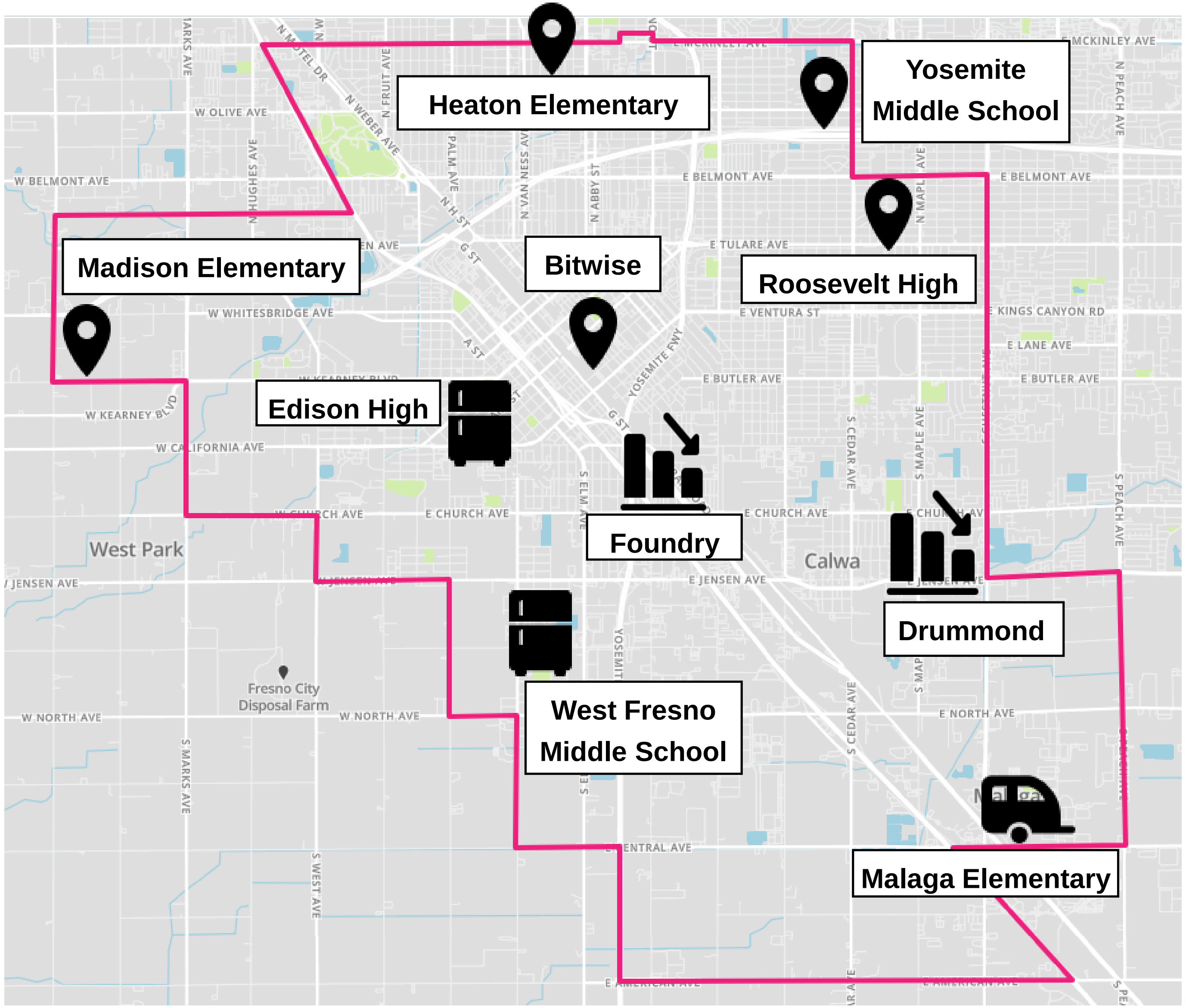
Update on South Central Fresno Community Air Monitoring

South Central Fresno CSC
November 30, 2022

CAMP Fully Deployed



Heaton Elementary
Yosemite Middle School
Madison Elementary
Bitwise
Roosevelt High
Edison High
Foundry
Drummond
West Fresno Middle School
Malaga Elementary
West Park
Calwa
Fresno City Disposal Farm
W BELMONT AVE
W OLIVE AVE
E BELMONT AVE
E TULARE AVE
E VENTURA ST
E KINGS CANYON RD
E LANE AVE
E BUTLER AVE
W WHITESBRIDGE AVE
W KEARNEY BLVD
W CALIFORNIA AVE
E CHURCH AVE
E JENSEN AVE
W NORTH AVE
E NORTH AVE
E MCKINLEY AVE
E AMERICAN AVE
YOSEMITE FWY
S CEDAR AVE
S MAPLE AVE
S PEACH AVE
S MARKS AVE
S WEST AVE
S ELM AVE
N PALM AVE
N VAN NESS AVE
N FRUIT AVE
N WEBER AVE
N HUGHES AVE

PM2.5 Monitor

Compact System: PM2.5, Black Carbon, Ozone, BTEX, NOx, VOC, CO (Edison), Toxics (Edison), SO2 (West Fresno)

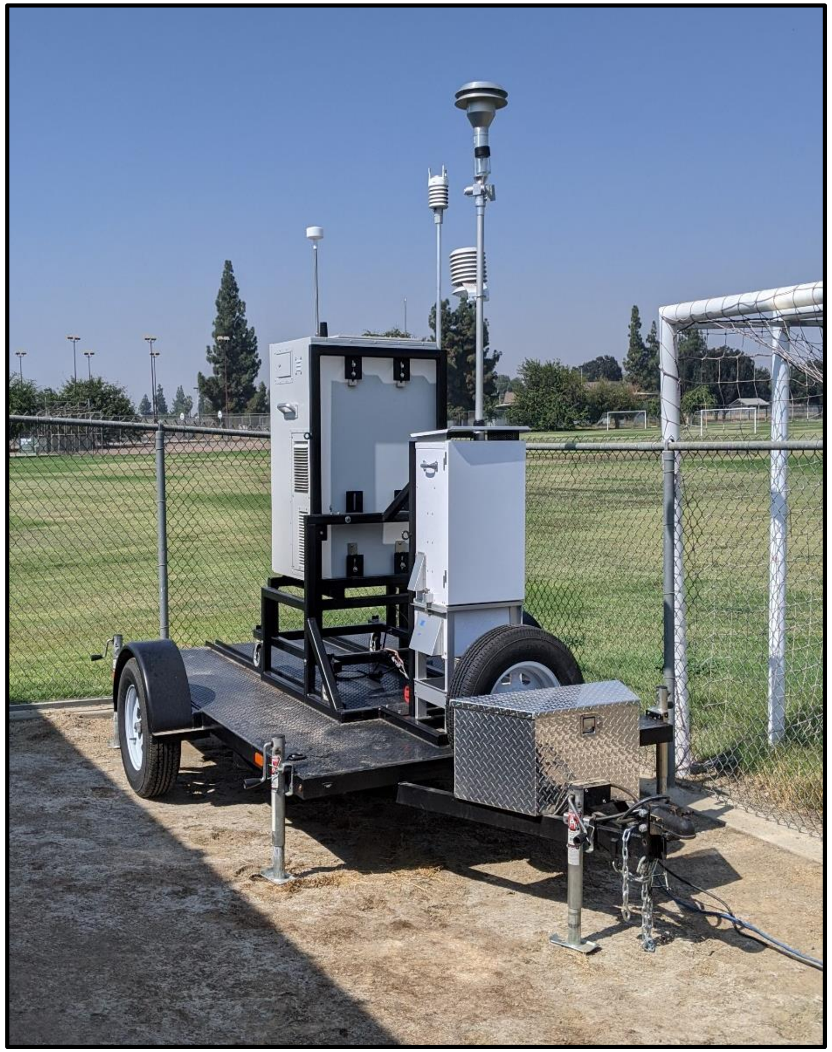
Regulatory Air Monitor: Foundry (PM2.5), Drummond (Ozone, NO2, PM10)

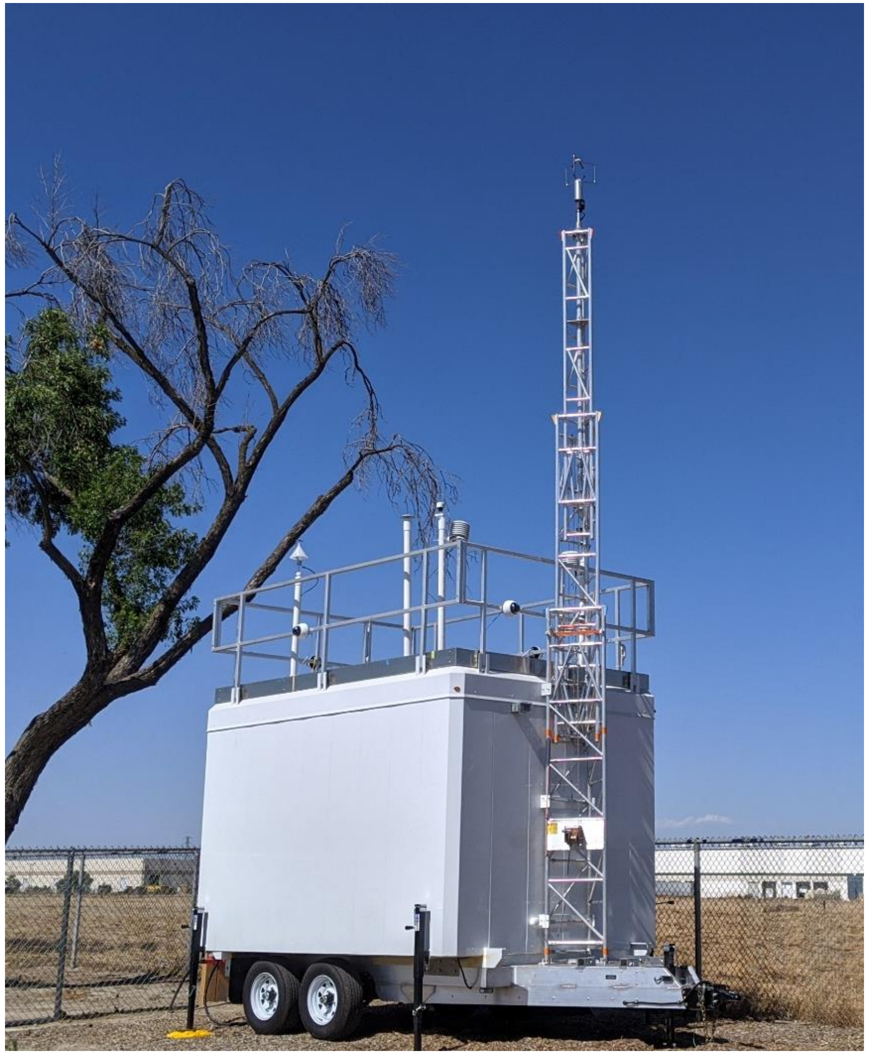
Trailer: PM2.5, Black Carbon, Ozone, CO, NO2/NO, H2S/SO2, BTEX

Mobile Monitoring Van: respond to community concern

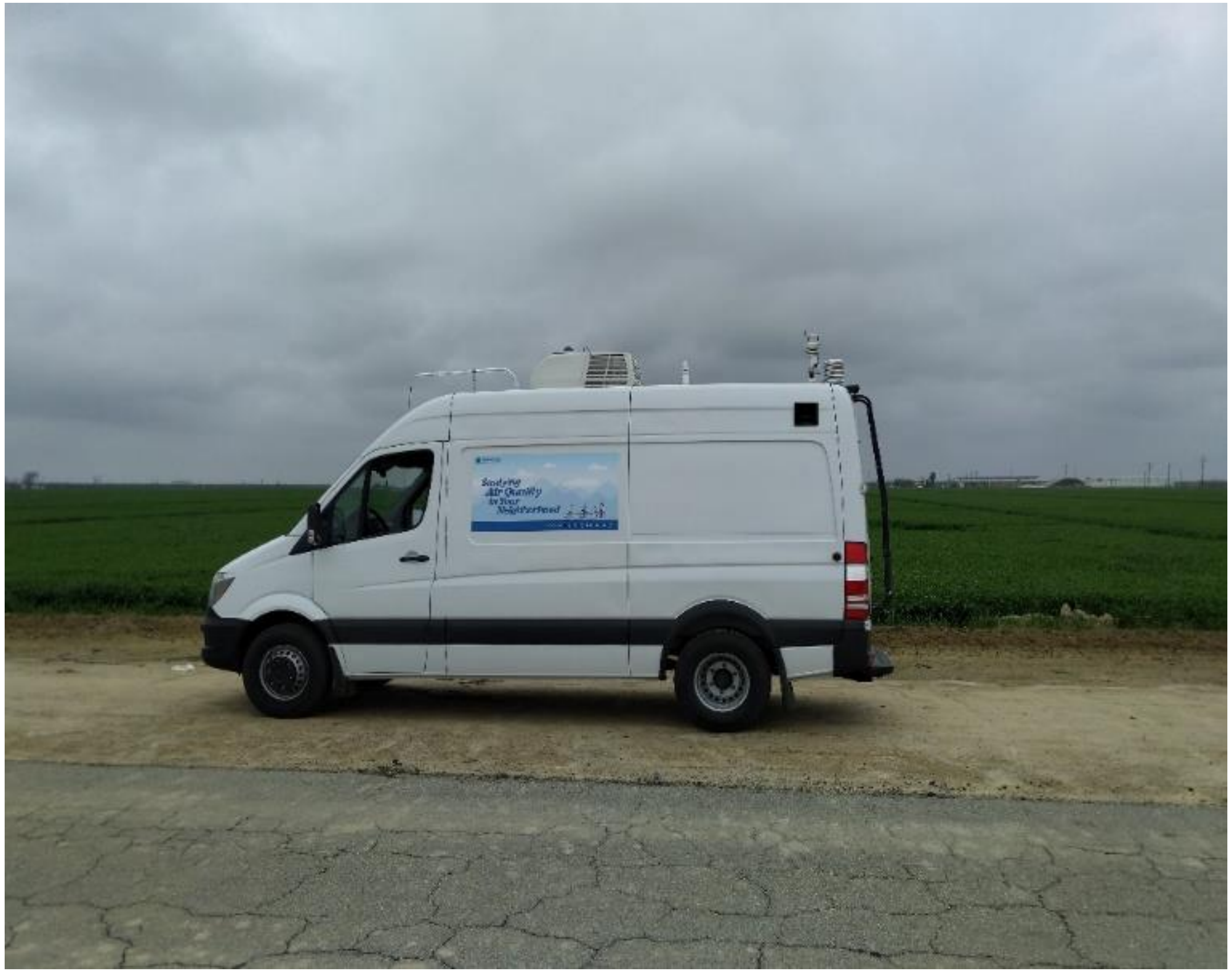
Community Air Monitoring Platforms

Community Air Monitoring Platforms (cont'd)





Community Air Monitoring Platforms (cont'd)


Studying
Air Quality
in Your
Neighborhood

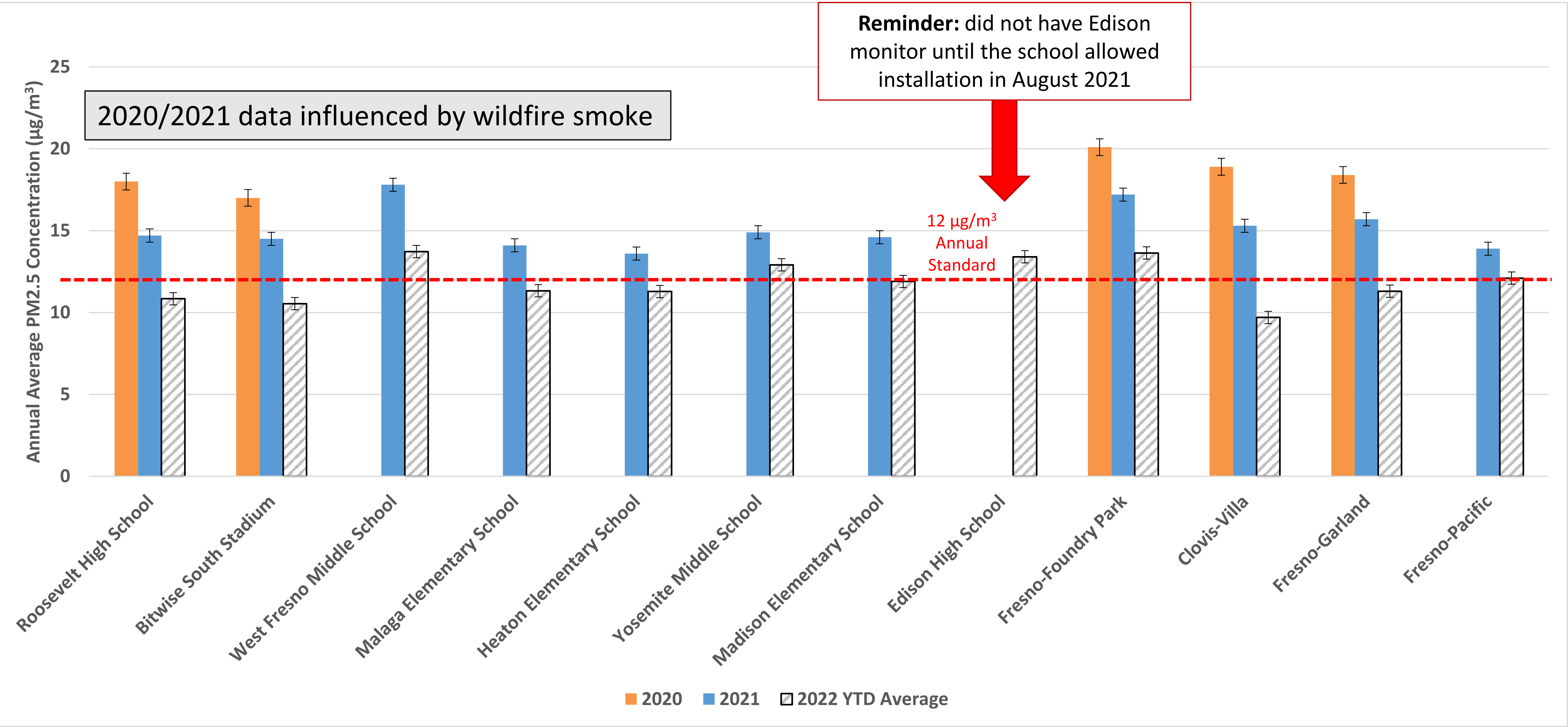
Ongoing Community Air Monitoring

- District continuing to conduct localized air monitoring in the South Central Fresno community
- Fully deployed air monitoring platforms across the community, according to Community Steering Committee recommended network design
- Air monitoring van actively being used to regularly monitor pollutants in areas of interest of the community
- Extensive PM2.5 and VOC speciation sampling and laboratory analysis being conducted since late 2019
- Continue to seek input from CSC for suggestions

CSC Comments from the July Meeting

Comments/Questions from July CSC	
1	Presentation of speciation data using chemical names and not using acronyms *(Updated in this presentation)*
2	Additional analysis of PM2.5 air monitoring data (e.g., number of days when the concentrations exceeded air quality standard, comparisons with regulatory monitoring data) *(Updated in this presentation)*
3	Is there a way to distinguish the contributions from different biomass burning sources? *(Can determine that PM2.5 emissions are from wood burning but cannot determine source, i.e. residential wood burning or wildfire)*
4	Do the air toxics threshold levels consider both adults and children? *(District coordinating with OEHHA and CARB to clarify)*
5	What pesticide monitoring is planned for community? *(There is an action item that states "The air district will bring the department of pesticide regulation into the conversation with the Community Steering Committee with regards to air quality monitoring.")*
6	Monitoring outside of the community, near N. Parkway Dr. and W. Olive Ave *(Checked with City of Fresno and no current renovation work at nearby motels; will monitor with van when/if construction takes place)*

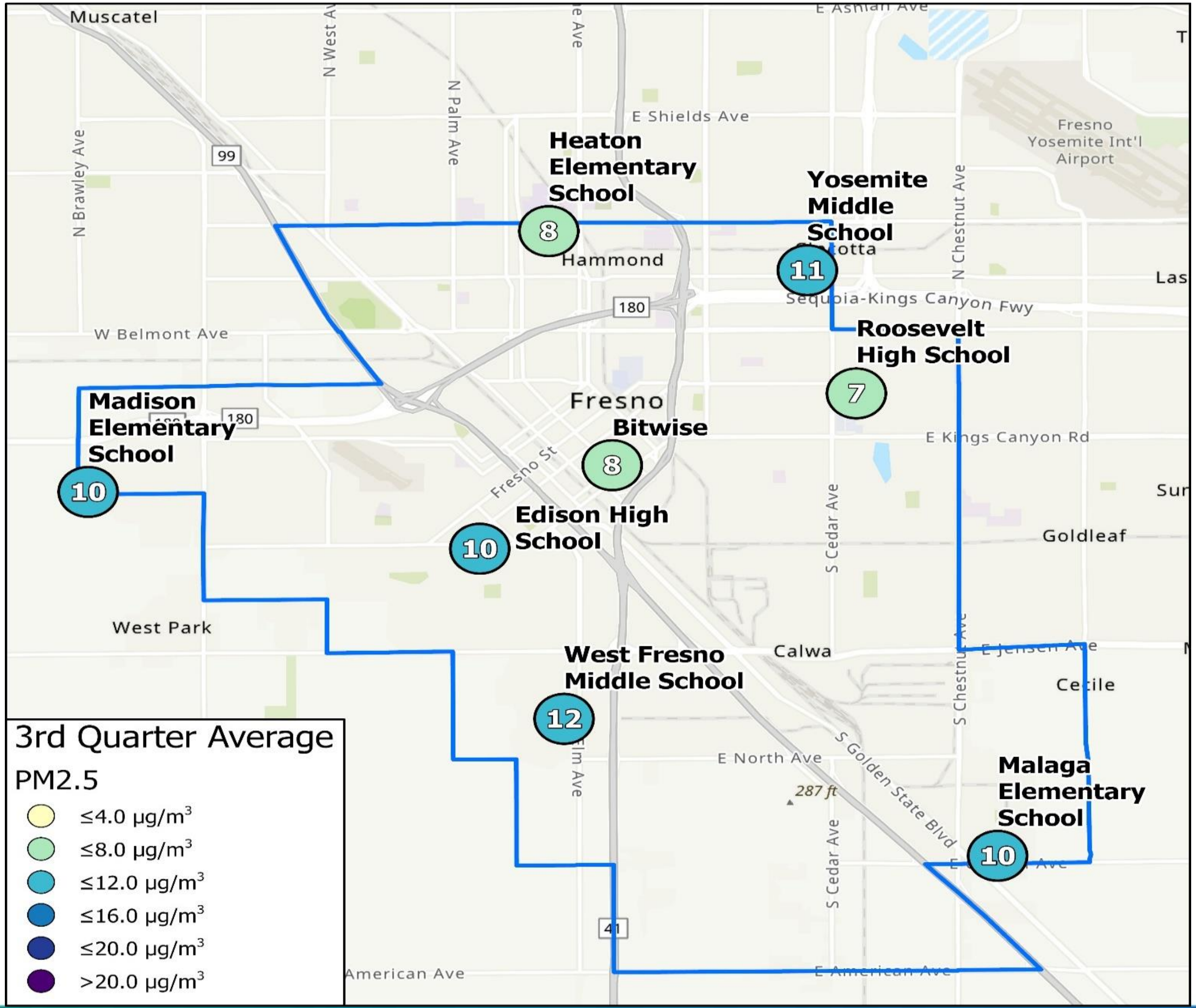
Annual Average PM2.5 Comparison



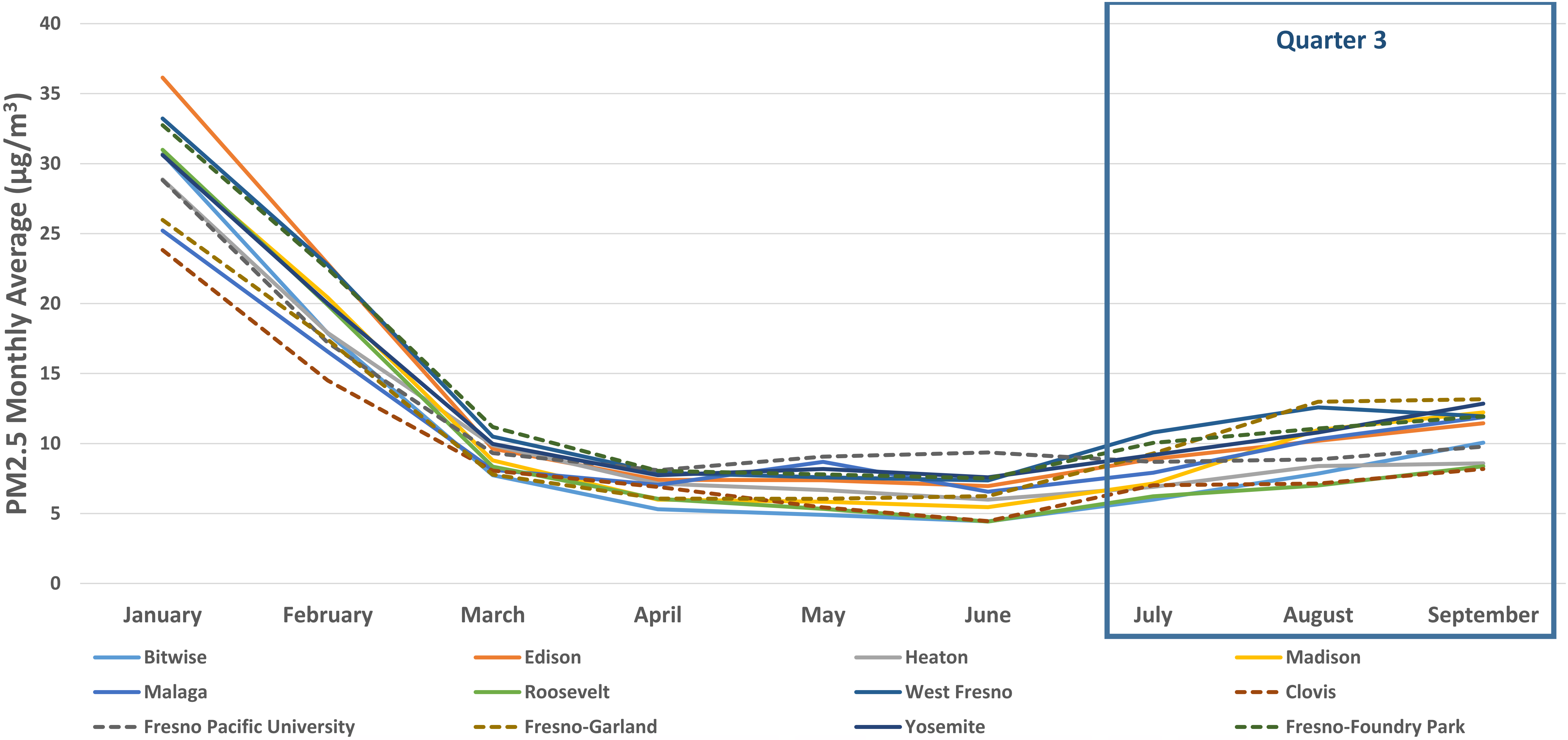
Reminder: did not have Edison monitor until the school allowed installation in August 2021

2020/2021 data influenced by wildfire smoke

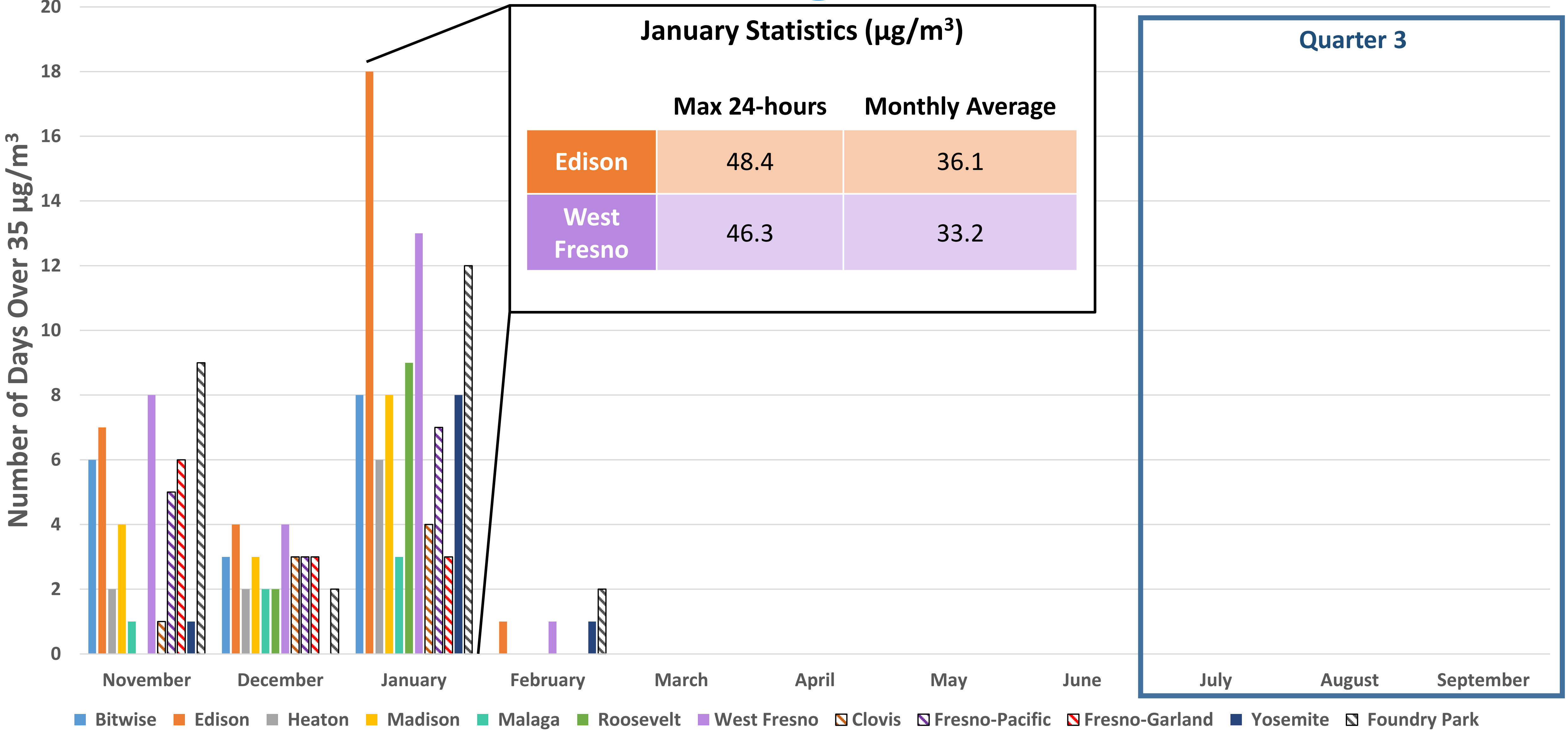
Third Quarter Average PM2.5


Heaton Elementary School
8
Yosemite Middle School
11
Roosevelt High School
7
Madison Elementary School
10
Fresno
Bitwise
8
Edison High School
10
West Fresno Middle School
12
Malaga Elementary School
10
Muscatel
Fresno Yosemite Int'l Airport
E Shields Ave
Hammond
Sequoia-Kings Canyon Fwy
W Belmont Ave
E Kings Canyon Rd
Goldleaf
West Park
Calwa
E Jensen Ave
Cecile
E North Ave
S Golden State Blvd
American Ave
E American Ave
N Brawley Ave
N West Ave
N Palm Ave
N Chestnut Ave
S Cedar Ave
Fresno St
99
180
41
287 ft
3rd Quarter Average
PM2.5
≤4.0 μg/m³
≤8.0 μg/m³
≤12.0 μg/m³
≤16.0 μg/m³
≤20.0 μg/m³
>20.0 μg/m³

PM2.5 Monthly Average



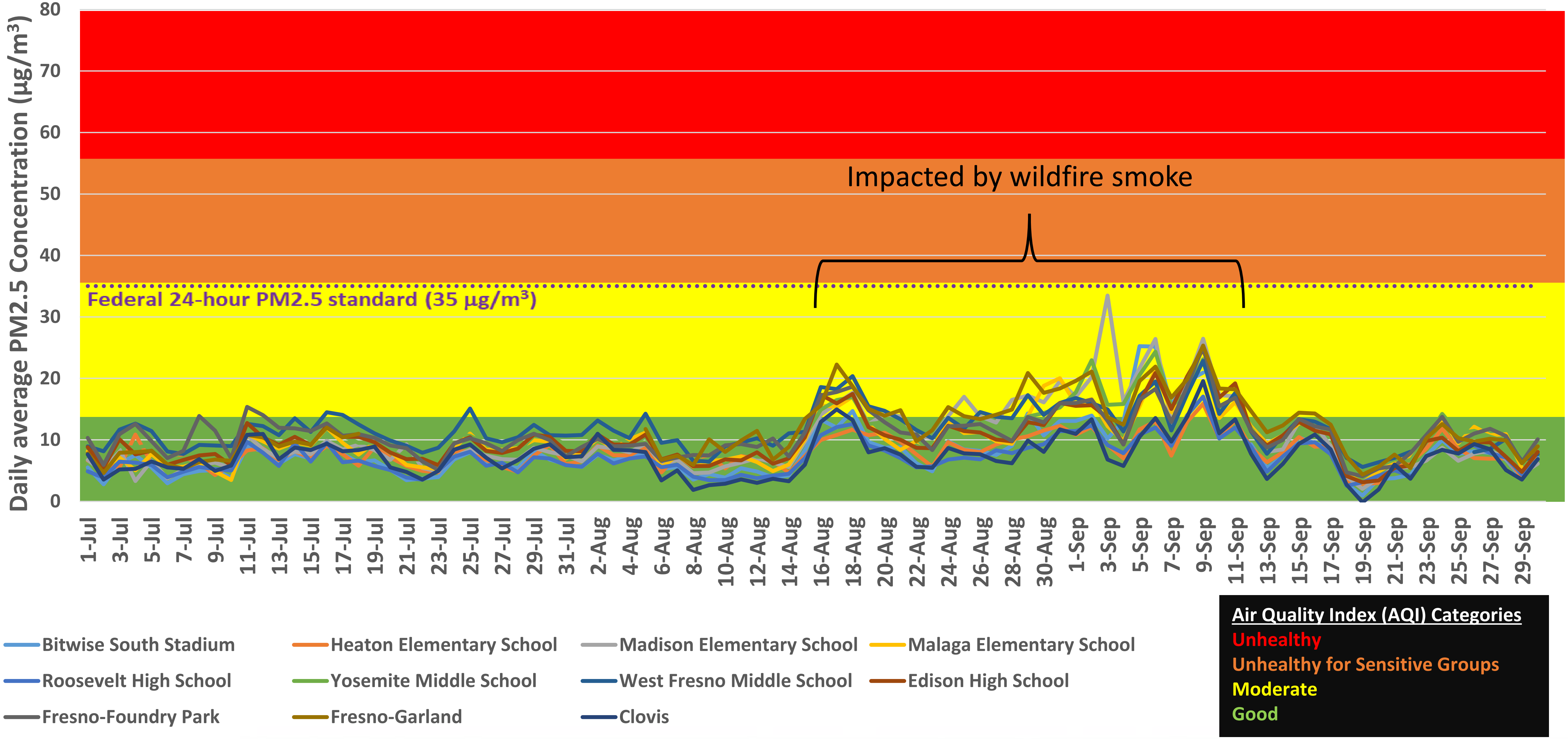
Number of Days Exceeding Daily PM2.5 Standard



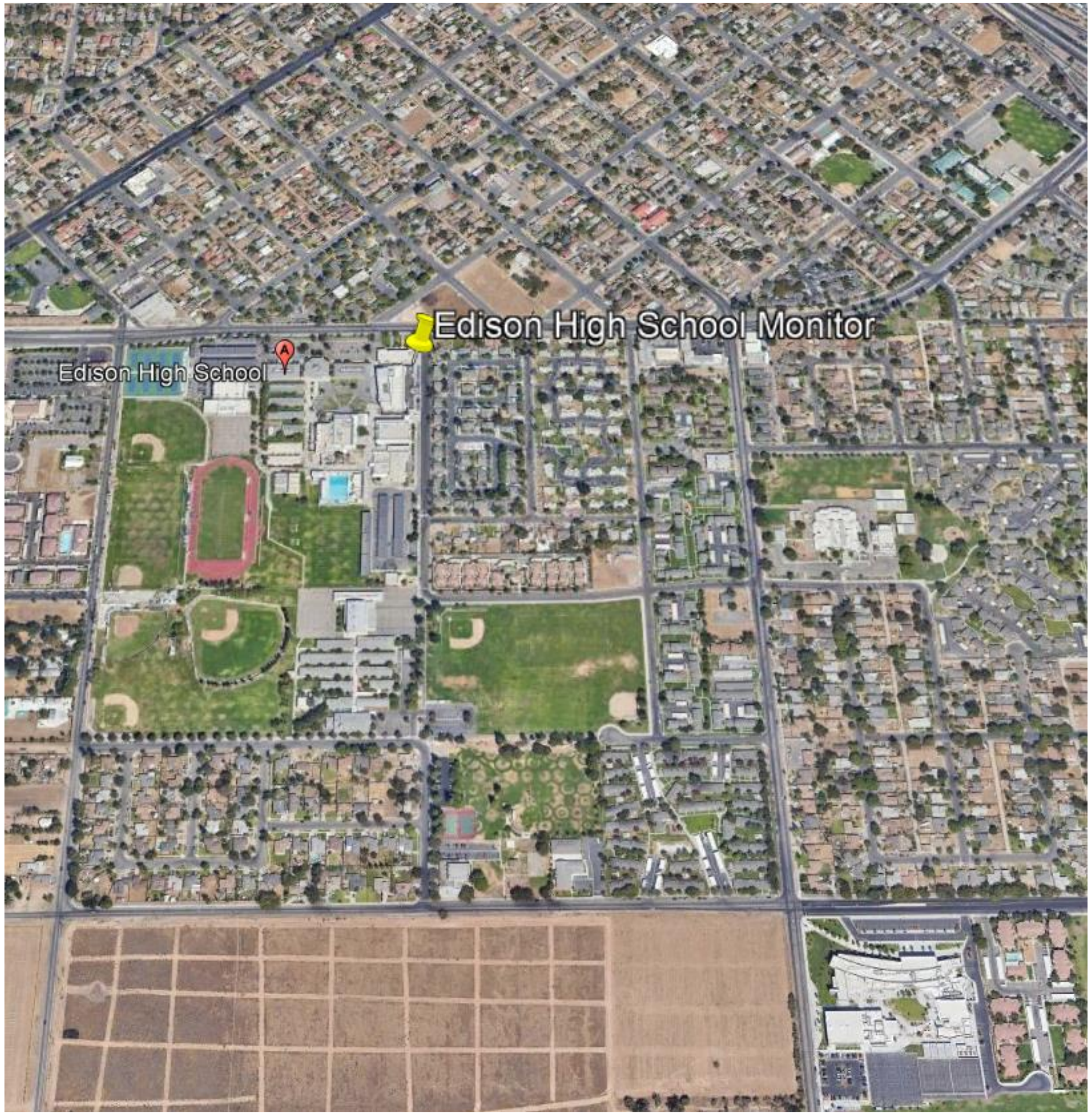
January Statistics (µg/m³)

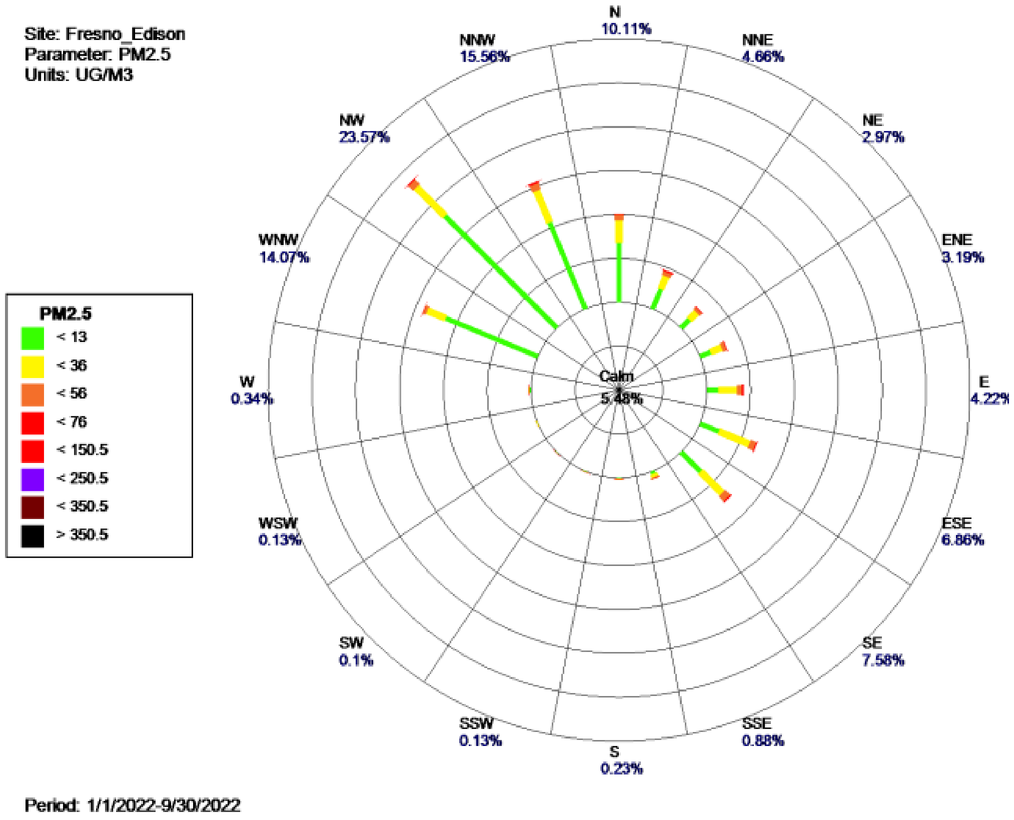
	Max 24-hours	Monthly Average
Edison	48.4	36.1
West Fresno	46.3	33.2

Daily Average PM2.5 Trend



Direction of PM2.5 at Edison High School (2022 YTD)

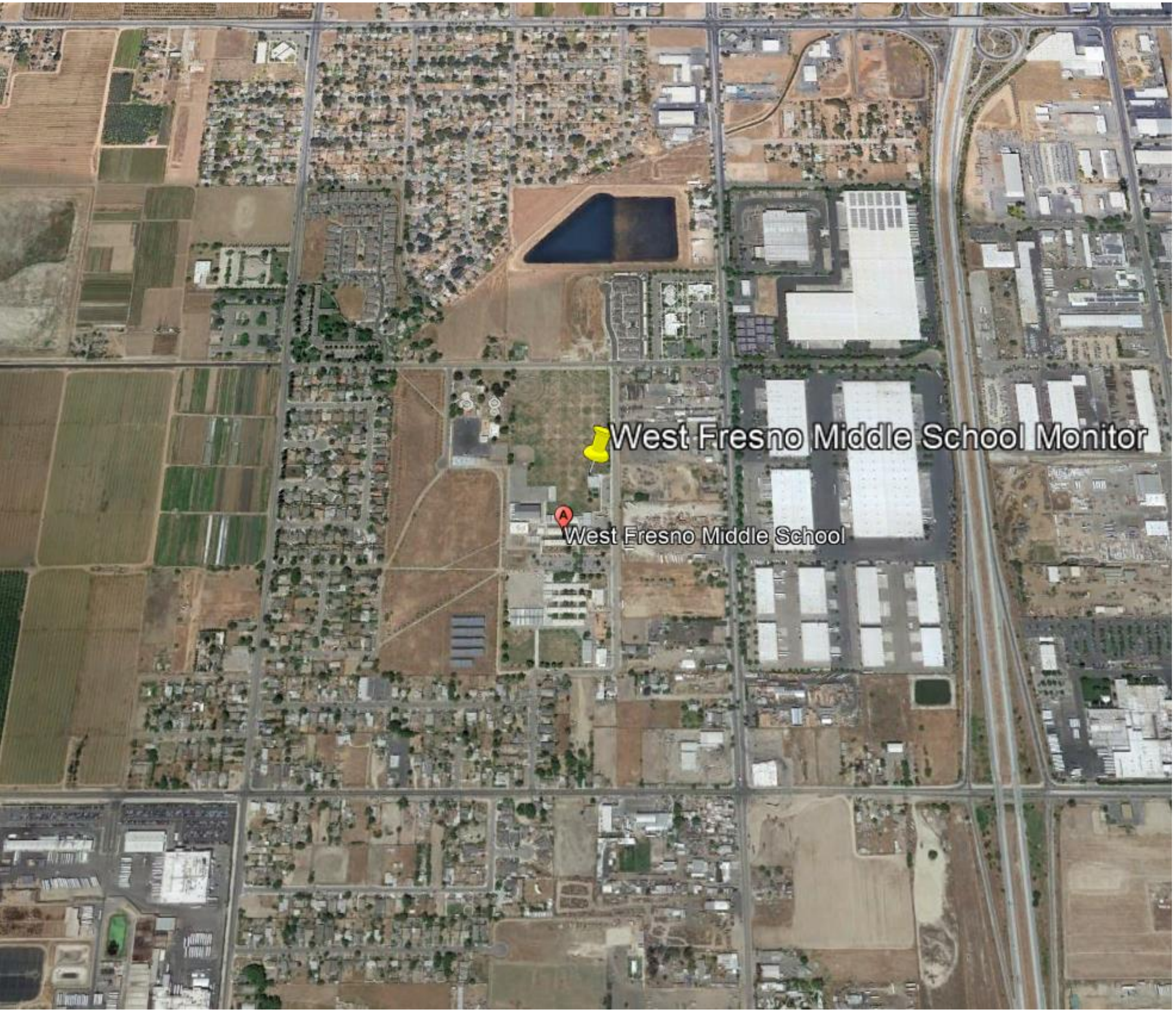

Edison High School Monitor
Edison High School
A

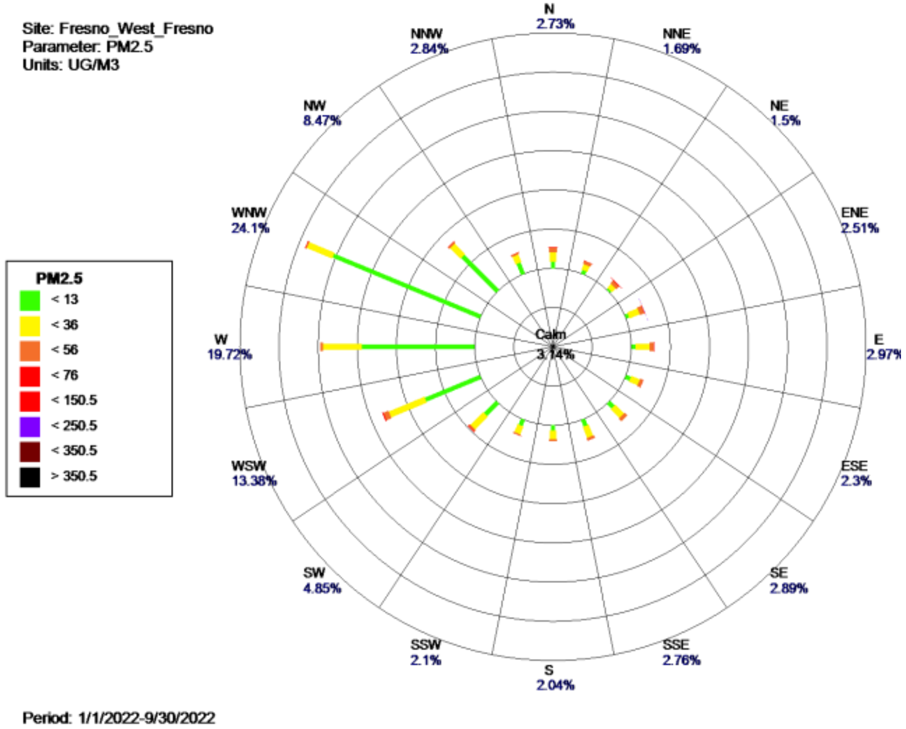


- PM2.5 most often coming from the from the Northwest
- District working to explore possible sources this winter, with better speciation and nighttime surveillance

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Direction of PM2.5 at West Fresno (2022 YTD)

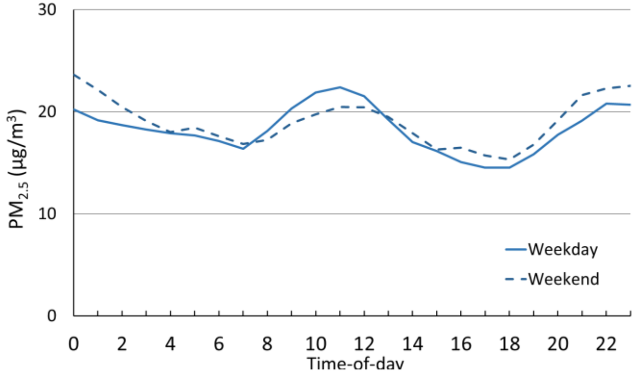

West Fresno Middle School Monitor
A
West Fresno Middle School

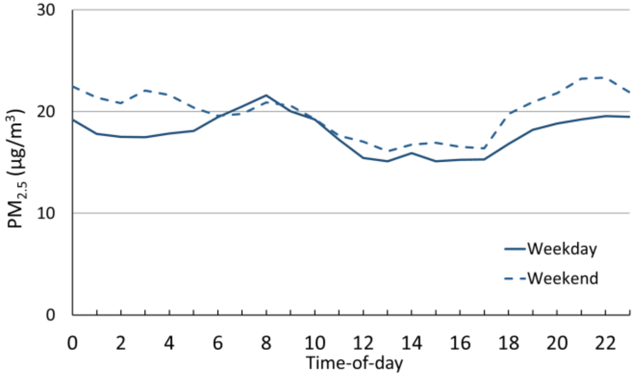


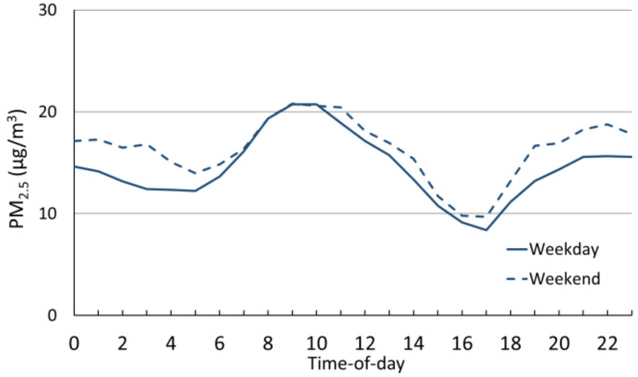
- PM2.5 most often coming from the from the West
- District working to explore possible sources this winter, with nighttime surveillance

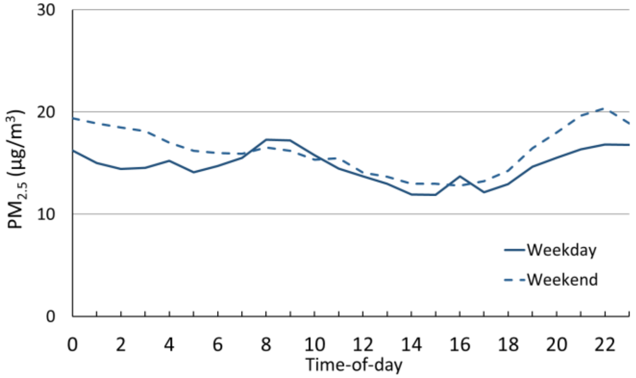
Variations of PM2.5 During the Day (Yearly Data)

August 2021 – July 2022


West Fresno MS (Aug. 2021-Jul. 2022)


Edison HS (Aug. 2021-Jul. 2022)

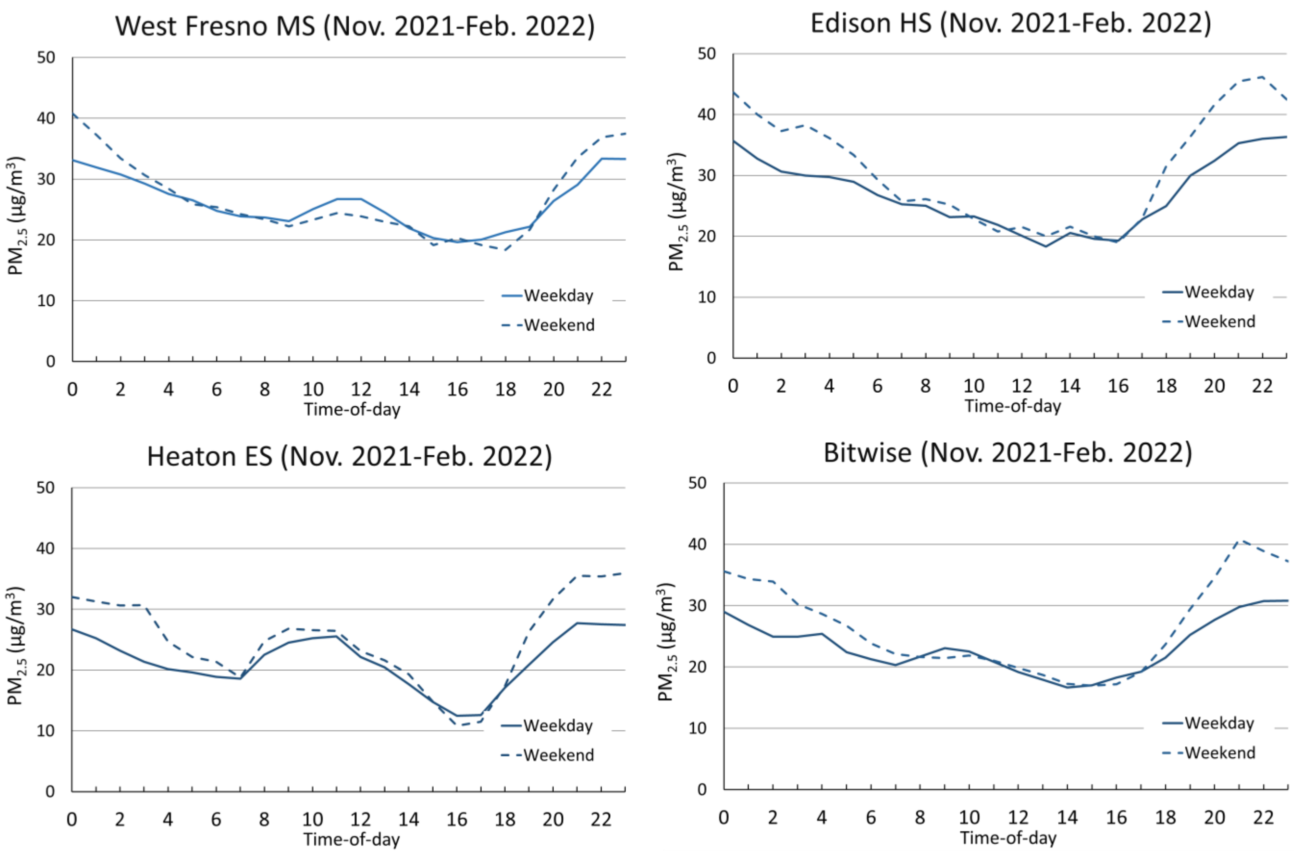

Heaton ES (Aug. 2021-Jul. 2022)


Bitwise (Aug. 2021-Jul. 2022)

- Data analyzed for West Fresno Middle School, Edison High School, Heaton Elementary School and Bitwise
- General patterns:
  - Two peaks at all four sites: morning (8:00 – 11:00) and nighttime (after 18:00 – 20:00)
  - Low concentrations in the afternoon (lowest at Heaton ES)
- Weekday vs. weekend:
  - Higher morning peaks at West Fresno MS and Bitwise on weekdays
  - Higher nighttime concentrations at all four sites on weekends
- General patterns are similar to those at other locations

Variations of PM2.5 During the Day (Winter Data)

2021-2022 Winter (November 2021 – February 2022)


West Fresno MS (Nov. 2021-Feb. 2022)

Edison HS (Nov. 2021-Feb. 2022)

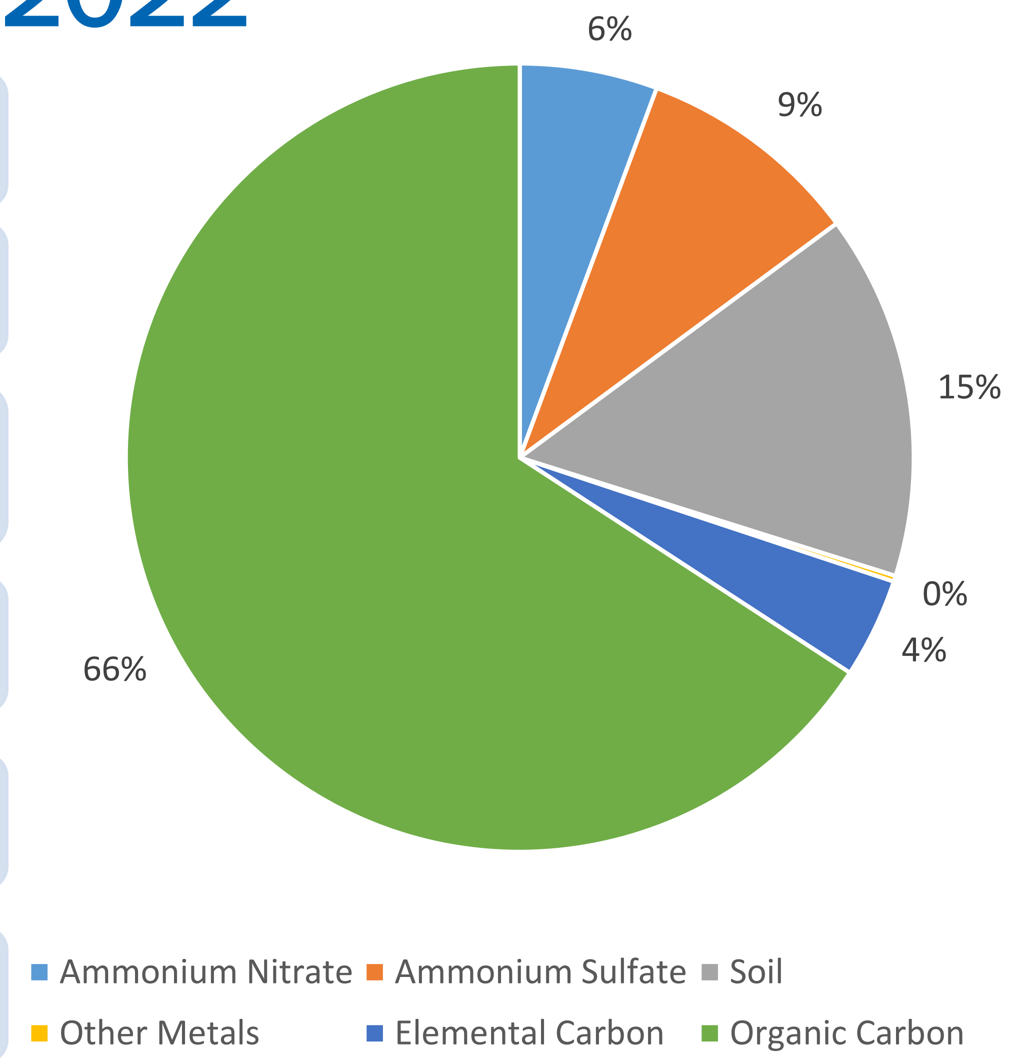
Heaton ES (Nov. 2021-Feb. 2022)

Bitwise (Nov. 2021-Feb. 2022)

- Data analyzed for the same four sites
- General patterns:
  - Morning peaks at West Fresno MS, Heaton ES and Bitwise
  - No morning peak at Edison HS
  - Nighttime peaks at all four sites
  - Low concentrations in the afternoon (lowest at Heaton ES)
- Weekday vs. weekend:
  - Higher morning peaks at West Fresno MS and Bitwise on weekdays
  - Much higher nighttime concentrations at all four sites on weekends

Types of PM2.5 at Edison High School March – August 2022

Ammonium Nitrate:	• Formed in atmosphere (not emitted) from emissions of nitrogen oxides (NOx), which is mostly from mobile sources.
Ammonium Sulfate:	• Formed in atmosphere (not emitted) from emissions of sulfur oxide (SOx) from mobile sources and industrial processes.
Organic carbon:	• **Directly Emitted:** combustion including cooking, industrial processes, mobile source exhaust, tire wear, and wood burning • **Formed in Atmosphere**: from wood burning, solvent use, and industrial processes.
BC or Elemental Carbon:	• Directly emitted, also known as soot or black carbon, and is formed during incomplete combustion in fuels, including mobile exhaust (mainly diesel) and wood burning.
Soil:	• Road dust and soil dust that are entrained in the air from activity, such as soil disturbance or airflow from traffic.
Other Metals:	• Components from soil emissions or found in other particulates having been emitted in connection with combustion from engine wear, brake wear, and similar processes. Also fireworks.



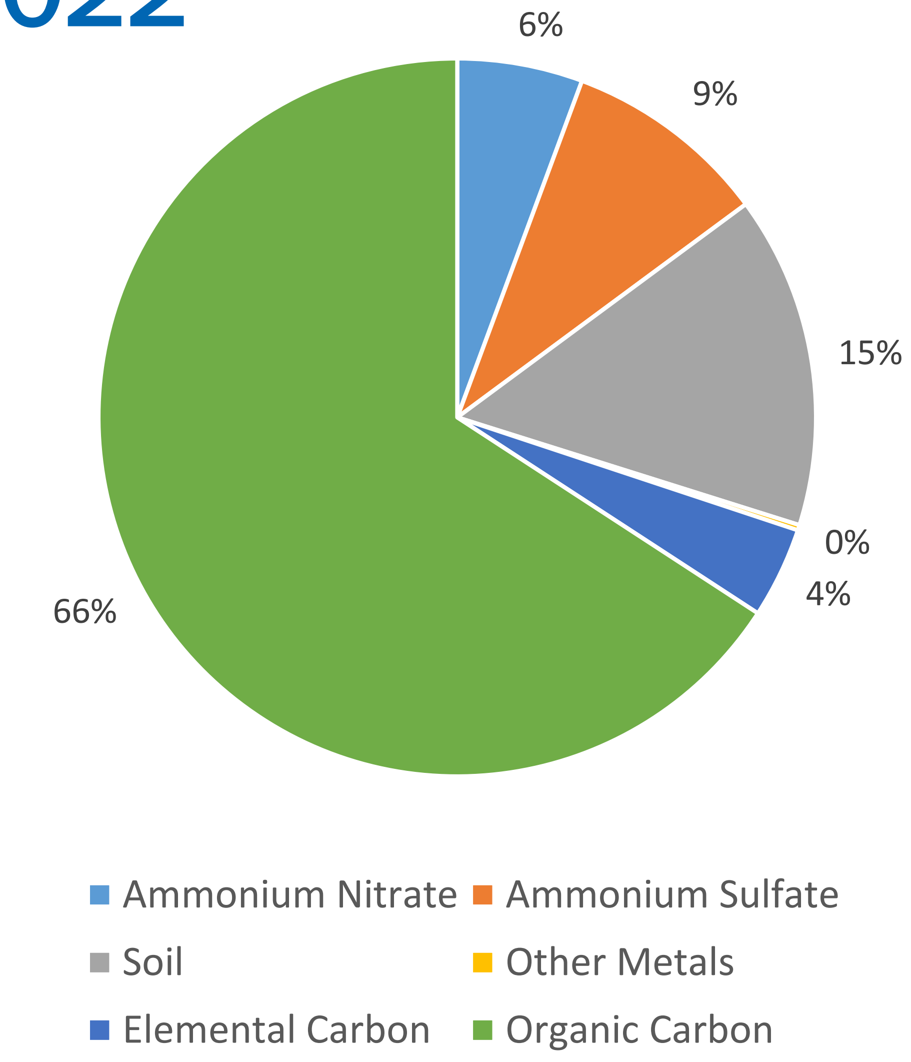
Types of PM2.5 at Edison High School March – August 2022

- Began collection of air samples in March 2022 to help assess potential sources of elevated PM2.5
- Lower PM2.5 concentrations recorded during this period: no exceedances of 35 μg/m^3
- March – August Edison average similar to all other sites
- Planning to continue speciation monitoring and analysis through 2022-2023 winter season to observe potential differences

NEXT STEPS

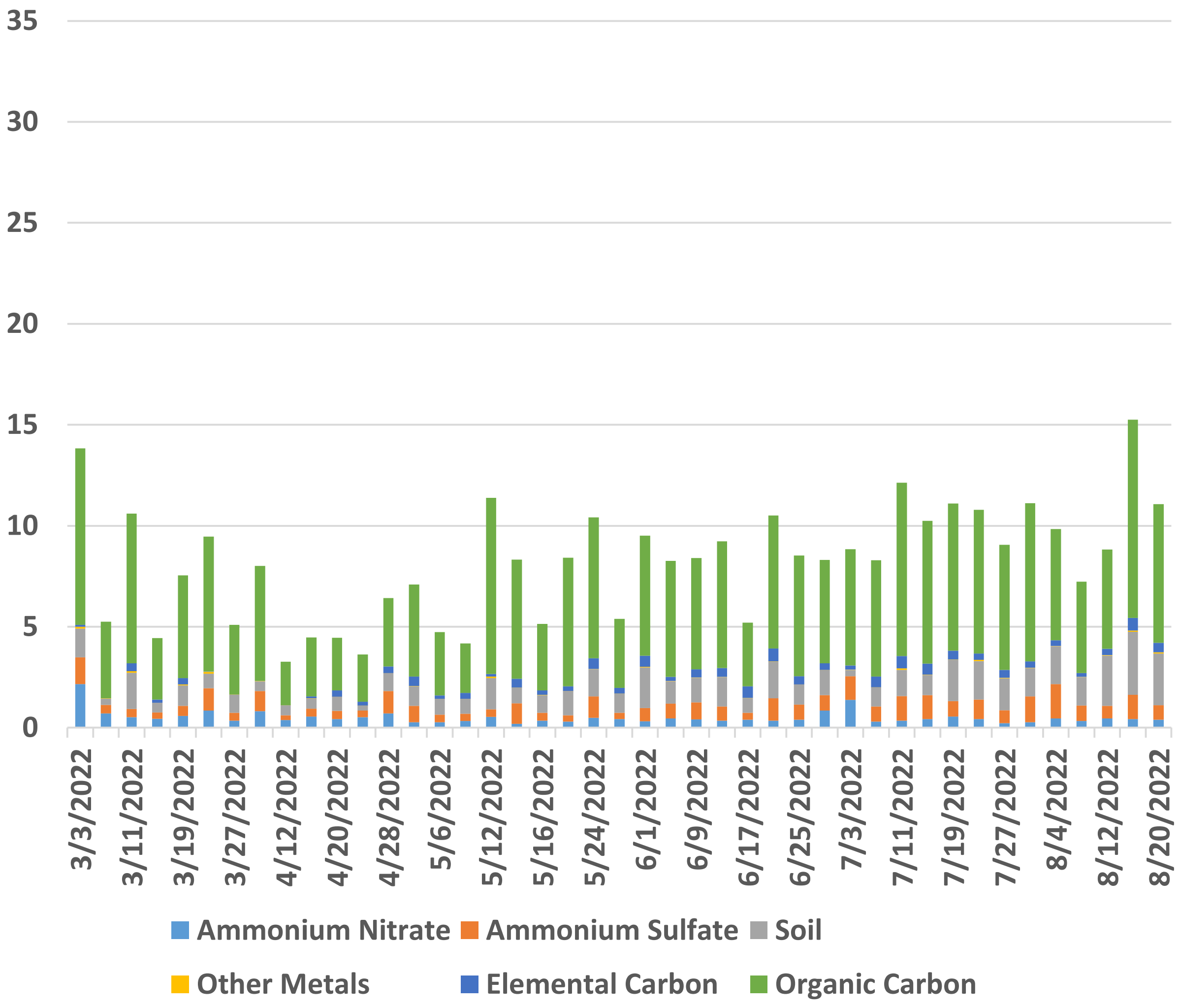
New lab contract already in place to better analyze Organic Carbon in PM2.5 samples at Edison

“Levoglucosan” will be tested, which can be used to understand if PM2.5 is coming from burning wood

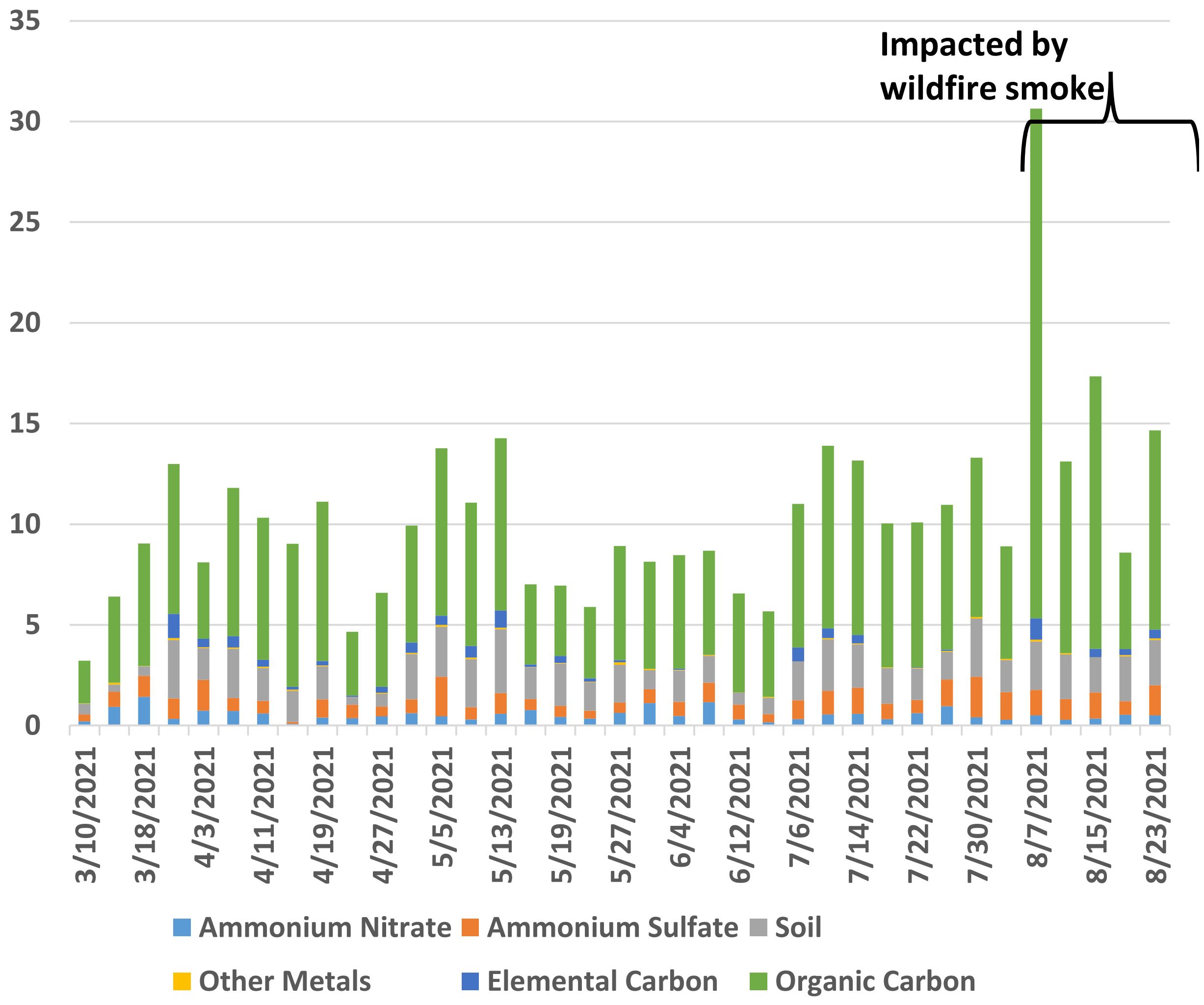


Types of PM2.5 Comparison

Edison High School (2022)



Malaga Elementary School (2021)


Impacted by wildfire smoke

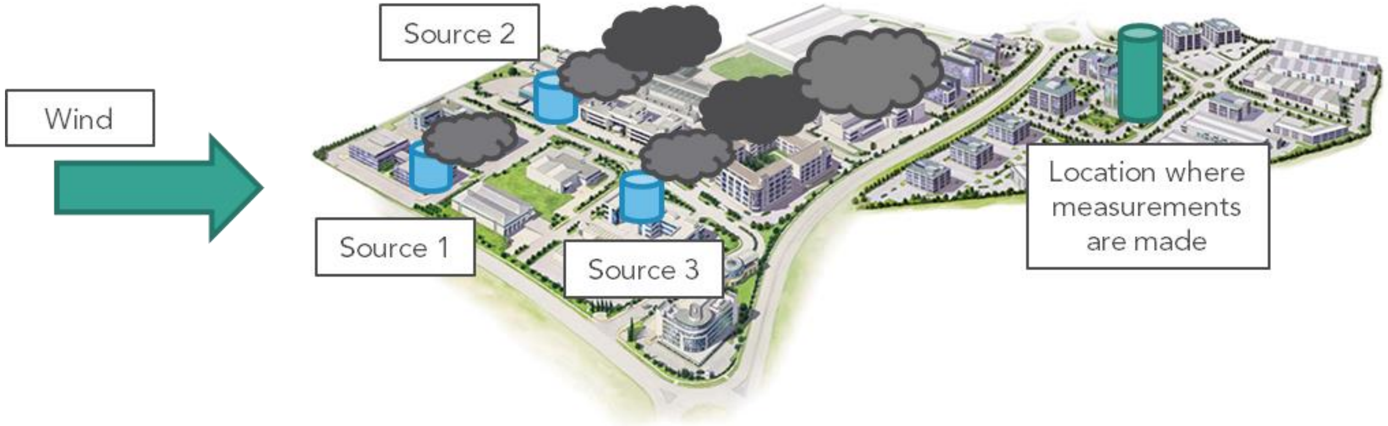
What is source apportionment analysis?

Simply Put:

It is an estimate of **"how much of what comes from which source"**

In Other Words:

Measurements of air pollutants can tell us about the types of sources that affected the air quality at the location where the measurements were made


Source 2
Wind
Source 1
Source 3
Location where measurements are made

What does it take to do this analysis?

First, we need to collect the air quality data:

- Where we collect the air quality data matters
- Different air pollutants can tell us about different sources
- Frequency and duration of the measurements will improve the results
- Accuracy of measurement is very important

Second, we start the source apportionment analysis:

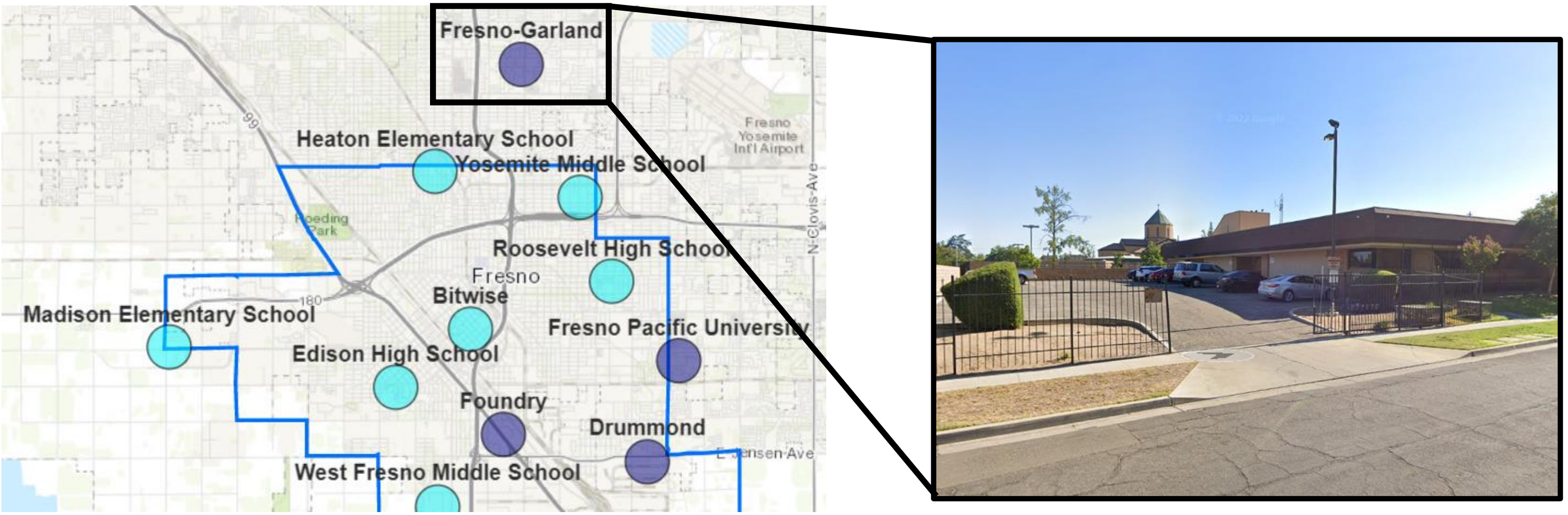
- Clean up the air quality data used for analysis
- Optimize the performance of the source apportionment analysis
- Do other data analysis to support the results with science (e.g., How did the meteorology affect the data?)

An example of source apportionment study

What: Research to study the sources of $PM_{2.5}$ at Fresno (Zhang, UC Davis)

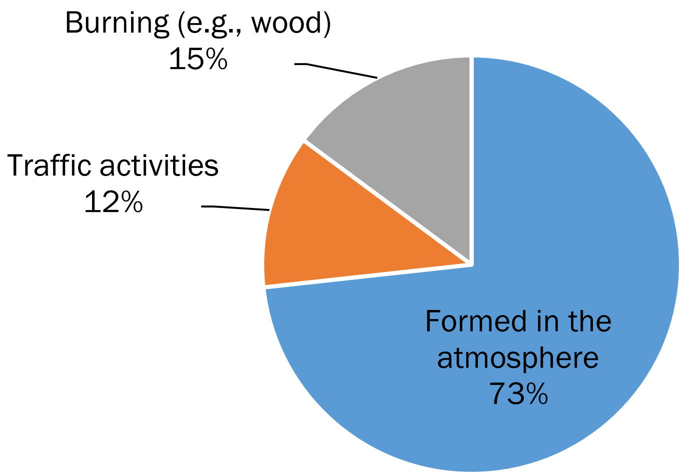
When: Oct 2018 – May 2019

How: Measured the components that make up $PM_{2.5}$ every hour for two years



Fresno-Garland
Heaton Elementary School
Yosemite Middle School
Fresno Yosemite Int'l Airport
Roeding Park
Roosevelt High School
Fresno
Bitwise
Madison Elementary School
Fresno Pacific University
Edison High School
Foundry
Drummond
West Fresno Middle School
E Jensen Ave
N Clovis Ave
99
180

Winter 2018/2019



Comments/Questions?