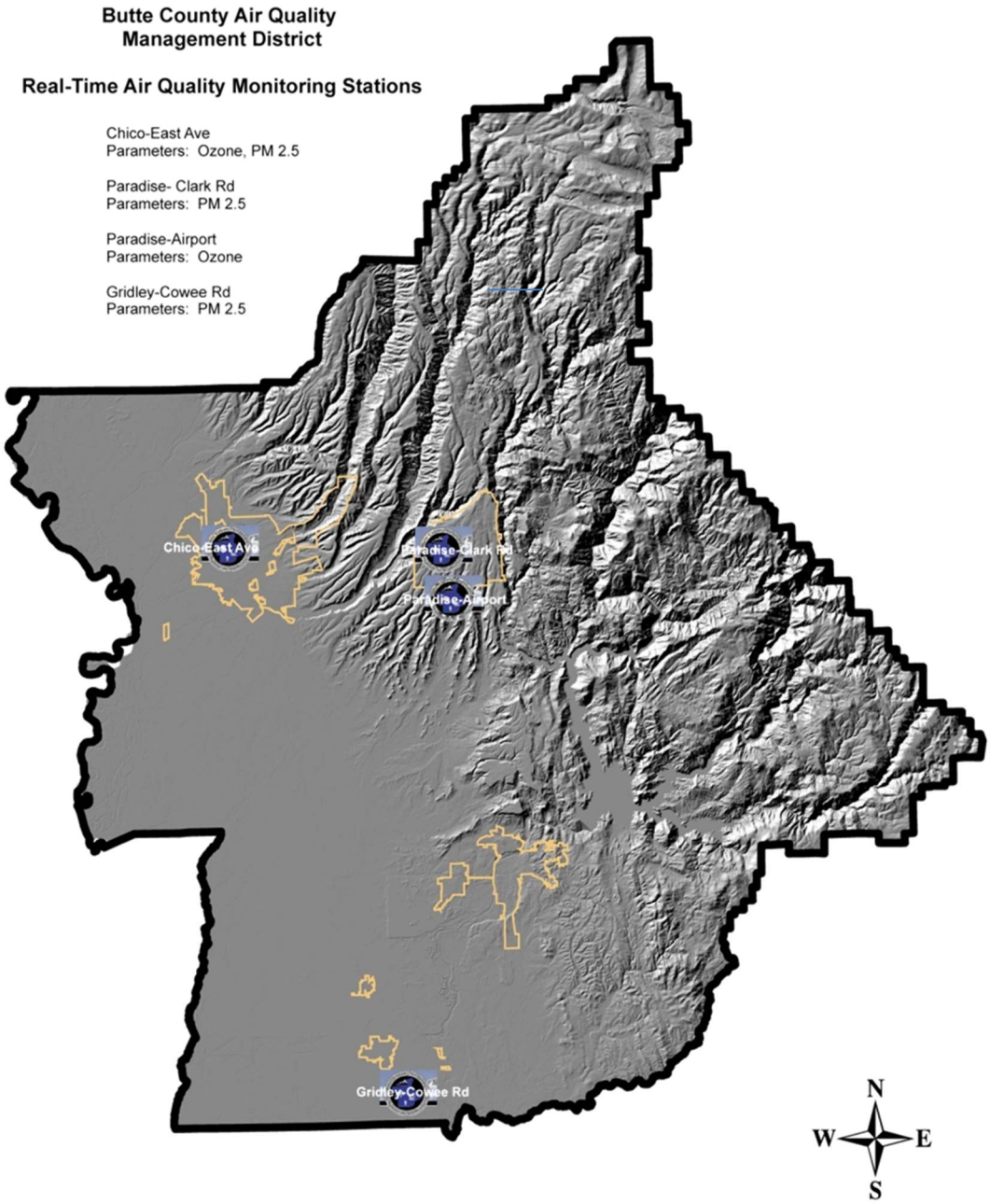
BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT

Air Quality Summary for 2023
and
2023 – 2024 Check Before You Light Program Summary

The following is a summary of Butte County's air quality for 2023 and a summary of the 2023-2024 Check Before You Light Program. This document gives the reader an overview of the two (2) criteria pollutants of greatest concern - ozone (O_3) and particulate matter ($PM_{2.5}$ and PM_{10}). The data was obtained from the official air monitoring sites located within Butte County. $PM_{2.5}$ is monitored in Chico, South Butte County southeast of Gridley, and Paradise. Ozone is monitored in Chico and Paradise. PM_{10} is only monitored in Chico. Official air monitoring in Butte County is conducted by the California Air Resource Board (CARB).



The **Ambient Air Quality Standards** establishes the concentration at which a pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. Both the California and federal governments have adopted health-based standards for the *criteria pollutants*, which for this report include Ozone and $PM_{2.5}$. In general, the air quality standards are expressed as a measure of the amount of pollutant per unit of air. For example, the ozone standards are expressed as parts per million (ppm) and the particulate matter standards are expressed as micrograms of particulate matter per cubic meter of air (ug/m3).

Ozone

Ozone is a colorless gas with a pungent odor. It is the chief component of urban smog. The name "smog" was created from the words smoke and fog. Ozone is not directly emitted as a pollutant but is formed in the atmosphere when reactive organic gases (ROG) and nitrogen oxides (NO_x) precursor emissions react in the presence of sunlight. Meteorology and terrain play major roles in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and cloudless skies provide for the optimum conditions. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often impacts a widespread area. The largest contribution of ozone-forming pollution that is transported to Butte County comes from vehicle emissions in urban areas to the south. Wildfires can also create emissions that increase ozone concentrations. Ozone concentrations tends to peak where the subsidence inversion above the Sacramento Valley meets the foothills of the Sierra Nevada mountains. This is the reason why ozone concentrations at the Paradise monitoring station are historically higher than the Chico monitoring station.

Ozone impacts lung function by irritating and damaging the respiratory system. In addition, ozone causes damage to vegetation, buildings, rubber, and some plastics. Recognizing the health impacts of daylong exposure, the United States Environmental Protection Agency (U.S. EPA) promulgated an 8-hour ozone standard in 1997 as a successor to the 1-hour standard, which was established in 1979. EPA revised the 8-hour federal standard in 2008 and again in 2015. CARB approved an 8-hour ozone state standard on April 28, 2005, which became effective in early 2006. Table 1 shows the State and National Ozone Standards effective in 2022.

TABLE 1
AMBIENT AIR QUALITY STANDARDS - OZONE

State Ozone Standard:	**National Ozone Standards:**
0.09 ppm for 1 hour,	---
not to be exceeded.	0.070 ppm for 8 hours, not to be exceeded.
0.07 ppm for 8 hours.	Based on the fourth highest concentration averaged over three years.*
not to be exceeded.	* Federal 8-hour ozone standard revised October 2015.

Butte County was officially designated marginal nonattainment for the 2015 federal ozone standard in 2018 by the U. S. EPA. August 2021 was the deadline for marginal areas to attain the 2015 federal ozone standard. U.S. EPA took final action in October 2022 to determine that Butte County met the 2015 federal ozone standard by the required deadline.

Table 2 shows the ozone air quality summary for 2023 and Figures 1 & 2 (attached) graphically show the maximum 8-hour measurements for each day in Chico and Paradise. CARB installed a new ozone monitor in Paradise on Clark Road while continuing to use the existing Airport monitor. The Paradise-Airport ozone monitor is considered the monitor of record for 2023, however the new Paradise-Clark Road monitor will become the monitor of record in Paradise for future years. Based on preliminary data, monitors in Chico

and Paradise did not exceed the 2015 federal 8-hour ozone standard in 2023. This is also the first time since ozone monitoring began in Butte County (1976) where the 2015 federal 8-hour ozone standard was not exceeded two years in a row. CARB designated Butte County as nonattainment-transitional for the California Ambient Air Quality Standard for ozone in January 2024.

TABLE 2
BUTTE COUNTY OZONE AIR QUALITY DATA SUMMARY 2023
(data is still preliminary as of April 2024)

	Chico	**Paradise (Airport)**
Max. 1-Hour Ozone Measurement Date	0.075 ppm 7/1/2023	0.075 ppm 10/20/2023
Days Above State Std. (0.09ppm)	**0**	**0**
Max. 8-Hour Ozone Measurement	0.068 ppm (tie) 7/19/2023 7/20/2023	0.07 ppm 10/20/2023
4th Highest 8-Hour Ozone Measurement (used for calculating Design Value)	0.066 ppm	0.066 ppm
Days Above State Std. (0.07ppm) – *rounding differs from Fed. Std.*)	**0**	**0**
Days Above 2015 Fed. Std. (0.07ppm)	**0**	**0**

Particulate Matter ($PM_{2.5}$)

Particulate Matter ($PM_{2.5}$) refers to particles with an aerodynamic diameter of 2.5 microns or smaller. For comparison, the average diameter of a human hair is about 70 microns. $PM_{2.5}$ is a mixture of substances that can include elements such as carbon, lead, and nickel; compounds such as nitrates, organic compounds, and sulfates; and complex mixtures such as diesel exhaust and soil. These substances occur in the form of solid particles or as liquid droplets. Some particles are emitted directly into the atmosphere. Other particles, referred to as secondary particles, result from gases that are transformed into particles through physical and chemical processes in the atmosphere. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from construction and demolition, residential fuel combustion (woodstoves and fireplaces), and open burning.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NOx, sulfur oxides (SOx), ROG, and ammonia. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 70 percent of the ambient $PM_{2.5}$ in the Sacramento Valley Air Basin.

The fine particles pose an increased health risk because they can deposit deep in the lung and contain substances that are particularly harmful to human health; therefore, this report will look at $PM_{2.5}$ data and trends. Table 3 shows the State and National $PM_{2.5}$ standards effective in 2023. In early 2024, US EPA updated the annual $PM_{2.5}$ standard from 12 µg/m3 to 9 µg/m3.

TABLE 3
AMBIENT AIR QUALITY STANDARDS – $PM_{2.5}$

State $PM_{2.5}$ Standards: 12 µg/m^3 annual arithmetic mean not to be exceeded.	**National $PM_{2.5}$ Standards:**35 µg/m^3 for 24 hours, not to be exceeded, based on the 98th percentile concentration averaged over three years and 12 µg/m^3 annual arithmetic mean averaged over 3 years.

Butte County has continued to meet the federal $PM_{2.5}$ standard since 2013 when the U. S. EPA officially recognized that Butte County's monitoring data showed attainment of the standard. The U. S. EPA approved a $PM_{2.5}$ Redesignation Request and Maintenance Plan effective August 2018. CARB designated Butte County as attainment for the California Ambient Air Quality Standard for $PM_{2.5}$ in January 2024.

Table 4 shows the Chico, Paradise, and South Butte County $PM_{2.5}$ monitoring summary for 2023. The Chico air monitoring station includes a continuous $PM_{2.5}$ monitor known as a Beta Attenuation Monitor (BAM). This monitor has been approved as a federal equivalency method (FEM) monitor and therefore can be used for determining attainment with the federal $PM_{2.5}$ standards. Paradise and South Butte County monitor $PM_{2.5}$ using a non-FEM BAM. This data is useful for public reporting and understanding diurnal and episodic behavior of fine particles, background monitoring, and transport assessment. The Paradise-Theater monitoring location was closed by CARB in July 2023 and moved to the new Paradise-Clark Road location to be co-located with the ozone monitor.

TABLE 4
BUTTE COUNTY $PM_{2.5}$ AIR QUALITY DATA 2023
(data is still preliminary as of April 2024)

	Chico (FEM)	Paradise (Non-FEM)	South Butte Co. (Non-FEM)
Max 24-Hour $PM_{2.5}$ Measurement Date	35.4 ug/m3 8/29/2023	22.9 ug/m3 6/14/2023	33.1 ug/m3 12/10/2023
98th Percentile 24-Hour $PM_{2.5}$ Value (used for calculating Design Value)	21.7 ug/m3	n/a	n/a
Days Above Fed. Std. (35 ug/m3)	**0**	**0**	**0**
Annual Average	7.8 ug/m3	n/a	n/a

Figures 3, 4, and 5 (attached) charts the 2023 $PM_{2.5}$ 24-hour average data for Chico, Paradise, and South Butte County respectively. There were no exceedances of the federal $PM_{2.5}$ standards at any monitor in Butte County in 2023. Portions of Butte County experienced short-term wildfire smoke impacts in late August 2023 due to wildfires burning in far northwest California and southwest Oregon.

Particulate Matter (PM_{10})

Particulate Matter (PM_{10}) refers to particles with an aerodynamic diameter of ten (10) microns or smaller. This measurement of particulate matter captures $PM_{2.5}$ discussed above as well as coarser particulates that may still pose risks to human health at elevated concentrations. PM_{10} includes larger particulates like dust from disturbed soil, rock crushing, traffic on dirt roads, or high wind events. Table 5 shows the State and National PM_{10} standards.

TABLE 5
AMBIENT AIR QUALITY STANDARDS – PM_{10}

State PM_{10} Standards: 20 µg/m³ annual arithmetic mean not to be exceeded. 50 µg/m³ for a 24-hour average not to be exceeded.	**National PM_{10} Standard:** 150 µg/m³ not to be exceeded more than once per year on average over 3 years.

The Chico monitoring location has the only permanent PM_{10} monitor in Butte County. Table 6 shows the Chico PM_{10} monitoring summary for 2023. The Chico air monitoring station includes a continuous PM_{10} BAM that has been approved as a federal equivalency method (FEM) monitor, and therefore can be used for determining attainment with the federal PM_{10} standards.

TABLE 6 BUTTE COUNTY PM_{10} AIR QUALITY DATA 2023 *(data is still preliminary as of April 2024)*	
	Chico (FEM)
Max 24-Hour PM_{10} Measurement Date	78.6 ug/m3 9/22/2023
Days Above Fed. Std. (150 µg/m^3)	**0**
Days Above State Std. (50 µg/m^3)	**15**
Annual Average	**21.5 µg/m^3**

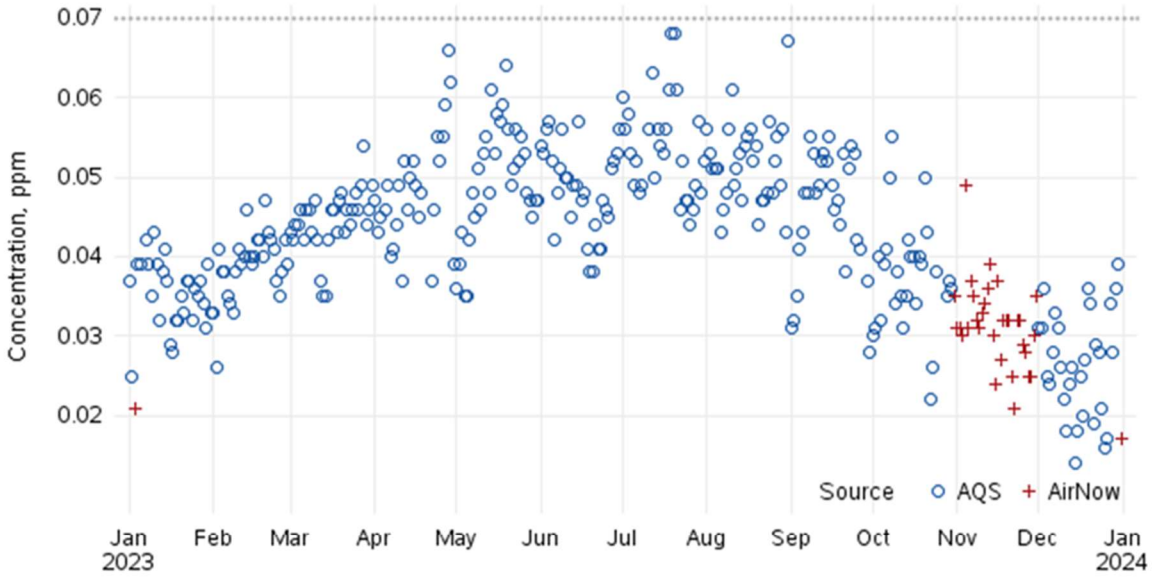
Although smoke transported from wildfires and dust generated during harvest season can lead to exceedances of the State PM_{10} standard, most exceedances in 2024 were the result of construction activities generating localized dust at McMannus Elementary School and along East Avenue next to the monitoring station.

2023-2024 Check Before You Light Program Season

The 2023-2024 Check Before You Light (CBYL) Program was effective November 1, 2023 through February 29, 2024. The CBYL Program requests that the public voluntarily refrain from using woodstoves and fireplaces when an area in Butte County is expected to exceed the federal 24-hr $PM_{2.5}$ health standard (35ug/m3). These conditions generally occur on cold winter nights with little air movement and strong inversions. The federal standard is also the threshold for the Air Quality Index (AQI) level of 101 which is considered Unhealthy for Sensitive Groups. People with respiratory or heart disease, the elderly and children are the groups most at risk. Advisories are issued for the following day based on air quality and meteorological data measured in Chico, Gridley, and Paradise. When advisories are issued for the Chico area a mandatory no-burn ordinance adopted by the Chico City Council restricts burning in non-EPA certified wood burning devices within the city limits.

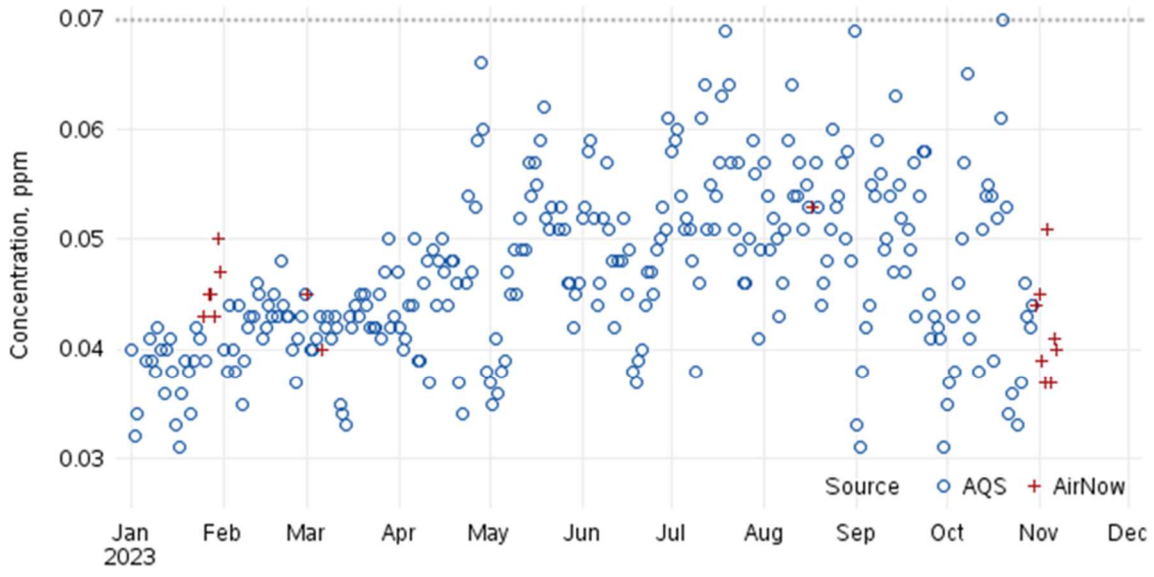
There were no advisories issued for the 2023-2024 CBYL season. There were also no exceedances of the federal 24-hr $PM_{2.5}$ standard at the Chico, Paradise, or South Butte County monitoring locations during the 2023-2024 CBYL season. The was the third season in a row with these conditions (Figure 7).

Figure 1 - 2023 Air Quality Summary: Daily Max 8-Hour Ozone Concentrations – Chico, CA (East Avenue)



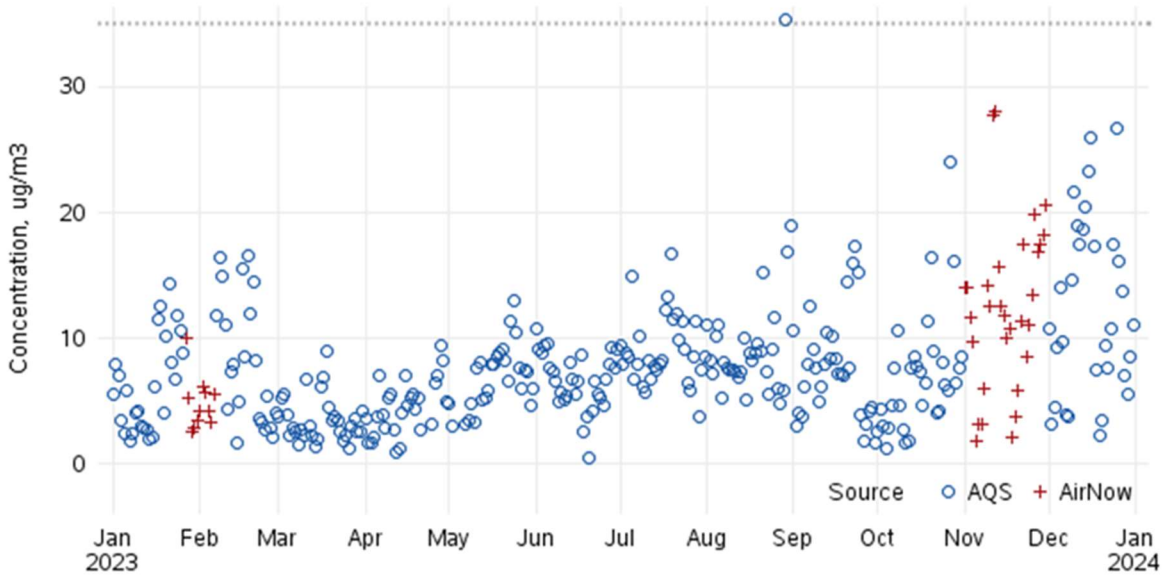
Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 2 - 2023 Air Quality Summary: Daily Max 8-Hour Ozone Concentrations – Paradise, CA (Airport)



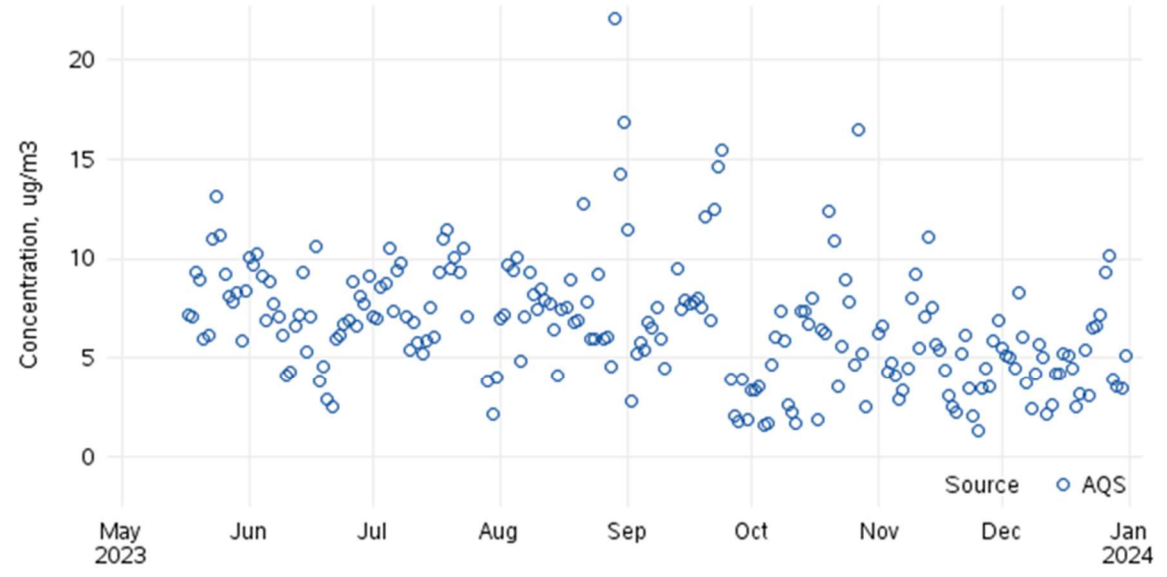
Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 3 - 2023 Air Quality Summary: 24-hour Average PM2.5 Measurements – Chico, CA (East Avenue)



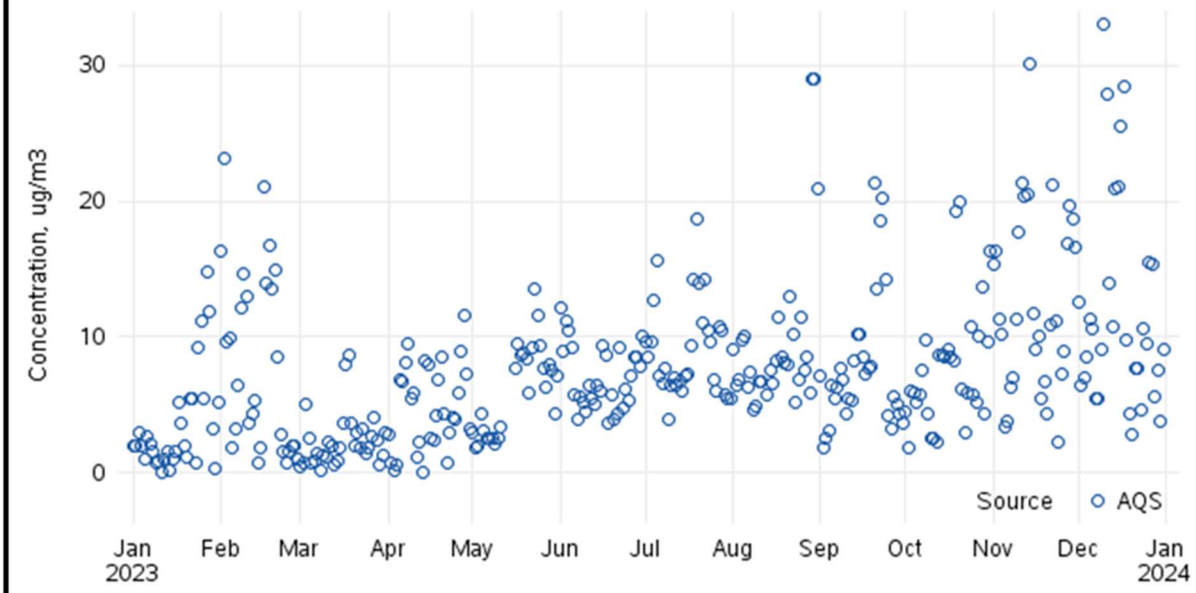
Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 4 - 2023 Air Quality Summary: 24-hour Average PM2.5 Measurements – Paradise, CA (Clark Road)



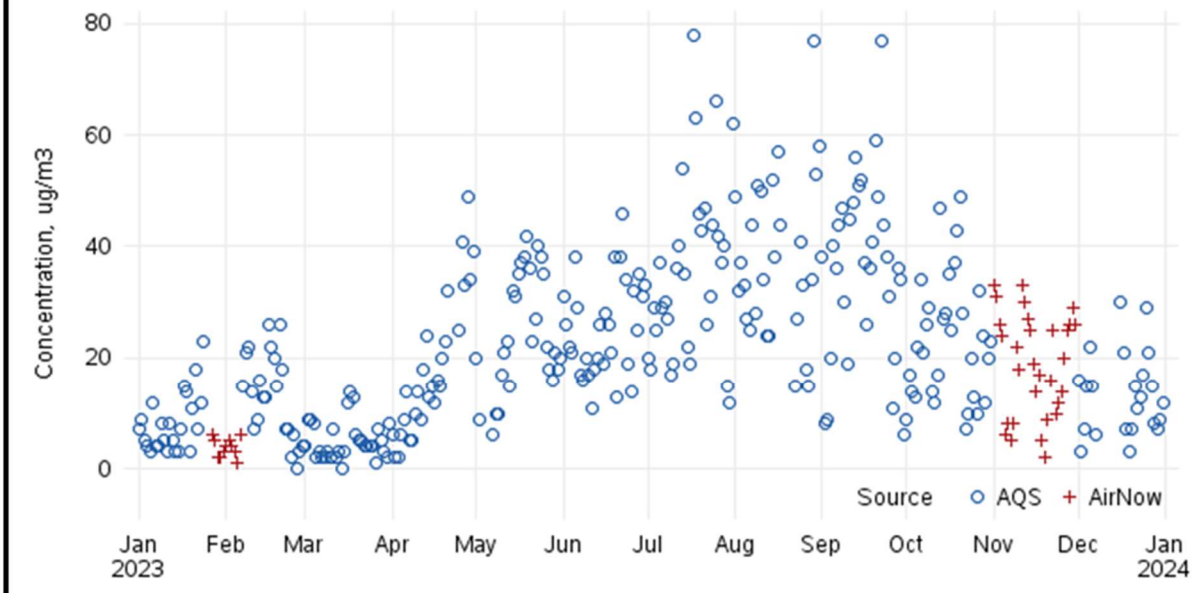
Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 5 - 2023 Air Quality Summary: 24-hour Average PM2.5 Measurements – South Butte County (Cowee Avenue)



Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 6 - 2023 Air Quality Summary: 24-hour Average PM10 Measurements – Chico, CA (East Avenue)



Source: U.S. EPA AirData <https://www.epa.gov/air-data>
Generated: April 12, 2024

Figure 7 – Number of Exceedances of the Federal PM2.5 24-hr Standard in Chico & Number of CBYL Advisories