Air and Fire: A study of California

Project 1 Team
Jagjeet, Jon, Robert, and Alex

The Questions Asked….

- Comparing national fire data with California fire data
- Comparing California fire data with California air quality data
- Looking at the correlation of counties with the worst air quality and fires
- Projecting fires into the future

Data Collection Methods and creation of our Datasets

Fire Data

To obtain the fire data, we used a previously untaught method of SQLlite.

Air Quality

Used Kaggle to pull data using BigQuery, a Google product that is a serverless data warehouse.

Fire Data Exporter

In [2]:
```
import pandas as pd
import sqlite3
```

In [7]:
```
#Read the SQL Data
con = sqlite3.connect("../Resources/FPA_FOD_20170508.sqlite")
fire_data = pd.read_sql_query("SELECT OBJECTID, FOD_ID, FPA_ID, FIRE_YEAR, FIPS_NAME, COMPLEX_NAME,
print(fire_data)
con.close()
```

```
         OBJECTID     FOD_ID            FPA_ID  FIRE_YEAR  FIPS_NAME  \
0               1          1        FS-1418826       2005     Plumas
1               2          2        FS-1418827       2004     Placer
2               3          3        FS-1418835       2004  El Dorado
3               4          4        FS-1418845       2004     Alpine
4               5          5        FS-1418847       2004     Alpine
...           ...        ...               ...        ...        ...
1880460   1880461  300348363  2015CAIRS29019636       2015       None
1880461   1880462  300348373  2015CAIRS29217935       2015       None
1880462   1880463  300348375  2015CAIRS28364460       2015       None
1880463   1880464  300348377  2015CAIRS29218079       2015       None
1880464   1880465  300348399  2015CAIRS26733926       2015       None

        COMPLEX_NAME  FIRE_NAME  FIRE_SIZE  DISCOVERY_DATE  \
0               None   FOUNTAIN       0.10       2453403.5
1               None     PIGEON       0.25       2453137.5
2               None      SLACK       0.10       2453156.5
3               None       DEER       0.10       2453184.5
4               None   STEVENOT       0.10       2453184.5
```

```
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/) that gets preserved as output when you create a v
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of the current session
```

```
import pandas as pd
import numpy as np
from google.cloud import bigquery
from bq_helper import BigQueryHelper

bq_assistant = BigQueryHelper("bigquery-public-data", "epa_historical_air_quality")

QUERY = (
    'SELECT * FROM `bigquery-public-data.epa_historical_air_quality.pm25_frm_daily_summary` '
    'LIMIT 5')

#Estimate query size
query_size = bq_assistant.estimate_query_size(QUERY)
print(f"Query size is: {query_size:.2f}GB")
```

```
Using Kaggle's public dataset BigQuery integration.
Query size is: 1.80GB
```

+ Code + Markdown

Analysis

Fire Data:

- Total Acres Burned, and Number of Fires and Duration of Fire were used as measurement standards in our analysis

Air Quality

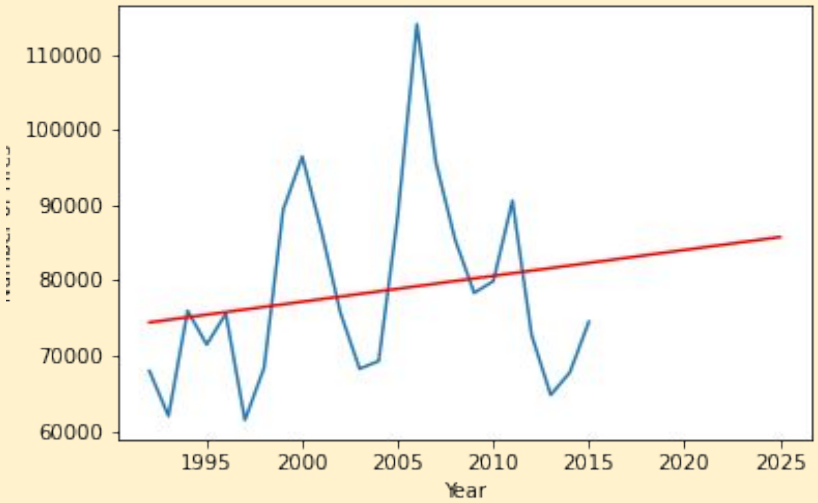
- PM 2.5 Max value for the year was captured

Limitations

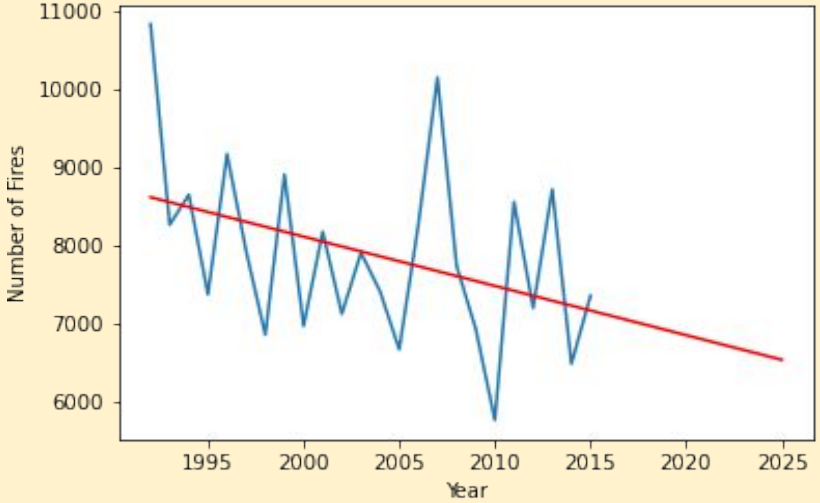
- No trending of causes
- Pollution: Cars/Buses/Planes do exist (we have to account for them but they are an unknown variable)
- Not all locations in California are air monitored

Fire Data- Total Number of Fires

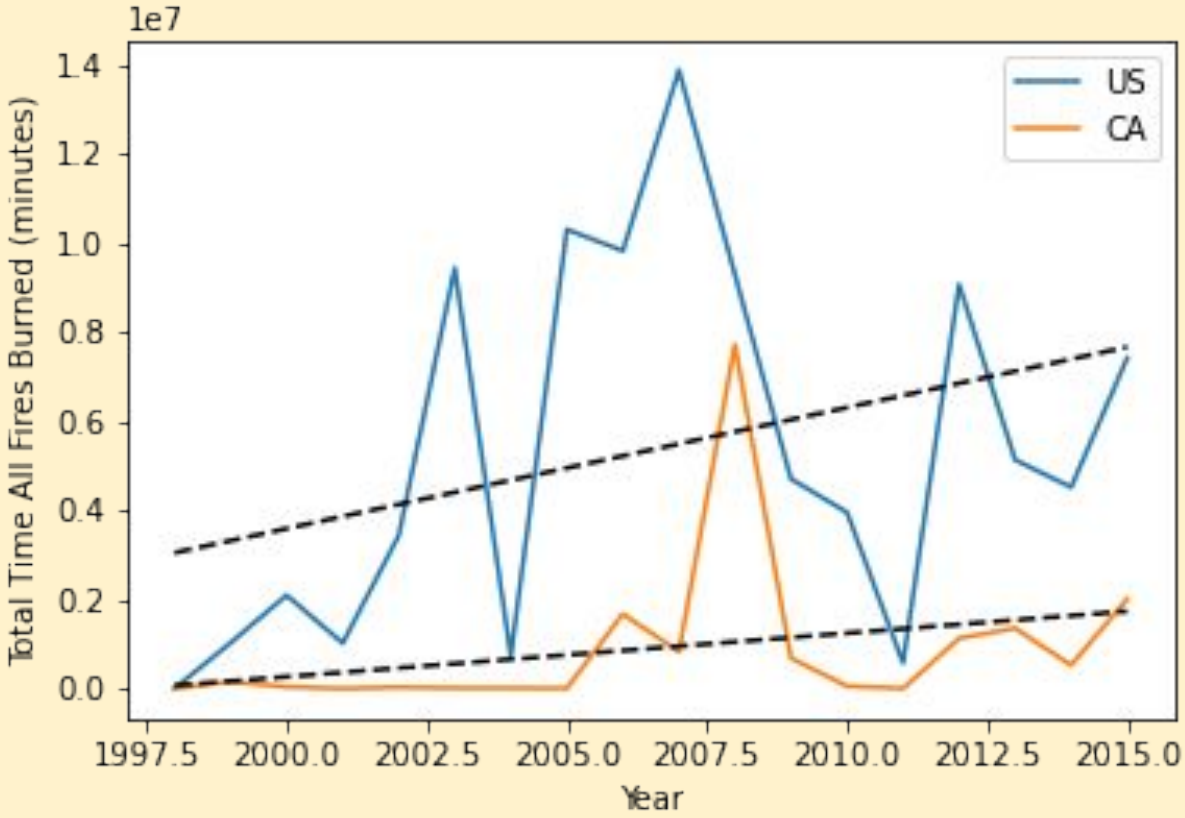
National



California

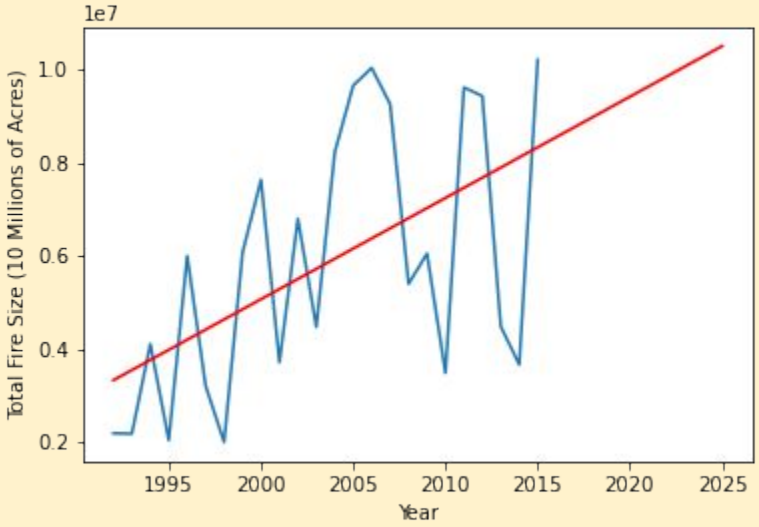


Total Fire Duration

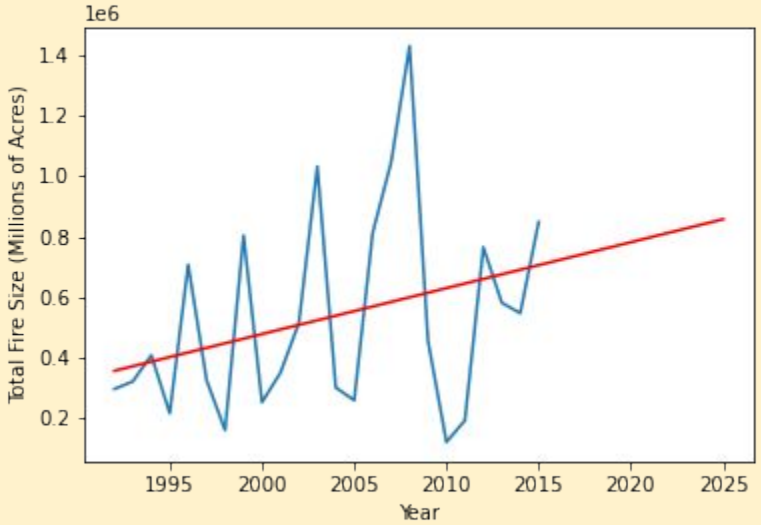


Fire Data- Total Fire Size (Acres)

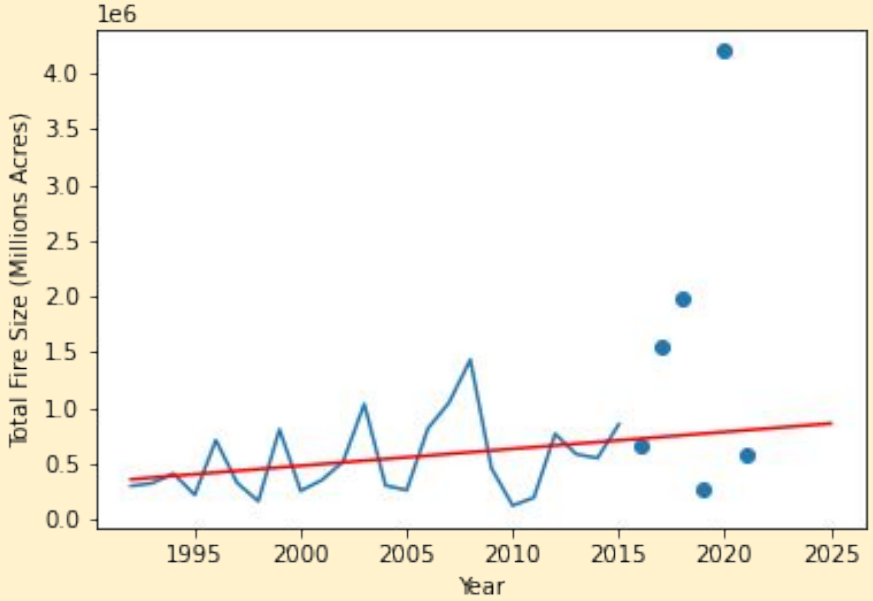
National



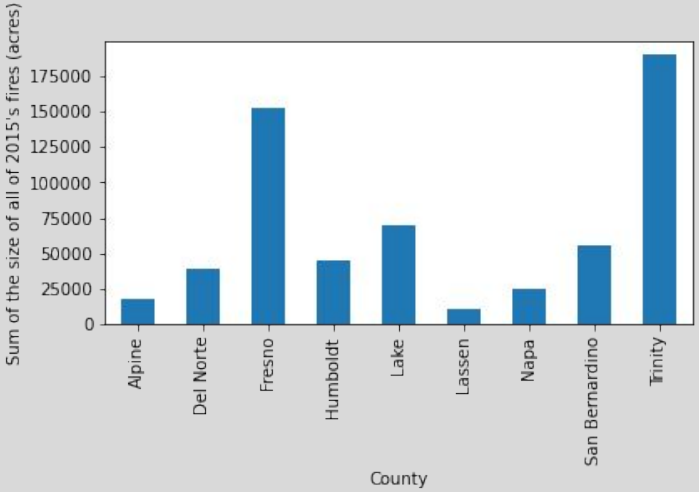
California



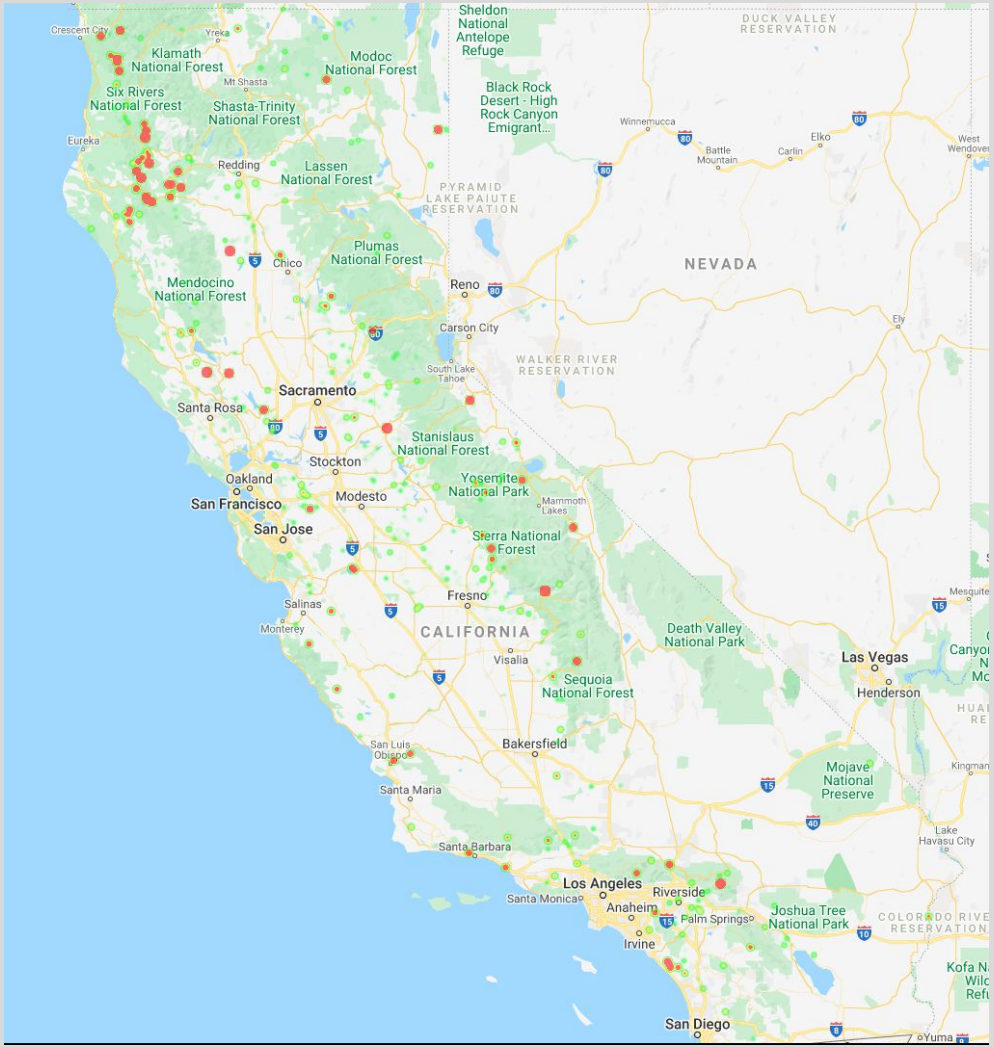
Fire Data- CA Total Fire Size (Acres)
Predicted vs Actual (CalFire)



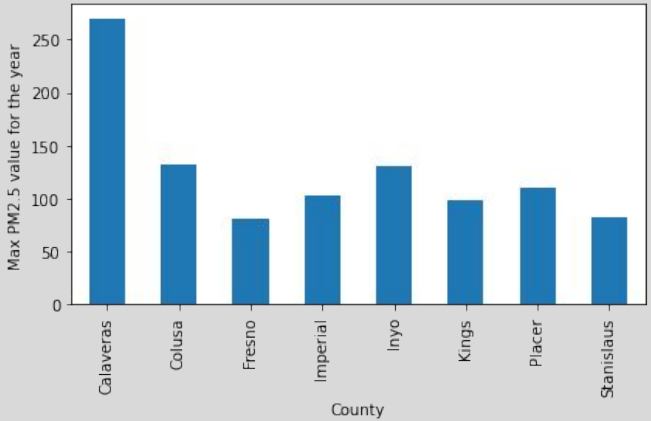
Fire Data



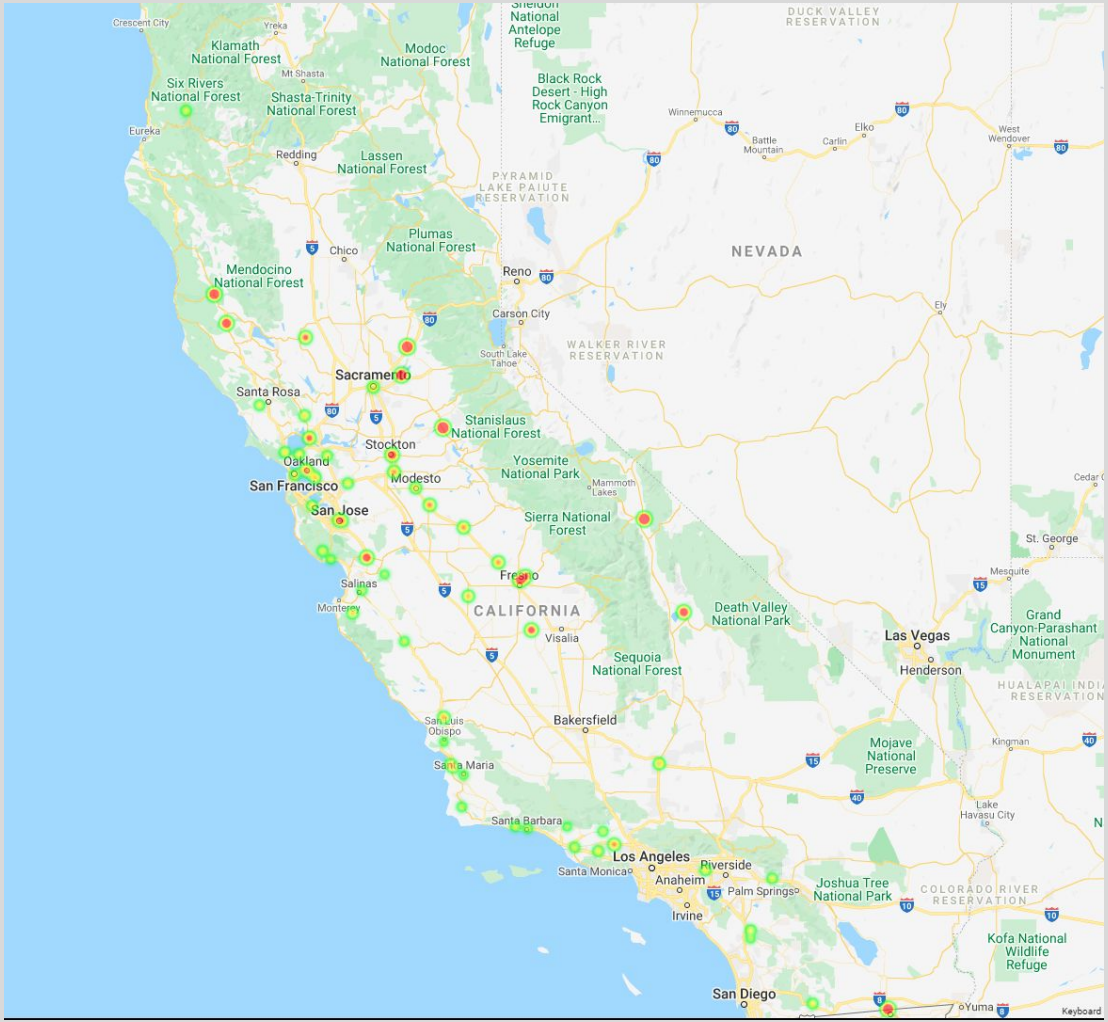
Heat map of fires in 2015 with the weight being based on the fire size (total acres burned)



Air Quality Data

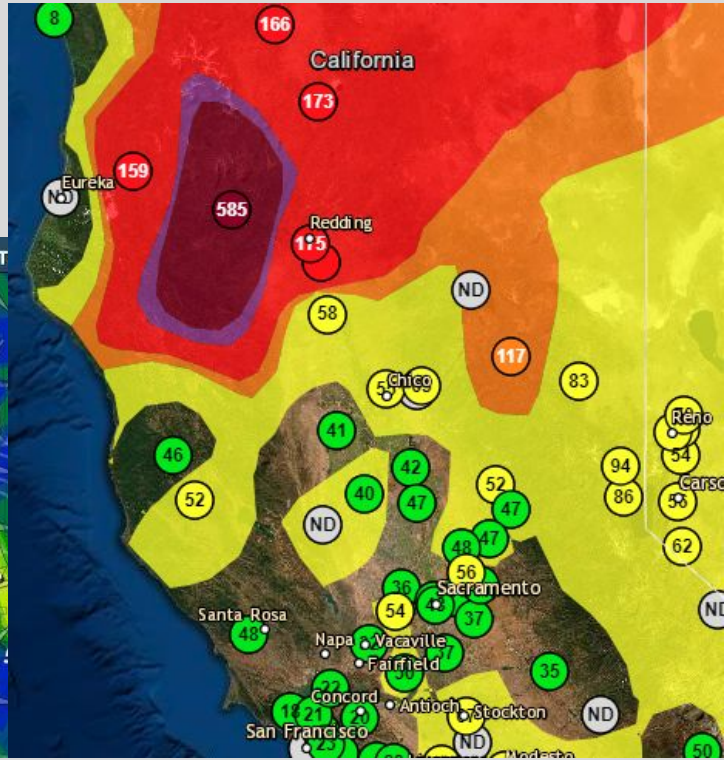


Map of max PM2.5 values for the year of 2015



Conclusion:What goes up in the air, must come down, but where is the question?

The data shows that while fires are concentrated in only a few counties (Fresno, Lake, San Bernardino, Trinity) the worst Air Quality numbers were in other counties (Calaveras, Placer, Inyo)

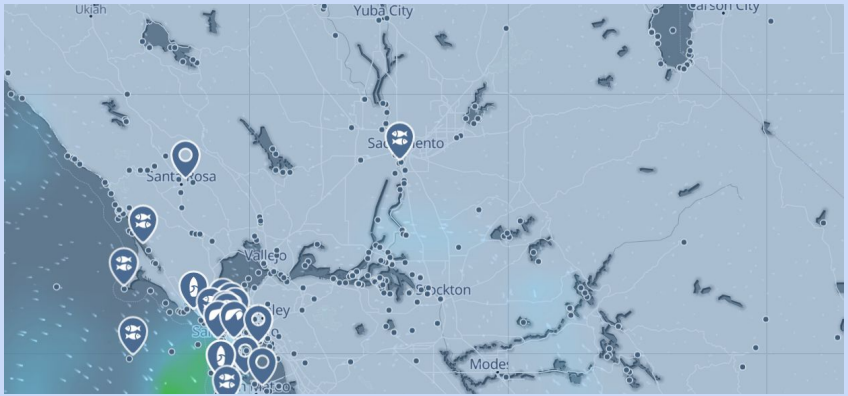


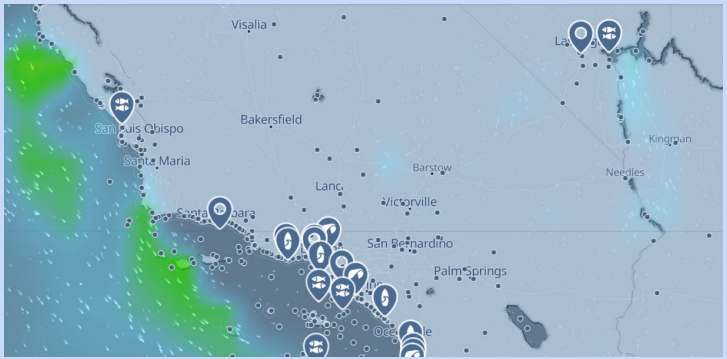
Conclusion:What goes up in the air, must come down, but where is the question?

Wind patterns throughout California when examined, play a major part in pushing smoke and ash in some cases hundreds of miles from where a fire takes place.

For example, Trade winds from San Francisco routinely push air debris into Stockton/Sacramento, and further into the Sierras.

Similarly, Wind patterns in Southern California push air debris from Los Angeles Northeast into San Bernardino, Lancaster, Bakersfield and Inyo County.





Questions?