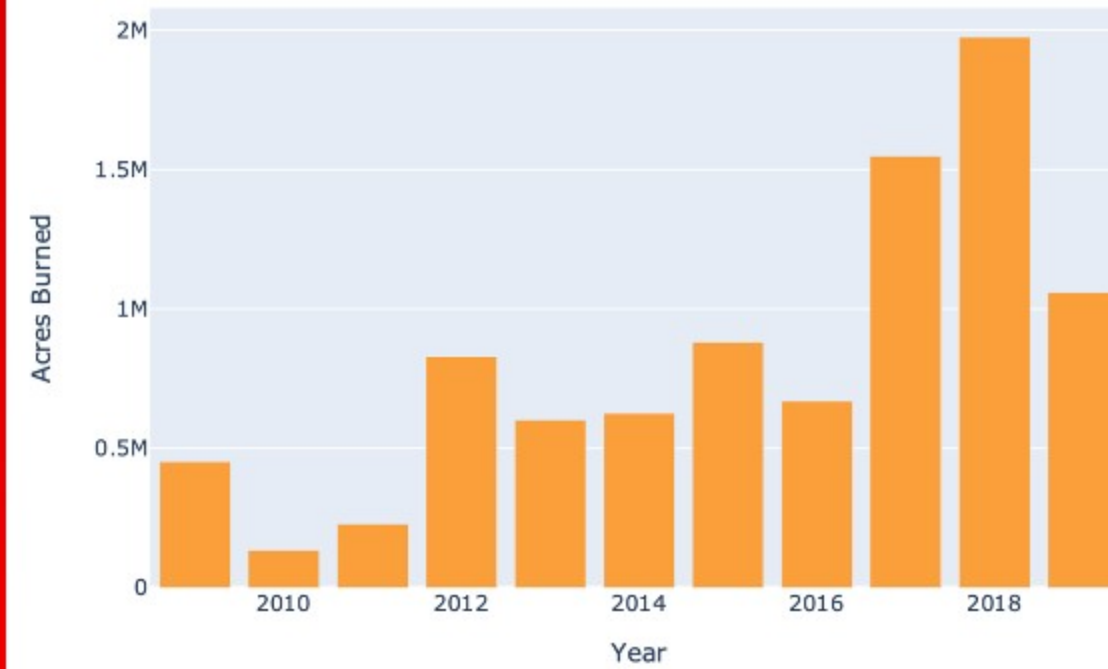
Data Collection

Data on acres burned, dollar damage, and number of fires by year, cause, and county was taken from CAL Fire Redbooks (<https://www.fire.ca.gov/stats-events/>) for the years 2009-2019. This data *only* includes fires in CAL Fire's direct protection area.

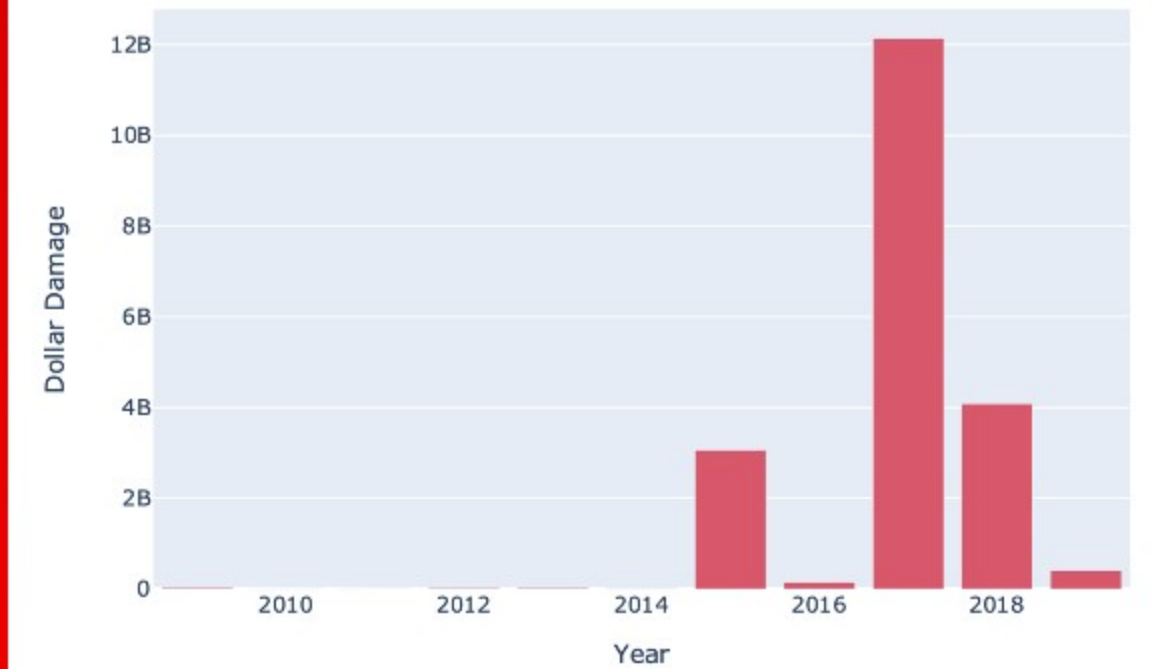
Number of Fires Over the Years



Acres Burned Over the Years

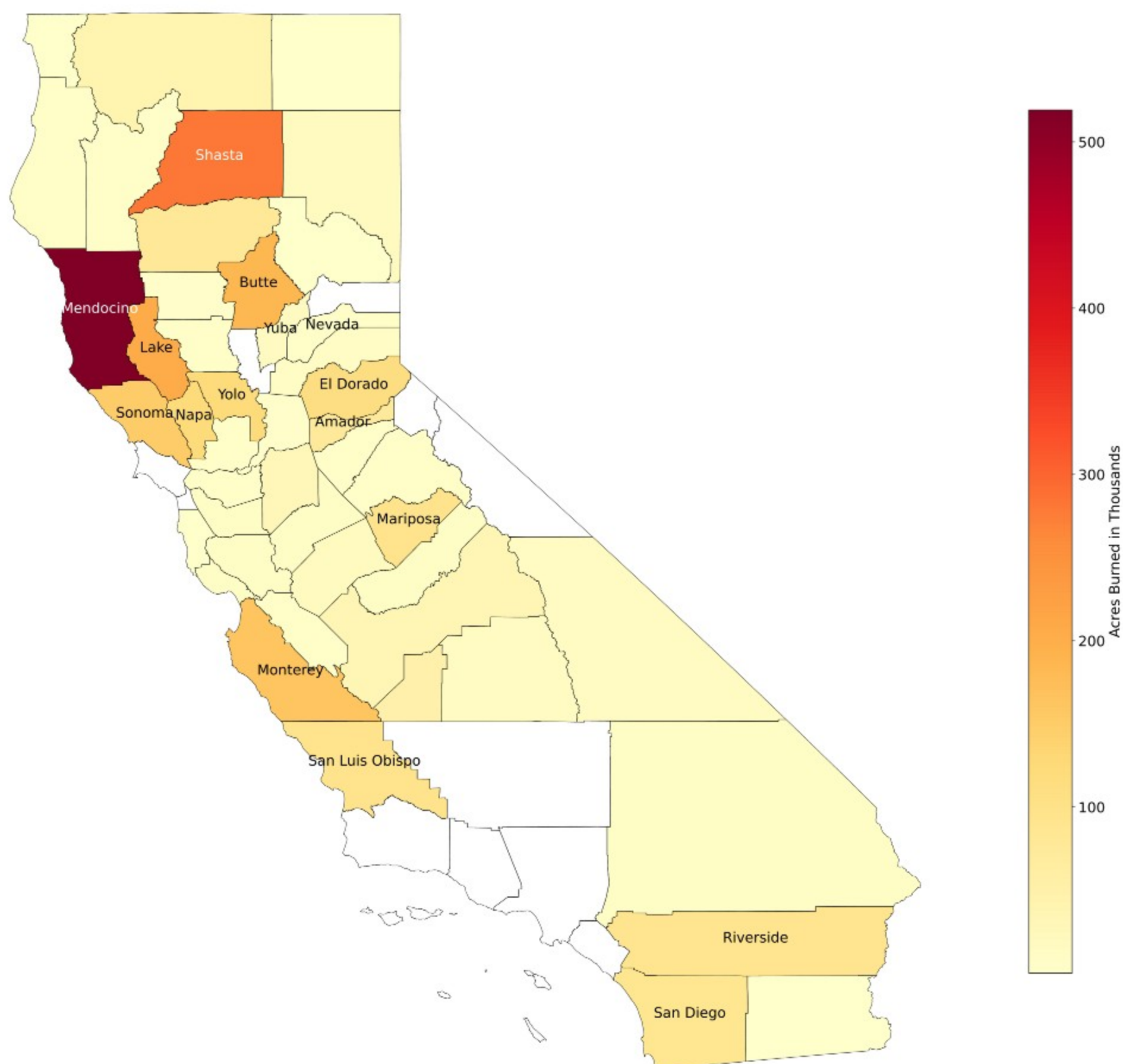


Dollar Damage Over the Years

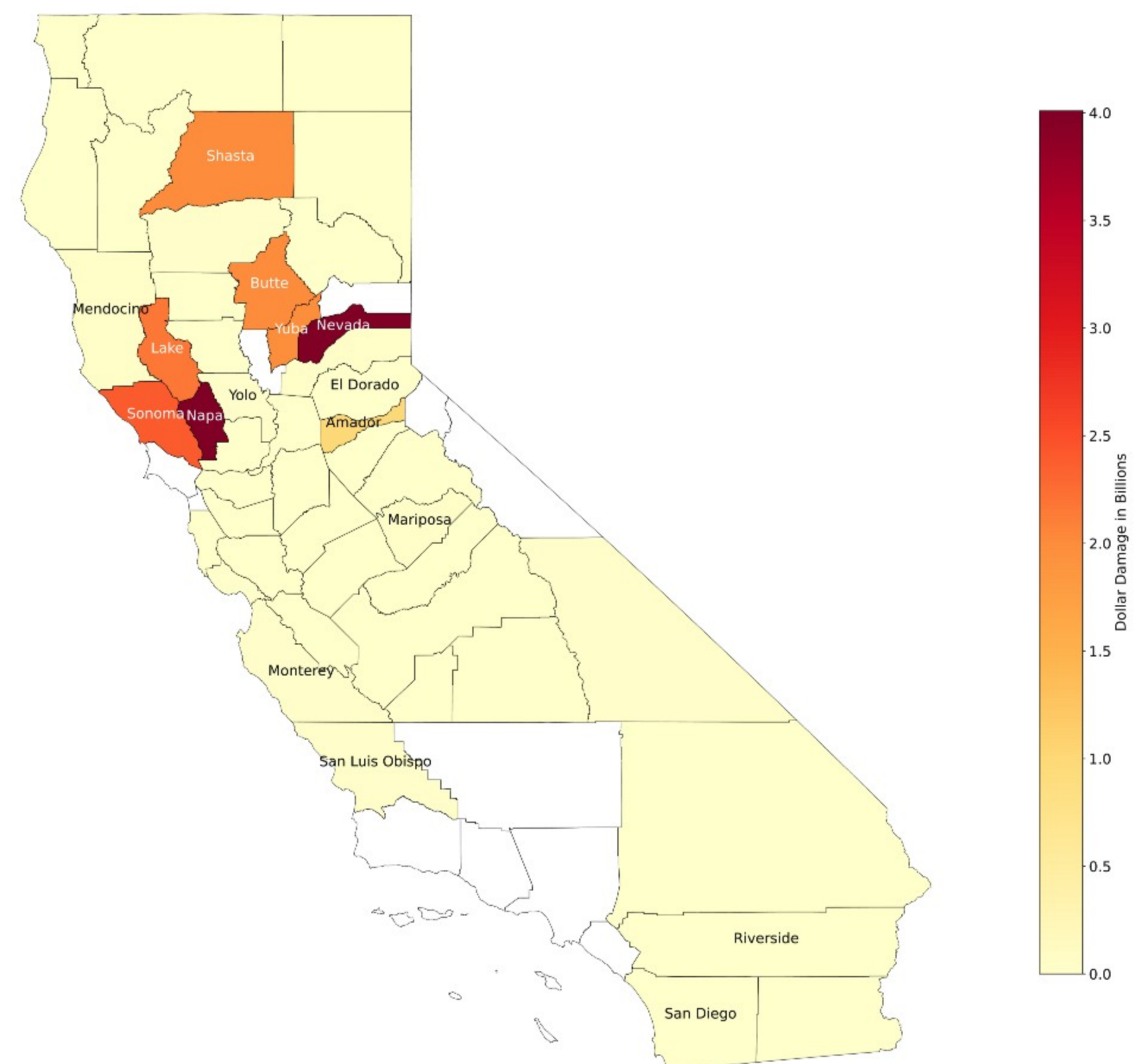


The three bar charts above show the trend of number of fires (left), acres burned (center), and dollar damage (right) over the years. Interestingly, the number of fires has stayed about the same while the dollar damage and acres burned have increased. This means that an individual fire, on average, burns more acres and causes more dollar damage in recent years. Another thing to note is that dollar damage and acres burned didn't reach their maximum in the same year: dollar damage was the highest in 2017, whereas acres burned was the highest in 2018.

Acres Burned by County (2009-2019)

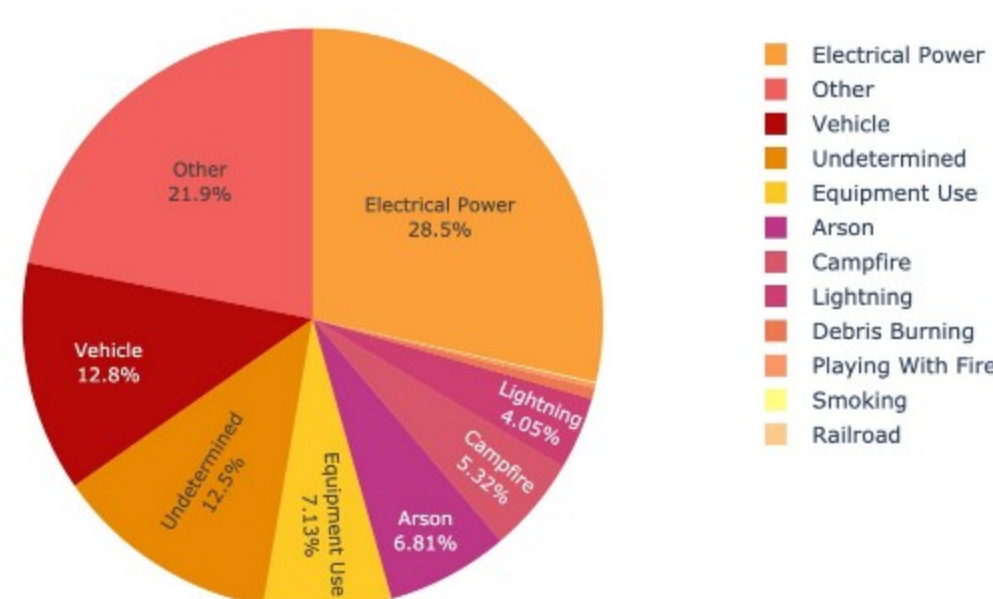


Dollar Damage by County (2009-2019)



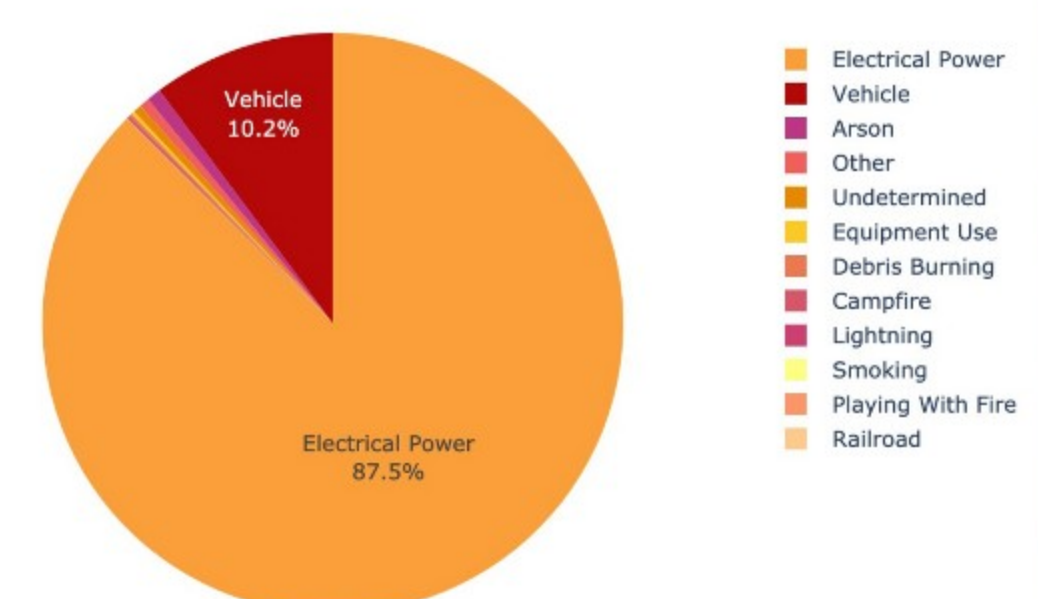
The two maps above show the distribution of acres burned (left) and dollar damage (right) by county. The impact of fires seems to be concentrated in a few counties. Some specific counties significantly impacted include Butte, Lake, Mendocino, Napa, Nevada, Shasta, and Sonoma. Additionally, there is some correlation between dollar damage and acres burned, but there are some differences as well. For example, Mendocino has a lot of acres burned but it doesn't have a proportionally higher dollar damage. Note that the counties in white are outside of CAL Fire's direct protection area.

Causes of Acres Burned (2009-2019)



The two pie charts show the distribution of causes of acres burned (left) and dollar damage (right). We can see that there is a major difference between the distribution of causes between dollar damage and acres burned. For example, electrical power causes more than 85% of the dollar damage while it accounts for less than 30% in acres burned.

Causes of Dollar Damage (2009-2019)



Conclusion

1. **Hypothesis #1 is partially supported.** The bar charts show that dollar damage and acres burned are increasing over time, but the number of fires is staying about the same. The data doesn't tell us about the causes behind these trends, but we can speculate that it may be due to climate change. Hotter and drier climate will lead to more acres burned and increased dollar damage for the same number of fires.
 2. **Hypothesis #2 is not supported.** As we can see in the maps, in northern California, acres burned and dollar damage are clustered in a few counties. We cannot draw a similar conclusion for southern counties since many counties there are outside of CAL Fire's direct protection area.
 3. **Hypothesis #3 is not supported.** As shown in the pie charts, electrical power causes over 85% of dollar damage while in acres burned it causes less than 30%. This is a major difference.
- The results above suggest some strategies for reducing the impact of fires. More resources should be given to protect severely impacted counties and to address major causes such as electrical power.

