# Investigating California Wildfires - Prediction and Prevention

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DSC 170 Fall 2020

# Introduction

Wildfires In California Will 'Continue To Get Worse,' Climate Change Experts Explore Why

*Why Does California Have So Many Wildfires?*


**California catches a break from worst-ever year for wildfires with cooler weather, but the threat remains**

Chris Woodyard USA TODAY

**California fires: Five reasons why this year is so bad**

So far, 2.3 million acres have burned, surpassing old record with two months left in fire season

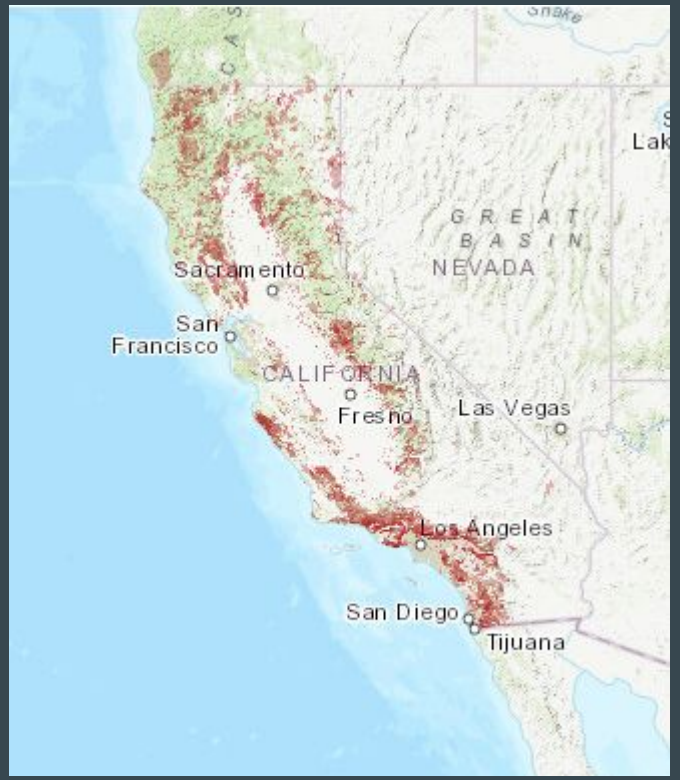
# Problem Statement / Significance

- What factors contribute to wildfires, and can we analyze these factors before an incident to find high risk areas for wildfires and take the necessary precautions?
- Business Case
  - Resource Allocation
  - Financial Implication
    - 2020 California wildfire damages estimated at $20B
      - Property Damage
      - Health Care Bills
      - Reverse Tourism

# Analysis

# Investigating Past Wildfire Locations

- tried to get a historical sense of wildfires with previous locations + geoenrichment
- through correlation analysis, a lot of the features we expected to highly correlate did not correlate well at all



# Analysis Plan

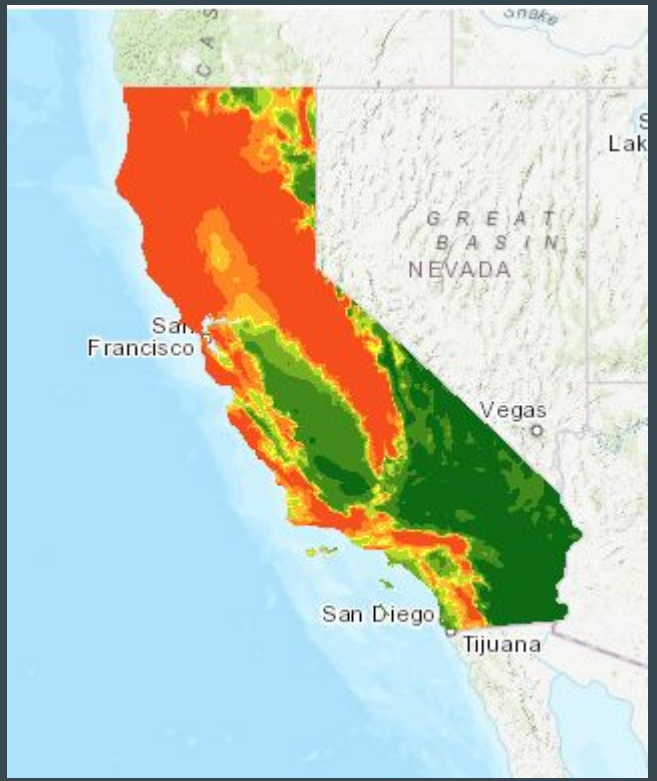
- Suitability Model

- Fire Station Optimization

# 1. Suitability Model - Areas With Highest Wildfire Risk

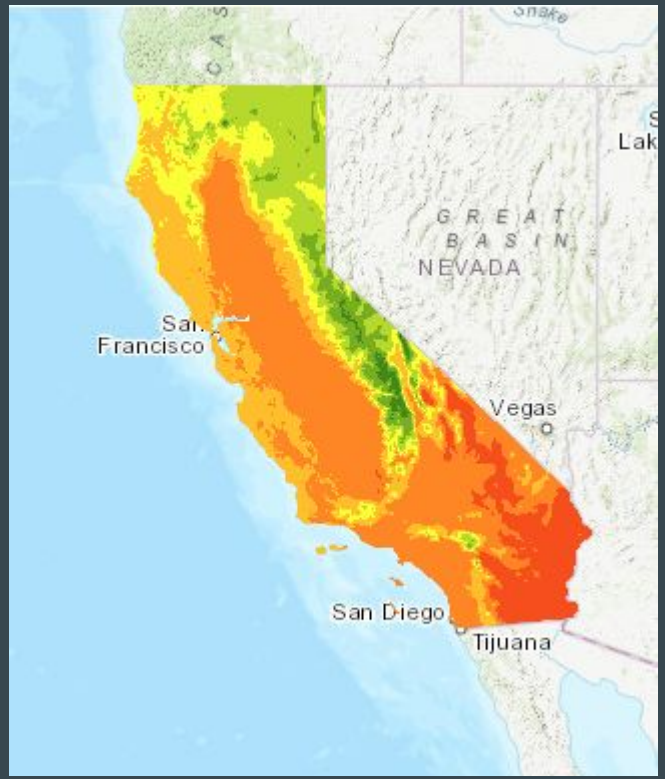
# Input 1 : Rainfall

- used as an indication of soil moisture
- assumption - soil moisture → more plants
- final raster weight: 10%



# Input 2 : Temperature

- temperature drives humidity
- although humidity drives growth of vegetation, we've also seen that more arid areas promote wildfire growth
- final raster weight: 10%

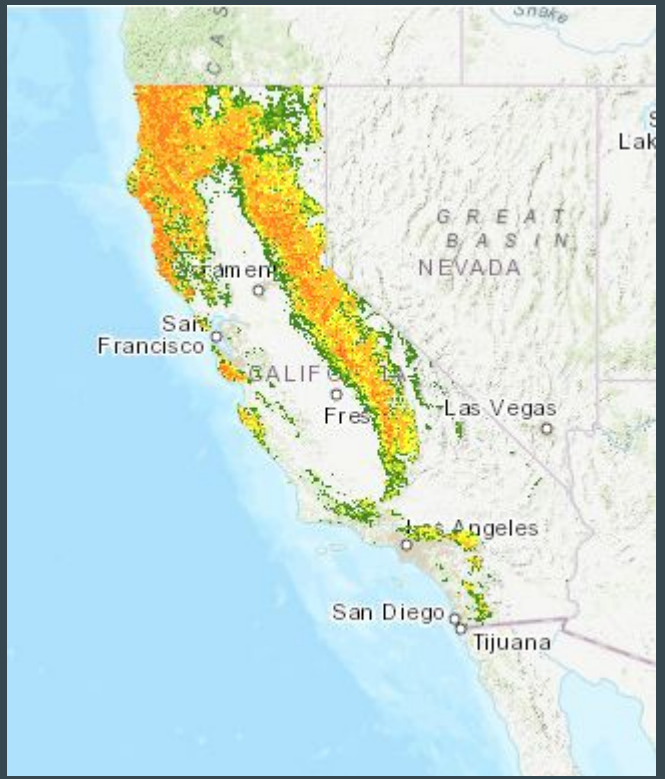


# Input 3 : Biomass

- higher biomass → more trees → fires

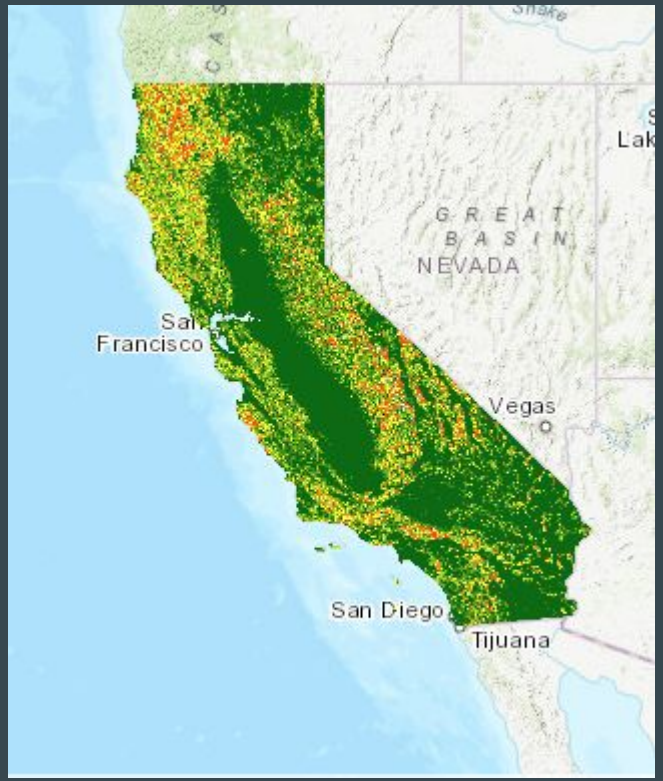
  can spread easier

- final raster weight: 60%



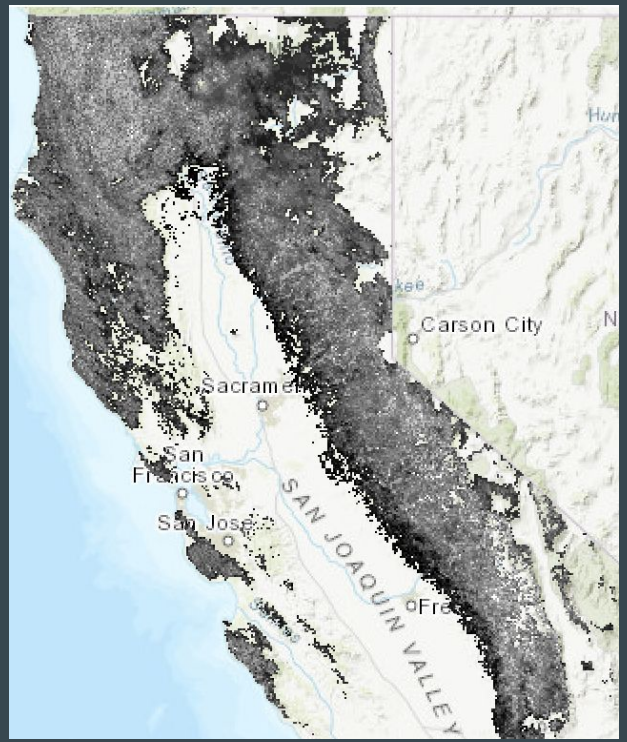
# Input 4 : Slope

- “Typically, wildfires burn up a slope faster and more intensely than along flat ground. The steeper the slope the longer the flame lengths and faster-moving the fire.” - RedZone
- final raster weight: 20%



# Suitability Model - Results

- Darker areas indicate more susceptibility to wildfires
- Areas with most susceptibility generally reside inside National Parks
- Areas with little susceptibility reside inside San Joaquin Valley (farmland)



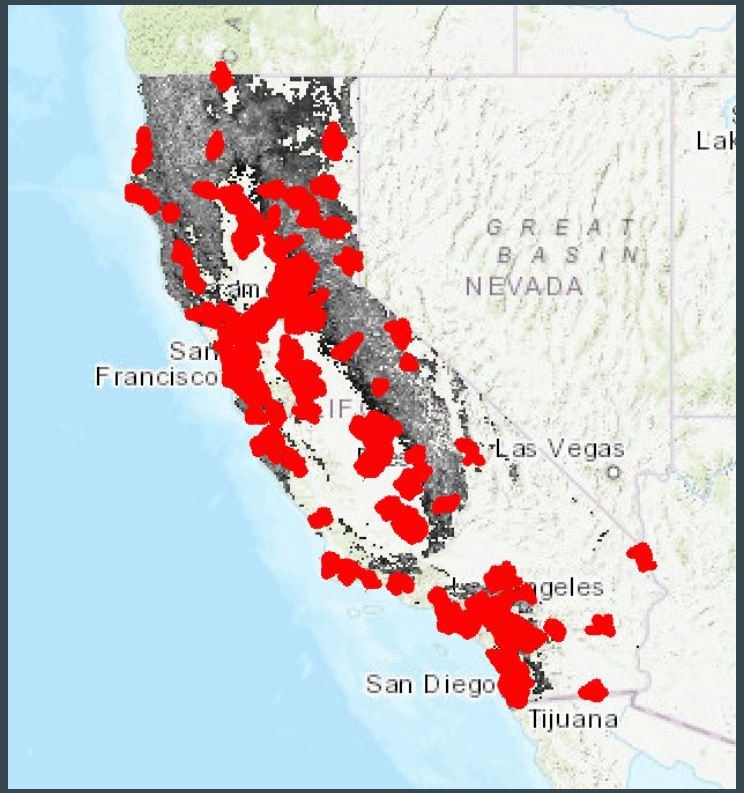
# 2. Optimizing Fire Station Locations

# Visualizing Fire Station Locations

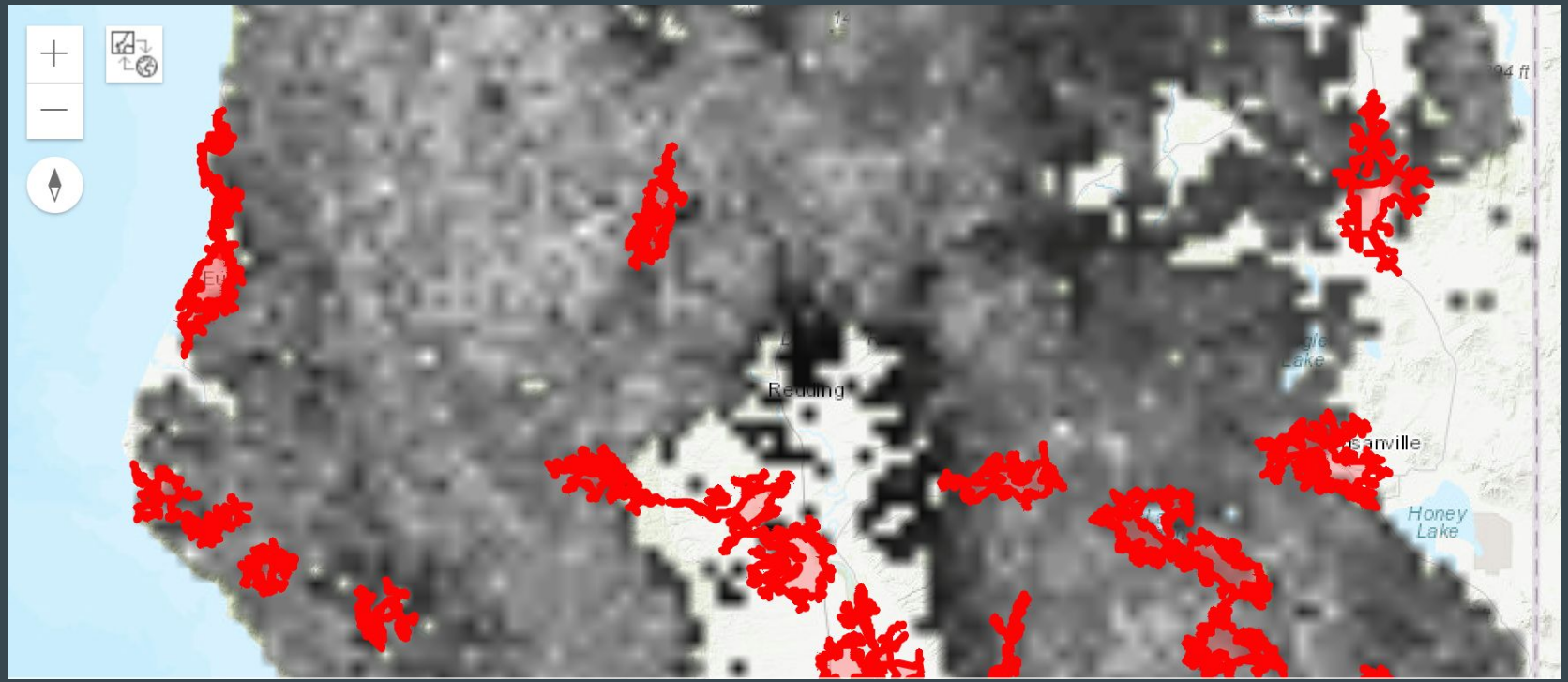
- Produced 15 minute drive time buffers for 200 random fire stations in CA

Takeaway:

- Fire stations *seem* to be reflective of general population



# Closer View

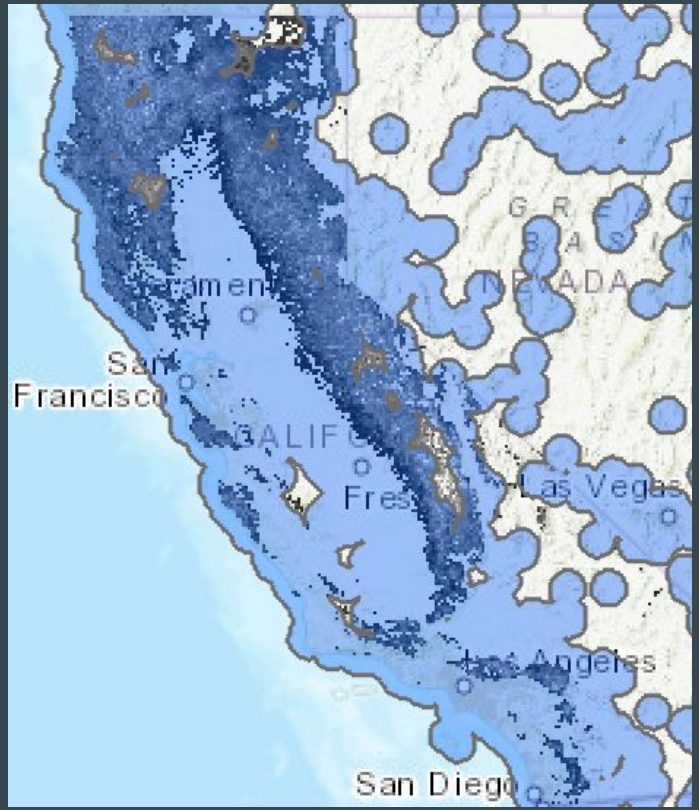


# Visualizing Fire Station Locations

- Produced 15 mile buffers for all fire stations in CA

Takeaway:

- Some mildly susceptible areas are not fully covered!

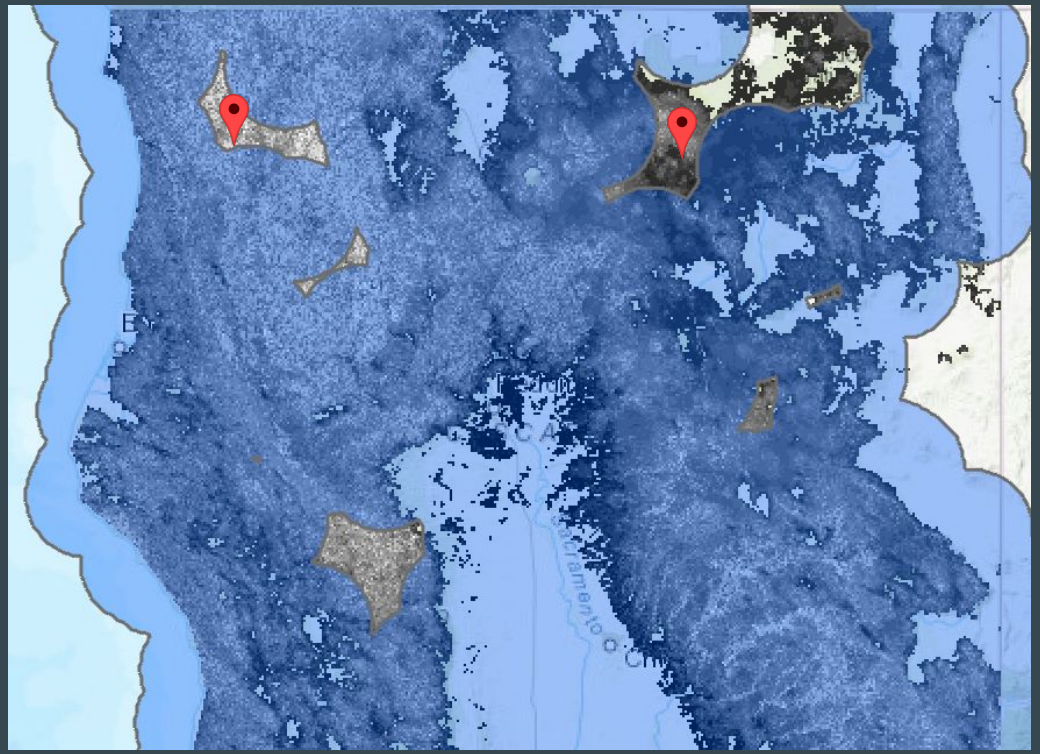


# Finding Underserviced Areas

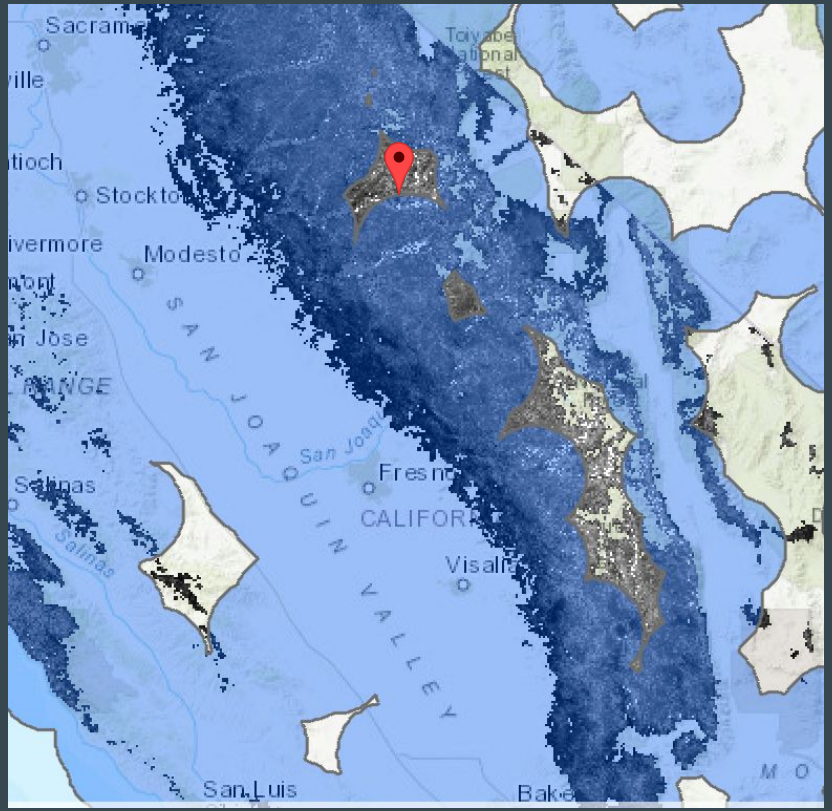
- Recommend prospective locations
  - Fire stations
  - Supply Depots

- Goal: Have fire stations within a 15 mile radius of susceptible locations

# Example: Klamath National Forest & Modoc National Forest



# Example: Stanislaus National Forest



# Next Steps

1. Include wind speed raster → one of the most crucial aspects of wildfire intensity

2. Perform location allocation of fire stations / supply depots

3. Consider metrics for assessing how effective these prospective fire stations will be in mitigating and preventing wildfires

# Thank you for listening!
# Questions?