Draft Update on South Central Fresno Community Air Monitoring
Borrador de Actualización Sobre el Monitoreo de Aire en la Comunidad de Centro-Sur Fresno

South Central Fresno CSC
Air Monitoring Subcommittee Meeting

Comité Directivo de Centro-Sur Fresno
Reunión del Subcomité de Monitoreo del Aire
November 1, 2022

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Air Monitoring Update
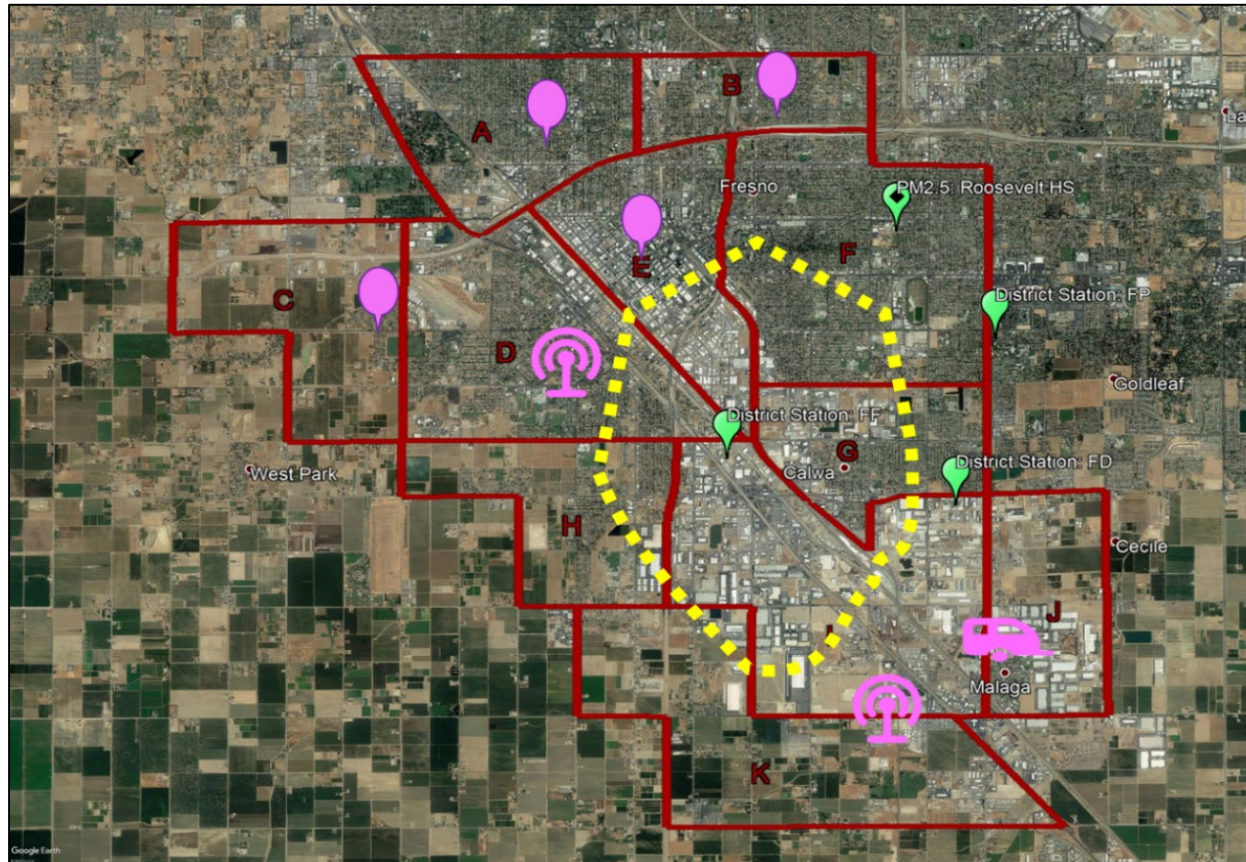## *Actualización del Monitoreo de Aire*

Air Monitoring Network Status

Analysis of Air Monitoring Data Collected

Enhancements to Website and Reports

Subcommittee Actions and Discussion with Schools

South Central Fresno
Community Air Monitoring Network Design
Diseño de la Red de Monitoreo del Aire de la Comunidad de Centro-Sur Fresno

CAMP Fully Deployed/ *CAMP Totalmente Implementado*

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

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Community Air Monitoring Platforms
Plataformas de Monitoreo del Aire Comunitario

Community Air Monitoring Platforms (cont'd)
Plataformas de Monitoreo del Aire Comunitario (continuado)

Community Air Monitoring Platforms (cont'd)
Plataformas de Monitoreo del Aire Comunitario (continuado)

Ongoing Community Air Monitoring
Monitoreo de Aire de la Comunidad en Curso

- 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

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CSC Comments from the July Meeting
Comentarios del Comité Directivo de la Reunión de Julio

|	Comments/Questions from July CSC		Comentarios/Preguntas del Comité Directivo de Julio
1	Presentation of speciation data using chemical names and not using acronyms	1	*Presentación de datos de especiación usando nombres químicos y no usando siglas*
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)	2	*Análisis adicional de los datos de monitoreo de aire de PM2.5 (p. ej., número de días en que las concentraciones excedieron el estándar de calidad del aire, comparaciones con los datos de monitoreo reglamentarios)*
3	Is there a way to distinguish the contributions from different biomass burning sources?	3	*¿Hay alguna manera de distinguir las contribuciones de diferentes fuentes de quema de biomasa?*
4	Are there different threshold levels for adults and children of air toxics?	4	*¿Hay diferentes niveles de umbral para adultos y niños de tóxicos del aire?*
5	What pesticide monitoring is planned for community?	5	*¿Qué monitoreo de pesticidas está planeado para la comunidad?*
6	Monitoring outside of the community, near N. Parkway Dr. and W. Olive Ave	6	*Monitoreo fuera de la comunidad, cerca de N. Parkway Dr. y W. Olive Ave.*

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24-hour Average PM2.5 Trend
Tendencia del Promedio de PM2.5 de 24 horas
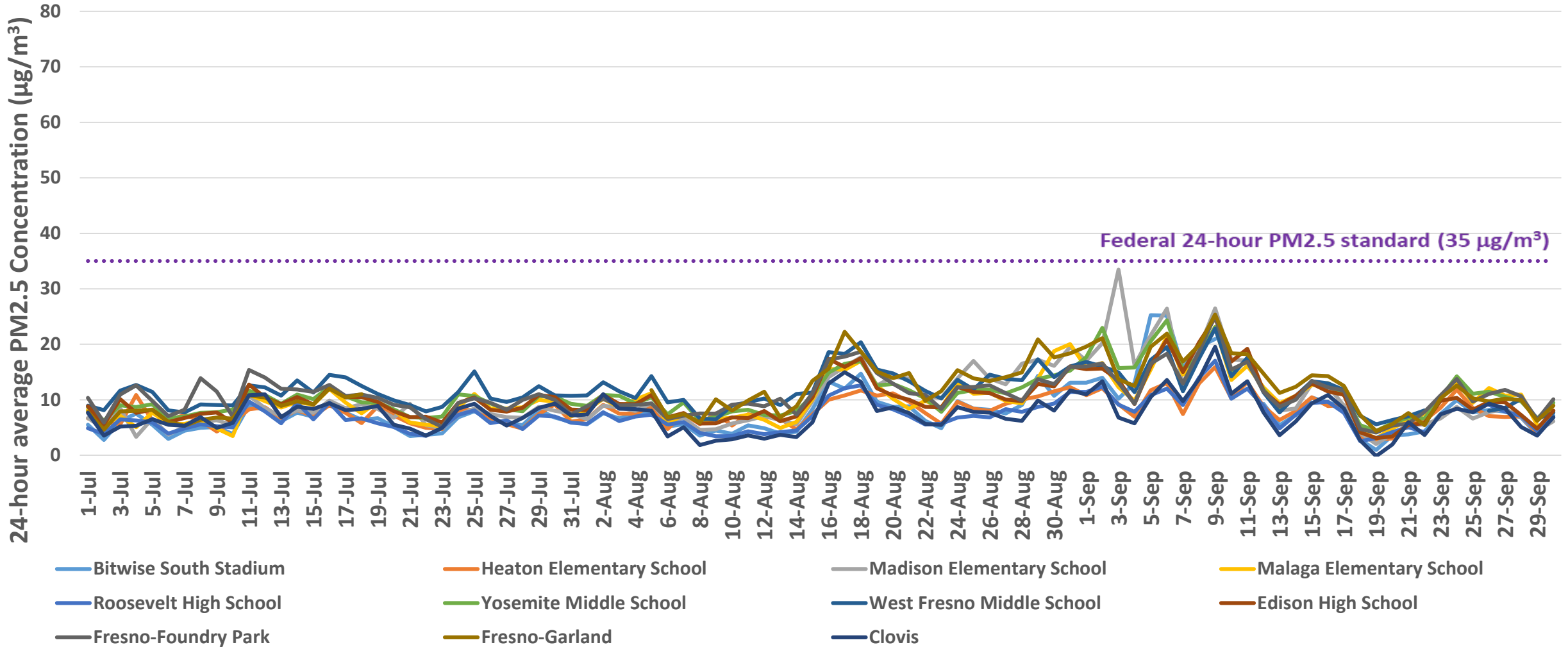
PM2.5 Monthly Average
Promedio Mensual de PM2.5

Need Clovis, Garland, Pacific

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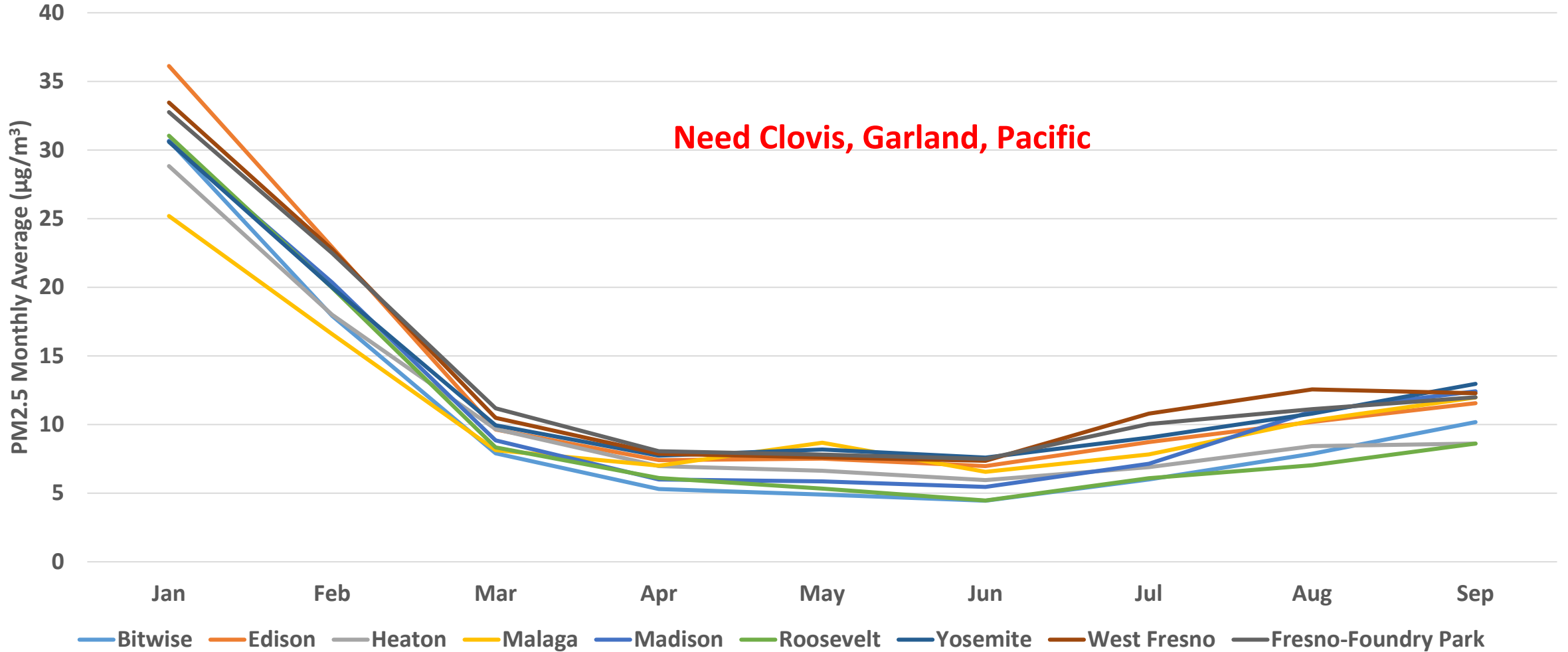
Annual Average PM2.5 Comparison
Comparación del Promedio Anual de PM2.5

Need Clovis, Garland, Pacific

12 µg/m³ Annual Standard

Annual Average PM2.5 Concentration (µg/m³)

Roosevelt High School | Bitwise South Stadium | West Fresno Middle School | Malaga Elementary School | Heaton Elementary School | Yosemite Middle School | Madison Elementary School | Edison High School | Fresno-Foundry Park

■ 2020   ■ 2021   ▨ 2022 YTD Average

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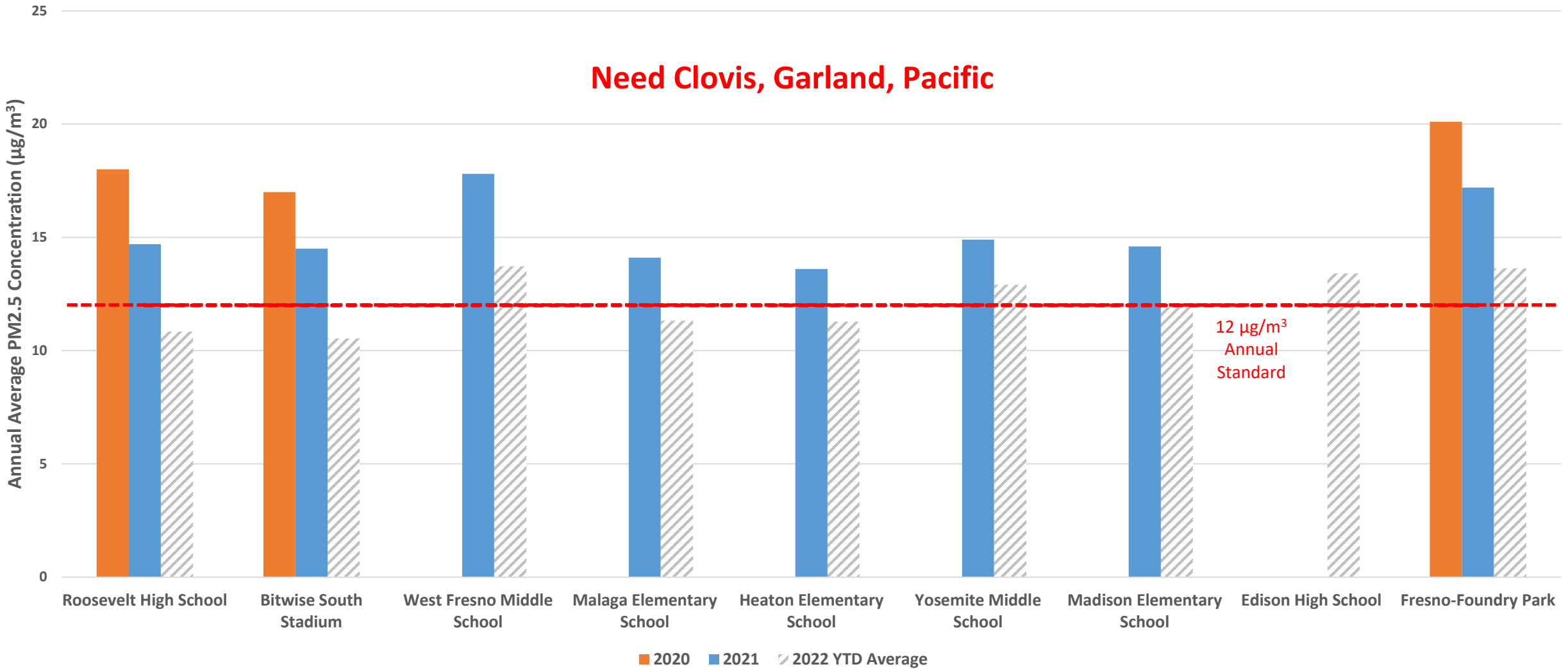
Annual Average PM2.5 Comparison (μg/m³)
Comparación del Promedio Anual de PM2.5 (μg/m³)

	2020	2021	2022 YTD
Fresno Community Monitors			
Roosevelt	18.0	14.7	10.8
Bitwise	17.0	14.5	10.5
West Fresno	-	17.8	13.7
Malaga	-	14.1	11.3
Heaton	-	13.6	11.3
Yosemite	-	14.9	12.9
Madison	-	14.6*	11.9
Edison	-	-	13.4
Nearby Regulatory Monitors			
Foundry	20.1	17.2	13.6

Site was not online for entire year

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Edison Pollution Rose
2022 YTD
Aumento la Contaminación de Edison 2022 del Año Hasta la Fecha

Site: Fresno_Edison
Parameter: PM2.5
Units: UG/M3

PM2.5
- < 13
- < 36
- < 56
- < 76
- < 150.5
- < 250.5
- < 350.5
- > 350.5

N 10.11%
NNW 15.56%
NNE 4.66%
NW 23.57%
NE 2.97%
WNW 14.07%
ENE 3.19%
W 0.34%
Calm 5.48%
E 4.22%
WSW 0.13%
ESE 6.86%
SW 0.1%
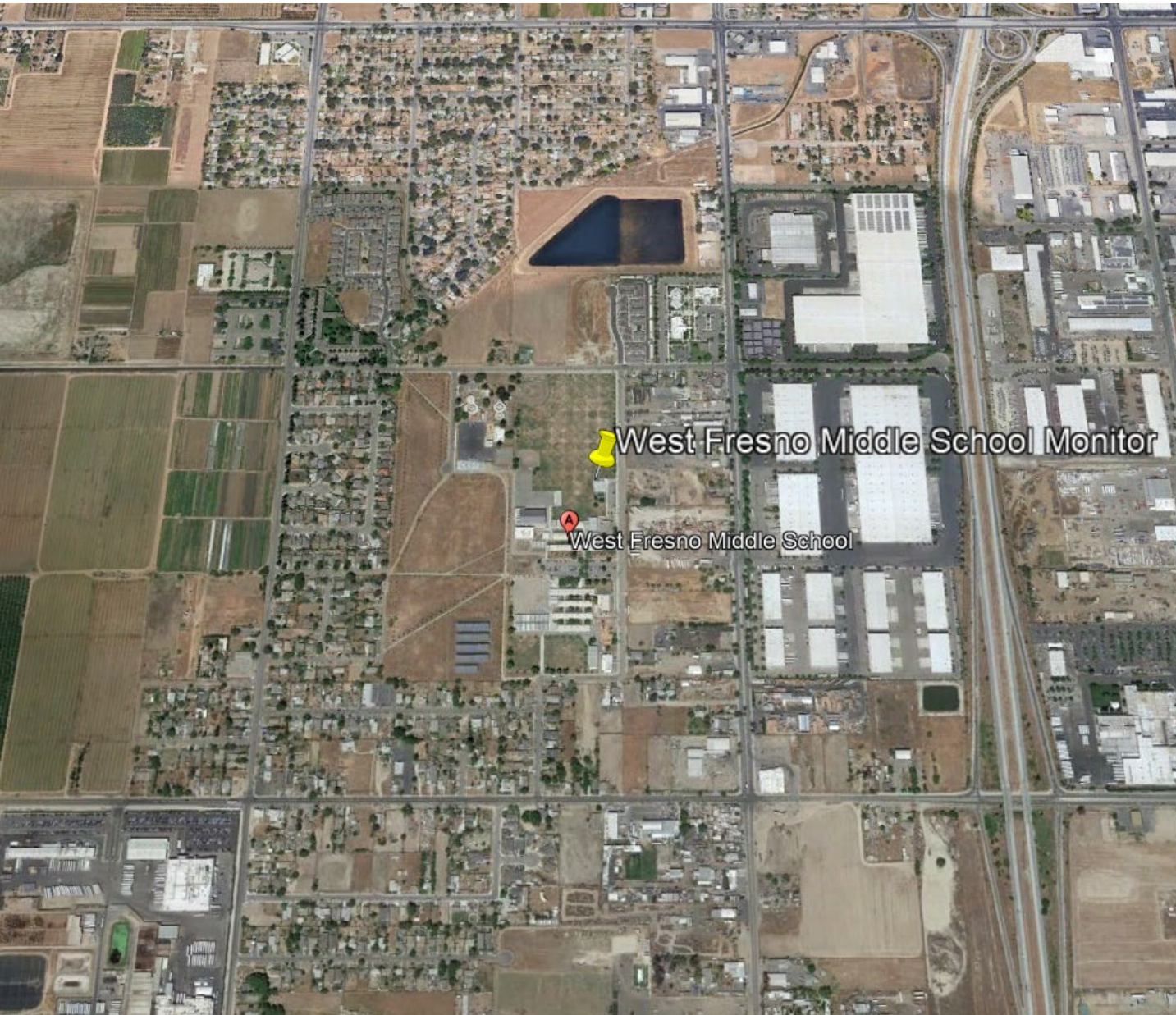SE 7.58%
SSW 0.13%
SSE 0.88%
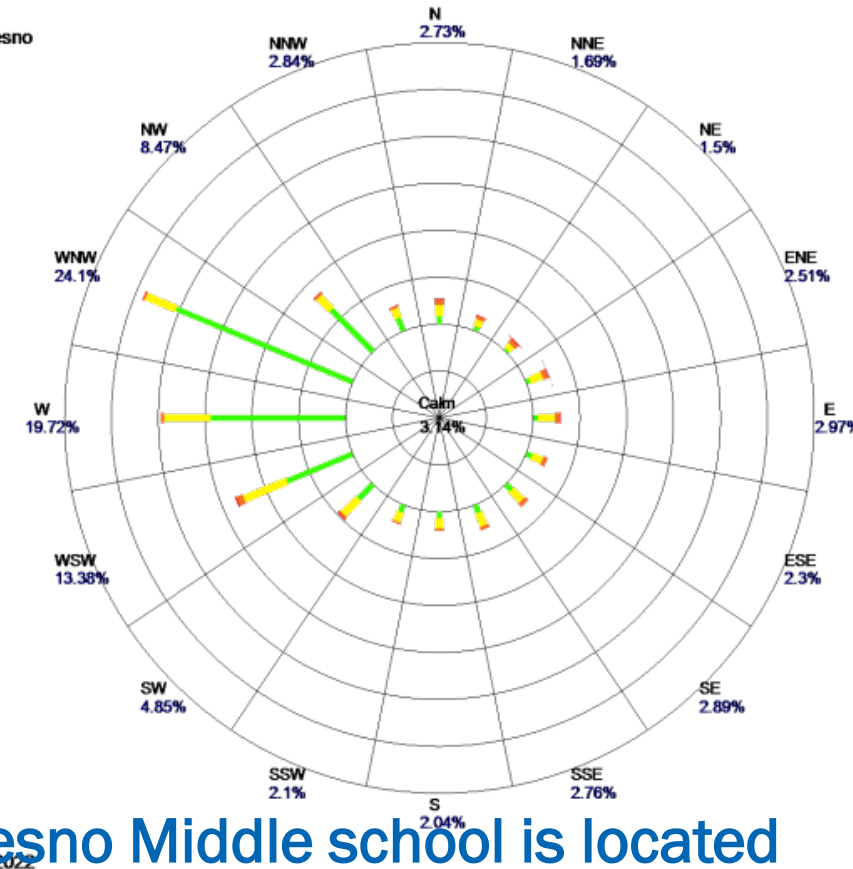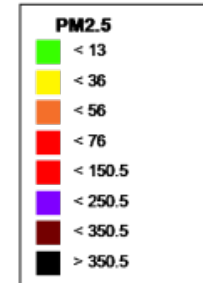S 0.23%
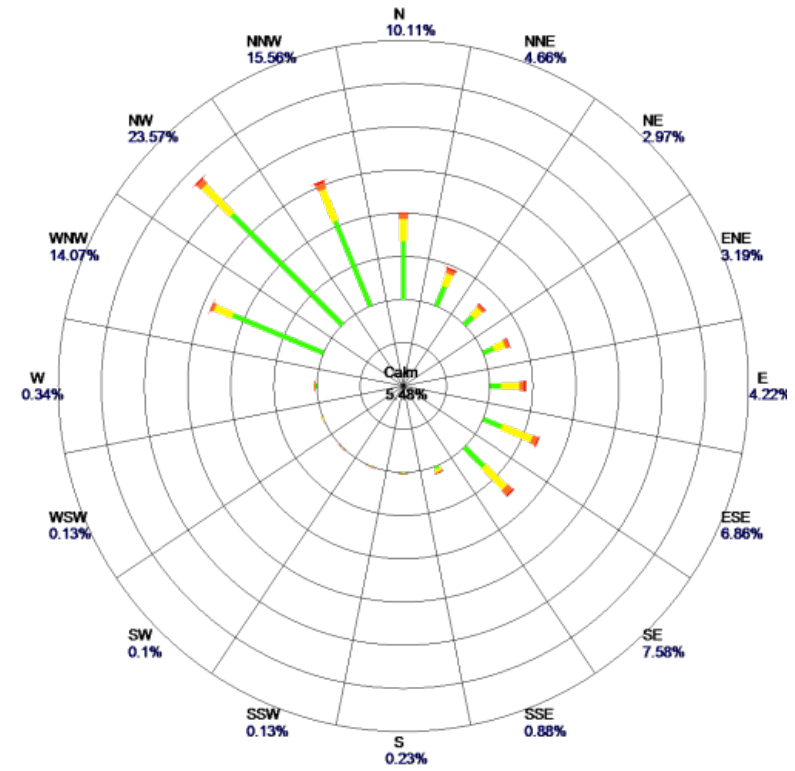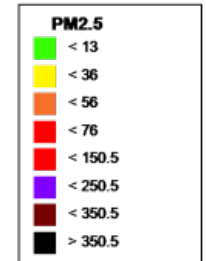
Period: 1/1/2022-9/30/2022

Residential areas surround Edison High School from the West Northwest to the Southeast

West Fresno Pollution Rose
2022 YTD
Aumento la contaminación del Oeste de
Fresno 2022 *del Año Hasta la Fecha*

Site: Fresno_West_Fresno
Parameter: PM2.5
Units: UG/M3

PM2.5
< 13
< 36
< 56
< 76
< 150.5
< 250.5
< 350.5
> 350.5

N 2.73%
NNW 2.84%
NNE 1.69%
NW 8.47%
NE 1.5%
WNW 24.1%
ENE 2.51%
W 19.72%
Calm 3.14%
E 2.97%
WSW 13.38%
ESE 2.3%
SW 4.85%
SE 2.89%
SSW 2.1%
SSE 2.76%
S 2.04%

Period: 1/1/2022-9/30/2022

West Fresno Middle school is located
near a residential area, vacant fields,
and an industrial area.

West Fresno Middle School Monitor

West Fresno Middle School

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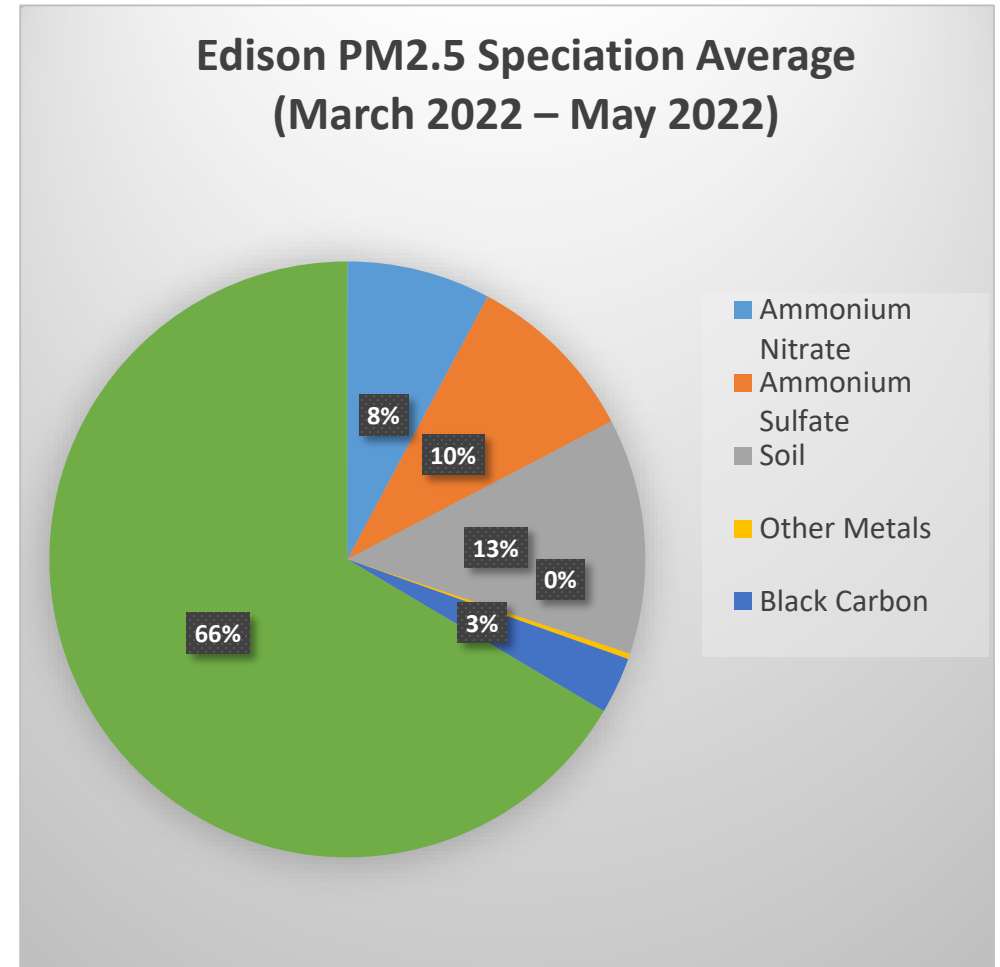# Number of Days Exceeding Daily PM2.5 Standard
Número de Días que Exceden el Estándar Diario de PM2.5
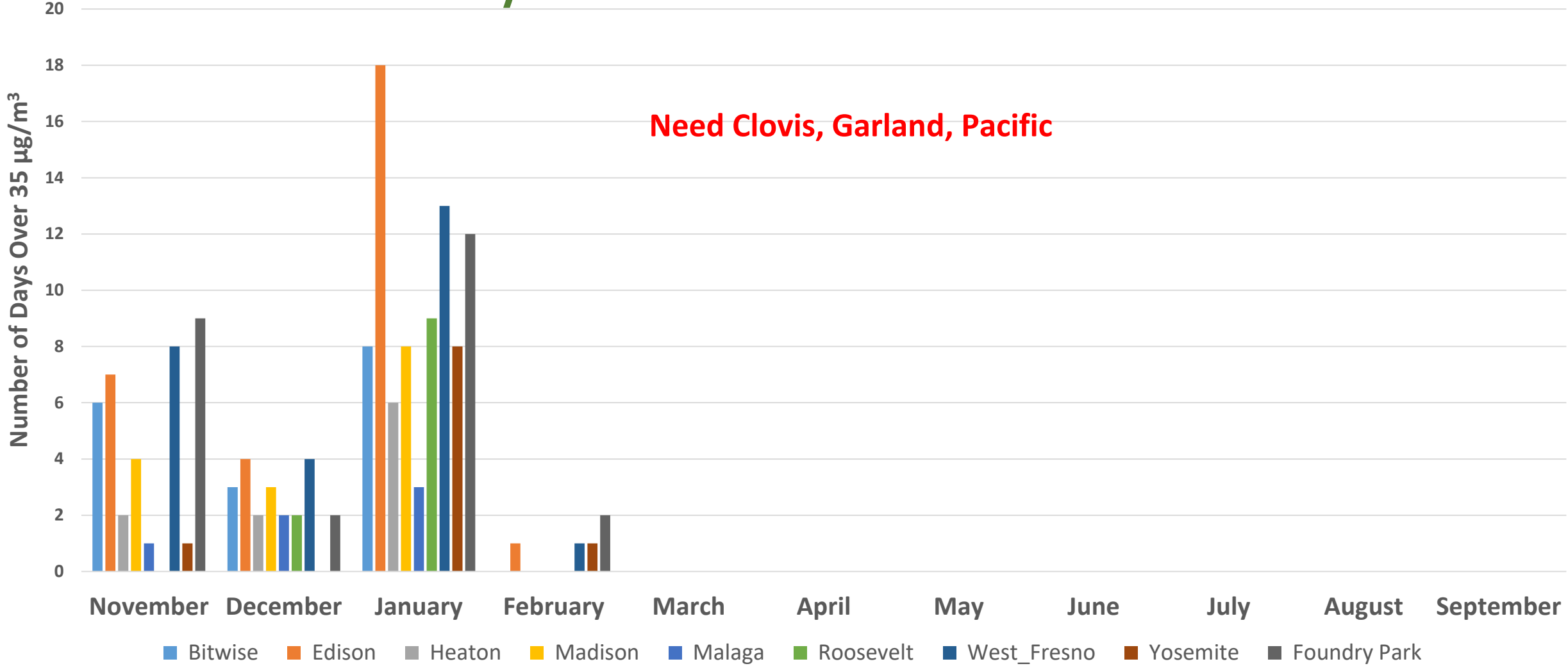
PM2.5 Speciation at Edison High School
Especiación de PM2.5 en Edison High School

- Began speciation in March 2022 to help assess potential sources of elevated PM2.5
- Lower PM2.5 concentrations recorded during this period
- Edison values more in-line with other sites outside of the winter season
- Planning to continue speciation monitoring and analysis through 2022-2023 winter season to observe potential differences
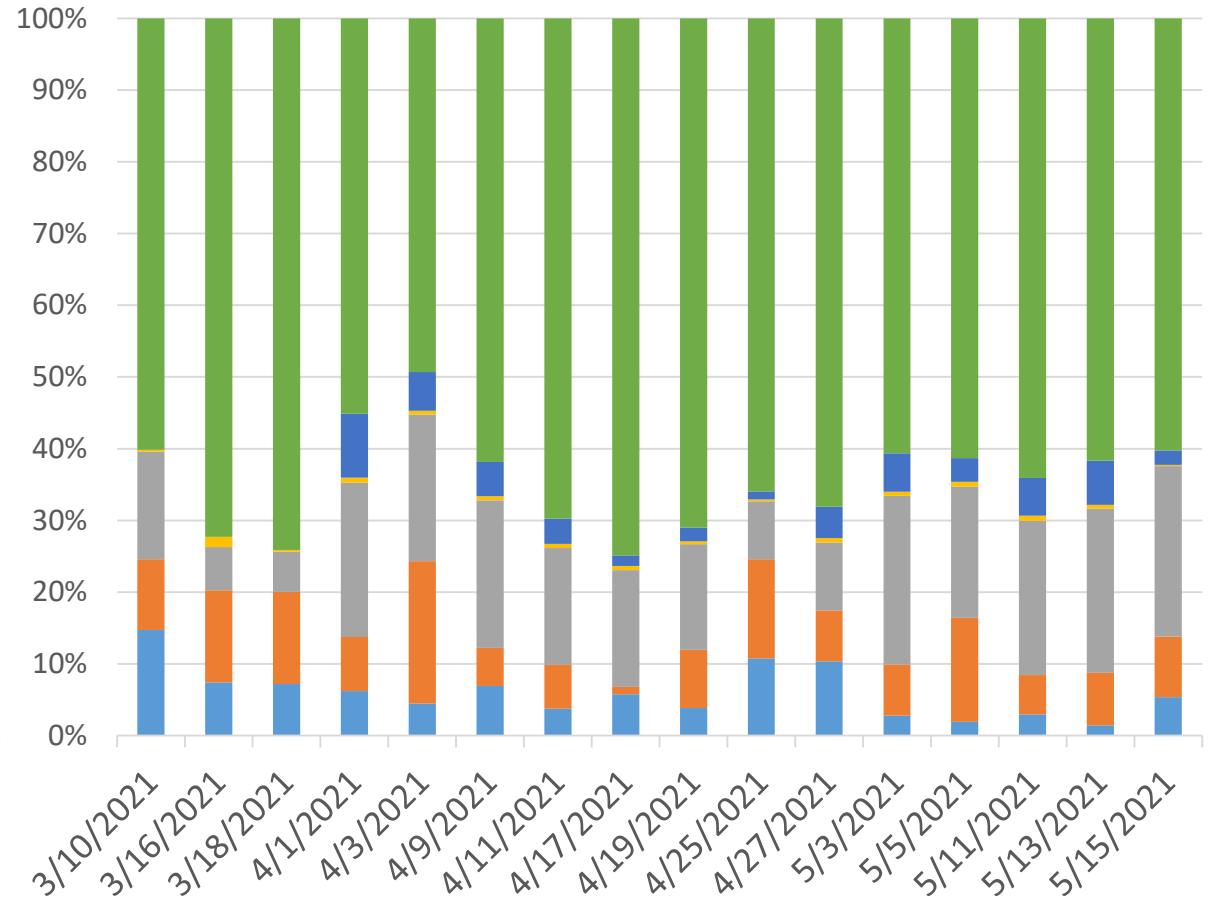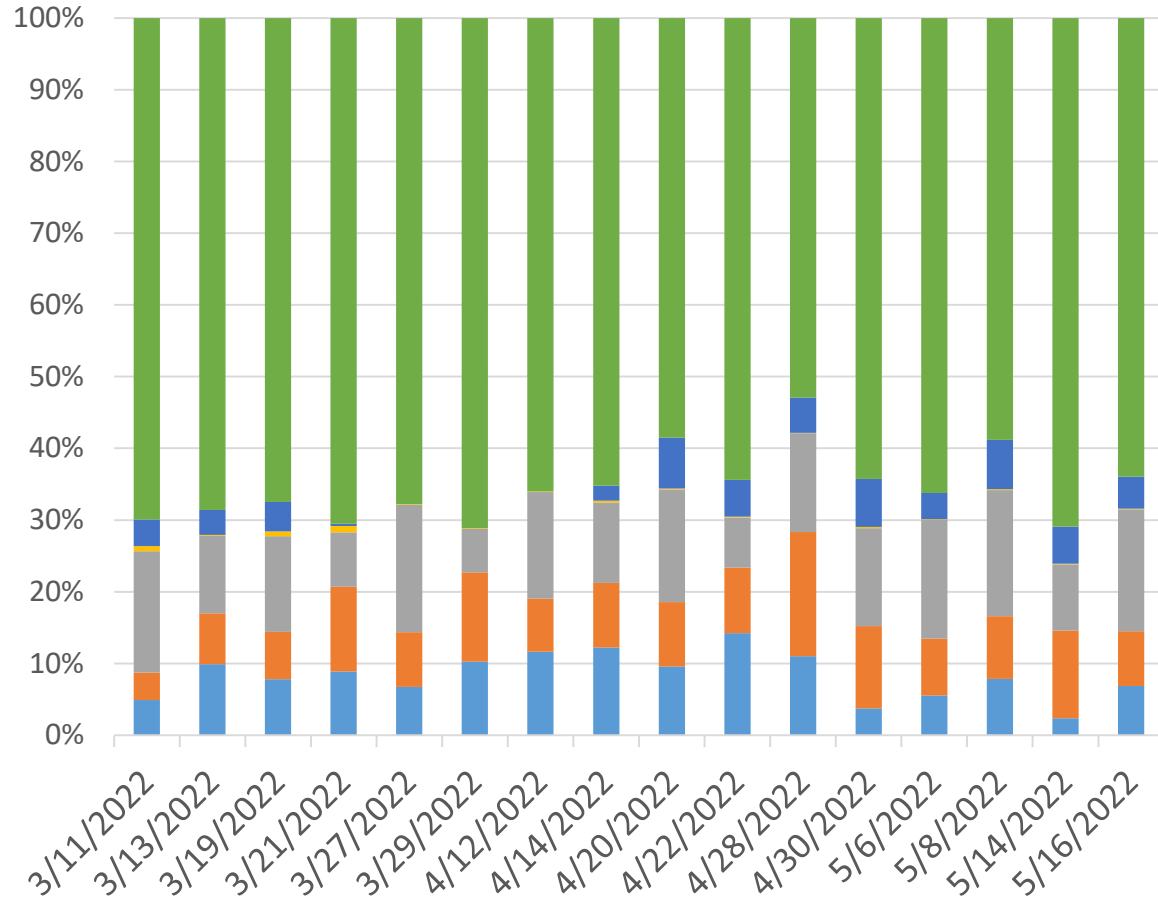- New lab contract includes analysis of levoglucosan as a wood-burning tracer chemical

Edison PM2.5 Speciation Average (March 2022 – May 2022)

Pie chart legend:
- Ammonium Nitrate — 8%
- Ammonium Sulfate — 10%
- Soil — 13%
- Other Metals — 0%
- Black Carbon — 3%
- (green) — 66%

PM2.5 Speciation Data Comparison
Comparación de Datos de Especiación de PM2.5
Edison High School (2022) | Malaga Elementary School (2021)

Ammonium Nitrate | Ammonium Sulfate | Soil | Other Metals | Black Carbon | Organic Carbon

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PM2.5 Speciation Data Comparison
Comparación de Datos de Especiación de PM2.5

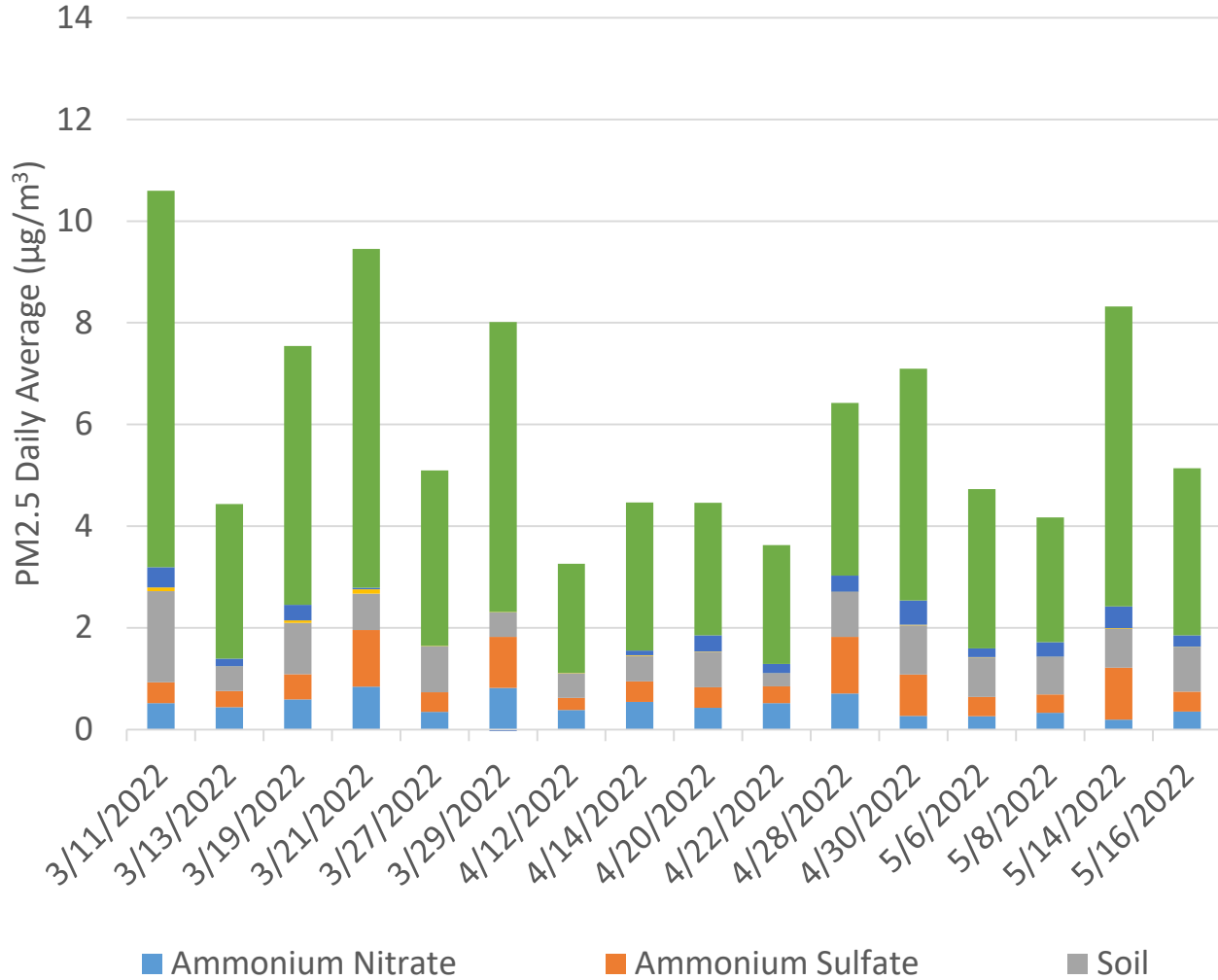
Edison High School (2022)

Malaga Elementary School (2021)

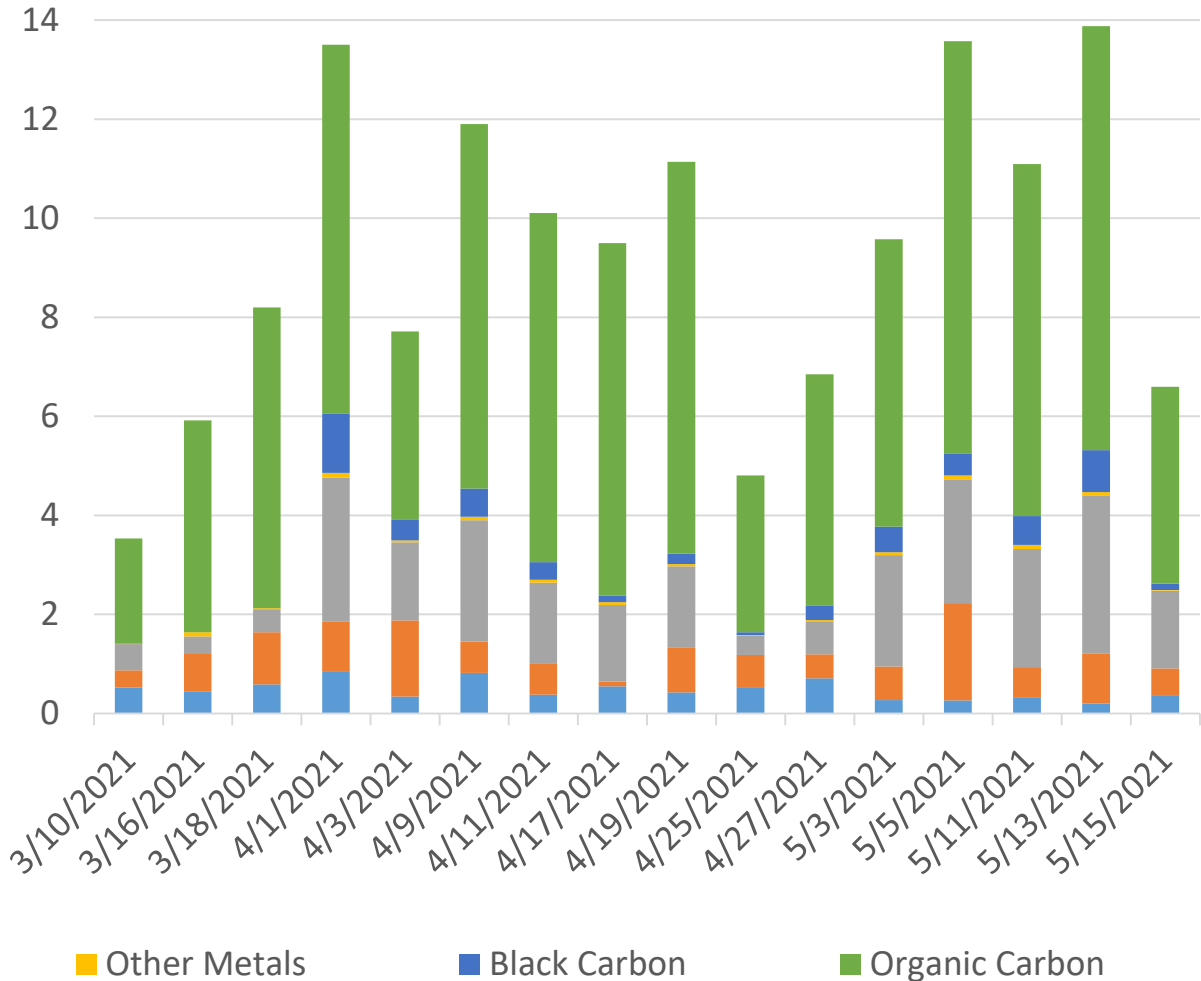Legend: ■ Ammonium Nitrate   ■ Ammonium Sulfate   ■ Soil   ■ Other Metals   ■ Black Carbon   ■ Organic Carbon
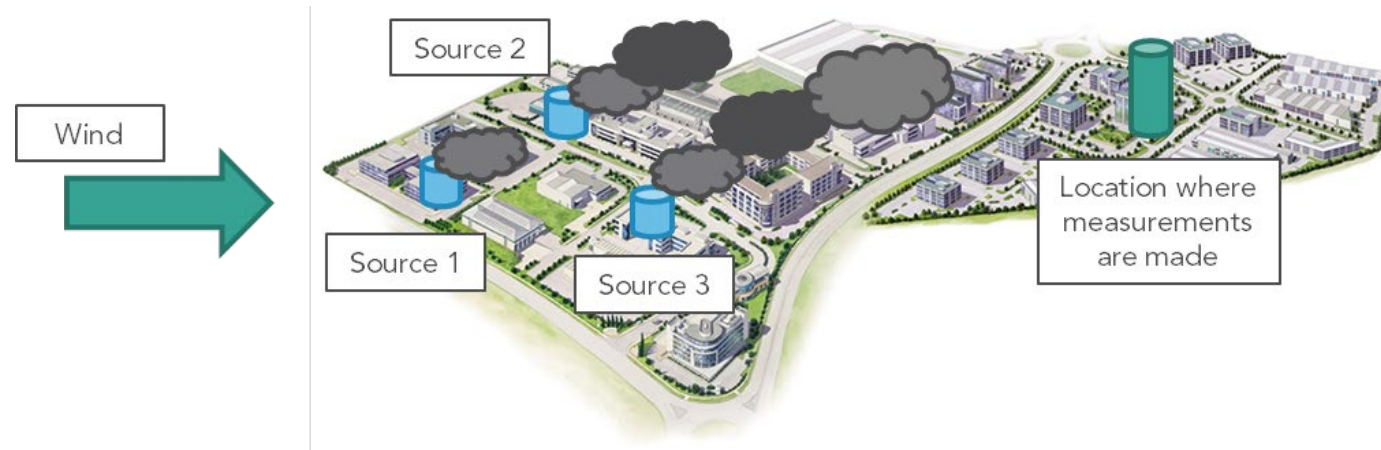
What is Source Apportionment?
¿Qué es la Distribución de Fuentes?

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 which specific sources or what types of sources affected the air quality at the location where the measurements were made

Data Needs for Source Apportionment Analysis
Necesidades de Datos para el Análisis de Distribución de Fuentes

First, we need the measurements:
- Location of measurements matter (e.g., meteorology)
- Different air pollutants can tell us about different sources
- Frequency and duration of measurements improve the results

These are needed as the input to the source apportionment model

Second, we need the uncertainties of those measurements:
- How accurate are these measurements?

Third, we run the source apportionment model:
- Statistical confidence building measures
- Model performance evaluation
- Data interpretation
- Supplemental data analysis (e.g., conditional probability function)

An Example of Source Apportionment Analysis
Un Ejemplo de Análisis de Reparto de Fuentes

- Two years of PM$_{2.5}$ monitoring at Fresno, CA using Aerosol Chemical Speciation Monitor (ACSM); Oct 2018 – May 2019

- Source apportionment of PM$_{2.5}$-ACSM resolved three source types:
  - Biomass burning (15%)
  - Fossil fuel combustion (12%)
  - PM$_{2.5}$ formed in the atmosphere (32%)

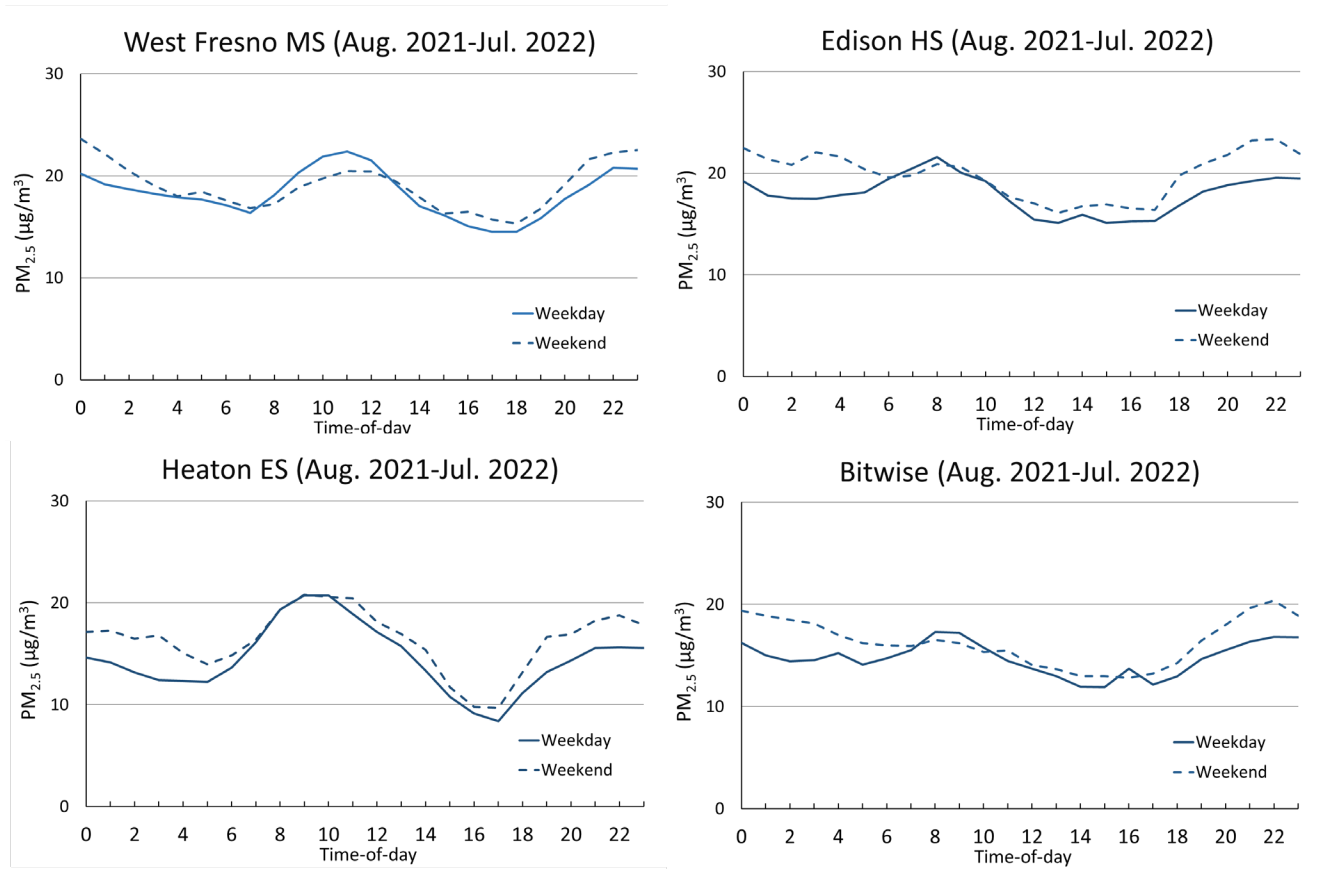- Similar analysis can be done for VOC measurements (including air toxics)
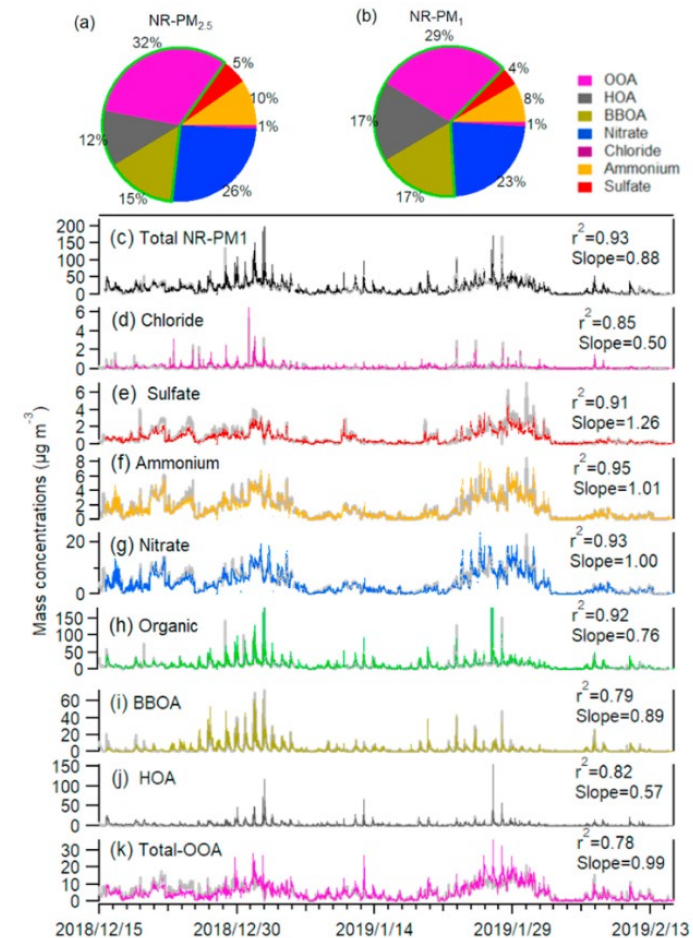
Sun et al. 2022, Environmental Pollution

Variations of PM2.5 During the Day (Yearly Data)
Variaciones de PM2.5 Durante el Día (Datos Anuales)

August 2021 – July 2022

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

Edison HS (Aug. 2021-Jul. 2022)

Heaton ES (Aug. 2021-Jul. 2022)
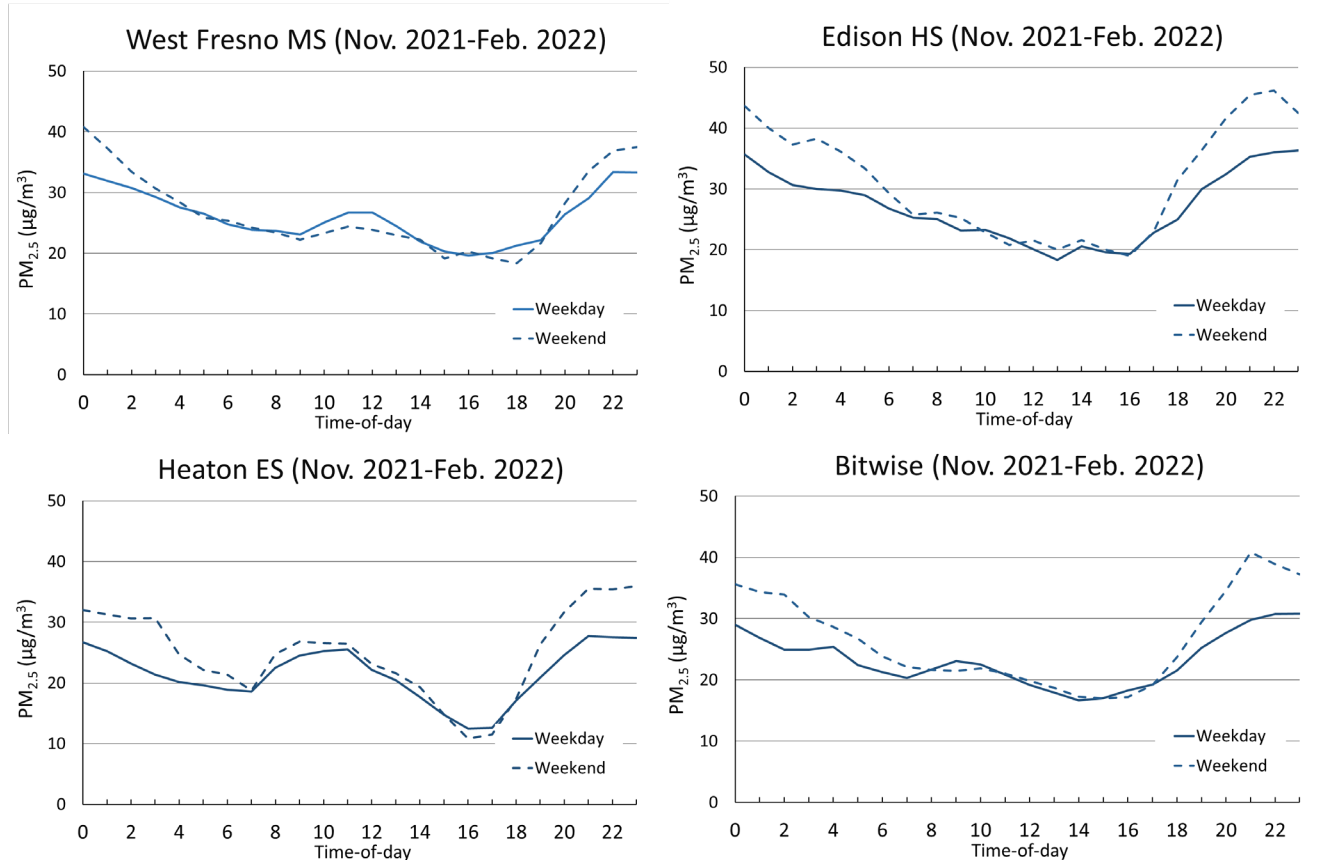
Bitwise (Aug. 2021-Jul. 2022)

- Data analyzed for four sites:
  - High $PM_{2.5}$: West Fresno MS and Edison HS
  - Low $PM_{2.5}$: Heaton ES and Bitwise
- General patterns – two peaks:
  - 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 peak at West Fresno MS and Bitwise on weekdays
  - Higher nighttime concentrations at all four sites on weekends

Variations of PM2.5 During the Day (Winter Data)
Variaciones de PM2.5 Durante el Día (Datos de Invierno)

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

Comments/Questions?
¿Comentarios/Preguntas?