Update on South Central Fresno Community Air Monitoring

South Central Fresno CSC
April 12, 2023

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

CAMP Fully Deployed

PM2.5 Monitor

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

Mobile Monitoring Van: respond to community concern
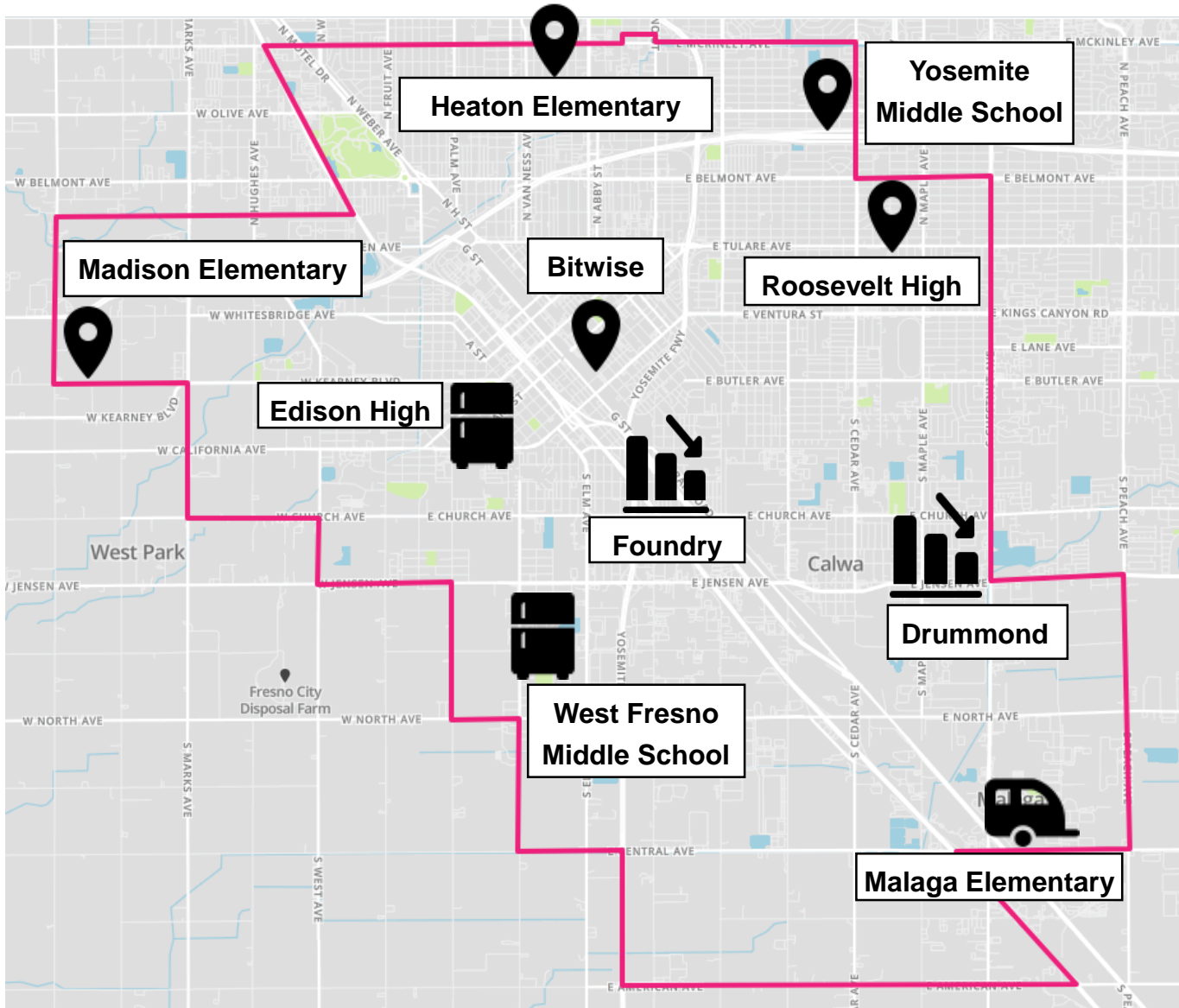
Compact System: PM2.5, Black Carbon, Ozone, BTEX, NOx, VOC, CO (Edison), Toxics (Edison), SO2 (West Fresno)

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

Map labels: Heaton Elementary, Yosemite Middle School, Madison Elementary, Bitwise, Roosevelt High, Edison High, Foundry, Drummond, West Fresno Middle School, Malaga Elementary

Community Air Monitoring Platforms

Community Air Monitoring Platforms (cont'd)

Community Air Monitoring Platforms (cont'd)

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 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

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Air Monitoring Update

CARB's "AQview" community data webpage is ready

PM2.5 was higher than previous quarter - November & December PM2.5 show expected winter increases

PM2.5 higher in areas surrounded by residences - Wood burning (fireplaces, outdoor fire pits, etc.) a contributor

PM2.5 lower in areas surrounded by agricultural land (Madison School) and commercial/industrial areas (Malaga School)

Lab analysis shows 1) Ammonium Nitrate is main reason PM2.5 increases in the winter time, and 2) Wood burning is happening since woodburning compound "levoglucosan" is present

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October-December 2022 Average PM2.5 Levels
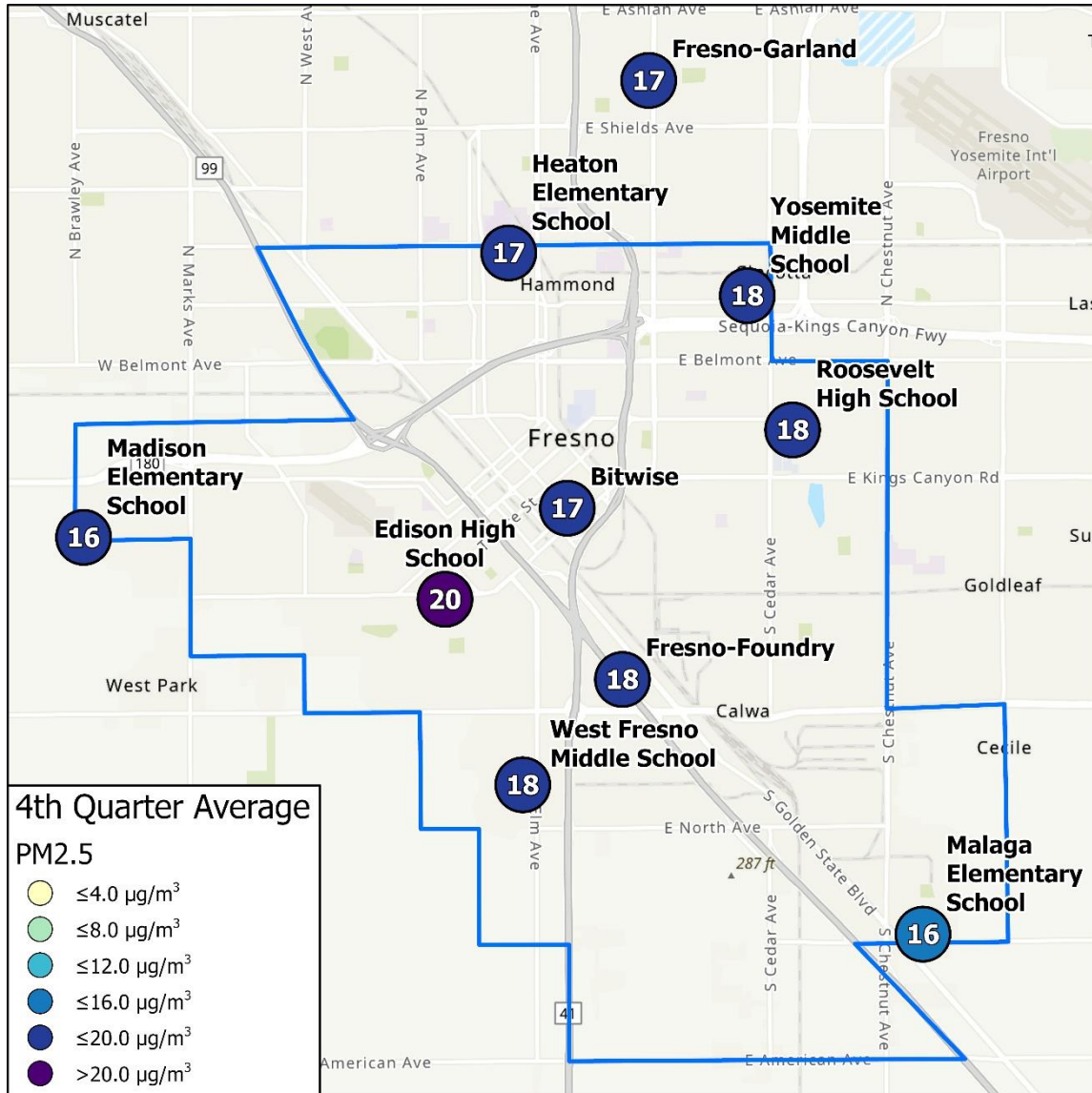
Highest PM2.5 average over time period was 20 µg/m³ at **Edison**

Lowest PM2.5 average over time period at **Malaga** & **Madison**

All locations had lower averages in October-December 2022 than the same months in 2020 or 2021

Throughout today's presentation, we explore the differences between community sites this winter
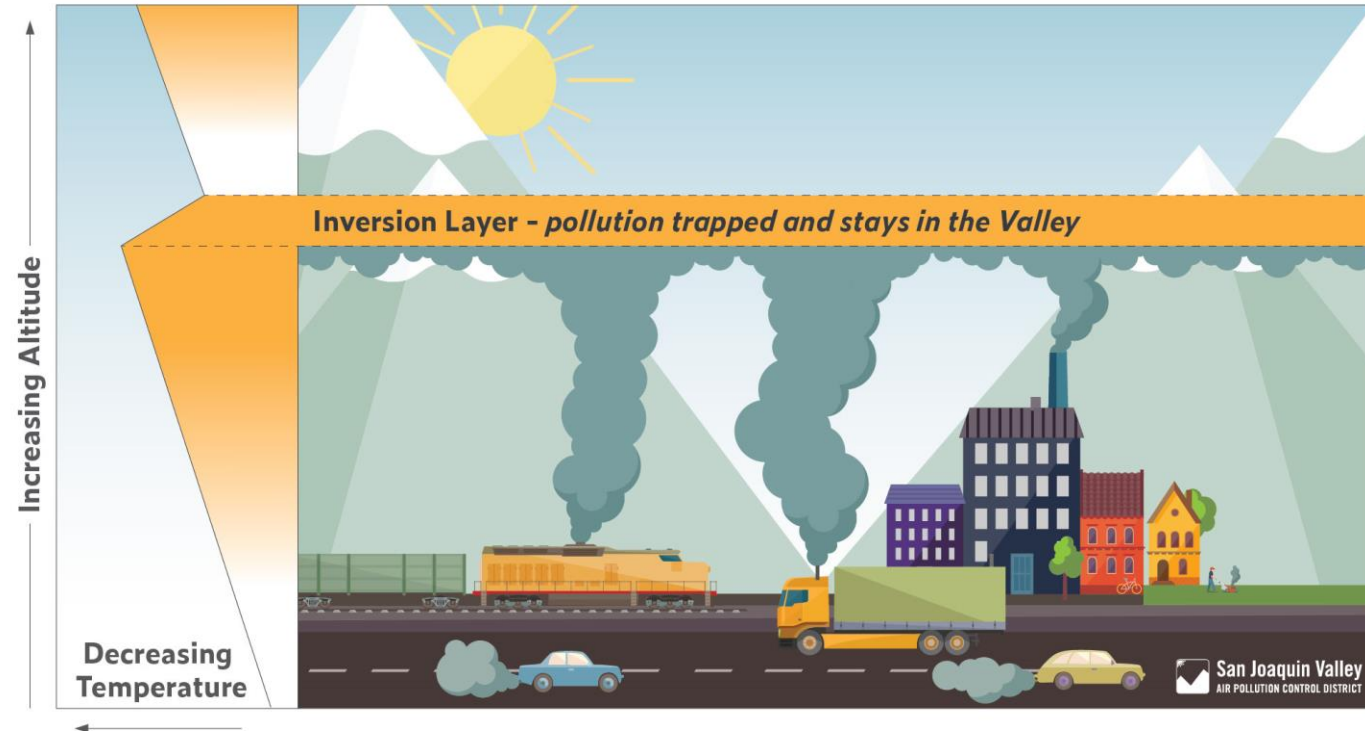
Update on 2022 Annual PM2.5 Average

We have seen a decrease in PM2.5 levels across all locations since 2020. Each year had challenges, including wildfire impacts and exceptional drought
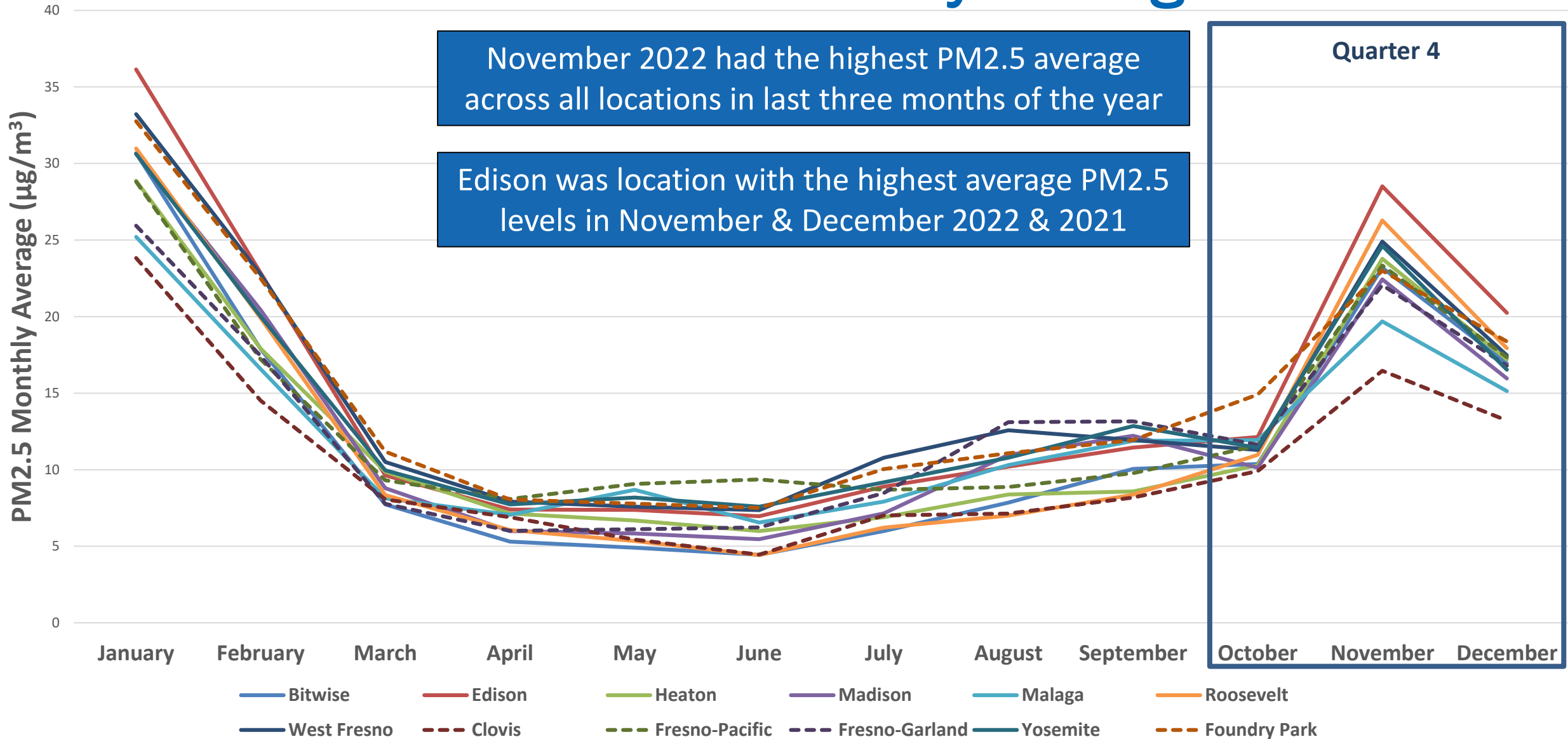
12 µg/m³ Annual Standard

Legend: 2019, 2020, 2021, 2022
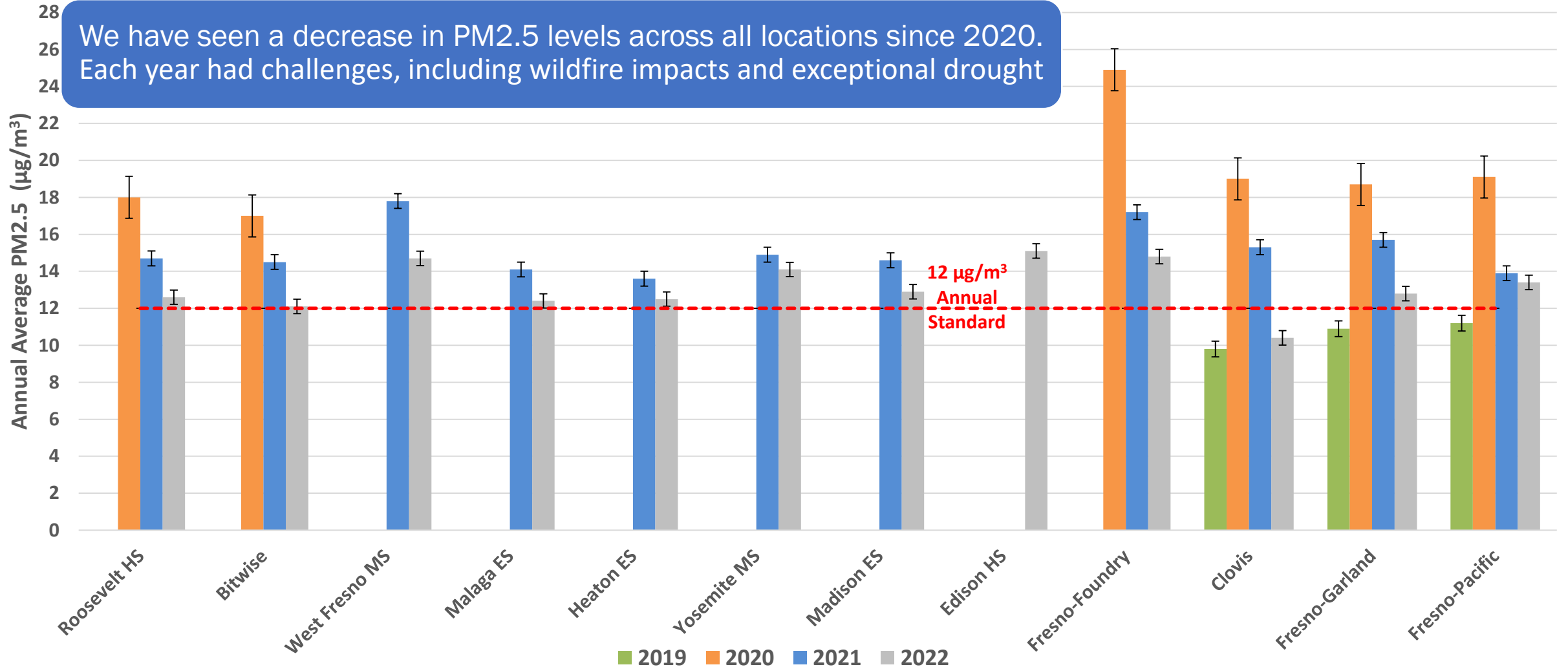
Edison & West Fresno monitoring locations have the highest PM2.5 levels in 2022

What causes PM2.5 levels to be higher in the winter?

- A temperature inversion layer is a layer of air above the ground that has a higher temperature

- Air temperature should decrease as elevation increases away from the ground

- A temperature inversion prevents air and pollution from lifting away from the ground and acts like a lid over the Valley

- Pollution becomes trapped under the inversion "lid" and builds up causing higher PM2.5 pollution concentrations at the ground level where people and air monitors are

Inversion Layer - pollution trapped and stays in the Valley

Increasing Altitude

Decreasing Temperature

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2022 PM2.5 Monthly Average

November 2022 had the highest PM2.5 average across all locations in last three months of the year

Edison was location with the highest average PM2.5 levels in November & December 2022 & 2021

Quarter 4

Daily Average PM2.5 October – December 2022
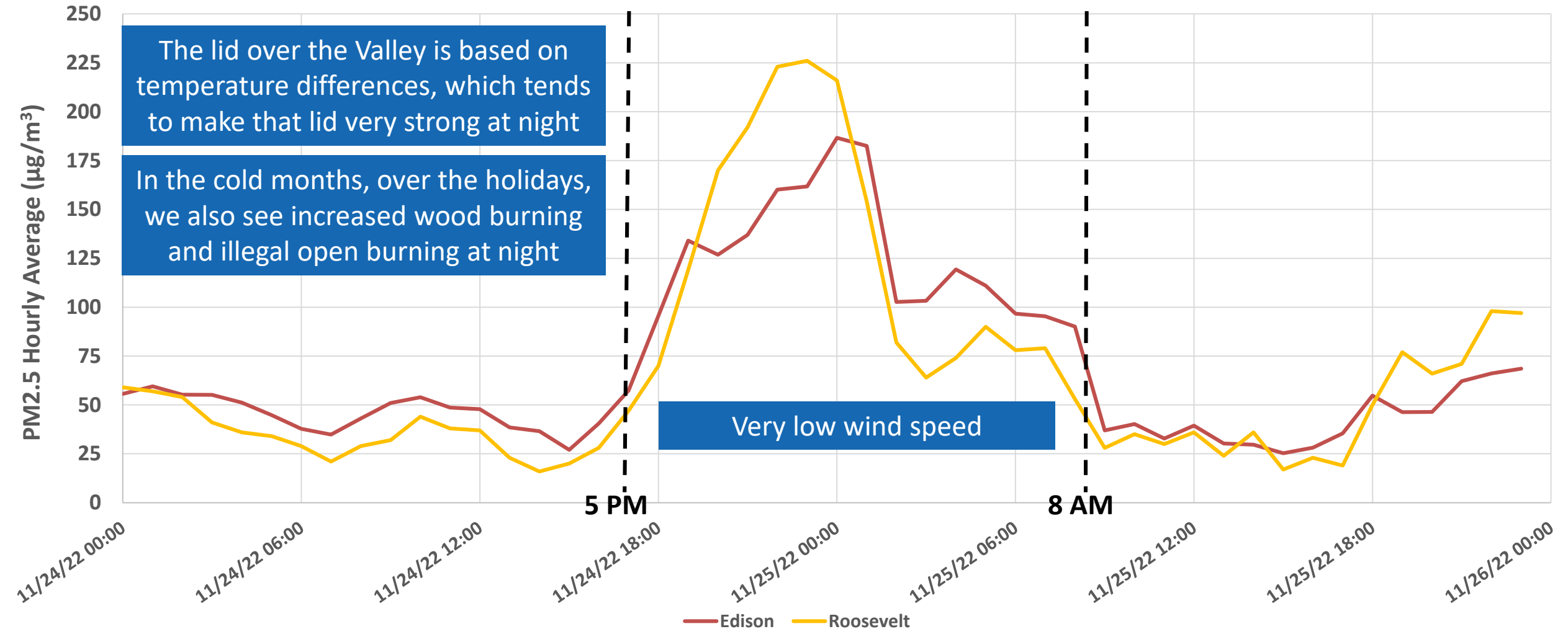

Most days are in the "good" or "moderate" category

The valley is a bowl that sometimes has an invisible lid over us in the winter. This causes pollution to be trapped.

The lid over the Valley was very strong in November, causing a spike in PM2.5 levels everywhere.

Federal 24-hour PM2.5 standard (35 µg/m³)

y-axis: 2022 PM2.5 24-hour Average (µg/m³)

Thanksgiving

Christmas

Legend: Bitwise · Edison · Heaton · Madison · Malaga · Roosevelt · West_Fresno · Yosemite · Foundry Park
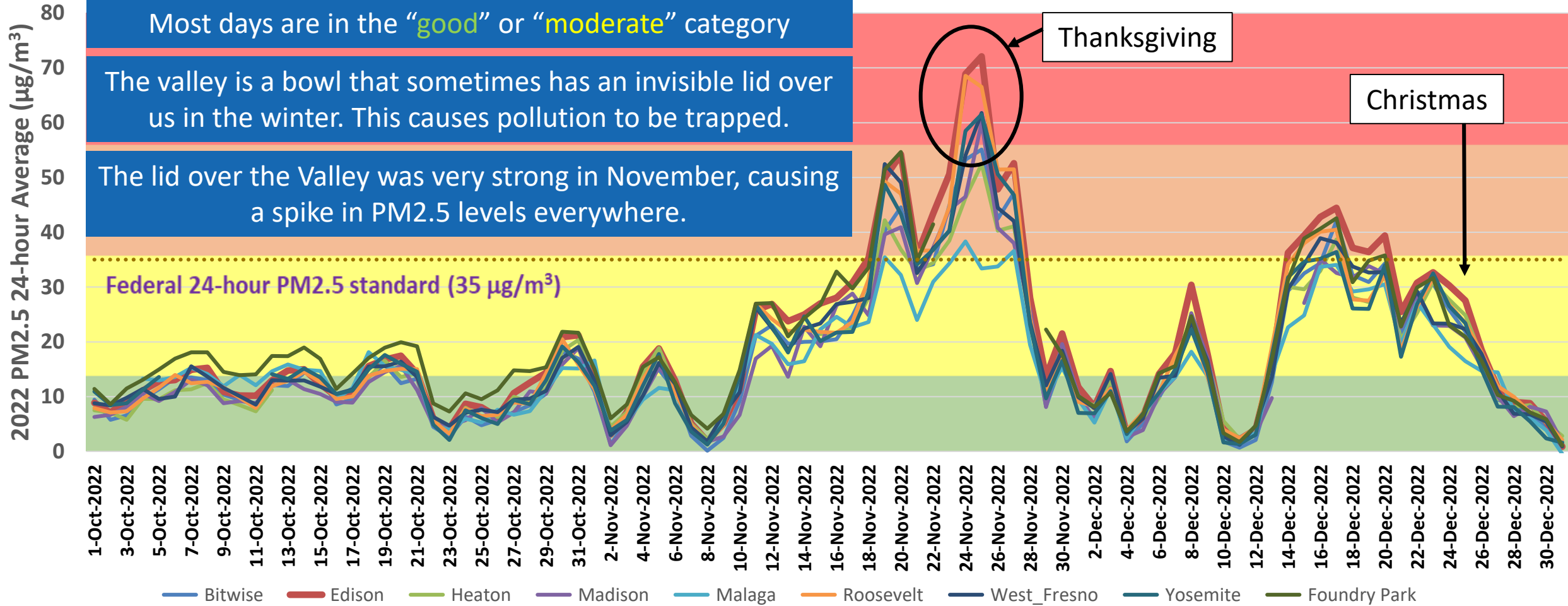
Over the holidays when the lid is strong, we tend to see more pollution where folks live. For example, Roosevelt and Edison are in very populated neighborhoods and we see a peak on Thanksgiving. **We have more analysis of these locations on the next slide.**

Hourly PM2.5 Edison and Roosevelt Nov 24th & 25th

The lid over the Valley is based on temperature differences, which tends to make that lid very strong at night

In the cold months, over the holidays, we also see increased wood burning and illegal open burning at night

Very low wind speed

5 PM

8 AM

Edison   Roosevelt

How can the District make sure the community knows that we expect worse air quality?

- Schools participate in the Healthy Air Living school program

- News releases are issued before known and expected high pollution days

- District posts updates to social media sites like Facebook, Twitter, and Nextdoor

How can the District make sure the community knows that we expect worse air quality?

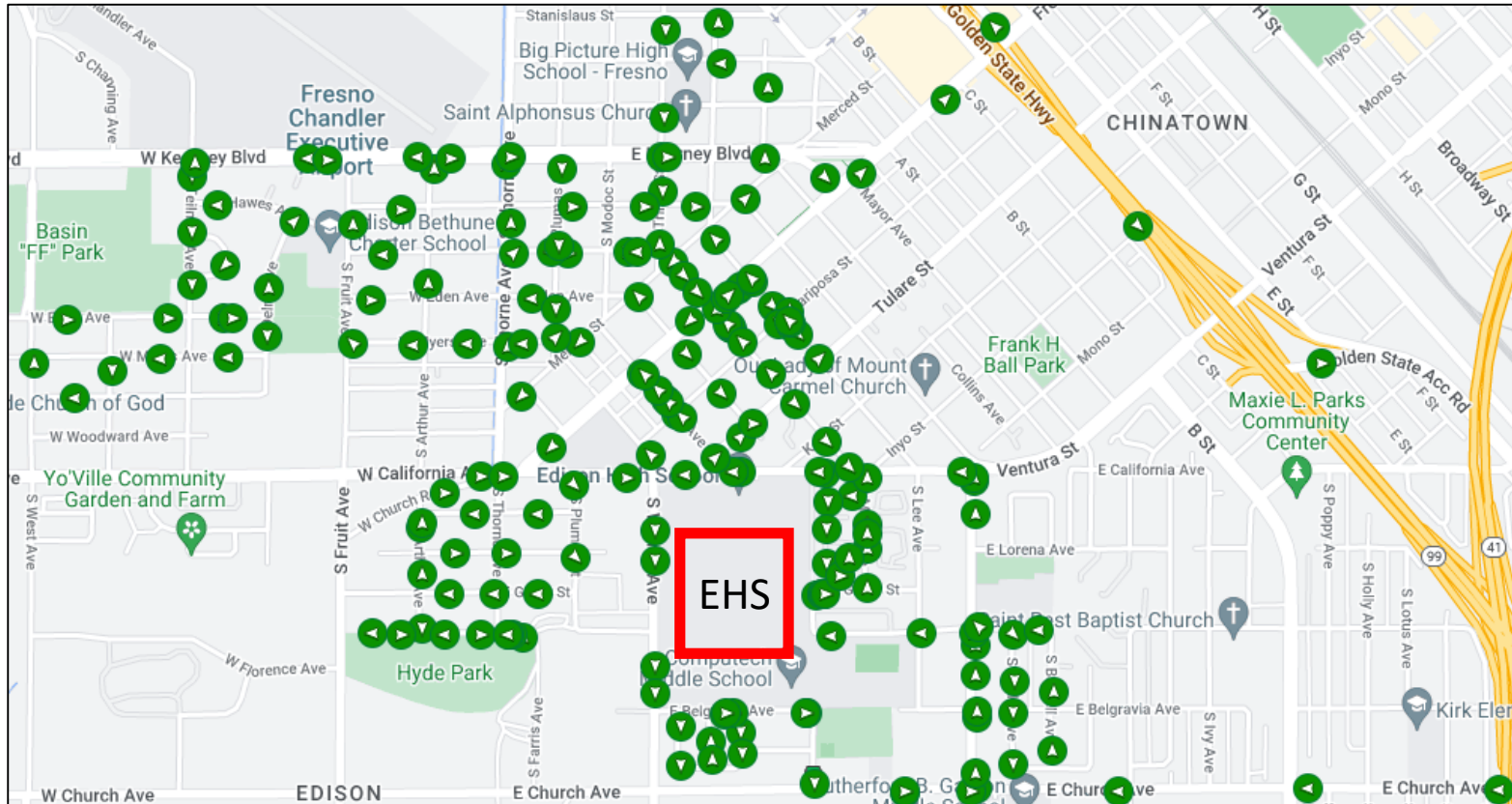# Efforts to Understand Causes of High PM2.5

Surveillance and Enforcement

- Inspectors and air monitoring operators are looking for activity around the area

Air Pollution Monitoring Network

- Lab analysis of the PM2.5 air samples

District Enforcement Efforts near Edison HS

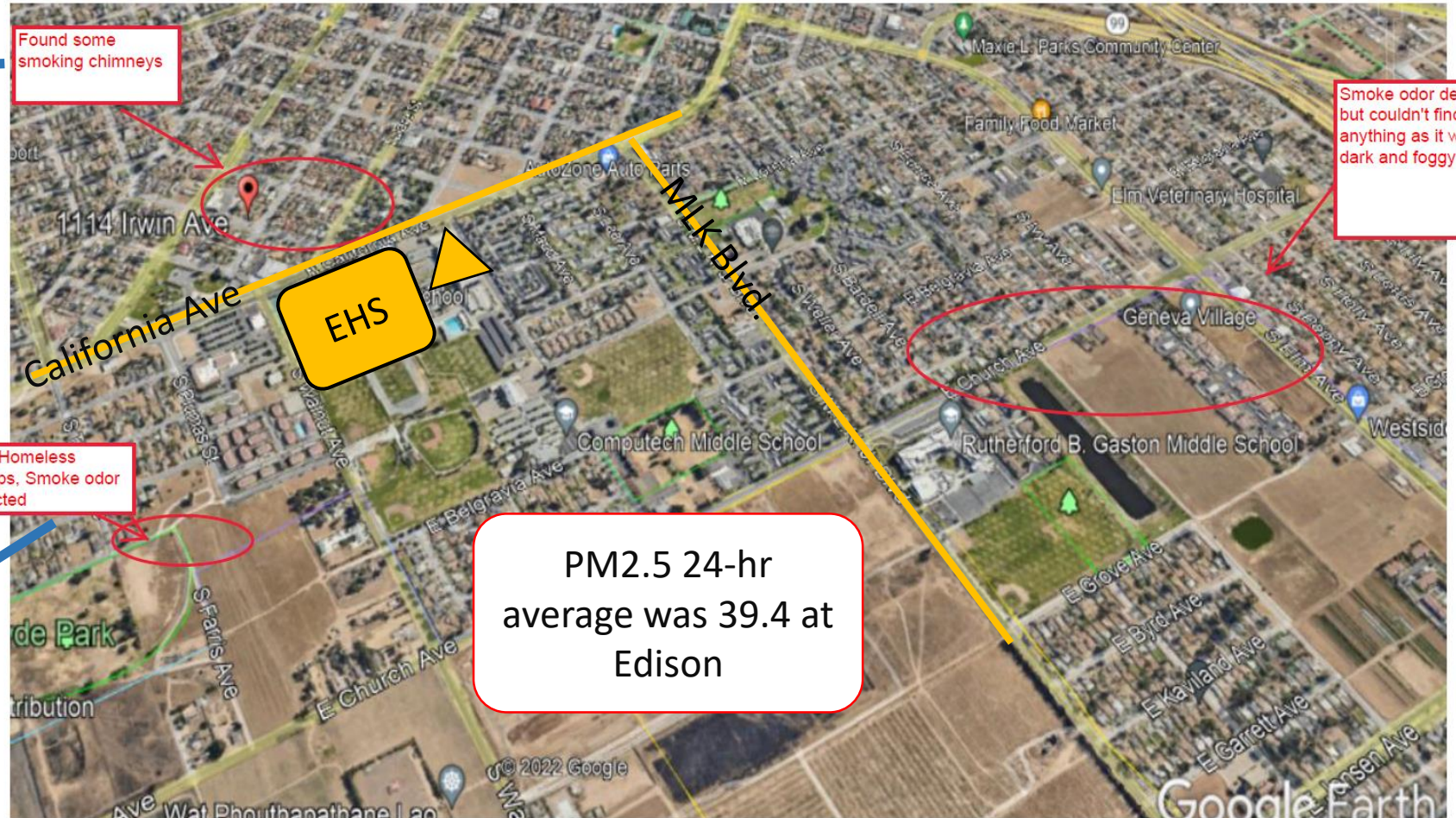*Surveillance route taken by an Air Quality Inspector from 6-8AM on December 15, 2022*

- Based on air quality measurements, air quality inspectors regularly go to areas of concern to determine potential causes
- Inspectors conduct surveillance in evening and early morning hours
- GPS mapping ensures surveillance route does not overlap

District Enforcement Efforts near Edison HS

Smoking chimneys found to the north west of Edison HS
- No Burning for All
- NOVs issued

Found some smoking chimneys

Smoke odor detected but couldn't find anything as it was dark and foggy

Few Homeless Camps, Smoke odor detected

California Ave

EHS

MLK Blvd.

PM2.5 24-hr average was 39.4 at Edison

Annotated surveillance area for December 15

15-Dec-2022 06:53:43 AM 36.717678 N 119.81311 W

What does enforcement look like during the winter season?

Enforcement happens throughout the community boundary

Respond to community complaints and concerns

Focused enforcement efforts when air monitoring shows that air quality is poor

Increased surveillance on "no burn" days

102 citations issued in South Central Fresno November – February 2022-23

Types of PM2.5 at Edison High School October – December 2022

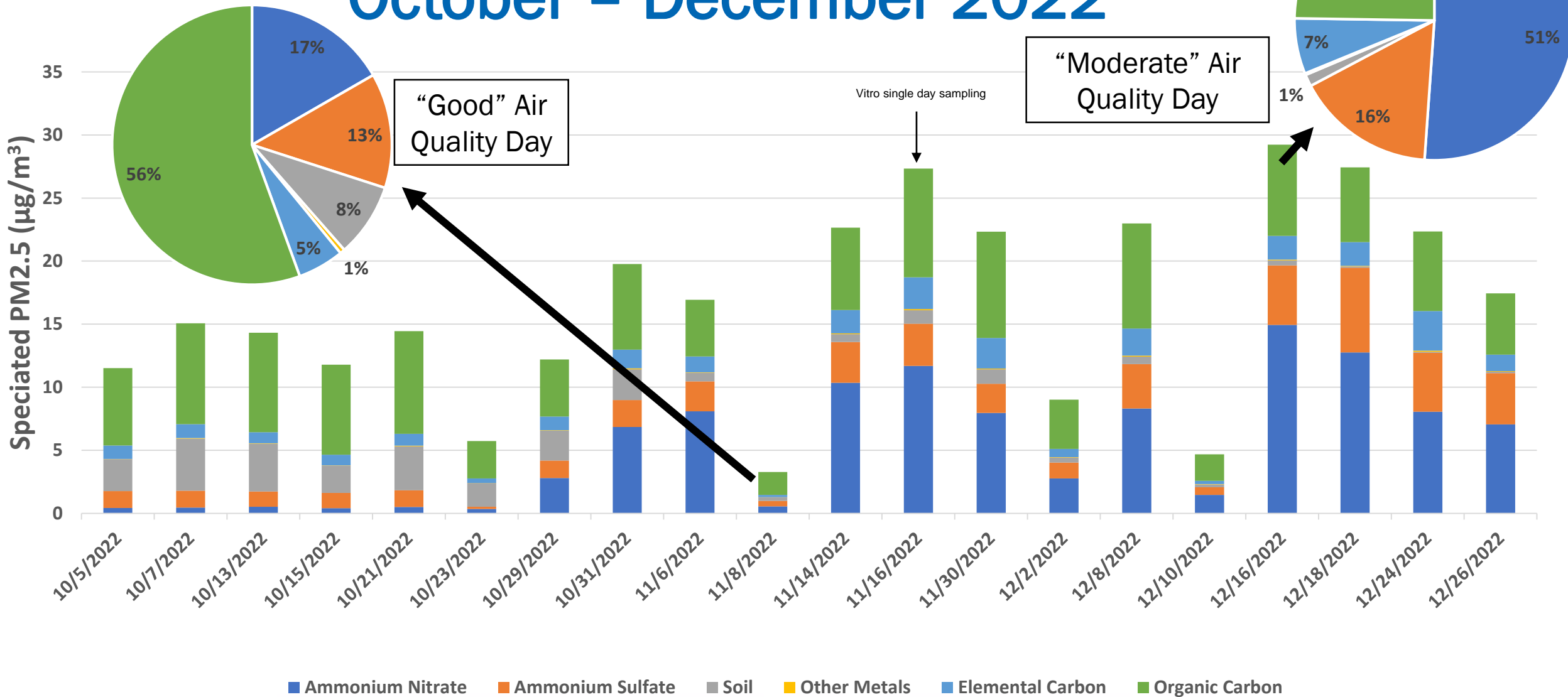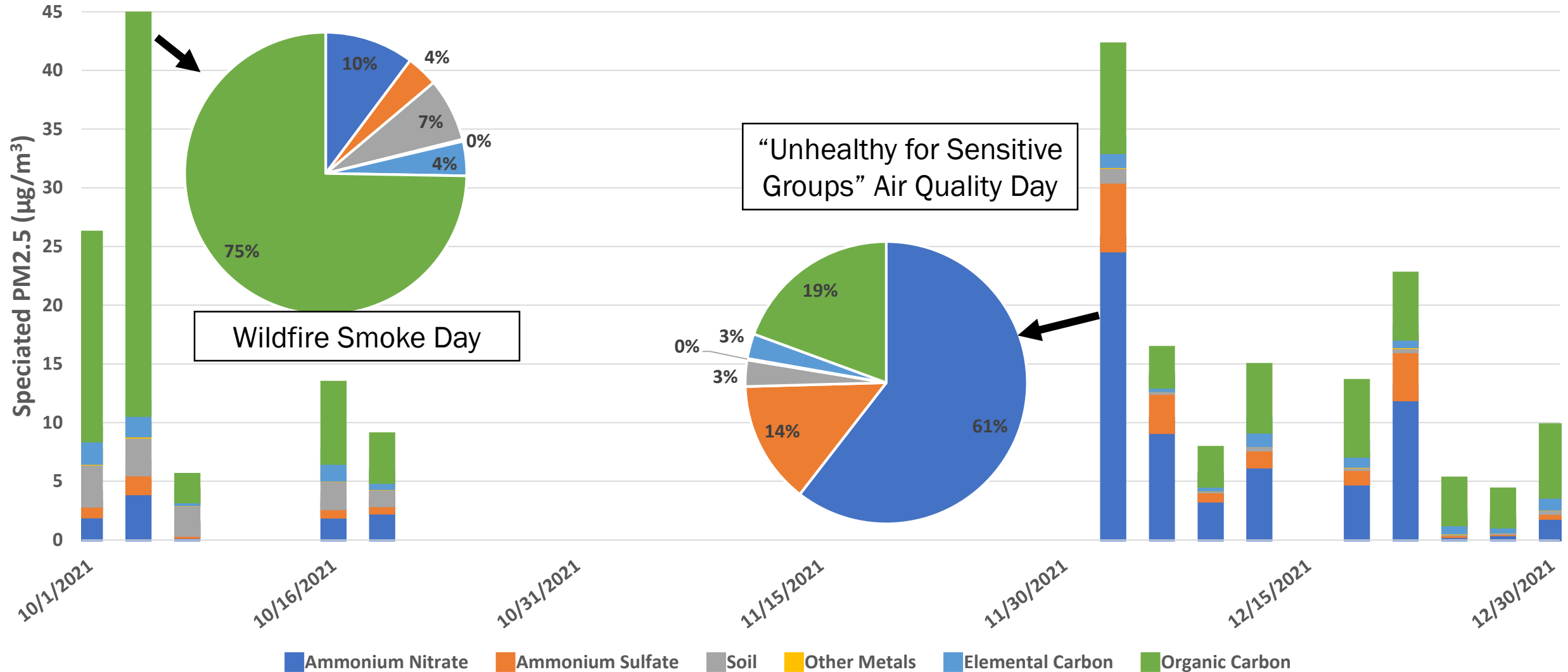|	
Ammonium Nitrate:	• Formed in atmosphere (not emitted) from emissions of nitrogen oxides (NOx), which is mostly from mobile sources.
Ammonium Sulfate:	• Formed in atmosphere (not emitted) from emissions of sulfur oxide (SOx) from mobile sources and industrial processes.
Organic carbon:	• **Directly 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. • **Wood burning indicators:** <u>Levoglucosan</u>, mannosan, galactosan, potassium ions
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 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.

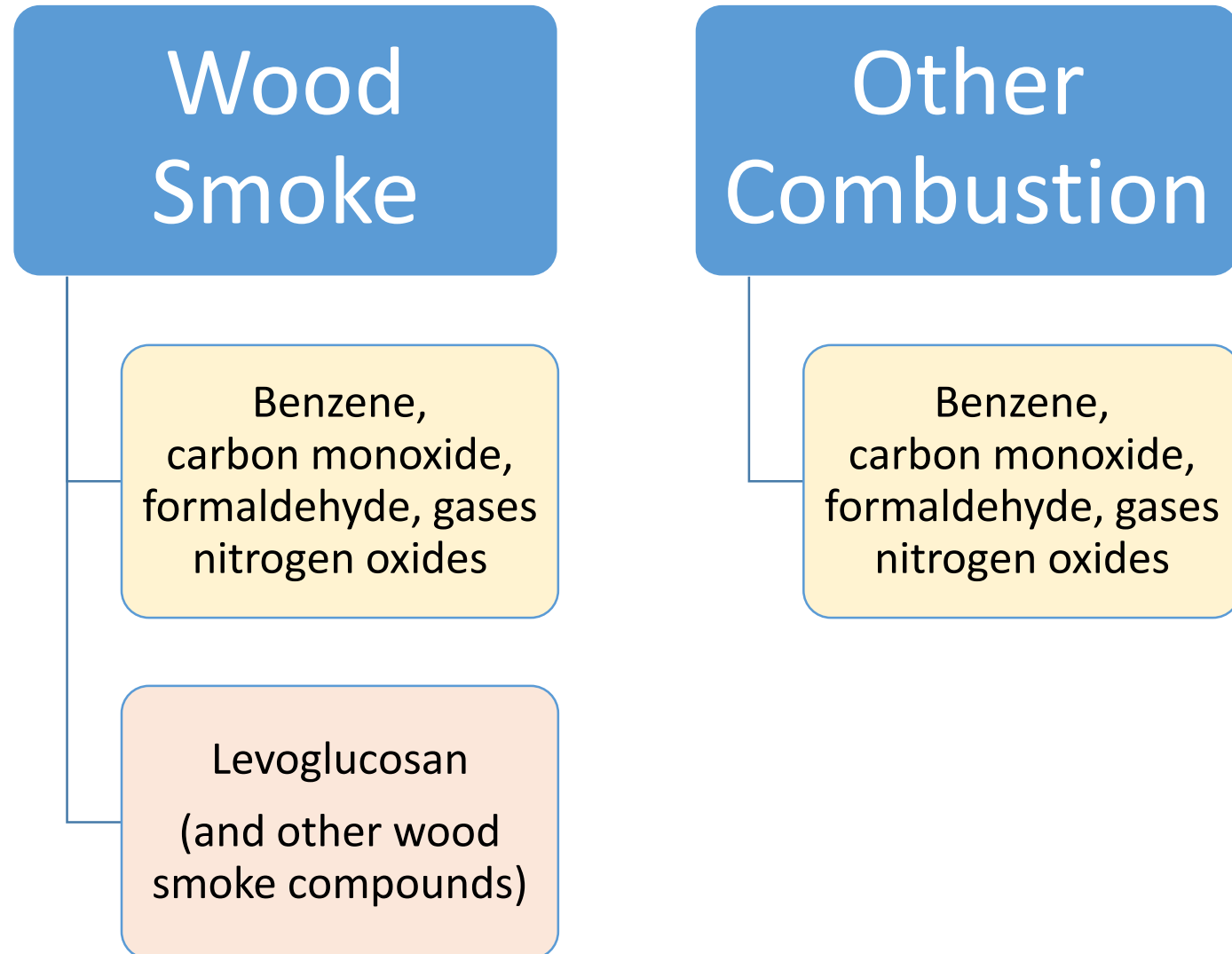# Types of PM2.5 at Edison High School October – December 2022

Types of PM2.5 at Fresno-Garland October – December 2021

Wildfire Smoke Day

"Unhealthy for Sensitive Groups" Air Quality Day

Legend: Ammonium Nitrate | Ammonium Sulfate | Soil | Other Metals | Elemental Carbon | Organic Carbon

How can we tell if the PM2.5 is from wood burning?

- As an example, here are some compounds and chemicals that are present in wood smoke and other types of combustion

- Levoglucosan is monitored because it is not from other types of combustion

- Levoglucosan is only from wood smoke

Wood Smoke

Benzene, carbon monoxide, formaldehyde, gases nitrogen oxides

Levoglucosan

(and other wood smoke compounds)

Other Combustion

Benzene, carbon monoxide, formaldehyde, gases nitrogen oxides

How can we tell if the PM2.5 is from wood burning?

There is a compound called "levoglucosan" that can let us know whether the PM2.5 we collected came from wood burning. Based on the CSC and District concerns, we began testing in October 2022.
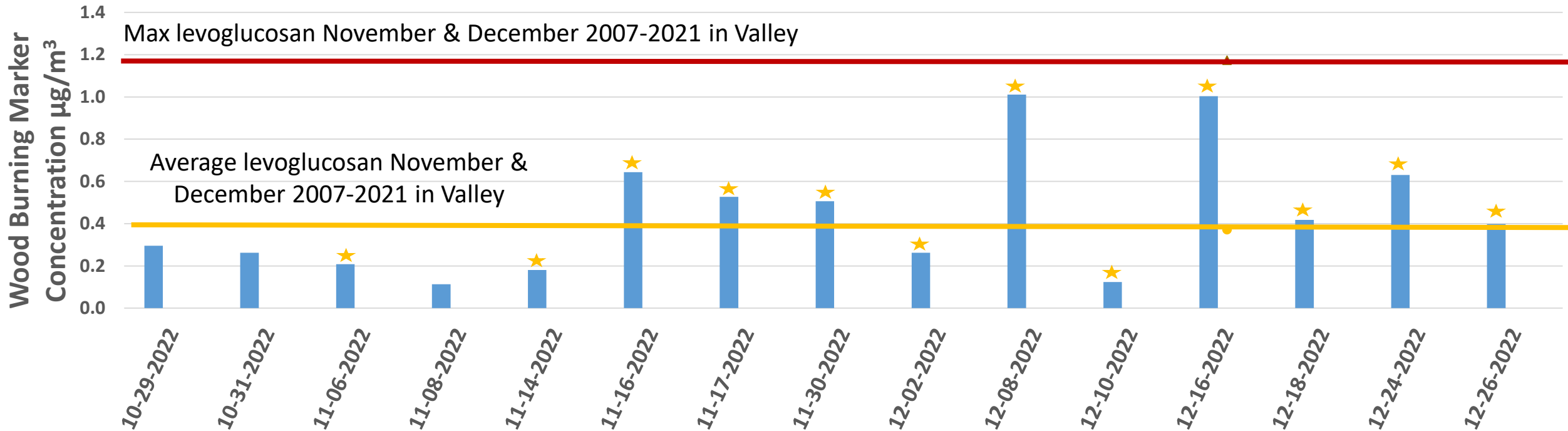

On several days, the marker for wood burning is higher than average, and close to the maximum.
This can mean that wood burning of any kind is occurring, including residential & illegal open burning.

AQview Map is Now Live!

CARB AQview Goals:

- Provide latest up-to-date information on AB 617 communities and community air monitoring efforts

- Provide single platform to view and access air quality data from different networks

- Provide simple, intuitive, and mobile-friendly interfaces for viewing real-time exposure
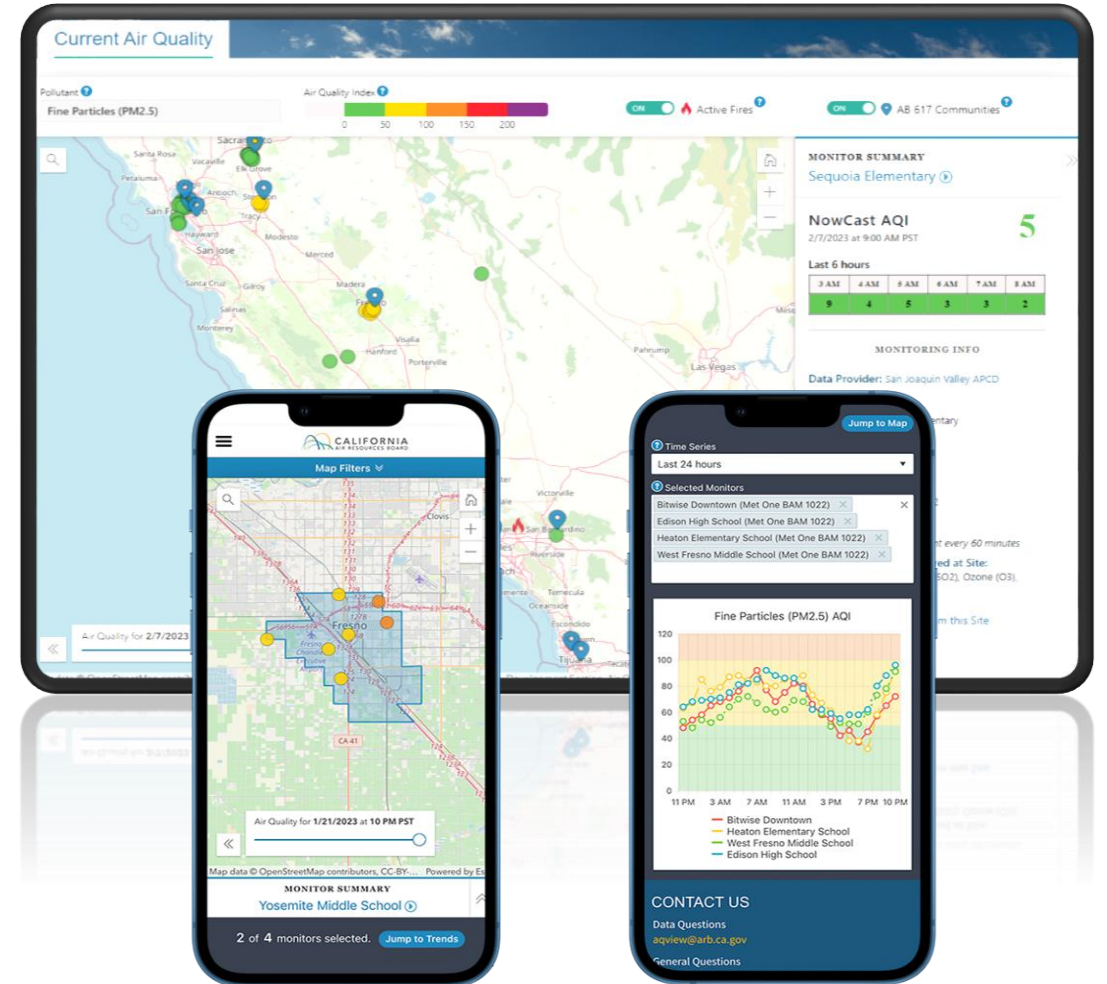
South Central Fresno Data Available in AQview

- 8 air quality monitoring sites with data available starting in Mar. 2019

- Wide range of pollutants including PM2.5, PM10, nitrogen oxides, ozone, carbon monoxide, hydrogen sulfide, sulfur dioxide, and BTEX

- Mobile air monitoring van data available starting in 2020, spanning multiple locations across the community
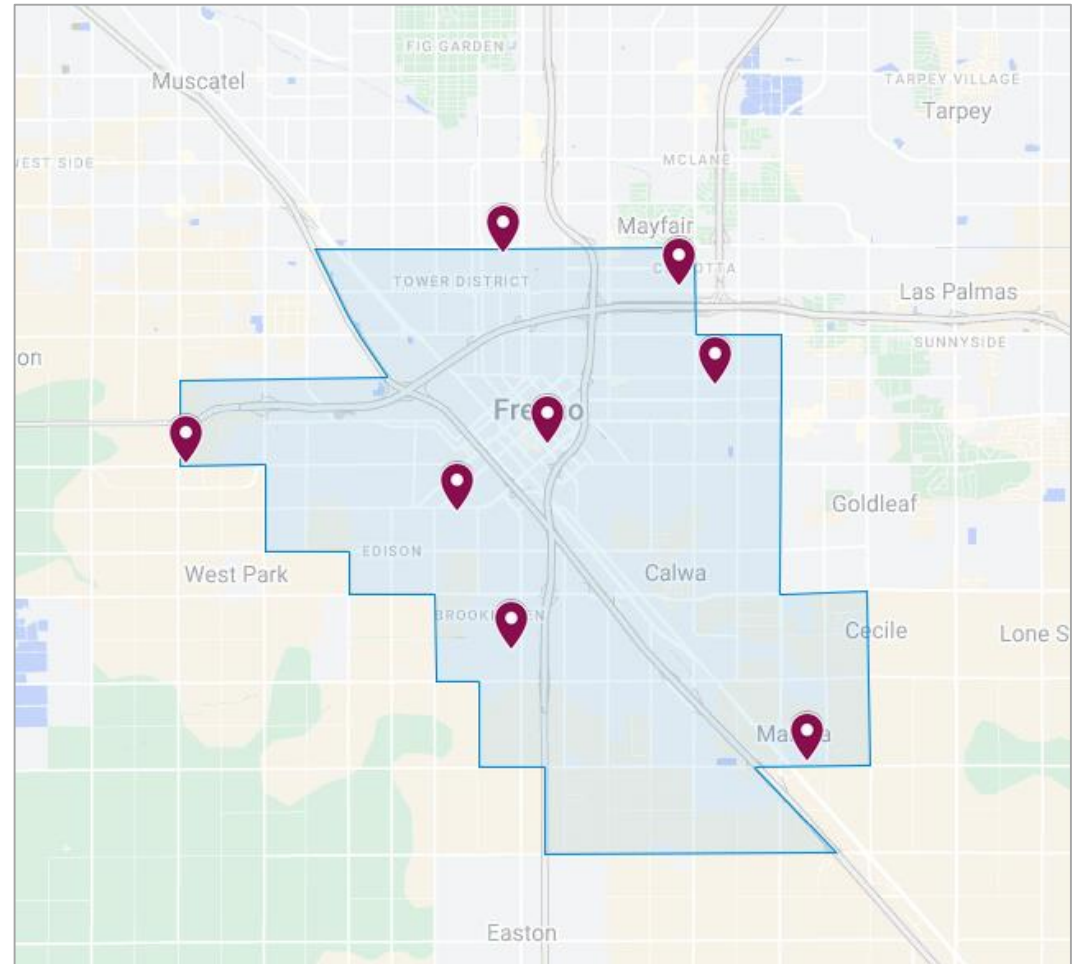
Request for Feedback

- Do you have questions about the data?

- Is AQview easy to use on both desktop computers and mobile devices?

- Do you have any ideas for additional features?

https://carb.mysocialpinpoint.com/aqview-feedback-ideas/ideas#/

Summary & Next Steps

- PM2.5 speciation sampling and analysis at Edison will continue
- Trends are typical for winter time with increases in Ammonium Nitrate
- Historical trends of woodburning tracers like Levoglucosan show winter time increases
- More data, community feedback, and analysis between District, CARB, & Desert Research Institute to further understand possible causes for increased PM2.5 in the community during winter
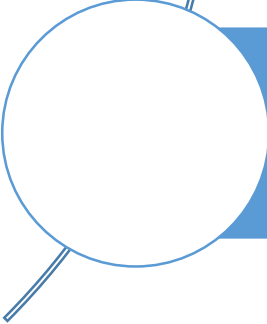
Questions for the Community

Did you receive alerts?

Do you think neighbors know how to check the air quality?

How can we make sure people are better prepared to protect their health?

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Comments/Questions?