

ARIZONA
Phoenix-Mesa and Yuma Nonattainment Areas
Final Area Designations for the
2015 Ozone National Ambient Air Quality Standards
Technical Support Document (TSD)

1.0 Summary

This technical support document (TSD) describes the EPA’s final designations for Phoenix-Mesa and Yuma in Arizona as nonattainment for the 2015 ozone National Ambient Air Quality Standards (NAAQS).

On October 1, 2015, the EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292; October 26, 2015). The EPA strengthened both standards to a level of 0.070 parts per million (ppm). In accordance with Section 107(d) of the Clean Air Act (CAA), whenever the EPA establishes a new or revised NAAQS, the EPA must promulgate designations for all areas of the country for that NAAQS.

Under section 107(d), states were required to submit area designation recommendations to the EPA for the 2015 ozone NAAQS no later than one year following promulgation of the standards, i.e., by October 1, 2016. Tribes were also invited to submit area designation recommendations and were given an opportunity for consultation.¹ On September 27, 2016, Arizona recommended that the partial counties identified in Table 1.1 be designated as nonattainment for the 2015 ozone NAAQS based on air quality data from 2013-2015.² On September 9, 2016, the Gila River Indian Community recommended that portions of their lands be designated attainment for the 2015 ozone NAAQS based on air quality data from 2013-2015.³ On September 25, 2017, the Gila River Indian Community clarified their recommendation. They requested that the main body of the tribal land be designated as a separate attainment area from the adjacent State of Arizona attainment area, and that the “Parcels M and N” area be designated as part of the Phoenix-Mesa nonattainment area but be recognized as under tribal jurisdiction in the tables found at 40 CFR Part 81 (see Table 1.1).⁴

After considering these recommendations and based on the EPA’s technical analysis as described in this TSD, the EPA is designating the areas listed in Table 1.1 as nonattainment for the 2015 ozone NAAQS. The EPA must designate an area nonattainment if it has an air quality monitor that is

¹ In 2011, the EPA issued a memorandum outlining the EPA’s approach for designating areas of Indian country. If the EPA either does not receive an initial designation recommendation from a tribe, or receives a recommendation that does not specify designation of a separate area, the EPA is designating the relevant tribe’s area of Indian country as part of the surrounding area, and to the extent possible, to ensure that a single tribe’s areas of Indian country are not inadvertently split based on the use of other jurisdictional boundaries (e.g., county boundaries) when designating the surrounding state areas. Please see EPA Policy for Designating Establishing Separate Air Quality Designations for Areas of Indian Country: <https://www.epa.gov/sites/production/files/2016-02/documents/indian-country-separate-area.pdf> and EPA Policy on Consultation and Coordination with Indian Tribes: <https://www.epa.gov/sites/production/files/2013-08/documents/cons-and-coord-with-indian-tribes-policy.pdf>.

² Letter from Douglas A. Ducey, Governor, State of Arizona to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, September 27, 2016.

³ Letter from Stephen R. Lewis, Governor, Gila River Indian Community to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, September 9, 2016.

⁴ Letter from Stephen R. Lewis, Governor, Gila River Indian Community to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, September 25, 2017.

violating the standard or if it has sources of emissions that are contributing to a violation of the NAAQS in a nearby area. Detailed descriptions of the nonattainment boundaries for these areas are found in the supporting technical analysis for each area in Sections 3 and 4.

Table 1.1 Arizona State and Tribal Recommended Nonattainment Areas and the EPA’s Final Designated Nonattainment Areas for the 2015 Ozone NAAQS.

Area	Arizona’s or Tribe’s Recommended Nonattainment Counties [or Areas of Indian Country]	EPA’s Final Nonattainment Counties [or Areas of Indian Country]
Phoenix-Mesa, AZ*	Gila (partial) Maricopa (partial) Pinal (partial)	Gila (partial) Maricopa (partial) Pinal (partial)
<ul style="list-style-type: none"> • Fort McDowell Yavapai Nation 	<ul style="list-style-type: none"> • did not submit recommendation 	<ul style="list-style-type: none"> • Fort McDowell Yavapai Nation
<ul style="list-style-type: none"> • Gila River Indian Community 	<ul style="list-style-type: none"> • Gila River Indian Community (partial)** 	<ul style="list-style-type: none"> • Gila River Indian Community (partial)
<ul style="list-style-type: none"> • Tohono O’odham Nation of Arizona 	<ul style="list-style-type: none"> • did not submit recommendation 	<ul style="list-style-type: none"> • Tohono O’odham Nation of Arizona (partial)
<ul style="list-style-type: none"> • Salt River Pima-Maricopa Indian Community 	<ul style="list-style-type: none"> • did not submit recommendation 	<ul style="list-style-type: none"> • Salt River Pima-Maricopa Indian Community
Yuma, AZ*	Yuma (partial)	Yuma (partial)
<ul style="list-style-type: none"> • Cocopah Tribe of Arizona 	<ul style="list-style-type: none"> • did not submit recommendation 	<ul style="list-style-type: none"> • Cocopah Tribe of Arizona (partial)
<ul style="list-style-type: none"> • Quechan Tribe of the Fort Yuma Indian Reservation 	<ul style="list-style-type: none"> • did not submit recommendation 	<ul style="list-style-type: none"> • Quechan Tribe of the Fort Yuma Indian Reservation (partial)

*Phoenix-Mesa and Yuma are multi-jurisdictional nonattainment areas that include areas of Indian country of federally-recognized tribes. The areas of Indian country of each tribe that the EPA is designating as part of the nonattainment area are discussed in Section 3, Technical Analysis for Phoenix-Mesa, AZ and Section 4, Technical Analysis for Yuma, AZ.

**The Gila River Indian Community recommended that the main body of the tribal land be designated as a separate attainment area, and that the “Parcels M and N” area be designated as part of the Phoenix-Mesa nonattainment area but be recognized as under tribal jurisdiction in the tables found at 40 CFR Part 81. For additional information, see Section 3, Technical Analysis for Phoenix-Mesa, AZ.

In its recommendation letter, Arizona recommended that the EPA designate as attainment/unclassifiable all other areas of the State not identified in the Recommended Nonattainment Counties column of Table 1.1. On November 6, 2017 (82 FR 54232; November 16, 2017), the EPA signed a final rule designating the counties listed in Table 1.2 below as attainment/unclassifiable.⁵ The EPA is designating the remainder of Arizona areas not listed in Table 1.1 or Table 1.2 as attainment/unclassifiable based on Arizona’s recommendation, ambient monitoring data collected during the 2014-2016 period, where available, showing compliance with the 2015 ozone NAAQS, and

⁵ See Federal Register, vol. 82, p. 54232.

the EPA’s assessment that these areas are not contributing to a violation in a nearby area.⁶ The EPA explains in section 2.0 the approach it is now taking to designate the remaining areas in the State.

Table 1.2 Arizona Counties Designated on November 16, 2017.

County	Designation
Apache County	Attainment/Unclassifiable
Cochise County	Attainment/Unclassifiable
Greenlee County	Attainment/Unclassifiable
Santa Cruz County	Attainment/Unclassifiable

The EPA is designating all tribes in accordance with two guidance documents issued in December 2011 by the EPA Office of Air Quality Planning and Standards titled, “Guidance to Regions for Working with Tribes during the National Ambient Air Quality Standards (NAAQS)) Designations Process,”⁷ and “Policy for Establishing Separate Air Quality Designations for Areas of Indian Country.”⁸ As discussed in these policies, tribes retain sovereign authorities over their members and territories, and jurisdiction in Indian country generally rests with the relevant tribe and the federal government, not with states. As such, designating areas of Indian country as part of a multi-jurisdictional area has no effect on tribal sovereignty over those areas.

2.0 Nonattainment Area Analyses and Boundary Determination

The EPA evaluated and determined the boundaries for each nonattainment area on a case-by-case basis, considering the specific facts and circumstances of the area. In accordance with the CAA section 107(d), the EPA is designating as nonattainment the areas with the monitors that are violating the 2015 ozone NAAQS and nearby areas with emissions sources (i.e., stationary, mobile, and/or area sources) that contribute to the violations. As described in the EPA’s designations guidance for the 2015 NAAQS (hereafter referred to as the “ozone designations guidance”),⁹ after identifying each monitor indicating a violation of the ozone NAAQS in an area, the EPA analyzed those nearby areas with emissions potentially contributing to the violating area. In guidance issued in February 2016, the EPA provided that using the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA)¹⁰ as a starting point for the contribution analysis is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA or CSA.

⁶ In previous ozone designations and in the designation guidance for the 2015 ozone NAAQS, the EPA used the designation category label Unclassifiable/Attainment to identify both areas that were monitoring attainment and areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to a violation in a nearby area. The EPA is now reversing the order of the label to be Attainment/Unclassifiable so that the category is more clearly distinguished from the separate Unclassifiable category.

⁷ <https://www.epa.gov/sites/production/files/2016-02/documents/ozone-designation-tribes.pdf>

⁸ <https://www.epa.gov/sites/production/files/2016-02/documents/indian-country-separate-area.pdf>

⁹ The EPA issued guidance on February 25, 2016, that identified important factors that the EPA evaluated in determining appropriate area designations and nonattainment boundaries for the 2015 ozone NAAQS. Available at <https://www.epa.gov/ozone-designations/epa-guidance-area-designations-2015-ozone-naaqs>

¹⁰ Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The Office of Management and Budget (OMB) adopts standards for defining statistical areas. The statistical areas are delineated based on U.S. Census Bureau data. The lists are periodically updated by the OMB. The EPA used the most recent July 2015 update (OMB Bulletin No. 15-01), which is based on application of the 2010 OMB standards to the 2010 Census, 2006-2010 American Community Survey, as well as 2013 Population Estimates Program data.

On November 6, 2017, the EPA issued attainment/unclassifiable designations for approximately 85% of the United States and one unclassifiable area designation. At that time, consistent with statements in the designations guidance regarding the scope of the area the EPA would analyze in determining nonattainment boundaries, EPA deferred designation for any counties in the larger of a CSA or CBSA where one or more counties in the CSA or CBSA was violating the standard and any counties with a violating monitor not located in a CSA or CBSA. In addition, the EPA deferred designation for any other counties adjacent to a county with a violating monitor. The EPA also deferred designation for any county that had incomplete monitoring data, any county in the larger of the CSA or CBSA where such a county was located, and any county located adjacent to a county with incomplete monitoring data.

The EPA is proceeding to complete the remaining designations consistent with the designations guidance (and EPA’s past practice) regarding the scope of the area EPA would analyze in determining nonattainment boundaries for the ozone NAAQS as outlined above. For those deferred areas where one or more counties violating the ozone NAAQS or with incomplete data are located in a CSA or CBSA, in most cases the technical analysis for the nonattainment area includes any counties in the larger of the relevant CSA or CBSA. For counties with a violating monitor not located in a CSA or CBSA, EPA explains in the technical analysis sections, its decision whether to consider in the five-factor analysis for each area any other adjacent counties for which EPA previously deferred action. We are designating all counties not included in five-factor analyses for a specific nonattainment or unclassifiable area analyses, as attainment/unclassifiable. These deferred areas are identified in a separate document entitled “Designations for Deferred Counties and County Equivalents Not Addressed in the Technical Analyses.” which is available in the docket. The EPA’s analytical approach is detailed in Table 2.1 below and further discussed in Sections 3 and 4 of this technical support document.

Table 2.1 Area of Analysis for Final Nonattainment Areas in Arizona

Nonattainment Area	Area of Analysis	Associated CBSA	Associated CSA
Phoenix-Mesa, AZ	Gila County Maricopa County Pinal County	Payson, AZ CBSA Phoenix-Mesa- Scottsdale, AZ CBSA	None
Yuma, AZ	Yuma County	Yuma CBSA	None

Master Legend

Ozone monitoring site with 2014-2016 design value

- No valid value
- 0 - 0.070 parts per million (ppm)
- 0.071 and above

National Emissions Inventory (NEI) 2014 v1

- Large Point Sources (VOC or NOx >= 100 gross tons)
- ★ Small Point Sources

Hysplit

Elevation (Meters)

- ~ 100
- ~ 500
- ~ 1,000

EPA's Final Nonattainment Area Boundary

Federal American Indian Reservations and Off Reservation Lands

State Boundaries

County Boundaries

CSAs - Combined Statistical Areas

CBSAs - Metropolitan Statistical Areas

CBSAs - Micropolitan Statistical Areas

NAAAs-8 Hour Ozone (1997 NAAQS)

- Maintenance (NAAQS revoked)
- Nonattainment (NAAQS revoked)

NAAAs-8 Hour Ozone (2008 NAAQS)

- Nonattainment
- Maintenance

County Population (2010)

- > 5,194,675 to 9,818,605
- > 2,035,210 to 5,194,675
- > 744,344 to 2,035,210
- > 220,000 to 744,344
- 0 to 220,000

Census Tracts Population (2012)

- 0 to 2,825
- > 2,825 to 4,481
- > 4,481 to 6,373
- > 6,373 to 10,145
- > 10,145 to 39,143

Vehicle Miles Traveled - 2014

- 0 - 36,071,088
- 36,071,088.01 - 52,484,020
- 52,484,020.01 - 88,659,368
- 88,659,368.01 - 204,018,496
- 204,018,496.01 - 5,247,588,352

Figures in the remainder of this document refer to the master legend above.

3.0 Technical Analysis for Phoenix-Mesa, AZ

This technical analysis identifies the area with monitors that violate the 2015 ozone NAAQS. It also provides EPA's evaluation of this area and nearby areas to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitors in the area.

The area of analysis for the Phoenix-Mesa Arizona area includes the Phoenix-Mesa-Scottsdale CBSA and the Payson CBSA, which together consists of Maricopa, Pinal, and Gila counties. Table 3.1 identifies the area of analysis for the Phoenix-Mesa, AZ nonattainment area. There is no CSA associated with this area.

Table 3.1 Area of Analysis.

Nonattainment Area	Area of Analysis	Associated CBSA	Associated CSA
Phoenix-Mesa, AZ	Gila County Maricopa County Pinal County	Payson, AZ CBSA Phoenix-Mesa- Scottsdale, AZ CBSA	None

This analysis was based on the weight-of-evidence of the five factors recommended in the EPA's ozone designations guidance and other relevant information. In developing this technical analysis, the EPA used the latest data and information available to the EPA (and to the states and tribes through the Ozone Designations Mapping Tool and the EPA Ozone Designations Guidance and Data web page).¹ In addition, the EPA considered all additional data or information provided to the EPA by states or tribes.

The five factors recommended in the EPA's guidance are:

1. Air Quality Data (including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor);
2. Emissions and Emissions-Related Data (including locations of sources, population, amount of emissions, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography/Topography (including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations); and
5. Jurisdictional Boundaries (e.g., counties, air districts, existing nonattainment areas, areas of Indian country, Metropolitan Planning Organizations (MPOs)).

Figure 3.1 is a map of the EPA's nonattainment boundary for Phoenix-Mesa. The map shows the location of the ambient air quality monitors, county boundaries, tribal boundaries, and existing 1997 and 2008 ozone NAAQS nonattainment boundaries. The EPA is not modifying the State's recommended boundaries for the Phoenix-Mesa nonattainment area.

For purposes of the 1997 and 2008 ozone NAAQS, portions of this area were designated nonattainment but the areas were not identical. The boundaries for the nonattainment area for the 1997

¹ The EPA's Ozone Designations Guidance and Data web page can be found at <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>.

and 2008 ozone NAAQS included parts of Maricopa and Pinal counties. No portion of Gila County was included in the boundaries of the nonattainment areas for the 1997 or 2008 ozone NAAQS.

Figure 3.1a The EPA’s Nonattainment Boundaries for Phoenix-Mesa, AZ.

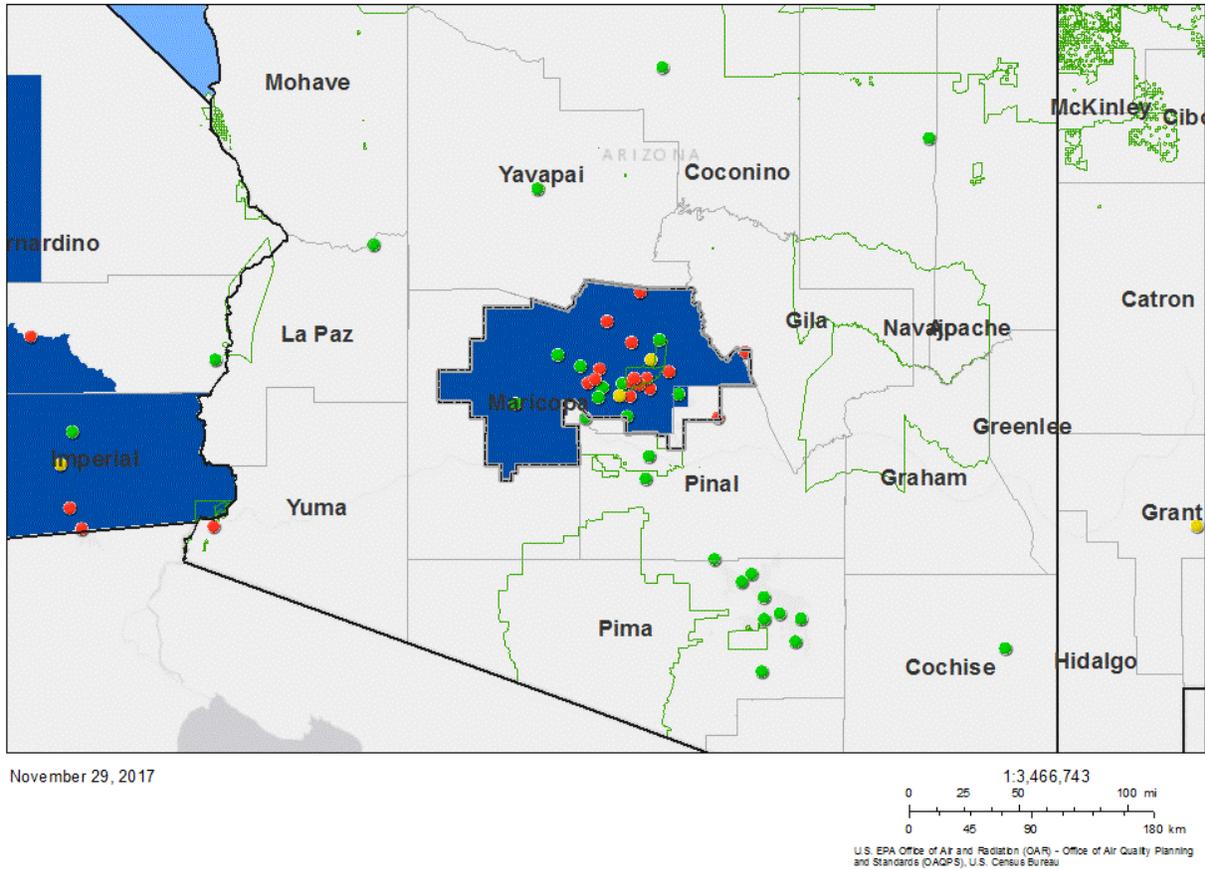


Figure 3.1a shows the EPA’s nonattainment boundary for Phoenix-Mesa, AZ as a gray line with a dashed black center. Nonattainment areas for the 1997 and 2008 ozone NAAQS are shown in dark blue areas. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.1b The EPA’s Nonattainment Boundaries for Phoenix-Mesa, AZ with Gila River Indian Community’s “Parcels M and N”

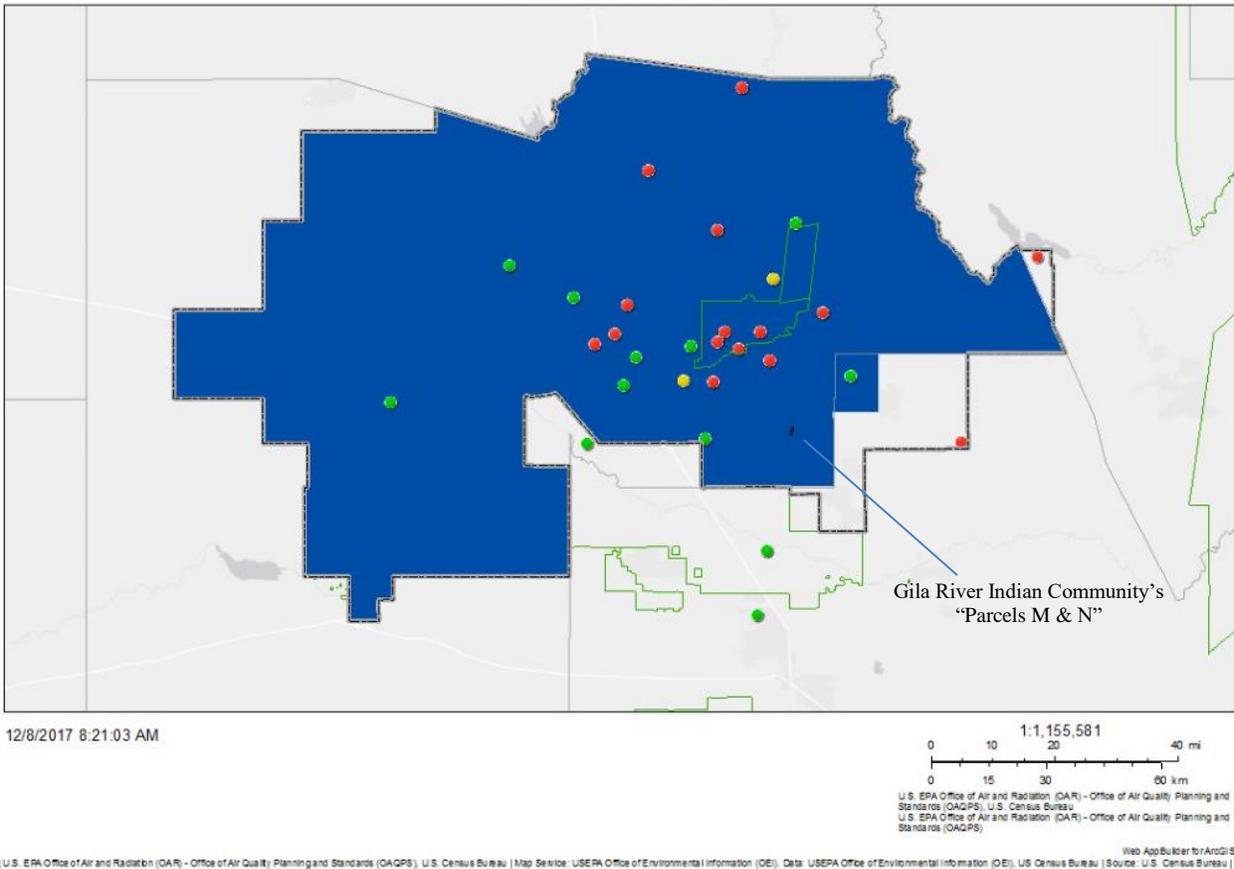


Figure 3.1b shows the EPA’s nonattainment boundary for Phoenix-Mesa, AZ as a gray line with a dashed black center. Gila River Indian Community’s “parcels M and N” are shown and labeled (see Section 1.0 of this document and Factor 5 of this section for further discussion). Nonattainment areas for the 2008 ozone NAAQS are shown in dark blue areas. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA must designate as nonattainment any area that violates the NAAQS and any nearby areas that contribute to the violation in the violating area. Gila, Maricopa, and Pinal counties have monitors in violation of the 2015 ozone NAAQS, therefore portions of these counties are included in the nonattainment area. The following sections describe the five factor analysis. While the factors are presented individually, they are not independent. The five factor analysis process carefully considers the interconnections among the different factors and the dependence of each factor on one or more of the others, such as the interaction between emissions and meteorology for the area being evaluated.

The Phoenix-Mesa nonattainment area includes portions of Indian country of the following tribes: Fort McDowell Yavapai Nation, Gila River Indian Community, Tohono O’odham Nation of Arizona (Tohono O’odham Nation), and Salt River Pima-Maricopa Indian Community of the Salt River Reservation (Salt River Indian Community). The Gila River Indian Community and Tohono O’odham Nation both have non-contiguous areas of Indian country in Maricopa and Pinal counties. We are designating the portions of the tribal lands that lie within the boundaries of the Phoenix-Mesa nonattainment area as nonattainment as part of this area. Consistent with the Gila River Indian Community’s recommendation “parcels M and N” (Figure 3.1b) that are under the tribe’s jurisdiction will be identified as such in the tables found at 40 CFR Part 81.

We are designating the portions of the tribal lands that lie outside of the nonattainment area boundaries as attainment/unclassifiable, consistent with the surrounding area. We are designating the main body of the Gila River Indian Community's tribal land as a separate attainment/unclassifiable area, consistent with their recommendation.

Factor Assessment

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in the Phoenix-Mesa area based on data for the 2014-2016 period (i.e., the 2016 design value, or DV). This is the most recent three-year period with fully-certified air quality data.² The design value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentration.³ The 2015 NAAQS are met when the design value is 0.070 ppm or less. Only ozone measurement data collected in accordance with the quality assurance (QA) requirements using approved (FRM/FEM) monitors are used for NAAQS compliance determinations.⁴ The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) database to calculate the ozone design values.

Individual exceedances or violations of the 2015 ozone NAAQS that the EPA determines have been caused by an exceptional event that meets the administrative and technical criteria in the Exceptional Events Rule⁵ are not included in these calculations. Whenever several monitors are located in a county (or designated nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e. monitors with design values greater than 0.070 ppm) in a county or other geographic area forms the basis for designating that county or area as nonattainment. The remaining four factors are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s) based on a consideration of what nearby areas are contributing to a violation of the NAAQS.

The EPA identified monitors where the most recent design values violate the NAAQS, and examined historical ozone air quality measurement data (including previous design values) to understand the nature of the ozone ambient air quality problem in the area. Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are operated in accordance with 40 CFR part 58 Appendices A, C, D, and E and operating with an FRM or FEM monitor. These requirements must be met in order to be acceptable for comparison to the 2015 ozone NAAQS for designation purposes. All data from Special Purpose Monitors (SPMs) using an FRM or FEM are eligible for comparison to the NAAQS, subject to the requirements given in the March 28, 2016 Revision to Ambient Monitoring Quality Assurance and Other Requirements Rule (81 FR 17248).

The 2014-2016 design values for counties in the area of analysis are shown in Table 3.2.

² Air quality data used in these TSDs were pulled from the EPA's Air Quality System on October 2, 2017, and are available at: https://www.epa.gov/sites/production/files/2017-10/ozone_designvalues_20142016_final_10_02_17_0.xlsx.

³ The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50 Appendix U.

⁴ The QA requirements for ozone monitoring data are specified in 40 CFR part 58 Appendix A. The performance test requirements for candidate FEMs are provided in 40 CFR part 53 Subpart B.

⁵ The EPA finalized the rule on the Treatment of Data Influenced by Exceptional Events (81 FR 68513) and the guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events in September of 2016. For more information, see <https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance>.

Table 3.2 Air Quality Data (all values in ppm).

County, State	State Recommended Nonattainment?	AQS Site ID	2014-2016 DV	2014 4 th highest daily max value	2015 4 th highest daily max value	2016 4 th highest daily max value
Gila, AZ	Yes (partial)	04-007-0010	0.071	0.072	0.073	0.070
Maricopa, AZ	Yes (partial)	04-013-0019	0.073	0.076	0.074	0.071
		04-013-1003	0.076	0.078	0.077	0.075
		04-013-1004	0.075	0.078	0.074	0.075
		04-013-1010	0.073	0.076	0.072	0.073
		04-013-2001	0.068	0.071	0.067	0.066
		04-013-2005	0.077	0.080	0.077	0.074
		04-013-3002	0.070	0.071	0.071	0.070
		04-013-3003	0.070	0.072	0.068	0.070
		04-013-4003	0.070	0.073	0.070	0.067
		04-013-4004	0.069	0.070	0.070	0.069
		04-013-4005	N/A	0.071	0.051	0.068
		04-013-4008	0.071	0.074	0.069	0.071
		04-013-4010	0.066	0.070	0.067	0.063
		04-013-4011	0.059	0.060	0.060	0.059
		04-013-7003	0.067	0.069	0.067	0.065
		04-013-7020	0.072	0.073	0.073	0.070
		04-013-7021	0.076	0.080	0.074	0.074
		04-013-7022	0.074	0.076	0.076	0.072
		04-013-7024	0.071	0.071	0.072	0.070
		04-013-9508	0.073	0.074	0.073	0.072
04-013-9702	0.072	0.074	0.073	0.071		
04-013-9704	N/A	0.068	0.069	0.068		
04-013-9706	0.070	0.073	0.068	0.070		
04-013-9997	0.075	0.077	0.075	0.075		
Pinal, AZ	Yes (partial)	04-021-3001	0.070	0.066	0.073	0.072
		04-021-3003	0.065	0.065	0.066	0.066
		04-021-3007	0.065	0.065	0.066	0.066
		04-021-7001	0.065	0.066	0.064	0.066
		04-021-8001	0.071	0.068	0.074	0.072

The highest design value in each county is indicated in bold type.

N/A means that the monitor did not meet the completeness criteria described in 40 CFR part 50 Appendix U, or no data exists for the county.

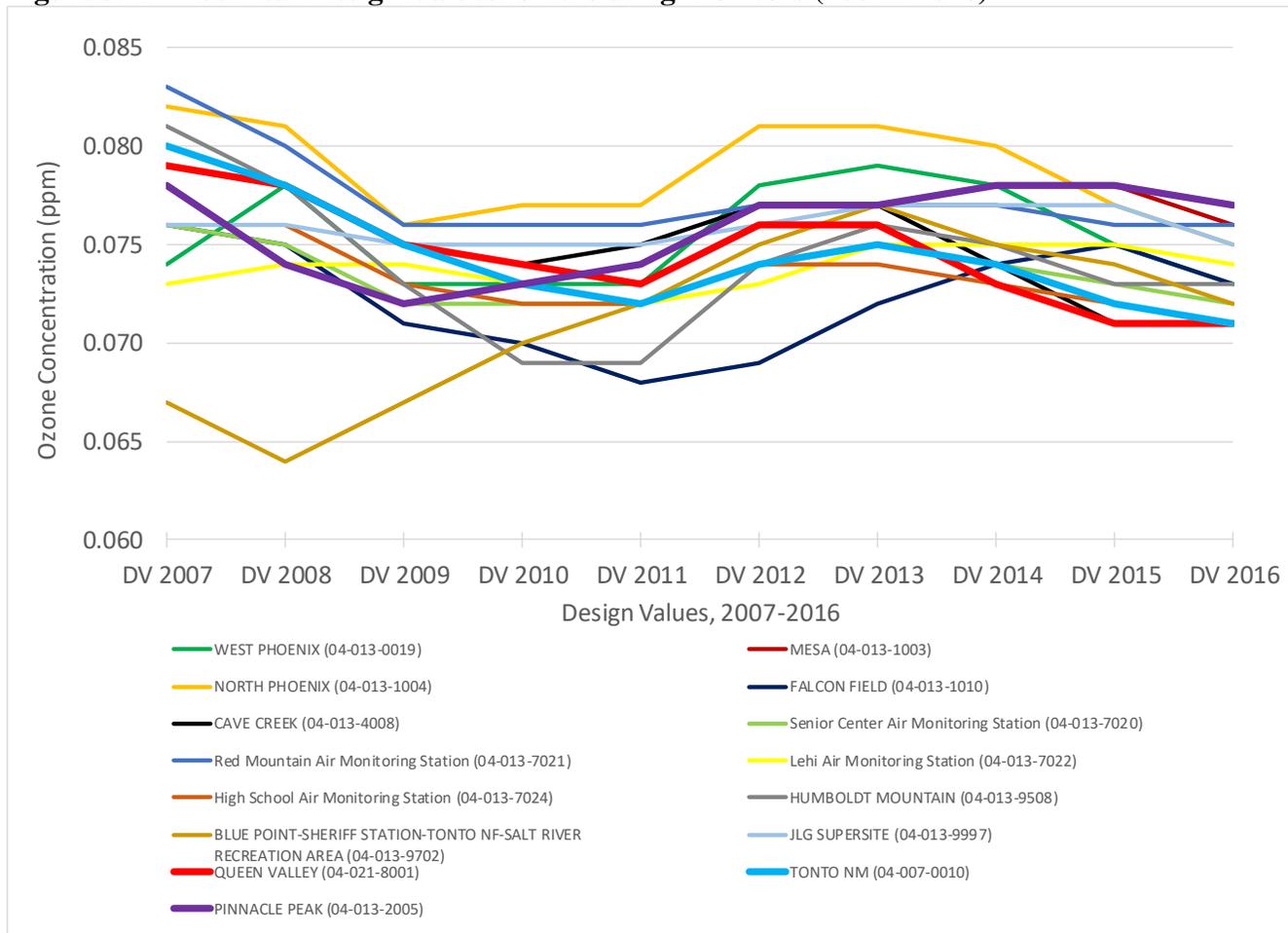
Maricopa County, Pinal County, and Gila County show a violation of the 2015 ozone NAAQS, therefore all or parts of these counties are included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area.

Figure 3.1b, shown previously, identifies the Phoenix-Mesa nonattainment area and the violating monitors. Table 3.2 identifies the design values for all violating monitors in the area of analysis. Figure 3.2 shows the historical trend of design values for the monitors with the highest design value for each county in the area of analysis. As indicated in Table 3.2, there are 15 violating monitors that are located in the area of analysis. The violating monitors are located in or near the city of Phoenix in Maricopa County as well as bordering areas in northern Pinal County and western Gila County.

Monitors that are attaining the 2015 ozone NAAQS are generally located in the western and northwestern portion of the Phoenix Metro area within Maricopa County. Additional attaining monitors are located in the western and southern portions of Pinal County, near the cities of Casa Grande and the Pinal-Pima County border, respectively.

As shown in Figure 3.2, the trends in previous design values at the violating monitors in each county within the area of analysis show that ozone concentrations have been generally trending down in Gila and Pinal counties over the past 10 years but also show moderate increases in ozone concentrations in 2011, 2012, and 2013. While some monitors in the area show a general downward trend since 2013, ozone concentrations at Pinnacle Peak, the highest design value monitor in Maricopa County, increased after 2009 and have shown no trend in recent years.

Figure 3.2 Three-Year Design Values for Violating Monitors (2007 – 2016).



Gila, Maricopa, and Pinal counties have one or more monitoring sites showing a violation of the 2015 ozone NAAQS based on 2014-2016 data. The Queen Valley (AQS ID 04-021-8001) monitor in Pinal County and the Tonto National Monument (AQS ID 04-007-0010) monitor in Gila County are both located outside of the nonattainment area for the 2008 ozone NAAQS and are violating the 2015 NAAQS. This forms the basis for the State’s recommendation to provide expanded boundaries for purposes of designating nonattainment areas for the 2015 ozone NAAQS. Therefore, Gila, Maricopa, and Pinal counties are included in whole or in part within the nonattainment area for the Phoenix-Mesa area.

Factor 2: Emissions and Emissions-Related Data

The EPA evaluated ozone precursor emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

The EPA reviewed data from the 2014 National Emissions Inventory (NEI). For each county in the area of analysis, the EPA examined the magnitude of large sources (NO_x or VOC emissions greater than 100 tons per year) and small point and the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, non-road mobile, on-road mobile, and fires. Emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

Table 3.3 provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for the area of analysis considered for inclusion in the Phoenix-Mesa nonattainment area.

Table 3.3 Total County-Level NO_x and VOC Emissions.

County, State	State Recommended Nonattainment?	Total NO _x (tpy)	Total VOC (tpy)
Maricopa, AZ	Yes (partial)	61,528	80,493
Pinal, AZ	Yes (partial)	12,513	9,772
Gila, AZ	Yes (partial)	2,245	8,010
Area wide:		76,286	98,275

For state-recommended partial counties, the emissions shown are for the entire county.

In addition to reviewing county-wide emissions of NO_x and VOC in the area of analysis, the EPA also reviewed emissions from large point sources. The location of these sources, together with the other factors, can help inform nonattainment area boundaries. The locations of the large point sources are shown in Figure 3.3 below. The nonattainment boundary and location of monitors are also shown.

Figure 3.3 Large Point Sources in the Area of Analysis.

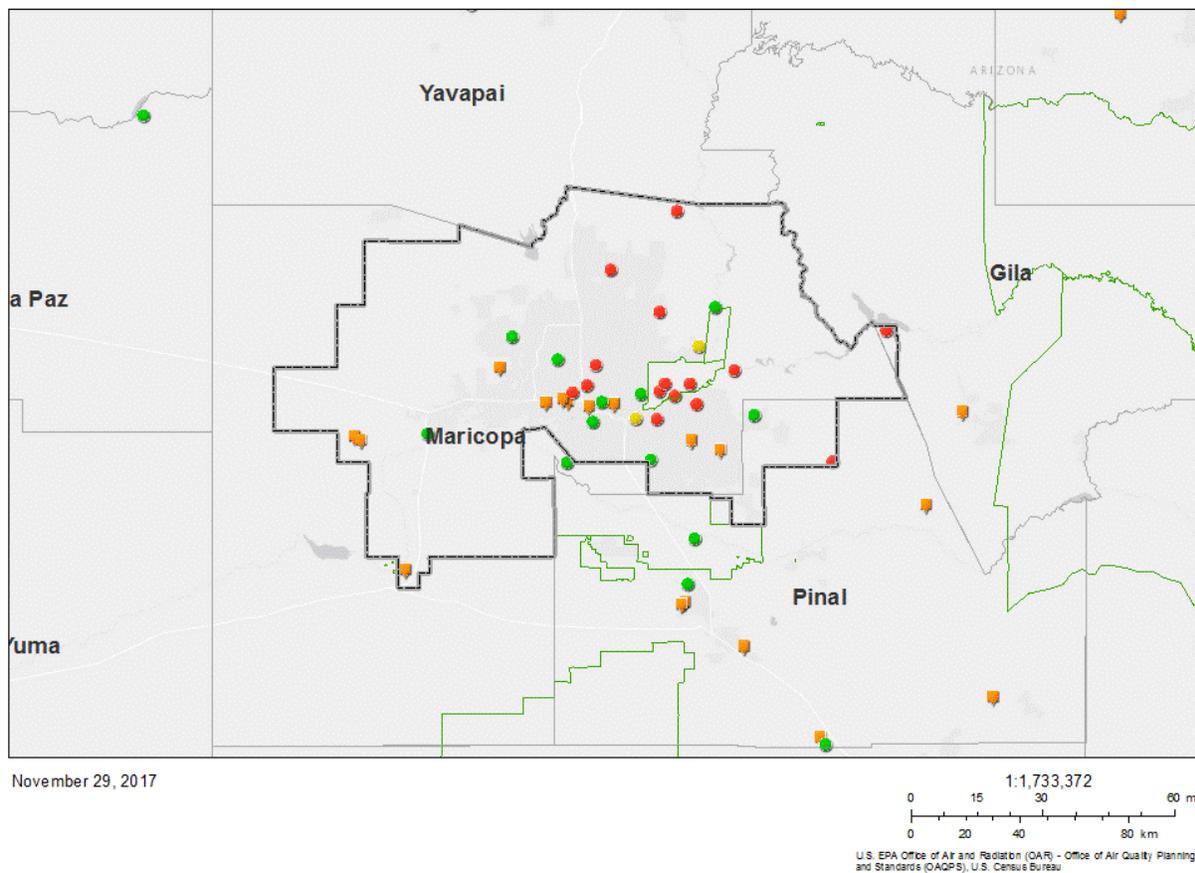


Figure 3.3 shows large point sources in the area of analysis for Phoenix-Mesa, AZ as orange squares. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's analysis of relevant county-level emissions and the geographic locations of the relevant emissions showed that Maricopa County has the highest emissions levels within the area of analysis. NO_x emissions in Maricopa County are approximately 5 times greater than those in Pinal County and almost 30 times greater than those in Gila County. For VOC emissions, Maricopa County has more than 8 times the emissions of Pinal County and approximately 10 times the emissions of Gila County. Most of the large point sources of ozone precursors are centralized around the urban core of the city of Phoenix in Maricopa County. There are no large point sources located in the western and southwestern portions of Maricopa County. One large point source is located in southwestern Gila County and a few large point sources are scattered throughout Pinal County.

Population density and degree of urbanization

In this part of the factor analysis, the EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include emissions of NO_x and VOC from on-road and non-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to violations of the NAAQS. Table 3.4 shows the population, population density, and population growth information for each county in the area of analysis.

Table 3.4 Population and Growth.

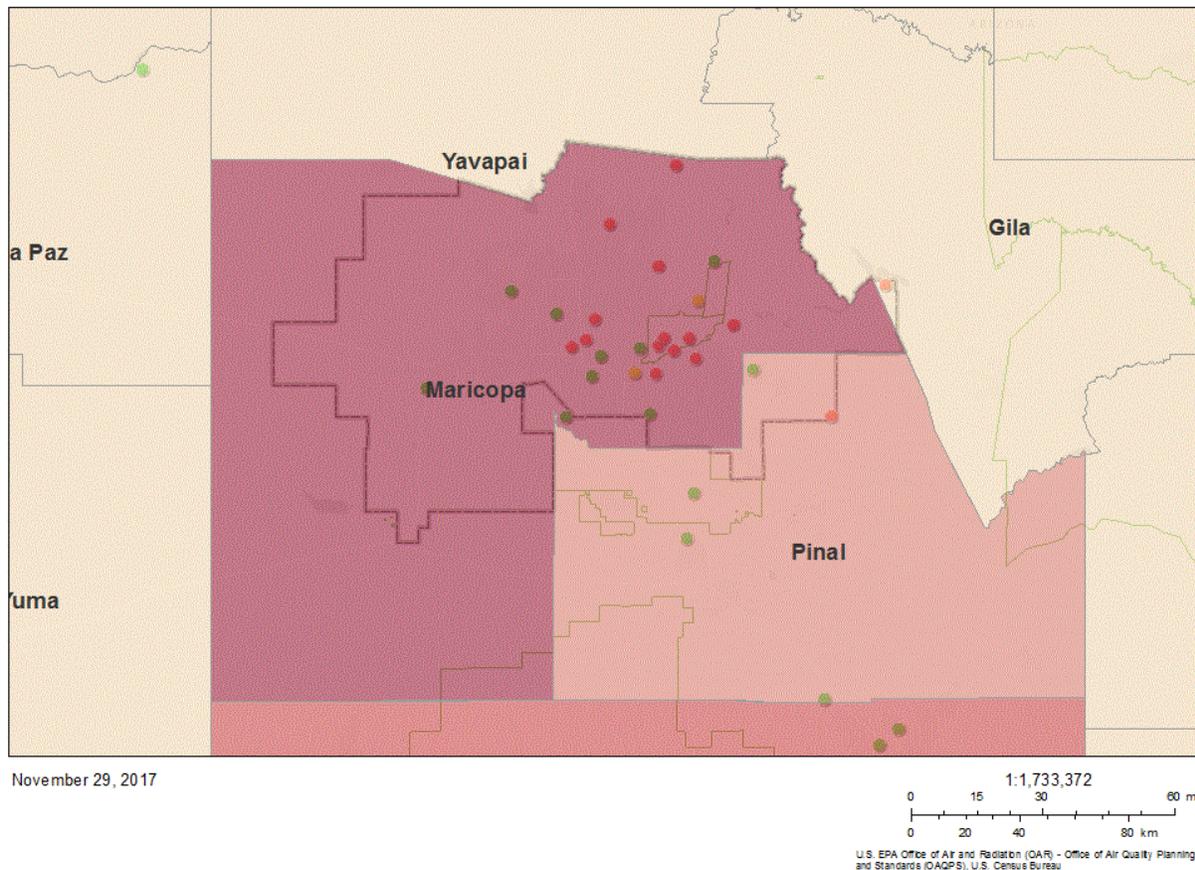
County, State	State Recommended Nonattainment?	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute Change in Population (2010-2015)	Population % Change (2010-2015)
Maricopa, AZ	Yes (partial)	3,817,117	4,167,947	453	350,830	9%
Pinal, AZ	Yes (partial)	375,770	406,584	76	30,814	8%
Gila, AZ	Yes (partial)	53,597	53,159	11	-438	-1%
Area wide:		4,246,484	4,627,690	239	381,206	9%

For state-recommended partial counties, the population shown is for the entire county.

Source: U.S. Census Bureau population estimates for 2010 and 2015. www.census.gov/data.html.

Figure 3.4 shows the county-level population density for the area of analysis. Maricopa County has the by far the highest population levels within the area of analysis. The majority of the population in Maricopa County is centered in the Phoenix metropolitan area and surrounding suburbs. Pinal County is moderately populated compared to Maricopa County, with population centers located in the cities of Maricopa and Casa Grande. Gila County is the least populated county and also had a small decrease in population for the period 2010-2015. Both Maricopa and Pinal Counties had a moderate increase in population 9% and 8%, respectively.

Figure 3.4 County-Level Population.



U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), U.S. Census Bureau | Source: U.S. Census Bureau | Web AppBuilder for ArcGIS

Figure 3.4 shows county-level population in the area of analysis for Phoenix-Mesa, AZ. Lighter shades of red indicate areas with smaller populations; darker shades of red indicate areas with larger populations. The EPA’s nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Traffic and Vehicle Miles Travelled (VMT)

The EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for each county in the area of analysis. In combination with the population/population density data and the location of main transportation arteries, this information helps identify the probable location of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and high VMT and/or high number of commuters indicates the presence of motor vehicle emissions that may contribute to violations of the NAAQS. Rapid population or VMT growth in a county on the urban perimeter may signify increasing integration with the core urban area, and thus could indicate that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. In addition to VMT, the EPA evaluated worker data collected by the U.S. Census Bureau for the area of analysis. Table 3.5 shows the traffic and commuting pattern data, including total VMT for each county in the area of analysis, number of residents who work in each county, number of residents that work in counties with violating monitor(s), and the percent of residents working in counties with violating monitor(s). The data in Table 3.5 are 2014 data.

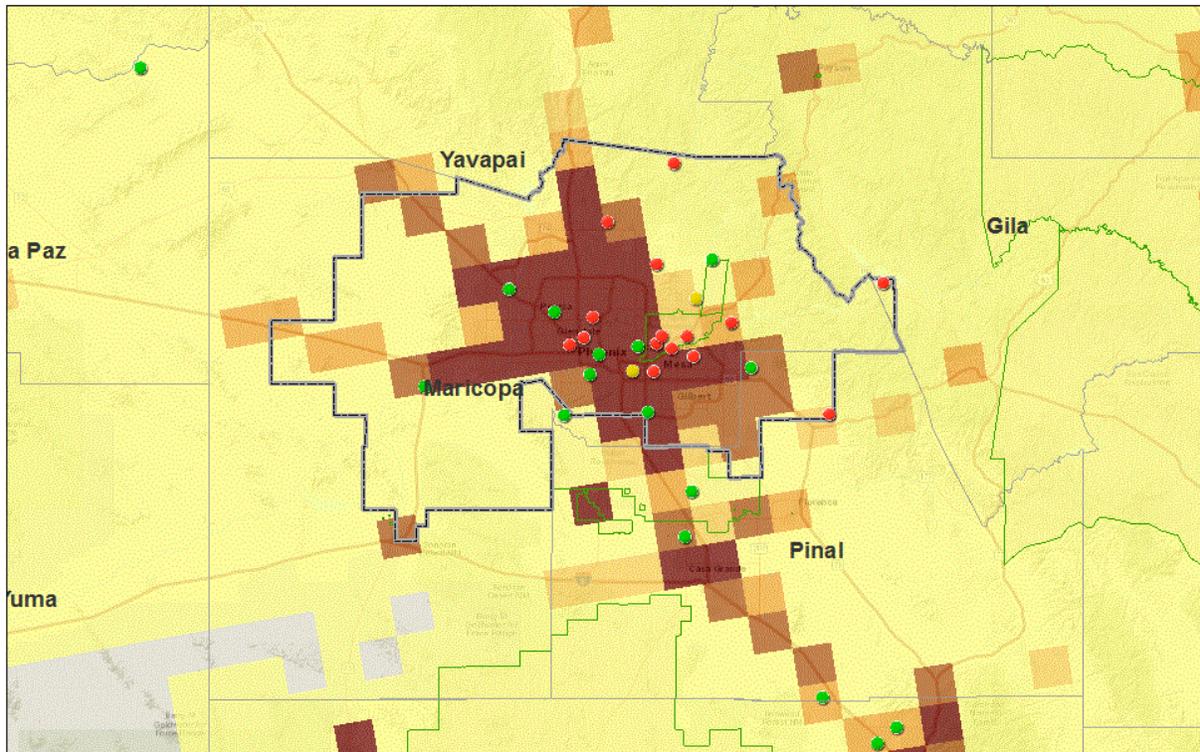
Table 3.5 Traffic and Commuting Patterns.

County, State	State Recommended Nonattainment?	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number Commuting To or Within Counties with Violating Monitor(s) Within Area of Analysis	Percentage Commuting To or Within Counties with Violating Monitor(s) Within Area of Analysis
Maricopa, AZ	Yes (partial)	32,590	1,652,004	1,567,200	94.9%
Pinal, AZ	Yes (partial)	3,413	135,015	119,024	88.2%
Gila, AZ	Yes (partial)	623	18,280	14,819	81.1%
Total:		36,626	1,805,299	1,701,043	94.2%

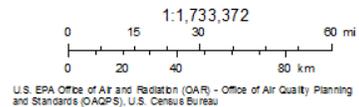
For state-recommended partial counties, the data provided are for the entire county. Counties with a monitor(s) violating the NAAQS are indicated in bold.

To show traffic and commuting patterns, Figure 3.5 overlays twelve-kilometer gridded VMT from the 2014 NEI with a map of the transportation arteries.

Figure 3.5 Twelve Kilometer Gridded VMT (Miles) Overlaid with Transportation Arteries.



November 29, 2017



U.S. EPA Office of Air and Radiation (GAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Esri, HERE, Garmin, NGA, USGS, NPS | Web App Builder for ArcGIS

Figure 3.5 shows gridded VMT in the area of analysis for Phoenix-Mesa, AZ. Lighter shades of yellow indicate areas with lower VMT; darker shades of red indicate areas with higher VMT. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

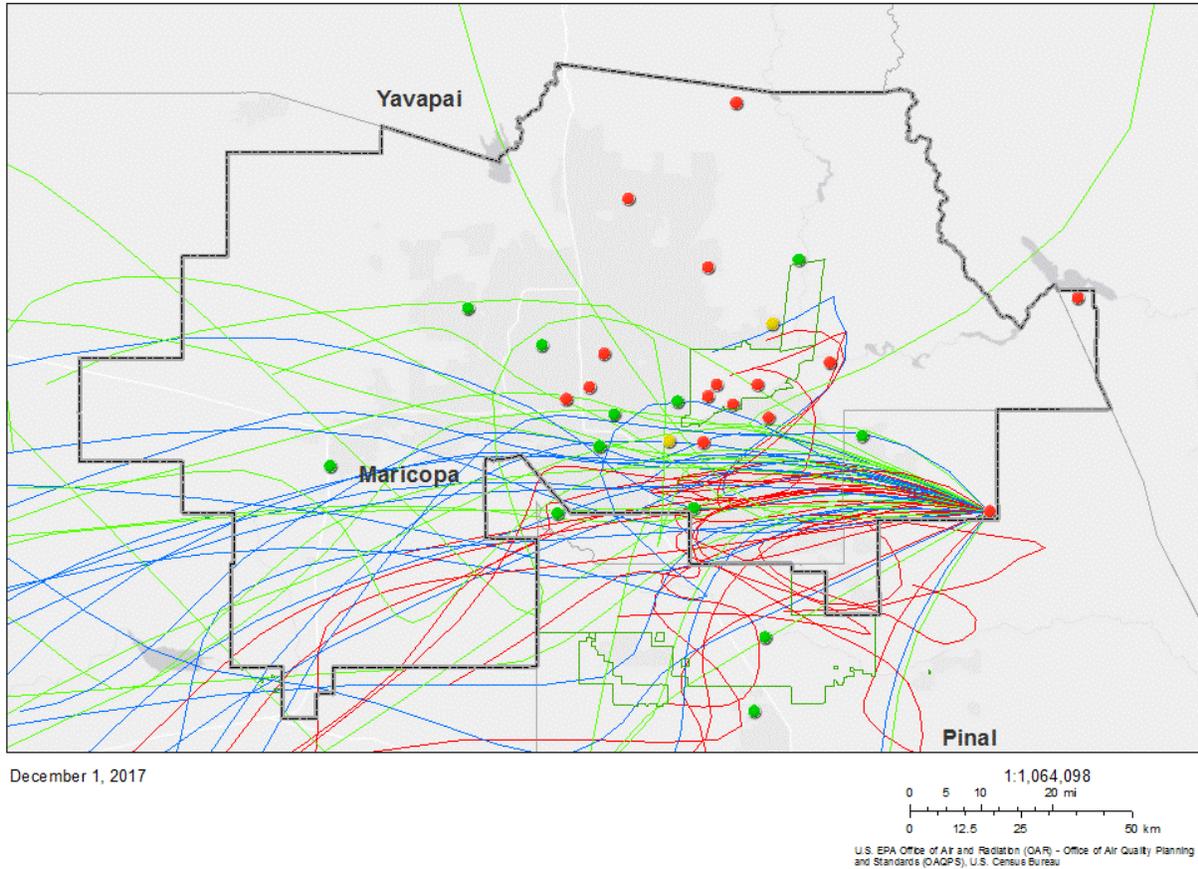
The EPA's analysis of traffic and commuting patterns is based on data from the VMT spreadsheet on the Ozone Designations webpage (see footnote 1) and On the Map data from the Census Bureau.⁶ Maricopa County has the highest total VMT levels within the area of analysis almost ten times that of Pinal County and over 50 times that in Gila County. All three counties have a high percentage of commuters traveling to or within counties with a violating monitor. Some areas in the southwestern portion of Pinal County contain areas of moderate and high VMT along Interstate 10-West. As shown in Figure 3.5, Gila County has few areas with moderate levels of VMT.

Factor 3: Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may inform the determination of nonattainment area boundaries. In order to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of ozone and precursor emissions from sources in the area, the EPA evaluated 2014-2016 HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) trajectories at 100, 500, and 1000 meters above ground level (AGL) that illustrate the three-dimensional paths traveled by air parcels to a violating monitor. Figure 3.6 shows the 24-hour HYSPLIT back trajectories for each exceedance day (i.e., daily maximum 8 hour values that exceed the 2015 ozone NAAQS) for the two violating monitors in Pinal and Gila counties (Queen Valley, AQS IDs 04-021-8001 and Tonto NM, AQS ID 04-007-0010), the north-most violating monitor in Maricopa County (Humboldt Mountain, AQS ID 04-013-9508) and the highest design value site in Maricopa County (Pinnacle Peak, AQS ID 04-013-2005), representing the range of possible transport patterns and the spatial extent of violating monitors.

⁶ The Census Bureau's On The Map web page can be found at <https://onthemap.ces.census.gov/>

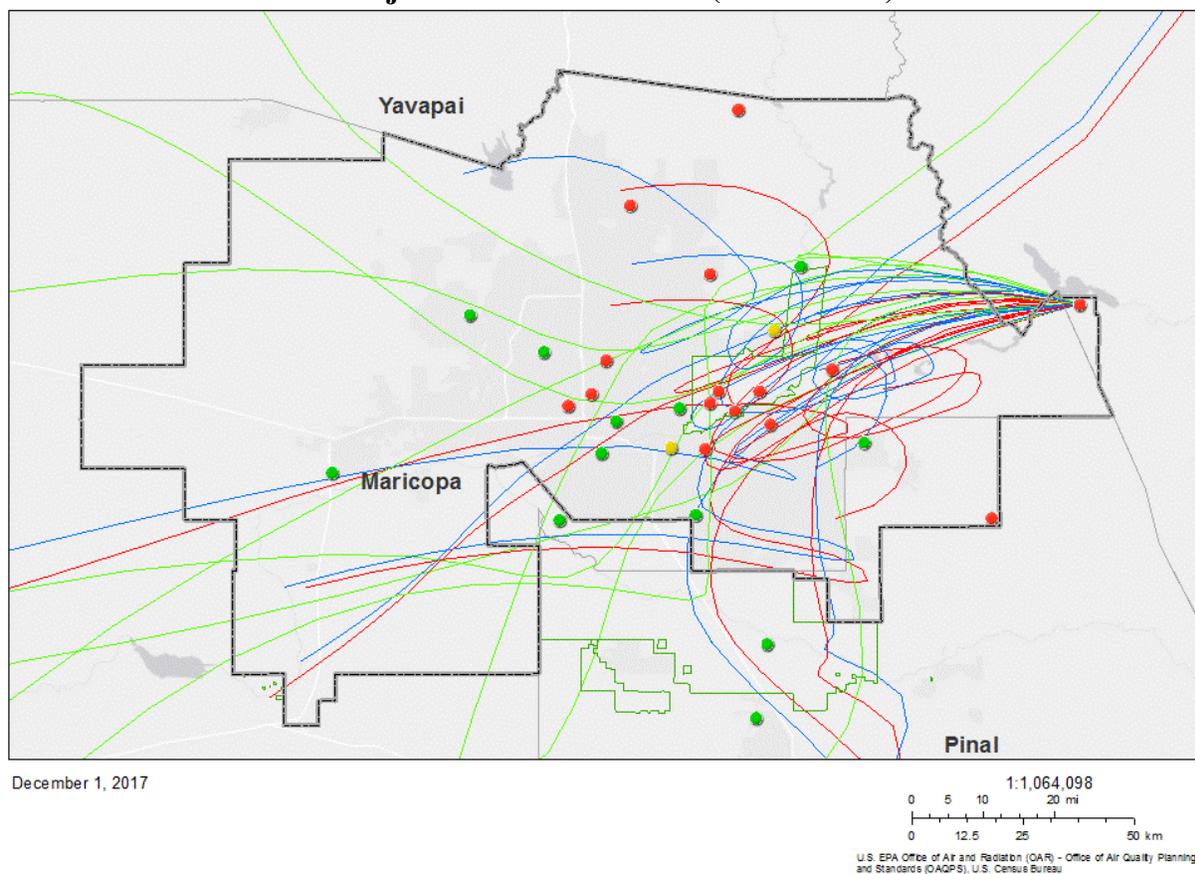
Figure 3.6a HYSPLIT Back Trajectories for Queen Valley (04-021-8001).



Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Web AppBuilder for ArcGIS

Figure 3.6a shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6b HYSPLIT Back Trajectories for Tonto NM (04-007-0010).



Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Web App Builder for ArcGIS

Figure 3.6b shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6c HYSPLIT Back Trajectories for Humboldt Mountain (04-013-9508).

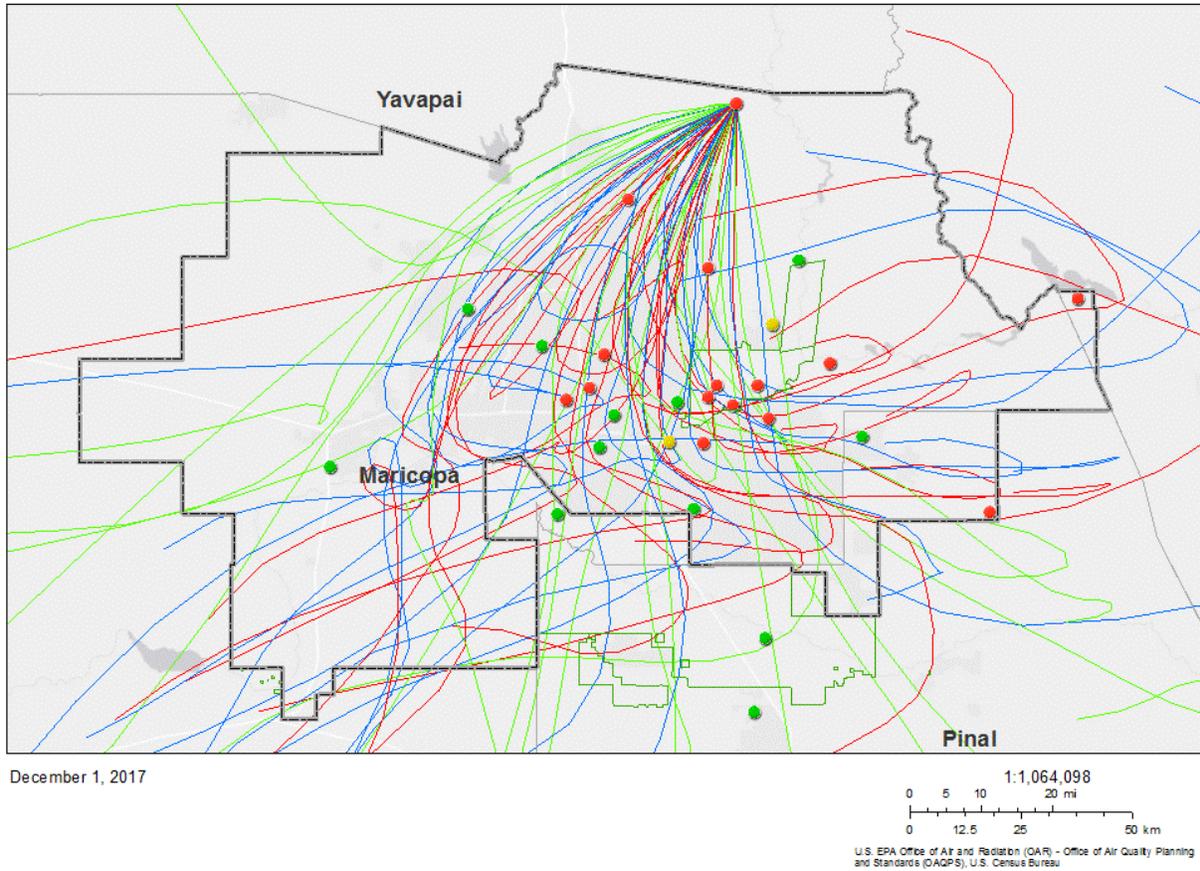


Figure 3.6c shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6d HYSPLIT Back Trajectories for Pinnacle Peak (04-013-2005).

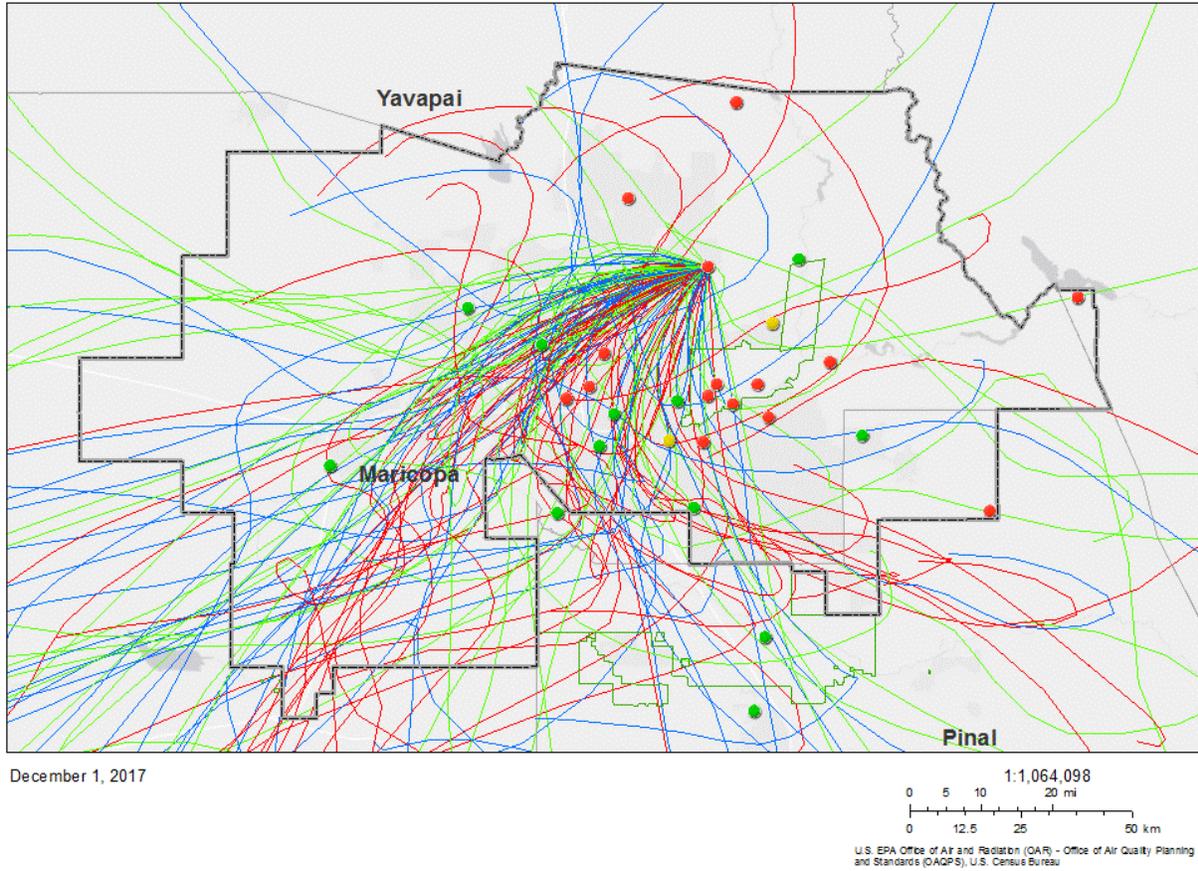


Figure 3.6d shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's HYSPLIT analysis shows that most back trajectories for days exceeding the 2015 ozone NAAQS in 2014-2016 pass over the urban core of the city of Phoenix and travel from the west or southwest. Some trajectories from Humboldt Mountain and Pinnacle Peak monitors come from farther west, still passing over areas of high VMT and large point source emissions, as shown in Figures 3.3 and 3.5. A smaller number of trajectories for some of the monitors travel from the south east.

The Phoenix-Mesa area lies in a hot desert area of Arizona, where average high temperatures during the ozone season (April-October) range from about 85-105 degrees F, with the highest temperatures in July. In the absence of the strong winds associated with summer storms, mountain-valley flow defines the daily surface wind patterns in the Phoenix-Mesa area. The Arizona Department of Environmental Quality (ADEQ) has described a basic flow pattern that results in "sloshing" of pollutants towards the west, and then later in the day back toward the east:

Because Phoenix lies within a valley, a typical mountain-valley diurnal wind pattern takes place. Hence, in the absence of major storm fronts, topography dictates the strength and direction of surface winds and drives the diurnal wind shift and flow. Eastern Maricopa County typically receives the Phoenix urban plume because of the prevailing late daytime and early evening valley-to-mountain surface winds out of the southwest. Absent any overriding weather pattern, winds typically start out from the east in the morning, become near calm around noon, and shift out of the southwest and west during the afternoon.⁷

This flow is consistent with the back trajectories shown above, with pollutants from emission sources in the Phoenix urban core and from the southeast affecting areas to the north and east.

Factor 4: Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

The EPA used geography/topography analysis to evaluate the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. Topography impacts pollutant formation and transport in Arizona, and thus plays an important role in assessing what areas are contributing to monitored violations of the NAAQS. Figure 3.7 shows topography for the area of analysis.

The Phoenix-Mesa area is partly surrounded by mountains of varying heights, as described by the State:

Although located in the broad and mostly flat Salt River Valley, metropolitan Phoenix lies close to mountainous, complex terrain. The valley is bordered by several mountain chains including: the Mazatzal and Superstition Mountains to the east, the New River Mountains to the north and northeast, the Hieroglyphic Mountains to the northwest near Lake Pleasant, the White Tank Mountains in the west, the Estrella Mountains to the southwest, and the South Mountains to the south. Elevations range from about

⁷ Arizona's 2015 Ozone NAAQS Boundary Recommendations, p.33

1000 feet above sea level near downtown Phoenix to nearly 8000 feet along the Maricopa County border with Gila County and Yavapai County. This higher terrain, located to the north and east, generally forms a natural boundary between the Salt River Valley and complex terrain beyond the County border.⁸

As described above, mountain-valley flow defines the daily surface wind patterns in the Phoenix-Mesa area, with air flow toward the west in the morning, and then later in the day back toward the east. While the mountains to the east and west can prevent transport of pollutants in certain directions, they do not form a closed basin. Although there is opportunity for transport from outside the immediate metropolitan Phoenix area, those outside areas are significantly less populated with the exception of a few smaller communities, and emission sources are fewer.

Figure 3.7 Topographic Illustration of the Physical Features.

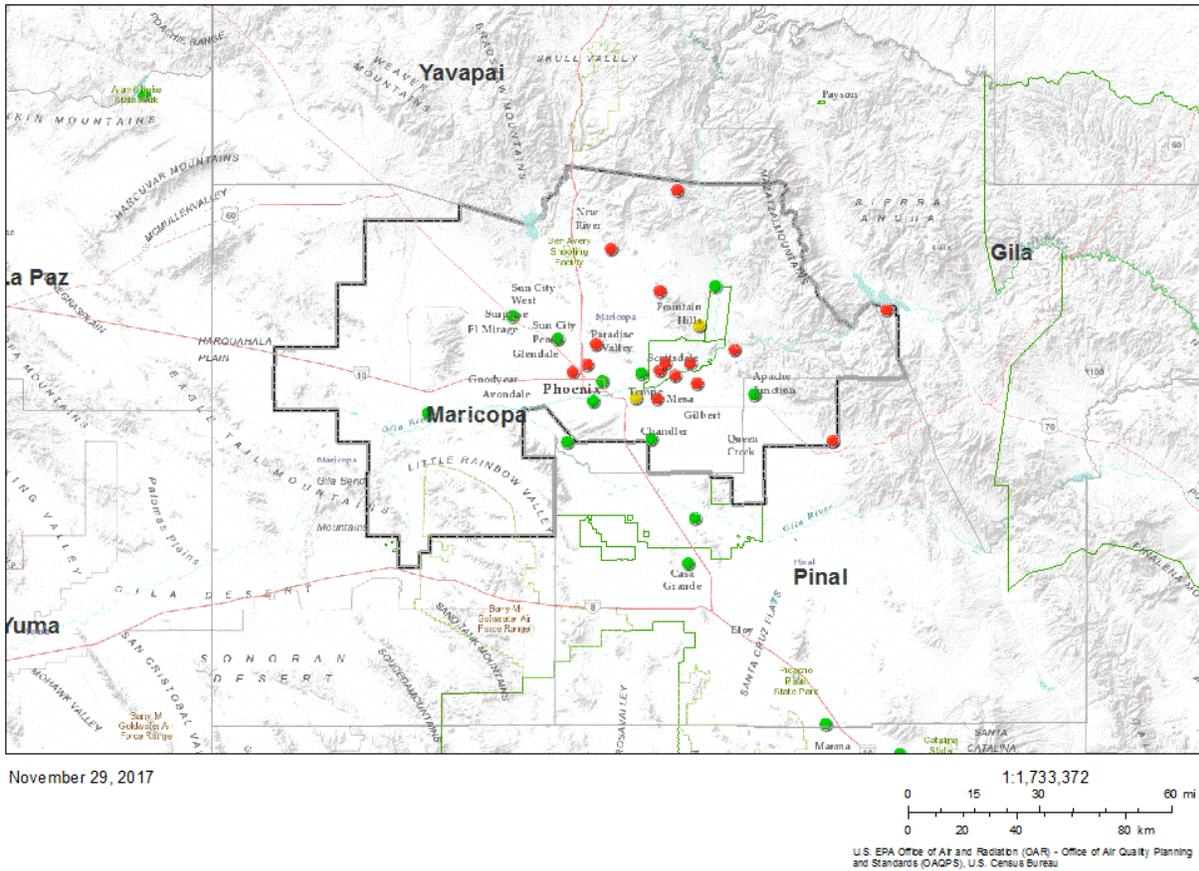


Figure 3.7 shows the topography in the area of analysis for Phoenix-Mesa, AZ. The EPA’s nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

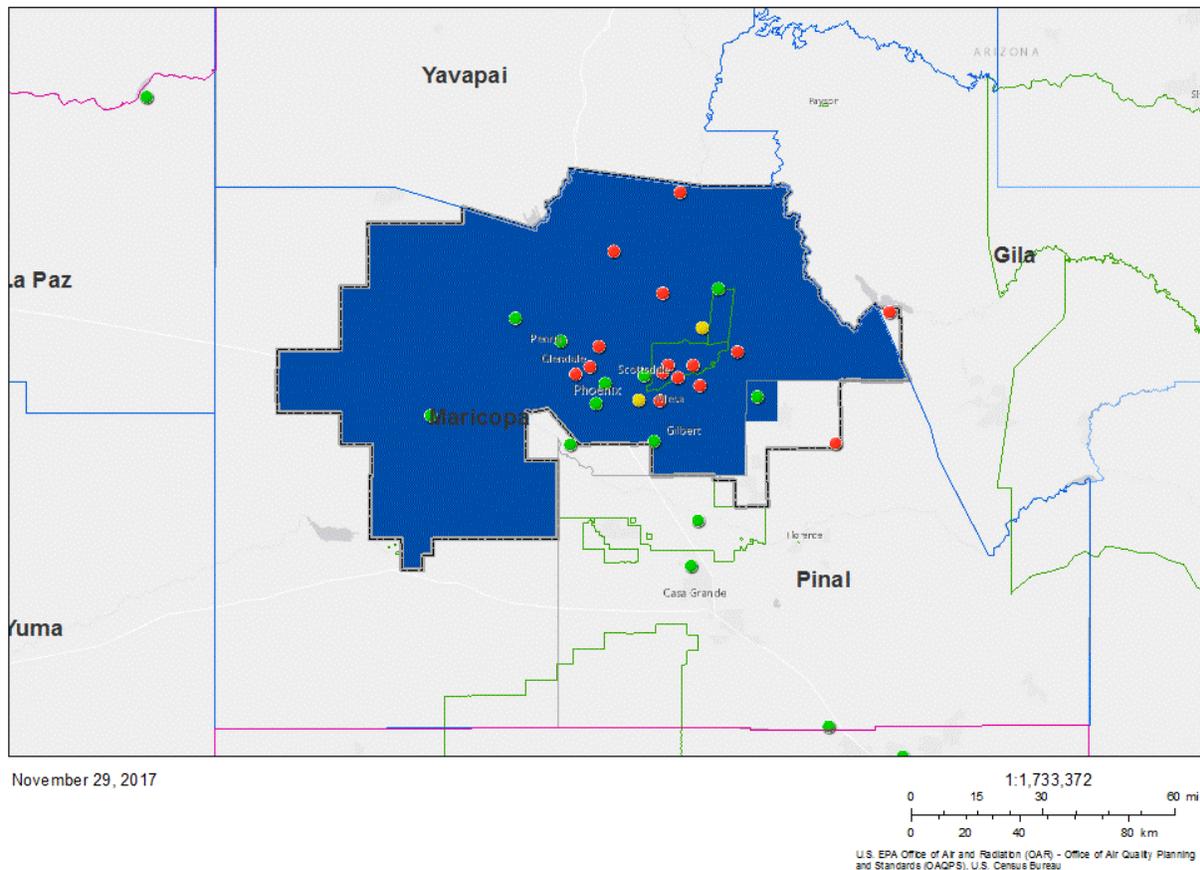
⁸ Arizona’s 2015 Ozone NAAQS Boundary Recommendations, p.33.

Factor 5: Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, the EPA considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary to carry out the air quality planning and enforcement functions for nonattainment areas. In defining the boundaries of the Phoenix-Mesa nonattainment area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the designated areas.

Figure 3.8 shows the relevant jurisdictional boundaries for the Phoenix-Mesa nonattainment area, including county and CBSA boundaries, and areas of Indian country.

Figure 3.8 Jurisdictional Boundaries.



g and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI) | Data: USEPA Office of Environmental Information (OEI) | US Census Bureau | Source: U.S. Census Bureau | Esri, HERE, Garmin, NGA, USGS, NPS | Esri, HERE, NPS | Web AppBuilder for ArcGIS

Figure 3.8 shows jurisdictional boundaries, including state boundaries (black lines), combined statistical areas (pink lines), metropolitan statistical areas (dark blue lines), and micropolitan statistical areas (light blue lines) in the area of analysis for Phoenix-Mesa, AZ. The EPA’s nonattainment boundary for Phoenix-Mesa, AZ is shown as a gray line with a dashed black center. The nonattainment boundaries for the 1997 and 2008 ozone NAAQS are shown in blue. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The Phoenix-Mesa area has previously established nonattainment boundaries associated with the 1997 and 2008 ozone NAAQS, which include portions of Maricopa and Pinal counties.

The Maricopa Association of Governments (MAG), the MPO for the region, has authority for air quality and transportation planning for all of Maricopa County and for the eastern urbanized area extending into the northwestern part Pinal County. ADEQ has air quality planning authority for Gila County.

As mentioned above, within the boundaries recommended by the State, there are several areas of Indian country belonging to the following tribes: Fort McDowell Yavapai Nation, Gila River Indian Community, Salt River Indian Community, and Tohono O’odham Nation. As defined at 18 U.S.C. 1151, “Indian country” refers to: “(a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.” The EPA

recognizes the sovereignty of tribal governments, and has attempted to take the input of the tribes into account in establishing appropriate nonattainment area boundaries. We are designating as part of the Phoenix-Mesa nonattainment area the portions of the tribal land that lie within the boundaries of the Phoenix-Mesa nonattainment area. Consistent with Gila River Indian Community's recommendation, the "M and N parcels" under the tribe's jurisdiction will be identified as such in the tables found at 40 CFR Part 81.

The Gila River Indian Community and Tohono O'odham Nation both have non-contiguous areas of Indian country in Maricopa and Pinal counties outside of the nonattainment area. We are designating the portions of the tribal land that lie outside of the nonattainment area boundaries as attainment/unclassifiable consistent with the surrounding area. Consistent with the Gila River Indian Community's recommendation, we are designating the main body of the tribal land as a separate attainment/unclassifiable area and are identifying the area as such in the tables found at 40 CFR Part 81.

Conclusion for Phoenix-Mesa, AZ

Based on the assessment of factors described above, the EPA is not modifying the state's recommendation to include the following counties in the Phoenix-Mesa nonattainment area: Gila County (partial), Maricopa County (partial), and Pinal County (partial). The air quality monitors in Gila, Maricopa, and Pinal counties indicate violations of the 2015 ozone NAAQS based on the 2016 design values, therefore all or portions of these counties must be included in the nonattainment area. Emissions and emissions-related data show that Maricopa County has the highest levels of precursor emissions and that the emissions sources are generally centralized around the Phoenix urban core and the San Tan Valley in northern Pinal County, with a lesser amount of emissions generated in Gila County and the western and southern portions of Maricopa and Pinal Counties, respectively. Meteorology suggests that ozone concentrations in the Phoenix-Mesa area are influenced by a mountain-valley diurnal wind pattern which is characterized by winds from the east in the morning changing direction to from the west later in the day, with pollutants from emission sources in the Phoenix urban core and San Tan Valley affecting areas to the north and east. Geography and topography show that the flat Salt River Valley is surrounded by mountain ranges of varying heights with the highest terrain to the north and east. The partial counties of Maricopa and Pinal are contained in the same air basin. Gila County is bounded by mountains at its western border with Maricopa and Pinal counties; the violating monitor is at elevation in these bordering mountains. Therefore, meteorology, geography and topography support maintaining these three counties and partial counties as one nonattainment area. In considering jurisdictional boundaries, the EPA notes that the State's recommended nonattainment boundary expands the boundary to the east and southeast to include additional parts of Pinal and Gila counties but is otherwise consistent with the boundary for the 2008 ozone NAAQS.

Based on our consideration of all five factors, the EPA is not modifying the State's recommendation and is designating Phoenix-Mesa nonattainment for the 2015 ozone NAAQS. We are designating as part of the Phoenix-Mesa nonattainment area the portions of tribal land that lie within the boundaries of the Phoenix-Mesa nonattainment area.

4.0 Technical Analysis for Yuma, AZ

This technical analysis identifies the area with a monitor that violates the 2015 ozone NAAQS. It also provides EPA’s evaluation of this area and nearby areas to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitors in the area.

Table 4.1 identifies the area of analysis for the Yuma, AZ nonattainment area. The area of analysis is the entirety of Yuma County, which comprises the single-county Yuma Core Based Statistical Area (CBSA). There is no Combined Statistical Area (CSA) associated with this area. Yuma County has not previously been designated as nonattainment for ozone.

Table 4.1 Area of Analysis.

Nonattainment Area	Area of Analysis	Associated CBSA	Associated CSA
Yuma, AZ	Yuma County	Yuma	None

Yuma County is located in the southwest corner of the State of Arizona, and is bordered by California on the west and Mexico on the south and southwest. As with many counties in the western US, it is relatively large in size, measuring 5,514 square miles.¹ Most of the land area in the county is unpopulated, as shown in Figure 4.0 below. Population is centered in and around the city of Yuma, which is in the southwest corner of the county.

¹ <https://www.census.gov/quickfacts/fact/table/yumacountyarizona/PST045216>

Figure 4.0 Yuma County.

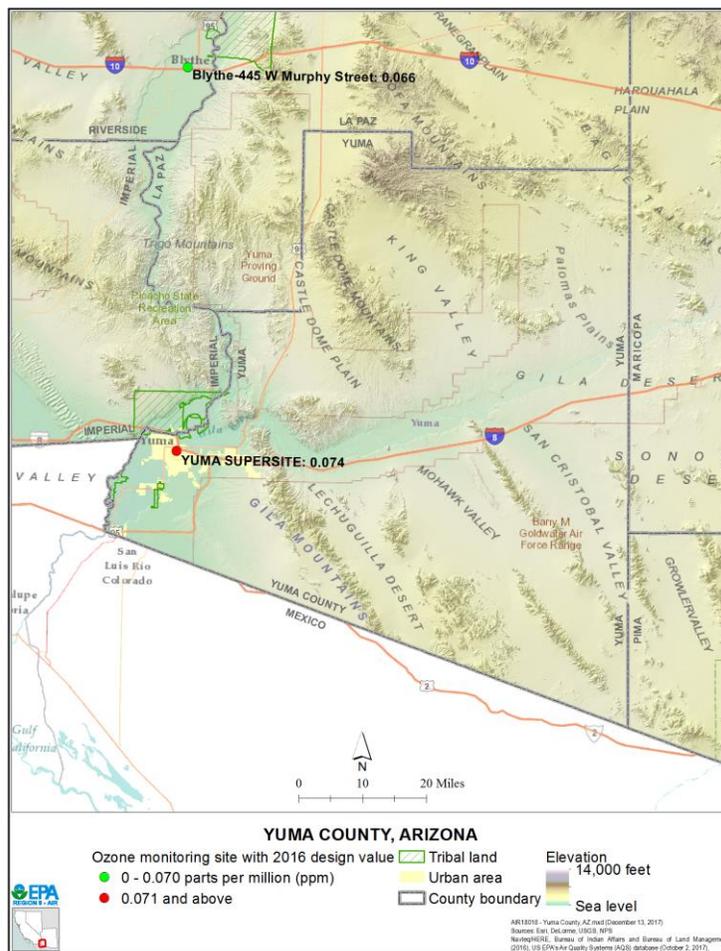


Figure 4.0 shows Yuma County, Arizona and surrounding areas. Urban areas are shown as yellow shading. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green.

This Technical Support Document discusses the Yuma nonattainment area. The nonattainment area is centered around the city of Yuma and comprises a relatively small portion of the county. The nonattainment area of Imperial County, CA is adjacent to the Yuma nonattainment area. Information specific to that area is contained in the California Technical Support Document. The Yuma nonattainment area is bordered on the west by Mexico. Potential impacts to air quality in the Yuma nonattainment area from sources in Mexico are discussed in the conclusion section of this Technical Support Document, but the EPA did not include any portion of Mexico in the area of analysis below because these sources lie outside of the United States.

The Yuma area also includes areas of Indian country of the following tribes: the Cocopah tribe of Arizona and the Quechan Tribe of the Fort Yuma Indian Reservation. The tribes did not submit a recommendation and the EPA is designating portions of these tribal areas as part of the designated nonattainment area. The EPA is not modifying the State's recommendation to designate a portion of Yuma County as nonattainment for the 2015 ozone NAAQS and to designate the remainder of the county as attainment/unclassifiable.

This analysis was based on the weight-of-evidence of the five factors recommended in the EPA's ozone designations guidance and other relevant information. In developing this technical analysis, the

EPA used the latest data and information available to the EPA (and to the states and tribes through the Ozone Designations Mapping Tool and the EPA Ozone Designations Guidance and Data web page).² In addition, the EPA considered all additional data or information provided to the EPA by states or tribes.

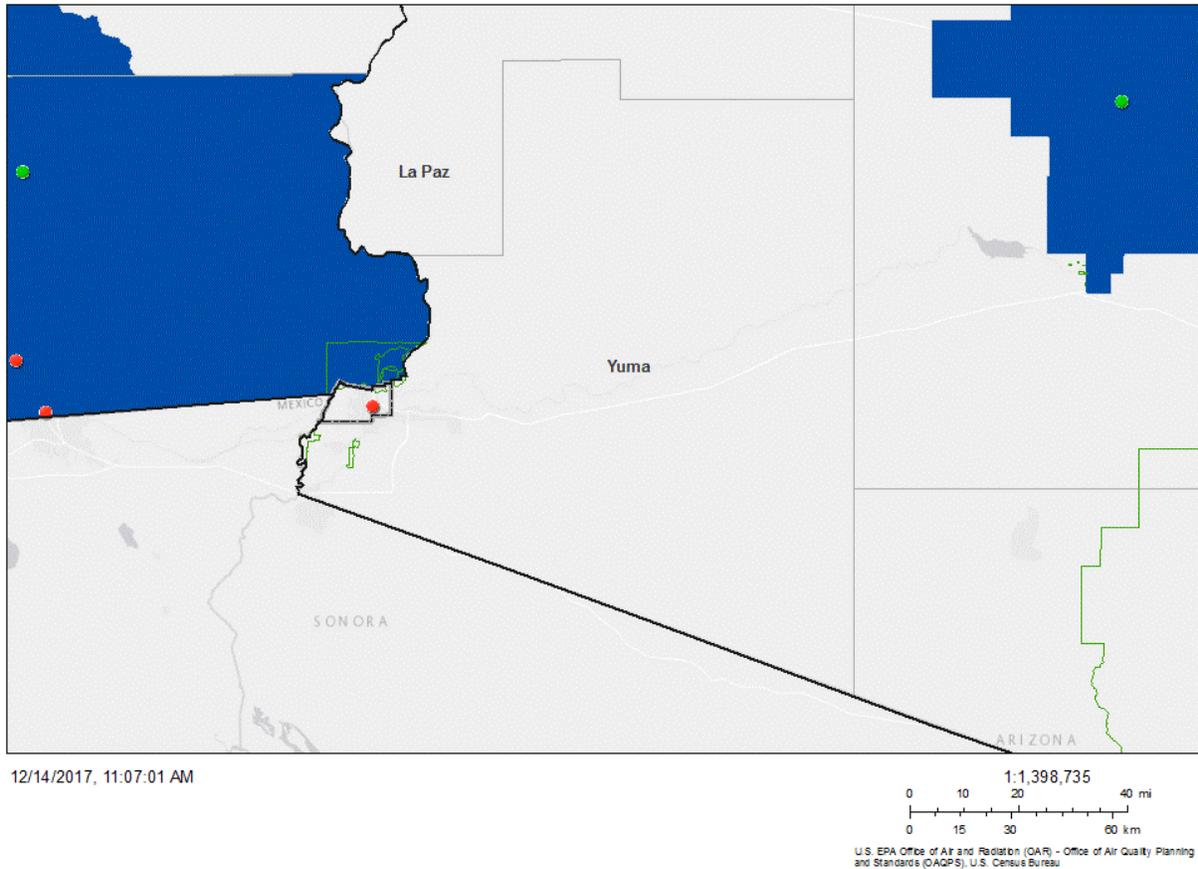
The five factors recommended in the EPA’s guidance are:

1. Air Quality Data (including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor);
2. Emissions and Emissions-Related Data (including locations of sources, population, amount of emissions, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography/Topography (including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations); and
5. Jurisdictional Boundaries (e.g., counties, air districts, existing nonattainment areas, areas of Indian country, Metropolitan Planning Organizations (MPOs)).

Figure 4.1 is a map of the EPA’s nonattainment boundary for Yuma. The map shows the location of the ambient air quality monitors, county boundaries, and tribal boundaries. The Yuma nonattainment area includes Indian country of the Cocopah Tribe of Arizona (Cocopah Tribe) and the Quechan Tribe of the Fort Yuma Indian Reservation (Quechan Tribe). With respect to the 1997 and 2008 ozone NAAQS, EPA designated Yuma County as “unclassifiable/attainment.”

² The EPA’s Ozone Designations Guidance and Data web page can be found at <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>.

Figure 4.1 EPA's Nonattainment Boundaries for Yuma, AZ.



U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Web AppBuilder for ArcGIS

Figure 4.1 shows the EPA's nonattainment boundary for Yuma, AZ as a gray line with a dashed black center. Nonattainment areas for the 2008 and 1997 ozone NAAQS are shown in dark blue areas. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA must designate as nonattainment any area that violates the NAAQS and any nearby areas that contribute to the violation in the violating area. Yuma County has a monitor in violation of the 2015 ozone NAAQS, therefore this county in whole or in part is included in the nonattainment area. The following sections describe the five factor analysis. While the factors are presented individually, they are not independent. The five factor analysis process carefully considers the interconnections among the different factors and the dependence of each factor on one or more of the others, such as the interaction between emissions and meteorology for the area being evaluated.

Factor Assessment

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in Yuma County based on data for the 2014-2016 period (i.e., the 2016 design value, or DV). This is the most recent

three-year period with fully-certified air quality data.³ The design value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentration.⁴ The 2015 NAAQS are met when the design value is 0.070 ppm or less. Only ozone measurement data collected in accordance with the quality assurance (QA) requirements using approved (FRM/FEM) monitors are used for NAAQS compliance determinations.⁵ The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) database to calculate the ozone design values.

Individual exceedances or violations of the 2015 ozone NAAQS that the EPA determines have been caused by an exceptional event that meets the administrative and technical criteria in the Exceptional Events Rule⁶ are not included in these calculations. Whenever several monitors are located in a county (or designated nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e. monitors with design values greater than 0.070 ppm) in a county or other geographic area forms the basis for designating that county or area as nonattainment. The remaining four factors are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s) based on a consideration of what nearby areas are contributing to a violation of the NAAQS.

The EPA identified monitors where the most recent design values violate the NAAQS, and examined historical ozone air quality measurement data (including previous design values) to understand the nature of the ozone ambient air quality problem in the area. Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are operated in accordance with 40 CFR part 58 Appendices A, C, D, and E and operating with an FRM or FEM monitor. These requirements must be met in order to be acceptable for comparison to the 2015 ozone NAAQS for designation purposes. All data from Special Purpose Monitors (SPMs) using an FRM or FEM are eligible for comparison to the NAAQS, subject to the requirements given in the March 28, 2016 Revision to Ambient Monitoring Quality Assurance and Other Requirements Rule (81 FR 17248).

The 2014-2016 design values for counties in the area of analysis are shown in Table 4.2.

Table 4.2. Air Quality Data (all values in ppm).

County, State	State Recommended Nonattainment?	AQS Site ID	2014-2016 DV	2014 4 th highest daily max value	2015 4 th highest daily max value	2016 4 th highest daily max value
Yuma, AZ	Yes (partial)	04-027-8011	0.074	0.078	0.077	0.067

The highest design value in each county is indicated in bold type.

N/A means that the monitor did not meet the completeness criteria described in 40 CFR part 50 Appendix U, or no data exists for the county.

³ Air quality data used in these TSDs were pulled from the EPA's Air Quality System on October 2, 2017 and are available at: https://www.epa.gov/sites/production/files/2017-10/ozone_designvalues_20142016_final_10_02_17_0.xlsx

⁴ The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50 Appendix U.

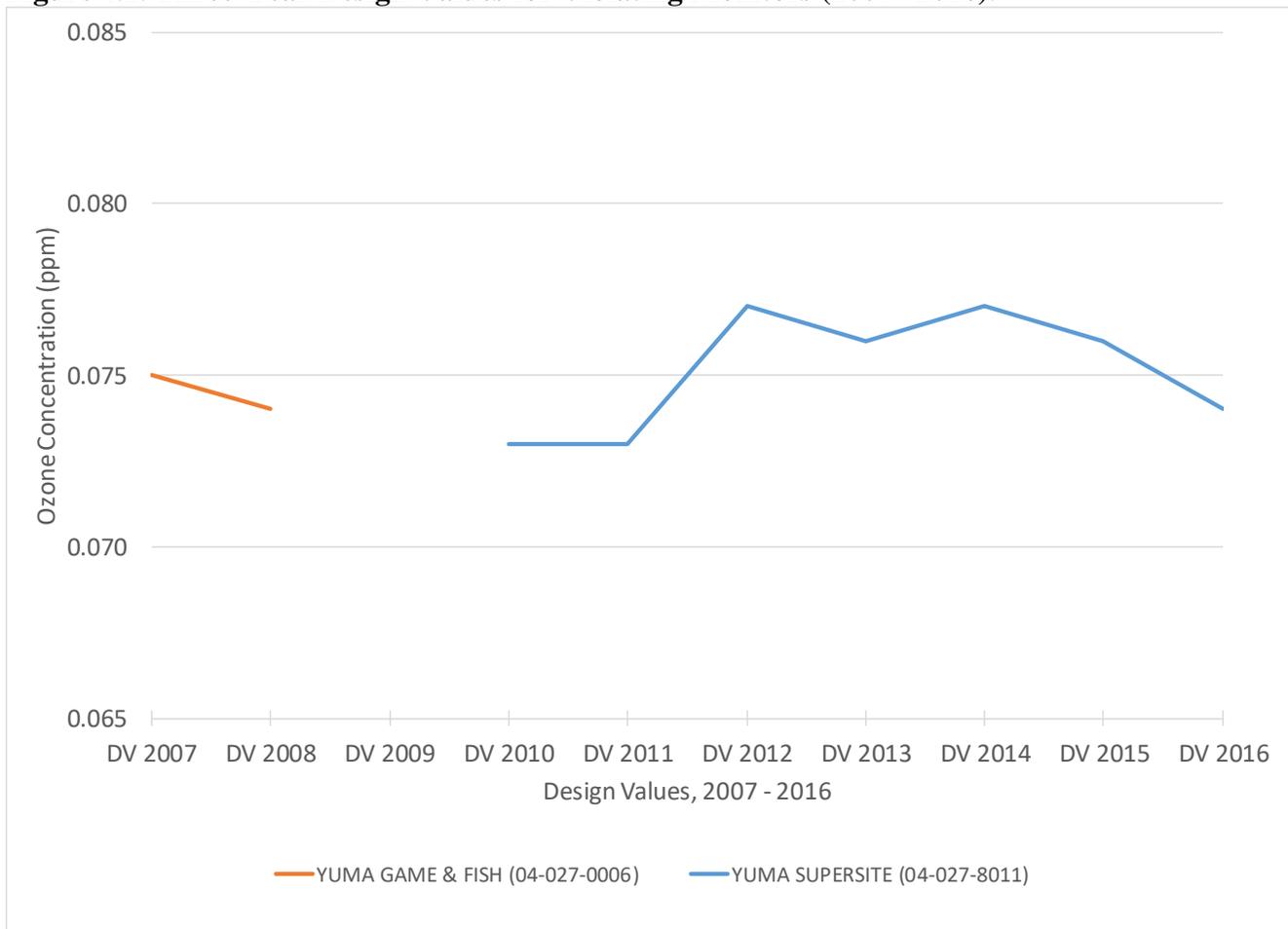
⁵ The QA requirements for ozone monitoring data are specified in 40 CFR part 58 Appendix A. The performance test requirements for candidate FEMs are provided in 40 CFR part 53 Subpart B.

⁶ The EPA finalized the rule on the Treatment of Data Influenced by Exceptional Events (81 FR 68513) and the guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events in September of 2016. For more information, see <https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance>.

Figure 4.1, shown previously, identifies the Yuma nonattainment area and the currently violating monitor. Table 4.2 identifies the design value for the monitor currently operating in the area of analysis. Figure 4.2 shows the historical trend of design values for the violating monitors. As indicated on the map, there is one violating monitor that is located in the southwestern portion of Yuma County, Yuma Supersite (AQS ID: 04-027-8011). This is the only monitor in the county. The Yuma Supersite monitor has a valid 2016 DV of 0.074 ppm and is located in the city of Yuma. The first valid design value for the Yuma Supersite monitor was in 2010. An additional monitor, Yuma Fish & Game (AQS ID: 04-027-0006), previously operated in Yuma County, with the last valid design value measured in 2008. Data from the Yuma Fish & Game monitor is included in Figure 4.2 to provide a longer timeframe for ozone trends in Yuma County.

As shown in Figure 4.2, the trends for previous design values of the Yuma Fish & Game monitor and the Yuma Supersite monitor located within the area of analysis show that ozone concentrations have generally remained stable in the past ten years, but show a general increasing trend between 2011 and 2014 followed by a decreasing trend between 2014 and 2016.

Figure 4.2. Three-Year Design Values for Violating Monitors (2007– 2016).



Yuma County has one monitoring site showing a violation of the 2015 ozone NAAQS based on 2014-2016 data. Yuma County shows a violation of the 2015 ozone NAAQS, therefore this county in whole or in part is included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area.

Factor 2: Emissions and Emissions-Related Data

The EPA evaluated ozone precursor emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

The EPA reviewed data from the 2014 National Emissions Inventory (NEI). For each county in the area of analysis, the EPA examined the magnitude of large sources (NO_x or VOC emissions greater than 100 tons per year) and small point sources and the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, non-road mobile, on-road mobile, and fires. Emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

Table 4.3 provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for the area of analysis.

Table 4.3. Total County-Level NO_x and VOC Emissions.

County, State	State Recommended Nonattainment?	Total NO _x (tpy)	Total VOC (tpy)
Yuma, AZ	Yes (partial)	8,236	7,462
Area wide:		8,236	7,462

For state-recommended partial counties, the emissions shown are for the entire county.

In addition to reviewing county-wide emissions of NO_x and VOC in the area of analysis, the EPA also reviewed emissions from large point sources. The location of these sources, together with the other factors, can help inform nonattainment boundaries. The locations of the large and small point sources are shown in Figure 4.3 below. The final nonattainment boundary is also shown.

Figure 4.3 Large and Small Point Sources in the Area of Analysis.

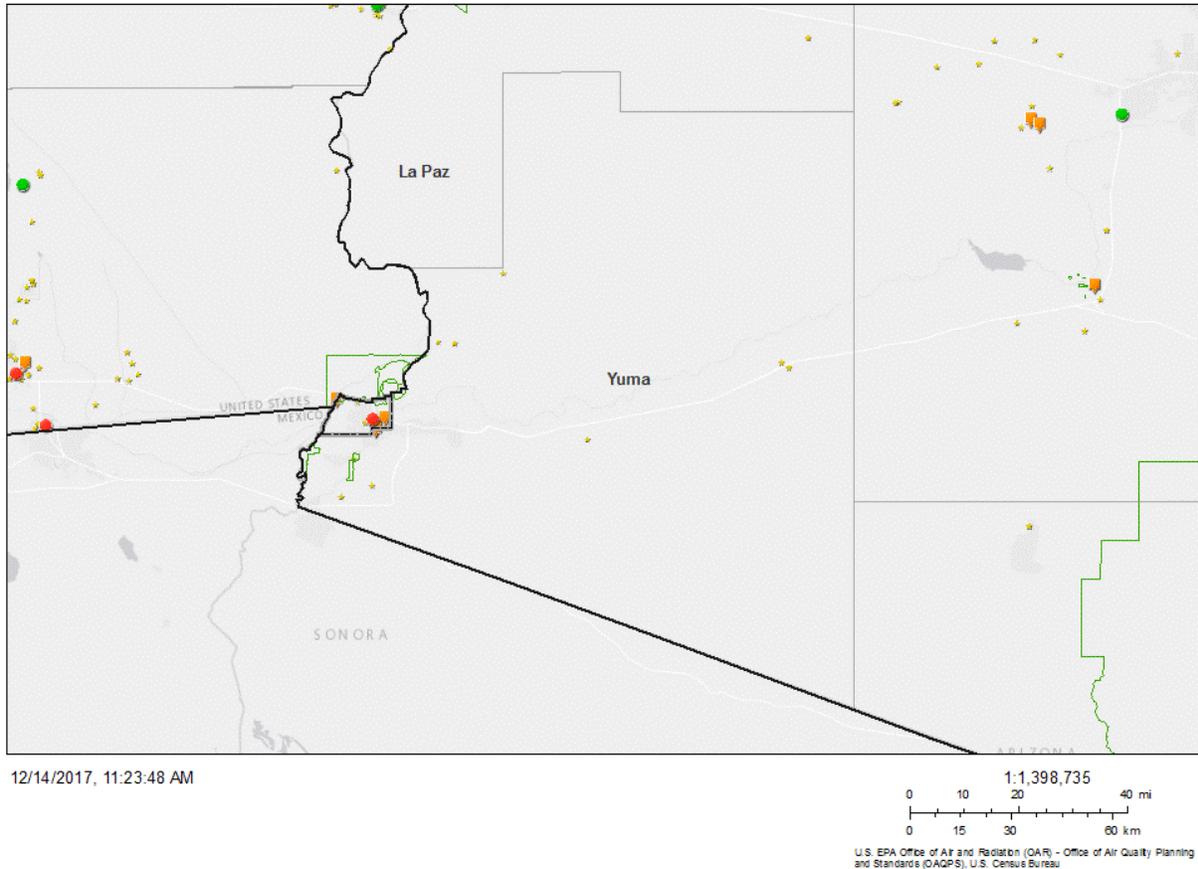


Figure 4.3 shows large point sources in the area of analysis for Yuma, AZ as orange squares. Small point sources are shown as yellow stars. The EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA’s analysis of relevant county-level emissions and the geographic locations of the relevant emissions shows that all of the large point sources of ozone precursors are centralized around the city of Yuma in Yuma County. There are three large point sources in Yuma County. Two of these large point sources are located inside the EPA’s nonattainment boundary and one is located outside the nonattainment boundary.

With regard to total emissions, the EPA’s pollution transport modeling indicates that man-made sources in Arizona contribute approximately 6% to the projected 2017 design value at the Yuma monitor.⁷

⁷ See Table 2c., Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone White Paper for Discussion, December 30, 2015. A copy of the White Paper is available at <https://www.epa.gov/sites/production/files/2016-03/documents/whitepaper-bgo3-final.pdf>. The results are based on 2017 CAMx source apportionment modeling that was released publicly on January 22, 2015 as part of the memo: Information on the Interstate Transport “Good Neighbor” Provisions for the 2008 O3 National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I). A copy of that memo and related documents can be found at the following website: <http://www3.epa.gov/airtransport/ozonetransportNAAQS.html>

Population density and degree of urbanization

In this part of the factor analysis, the EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include emissions of NO_x and VOC from on-road and non-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to violations of the NAAQS. Table 4.4 shows the population, population density, and population growth information for Yuma County. Figure 4.4 shows the 2012 census tract-level population information for Yuma County.

Table 4.4. Population and Growth.

County, State	State Recommended Nonattainment?	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute Change in Population (2010-2015)	Population % Change (2010-2015)
Yuma, AZ	Yes (partial)	195,751	204,275	37	8,524	4%
Area wide:		195,751	204,275	37	8,524	4%

For state-recommended partial counties, the population shown is for the entire county.

Source: U.S. Census Bureau population estimates for 2010 and 2015. www.census.gov/data.html.

Figure 4.4 Census Tract-Level Population.

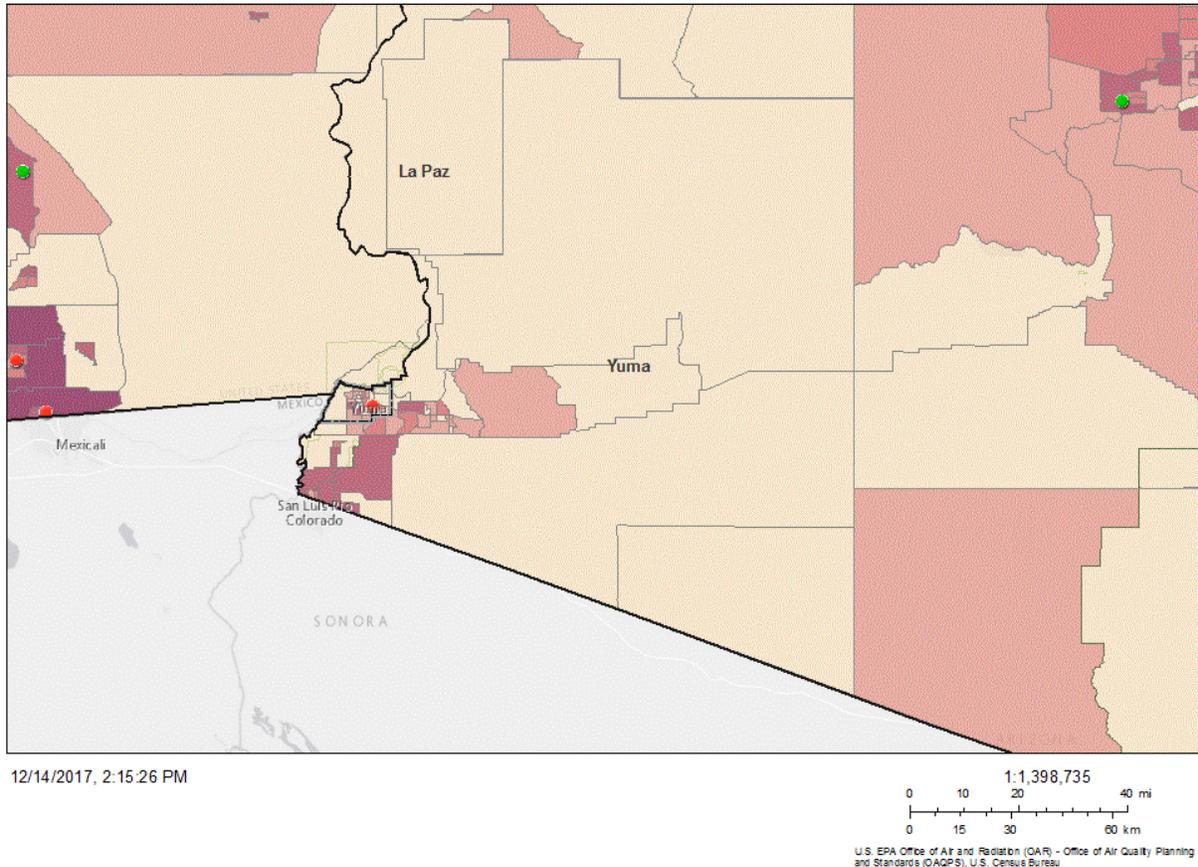
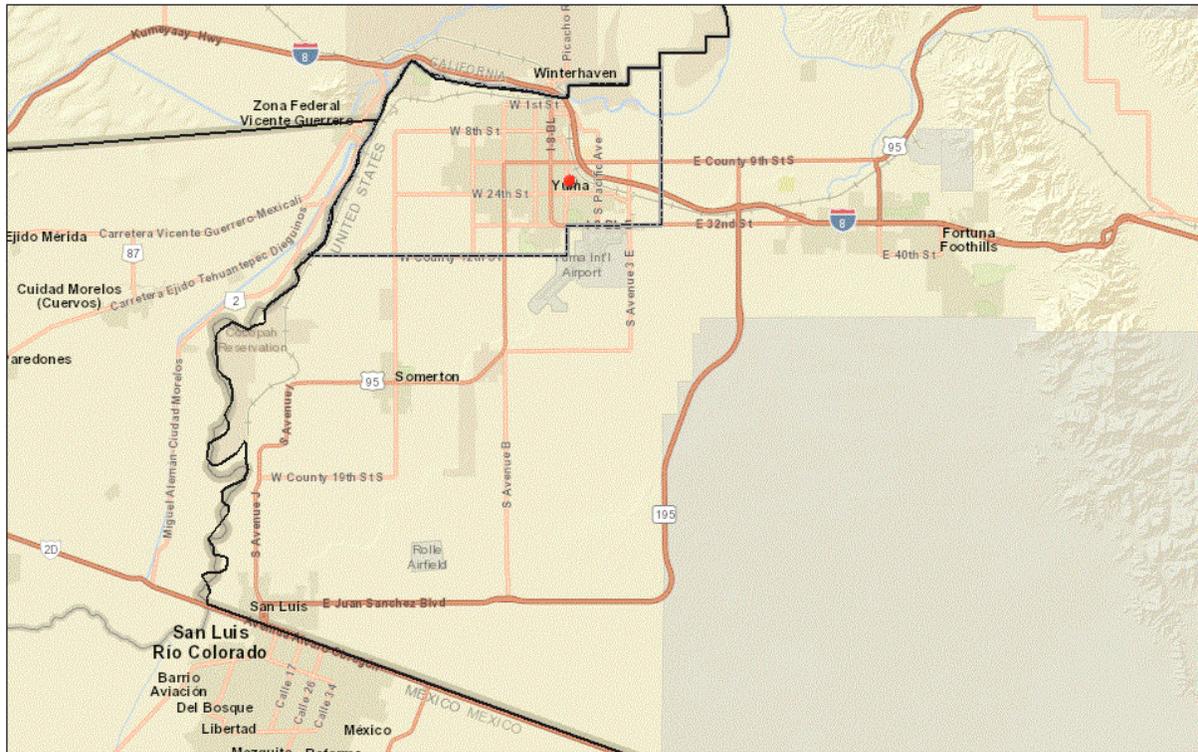


Figure 4.4 shows census tract population in the area of analysis for Yuma, AZ. Lighter shades of red indicate areas with smaller populations; darker shades of red indicate areas with larger populations. The EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

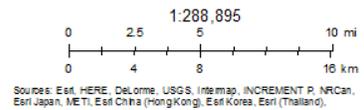
Generally, eastern portions of Yuma County are less populated than the western portions of the county with areas of higher population located around the city of Yuma. The city of Yuma had a 2010 population of 93,064 and an estimated 2015 population of 93,717, which represents nearly half of the population in the county.⁸ The census tracts located to the south of the city of Yuma include the cities of Somerton and San Luis, and have a total population of approximately 48,000 people. The census tracts located to the east in the area surrounding Fortuna Foothills have a total population of approximately 43,000 people. The State’s recommend nonattainment area includes the population centered in the city of Yuma but does not include the populations located to the east and south of the urban core of Yuma. Locations of Somerton, San Luis, Fortuna Foothills and other cities in the Yuma area are shown in Figure 4.4a below.

⁸ <https://www.census.gov/data/tables/2016/demo/popest/total-cities-and-towns.html#ds>

Figure 4.4a Yuma Urban Area.



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Source: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),

Web AppBuilder for ArcGIS | Source: U.S. Census Bureau | Bureau of Land Management, Esri, HERE, Garmin, NGA, USGS, NPS |

Figure 4.4a shows locations of cities in the area of analysis for Yuma, AZ. The EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Traffic and Vehicle Miles Travelled (VMT)

The EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for Yuma County. In combination with the population/population density data and the location of main transportation arteries, this information helps identify the probable location of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and high VMT and/or high number of commuters indicates the presence of motor vehicle emissions that may contribute to violations of the NAAQS. Rapid population or VMT growth in a county on the urban perimeter may signify increasing integration with the core urban area, and thus could indicate that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. In addition to VMT, the EPA evaluated worker data collected by the U.S. Census Bureau for the area of analysis. Table 4.5 shows the traffic and commuting pattern data, including total VMT for Yuma county, number of residents who work in the county, number of residents that commute within the county, and the percent of residents commuting within Yuma county. The data in Table 4.5 are 2014 data.

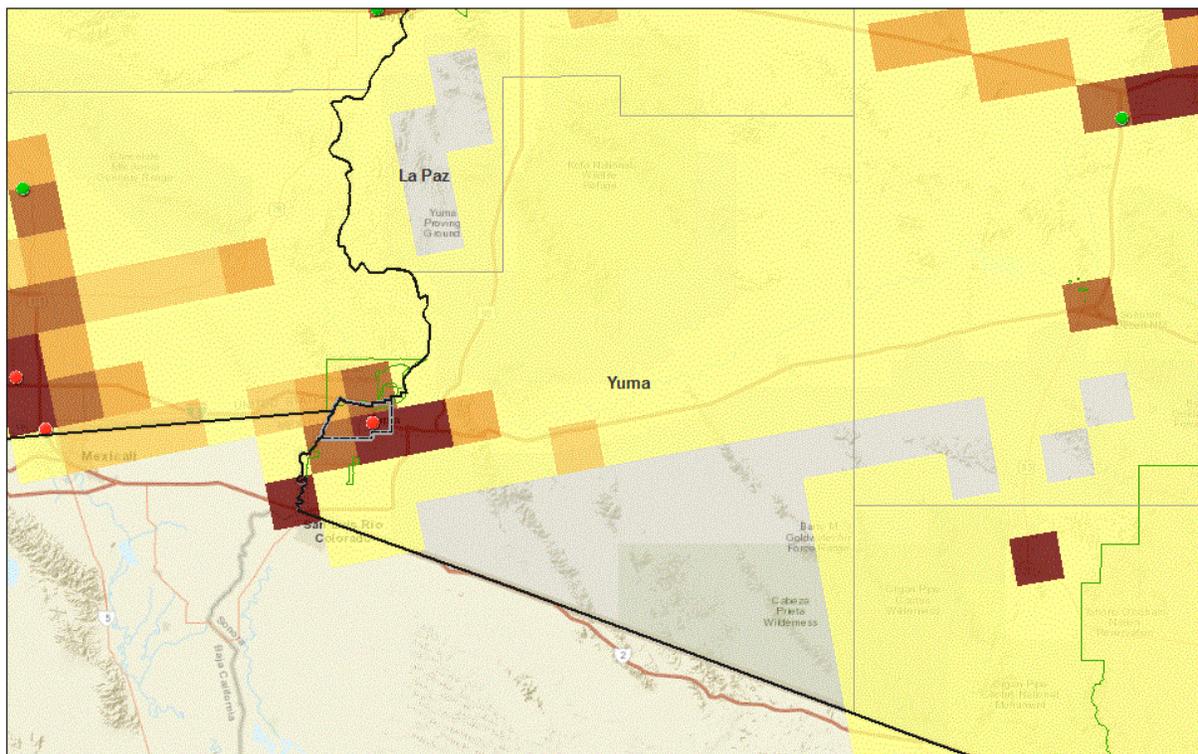
Table 4.5. Traffic and Commuting Patterns.

County, State	State Recommended Nonattainment?	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number Commuting To or Within Counties with Violating Monitor(s) Within Area of Analysis	Percentage Commuting To or Within Counties with Violating Monitor(s) Within Area of Analysis
Yuma, AZ	Yes (partial)	1,787	63,433	47,311	74.6%
Total:		1,787	63,433	47,311	74.6%

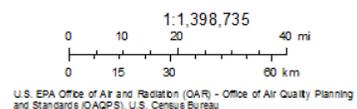
For state-recommended partial counties, the data provided are for the entire county. Counties with a monitor(s) violating the NAAQS are indicated in bold.

To show traffic and commuting patterns, Figure 4.5 overlays twelve-kilometer gridded VMT from the 2014 NEI with a map of the transportation arteries.

Figure 4.5 Twelve Kilometer Gridded VMT (Miles) Overlaid with Transportation Arteries.



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Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI). Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Esri, HERE, Garmin, NGA, USGS, NPS | Web AppBuilder for ArcGIS

Figure 4.5 shows gridded VMT in the area of analysis for Yuma, AZ. Lighter shades of yellow indicate areas with lower VMT; darker shades of red indicate areas with higher VMT. The EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's analysis of traffic and commuting patterns is based on the 2014 NEI and On the Map⁹ data from the Census Bureau and shows that the area around the city of Yuma has the highest total VMT levels within the area of analysis. Areas immediately to the east of the city of Yuma also contain grid cells with high VMT that generally align with Interstate-8 and the population centers around Fortuna Foothills. To the south of the city of Yuma, there is another grid cell with high VMT that is centered on the city of San Luis near the US-Mexico border and includes the San Luis Port of Entry. According to Border Crossing/Entry Data from the Bureau of Transportation Statistics, based on 2014-2016 data, annually more than 30,000 trucks and three million passenger cars enter the U.S. through the San Luis Port of Entry¹⁰. In 2016 it was the tenth busiest southern border crossing in the U.S. for passenger vehicles and the 14th busiest southern border crossing in the U.S. for trucks. It is the second busiest border crossing in Arizona, behind Nogales, for both trucks and passenger cars.

The State's recommended nonattainment area boundary includes the VMT centered in the city of Yuma but does not include the VMT east of the city of Yuma in the Fortuna Foothills area or south of the city of Yuma near the cities of Somerton and San Luis. The State's recommended nonattainment area boundary also does not include VMT associated with traffic crossing the US-Mexico border for grid cells in Figure 4.5 that overlap with Mexico, only the VMT totals from the US were included.

Factor 3: Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may inform the determination of nonattainment area boundaries. In order to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of ozone and precursor emissions from sources in the area, the EPA evaluated 2014-2016 HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) trajectories at 100, 500, and 1000 meters above ground level (AGL) that illustrate the three-dimensional paths traveled by air parcels to a violating monitor. Figure 4.6 shows the 24-hour HYSPLIT back trajectories for each exceedance day (i.e., daily maximum 8-hour values that exceed the 2015 ozone NAAQS) for the violating monitor.

⁹ The Census Bureau's On The Map web page can be found at <https://onthemap.ces.census.gov/>

¹⁰ The U.S. Department of Transportation's Bureau of Transportation Statistics Border Crossing/Entry Data web page can be found at: <https://www.bts.gov/content/border-crossingentry-data>

Figure 4.6 HYSPLIT Back Trajectories for Yuma (AQS ID 04-027-0011).

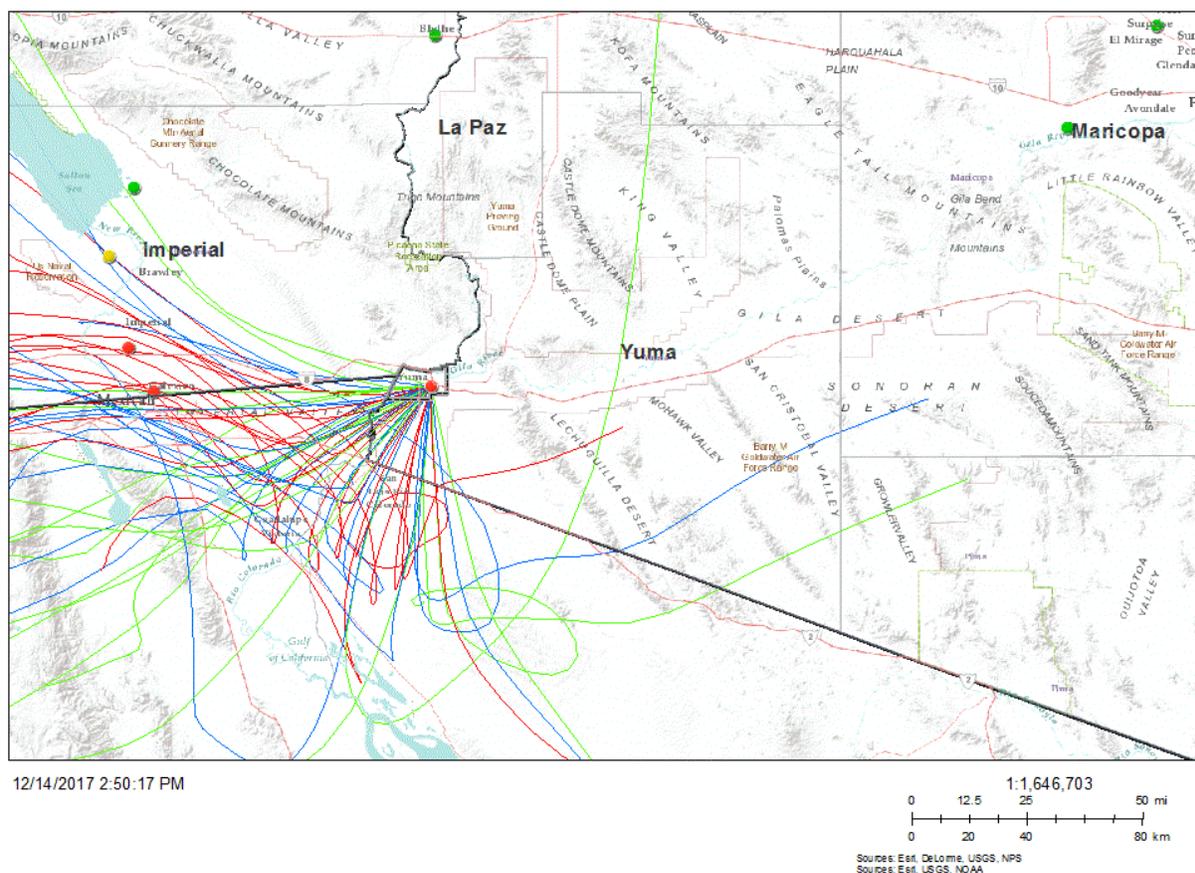


Figure 4.6 shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA’s HYSPLIT analysis shows back trajectories for days exceeding the 2015 ozone NAAQS in 2014-2016 pass through areas to the south and southwest. The trajectories are predominantly from Mexico, passing through the southwestern portion of the county. Other trajectories are from the west, passing through Imperial Valley in California, then through the portion of Mexico directly west of the monitor, before impacting the monitor. There are very few trajectories through portions of Yuma County other than the southwest corner.

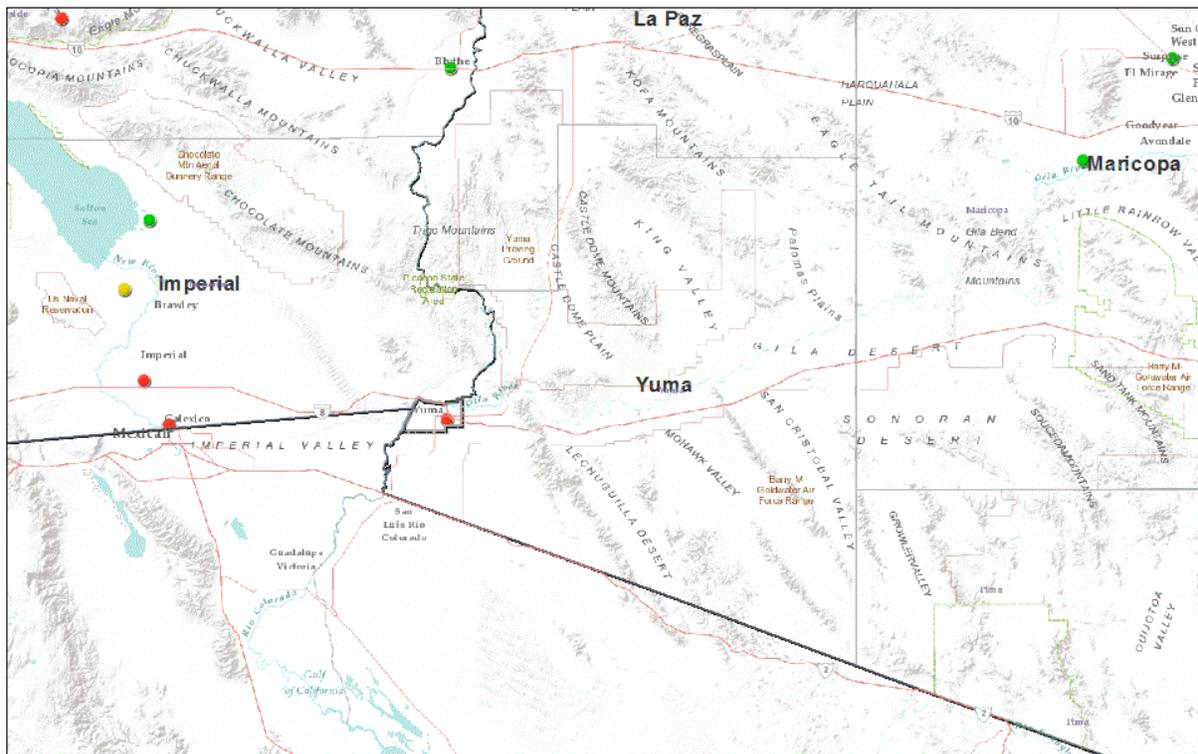
Factor 4: Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

The EPA used geography/topography analysis to evaluate the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

Figure 4.7a shows the topography of the entirety of Yuma County and Figure 4.7b shows the topography in southwestern Yuma County. Yuma County is located in the Yuma Desert, which is a low elevation section of the Sonoran Desert in the southwestern-most corner of Arizona. Yuma County is bordered by Mexico to the south and California and Mexico to the west. The States' recommended nonattainment area is bordered by the Colorado River to the west, the Gila Mountain Range to the east and the Laguna Mountain to the northeast. The Gila Mountains are located in the southwestern portion of the county, approximately 10 miles from Yuma City. The mountain range is approximately 26 miles long, 5 miles wide, peaking at 3,156 feet. The Laguna Mountains are north of the Gila River, which lies north of the City of Yuma. This mountain range is approximately 7 miles by 7 miles, peaking at approximately 1,080 feet. These features provide a natural boundary to airflow to the east.

Figure 4.7a Topographic Illustration of the Physical Features.



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1:1,646,703
 0 12.5 25 50 mi
 0 20 40 80 km
 Sources: Est. DeLorme, USGS, NPS
 Sources: Est. USGS, NOAA

Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OE) | Data: USEPA Office of Environmental Information (OE), US Census Bureau | Source: U.S. Census Bureau | Sources: Est. USGS, NOAA | Sources: Est. DeLorme, USGS, NPS | Web AppBuilder for ArcGIS

Figure 4.7a shows the topography in the area of analysis for southwestern Yuma County. The EPA's nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 4.7b Topographic Illustration of the Physical Features.

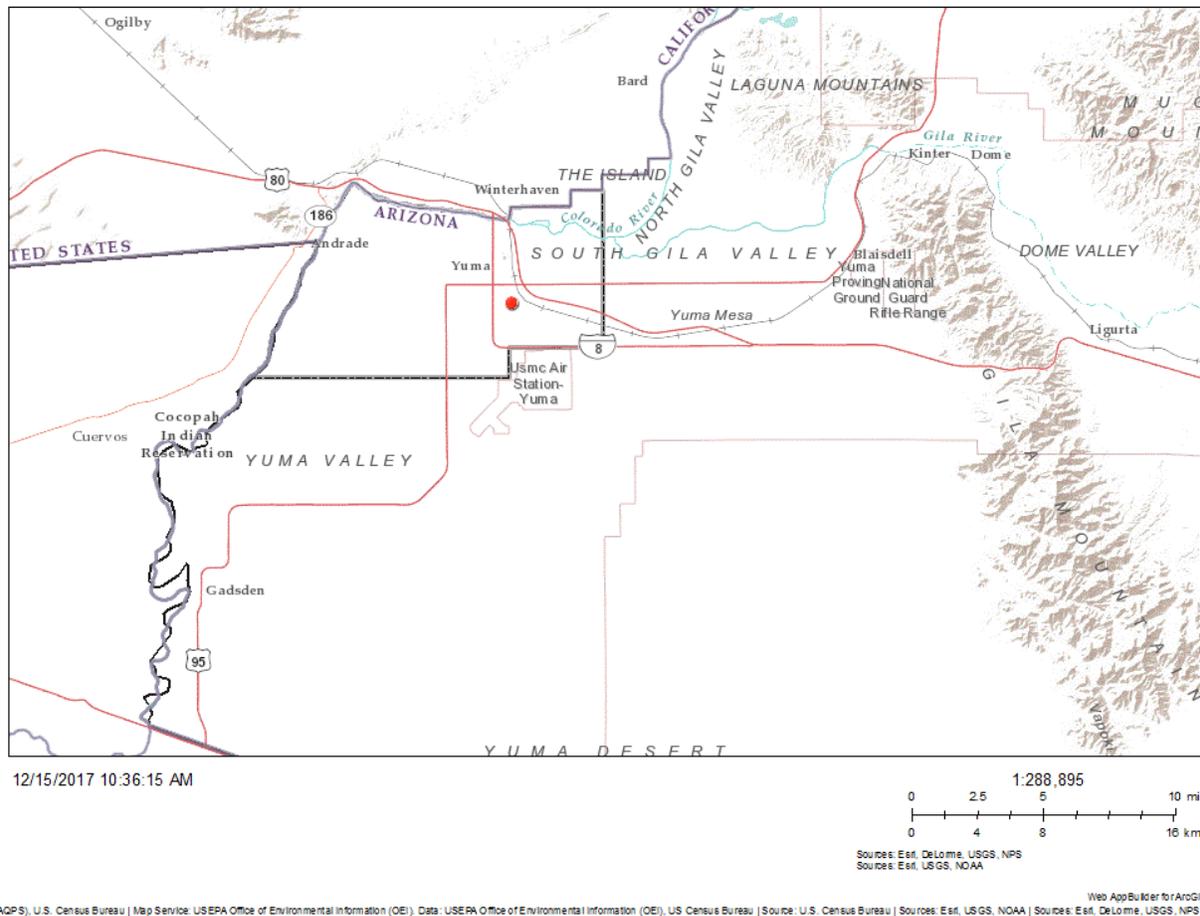


Figure 4.7b shows the topography in the area of analysis for Yuma County, AZ. EPA’s nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Factor 5: Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, the EPA considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary to carry out the air quality planning and enforcement functions for nonattainment areas. In defining the boundaries of the nonattainment area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the designated areas.

Figure 4.8 shows the relevant jurisdictional boundaries for the Yuma area, including the Yuma county boundary and Yuma CBSA boundary, and areas of Indian Country. The county and CBSA boundaries

are identical and are shown on the map with a blue line. Also shown in Figure 4.8 is the EPA's nonattainment area boundary.

Figure 4.8 Jurisdictional Boundaries.

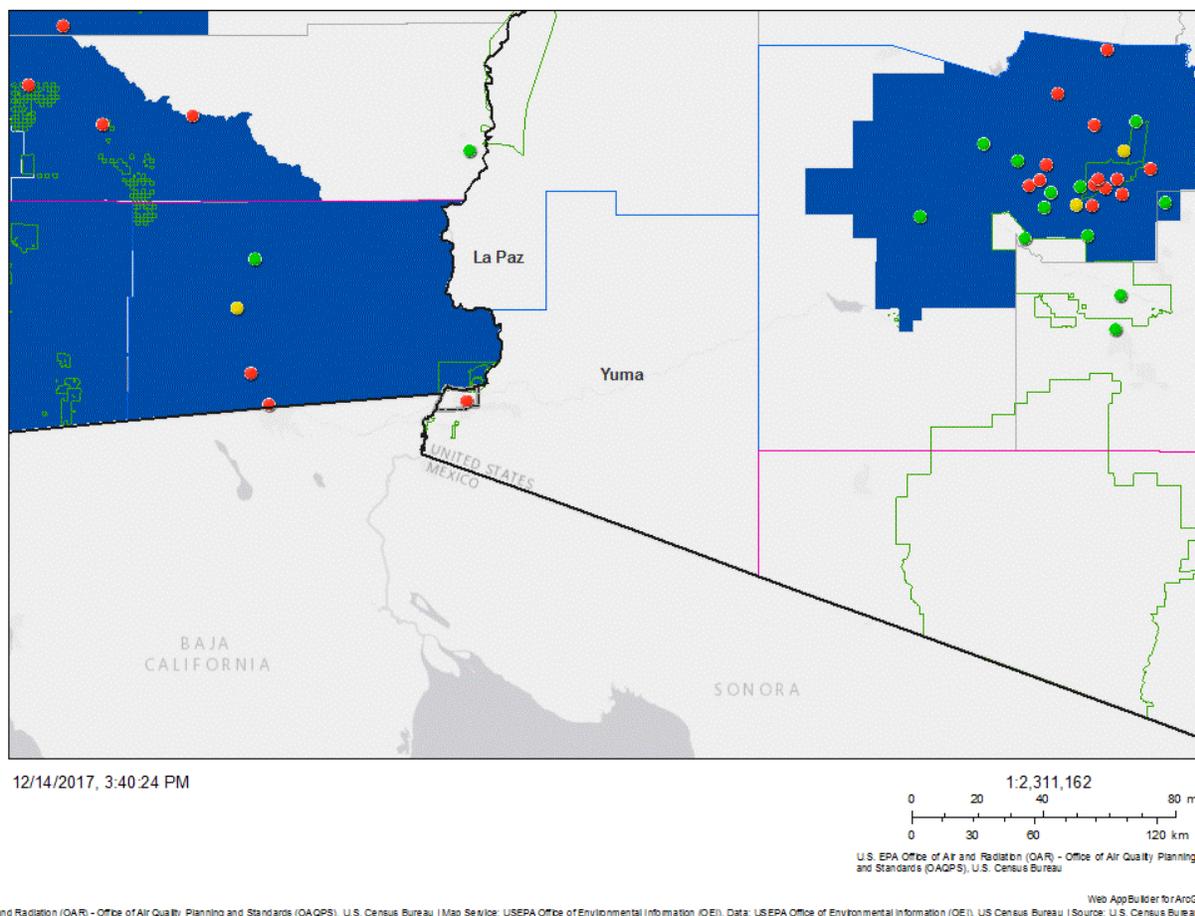


Figure 4.8 shows jurisdictional boundaries, including state boundaries (black lines), combined statistical areas (pink lines), metropolitan statistical areas (dark blue lines), and micropolitan statistical areas (light blue lines) in the area of analysis for Yuma, AZ. The EPA's nonattainment boundary for Yuma, AZ is shown as a gray line with a dashed black center. The nonattainment boundaries for the 1997 and 2008 ozone NAAQS are shown in blue. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The Yuma area does not have previously established nonattainment boundaries associated with the 1997 or 2008 ozone NAAQS.

Yuma Metropolitan Planning Organization (YMPO) has jurisdiction for transportation planning in Yuma County, and the Arizona Department of Environmental Quality (ADEQ) has authority for air quality planning and permitting in the county.

As mentioned above, the Yuma area also includes Indian country belonging to the Cocopah Tribe and the Quechan Tribe. As defined at 18 U.S.C. 1151, "Indian country" refers to: "(a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (b) all dependent Indian communities within the borders of the United States whether

within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.” The EPA recognizes the sovereignty of tribal governments, and has attempted to take the input of the tribes into account in establishing appropriate nonattainment area boundaries.

Conclusion for Yuma, AZ

Based on the assessment of factors described above, the EPA is not modifying the State’s recommendation to designate a portion of Yuma County as nonattainment and the remainder of Yuma County as attainment/unclassifiable for the 2015 ozone NAAQS. The air quality monitor in Yuma County indicates violations of the 2015 ozone NAAQS based on the 2016 design values, therefore a portion of this county is included in the nonattainment area.

As described above, the State recommended a nonattainment area centered around the city of Yuma. The State-recommended area is bounded on the north and west by the Arizona state line, on the south by the line of latitude 32° 39’ 20” N and on the east by the line of longitude 114° 33’ 50” W, and excluding sections 10, 11 and 12 of Township T9S, R23W. The EPA is not modifying this boundary.

As described in factor 2, most of Yuma County contains relatively few sources of ozone precursors. The county contains three large point sources, all located in and around the city of Yuma. Two are located within the nonattainment area boundary, and one is located outside of the boundary. Vehicle traffic and population are also largely centered around the city of Yuma in the southwest portion of the county. Some of the population in the city of Yuma is located in the EPA nonattainment area, but the area does not contain the population centers located in Somerton, San Luis and Fortuna Foothills. VMT levels are highest in Yuma County around the city of Yuma, and are largely captured within the nonattainment area. Areas of high VMT at the southwestern border with Mexico are not included in the nonattainment area.

An assessment of meteorological data shows that, on high ozone days at the violating monitor, the winds are from the south and the west. In contrast, on such days, winds are rarely from the east, which supports exclusion of the area to the east of the city of Yuma. Geography and topography show some variation within Yuma County. Specifically, the city of Yuma and the surrounding area is bounded by mountain ranges to the east and to the north. Therefore, air quality data, emissions and emissions-related data, meteorology, geography, and topography support not including the areas to the east and northeast from the Yuma nonattainment area.

As shown in Figure 4.8, the nonattainment area is bounded on the northwest by the California border and on the west by the Mexico border. As described in other sections of this analysis, factors other than jurisdiction weighed heavily in the determination of the northeastern, eastern, and southern boundaries of the nonattainment area. For defining the northeastern, eastern, and southern borders of the nonattainment area, the EPA used latitude and longitude and the boundaries of townships and sections of the 2014 Arizona Public Land Survey System, as described above.

HYSPLIT data show that 56 of the 57 back trajectories from the violating days in Yuma – about 98 percent – originate or flow through Mexico before reaching the Yuma monitor. The back trajectories show that ozone violations in Yuma almost always involve some transport from Mexico. The EPA also reviewed emissions from sources in the nearby Mexican municipalities of Mexicali and San Luis Rio Colorado, (the two largest municipalities across the border from Yuma County). The

emissions from these municipalities are considerably larger than the emissions in the area of analysis (Yuma County). NO_x emissions from the two upwind Mexican municipalities are five times higher than NO_x emissions from Yuma County (43,021 vs. 8,236 tpy). VOC emissions are also approximately five times higher (36,349 vs. 7,462 tpy). Emissions from these municipalities in Mexico, especially when considered with HYSPLIT analysis, are therefore found to contribute to violations of the ozone NAAQS in Yuma County.

Arizona has recommended a portion of Yuma that includes the monitor and several nearby significant sources of ozone precursor emissions. These emissions represent a very small fraction of ozone precursor emissions in the area in and around the city of Yuma that have potential to impact ozone concentrations. In considering whether the recommended nonattainment area is appropriate, we note that the overwhelming majority of emissions from outside the city of Yuma are from the nearby Mexican municipalities of Mexicali and San Luis Rio Colorado, and upwind neighbor Imperial County, which is a separate ozone nonattainment area in California. There are additional NO_x and VOC emissions sources south of the city of Yuma down to the Mexican border, but these additional emissions comprise less than 2% of the area-wide total of ozone precursor emissions when emissions from the upwind areas in Mexico and the separate Imperial County nonattainment area are considered. Table 4.6 provides a comparison of emissions in the area of analysis to emissions in Imperial County, California and nearby municipalities in Mexico. The EPA therefore finds that it is not appropriate to include this additional area within the nonattainment area boundary, and agrees with the state’s recommended boundary.

Table 4.6. NO_x and VOC Emissions Comparison, (Area of Analysis, Imperial County, CA and Nearby Mexican Municipalities).

Area	NO _x		VOC	
	Tons Per Year	Pct of Total	Tons Per Year	Pct of Total
State Recommended Nonattainment Area	4,857	9%	3,451	7%
Additional area south of City of Yuma (to Mexican border)	1,287	2%	861	2%
Imperial County, CA (adjacent county)	6,192	11%	7,063	15%
Mexico (nearby Mexicali and San Luis Rio Colorado Municipalities)	43,021	78%	36,349	76%
Nearby Total	55,358	100%	47,724	100%

Gridded emissions are from 2014 Version 7.0 Modeling Platform. As part of the development of this modeling platform emissions from the 2014 NEI were spatially allocated to 12 km grid cells. Information on the methodologies used to spatially allocate these emissions is documented in Section 3.4 of the Technical Support Document (TSD), Preparation of Emissions Inventories for the Version 7 2014 Emissions Modeling Platform for NATA, June 2017 (https://www.epa.gov/sites/production/files/2017-08/documents/2014v7.0_2014_emismod_tsdv1.pdf)

Indian country of the Cocopah and Quechan tribes is included in the nonattainment area boundary. The Cocopah Tribe’s Indian country is located in three noncontiguous parcels: one is located to the northwest of the city of Yuma, along the Arizona-California state line. The other two parcels lie to the

south. The parcel located along the state line is being designated nonattainment as part of the Yuma nonattainment area. The other two parcels lie outside of the Yuma nonattainment area boundary and are being designated attainment/unclassifiable consistent with the surrounding area. The Quechan Tribe's Indian country is located just to the north of the city of Yuma. A small fraction (approximately 2300 acres) of the 45,000-acre Fort Yuma – Quechan Reservation is located in Arizona; most of the reservation is located in California. A portion of the Fort Yuma-Quechan Reservation is located within the Yuma nonattainment area and is being designated nonattainment as part of this area. Another portion of the Fort Yuma – Quechan Reservation is being designated attainment/unclassifiable, consistent with the portions of Yuma County outside of the Yuma nonattainment area.

Based on our consideration of all five factors, the EPA is not modifying the State's recommendation, and is designating a portion of Yuma County, AZ as nonattainment for the 2015 ozone NAAQS.