Introduction to $PM_{2.5}$ and Arizona's Draft Boundary Recommendations for the 2024 Primary Annual $PM_{2.5}$ NAAQS

July 10, 2024

ADEQ Arizona Department of Environmental Quality

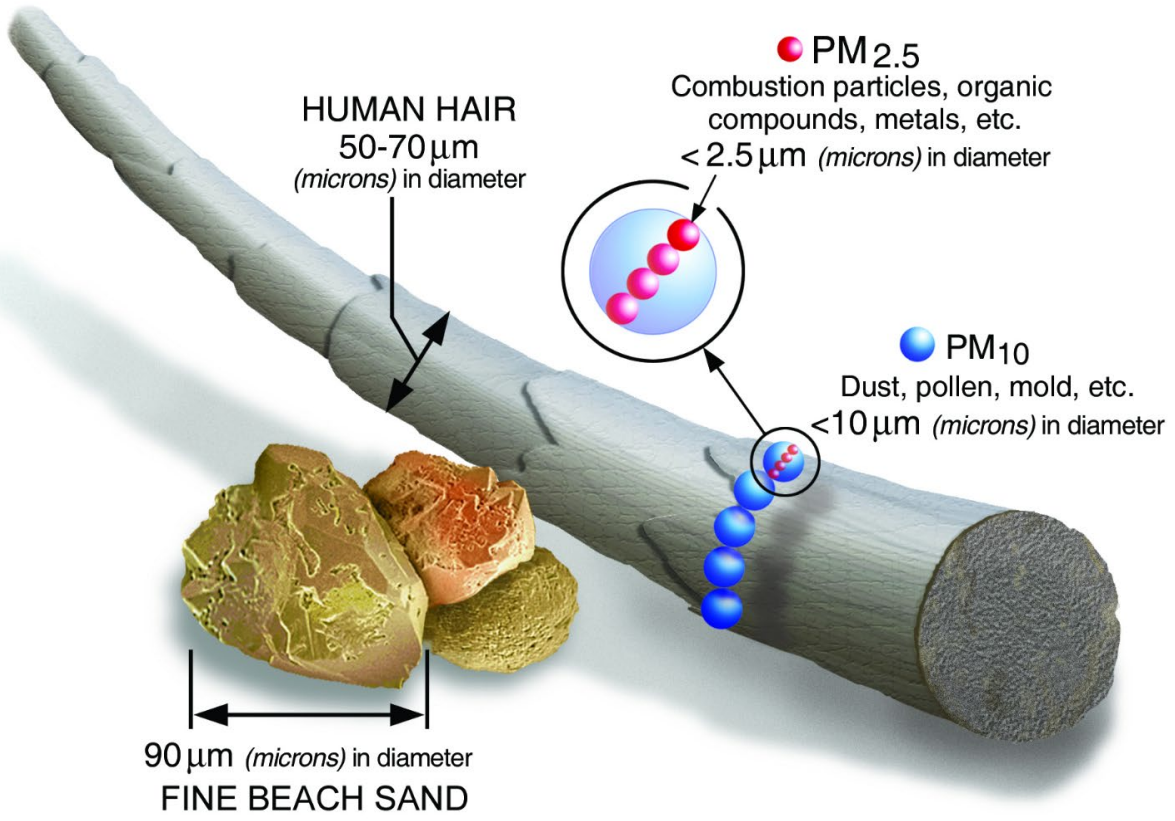
Clean Air, Safe Water, Healthy Land for Everyone

Overview of Presentation

- Revised $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS)
  - $PM_{2.5}$ Defined and the Importance of Size
  - Impact of $PM_{2.5}$ on Public Health
  - Revised Primary Annual $PM_{2.5}$ Standard
- ADEQ Area Designation Timeline
  - Five Factor Analysis
- State Overview of Current Arizona $PM_{2.5}$ Monitoring Data
- Boundary Recommendation
  - Pinal County NAA Analysis
- Draft NAA Boundary Recommendation Statistics
- $PM_{2.5}$ GIS Tool
- Contact Information

$PM_{2.5}$ Defined and the Importance of Size

- Particulate Matter (PM) is a complex mixture of small particles found in the air such as dirt, dust, smoke, and liquid droplets.
- Particles with a diameter of 2.5 micrometers or less are referred to as $PM_{2.5}$.
  - The size of particles is directly linked to their potential for causing health problems.
  - Smaller particles pose the greatest adverse health effects, because they can get deep into your lungs, and may even get into your bloodstream.



Source: EPA, Particulate Matter Basics: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

Revisions to the Particulate Matter NAAQS

Clean Air Act §109 directs the Environmental Protection Agency Administrator to propose and promulgate "primary" and "secondary" air quality standards

Clean Air Act §109(d)(1) requires EPA to review existing air quality criteria every 5 years

EPA last completed a review of the particulate matter (PM) standards on December 18, 2020

On February 7, 2024, EPA announced a final rule for the reconsideration of the National Ambient Air Quality Standards for particulate matter

16202 Federal Register / Vol. 89, No. 45 / Wednesday, March 6, 2024 / Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 50, 53, and 58

[EPA–HQ–OAR–2015–0072; FRL–8635–02–OAR]

RIN 2060–AV52

Reconsideration of the National Ambient Air Quality Standards for Particulate Matter

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Based on the Environmental Protection Agency's (EPA's) reconsideration of the air quality criteria and the national ambient air quality standards (NAAQS) for particulate matter (PM), the EPA is revising the primary annual $PM_{2.5}$ standard by lowering the level from 12.0 μg/m³ to 9.0 μg/m³. The Agency is retaining the current primary 24-hour $PM_{2.5}$ standard and the primary 24-hour PM_{10} standard. The Agency also is not changing the secondary 24-hour $PM_{2.5}$ standard, secondary annual $PM_{2.5}$ standard, and secondary 24-hour PM_{10} standard at this time. The EPA is also finalizing revisions to other key aspects related to the PM NAAQS, including revisions to the Air Quality Index (AQI) and monitoring requirements for the PM NAAQS.

DATES: This final rule is effective May 6, 2024.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2015–0072. All documents in the docket are listed on the *https://www.regulations.gov* website. Although listed in the index, some information is not publicly available, *e.g.*, CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through *https://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Dr. Lars Perlmutt, Health and Environmental Impacts Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Mail Code C539–04, Research Triangle Park, NC 27711; telephone: (919) 541–3037; fax: (919) 541–5315; email: *perlmutt.lars@epa.gov*.

SUPPLEMENTARY INFORMATION:

Table of Contents

The following topics are discussed in this preamble:

$PM_{2.5}$ and Public Health

Numerous studies link particle levels to increased hospital admissions and emergency room visits—and even to death from heart or lung diseases. Based on the Global Burden of Disease Project, of all the common air pollutants, $PM_{2.5}$ is associated with the greatest proportion of adverse health effects, both in the U.S. and world-wide.

Short-term $PM_{2.5}$ Exposure (hours or days)

- Can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections.
- Has been linked to heart attacks and arrhythmias in people with heart disease.

Long-term $PM_{2.5}$ Exposure (months or years)

- Associated with problems such as reduced lung function and the development of chronic bronchitis—and even premature death.

Sources:
EPA, How Does PM Affect Human Health?
Global Burden of Disease Study 2013

Fine Particulate Matter and Health Impacts

"We reach the conclusion that the available scientific evidence, air quality analyses, and the risk assessment, as summarized above, can reasonably be viewed as calling into question the adequacy of the public health protection afforded by the combination of the current annual and 24-hour primary $PM_{2.5}$ standards."

EPA, *Policy Assessment for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter,* May 2022, pg. 3-20 and 3-207

Table 3-1. Key causality determinations for $PM_{2.5}$ and UFP exposures.

Health Outcome	Size Fraction	Exposure Duration	2009 ISA	2019 ISA
Mortality	*$PM_{2.5}$*	*Long-term*	*Causal*	*Causal*
		Short-term		
Cardiovascular effects	*$PM_{2.5}$*	*Long-term*	*Causal*	*Causal*
		Short-term		
	UFP	Short-term	Suggestive of, but not sufficient to infer	Suggestive of, but not sufficient to infer
Respiratory effects	*$PM_{2.5}$*	*Long-term*	*Likely to be causal*	*Likely to be causal*
		Short-term		
	UFP	Short-term	Suggestive of, but not sufficient to infer	Suggestive of, but not sufficient to infer
Cancer	*$PM_{2.5}$*	*Long-term*	*Suggestive of, but not sufficient to infer*	*Likely to be causal*
Nervous System effects	*$PM_{2.5}$*	*Long-term*	---	*Likely to be causal*
		Short-term	Inadequate	Suggestive of, but not sufficient to infer
	UFP	Long-term	---	Suggestive of, but not sufficient to infer
		Short-term	Inadequate	Suggestive of, but not sufficient to infer
Metabolic effects	$PM_{2.5}$	Long-term	---	Suggestive of, but not sufficient to infer
		Short-term	---	Suggestive of, but not sufficient to infer
Reproduction and Fertility	$PM_{2.5}$	Long-, Short-term	Suggestive of, but not sufficient to infer	Suggestive of, but not sufficient to infer
Pregnancy and Birth Outcomes				

Revised Primary Annual $PM_{2.5}$ Standard

Pollutant	Standard	Averaging Time	Level
$PM_{2.5}$	Primary	Annual[1]	Lowered level from 12.0 µg/m^3 to 9.0 µg/m^3
$PM_{2.5}$	Secondary	Annual[1]	Retained current level of 15.0 µg/m^3
$PM_{2.5}$	Primary and Secondary	24-hour[2]	Retained current level of 35.0 µg/m^3
PM_{10}	Primary and Secondary	24-hour[2]	Retained current level of 150 µg/m^3

[1] Annual Standard Form is 3-year average of the weighted annual mean $PM_{2.5}$ concentrations

[2] 24-hour Standard Form is 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations

ADEQ Area Designation Timeline

Projected Timeline

February 7, 2024

Revised PM2.5 NAAQS Promulgated

September/October 2024

Draft boundary recommendations and technical support document posted; public hearing announced and comment period begins

October/November 2024

Comment period ends and public hearing held

January 7, 2025

Final boundary recommendations and response to comments submitted to Governor

February 7, 2025

Governor submits recommendations to EPA

February 7, 2026

EPA designations are made final (may take up to one additional year)

General Area Designation Timeline Cont.

No later than one year after promulgation of NAAQS, the Governor shall submit a list of all areas in the state designating as:

Nonattainment

An area that does not meet the NAAQS or an area that contributes to ambient air quality in a nearby area that does not meet the NAAQS

Unclassifiable

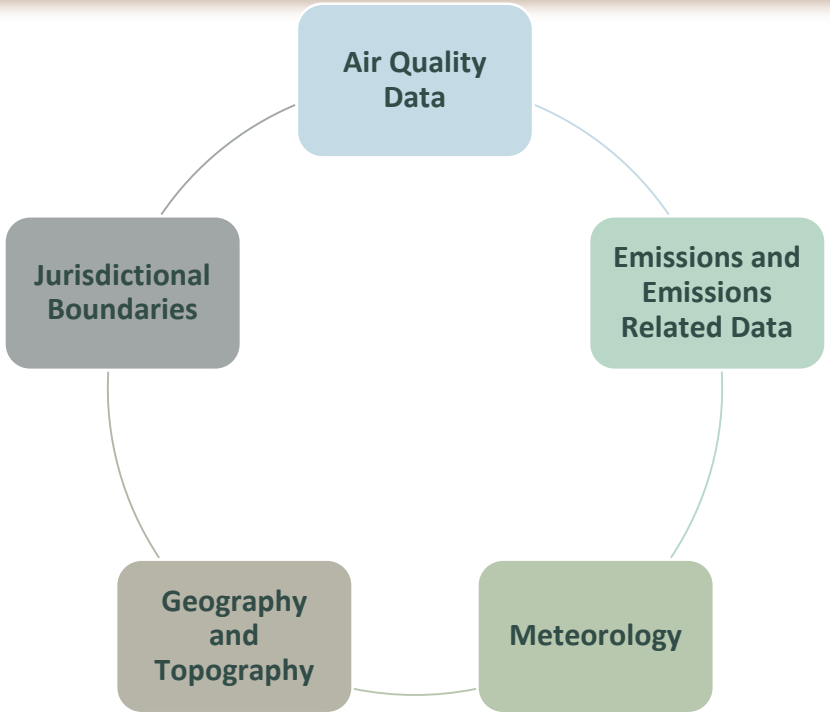
An area that cannot be classified based on available information as meeting or not meeting the NAAQS

Attainment

An area that meets the NAAQS and does not contribute to nonattainment

EPA may modify the list as it deems necessary but must notify the Governor of modifications 120 days before final designations

Five Factor Analysis and Weight-of-Evidence

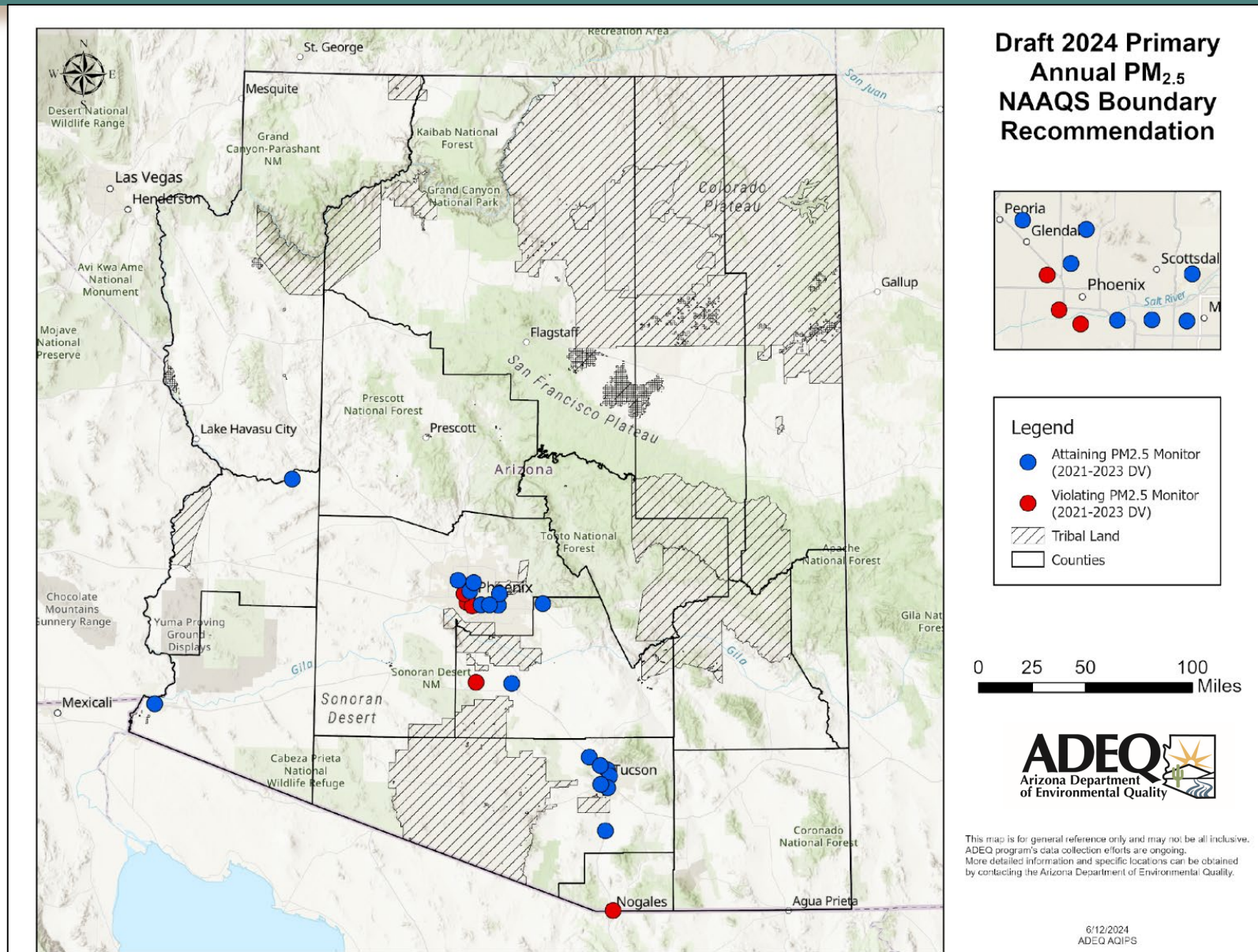


Weight-of-Evidence: Refers to the believability or persuasiveness of evidence for its probative value.

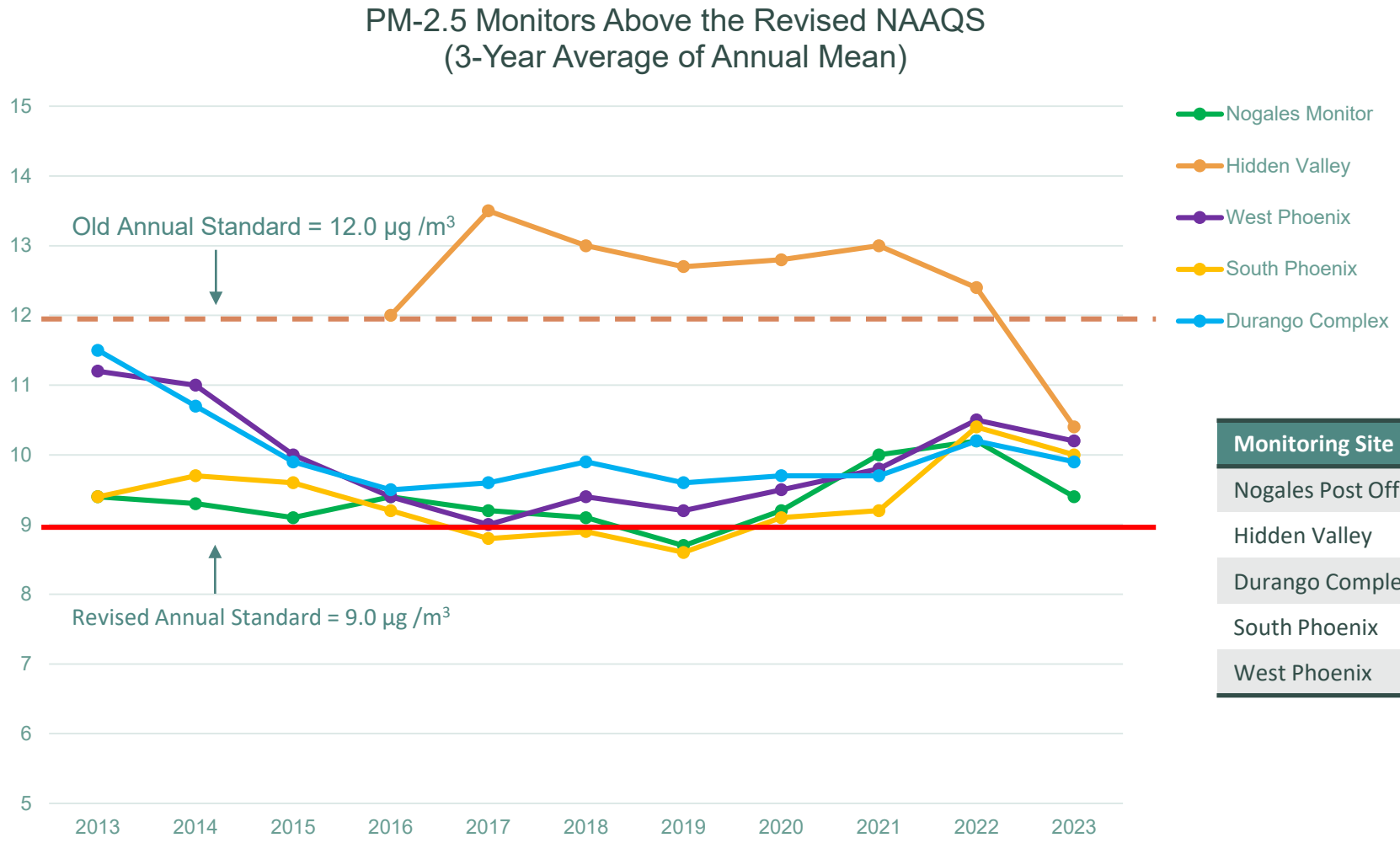
- EPA recommends that States evaluate the five factors together and use a weight-of-evidence approach for this analysis.
- "The guiding principle for this evaluation is to include within the boundaries of the nonattainment area, any nearby areas with emissions of $PM_{2.5}$ or $PM_{2.5}$ precursors that have the potential to be transported to the violating monitor."

State Level Overview

Current Arizona $PM_{2.5}$ Monitoring Data



Current Arizona $PM_{2.5}$ Monitoring Data



Monitoring Site	2021-2023 Design Value (µg /m³)
Nogales Post Office	9.4
Hidden Valley	10.4
Durango Complex	9.9
South Phoenix	10.0
West Phoenix	10.2

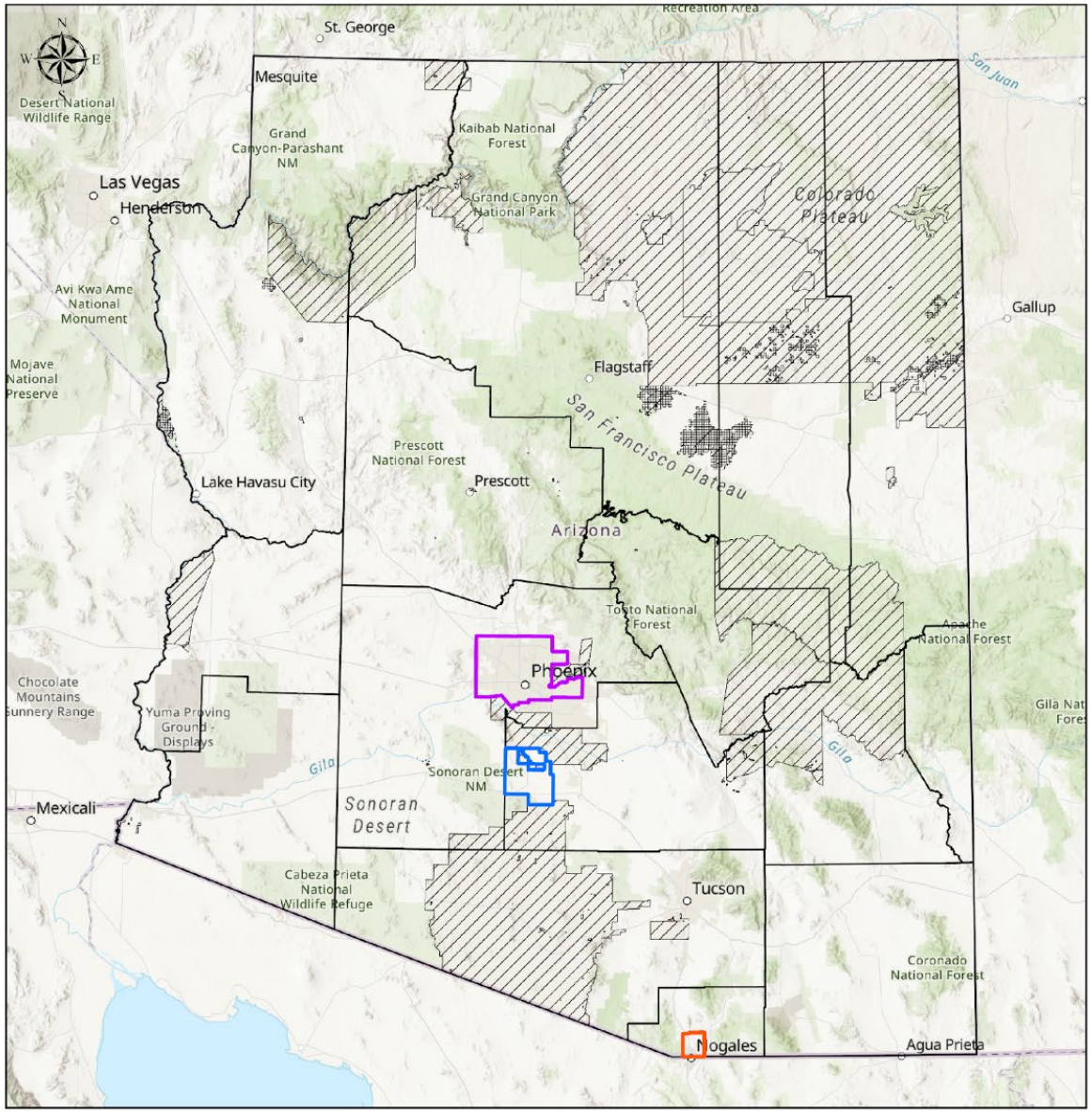
Boundary Recommendations

- EPA will be starting their analysis at the CSA/CBSA level. ADEQ will be splitting its analysis into two primary sections covering three NAA analyses covering the recommended five factor analysis at the CBSA level

- Phoenix-Mesa-Chandler, Arizona MSA
  - Maricopa County (Partial) NAA Recommendation
  - Contingency Based Pinal County (Partial) NAA Recommendation

- Nogales, Arizona µSA
  - Santa Cruz County (Partial) NAA Recommendation

Draft 2024 Primary Annual $PM_{2.5}$ NAA Boundaries



Draft 2024 Primary Annual $PM_{2.5}$ NAAQS Boundary Recommendation

Legend
- Maricopa Proposal
- Pinal Proposal
- Santa Cruz Proposal
- Tribal Land
- Counties

0 25 50 100 Miles

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6/12/2024
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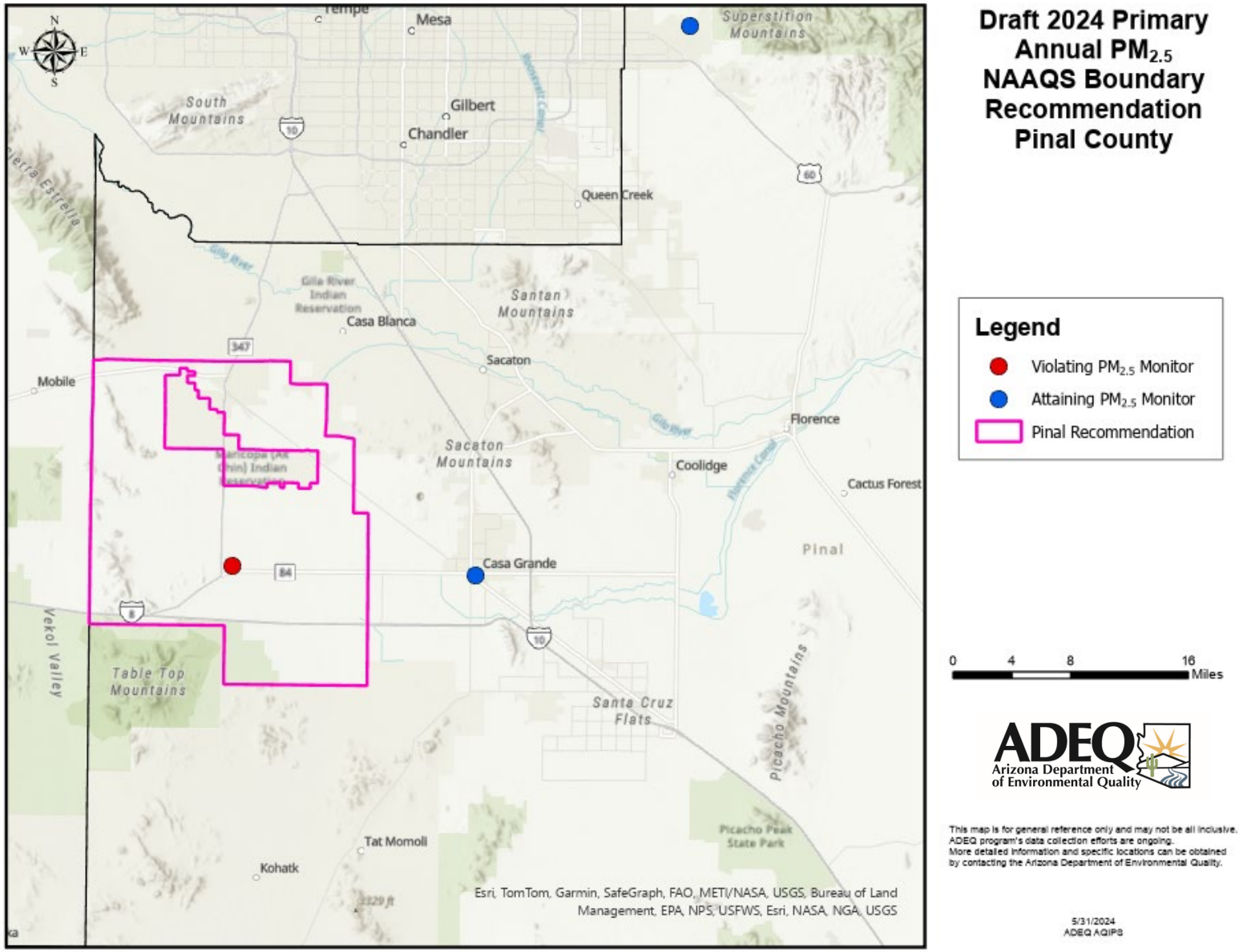
Pinal County
Nonattainment Area Analysis

Pinal County NAA Recommendation



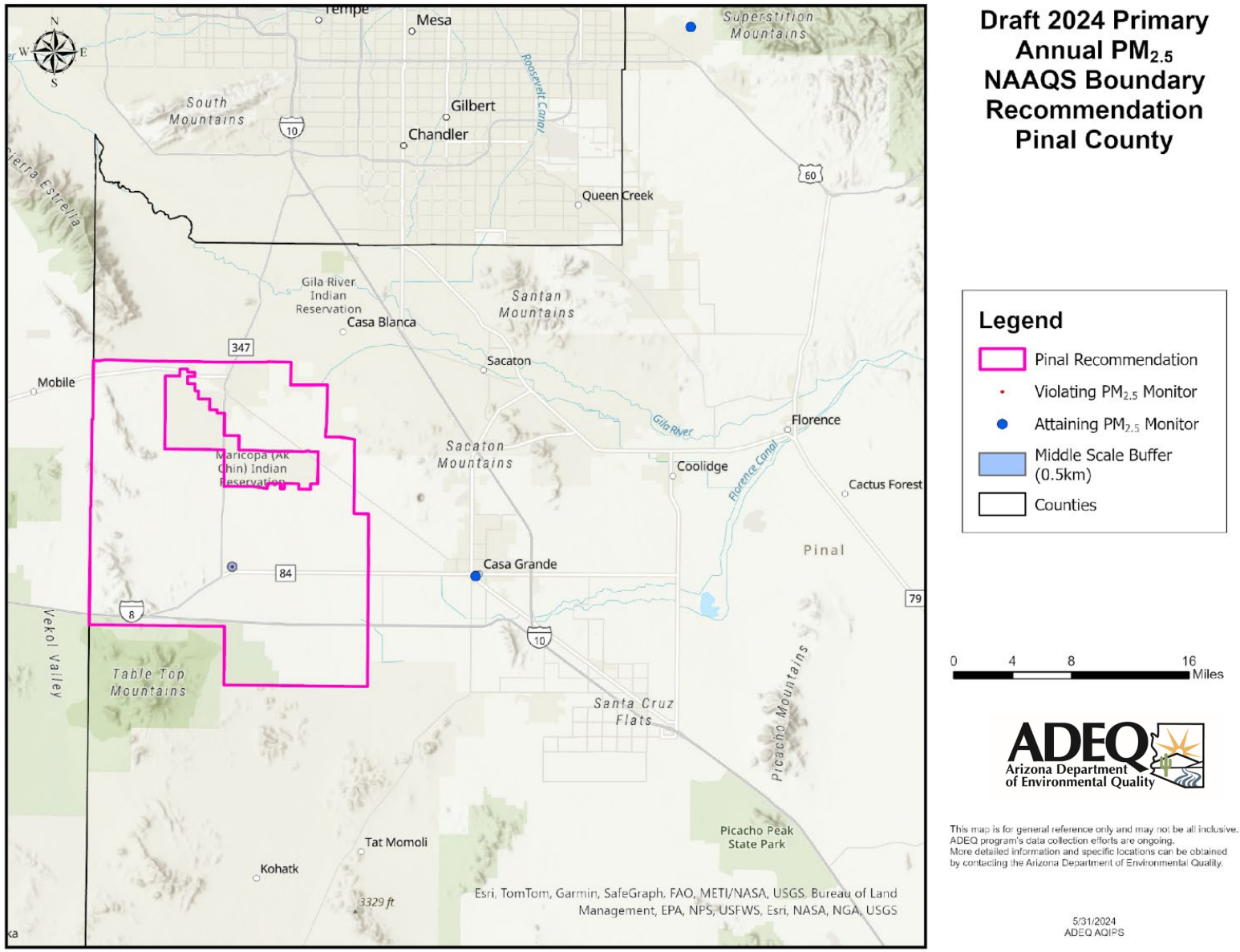
Pinal County NAA – Contingency Based Rec.

- 40 CFR § 58.30: "$PM_{2.5}$ measurement data from monitors that are not representative of area-wide air quality but rather of relatively unique micro-scale, or localized hot spot, or unique **middle-scale** impact sites are not eligible for comparison to the annual $PM_{2.5}$ NAAQS."

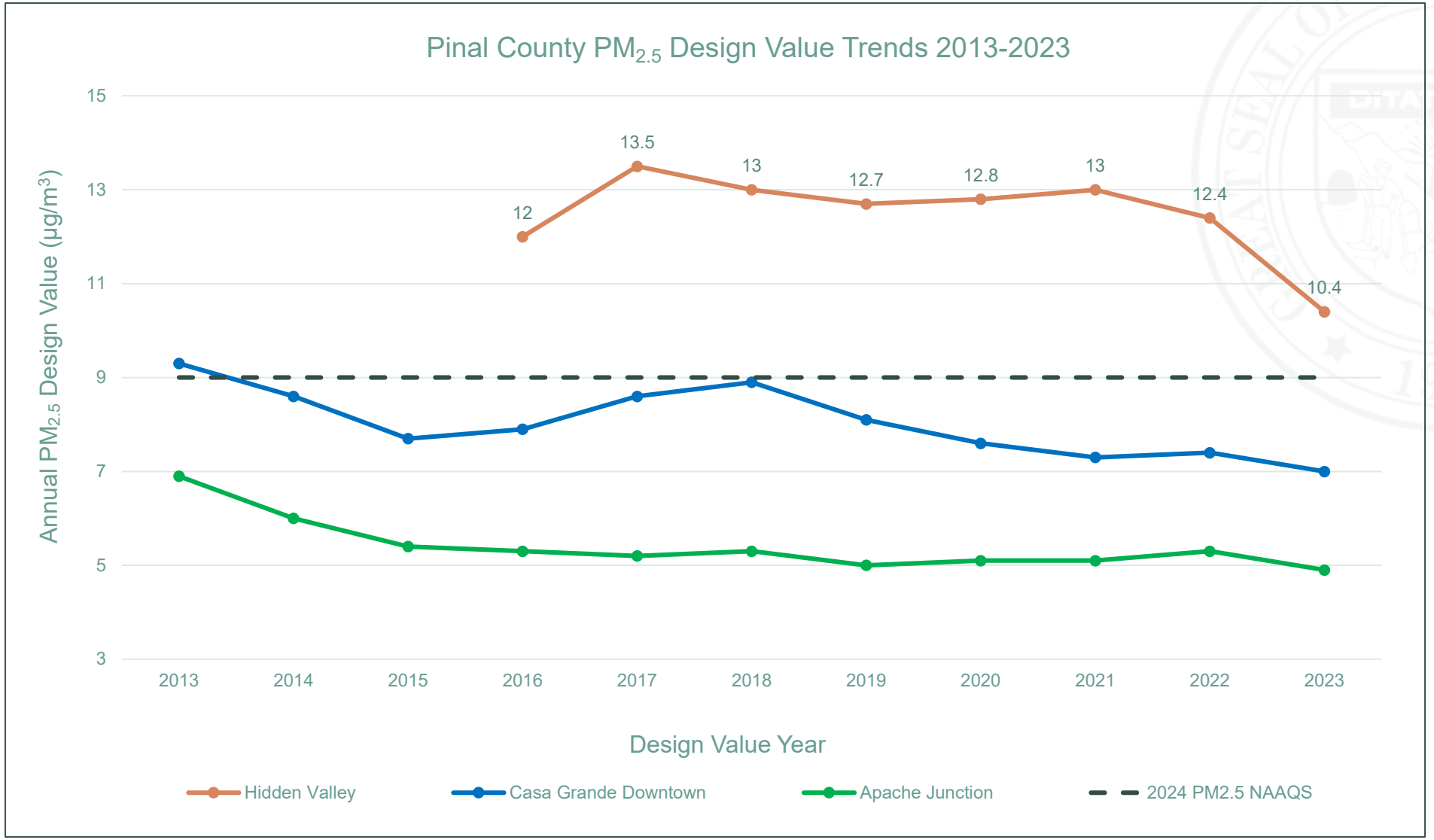
- PCAQD is making the request to EPA in their 2024 Air Monitoring Network Plan to exclude the Hidden Valley site from comparison to the Annual $PM_{2.5}$ NAAQS. (Public Hearing on June 11, 2024)

- ADEQ to recommend to designate Pinal County as attainment if EPA approves the § 58.30 request, or recommend retaining the existing 2006 West Central Pinal PM2.5 NAA boundary if EPA does not approve the request.

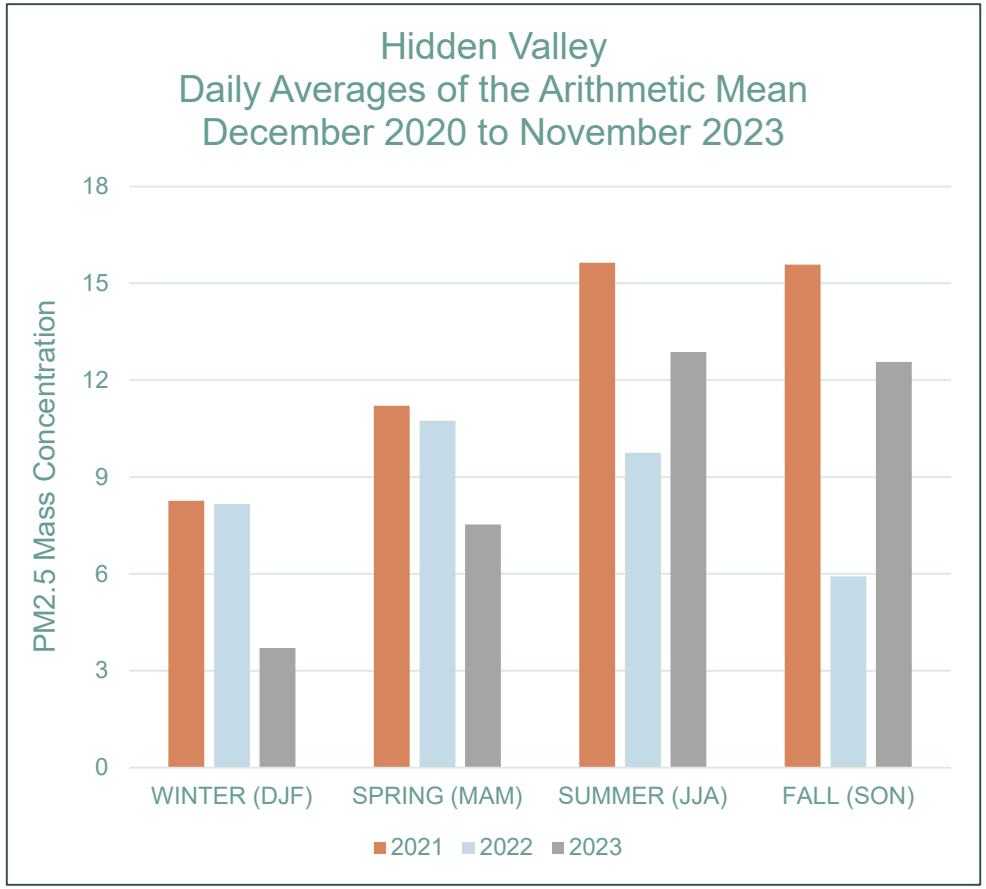
Pinal County NAA – Monitor Spatial Scale

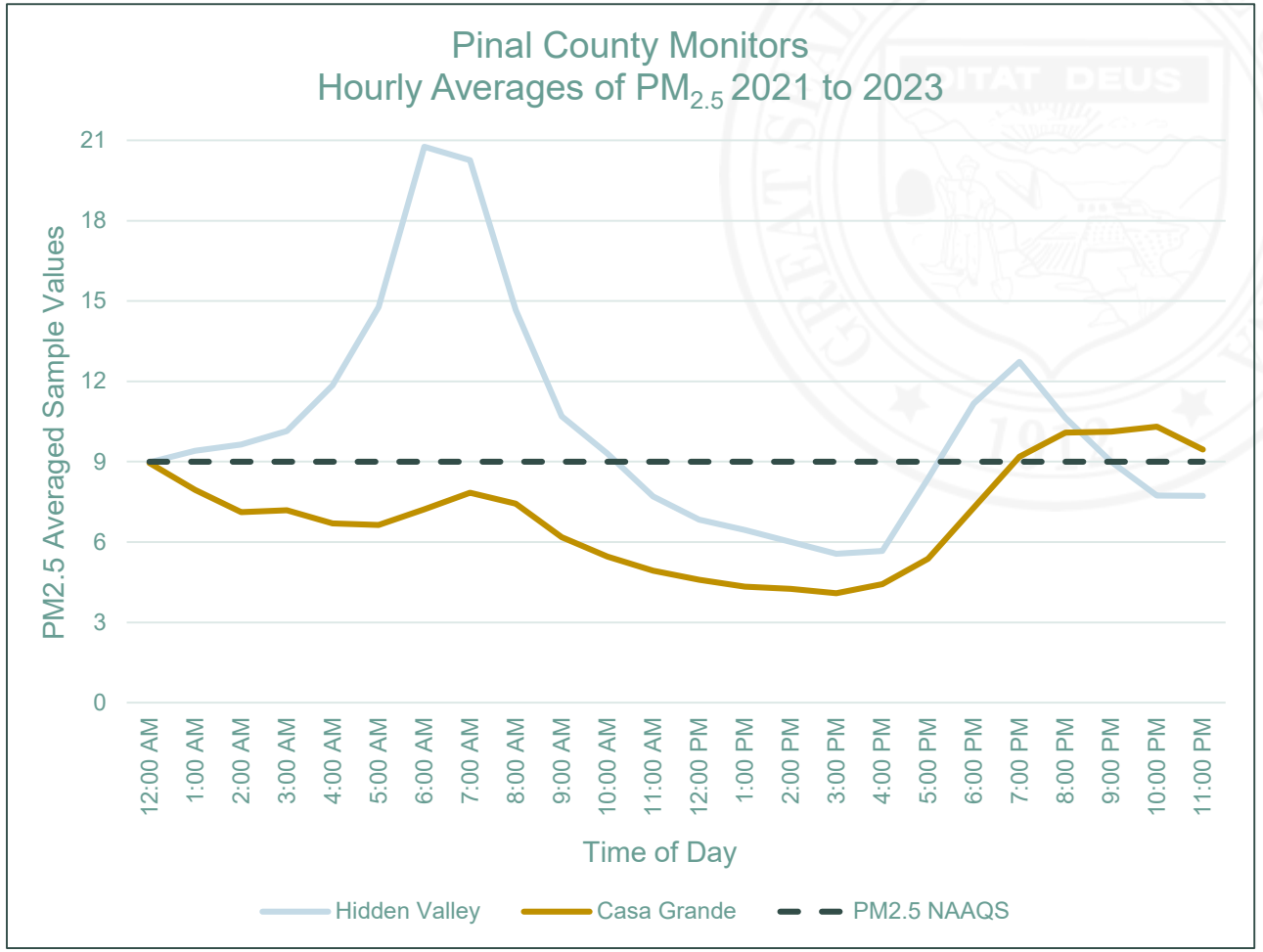


Pinal County NAA – Air Quality Data



Pinal County NAA – Air Quality Data



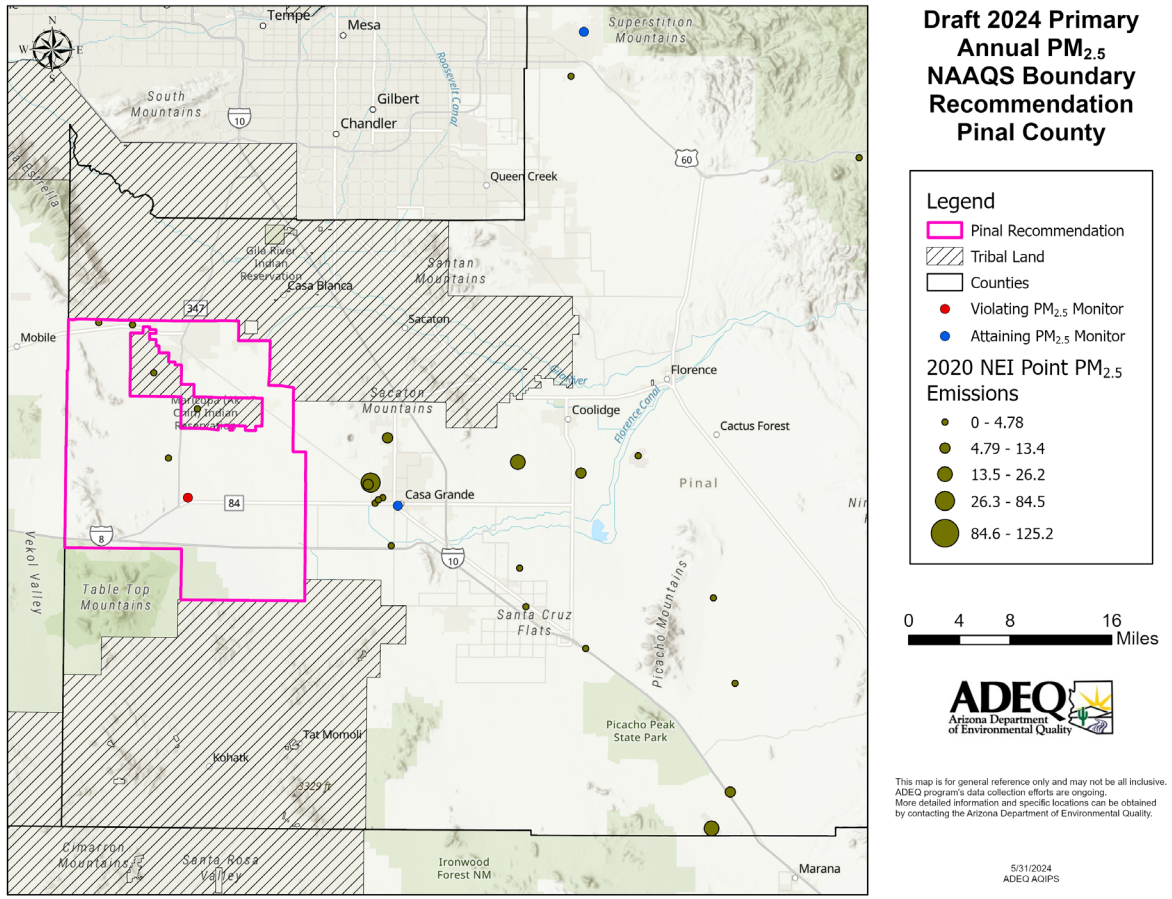


Pinal County – Emissions

Pinal County Primary $PM_{2.5}$ Source Sector Emissions from the 2020 NEI

Source	Source Sector Category	Emissions (tpy)	% of Total PM 2.5 Emissions
Nonpoint = 94.3%			
	Wildfires	3,104.0	50%
	Crops & Livestock Dust	1,220.2	20%
	Construction Dust	464.6	7%
	Waste Disposal	270.3	4%
	Residential Wood Burning	212.7	3%
	Commercial Cooking	151.0	2%
	Mining	135.5	2%
	Unpaved Road Dust	119.5	2%
	Agricultural Field Burning	89.2	1%
	Paved Road Dust	52.3	1%
	Locomotives	20.5	0%
	Misc. Area Sources	14.2	0%
	Misc. Industrial & Comm/Institutional Processes	3.8	0%
Point = 2.4%			
	Miscellaneous Point Sources	148.0	2%
Nonroad = 1.2%			
	Equipment - Diesel	51.9	1%
	Equipment - Gasoline	24.4	0%
	Equipment - Other	0.5	0%
Onroad = 2.1%			
	Diesel Vehicles	94.3	2%
	Non-Diesel Vehicles	37.9	1%
Total		**6,214.9**	**100%**

Pinal NAA – Emissions (2020 NEI and 2022 PCAQCD)



Draft 2024 Primary Annual $PM_{2.5}$ NAAQS Boundary Recommendation Pinal County

Legend
- Pinal Recommendation
- Tribal Land
- Counties
- Violating $PM_{2.5}$ Monitor
- Attaining $PM_{2.5}$ Monitor

2020 NEI Point $PM_{2.5}$ Emissions
- 0 - 4.78
- 4.79 - 13.4
- 13.5 - 26.2
- 26.3 - 84.5
- 84.6 - 125.2

0 4 8 16 Miles

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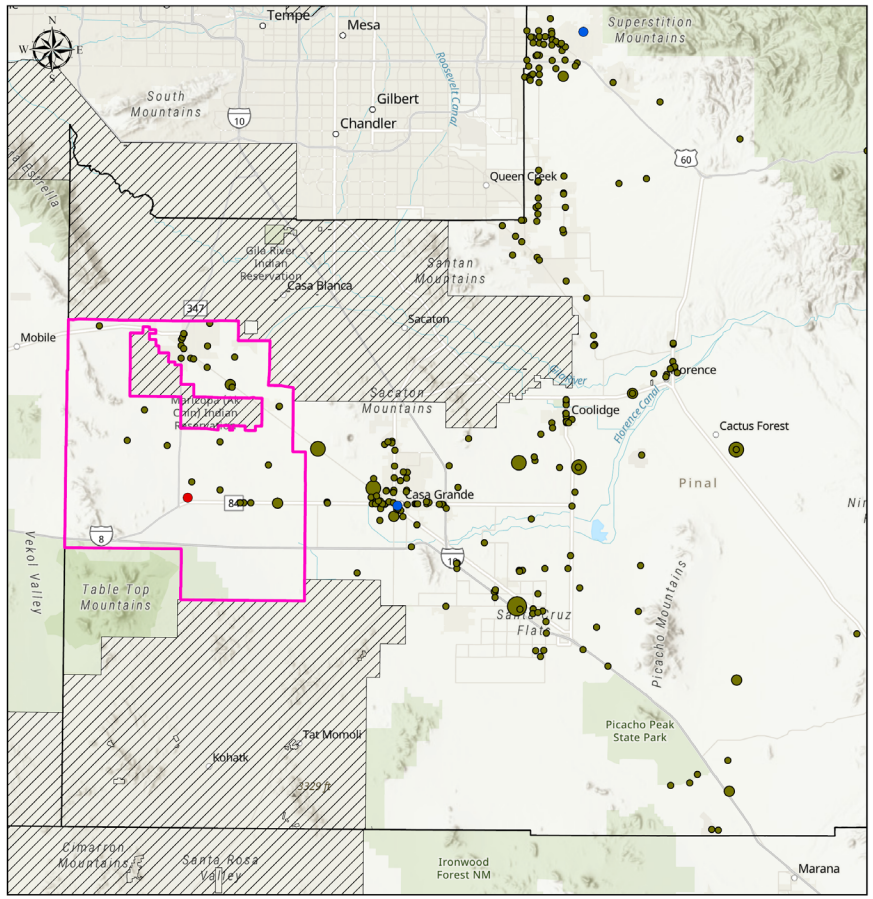

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- Violating $PM_{2.5}$ Monitor
- Attaining $PM_{2.5}$ Monitor

PCAQCD Permitted Point Sources of $PM_{2.5}$ 2022
- 0.0 - 0.9
- 1.1 - 5.5
- 5.6 - 12.3
- 12.4 - 20.1
- 20.2 - 51.2

0 4 8 16 Miles

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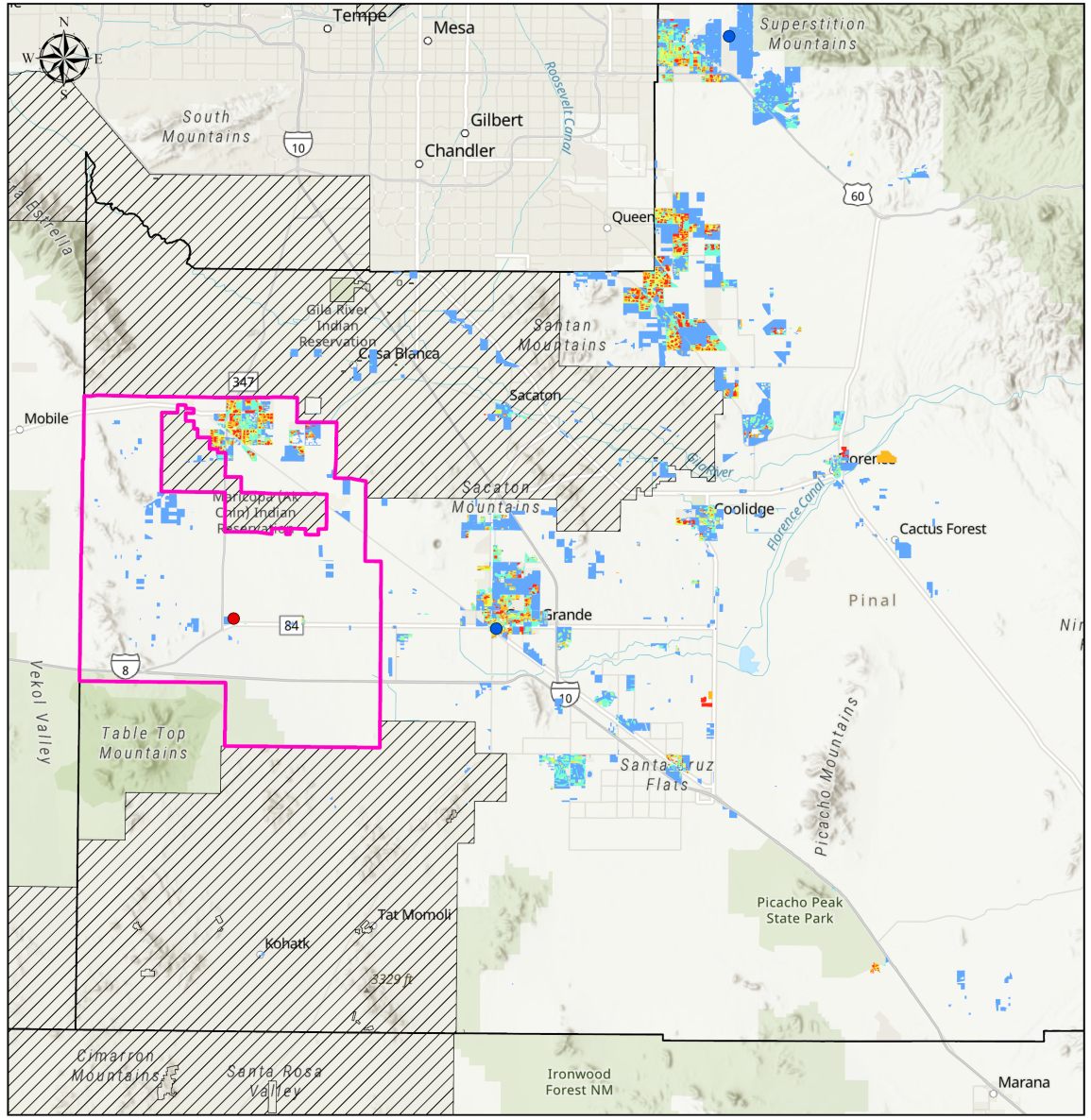
Pinal NAA – Emissions (2020 Population)



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Legend

- Pinal Recommendation
- Tribal Land
- Counties
- Violating $PM_{2.5}$ Monitor
- Attaining $PM_{2.5}$ Monitor

Persons per mi^2 2020

- Less than 250
- 251 - 2,000
- 2,001 - 4,000
- 4,001 - 6,000
- 6,001 - 8,000
- More than 8,000

0 4 8 16 Miles

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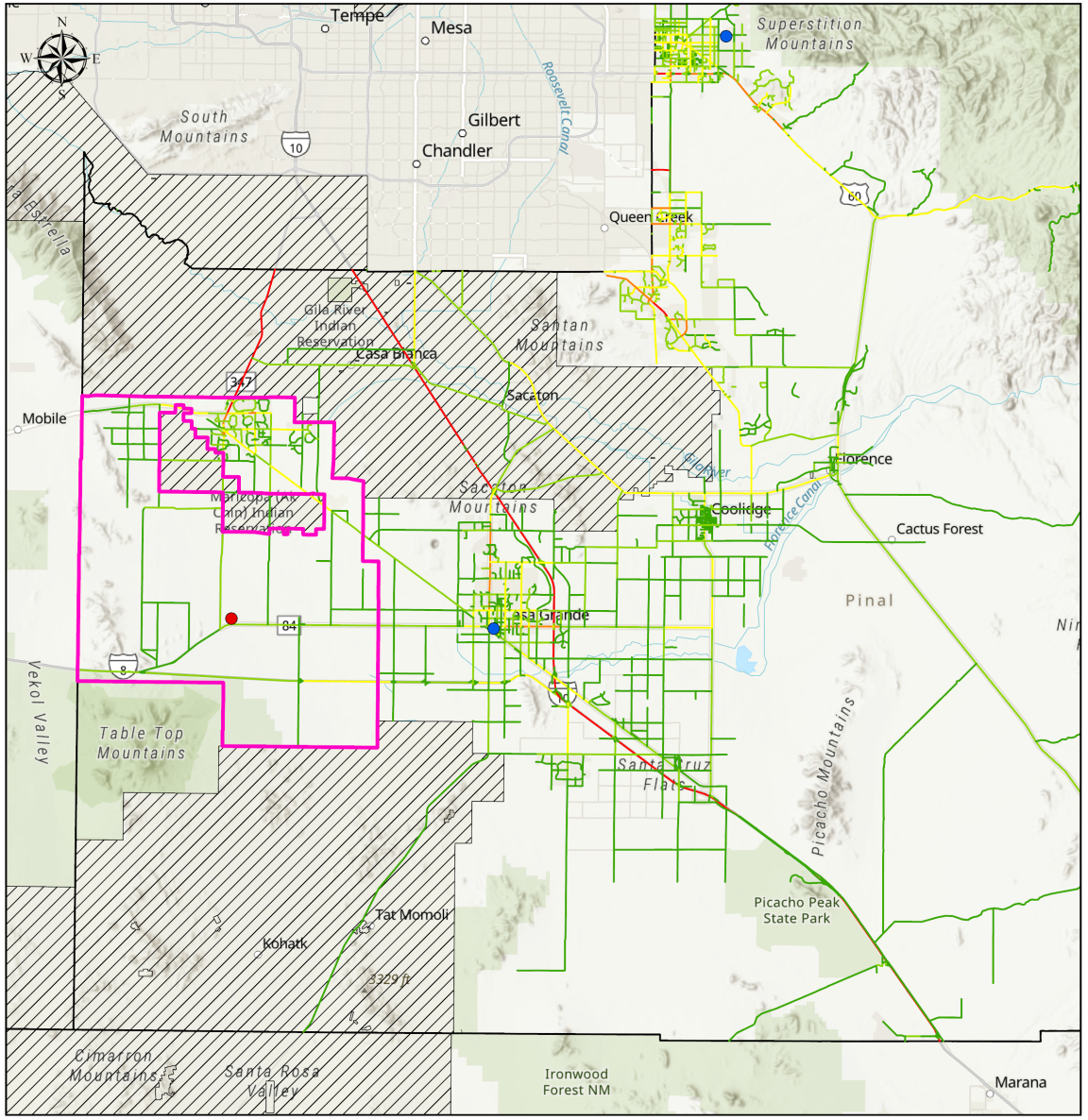
Pinal NAA – Emissions (Traffic)



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Legend

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- Violating $PM_{2.5}$ Monitor
- Attaining $PM_{2.5}$ Monitor

AADT

- 2 - 2,609
- 2,610 - 7,971
- 7,972 - 19,440
- 19,441 - 41,433
- 41,434 - 77,864

0 4 8 16 Miles

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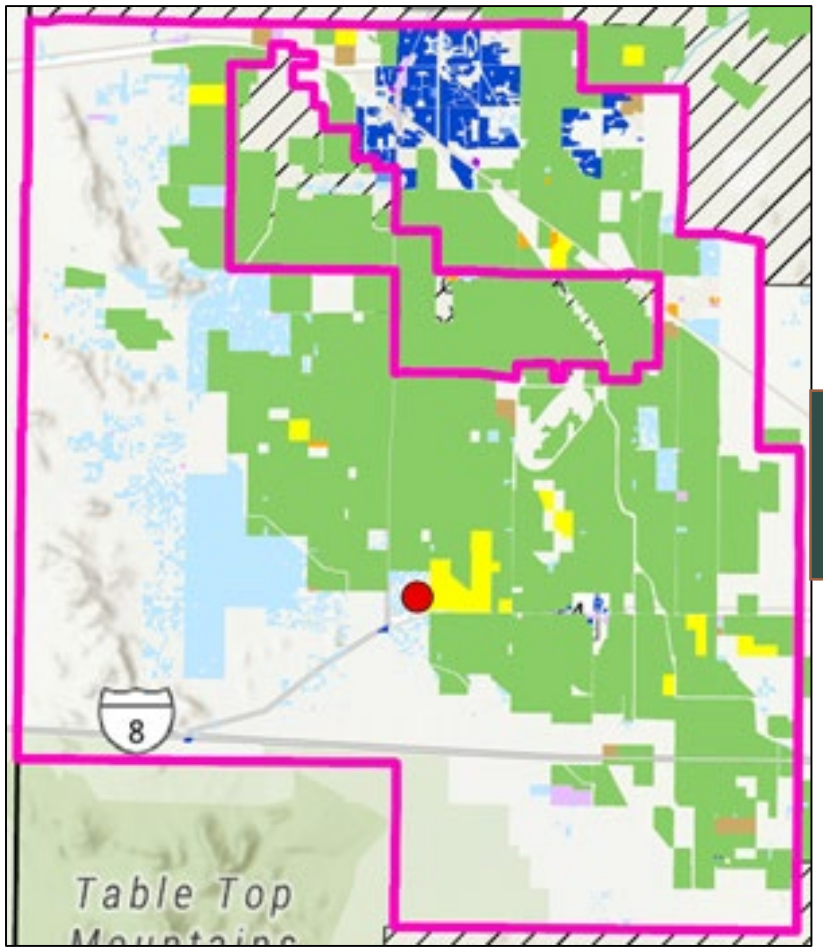
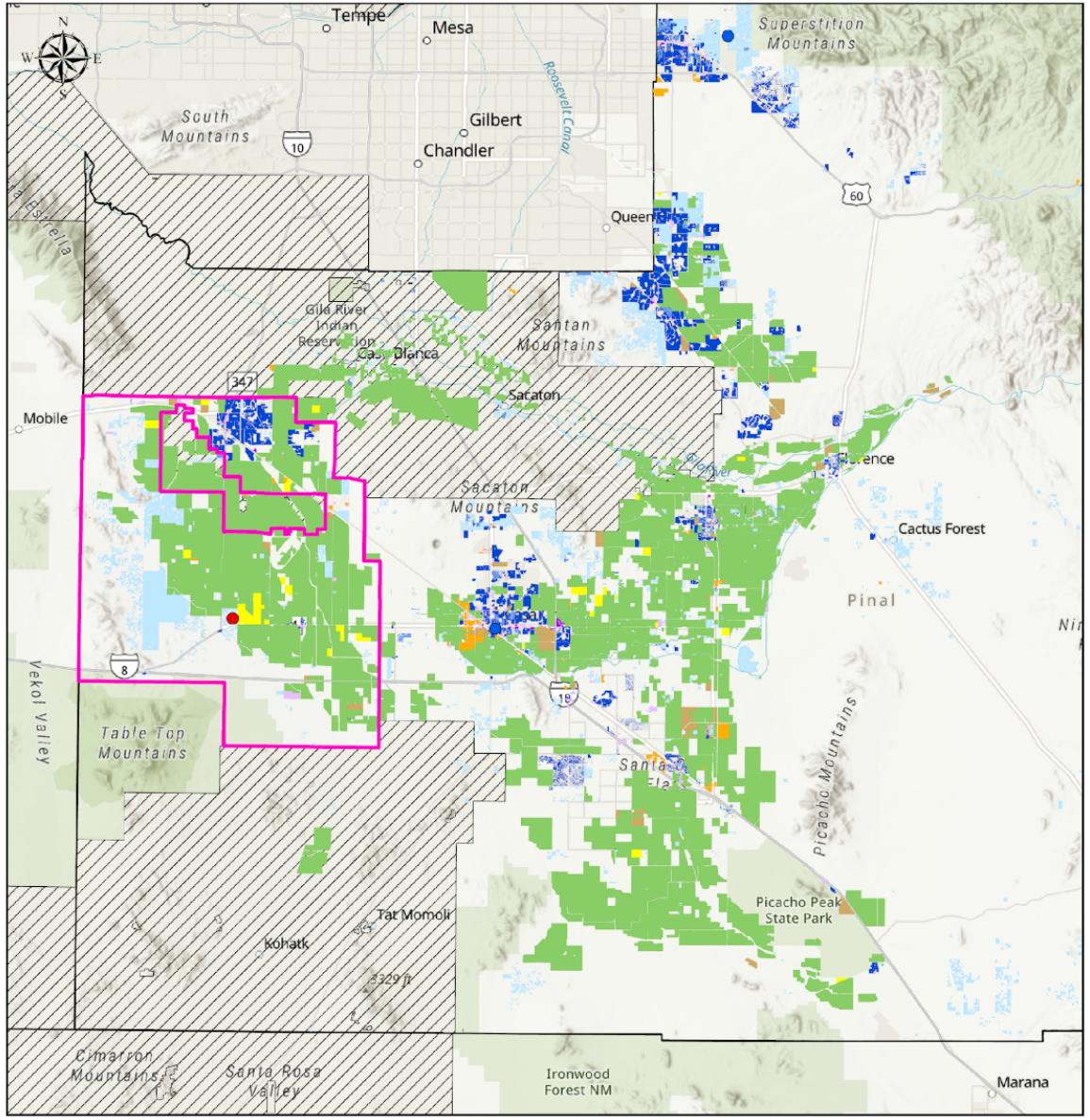
Pinal County NAA – Emissions (Land Use)





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Land Use Type

- Abandoned Agriculture
- Agriculture
- Commercial High
- Commercial Low
- Dairy or Feedlot
- Industrial
- Single Family High Density
- Single Family Low Density
- Single Family Medium Density

0 4 8 16 Miles

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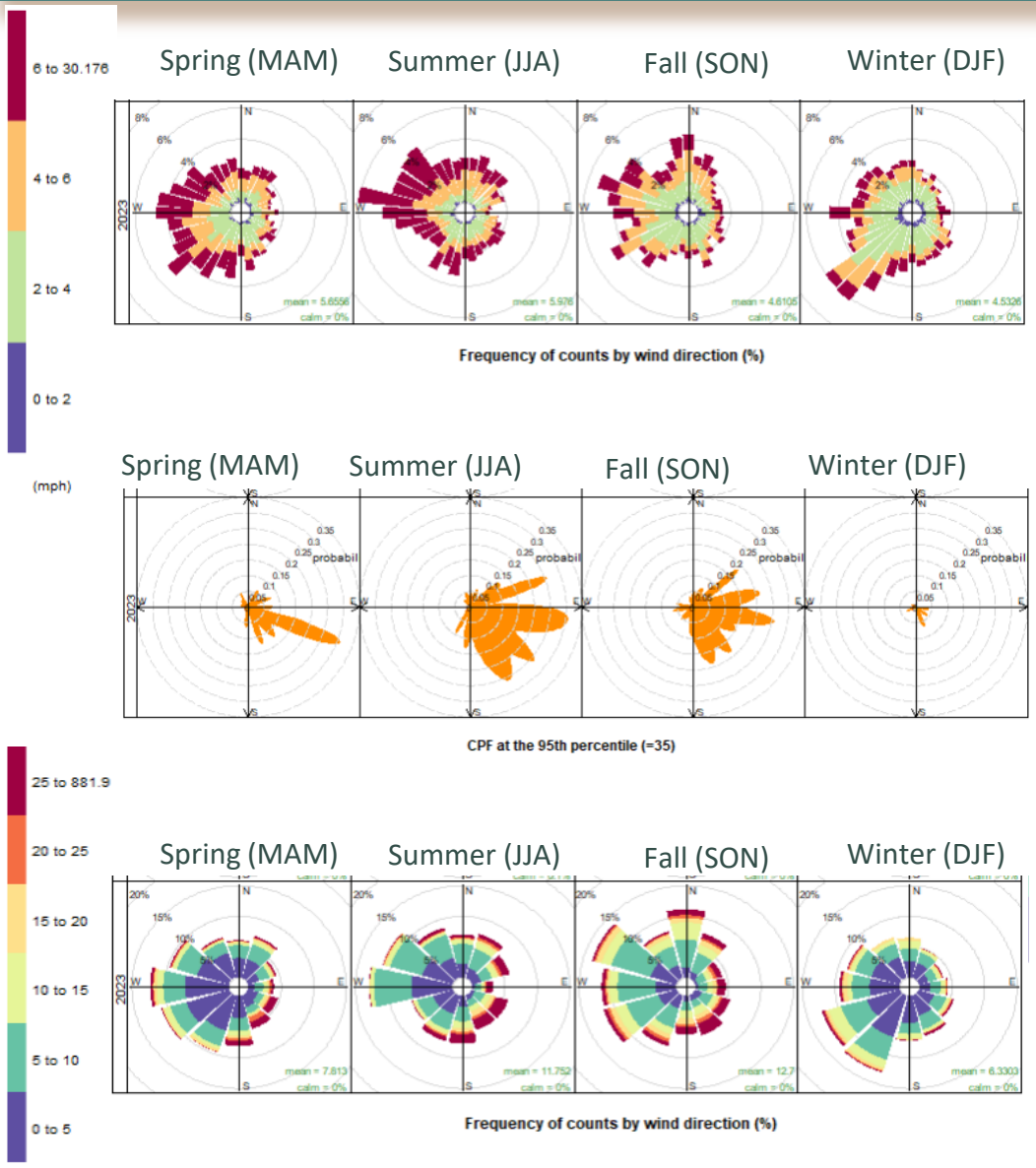
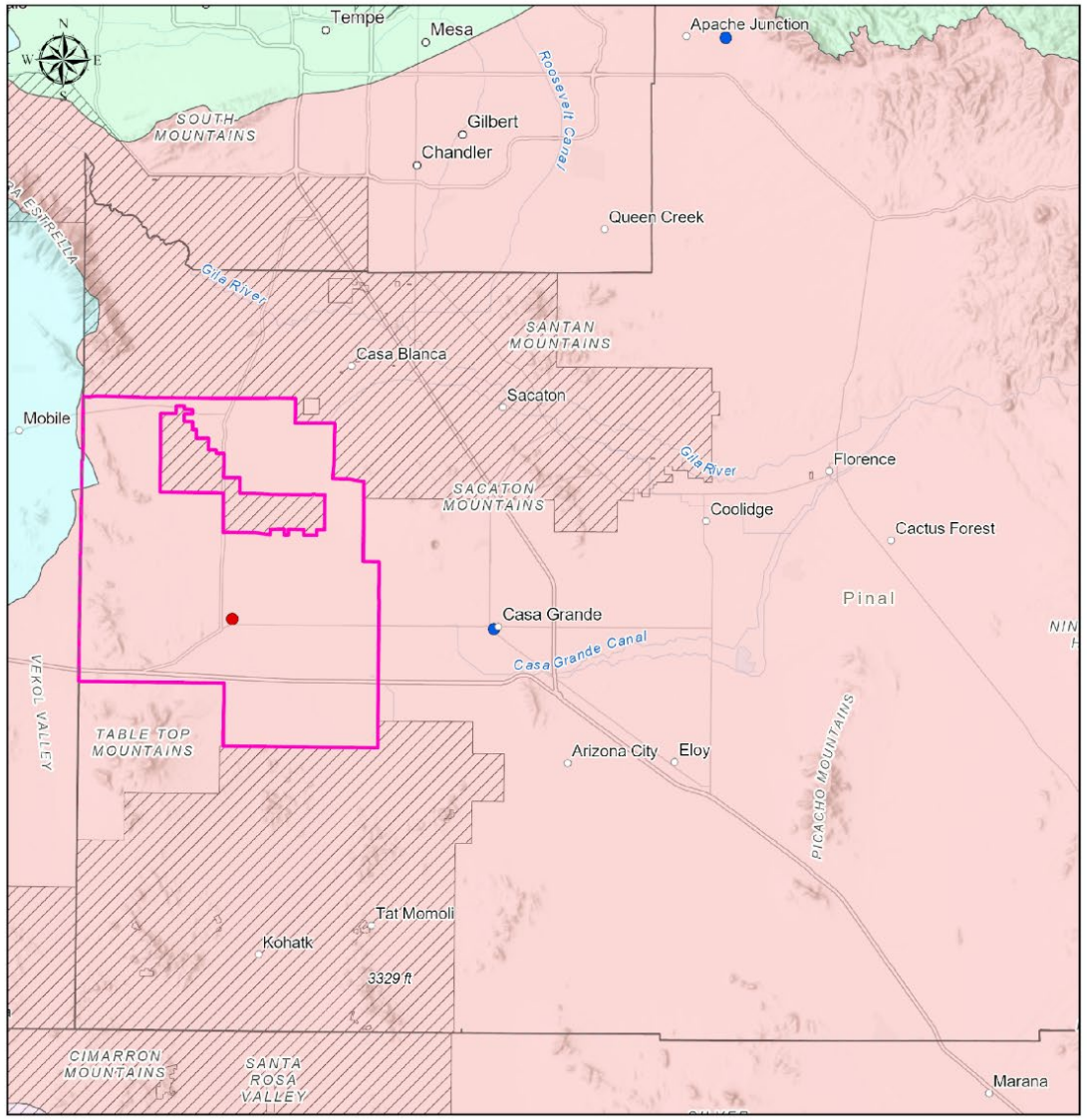
Pinal NAA – Meteorology, Geography/Topography





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NAME
- Colorado River Airshed
- Colorado River\Mexico Airshed
- Gila River Airshed
- Gila River Basin Airshed
- Little Colorado River Airshed
- Lower Colorado Airshed
- Lower Salt River Airshed
- Mexico Drainage Airshed
- Upper Colorado River Airshed
- Upper Gila River Airshed
- Verde River Airshed

0 4 8 16 Miles

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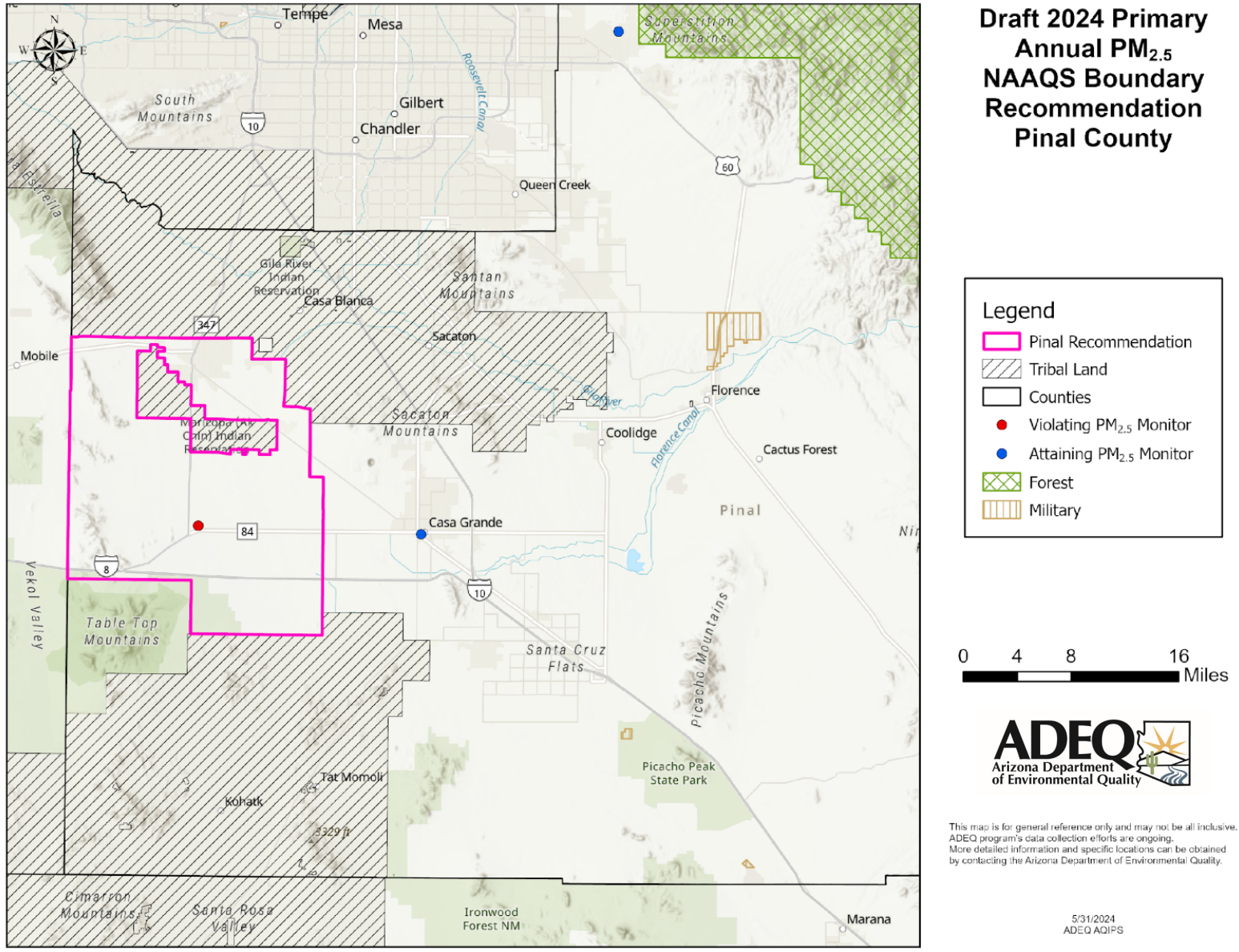
Pinal County NAA – Jurisdictional Boundaries



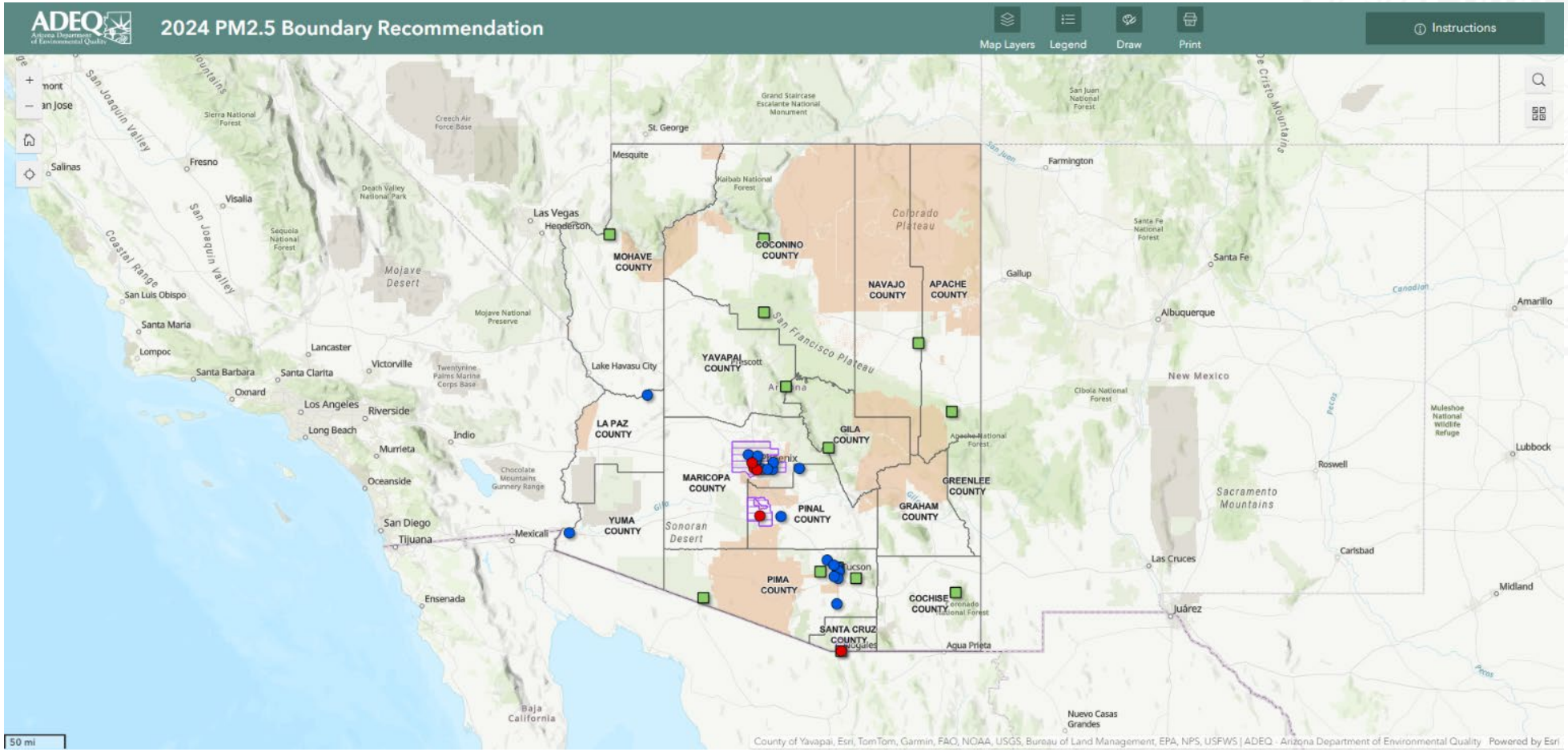
Draft NAA Boundary Recommendation Statistics

Draft 2024 Primary Annual $PM_{2.5}$ NAA Boundary Recommendation Statistics					
Area	**$PM_{2.5}$ Point Source Emissions (2020 NEI)**	**AADT**	**VMT**	**Population Density**	**Significant Land Use**
Pinal County Retained Boundary	1.6%	10.8%	7.3%	12.7%	27.3%

$PM_{2.5}$ GIS Tool

ADEQ Arizona Department of Environmental Quality

ADEQ 2024 PM2.5 Boundary Recommendation GIS Tool



Thank you. Questions?

To receive information and updates about the boundary designation process, including meeting opportunities, subscribe to ADEQ's $PM_{2.5}$ Boundary Designations email list at:

bit.ly/SubscribePM25

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Clean Air, Safe Water, Healthy Land for Everyone

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Arizona Department of Environmental Quality

Clean Air, Safe Water,
Healthy Land for Everyone