STATE OF ARIZONA
OFFICE OF THE GOVERNOR

DOUGLAS A. DUCEY
GOVERNOR

EXECUTIVE OFFICE

September 27, 2016

Ms. Alexis Strauss
Acting Regional Administrator
U.S. Environmental Protection Agency Region 9
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Re: State of Arizona's Initial Boundary Designations for 2015 Ozone NAAQS

Dear Ms. Strauss:

I hereby submit Arizona's initial boundary designations for the 2015 National Ambient Air Quality Standard (NAAQS) for ozone, consistent with the Clean Air Act, Section 107(d). Based on 2013-2015 data, Arizona designates portions of Maricopa, Pinal, and Gila Counties in one nonattainment area, along with three other suggested data-contingent alternatives for the Phoenix area. Arizona also designates a portion of Yuma County as nonattainment. Arizona Department of Environmental Quality (ADEQ) designates the rest of the state as attainment/unclassifiable. Arizona's designations do not apply to any Indian Country (term as defined in federal law, 18 U.S.C. § 1151).

Enclosed, please find ADEQ's 2015 Ozone NAAQS Boundary Recommendations and Technical Support Document, which I hereby adopt and submit as Arizona's official initial boundary designations.

If you have any questions, please contact Misael Cabrera, Director of the Arizona Department of Environmental Quality, at (602) 771-2203 or Timothy S. Franquist, Air Quality Division Director, at (602) 771-4684.

Sincerely,

Douglas A. Ducey
Governor
State of Arizona

Enclosure

cc: Elizabeth Adams, Acting Director, Air Division, U.S. EPA Region 9
Colleen McKaughan, Associate Director, Air Division, U.S. EPA Region 9
Misael Cabrera, Director, Arizona Department of Environmental Quality

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Enclosure 1
ADEQ's 2015 Ozone NAAQS Boundary Recommendations
and
Technical Support Document

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Arizona Department of Environmental Quality

2015 Ozone NAAQS Boundary Recommendations

Air Quality Division
August 30, 2016 Final Recommendations

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1 Executive Summary and Official Recommendations

In accordance with the Clean Air Act ("CAA") section 107(d)(1) and Arizona Revised Statutes ("A.R.S.") 49-405, this report documents and explains Arizona Department of Environmental Quality's ("ADEQ") recommendations to the governor of Arizona to initially designate areas of the state in response to new 2015 Ozone National Ambient Air Quality Standards of 70 parts per billion.

After consideration of currently available data within the context of available guidance, and after consultation with stakeholders, ADEQ recommends that the Governor designate portions of Maricopa, Pinal, and Gila Counties as one nonattainment area, a portion of Yuma County as another nonattainment area, and the rest of the state as attainment/unclassifiable areas. ADEQ also suggests future data contingent Phoenix area alternatives for EPA's consideration. Depending on future design values, ADEQ may revise these recommendations.

The recommendations are conveyed in terms of township, range, and section below and the remainder of the report provides supporting data for the recommendations. All recommendations exclude Indian Country as defined by federal law, 18 U.S.C. 1151.

1.1 Maricopa-Pinal-Gila Nonattainment Area

Based on current 2015 ozone design values, Arizona recommends that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor, and by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley (excluding Indian Country as defined by federal law, 18 U.S.C. 1151).

Table 1-1 Township and Range Description for Maricopa-Pinal-Gila Nonattainment Area

Designated Area[1]	Designation Type
Phoenix Area: Gila County (part)…………………………… T2N, R12E (except that portion in Maricopa County) T3N, R12E (except that portion in Maricopa County) T4N, R12E (Sections 25 through 29 (except those portions in Maricopa County) and 33 through 36 (except those potions in Maricopa County)	 Nonattainment Nonattainment

[1] All Arizona recommended areas exclude Indian Country.

Designated Area[1]	Designation Type
Maricopa County (part)…………………………. T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country) T1N, R5E (except that portion in Indian Country) T1N, R6E T1N, R7E T1N, R1W T1N, R2W T1N, R3W T1N, R4W T1N, R5W T1N, R6W T1N, R7W T1N, R8W T2N, R1E T2N, R2E T2N, R3E T2N, R4E T2N, R6E (except that portion in Indian Country) T2N, R7E (except that portion in Indian Country) T2N, R8E T2N, R9E T2N, R10E T2N, R11E T2N, R12E (except that portion in Gila County) T2N, R13E (except that portion in Gila County) T2N, R1W T2N, R2W T2N, R3W T2N, R4W T2N, R5W T2N, R6W T2N, R7W T2N, R8W T3N, R1E T3N, R2E T3N, R3E T3N, R4E T3N, R5E (except that portion in Indian Country) T3N, R6E (except that portion in Indian Country)	

Designated Area[1]	Designation Type
T3N, R7E (except that portion in Indian Country) T3N, R8E T3N, R9E T3N, R10E (except that portion in Gila County) T3N, R11E (except that portion in Gila County) T3N, R12E (except that portion in Gila County) T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W T5N, R3W	

Designated Area[1]	Designation Type
T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E	

Designated Area[1]	Designation Type
T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34) Pinal County (part) …………………………… T1N, R8E T1N, R9E T1N, R10E T1S, R8E T1S, R9E T1S, R10E	Nonattainment

Designated Area[1]	Designation Type
T2S, R8E (Sections 1 through 10, 15 through 22, and 27 through 34) T2S, R9E (Sections 1 through 6) T2S, R10E (Sections 1 through 6) T3S, R7E (Sections 1 through 6, 11 through 14, 23 through 26, and 35 through 36) T3S, R8E (Sections 3 through 10, 15 through 22, and 27 through 34)	

1.2 Yuma Nonattainment Area

Table 1-2 Township and Range Description of Yuma Nonattainment Area

Designated Area[2]	Designation Type
Yuma County (part)[3] .... That portion within Yuma County of the area described by the following: 1. Bounded on the north and west by the Arizona state line 2. Bounded on the south by the line of latitude at 32° 39' 20"N 3. Bounded on the east by the line of longitude 114° 33' 50"W 4. And excluding the sections 10, 11, and 12 of township T9S, R23W and any portion in Indian Country	Nonattainment

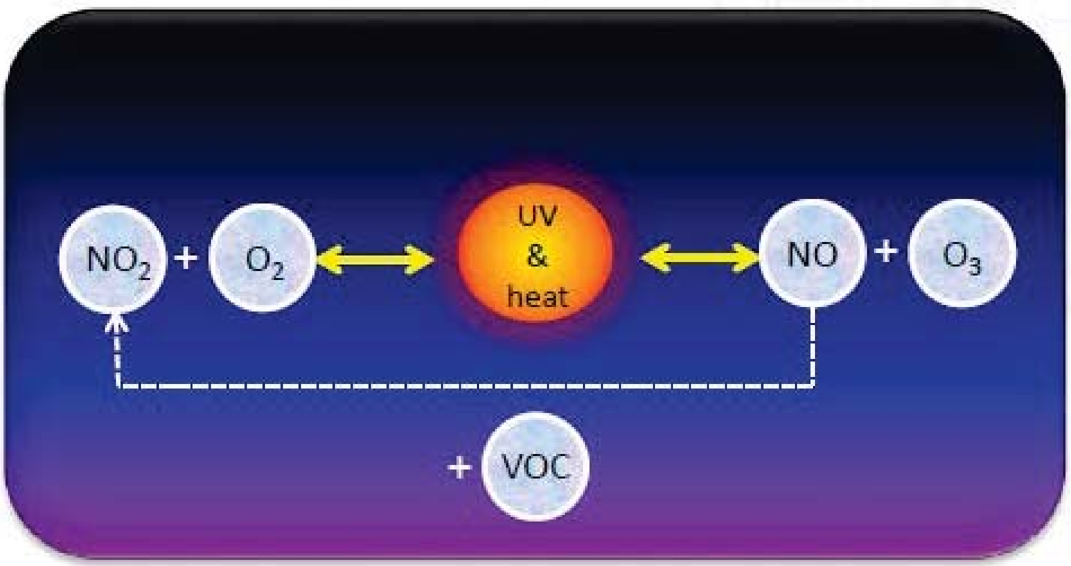
[2] All Arizona recommended areas exclude Indian Country.
[3] There are conflicting township section grid lines near the state line in this portion of Yuma County. For this reason, ADEQ utilized a different method to describe the Yuma area boundary in this recommendation.

2 Introduction and Background

2.1 Ozone Formation

Ozone is not released directly by any source but is rather a secondary pollutant formed from a complicated process involving precursor pollutants and sunlight. Nitrogen oxides (NOx) and volatile organic compounds (VOCs) are generally known as the main precursor pollutants to ozone, although other molecules are often involved in formation. Ozone forms naturally in the earth's troposphere[4] as shown in simplified form in Figure 2-1. Nitrogen dioxide (NO_2) and oxygen (O_2) react (i.e. photolyze) under the sun's heat and ultra violet rays to form nitrogen monoxide (NO) and ozone (O_3), and vice versa.[5] In a separate reaction, VOCs can oxidize and the resulting free radicals can convert nitrogen monoxide to nitrogen dioxide. This natural VOC reaction disrupts the equal balance of the photocatalytic reaction and allows for a slight accumulation of ozone.[6]

Figure 2-1 Ozone Formation



NO_x and VOCs are both naturally emitted compounds (e.g. NOx is emitted from soils, lightning, wildfires, and stratospheric intrusions[7] and VOCs are emitted from live plants, such as pine trees,

[4] The troposphere is the Earth's lowest atmospheric layer extending "from the earth's surface to about 8 km above polar regions and to about 16 km above tropical regions." EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidant: Volume II of III*, p. AX2-2 (2006) *available at* https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=149923&CFID=58102340&cftoken=94355181.

[5] *See generally id*. at AX2-3 – AX-2-5; NASA EARTH OBSERVATORY, *Chemistry in the Sunlight*, http://earthobservatory.nasa.gov/Features/ChemistrySunlight/chemistry_sunlight3.php (last visited May 27, 2016).

[6] *See generally id*.

[7] EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidant: Volume I of III*, p. 2-20 (2006) *available at* https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=149923&CFID=58102340&cftoken=94355181.

as byproducts of photosynthesis[8]). However, NO_x and VOCs are also produced by human activity (anthropogenically). Anthropogenically emitted NO_x sources include fossil fuel combustion sources such as car engines and industrial boilers (such as those found at electric generating stations). Anthropogenic VOCs originate from sources such as paints, coatings, and fossil fuels (e.g. gasoline). The addition of more NOx and VOCs into the equation, as a result of anthropogenic emissions, causes the accumulation of ozone concentrations to approach unhealthy and environmentally dangerous levels. Accumulation of ozone is especially likely to occur in urban areas where man-made NOx and VOC emissions are very high.[9] Urban populations are therefore likely the most affected by ozone's negative effects, such as reduction in lung function and respiratory inflammation and distress.[10] Ozone can also cause disruptions in ecosystems and reductions in plant growth, including crop yield loss.[11]

2.2 Legal Requirements and Guidance

In accordance with Clean Air Act (CAA) section 108, the Environmental Protection Agency (EPA) Administrator must identify, list, and issue criteria for certain air pollutants that in her "judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." EPA has listed six such pollutants, commonly called "criteria pollutants." Because of ozone's negative health and welfare (i.e. environmental) effects, ozone is regulated through the CAA as a criteria pollutant. According to CAA section 109, EPA must set air quality standards for criteria pollutants, also known as National Ambient Air Quality Standards (NAAQS).

Once EPA establishes or revises the NAAQS, CAA section 107(d)(1) mandates the governor of each state to submit initial area designations to EPA within the time required by EPA, but no later than one year after the NAAQS revision. The initial designations must list all areas within the state as either nonattainment, attainment, or unclassifiable. A nonattainment area is any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard (NAAQS) for the pollutant. An attainment area is any area outside of a nonattainment area that meets the NAAQS. An unclassifiable area is any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

ADEQ is tasked with preparing the boundary designations and supporting documents for the entire state of Arizona.[12] According to Arizona statute, ADEQ's proposed recommendations must

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[8] *See id*. at 2-21; D. Ehhalt, M. Prather, et al., *Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: Climate Change 2001, Working Group I: The Scientific Basis, Chapter 4,* Section 4.2.3.2 *available at* http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg1/127.htm (last visited May 27, 2016).
[9] *See* EPA, *Criteria for Ozone*, *supra* note 7 at E-6 ("The daily maximum 1-h O3 concentrations tend to be much higher in large urban areas or in areas downwind of large urban areas.").
[10] *See generally* EPA, *supra* note 7 at E-10 – E-23.
[11] *See generally* EPA, *supra* note 7 at E-23 – E-30.
[12] *See* Arizona Revised Statutes § 49-405 (2015) *available at* http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/49/00405.htm&Title=49&DocType=ARS.

first be completed and posted on ADEQ's website between four and five months before they are due to the governor.[13] ADEQ must then hold a public hearing regarding the recommendations after a comment period.[14] These proposed recommendations are then submitted to the governor at least one month before the governor must submit his initial designations.[15] Finally, the governor submits his initial boundary designations to EPA before the federally imposed deadline.

EPA most recently revised and promulgated the ozone NAAQS to 70 ppb[16] on October 1, 2015.[17] In order to comply with CAA section 107(d)(A) and the 2015 Ozone standard final rule,[18] all states' initial boundary designations are due before October 1, 2016. ADEQ's draft recommendation is further time constrained by state statute as noted above.

To comply with statutory time constraints, ADEQ collected and analyzed data as it became available. ADEQ also applied current guidance as it became available, including EPA's Background White Paper[19] and Boundary Guidance.[20] Attachment 3 of the Boundary Guidance lays out the main factors to consider in determining nonattainment area boundaries for the 2015 Ozone NAAQS. EPA will consider this guidance and associated factors in determining final boundary designations. The five guiding factors and a short summary of each follows:

1. Air Quality Data
2. Emissions and Emissions-Related Data
3. Meteorology
4. Geography/Topography
5. Jurisdictional Boundaries

For air quality data, designators are advised to identify all monitors in an area, all monitored violations, and design values for all monitors. Such data should exclude concurred exceptional event data. States will use 2013-2015 monitored design value data for initial designations, while EPA will use 2014-2016 data. EPA suggests evaluating historical trend data to provide a greater understanding of the nature of ozone issues in an area. EPA also suggests evaluating the spatial and temporal distribution of exceedances.

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[13] *See id*.
[14] *See id*.
[15] *See id*.
[16] As calculated per 40 CFR § 50.19 (2015).
[17] *See National Ambient Air Quality Standards for Ozone Final Rule*, 80 FR 65292, 65435 (Oct. 26, 2015) (standards were promulgated October 1, 2015).
[18] *Id*. at 65438.
[19] *Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone – White Paper for Discussion* [*Background White Paper*] (December 30, 2015), *available at* https://www.epa.gov/ozone-pollution/background-ozone-workshop-and-information.
[20] *Area Designations [Guidance] for the 2015 Ozone National Ambient Air Quality Standards* [*Boundary Guidance*], Memorandum from Janet G. McCabe, Acting Assistant Administrator, to Regional Administrators, Regions 1-10 (February 25, 2016), *available at* https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data.

For emissions and emissions-related data, EPA recommends using the most recent National Emissions Inventory (NEI) data to evaluate county level emissions magnitudes and the geographic locations of NO_x and VOC sources. As of the date of this analysis, the most current National Emission Inventory is 2011. EPA encourages examining whether an area is NOx or VOC limited, although ADEQ notes that when considering background and transported emissions impacts, it is sometimes difficult to practicably make this kind of determination. EPA recommends evaluating emissions data from "nearby" counties to assess potential contribution (See Section 2.3.2). EPA points out that while far upwind sources are not "nearby," an evaluation of an area can help identify the impact of emissions from distant sources and differentiate such emissions from nearby emissions. EPA also suggests analyzing population and location of urbanization as these can be indicators of emissions-related activities. In addition, traffic and commuting patterns can directly relate to precursor emissions and can show the interrelatedness to a nearby area. EPA suggests examining major arteries, traffic volume, and vehicle miles traveled (VMT).

EPA encourages evaluating meteorological information to "assess the fate and transport of emissions contributing to ozone concentrations."[21] The agency also suggests assessing source-receptor analysis relationships using wind speed and wind speed direction, possibly by running HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model trajectories.

EPA states that geography and topography, the location of physical features of land, may influence the fate, formation, and distribution of ozone concentrations.

Jurisdictional boundaries may be considered "once the geographic extent of the violating area and the nearby area contributing to violations is determined…for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas."[22]

The final step is that all of the above five factors are then weighed together as a whole in a weight of evidence. In a weight of evidence, when considering all of the data, one conclusion may outweigh, and in a sense appear superior to, other conclusions that could be made based on the same data.

2.3 ADEQ's Approach

2.3.1 ADEQ's Five Factor Data and General Approach

After consideration of currently available data within the context of available guidance, and after consultation with stakeholders, ADEQ recommends portions of Maricopa, Pinal, and Gila Counties as one nonattainment area, a portion of Yuma County as another nonattainment area, and the rest of the state as attainment/unclassifiable areas. ADEQ also suggests future data contingent Phoenix area alternatives for EPA's consideration.

[21] *Boundary Guidance*, *supra* note 20, Attachment 3 at 7.
[22] *Boundary Guidance*, *supra* note 20, Attachment 3 at 10.

These recommendations are based on monitoring data for the years 2013 through 2015. Depending on future design values, ADEQ may revise these recommendations.

ADEQ analyzed the best available data using the guiding five factors. The general sources of analyzed data are presented in Tables A1-1, -2, -3, -4, and -5 in Section A1.1 of Appendix A.

For air quality data, ADEQ analyzed 2015 design values based on the 4th highest maximum daily values for 2013-2015. Design values for the entire state are available in the Table A2-1 of Appendix A (Technical Support Document). All design values are derived from certified data monitored according to 40 CFR Part 58, including both CASTNET, ADEQ, and county operated monitors. Most ADEQ operated ozone monitors in the state have historically reported data for the ozone season only (April through October), per 40 CFR Part 58, Appendix D, Paragraph 4.1(i) and Arizona's approved annual network plans.[23] However, from 2016 forward the monitors will report year-round. ADEQ notes that while no exceptional events are concurred with by EPA, there is at least one exceptional event demonstration that has been submitted to EPA that may impact attainment status for future year design values.[24] See Figure A2-1 in Section A2.1 of Appendix A for an overall picture of the Arizona's monitoring network.

For emissions and emissions related data, ADEQ analyzed the following resources: the 2011 National Emissions Inventory ("2011 NEI"); 2014 permitted synthetic minor and major point source reporting data from ADEQ, Maricopa County, and Pinal County ("2014 point source data"); EPA transport modeling information ("EPA transport modeling"); U.S. Department of Agriculture data ("USDA data"); Arizona State Land Department land ownership data ("AZ land ownership data"); U.S. Census population data for 2000 and 2010 ("U.S. Census data"); Pinal County prison population data; Highway Performance Monitoring System (HPMS) traffic data; U.S. Department of Transportation statistics on border crossing data; and metropolitan planning organizations' (MPO) regional transportation plans (RTPs). Regarding traffic data, ADEQ looked at both average annual daily traffic (AADT)[25] and vehicle miles traveled (VMT).[26] ADEQ found that visually viewing roads in terms of VMT was unrepresentative in that not all traffic-counted road segments are the same length. Hence, all visual representations are shown in terms of AADT. VMT is provided as an area-wide estimate based on HPMS-sourced AADT for a specific area.

For meteorological data, ADEQ extracted real time data for the design value period from various monitoring sites, unless no meteorological data was available onsite. Using the best available meteorological data, ADEQ created annual average wind roses and wind roses for the 10 highest concentration days between 2013 and 2015. ADEQ also ran HYSPLIT model trajectories for at least the 10 highest days for every violating monitor in the state. All modeled trajectories are shown in Exhibit AI of the attached TSD. ADEQ performed analyses juxtaposing HYSPLIT modeling

[23] For more information see Appendix A (2015 Ozone Boundary Recommendation TSD), Section A2.1: Ozone Design Values.
[24] ADEQ, MAG, and Maricopa County have flagged and submitted an exceptional event demonstration in response to high concentrations resulting from a regional wildfire that affected certain monitors on June 20, 2015.
[25] ADT is a bidirectional count of average number of cars passing through a particular road segment in one day
[26] VMT is AADT multiplied by the length of the counted road segment, and annual VMT is that number multiplied by the number of days in the year.

results to hourly concentrations. Meteorological analyses are detailed in Section A3 of Appendix A to this recommendation.

For geographical and topographical maps, ADEQ used available base and reference maps in ESRI and GIS. Meteorological information was analyzed and weighted as appropriate within the context of geography and topography.

Jurisdiction was analyzed by evaluating known entities who have various types of authorities and the physical boundaries of such authorities. ADEQ evaluated what entities have air quality permitting authority, air quality planning authority, transportation planning authority, and where county boundaries, tribal land boundaries, and previously established ozone nonattainment areas are located.

EPA guides the regions and the states to consider the above five factors together in a weight of evidence analysis. While ADEQ heavily relied on the five factor analysis for evaluating the Phoenix area, ADEQ finds that the five factor analysis is not as relevant to the Yuma County area, and in fact, is not reasonably applied to the area (See Section 4.6)

In developing its recommendations, ADEQ involved as many stakeholders as possible. The agency held public stakeholder meetings on February 23, 2016, April 14, 2016, May 23, 2016, May 24, 2016, July 12, 2016, July 14, 2016, August 3, 2016, and August 9, 2016. ADEQ closely consulted with several agencies and stakeholders throughout the process, including, but not limited to: Pinal County Air Quality Control District ("PCAQCD"), Maricopa Association of Governments ("MAG"), Maricopa County Air Quality Department ("MCAQD"), Yuma Metropolitan Planning Organization ("YMPO"), and Yuma County officials.

In accordance with A.R.S. § 49-405, ADEQ posted the draft recommendations on May 31, 2016 on ADEQ's website and opened a formal comment period. ADEQ sent actual notice of the draft document and comment period to all counties and municipalities that would be included in the nonattainment area, and to all persons who had previously requested actual notice of the draft documents. Finally, ADEQ held a public hearing regarding the proposed recommendations on July 1, 2016.

In Section 3 below, ADEQ analyzed available data and recommends one future state nonattainment designation boundary for the Phoenix metropolitan area for the 2015 Ozone standard. In Section 4 below, ADEQ identifies a partial county nonattainment boundary for the Yuma nonattainment area. In Section 5 below, ADEQ identifies attainment/unclassifiable areas in the state, including Mohave County among other counties. In Section 6, ADEQ identifies three alternative boundaries for the Phoenix area contingent upon future data.

2.3.2 Transport and Background

As scientists learn more about background and the NAAQS approaches background levels, it becomes increasingly important to attempt to quantify background and transport levels. As standard levels lower, background and transport have a proportionally increased effect on nonattainment concentrations, especially as background levels continue to increase in magnitude. Quantifying background and transport can inform how to design effective control strategies and the feasibility of reaching attainment through such control strategies. For this reason, ADEQ weighed transport and background heavily, as appropriate, in its determination of effective boundaries.

2.3.2.1 Transport

Transport has been shown to affect ambient concentrations in Arizona and in the southwestern region generally. Several studies show that long-range interstate and international transport of ozone occurs throughout the atmosphere. Two studies performed in northern U.S. cities showed that ozone concentrations over metropolitan areas increase with wind speed, indicating that the transport of ozone and its precursors from upwind areas is important.[27] [28] Another study by Comrie (1994) used an air-mass trajectory analysis to evaluate the sources of high ozone events in rural, forested Pennsylvania and found that the Ohio River Valley and Texas are the most probable sources of NOx emissions.[29] A study by Blumenthal (1997) showed that during episodes of high ozone in the eastern U.S. winds several hundred meters above the ground can transport pollutants from the west, even if surface winds are from another direction.[30] Additional studies established that nocturnal low level jets are able to transport pollutants that have been entrained into the residual boundary layer several hundred kilometers, and can contribute to high levels of ozone overnight and in the early morning.[31] There have been numerous other studies, such as Levy (1985),[32] Lin (2012),[33] and Langford (2010)[34], to show that the transport of surface ozone over long distances is possible, and that previously thought hindrances such as topography and lack of daylight are not as important. There are also several studies performed using chemical modeling to analyze tropospheric ozone transport. EPA performed chemical modeling to assess the impact of transport on ozone concentrations throughout the country. Their analysis utilized the Comprehensive Air Quality Model with Extensions (CAMx version 6.11). This modeling

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[27] Schichtel, BA; Husar, RB. (2001). Eastern North American transport climatology during high- and low-ozone days. *Atmos Environ* 35: 1029-1038.

[28] Husar, RB; Renard, WP. (1998). Ozone as a function of local wind speed and direction: Evidence of local and regional transport. 91st annual meeting and exhibition of the Air & Waste Management Association, San Diego, CA.

[29] Comrie, A.C. (1994). Tracking ozone: air-mass trajectories and pollutant source regions influencing ozone in Pennsylvania forests. *Annals of the Association of American Geographers* 84 (4), 635-651.

[30] Blumenthal, DL; Lurmann, FW; Kumar, N; Dye, TS; Ray, SE; Korc, ME; Londergan, R; Moore, G. (1997). Transport and mixing phenomena related to ozone exceedances in the northeast US (analysis based on NARSTO-northeast data). Santa Rosa, CA: Sonoma Technology. Retrieved from http://capita.wustl.edu/otag/reports/otagrept/otagrept.html

[31] Corsmeier, U; Kalthhoff, N; Kolle, O; Motzian, M; Fiedler, F. (1997). Ozone concentration jump in the stable nocturnal boundary layer during a LLJ-event. *Atmos Environ* 31: 1977-1989.

[32] Levy, H., Mahlman, J. D., Moxim, W. J., & Liu, S. C. (1985). Tropospheric ozone: The role of transport. *Journal of Geophysical Research*, *90*(D2), 3753-3772.

[33] Lin, M., Fiore, A. M., Horowitz, L. W., Cooper, O. R., Naik, V., Holloway, J., Wyman, B. (2012). Transport of asian ozone pollution into surface air over the western united states in spring. *Journal of Geophysical Research: Atmospheres*, *117*(D21), - D00V07.

[34] Langford, A. O. (2010). Long-range transport of ozone from the Los Angeles basin: A case study. *Geophysical Research Letters*, 37(6).

platform utilized a 2011 base year for emissions, meteorology, and other inputs and was then projected forward to 2017.

2.3.2.2 Background

Background has also been shown to affect monitors in Arizona and in the southwestern region generally. EPA's definition for background includes internationally transported emissions and interstate transport of natural emissions. EPA considers policy relevant background ozone to be any ozone "formed from sources or processes other than U.S. manmade emissions of nitrogen oxides (NOx), volatile organic compounds (VOC), methane (CH_4), and carbon monoxide (CO)."[35] Background ozone can be: (1) naturally produced from sources such as stratospheric intrusion, lightning, wildfires, and vegetation within the U.S. or abroad or (2) manmade abroad from emission sources such as industrial processes, manmade fires, and car emissions outside of U.S. borders. Ozone can exist in the atmosphere for weeks and can be transported long distances, as shown by the literature above. According to a study commissioned by MAG, "background ozone can vary significantly over daily, seasonal, and inter-annual time scales, and over a wide range of spatial scales" and "natural sources contribute significantly to the daily-to-seasonal variability."[36] However, no model at this time is "capable of precise background estimates on a daily level."[37] Long term background ozone is "influenced by industrialization and climate change trends."[38] Some scientists have produce evidence that background is increasing by as much as 1 ppb per year.[39]

2.3.3 "Nearby" Interpretation

In the Boundary Guidance, EPA states that it evaluates emissions data from nearby counties to assess each county's potential contribution to a violating monitor. "Nearby" in EPA's view means that EPA will review relevant information associated with Office of Management and Budget delineated statistical boundaries such as Combined Statistical Areas (CSA) and Core Based Statistical Areas (CBSA, e.g. Metropolitan Statistical Areas (MSA)).[40] While CBSAs and CSAs do not presumptively form a nonattainment boundary,[41] the areas within such CBSAs and CSAs are evaluated to determine whether such areas are likely to be contributing to nearby areas within the same CBSA or CSA.

It is not necessarily appropriate to start with the CBSA or CSA and assume that the entire CBSA or CSA is contributing to a violating monitor. ADEQ believes this is especially true in a state with counties as large as those found in Arizona. Many areas in Arizona are practically, and for all intents and purposes, rural areas. Such areas are still technically a part of an MSA or CSA

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[35] *Background White Paper*, *supra* note 19, at 2; *see also Ozone Standard Final Rule supra* note 17, at 65436.
[36] ENVIRON, *Analysis of Rising Ozone Concentrations in Maricopa County in 2011-2012* (prepared for Maricopa Association of Governments) (July 2013), p. 53, *available at* http://www.azmag.gov/Documents/EP_2013-11-05_Analysis-of-Rising-Ozone-Concentrations-in-Maricopa-County-in-2011-2012.pdf.
[37] *Background White Paper supra* note 19, at 4.
[38] ENVIRON, *supra* note 36.
[39] ENVIRON, *supra* note 36.
[40] *See Boundary Guidance*, *supra* note at 5-7.
[41] *See Boundary Guidance*, *supra* note at 6.

because there is an urban area somewhere else in the same county, even if not nearby in the general sense of that word. Some violating monitors may be physically nearby, but outside of, a highly populated or high emitting MSA, and impacted mostly by that high emitting area, rather than by other sources within the same CBSA as themselves. Hence, CBSAs are not necessarily a good presumptively nearby starting point for a boundary; and in Arizona, given the large size of the counties, CBSAs may also not be an appropriate limiting factor either. If CBSA boundaries are the presumptive limit to a nonattainment boundary, and CBSAs envelop entire counties, including large swaths of undeveloped land, then essentially rural areas could inappropriately be a presumptive part of a nonattainment area.

2.3.4 EPA's Mapping Tool

EPA's mapping tool gives an excellent broad view of the state of the country and eases many comparisons between states.[42] However, after review, ADEQ believes that EPA's mapping tool is generally not an appropriate tool to use to define nonattainment boundaries in Arizona because the resolution is far too low given the large county sizes in Arizona. The representation of emissions is skewed because the ratio of populated and developed areas compared to county sizes is so small in comparison to many other areas in the country.

For example, the Dallas-Fort Worth-Arlington MSA is comprised of 11 counties, whereas the Phoenix-Scottsdale-Mesa MSA is made of two vast counties. Figure 2-2 below shows a side by side image comparison in the mapping tool, and Table 2-1 below shows a comparison of land area, emissions, and population between two MSAs. The summed emissions total of the 11 counties that comprise the Dallas area is similar to the Phoenix area sum of emissions from its two vast counties, of which only a limited area is actually urbanized. However, when viewing the mapping tool map, the Dallas-Fort Worth-Arlington area appears to emit less than the Phoenix-Scottsdale-Mesa area as a result of the color coding of the emissions in the individual counties that make up the Dallas and Phoenix areas. On the map, the severity of emissions from the Dallas area's individual counties actually pales in contrast to Phoenix area county contributions because of the vast size of Phoenix area counties in comparison to Dallas area counties.

For this reason, ADEQ believes that EPA's mapping tool is an inappropriate visual aid due to the size of counties in Arizona (and other western states) relative to the size of urban populated areas in those counties.

[42] EPA's ozone designations guidance mapping tool is located at https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data#C.

Figure 2-2 EPA Mapping Tool Phoenix and Dallas MSA Comparison

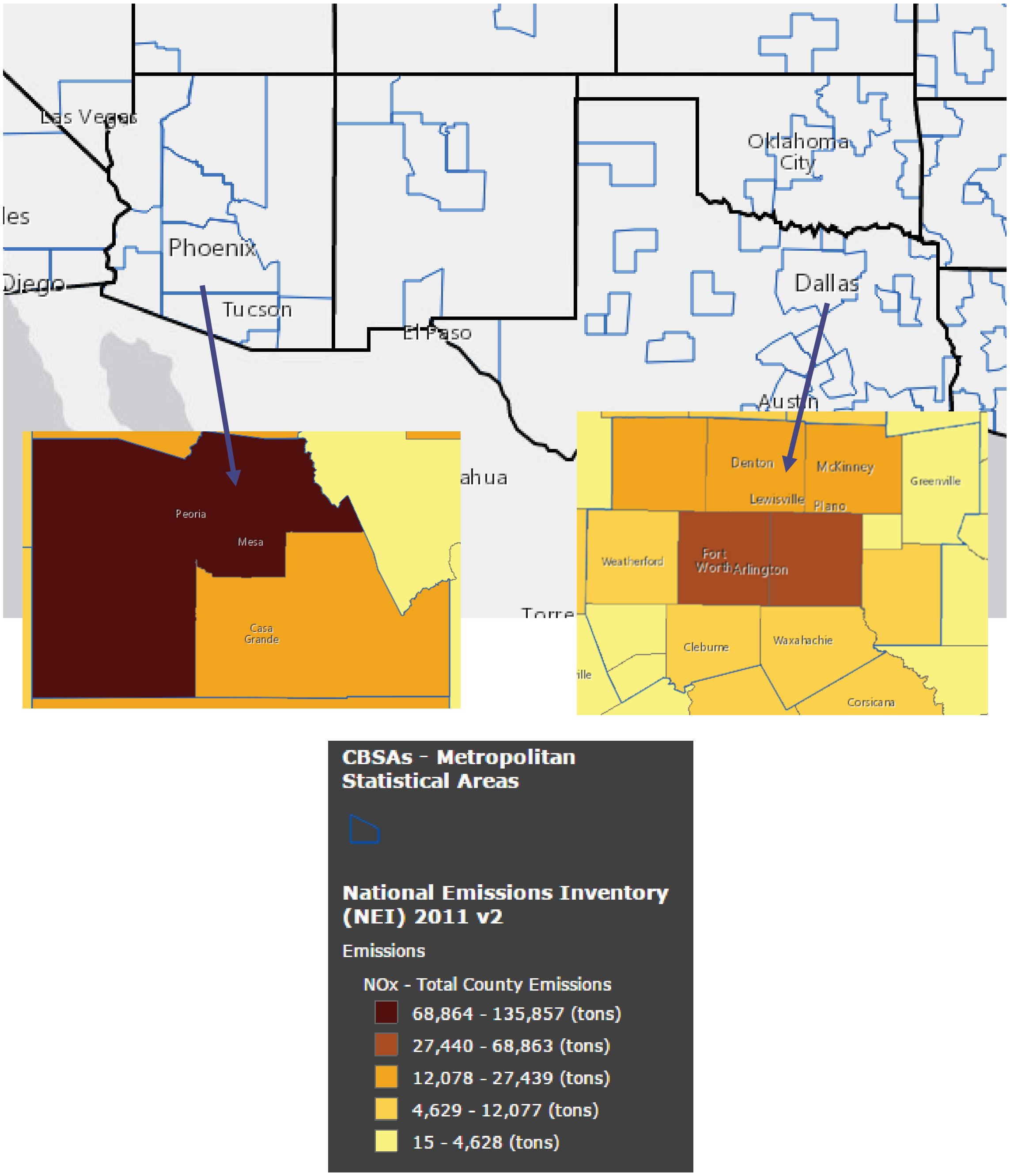


Table 2-1 EPA Mapping Tool Phoenix and Dallas MSA Comparison

Dallas-Fort Worth-Arlington MSA		
Land Area (mi)	9,279	---
Number of Counties	13	
Total 2011 Emissions NOx (TPY)/VOC (TPY)	178,595	307,050
2011 Emissions (TPY) per sq. mi. NOx (TPY)/VOC (TPY)	19.25	33.09
2010 Population	6,426,214	---
2010 Population Density (persons per sq. mi.)	455	

Phoenix-Mesa-Scottsdale MSA		
Land Area (mi)	14,599	---
Number of Counties	2	
Total 2011 Emissions NOx (TPY)/VOC (TPY)	103,347	421,857
2011 Emissions (TPY) per sq. mi. NOx (TPY)/VOC (TPY)	7.08	28.90
2010 Population	4,192,887	---
2010 Population Density (persons per sq. mi.)	287	

Additionally, ADEQ encourages EPA to refer to ADEQ's VMT calculations for recommended areas as the mapping tool's gridded resolution is a lower resolution than in ADEQ's recommendations. Visually, ADEQ also encourages EPA to consider ADEQ's average annual daily traffic images to understand the actual approximate daily traffic in applicable areas.

Ultimately, ADEQ requests EPA to consider the apparent skew in county versus urban area representation and low VMT resolution when making its final designations.

Finally, ADEQ relied upon ADEQ-produced HYSPLIT and meteorological analyses in its recommendation, except for as applied to the Mohave area.

3 Maricopa-Pinal-Gila Nonattainment Area

Given current 2015 ozone design values, both Pinal County's Queen Valley ozone monitor and Gila County's Tonto National Monument ozone monitor violate the 2015 Ozone NAAQS. Therefore, Arizona recommends that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor, and by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley (excluding Indian Country as defined by federal law). Figure 3-1 below shows the recommended boundary, and Figure 3-2 shows the recommended boundary in the context of other relevant data.

Figure 3-1 Maricopa-Pinal-Gila Nonattainment Area

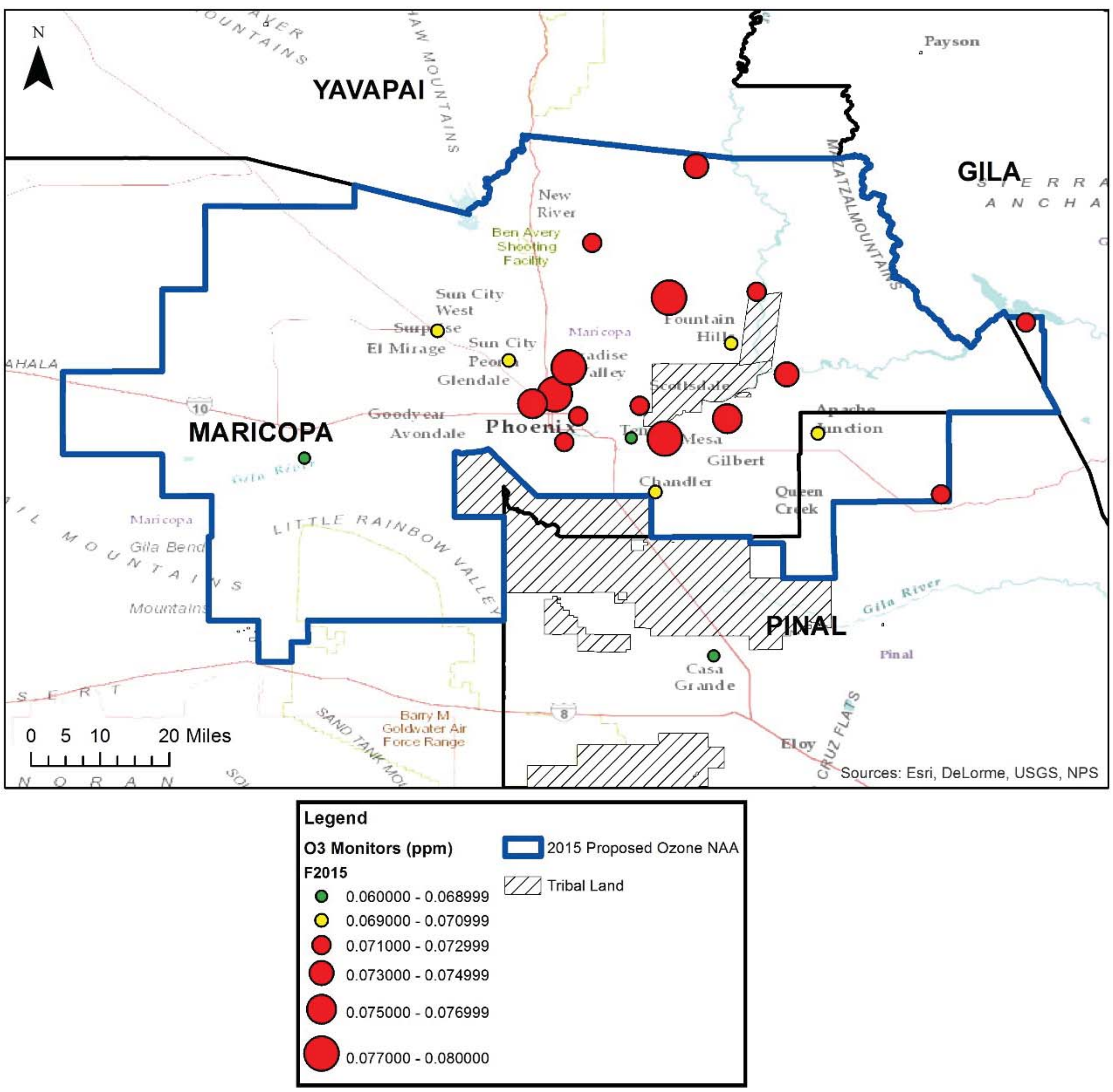
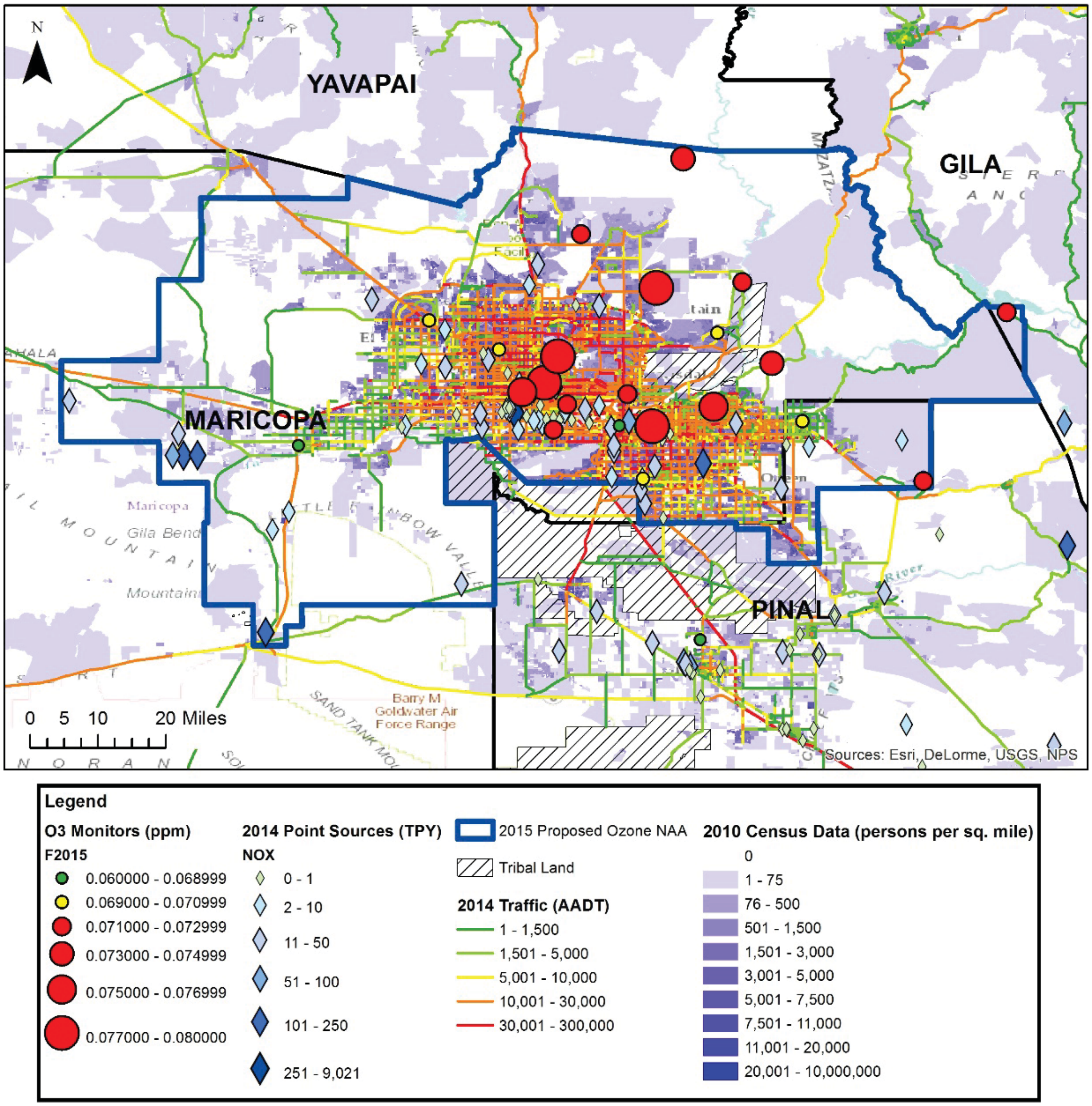


Figure 3-2 Maricopa-Pinal-Gila Nonattainment Area with Relevant Data



3.1.1 Air Quality Data

For this factor, ADEQ considered data from air quality monitors in the existing 2008 Phoenix-Mesa Nonattainment Area, as well as nearby[43] certified monitors. ADEQ also looked at all

[43] EPA generally interprets nearby as limited to the CBSA. The Tonto National Monument monitor is located outside of the Phoenix-Mesa-Scottsdale CBSA, which is comprised of Maricopa and Pinal Counties and is not "nearby" according to this definition. However, it is geographically nearby the existing nonattainment area boundary and considering the five factors, the Tonto monitor is likely impacted most by emissions from the Phoenix Metropolitan Area.

monitors within Gila County and Pinal County. ADEQ considered the 8-hr ozone design values for these monitors, based on the three most recent consecutive years of certified data, 2013-2015. By policy, the design value (DV) for a recommended area is determined by the monitor with the highest level. For the 2015 DV, there are two monitors with the same DV of 78 ppb, the Pinnacle Peak monitor and the Mesa Monitor. See the DVs for monitors in Maricopa County in Table 3-1 (two highest monitors are shown in bold), Pinal County in Table 3-2, and Gila County in Table 3-3. Figure 3-3 below shows a color-coded map of the monitor locations in the multi-county area.

Table 3-1 Maricopa County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Maricopa	04-013-0019	West Phoenix	0.075
	04-013-1003	**Mesa**	**0.078**
	04-013-1004	North Phoenix	0.077
	04-013-1010	Falcon Field	0.075
	04-013-2001	Glendale	0.070
	04-013-2005	**Pinnacle Peak**	**0.078**
	04-013-3002	Central Phoenix	0.072
	04-013-3003	South Scottsdale	0.071
	04-013-4003	South Phoenix	0.072
	04-013-4004	West Chandler	0.070
	04-013-4005	Tempe	Incomplete
	04-013-4008	Cave Creek	0.071
	04-013-4010	Dysart	0.070
	04-013-4011	Buckeye	0.060
	04-013-9508	Humboldt Mountain	0.073
	04-013-9702	Blue Point	0.074
	04-013-9704	Fountain Hills	Incomplete
	04-013-9706	Rio Verde	0.071
	04-013-9997	JLG Supersite	0.077

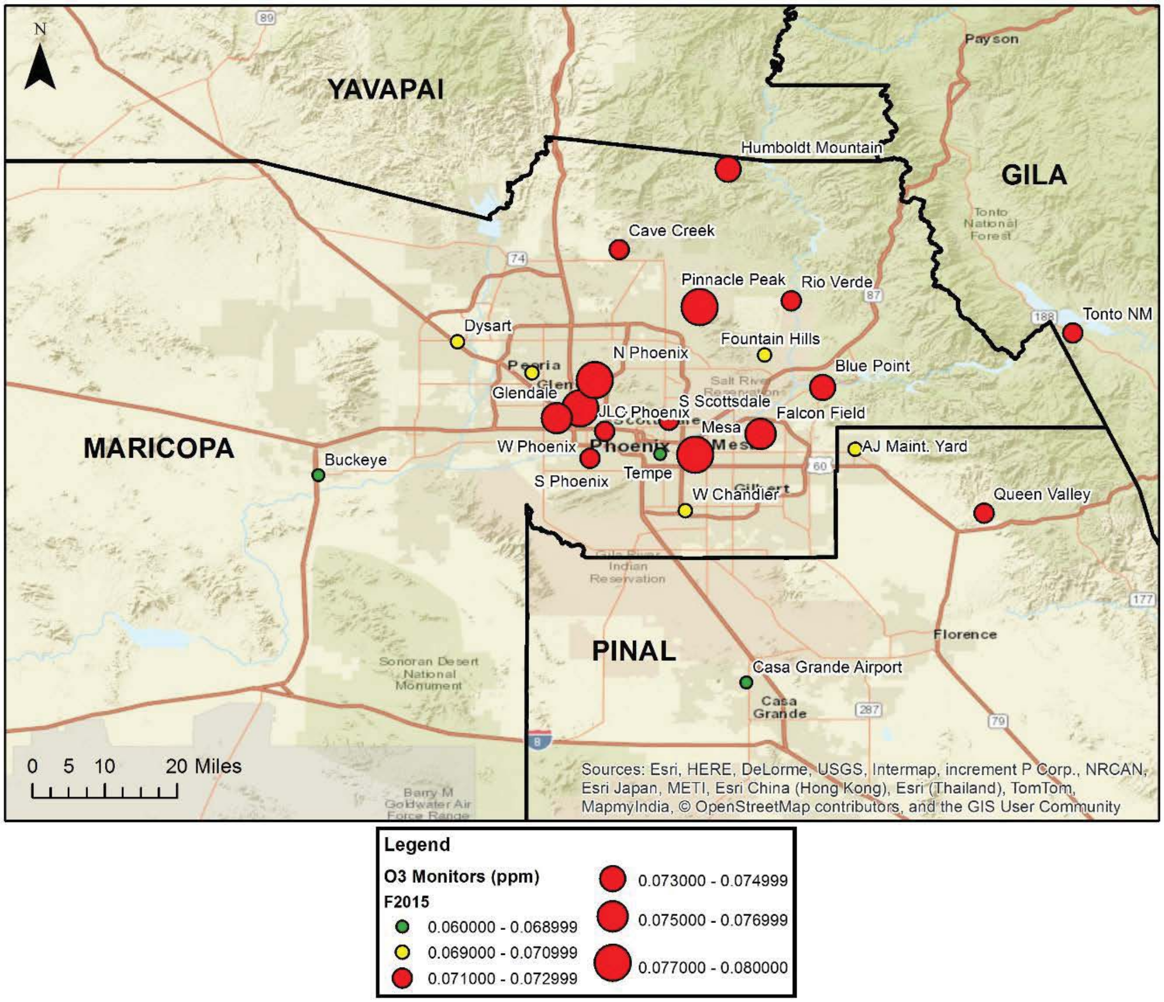
Table 3-2 Pinal County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Pinal	04-021-3001	AJ Maintenance Yard	0.069
	04-021-3003	Casa Grande Airport	0.065
	04-021-3007	Pinal Air Park	0.065
	04-021-8001	Queen Valley	0.071

Table 3-3 Gila County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Gila	04-007-0010	Tonto National Monument	0.072

Figure 3-3 Maricopa-Pinal-Gila Monitor Locations[44]



Overall, all monitors in the multi-county area have been trending downward. See Figure 3-4 for the long-term trends in the multi-county area. Because nonattainment areas are defined by their highest violating monitors, the historical trend of one of the two highest nonattaining monitors is shown below in Figure 3-5. The year 2015 marks the Mesa monitor's first valid design value in years. Hence, for purposes of viewing a trend line for the highest monitor in Maricopa County, only the trend for the Pinnacle Peak monitor is shown in Figure 3-5. Historical trends for the Gila and Pinal monitors are shown in Figure 3-6 and Figure 3-7, respectively.

[44] The Pinal Air Park monitor is not shown in this figure in order to allow a better resolution in the immediate area of the recommended boundary. The monitor is much further south on the border with Pima County, at the east to west midpoint of Pinal County. Please see Section A2 of the TSD for more detail regarding the monitor.

Figure 3-4 Maricopa, Pinal, and Gila Multi-County Long-Term Design Value Trend

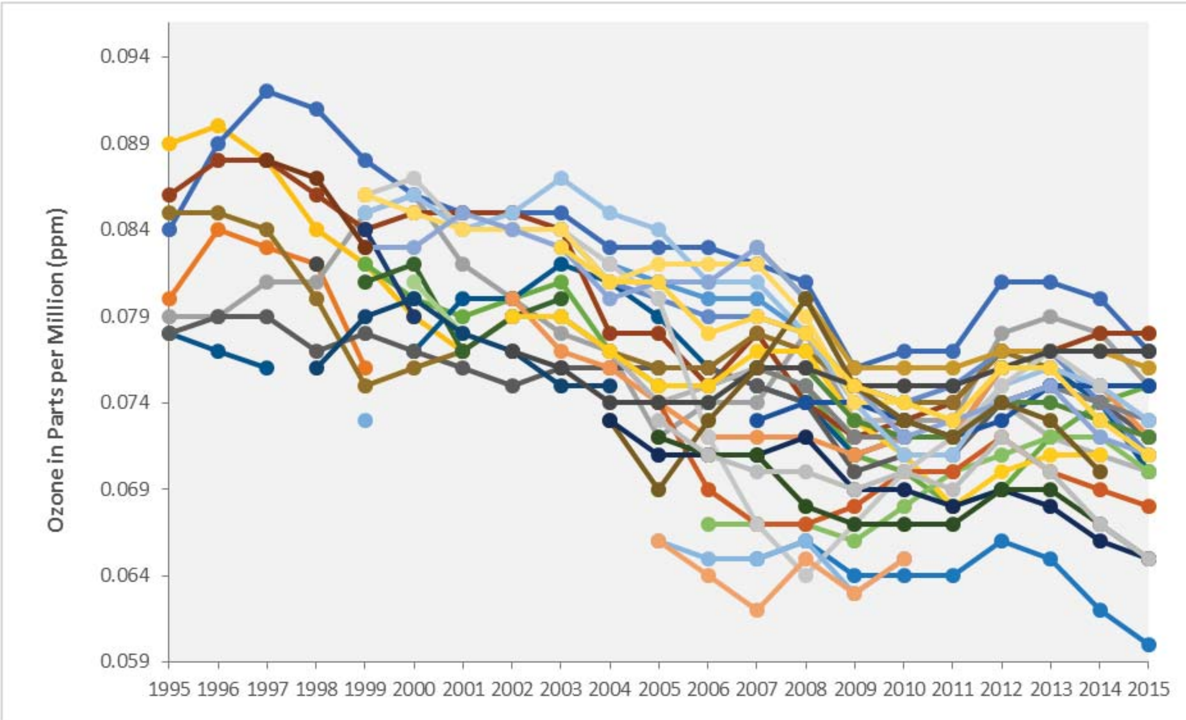


Figure 3-5 Maricopa County Long-Term Design Value Trend

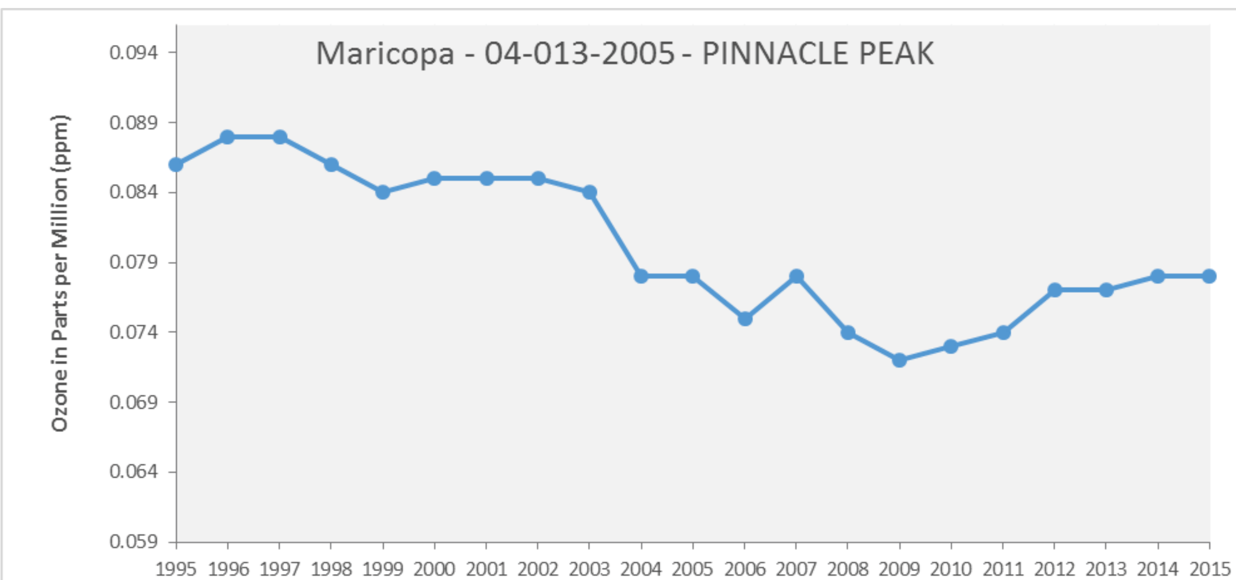


Figure 3-6 Pinal County Long-Term Design Value Trend

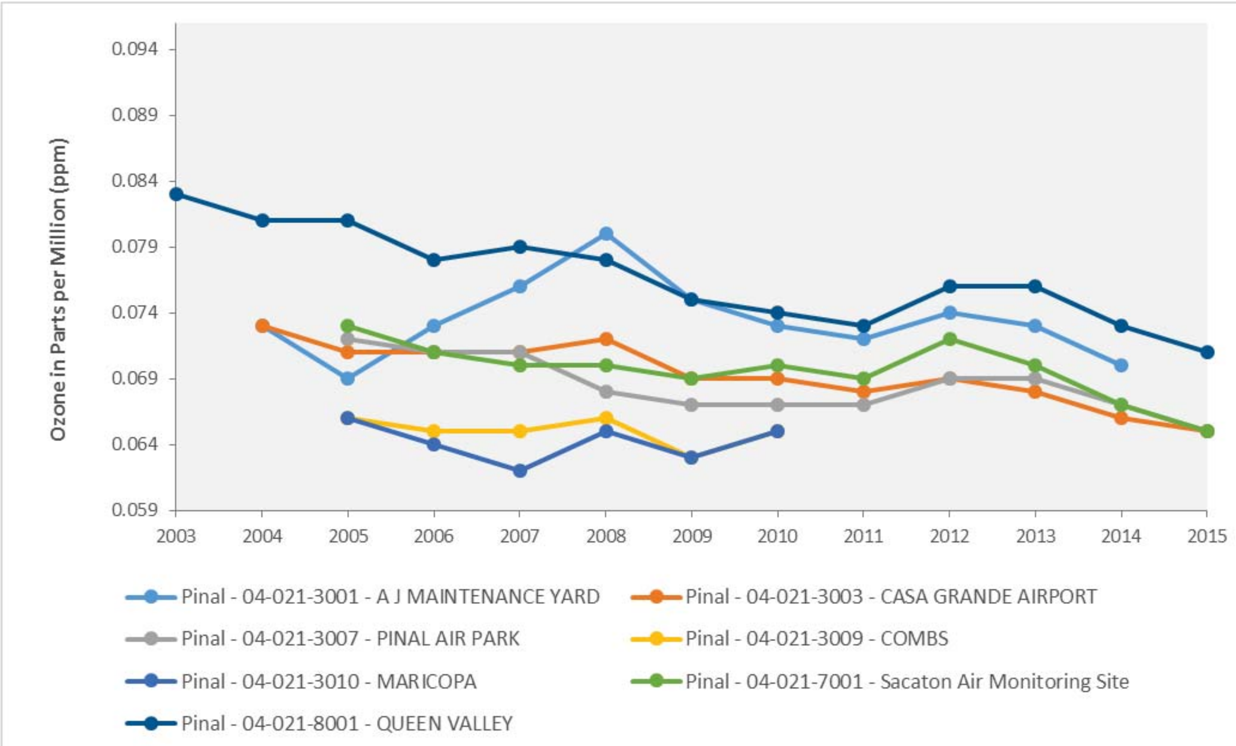
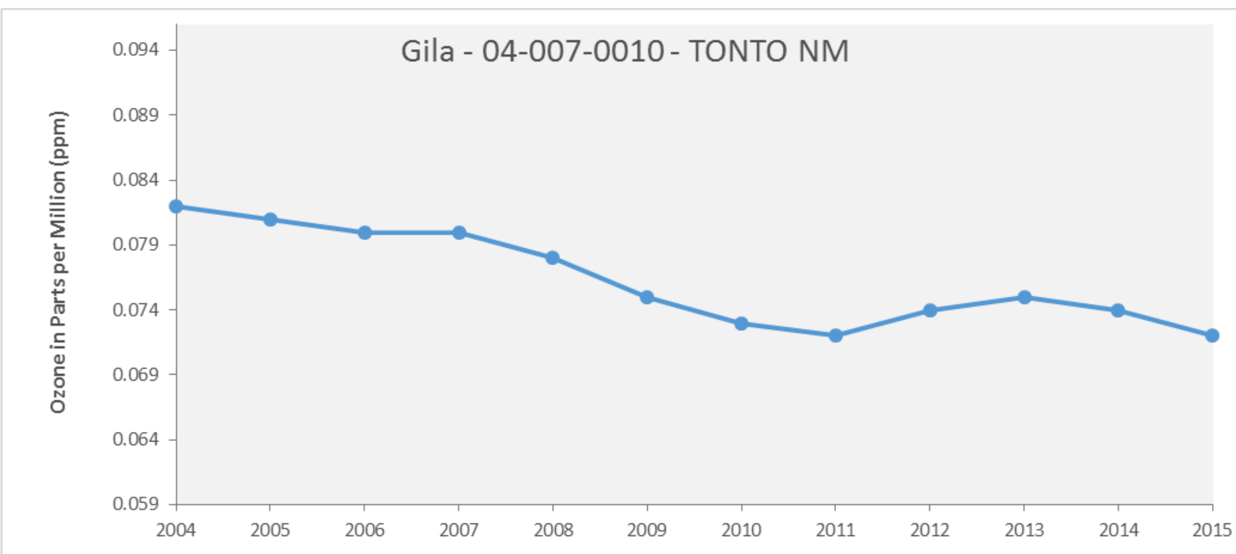


Figure 3-7 Gila County Long-Term Design Value Trend



3.1.2 Emissions and Emissions-Related Data

ADEQ evaluated emissions and emissions-related data from Maricopa, Pinal, and Gila Counties. Table 3-4, Table 3-5, Table 3-6, and Table 3-7 below represent the 2011 NEI emission data.

Table 3-4 County Level NOx Emissions

NOx Emissions (TPY)					
County	Point	Nonpoint	Onroad	Nonroad	County Total
Gila	338	399	1,329	340	2,406
Maricopa	4,684	8,274	56,748	18,738	88,443
Pinal	984	2,943	9,273	1,575	14,774
Multi-County Total	6,006	11,616	67,350	20,653	105,625

Table 3-5 County Level NOx Emissions as Percentage of County Total

NOx Emissions Approximate Percentage of County Total				
County	Point	Nonpoint	Onroad	Nonroad
Gila	14%	16.5%	55%	14%
Maricopa	5%	9.4%	64.2%	21.2%
Pinal	6.5%	20%	62.8%	10.6%
Multi-County	5.7%	11%	63.8%	19.6%

Table 3-6 County Level VOC Emissions

VOC Emissions (TPY)					
County	Point	Nonpoint	Onroad	Nonroad	County Total
Gila	110	108,389	758	2,255	111,512
Maricopa	1,150	244,022	25,659	15,839	286,670
Pinal	921	128,054	3,750	1,525	134,249
Multi-County Total	2,181	480,465	30,167	19,619	543,432

Table 3-7 County Level VOC Emissions as Percentage of County Total

VOC Emissions Approximate Percentage of County Total				
County	Point	Nonpoint	Onroad	Nonroad
Gila	0%	97.2%	55%	0.7%
Maricopa	0.4%	85.1%	9%	5.5%
Pinal	0.7%	95.4%	6.9%	1.1%
Multi-County	0.4%	88.4%	5.6%	3.6%

3.1.2.1 Point Source Data

See Figure 3-8 and Figure 3-9 for visual representations of NO_x and VOC emission sources, respectively, and the recommended boundary. These figures represent 2014 permitted point source data as reported by ADEQ, Maricopa County, and Pinal County, binned and displayed by actual emitted tons per year thresholds.

Maricopa and Pinal Counties both permit facilities down to one ton per year, ensuring that facilities are well controlled. There are numerous controls already in place in the current Phoenix-Mesa 2008 Ozone Nonattainment area. Additional controls are also being put in place according to CTG guidelines on RACT sources because of the involuntary reclassification to moderate as a result of the area not having attained the 2008 standard by the marginal classification deadline.[45] Law regarding Area A,[46] an area first established by statute in 1988,[47] ensures that reformulated gas is used and that car emissions are controlled through a stringent vehicle emissions inspection program. See an image of the current Area A boundary in Figure 3-10. While in northern Pinal County there are several low emitting sources, they likely contribute little to monitor concentrations. Far away from the Phoenix center in Pinal County are a few mid-range emitting facilities.

There are also a few mid-range point sources in Gila County that are not nearby the Phoenix center. These sources are not located within the same CBSA as the Phoenix area. Given the lack of any other emissions activities in the areas of these mid-range point sources, the proportion of point source emissions in both Pinal and Gila compared to other emission values shown in Table 3-5 and Table 3-7 above does not support significant contribution of these point sources to the Phoenix area's nonattainment. Additionally, these mid-range sources are more market driven and do not have as much assured potential to constantly emit during ozone season as other sources, such as electric generating stations.

Existing fossil fuel electric generating stations are captured within the recommended boundary. Electric generating stations have high potentials for emissions during the hot Phoenix summer months because of greater temperature modulation usage (i.e. air conditioning, refrigerators, other cooling equipment). As of 2009, Arizona homes used about a quarter less energy than the national average.[48] However, one quarter of the energy consumed in Arizona homes is for electricity dependent air conditioning, which is four times the national average.[49] This indicates that electric generating stations may typically be emitting more during the ozone season than any other time of the year.

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[45] *See Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Several Areas for the 2008 Ozone NAAQS*, 81 FR 26697, 26699 (May 4, 2016).

[46] Area A has been modified and expanded several times over the years to include additional areas of Maricopa County, Yavapai County, and Pinal County, the latest revision being in 2001. House Bill 2538 Amending ARS § 49-541, Forty-fifth Legislature, First Regular Session, 2001, Chapter 371, § 8) *available at* http://www.azleg.gov/legtext/45leg/1r/laws/0371.pdf.

[47] The area has had controls since the 1970s because it was designated a nonattainment area in 1974. The legal definition of "Area A" was established and added to ARS § 41-2121 in the HB 2206 (Thirty-eighth Legislature, Second Regular Session, 1988, Chapter 252, § 13).

[48] U.S. Energy Information Administration, H*ousehold Energy Use in Arizona: EIA's 2009 Residential Energy Consumption Survey, available at* http://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/az.pdf (last visited Aug. 12, 2016).

[49] U.S. Energy Information Administration, *Arizona State Profile and Energy Estimates: Quick facts* (December 17, 2015), http://www.eia.gov/state/?sid=az ("Twenty-five percent of the energy consumed in Arizona homes is for air conditioning, which is more than four times the national average of 6 percent....").

Figure 3-8 Permitted NOx Point Sources

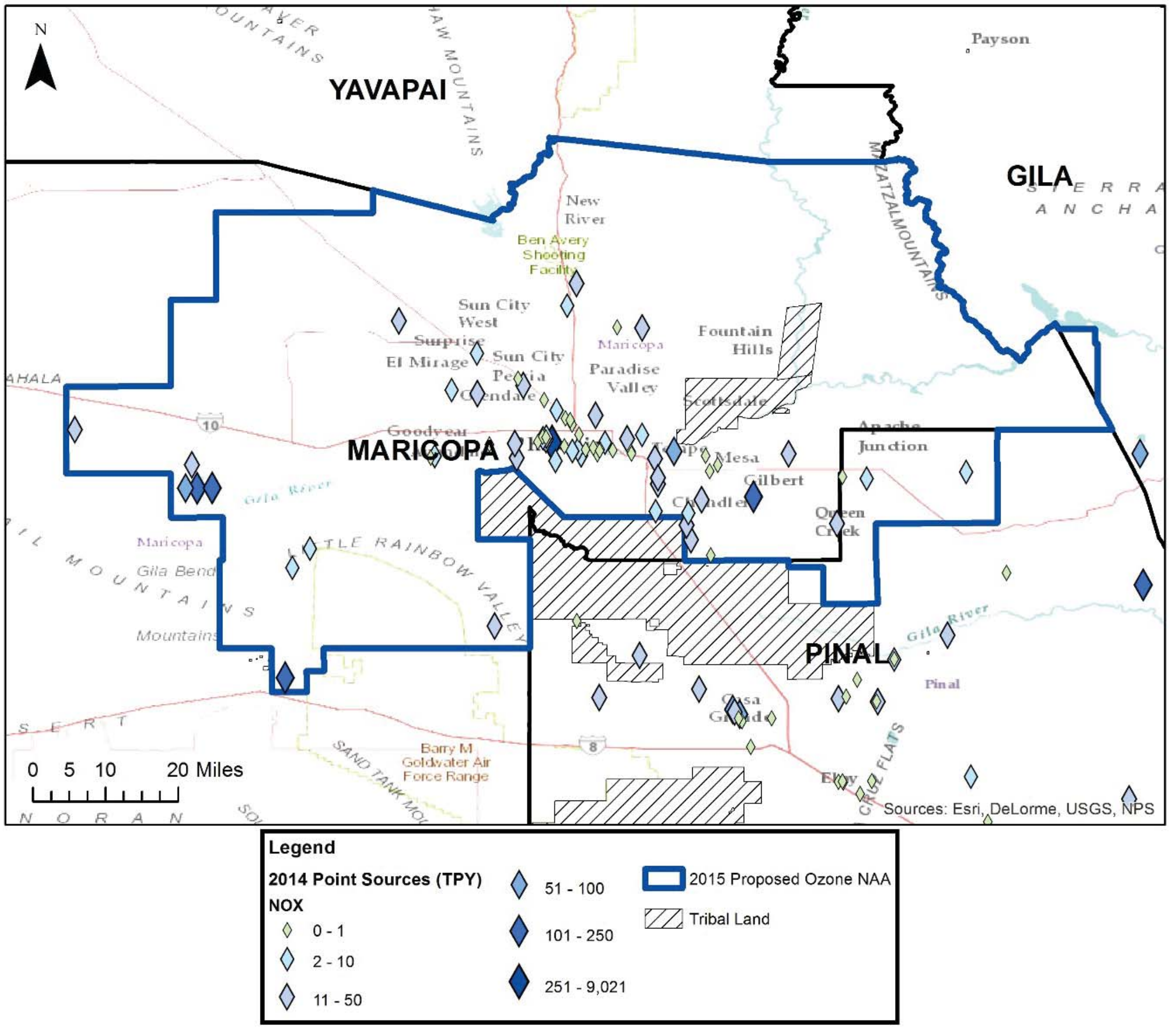


Figure 3-9 Permitted VOC Point Sources

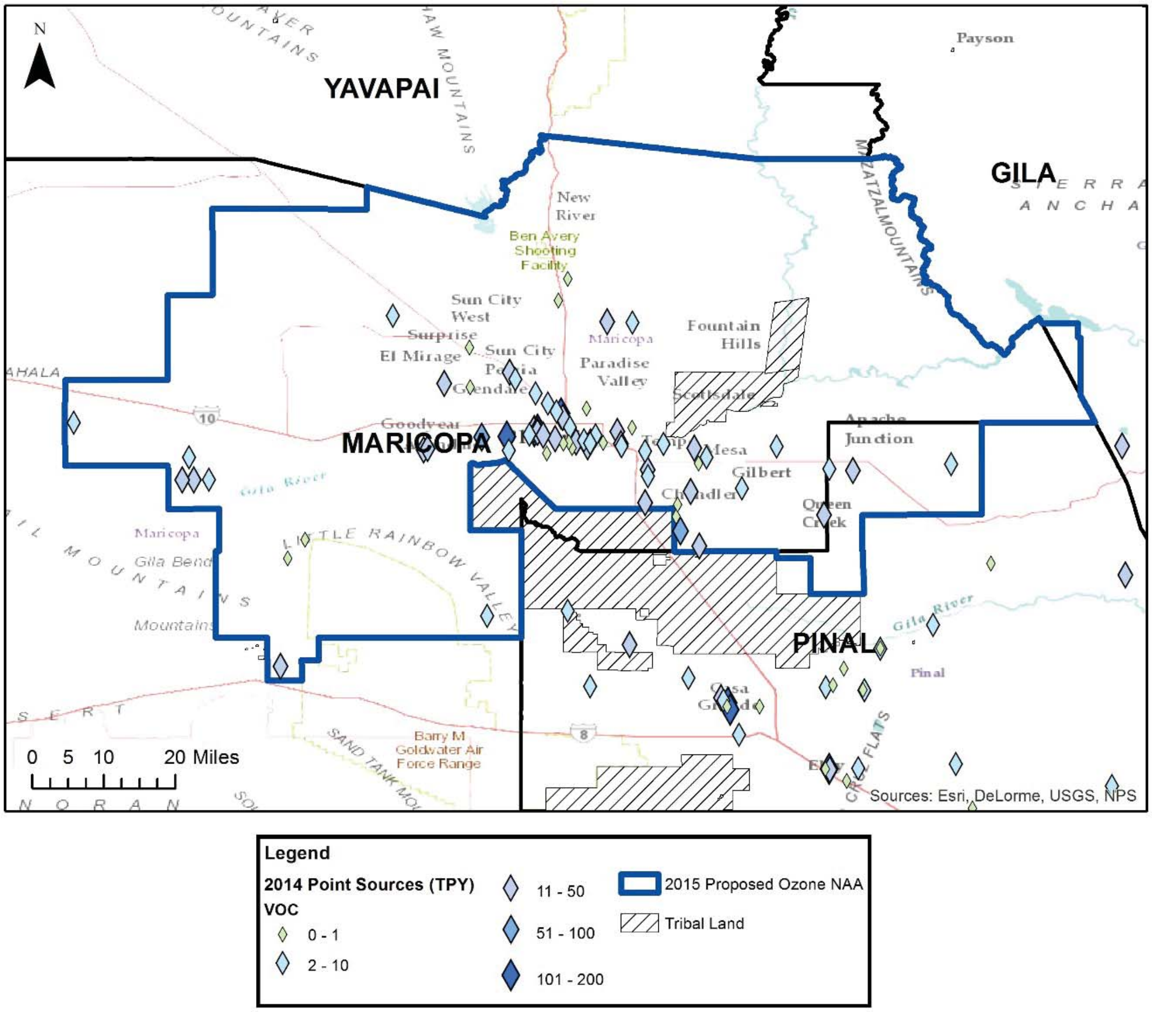
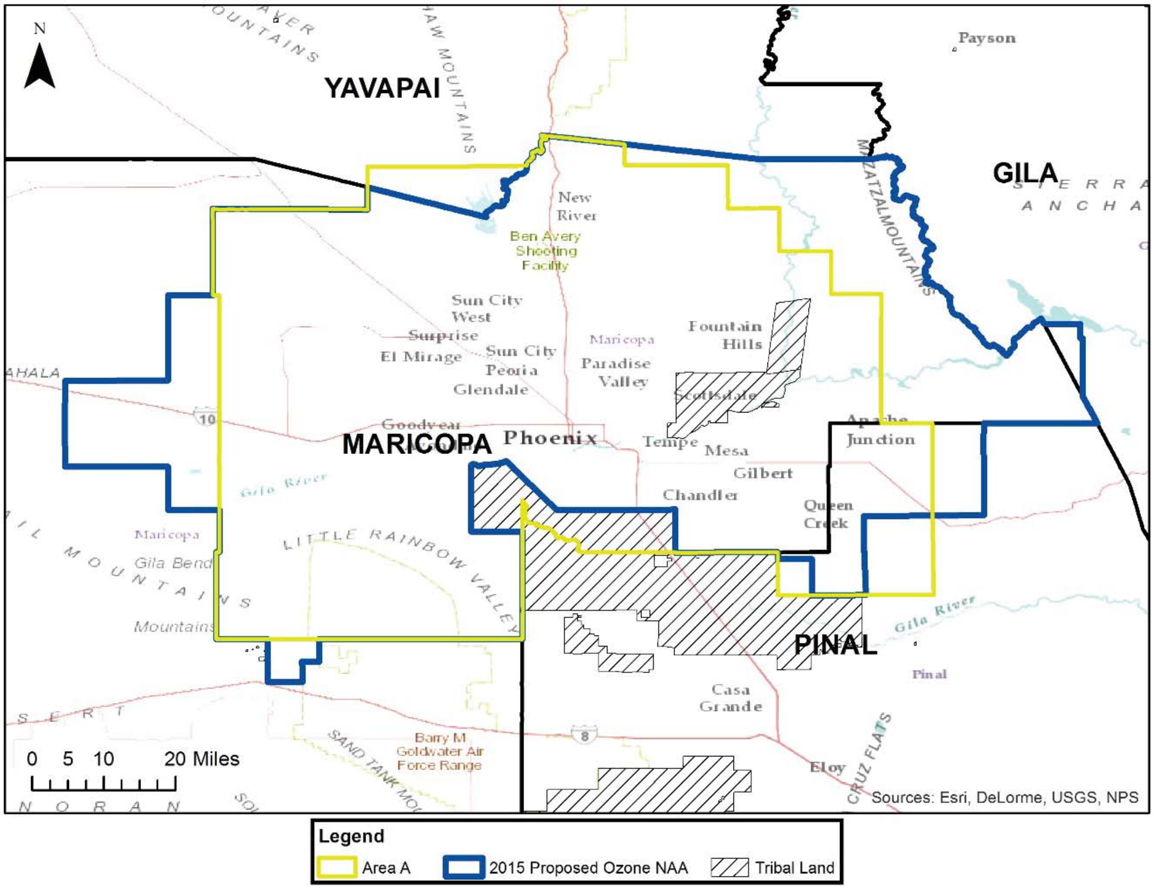


Figure 3-10 Area A Boundary in Maricopa and Pinal Counties



3.1.2.2 Traffic Data

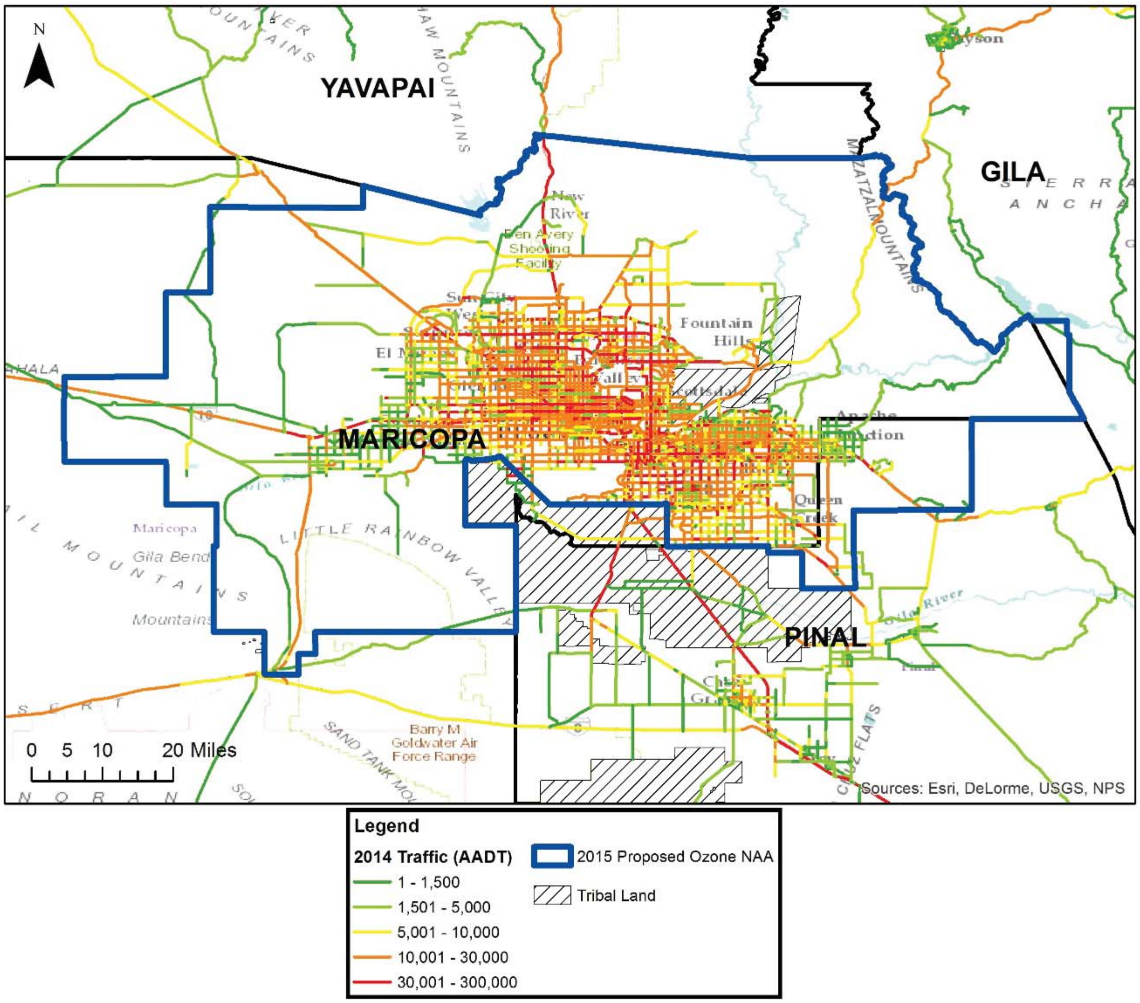
Figure 3-11 below represents average annual daily traffic (AADT) in the Maricopa-Pinal-Gila area. AADT is the annualized average 24-hour volume of vehicles at a given point or section of highway or road. It is normally calculated by determining the bidirectional volume of vehicles during a given period and dividing that number by the number of days in that period.[50]

Annual vehicle miles traveled (VMT) for a particular road segment is AADT multiplied by the length of the road segment for which AADT was calculated. VMT for an area is the summed VMT for each road segment in an area. VMT for the Phoenix-Scottsdale-Mesa CBSA (Maricopa and Pinal Counties combined) is 35,063,383,521 miles, according to 2014 HPMS data. The VMT for the Maricopa-Pinal-Gila recommended area is 31,325,749,782 miles. That means that 89% of annual VMT in the entire CBSA is captured by recommending this area.

[50] Arizona Department of Transportation, *Data and Analysis: Average Annual Daily Traffic (AADT)*, https://www.azdot.gov/planning/DataandAnalysis (last visited May 27, 2016).

ADEQ also evaluated inter-county commuting flows in area. According to the U.S. Census 2009-2013 5-Year American Community Survey,[51] approximately 45% of surveyed Pinal County residents commute from Pinal to Maricopa County for work, specifically, 58,647 out of 130,542 commuters. Urban traffic is clearly apparent in San Tan Valley.

Figure 3-11 Maricopa-Pinal-Gila Nonattainment Area Traffic



3.1.2.3 Population Data

EPA's Boundary Guidance asserts that population information can serve as a potential indicator of the probable location and magnitude of ozone emissions sources. ADEQ believes that this in combination with the other four factors, especially meteorology, may serve to inform areas that should be included in a nonattainment boundary. Figure 3-12 and Figure 3-13 below represents the change in population density in the Phoenix metropolitan area between the years 2000 and 2010, according to the U.S. Census. Table 3-8, Table 3-9, and Table 3-10 below show the change

[51] U.S. Census Bureau, *2009-2013 5-Year American Community Survey Commuting Flows, Table 1 County to County Commuting Flows, available at* http://www.census.gov/hhes/commuting/ (last visited May 27, 2016).

in actual population between 2000 and 2010. Table 3-11 also represent the change in population, or first survey of population, for particular Census Designated Places (CDPs) in areas in and near the Queen Valley ozone monitor in Pinal County. These CDP areas are shown in Figure 3-14. San Tan Valley was not yet a CDP in 2000. 2010 was the first year that population was estimated for that particular area. Figure 3-13 shows that a large area of dense population growth is captured within the recommended nonattainment area. The total 2010 population for the CBSA is 4,192,887 people, and the 2010 population for the Maricopa-Pinal-Gila area is 3,945,124 people. That means that approximately 94% of the CBSA population is contained within the recommended area, even though the recommended area only comprises 36% of the entire CBSA. Given the high density of the San Tan Valley, it is likely that a considerable portion of Pinal County's population related activity is attributable to San Tan Valley.

Figure 3-12 Maricopa-Pinal-Gila Nonattainment Area 2000 Census Population Density

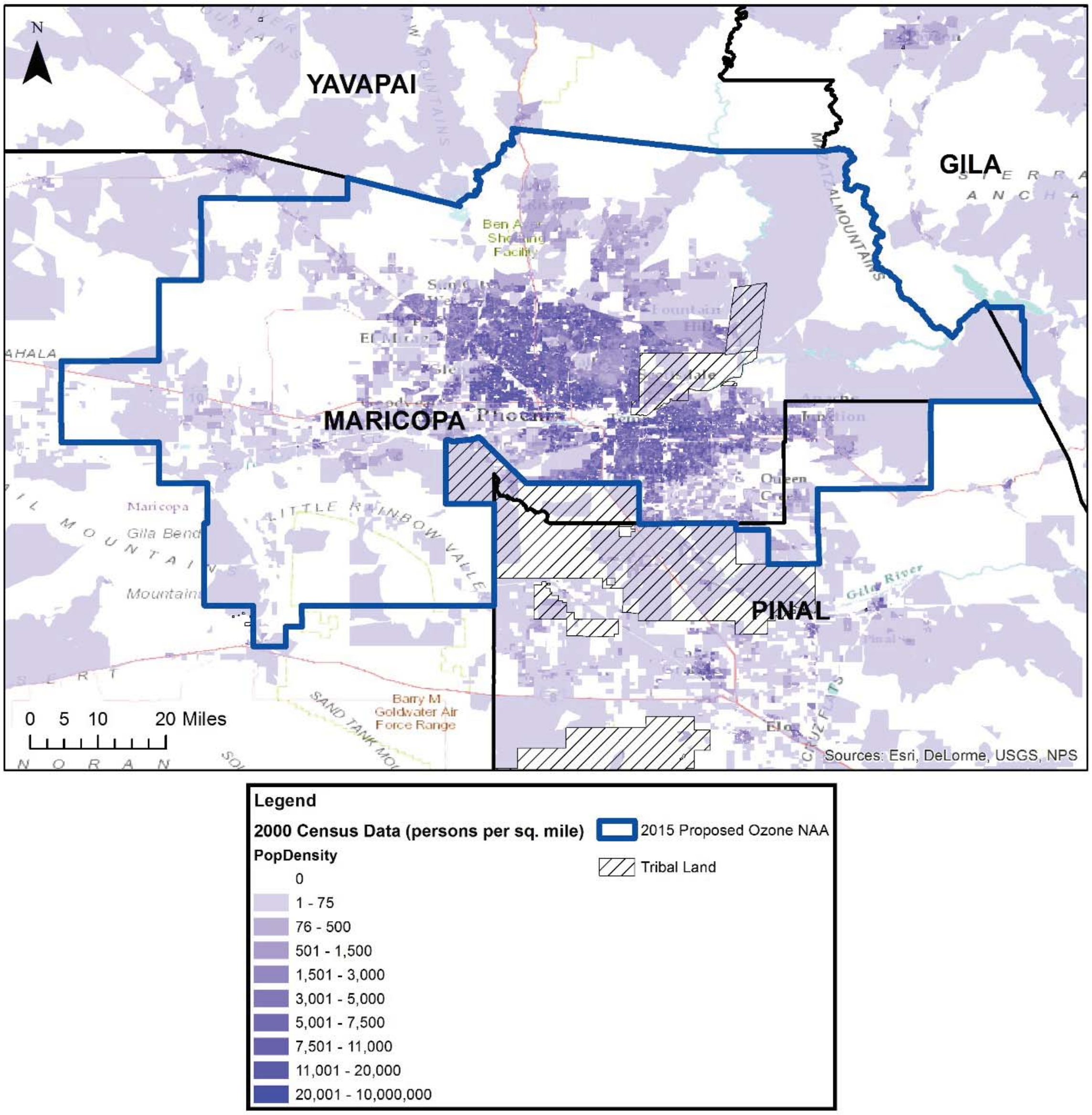


Figure 3-13 Maricopa-Pinal-Gila Nonattainment Area 2010 Census Population Density

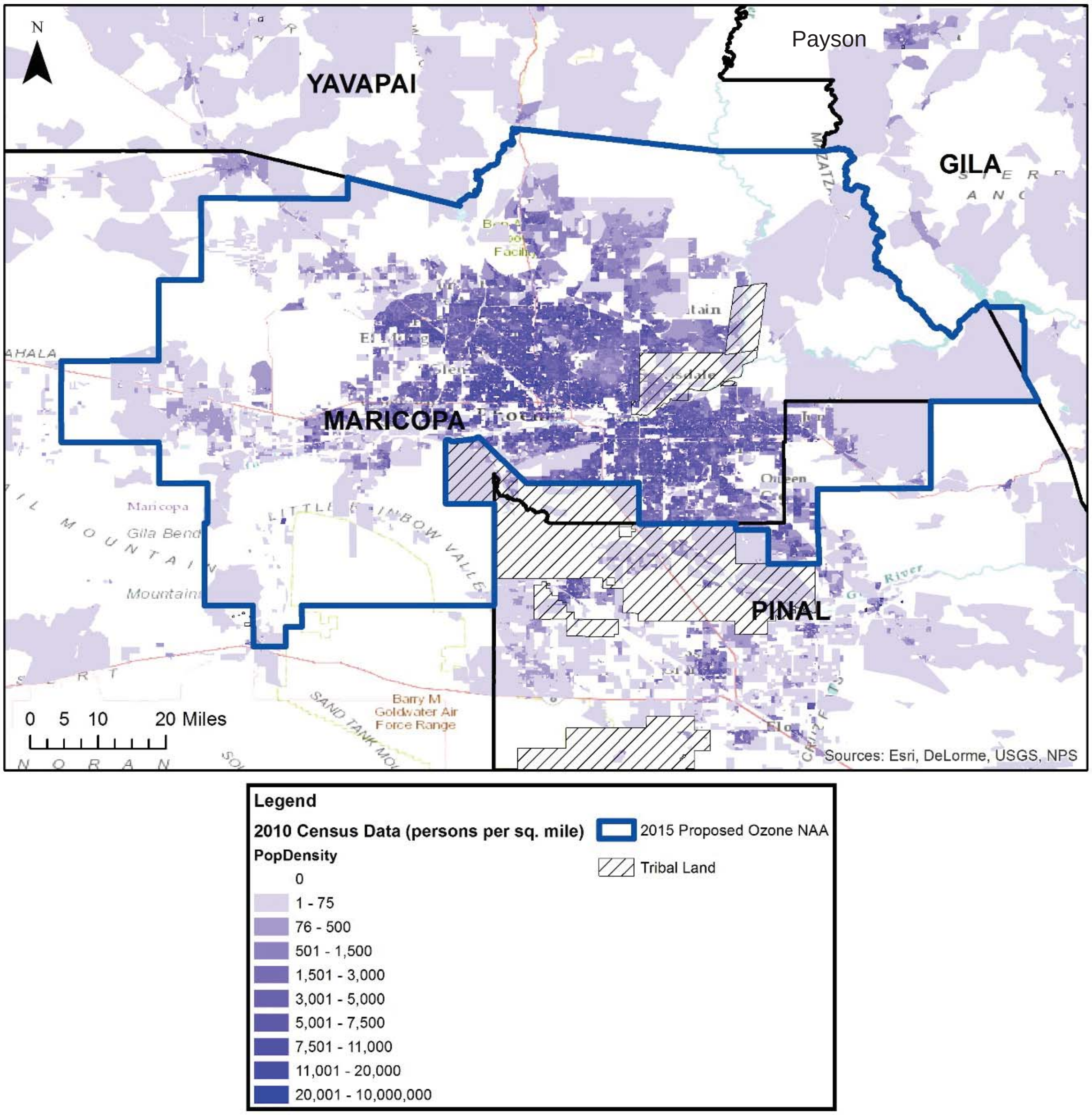


Table 3-8 Maricopa County Population Changes

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Maricopa	**3,072,149**	**3,817,117**	**24.2%**
Apache Junction (part)	273	294	7.7%
Avondale	35,883	76,238	112.5%
Buckeye	6,537	50,876	678.3%
Carefree	2,927	3,363	14.9%
Cave Creek	3,728	5,015	34.5%
Chandler	176,581	236,123	33.7%

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
El Mirage	7,609	31,797	317.9%
Fountain Hills	20,235	22,489	11.1%
Gila Bend	1,980	1,922	-2.9%
Gilbert	109,697	208,453	90.0%
Glendale	218,812	226,721	3.6%
Goodyear	18,911	65,275	245.2%
Guadalupe	5,228	5,523	5.6%
Litchfield Park	3,810	5,476	43.7%
Mesa	396,375	439,041	10.8%
Paradise Valley	13,664	12,820	-6.2%
Peoria (part)	108,363	154,058	42.2%
Phoenix	1,321,045	1,445,632	9.4%
Queen Creek (part)	4,197	25,912	517.4%
Scottsdale	202,705	217,385	7.2%
Surprise	30,848	117,517	281.0%
Tempe	158,625	161,719	2.0%
Tolleson	4,974	6,545	31.6%
Wickenburg	5,082	6,363	25.2%
Youngtown	3,010	6,156	104.5%
Balance of Maricopa County	211,050	284,404	34.8%

Table 3-9 Pinal County Population Changes

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Pinal	**179,727**	**375,770**	**109.1%**
Apache Junction (part)	31,541	35,546	12.7%
Casa Grande	25,224	48,571	92.6%
Coolidge	7,786	11,825	51.9%
Eloy	10,375	16,631	60.3%
Florence	17,054	25,536	49.7%
Kearny	2,249	1,950	-13.3%
Mammoth	1,762	1,426	-19.1%
Maricopa City[52]	(X)	43,482	--
Queen Creek (part)	119	449	277.3%
Superior	3,254	2,837	-12.8%
Winkelman (part)	4	0	-100.0%
Balance of Pinal County	78,737	187,517	138.2%

[52] Locality was formed or incorporated after Census 2000.

Table 3-10 Gila County Population Changes

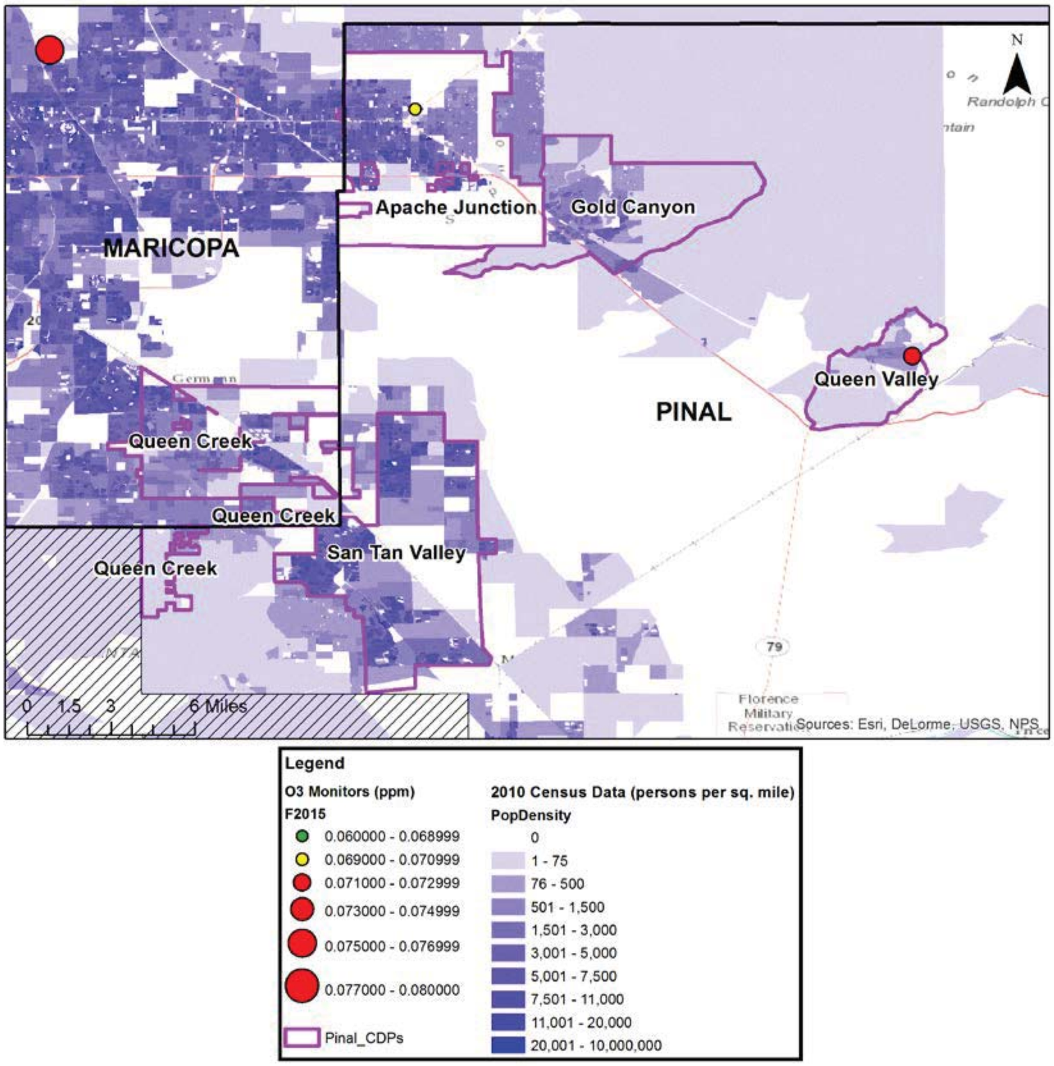
County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Gila	**51,335**	**53,597**	**4.4%**
Globe	7,486	7,532	0.6%
Hayden	892	662	-25.8%
Miami	1,936	1,837	-5.1%
Payson	13,620	15,301	12.3%
Star Valley [53]	(X)	2,310	--
Winkelman (part)	439	353	-19.6%
Balance of Gila County	24,940	25,602	2.7%

Table 3-11 Census Designated Places (CDPs) Population Changes

Area Name	2000 Population	2010 Population	% Growth
Pinal County Overall	179,727	375,770	109%
Specific areas:			
Queen Creek (total)	4,316	26,361	511%
Apache Junction	31,814	35,840	13%
Gold Canyon CDP	6,029	10,159	68.5%
Queen Valley CDP	820	788	-3.9%
San Tan Valley CDP	N/A	81,321	--

[53] Locality was formed or incorporated after Census 2000.

Figure 3-14 Census Designated Places of and near the Queen Valley Monitor



3.1.2.4 Transport and Background Data

In addition to the literature mentioned in Section 2.3.2, the Atmospheric Chemistry and Physics Journal published a paper documenting a photochemical modeling study demonstrating transport from California.[54] Past observations and studies through aircraft observations, back trajectory analyses, and now photochemical transport modeling have indicated that tropospheric ozone is attributable to both Arizona anthropogenic emissions and regional transport. The study shows that Arizona emissions are a main contributor to hourly daytime concentrations in Phoenix in July, but that Southern California emissions transported to Phoenix can contribute hourly emissions between 10-40 ppb during the day.[55] In addition, Southern California emissions can

[54] J. Li et al., *Regional-scale Transport of Air Pollutants: Impacts of Southern California Emissions on Phoenix Ground-Level Ozone Concentrations*, 15 ATMOSPHERIC CHEMISTRY AND PHYSICS DISCUSSIONS 8361-8401 (2015), *available at* http://www.atmos-chem-phys.net/15/9345/2015/acp-15-9345-2015.pdf.
[55] *Id*. at 8372.

increase daily 8-hour maxes in the Phoenix area by up to 32 ppb.[56] While the contribution from California varies, it has the potential to be significantly in the Phoenix area.

3.1.3 Meteorology

Meteorological conditions play a critical role in the formation and distribution of ozone. Daytime in the Phoenix area is generally conducive to ozone formation because of the near constant heat and sun. Average high temperatures in the ozone season from April to October, range from about 85 to 105 degrees Fahrenheit, with highest temperatures occurring in July. Table 3-12 below shows average temperatures and precipitation at the Phoenix Sky Harbor Airport location.

Table 3-12 Climate Summary at Phoenix Sky Harbor Location, AZ[57]

Years 1933-2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F)	66.2	70	76	84.5	93.7	103	105.7	103.6	99.1	88.3	75.3	66.5	86
Avg. Min. Temp. (F)	41.7	44.5	49.2	55.9	64.3	72.9	80.6	79.4	73.1	61	48.5	41.8	59.4
Avg. Total Precip. (in.)	0.78	0.76	0.84	0.28	0.13	0.09	0.86	1.02	0.68	0.57	0.55	0.9	7.46

Because of the abundance of sunlight and heat, higher 8-hour ozone concentrations generally begin around noon, with elevated 1-hour ozone concentrations measured well into the late afternoon, when ambient temperature and sunlight intensity are at their peak. Wind patterns in Phoenix suggest that ozone and ozone precursors can be transported in the morning from the far west and southern portions of the valley and impact central and eastern monitors in the Phoenix valley. The NOX and VOC rich air mass can become photochemically active during the transport process and begin to produce ozone. When the air parcel finally drifts into the Phoenix metropolitan area, the NOX and VOC rich air can mix with the NOX and VOC rich Phoenix air, and depending on the conditions (i.e. sunlight, heat, VOC/NOX mixing ratios) ozone concentrations can begin to climb. Absent the photochemical process at night, or during cloud cover, ozone precursors can accumulate over time and when conditions are right, rapid ozone production can occur.

3.1.3.1 Maricopa County Representative Data

3.1.3.1.1 Wind Roses

Figure 3-15 shows the location of the five selected representative_ozone monitoring sites in Maricopa County for wind rose analysis. Figure 3-16, Figure 3-17, Figure 3-18, Figure 3-19, and Figure 3-20 are wind roses showing the annual wind patterns at those selected sites in Maricopa County for 2013-2015. Overall, for the five sites displayed below, the annual winds show significant variability in wind direction across the valley.

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[56] *Id*. at 8379.
[57] WESTERN REGIONAL CLIMATE CENTER, *Phoenix Sky Harbor Int'l AP, Arizona (026481) Period of Record Monthly Climate summary, period of record 06/01/1933 to 01/20/2015*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?az6481 (last visited May 27, 2016).

Figure 3-15 Locations of Selected Wind Rose Monitoring Sites

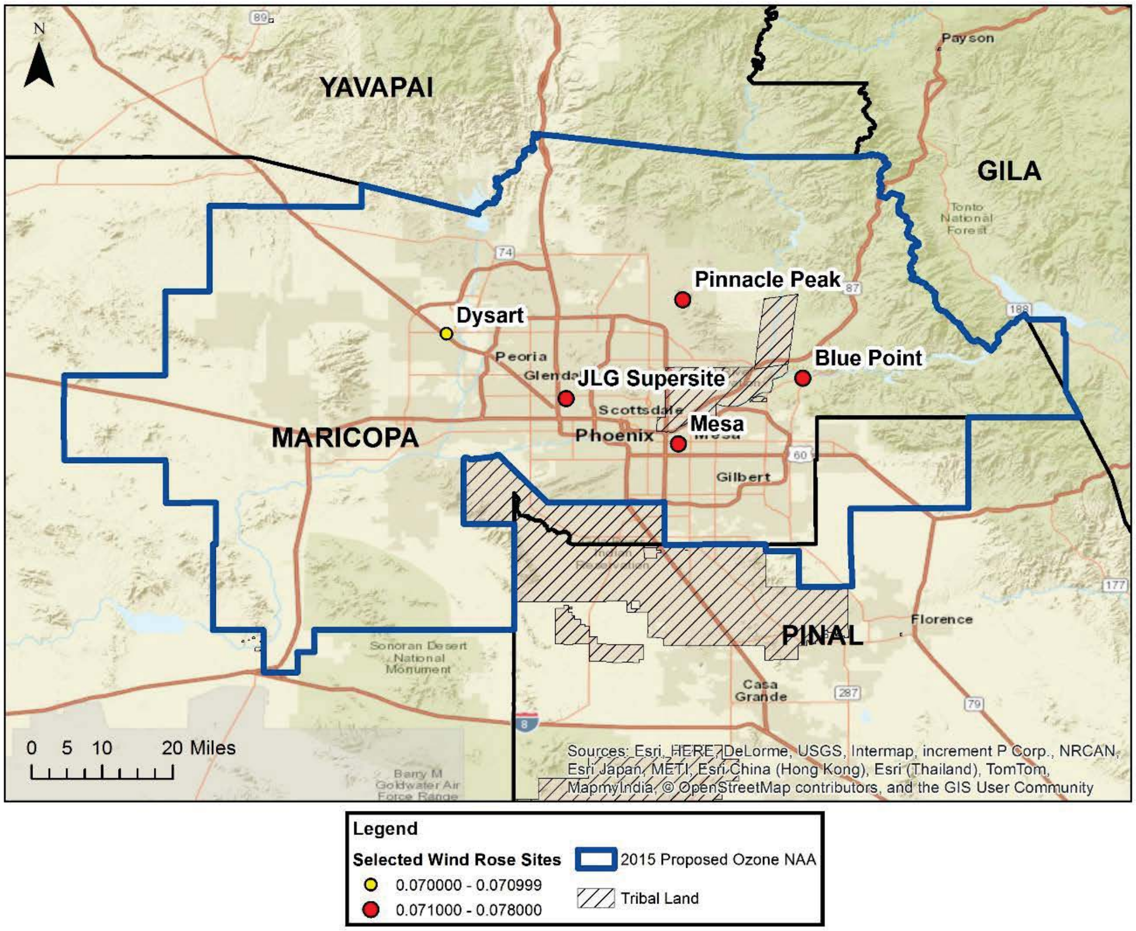


Figure 3-16 Blue Point Monitor – Annual Winds

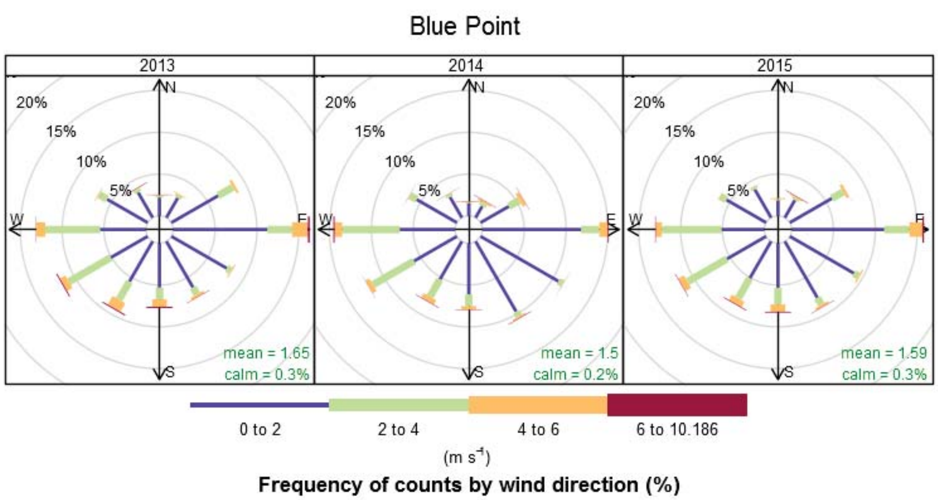


Figure 3-17 Dysart Monitor – Annual Winds

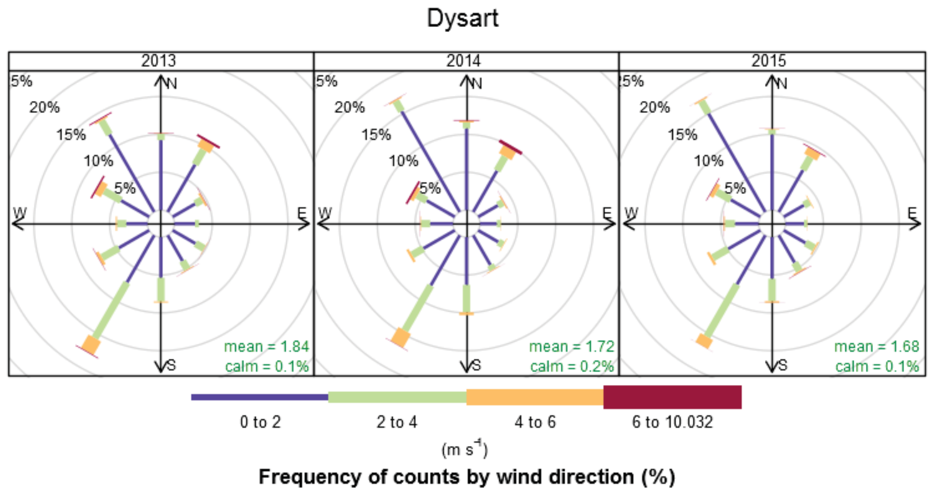


Figure 3-18 JLG Supersite Monitor – Annual Winds

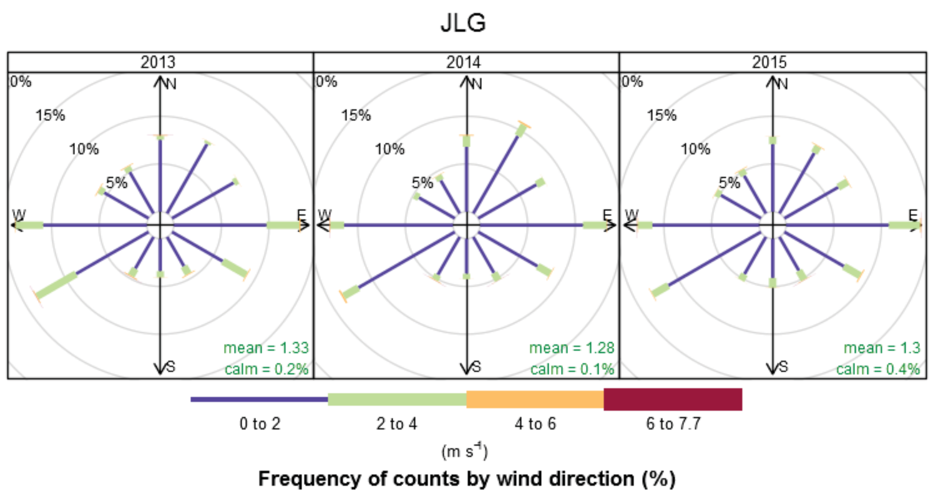


Figure 3-19 Mesa Monitor – Annual Winds

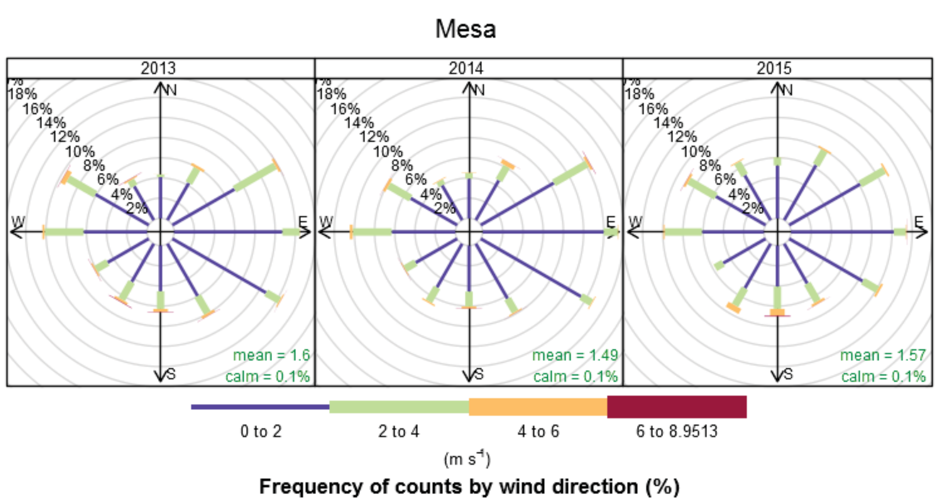


Figure 3-20 Pinnacle Peak Monitor – Annual Winds

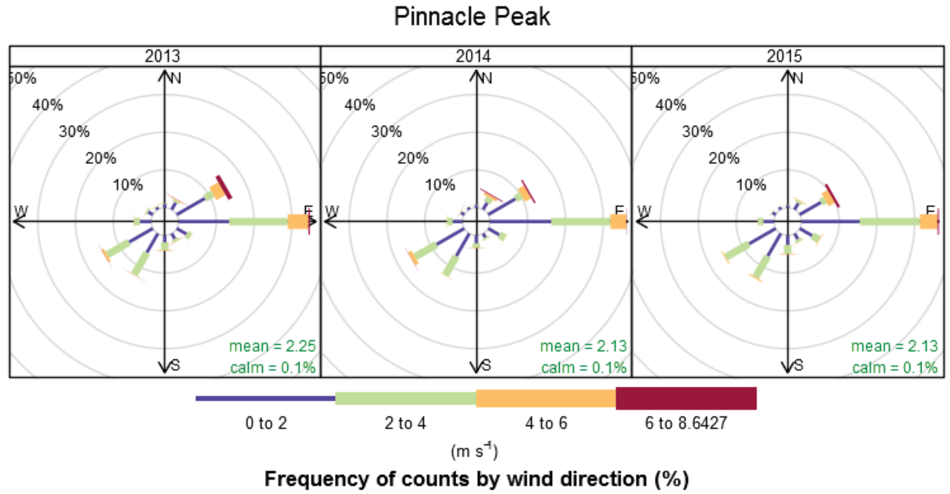
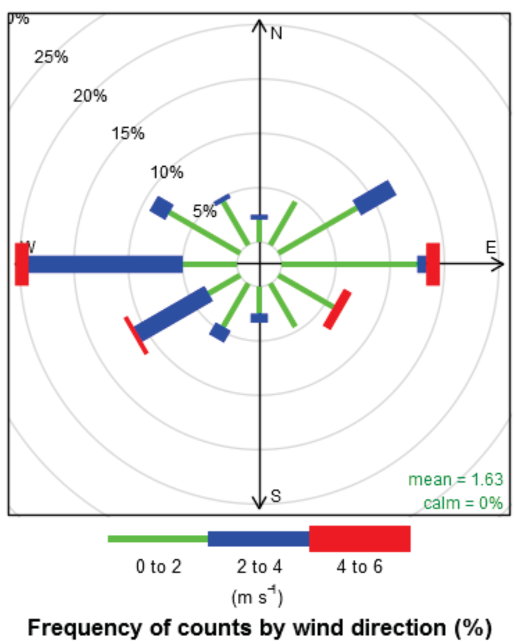


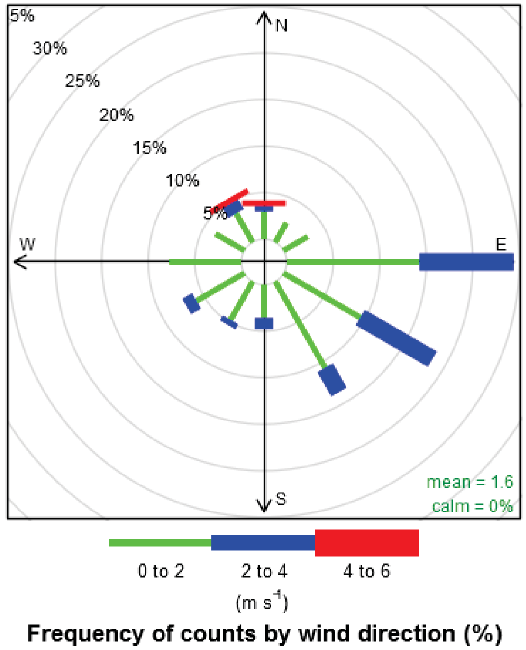
Figure 3-21, Figure 3-22, Figure 3-23, and Figure 3-24 are wind roses showing 24 hour wind patterns for the 10 highest ozone concentration days in 2013-2015 at selected representative violating ozone monitoring sites in Maricopa County.

Figure 3-21 Blue Point Monitor – 10 Highest Ozone Concentration Day Winds



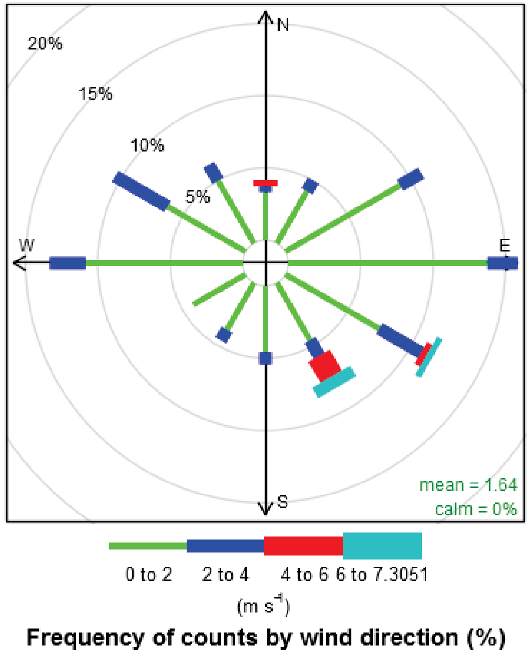
This 24-hour wind rose for the eastern most selected monitor shows strong winds from the west, the urban core of the Phoenix metropolitan area, during ozone exceedance days. Further analysis also showed that winds from 10am-8pm on these 10 days were predominantly from the west.

Figure 3-22 JLG Supersite Monitor – 10 Highest Ozone Concentration Day Winds



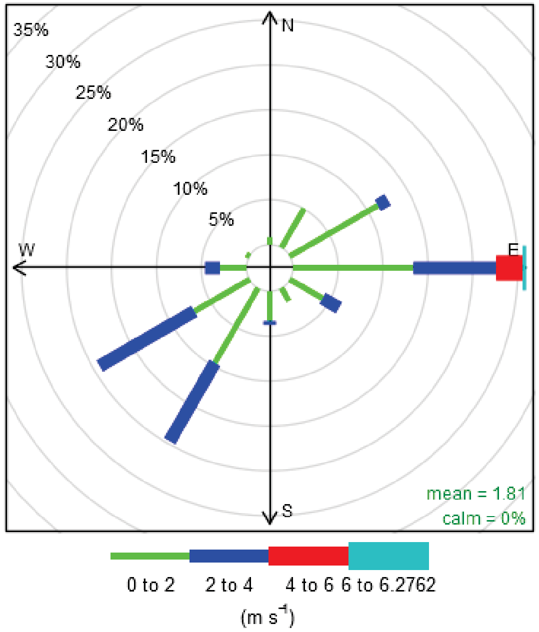
This 24-hour wind rose for this monitor located in central Phoenix shows a high frequency of winds from the east and southeast on ozone exceedance days. Further analysis showed that winds from 10am-8pm on these 10 days flowed somewhat less frequently from the east and slightly more frequently from the southwest than displayed above.

Figure 3-23 Mesa Monitor – 10 Highest Ozone Concentration Day Winds



The 24-hour wind rose for the southeastern most selected monitor shows varied wind directions on ozone exceedance days. Further analysis of the 10am-8pm winds on these 10 days showed far fewer easterly winds and significantly more westerly winds than shown above.

Figure 3-24 Pinnacle Peak Monitor – 10 Highest Ozone Concentration Day Winds



The 24-hour wind rose for this northeastern monitor, shows a split between easterly winds and southwesterly winds on these ozone exceedance days. Further analysis also showed that the 10am-8pm winds on these 10 days were predominantly from the southwest, but showed little wind flow from the east.

3.1.3.1.2 HYSPLITs

Pictured in Figure 3-25 below are 24 hour HYSPLIT trajectories to the ADEQ operated JLG Supersite. The image reflects a back trajectory for each hour in the 8 hour exceedance day average for the 10 highest ozone concentration days between 2013 and 2015. For methodologies and additional HYSPLIT model results please see Appendix A, section 3 and Exhibit A1, Section 14.

Figure 3-25 JLG Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories

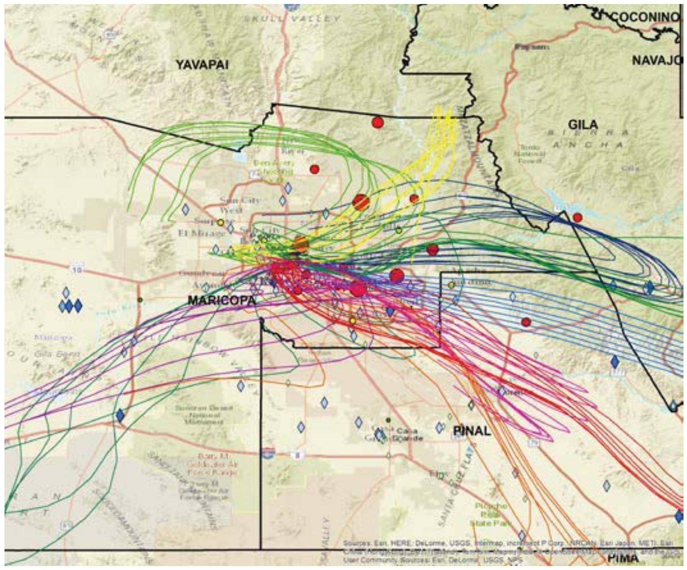
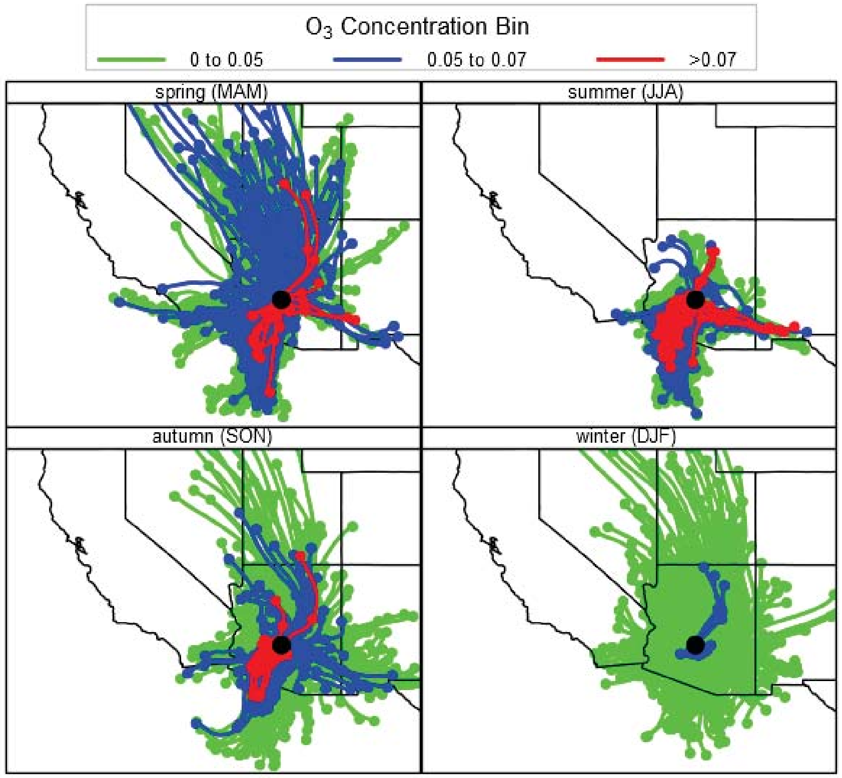


Figure 3-26 below is a diagram representing HYSPLIT 24 hour back trajectories. A trajectory is drawn to represent every third hour in a two year period (2013-2014),[58] and color-coded by concentration. The image is provided in order to give an overall contextual picture of modeled incoming meteorology over the course of a year.

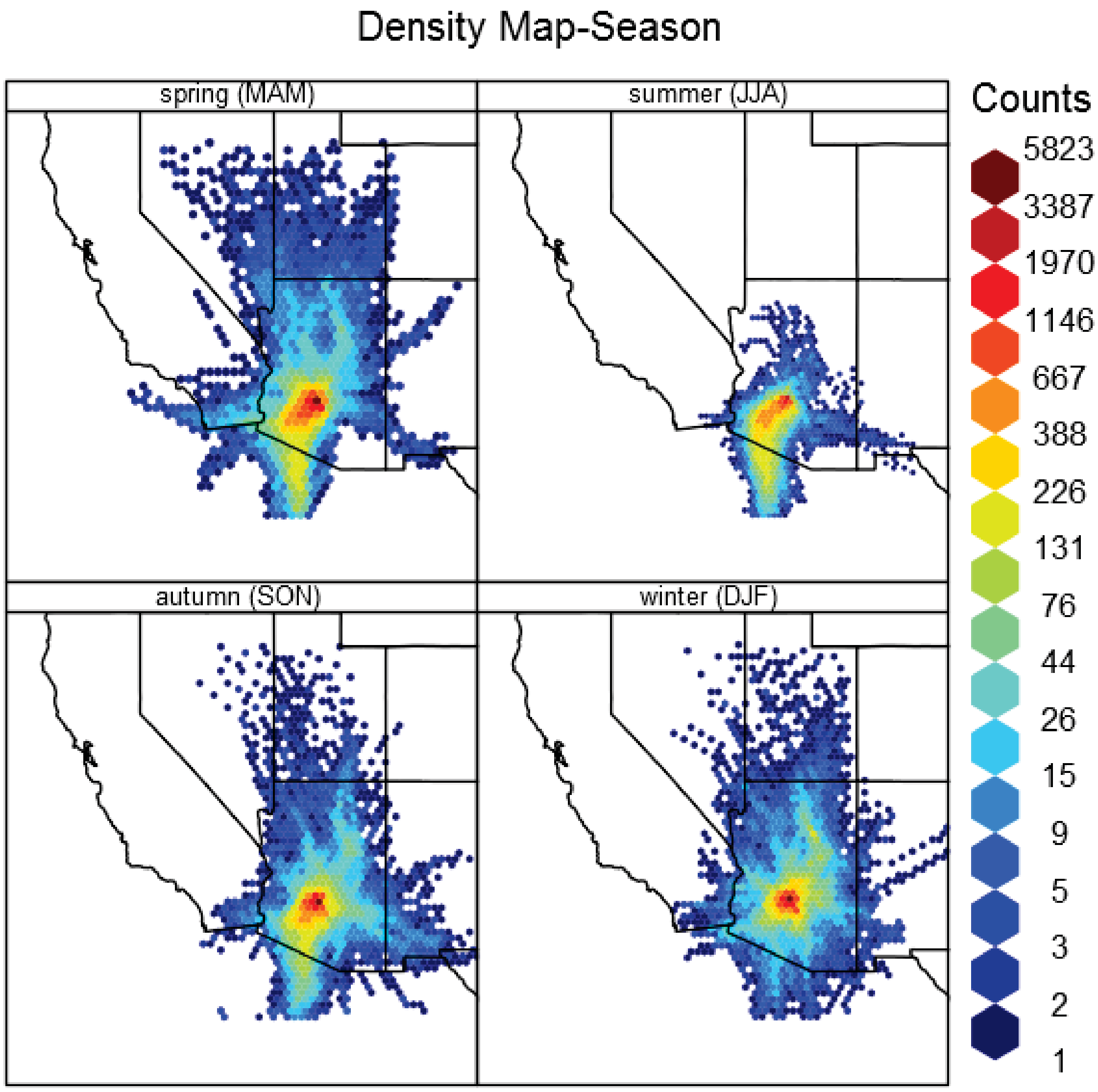
[58] i.e. Eight trajectories are drawn in a day.

Figure 3-26 JLG Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map



In Figure 3-27 below, see a back-trajectory density analysis showing how frequently modeled wind trajectories passed through gridded area sections on their way to the JLG Supersite monitor between 2013 and 2014. A 24 hour trajectory is drawn to represent every third hour in a two year period (2013-2014)

Figure 3-27 JLG Supersite Seasonal HYSPLIT Density Map

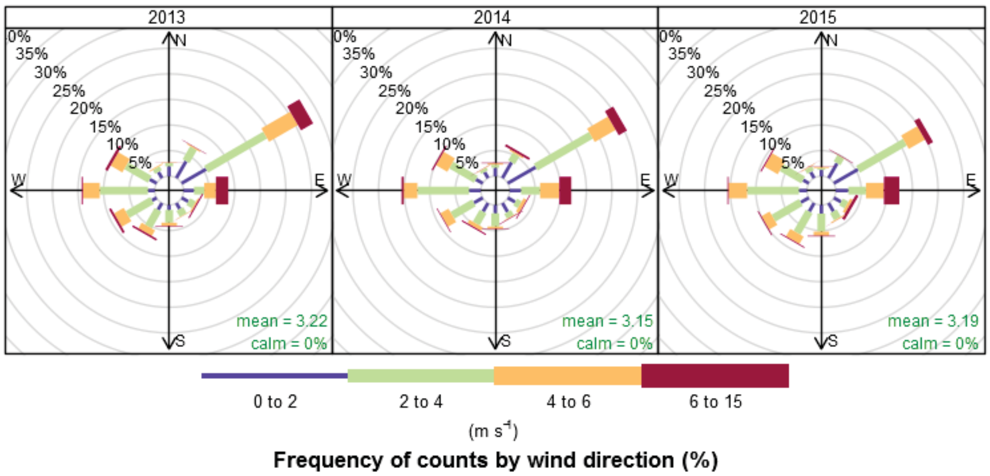


3.1.3.2 Pinal County's Queen Valley and San Tan Representative Data

3.1.3.2.1 Wind Roses

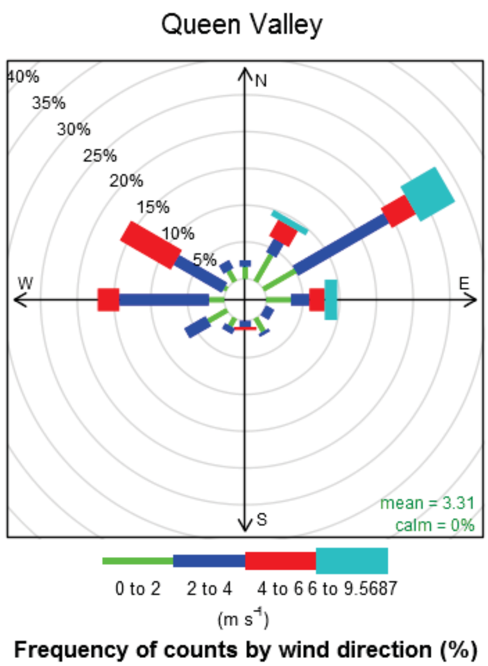
Figure 3-28 shows wind roses for the annual wind patterns at the Queen Valley monitor for 2013-2015. The annual wind rose below shows a pattern of strong winds coming from the northeast and east and similarly frequent cumulative winds coming from the west, northwest, and southwest.

Figure 3-28 Queen Valley Monitor – Annual Winds



[Figure 3-29](#) is a wind rose showing 24 hour wind patterns for the 10 highest days in 2013-2015 at the Queen Valley monitor. The ozone exceedance days' wind rose shares a similar pattern with the annual wind rose, with strong frequent winds from the northeast, and slightly less frequent, calmer winds from the northwest and west.

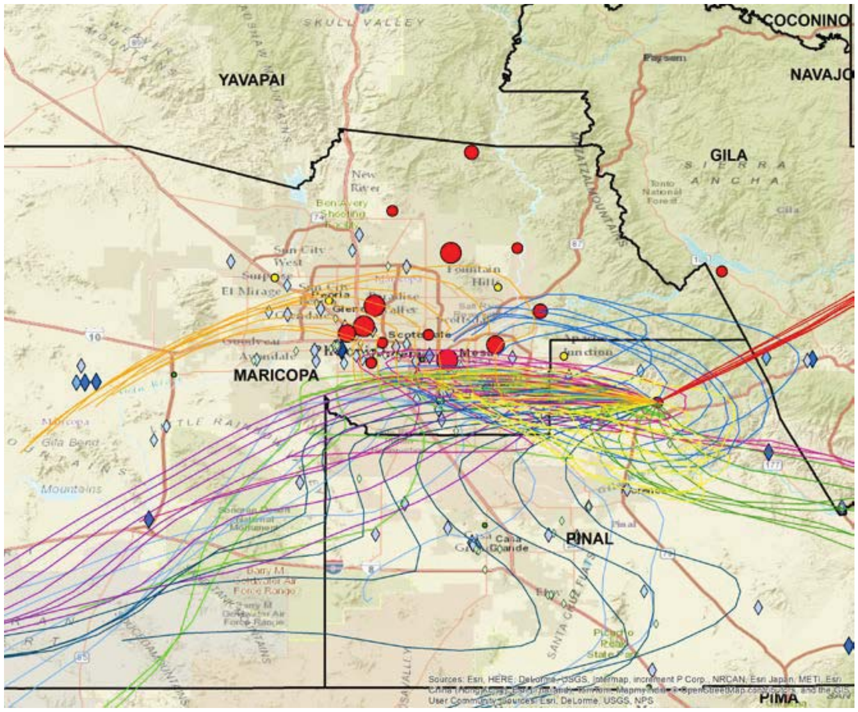
Figure 3-29 Queen Valley Monitor – 10 Highest Ozone Concentration Day Winds



3.1.3.2.2 HYSPLITs

Pictured in Figure 3-30 below are 24 hour HYSPLIT trajectories to the Queen Valley ozone monitor in Pinal County. The images reflect a trajectory for each hour in the 8-hour exceedances for the 10 highest ozone concentration days during 2013-2015. For methodology and additional HYSPLIT model results please see Appendix A, Section 3 and Exhibit A1, Section 15.

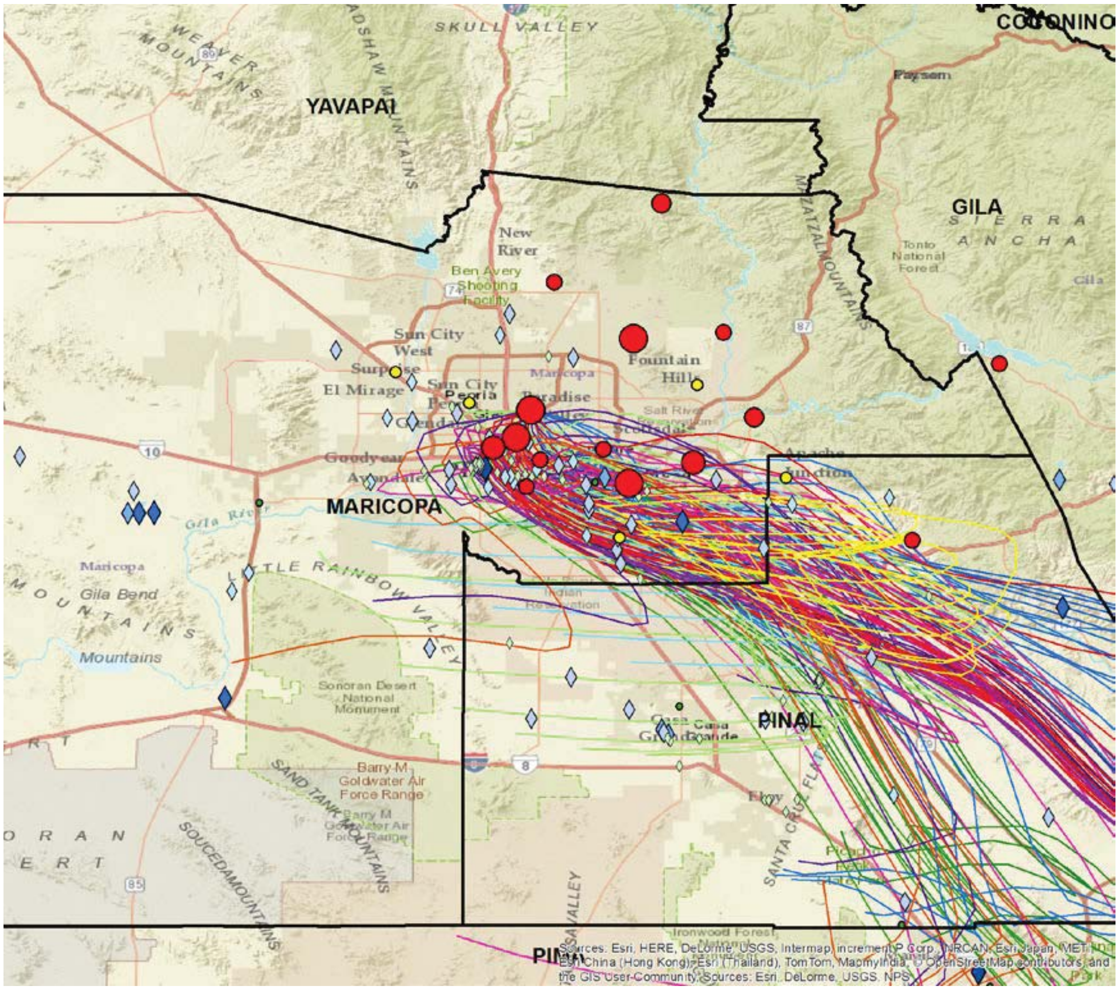
Figure 3-30 Queen Valley – 10 Highest Ozone Days HYSPLIT Back Trajectories



As shown above, air parcels often travel from the Phoenix area in Maricopa County to the Queen Valley monitor in Pinal County. This lends to the understanding that the Phoenix area emissions impact the Queen Valley monitor as the winds transport emissions to the monitor. Some of the air parcels travel through San Tan Valley on the path towards the Queen Valley monitor. While air trajectories for the Queen Valley monitor do not always pass through or originate from San Tan Valley, there is still a meteorological connection between the two.

Further, ADEQ also analyzed HYSPLIT trajectories from several other monitors in the central Phoenix area. Several of the air parcel trajectories that impact central Phoenix travel through the San Tan Valley. See Figure 3-31 below. This shows a strong meteorological connection between San Tan Valley and the rest of the Phoenix area.

Figure 3-31 Phoenix Area HYSPLITs That Pass Through San Tan Valley on Exceedance Days



3.1.3.2.3 Diurnal Analysis

ADEQ staff conducted a diurnal wind pattern analysis for the Queen Valley monitor, to determine where the emissions are likely transported from during exceeding hours. The HYSPLITs indicate that emissions are likely from the Maricopa County area of Phoenix and the nearby San Tan Valley. Looking at wind roses for the 10 highest days at Queen Valley, staff suspected that mountain valley wind patterns were the cause of the high percentage of eastern winds, shown on the above wind roses (See Figure 3-28 and Figure 3-29). ADEQ further analyzed diurnal wind patterns on the 10 highest ozone concentration days for 2013-2015 and found that during the exceedance hours (between 10:00 a.m. and 8:00 p.m.), winds are generally westerly. See Figure 3-32, Figure 3-33, and Figure 3-34 below:

Figure 3-32 Diurnal Wind Pattern for 10 Highest Ozone Days at Queen Valley

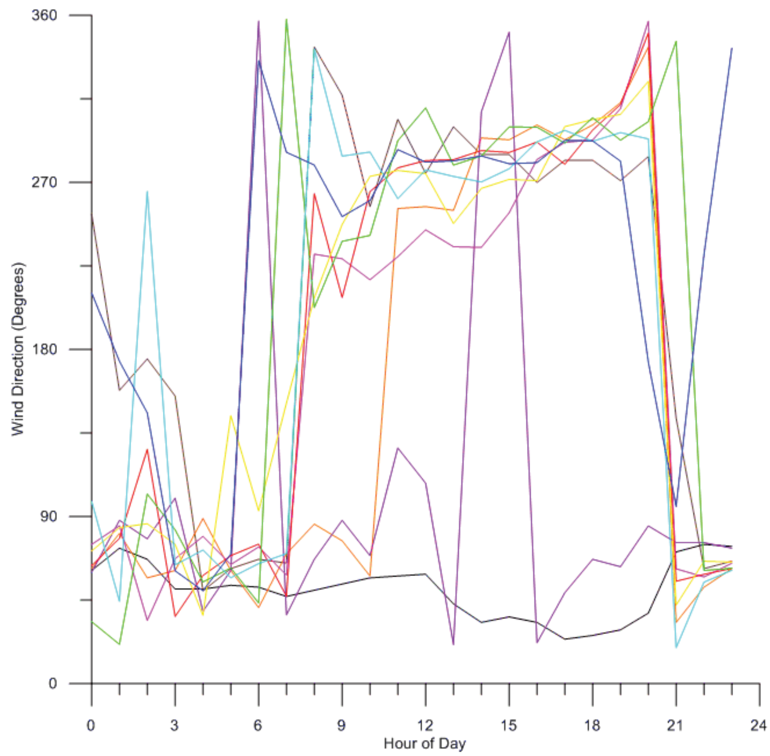


Figure 3-33 Average Diurnal Wind Pattern for 10 Highest Ozone Days at Queen Valley

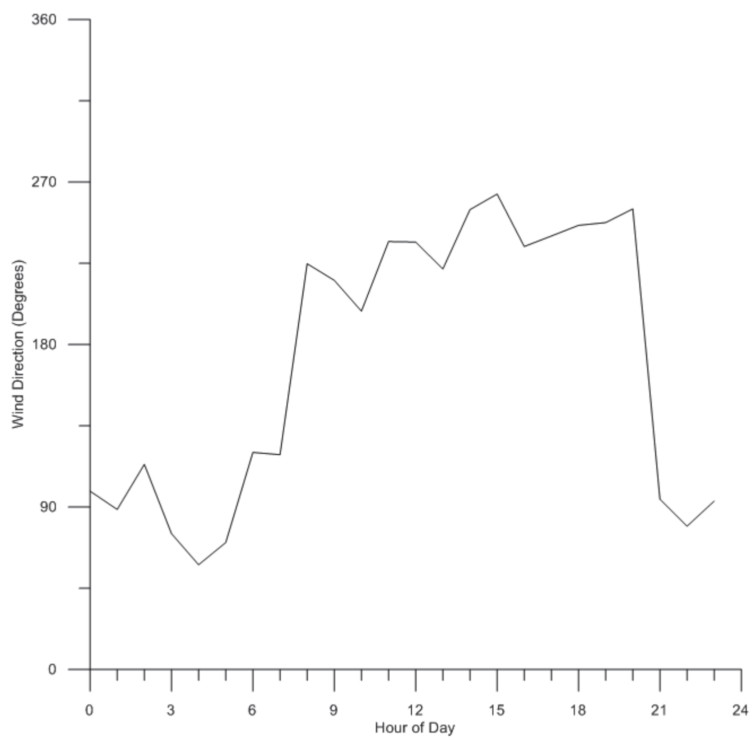
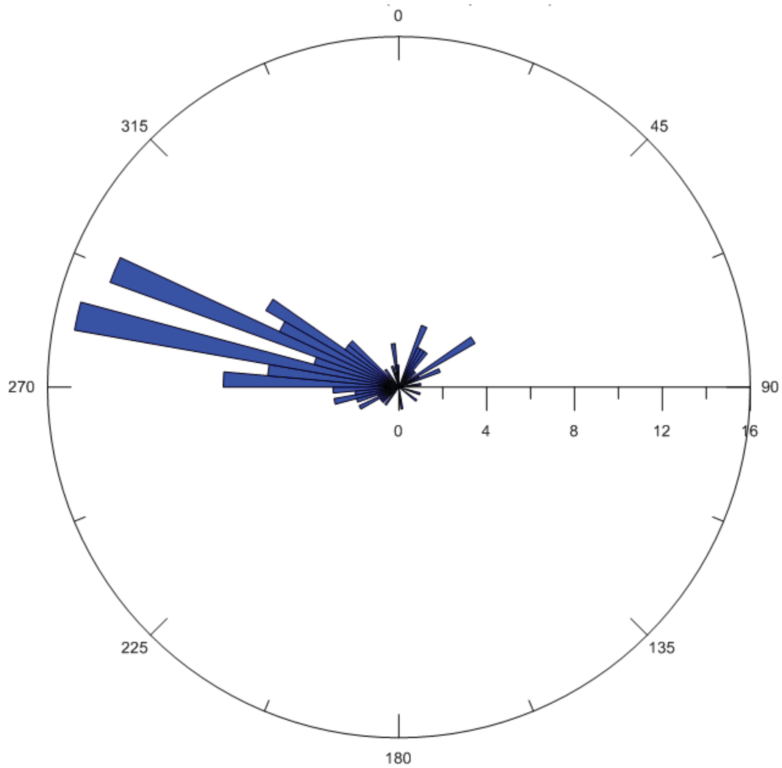


Figure 3-34 Queen Valley 10 am to 8pm 10 Highest Ozone Days Wind Directions



3.1.3.3 Gila County's Tonto National Monument Representative Data

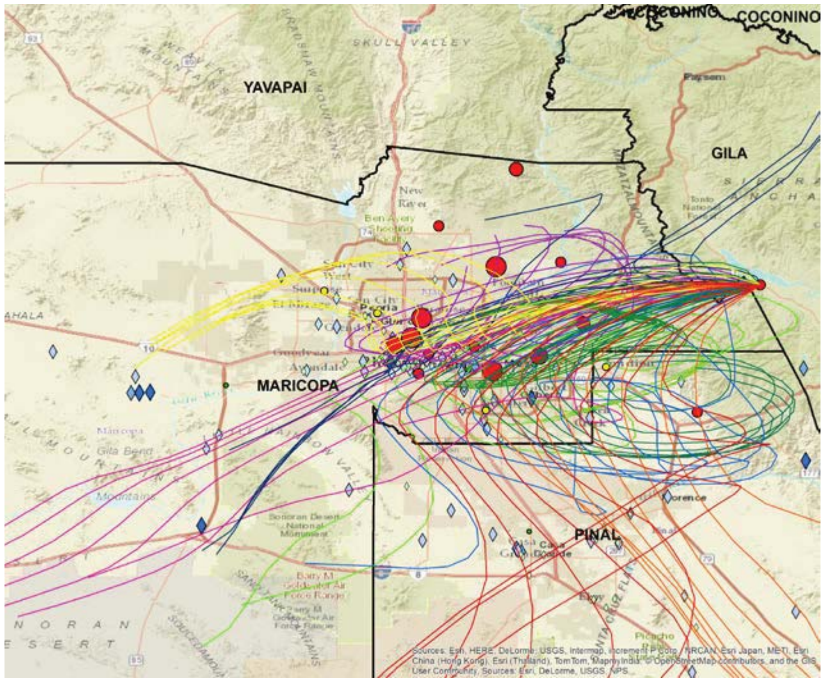
3.1.3.3.1 Wind Roses

There is no meteorological station located at the Tonto National Monument ozone monitor in Gila County. ADEQ considered reviewing meteorological data at the Blue Point ozone monitor as a surrogate for weather information at the Tonto National Monument monitor, but concluded that Blue Point data is likely not representative enough considering the distance from the Tonto monitor and the difference in topography.

3.1.3.3.2 HYSPLITs

Pictured in Figure 3-35 are 24 hour HYSPLIT back trajectories from the Tonto National Monument ozone monitor in Gila County. The images reflect a trajectory for each hour in the 8 hour exceedances for the 10 highest ozone concentration days during 2013-2015. For methodology and additional HYSPLIT model results please see Appendix A, Section 3 and Exhibit A1, Section 1.

Figure 3-35 Tonto National Monument – 10 Highest Ozone Days HYSPLIT Back Trajectories



3.1.4 Topography

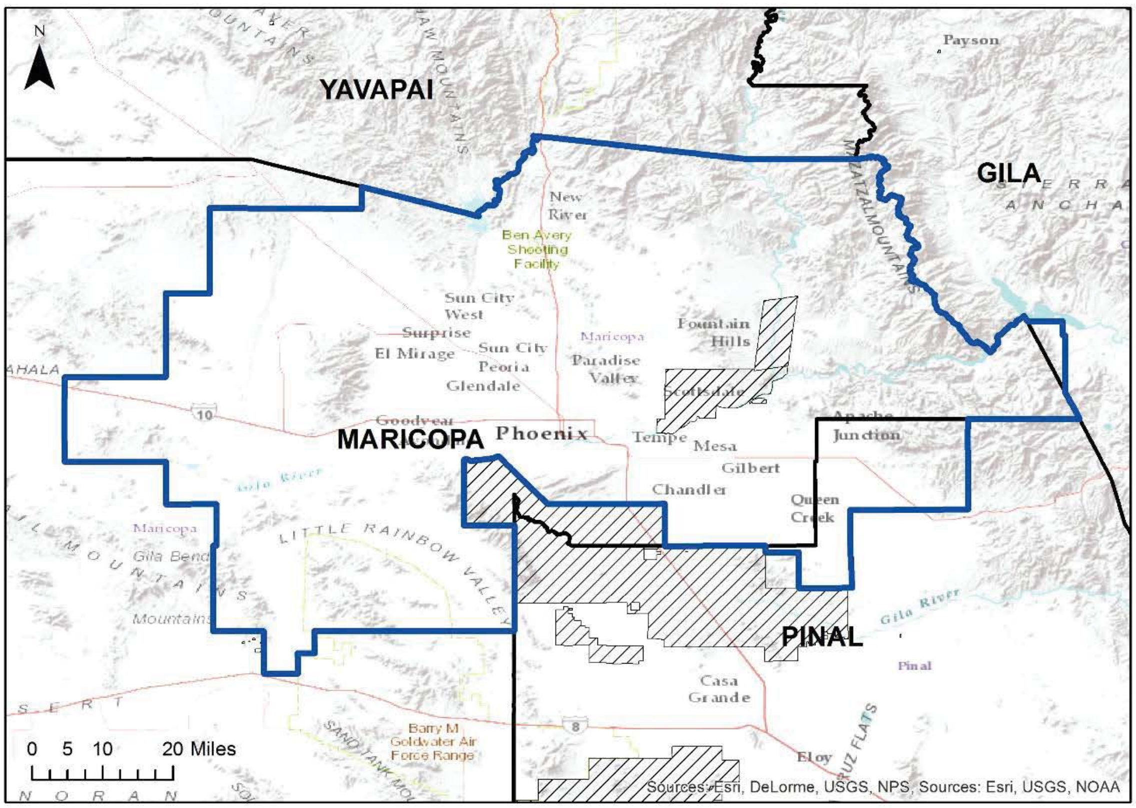
Although located in the broad and mostly flat Salt River Valley, metropolitan Phoenix lies close to mountainous, complex terrain. The valley is bordered by several mountain chains including: the Mazatzal and Superstition Mountains to the east, the New River Mountains to the north and northeast, the Hieroglyphic 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 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.

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. On days where there is a thermal low situated over Baja, the afternoon southwest flow may have enough momentum to push the ozone plume up and over the mountains to the east, triggering exceedances at the Tonto National Monument monitor in Gila County. When there is little influence from the thermal low, these afternoon westerly (out of the west) winds may not have the momentum to get over the mountains, and thus fall back down to the west. This is often evident by a secondary spike at several locations late at night or early morning the next day. For example, ozone levels at the Rio

Verde monitor may increase steadily throughout the day, peaking late in the afternoon. At this point, concentrations at the monitor may begin to decrease until the air parcel reaches the mountains and sloshes back to cause a concentration spike in the late evening or early the next morning. This slosh effect has been discussed in a paper entitled *A Case Study of the Climatic Mechanisms Contributing to the Transport of Lower Atmospheric Ozone Across Metropolitan Phoenix, Arizona, USA* (Ellis, Hilenbrandt, Thomas, Fernando 1999).

For an overall picture of the topography in the Phoenix area, see Figure 3-36 below:

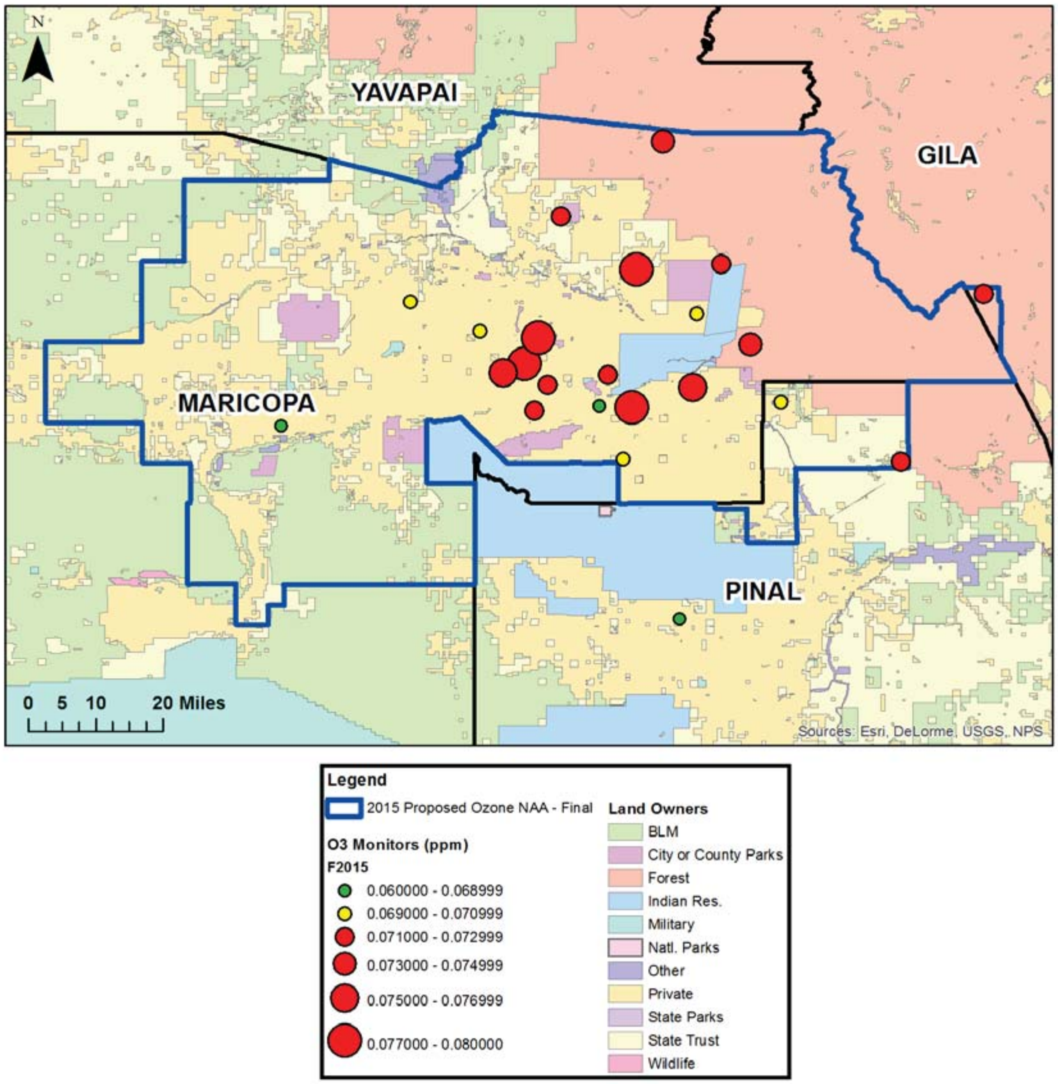
Figure 3-36 Phoenix Metropolitan Area Topography



3.1.5 Jurisdiction

ADEQ did not base its analysis on monitors located on tribal land. While many of the monitors in the city lay on private or state land, five of the monitors in the Phoenix area are located adjacent to or on Tonto National Forest land. See Figure 3-37 for land ownership.

Figure 3-37 Phoenix Metropolitan Area Land Ownership[59]



3.1.5.1 Air Quality Planning

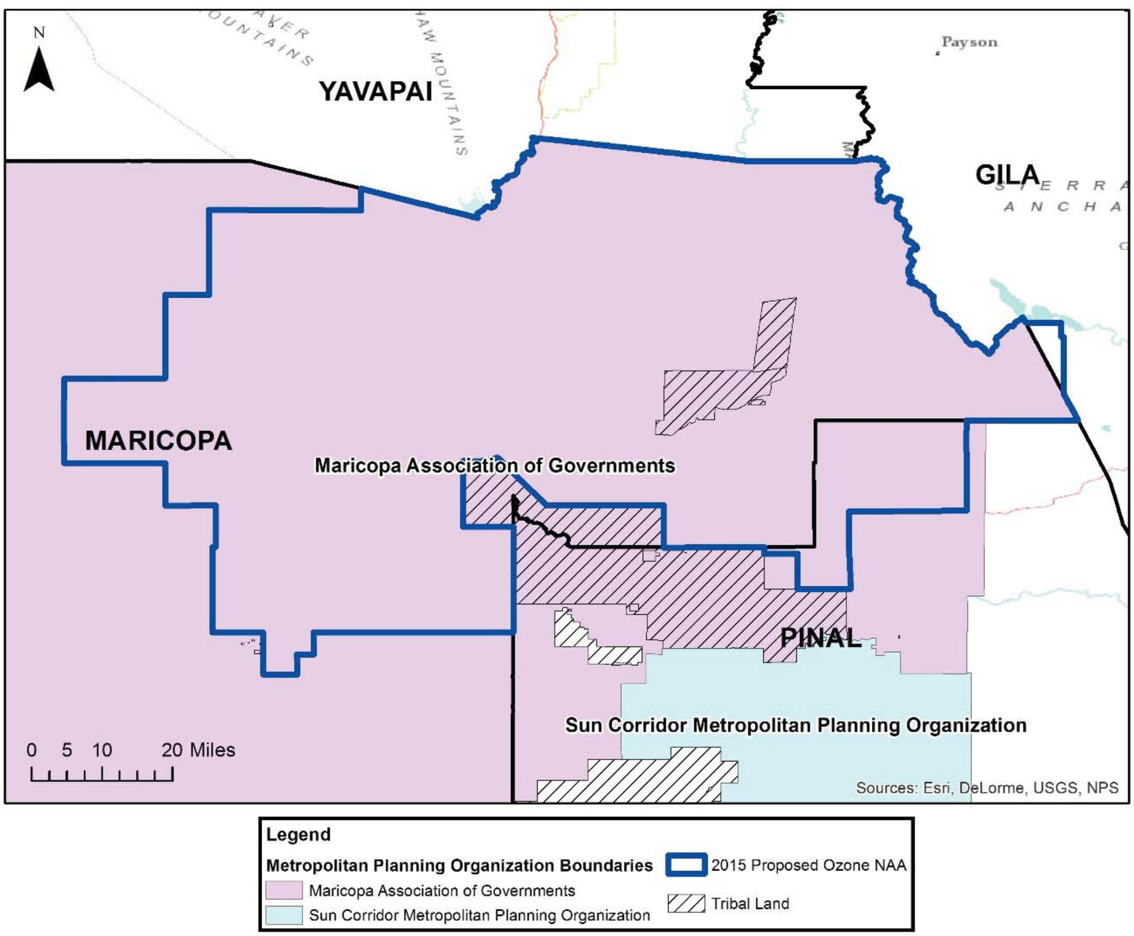
Maricopa Association of Governments (MAG) has air quality planning authority for current nonattainment areas in Maricopa County, including Apache Junction, the Pinal County portion of the 2008 Phoenix-Mesa Ozone Nonattainment Area. MAG also has jurisdiction over two particulate matter nonattainment areas in Pinal County, even where the areas overlap with Sun Corridor's jurisdiction as the certified metropolitan planning organization (MPO) under the

[59] The Pinal Air Park monitor is the only monitor not pictured in this figure because it is located so much further south and including the monitor would decrease resolution on the recommended area. The monitor is attaining the 2015 standard by a wide margin at 65 ppb and is located on the border with Pima County near the east to west midpoint of Pinal County. Please see Figure A2-1 of the TSD to see all the monitor locations in Pinal County.

Federal Highway Administration, according to Governor Ducey's 2016 certification and re-certification of air quality planning organizations per A.R.S. § 49-406(A).[60]

ADEQ also generally has air quality planning authority over parts of the state that do not have an air quality planning certified MPO (except for tribal land).[61] Figure 3-38 below shows the locations of tribal land and MPO jurisdiction. There is no MPO that has transportation planning authority in the immediate area surrounding the Gila County ozone monitor. However, ADEQ's interpretation of A.R.S. § 49-406 is that given a new certification by the governor for the 2015 Ozone Nonattainment area, MAG could assume air quality planning authority over the entire nonattainment area. This includes the small area in Gila County with no applicable MPO and any additional portions located in Pinal County.

Figure 3-38 Phoenix Metropolitan Area Tribal Land and MPO Jurisdiction



[60] Letter from Hon. Doug Ducey, Governor of Arizona, to Ms. Alexis Strauss, Acting Regional Administrator, EPA Region 9 (June 22, 2016) (on file with ADEQ).
[61] *See* ARS § 49-406(B).

3.1.5.2 Source Permitting and Enforcement[62]

Maricopa County has original jurisdiction to permit major sources within the County because it has an approved nonattainment NSR program and delegation by EPA to administer the federal PSD program.[63] Maricopa County also has permitting jurisdiction over other minor sources, except where ADEQ has asserted jurisdiction, and so is able to issue minor source permits. Permitting and enforcement is administered by Maricopa County Air Quality Department (MCAQD).

Pinal County has a SIP-approved PSD program, but lacks EPA approval for nonattainment NSR. ADEQ therefore has original jurisdiction over major sources in Pinal County, but has delegated that jurisdiction to Pinal County. PCAQD also has jurisdiction over minor sources, except where ADEQ has asserted jurisdiction. Permitting and enforcement is administered by Pinal County Air Quality Control District (PCAQD).

Gila County does not have an air pollution control program and ADEQ's interpretation is that ADEQ automatically has jurisdiction in such a case.[64]

Also, under ARS § 49-402(B), county permitting jurisdiction is subject to ADEQ's authority to assert jurisdiction over specific matters, geographical areas, or sources within those counties.

3.1.6 Weight of Evidence Analysis and Recommendation Summary

First, ADEQ is generally relying on its analysis for the 2008 ozone nonattainment area boundary as a basis for this recommendation. After review of all of the data, ADEQ generally finds the analysis is valid and sound.

However, given 2015 design values and the data presented, there are likely impacts from the Phoenix area to monitors outside of the 2008 boundary, namely the Tonto National Monument monitor in Gila County and the Queen Valley monitor in Pinal County. Concentrations at these monitors, like all monitors in the area, have been trending down in the long term, which indicates improving air quality. However, neither of these monitors are currently attaining the new 2015 ozone NAAQS according to 2015 design value data. Therefore, this recommendation includes the Queen Valley monitor and the Tonto National Monument monitor.

While monitor concentrations have trended downward and the Phoenix area is partly impacted by transported emissions, the Phoenix area largely impacts its own nonattainment for the new 2015 standard. It should be noted, however, that point sources are highly accounted for and

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[62] *See generally* ADEQ, *Second Submission of Supplemental Information to the 2012 New Source Review State Implementation Plan Submission*, July 2, 2014, *available at* http://www.regulations.gov/document?D=EPA-R09-OAR-2015-0187-0006 (relating to jurisdiction, supplementing the October 29, 2012 SIP Revision).

[63] *See* ARS § 49-402(A)(1).

[64] *See* ARS § 49-402(B) (before asserting jurisdiction over air quality permits in a county, ADEQ must give prior notice and an opportunity to confer to the "control officer"); *see also* ARS § 49-471(6) (control officer means "the executive head of the department authorized or designated to enforce air pollution regulations, or the executive head of an air pollution control district established pursuant to section 49-473"). In Gila County's case, there is no control county air quality agency control officer for ADEQ to notify.

controlled in both Maricopa and Pinal Counties. Facilities are permitted down to a ton. The existing 2008 Phoenix-Mesa Ozone Nonattainment Area is implementing RACT on point sources. Also, Area A, an area encompassed mostly by the 2008 nonattainment area and extending into Pinal County, already implements reformulated gas and is mandated to participate in the vehicle emissions inspection program. ADEQ's Ozone Transport I-SIP submission contained a list of many of the controls that apply in the Phoenix area.

Overall, the Phoenix area has become more densely populated within the 2008 boundary and in some areas outside of the 2008 boundary. Despite population growth, ozone has been decreasing overall due to continuous measures and potential fleet turnover within the metropolitan area. However, population, along with its associated activity and data, is still a distinct indicator and projection factor for emissions inventories (such as Maricopa County's 2011 emission inventory). With population, development and traffic have also grown, all of which are indicators of ozone precursor emitting activities. Outside of the Phoenix-Mesa Urbanized Area, and even in large expanses of it, there is little population or activity. However, the area that appears to have experienced the most growth, and has some of the most growth potential due to land ownership, existing infrastructure, and ease of transportation to and from the Phoenix area is the San Tan Valley. San Tan Valley was not even classified as a CDP in the 2000 U.S. Census, and according the 2010 Census, there were 81,321 people in the 35.781 square mile area of the CDP alone, with a density of 2,273 people per square mile. There is clearly a tight link between Pinal County and Maricopa County as 45% of surveyed working residents in Pinal County commute to Maricopa County for work. Traffic analysis supports this due to relatively significant traffic in the San Tan Valley area. ADEQ's recommended area captures 94% of the population in the Phoenix-Scottsdale-Mesa CBSA and 89% of the VMT for the area so that most high emitting activities caused by the urbanized area are included in the recommended area.

There has been no growth in the immediate area surrounding the Tonto National Monument monitor in Gila County. There are very few sources, point or otherwise, in Gila County near the monitor. Gila County is a micropolitan statistical area and the City of Payson is approximately forty miles away from the monitor. There is very little population or traffic near the monitor and the monitor is located on Tonto National Forest land. The Phoenix area is slightly closer to the Tonto National Monument monitor in Gila County than the City of Payson. Also, urban ozone contributing activities are far higher in Maricopa County than Gila County, likely because of the sheer size and population difference between Phoenix and Payson—Phoenix is far larger in both population and size (see Figure 3-13, Table 3-8, and Table 3-10). These facts indicate that likely contributing sources are those in the Phoenix area. Also, considering HYSPLIT modeling results (see Figure 3-35 in Section 3.4 below), the likely contributing sources to high ozone concentrations at the Tonto National Monument monitor are located in Maricopa County. The lack of growth near the Tonto National Monument monitor and the increased growth in San Tan Valley, which is close in proximity to the Queen Valley monitor, lead ADEQ to further analyze these areas through meteorological and topographical analyses for possible transport paths to these monitors.

ADEQ analyzed back trajectories for the Tonto National Monument monitor in Gila County to verify that emissions impacting the Tonto monitor were likely from the Phoenix area as opposed to the Payson area. As shown in the HYPSLIT trajectories in Figure 3-35 above, and Exhibit AI1 of Appendix A, the likely source of emissions impacts are from the Phoenix area, rather than the Payson area. As discussed in Section 3.1.4, there may sometimes be enough momentum from the southwestern flow to push emissions from Phoenix up and over the mountains near Roosevelt Lake to reach the Tonto National Monument monitor.

As shown in the Queen Valley monitor HYSPLIT trajectories in Figure 3-30 above, and Exhibit AI15 of Appendix A, several HYPSLIT back trajectories pass through Maricopa County and over the San Tan Valley area before reaching the Queen Valley monitor. In fact, the Queen Valley monitor is listed in ADEQ's monitoring plan as a PAMS site "considered to be downwind of the source of maximum precursor emissions in the Phoenix metropolitan area."[65] Given the topography and known mountain valley flow, as evidenced by the sloshing effect mentioned in Section 3.1.4, and the diurnal meteorological analysis in Section 3.1.3.2.3 showing a mainly western flow of actual winds during exceedance time periods, the Queen Valley monitor is likely impacted by emissions activities in the 2008 Phoenix-Mesa Ozone Nonattainment Area and San Tan Valley. While emissions from the San Tan Valley/Queen Creek area don't always directly impact the Queen Valley monitor, they do likely contribute to the monitor on some exceedance days. In addition, considering HYSPLIT trajectories from multiple monitors in the Phoenix area that travel through San Tan Valley, as shown in Figure 3-31, it is likely that emissions from the San Tan Valley/Queen Creek area likely affect multiple monitors in Phoenix. This especially likely considering that San Tan Valley is essentially a developed extension of the Phoenix-Scottsdale-Mesa metropolitan area.

For all the reasons above, ADEQ recommends that the 2015 Phoenix ozone nonattainment area should expand the 2008 ozone boundary to include portions of Pinal and Gila Counties. The newly expanded boundary should include a small portion of Pinal County encompassing the Queen Valley monitor and San Tan Valley, and a small portion of Gila County encompassing the Tonto National Monument monitor.

[65] ADEQ, *State of Arizona Annual Monitoring Network Plan*, p. 27 (2014), *available at* http://www.azdeq.gov/environ/air/assessment/download/amnp2014.pdf.

4 Yuma Nonattainment Area

ADEQ recommends that only a small part of Yuma County should be nonattainment. While ADEQ lays out some data reflecting the five factors below, ADEQ determined it was only appropriate to apply the five factors to a very tight area around the monitor. See Section 4.6 for further explanation as to why the five factors are not reasonably applied to the Yuma area. Figure 4-1 below shows the recommended boundary, and Figure 4-2 shows the recommended boundary in the context of other relevant data.

Figure 4-1 Yuma Nonattainment Area

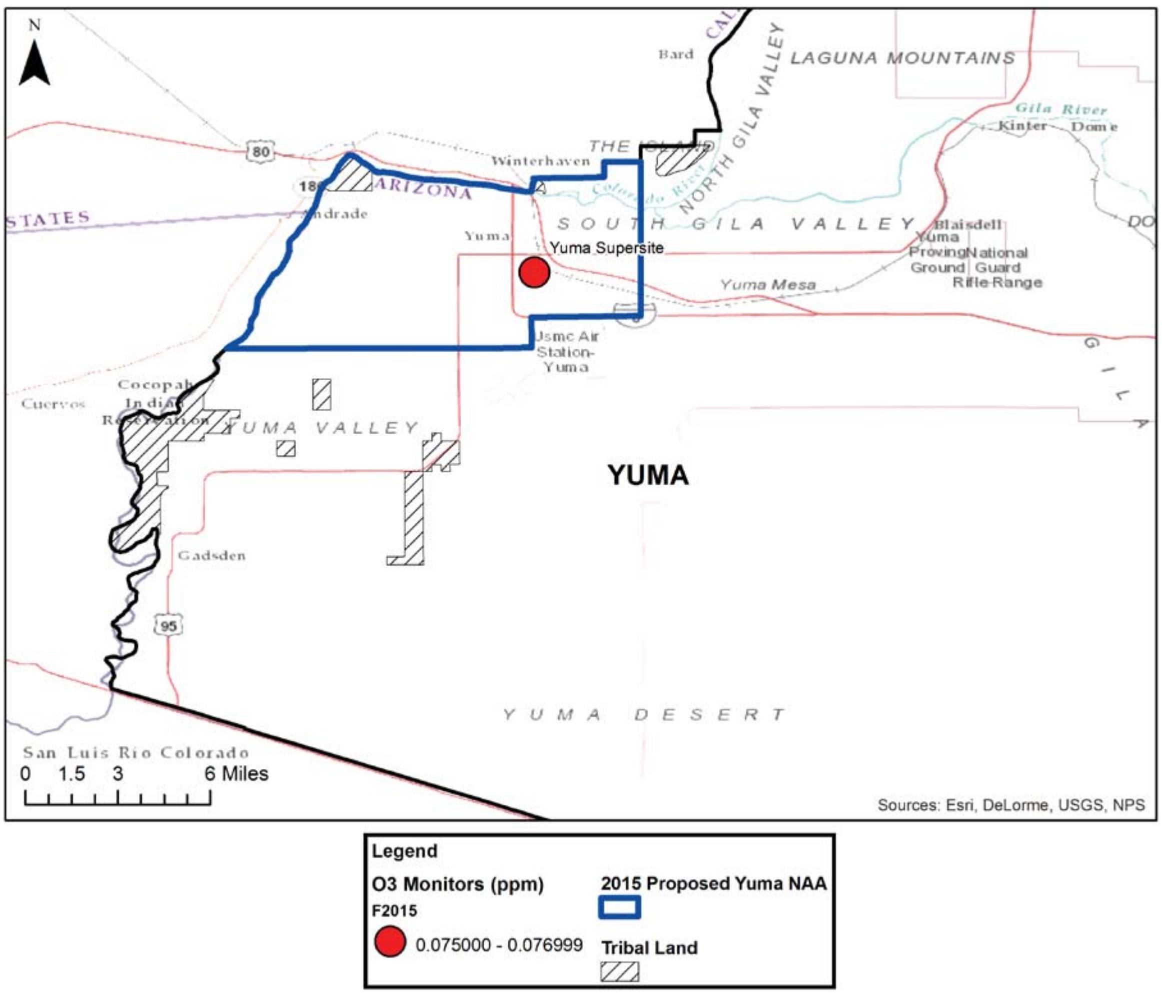
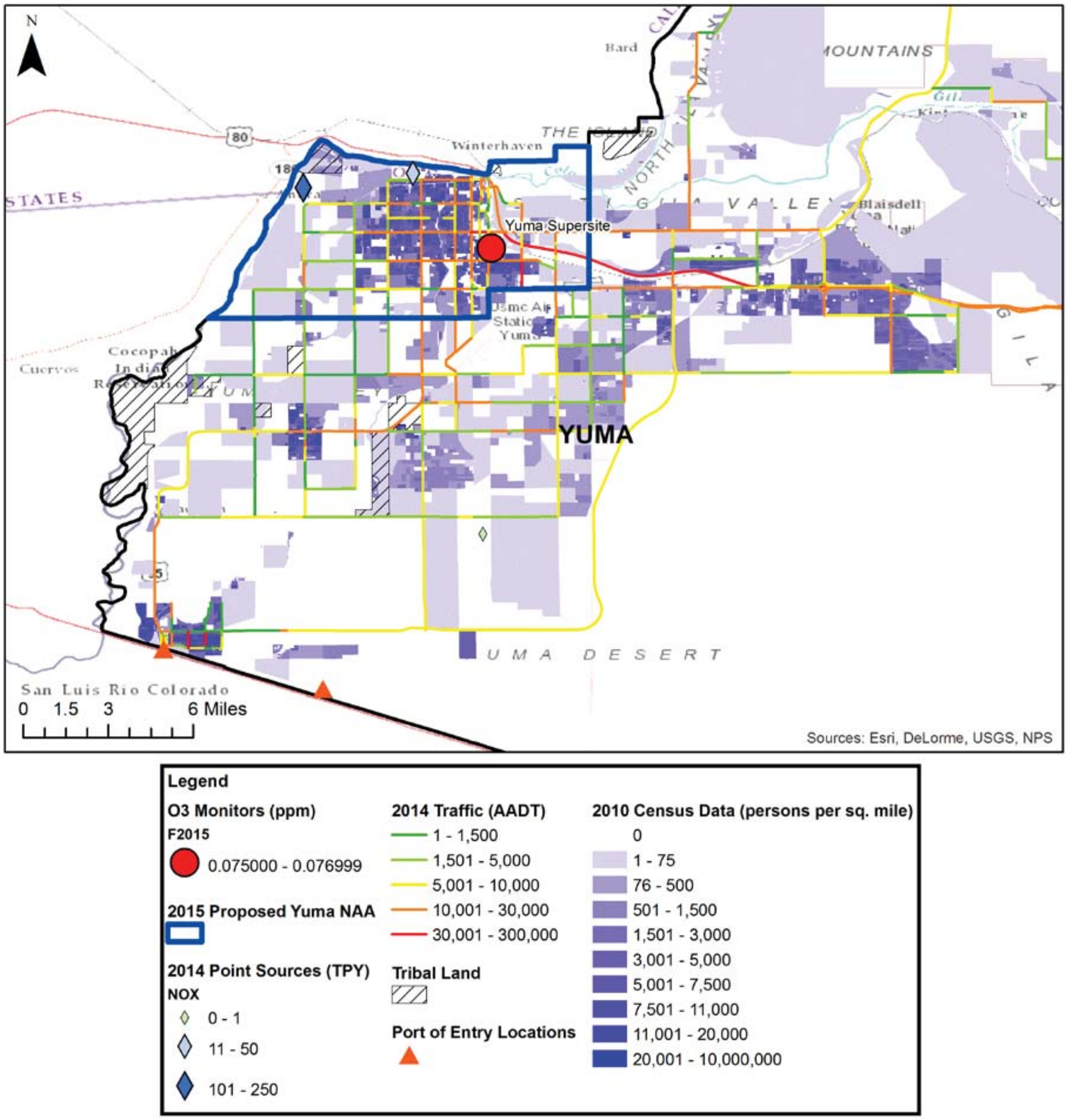


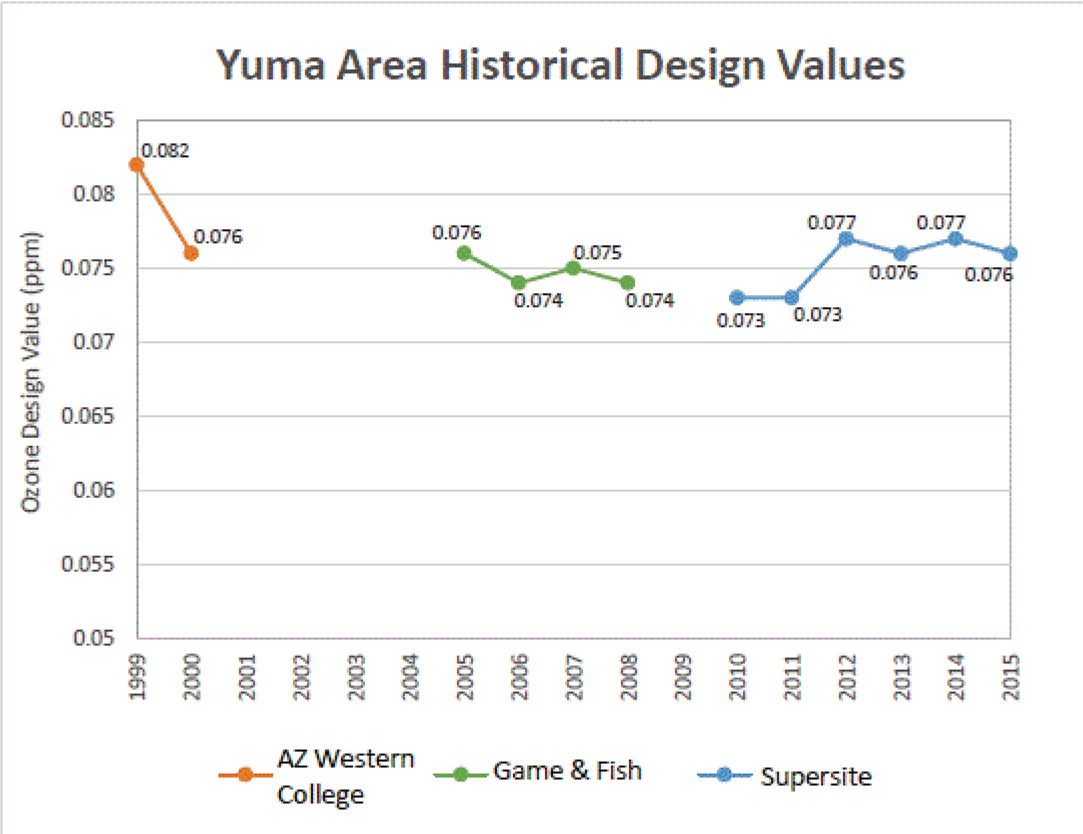
Figure 4-2 Yuma Nonattainment Area with Relevant Data



4.1 Air Quality Data

There is currently only one ozone monitor in the Yuma area, Yuma Supersite, which is operated by ADEQ. Design value concentrations at Yuma Supersite have generally trended upward since 2010, although values are much lower than the 1999 starting point at 82 ppb (Figure 4-3).

Figure 4-3 Yuma County Long-Term Design Value Trend



4.2 Emissions and Emissions-Related Data

ADEQ evaluated emissions and emissions-related data from Yuma County. Table 4-1 and Table 4-2 represent 2011 NEI emission data for NO_x and VOCs, respectively. Emissions totals are rather low, especially when compared to an area like Maricopa County or Southern California. It should be noted that approximately 95.5% of all VOCs in the county are estimated to be from biogenic emissions (e.g. vegetation and soils).

Table 4-1 Yuma County NOx Emissions

NOx Emissions		
Source Type	Emissions (TPY)	Percent of Total
Point Source	418	5.3%
Nonroad	898	10.8%
Onroad	4,234	50.9%
Nonpoint	2,768	33%
Total	**8,318**	**100%**

Table 4-2 Yuma County VOC Emissions

VOC Emissions		
Source Type	Emissions (TPY)	Percent of Total
Point Source	109	.2%
Nonroad	1,586	1.1%
Onroad	2,561	1.7%
Nonpoint	142,879	97 %
Total	**147,135**	**100%**

4.2.1 Point Source Data

Figure 4-4 and Figure 4-5 give visual representations of NO_x and VOC emission point sources, of which there are very few in Yuma County. These figures represent 2014 permitted point source data as reported by ADEQ, binned and displayed by actually emitted tons per year thresholds, and also show the proposed Yuma nonattainment boundary. There are two major point sources in the immediate area, an electric generating station (emitted approximately 135 tons of NO_x and 9.6 tons of VOCs during 2011) and a cogeneration plant (emitted only 23 tons of NO_x and 0.705 tons of VOCs during 2011). Yuma Proving Grounds are also nearby but the emissions are minimal (24.77 tons of NO_x and 21.5 tons of VOCs during 2011). Also, the facility is north of the monitor and HYPSLITs do not show that the facility is likely to contribute to the monitor. See Section 4.3.2 for the HYSPLIT analyses. South Yuma County Landfill is also nearby, but its emissions are similarly minimal (0.041 tons of NO_x and 27.6146 tons of VOCs during 2011). The landfill emits almost no NOx emissions, and VOC emissions are extremely small in comparison to total county VOC emissions (See Section 4.2 above).

Figure 4-4 Permitted NOx Point Sources

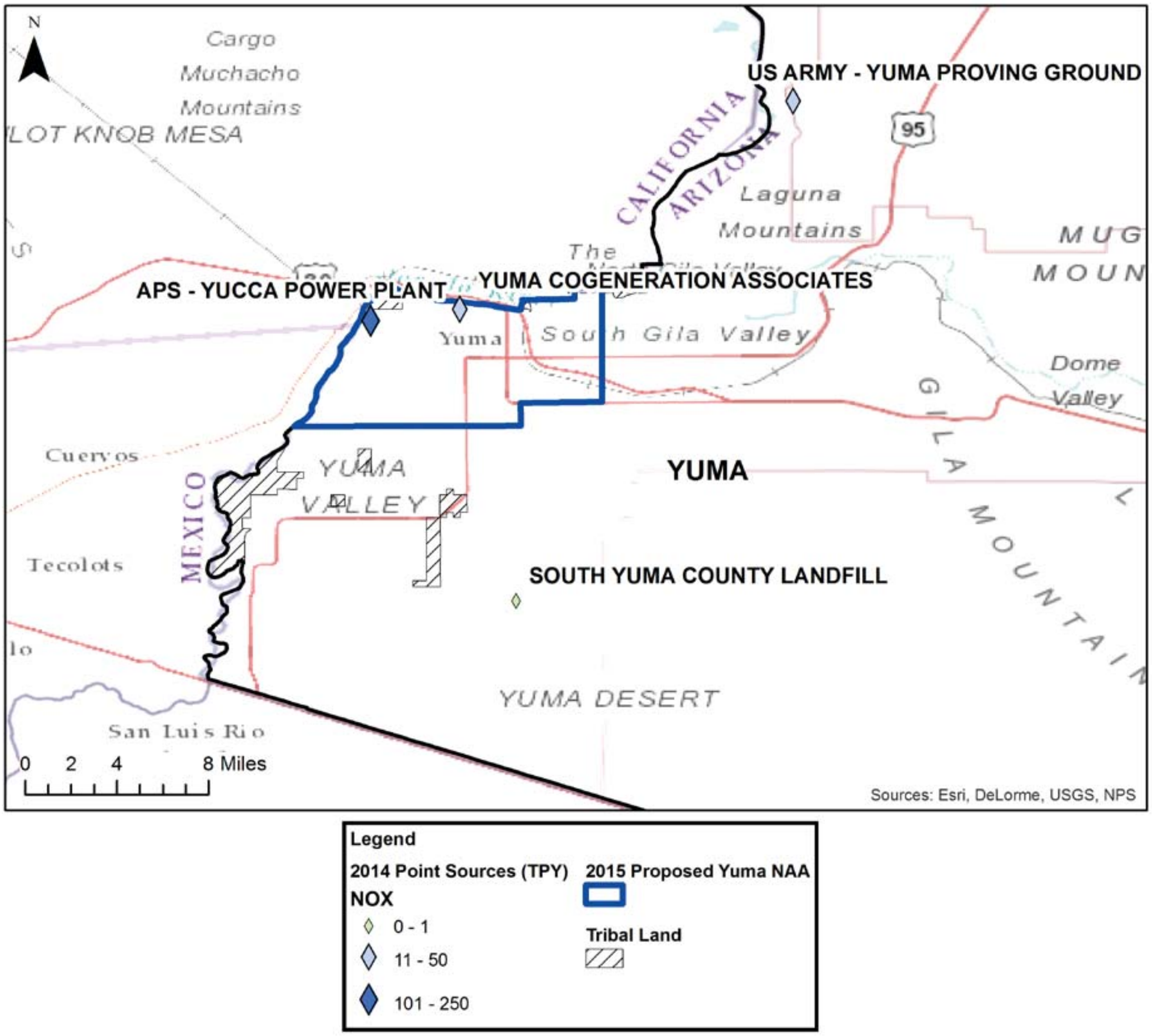
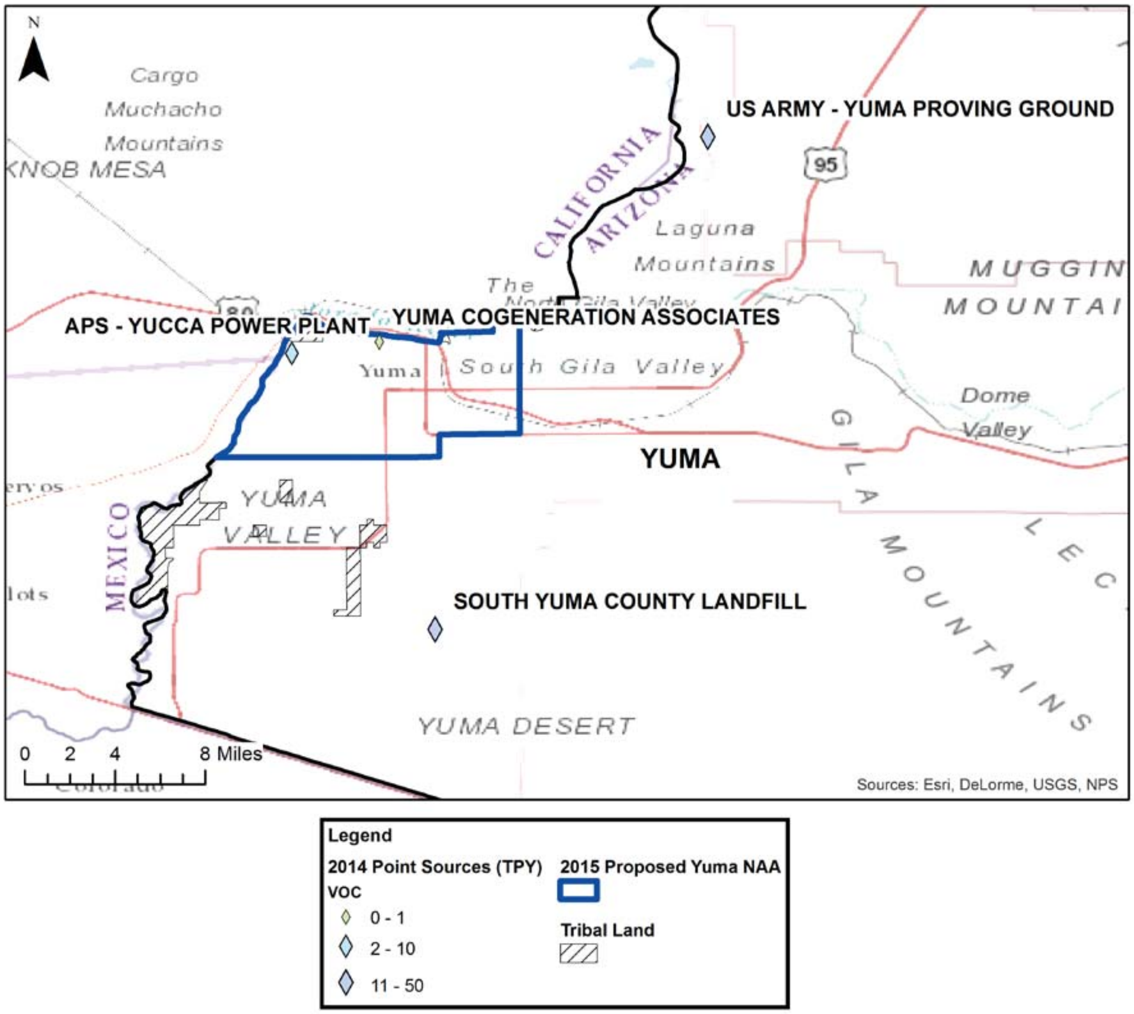


Figure 4-5 Permitted VOC Point Sources



4.2.2 Traffic Data

The Yuma area is a land port area and therefore subject to substantial amounts of transient interstate and international traffic. In addition, much of the economy in the Yuma area is seasonally dependent because of a higher rate of agricultural activity during cooler months. The Yuma area houses two ports of entry to and from Mexico, Port of Entry (POE) I in San Luis for personal vehicles and POE II east of San Luis for commercial traffic. Yuma is located on Interstate 8, which provides access between San Diego and Phoenix via Interstate 10. I-10 extends to Florida and also links to the I-40, which provides access to eastern states further north.

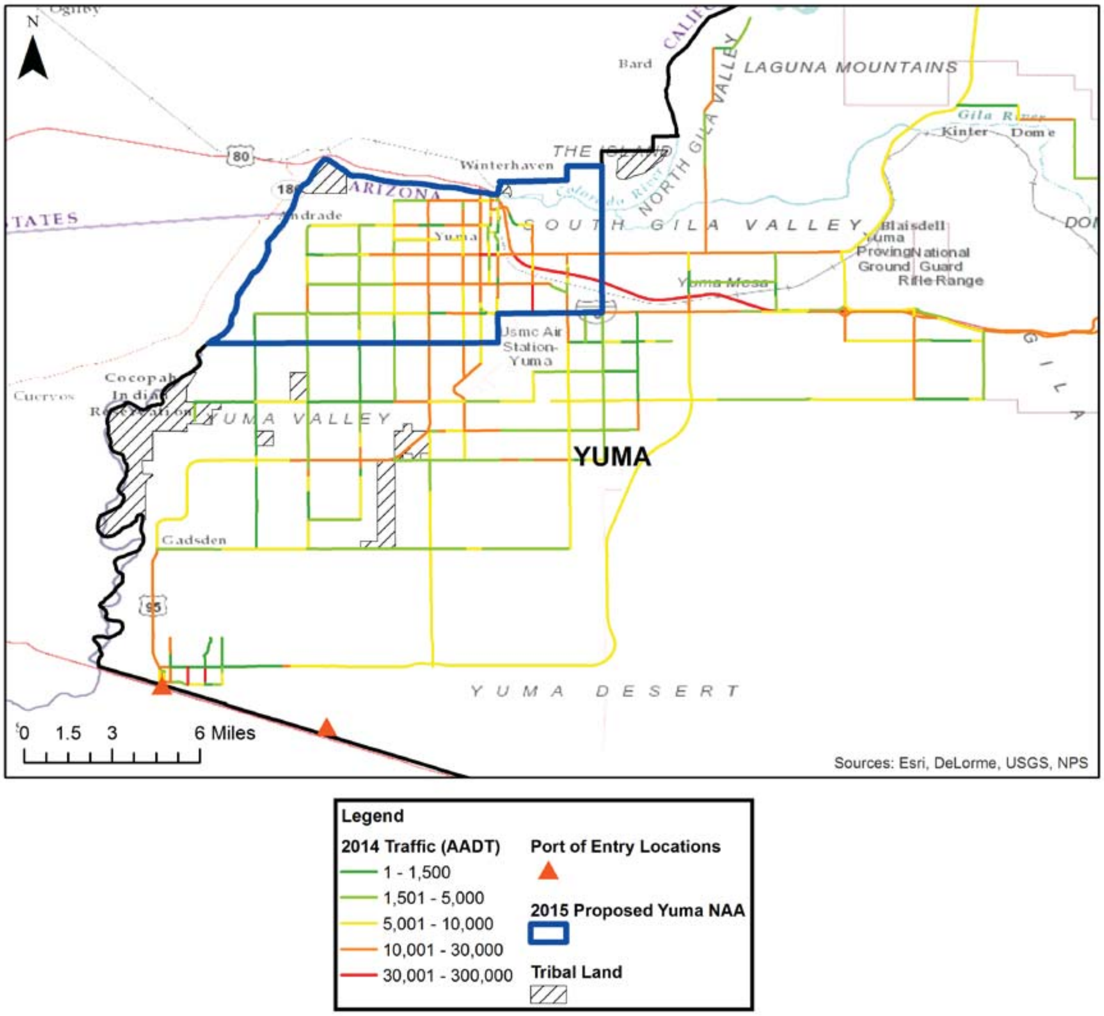
According to U.S. Customs and Border Protection located at POE II, all commercial truck traffic is diverted to POE II. State Route (SR) 195 provides ease of access between POE II and I-8. The interstate connections provide access for truck freight traffic between states and countries. According to Yuma Metropolitan Planning Organization ("YMPO"), "seventeen major trucking companies are located in the YMPO region."[66] While some truck shipments carry goods from Yuma to Mexico, the majority of shipments originate from Mexico with intended destinations outside of Yuma, typically in Los Angeles, San Diego, and Phoenix.[67] However, between 2013 and 2015, POE II experienced an average of only 33,027 commercial trucks per year, whereas a location like Nogales, AZ saw an average of 314,475 trucks over the same time period,[68] indicating that the area is not a significant shipping center.

Personal vehicles typically travel along Main Street between I-8 and the Mexican border. San Luis saw an annual average of 3,027,763 personal vehicles between 2013 and 2015, and comparably, Nogales experienced an average of 3,306,484 personal vehicles over the same time period.[69] According to YMPO, higher percentage traffic volume occurs in the cooler months because the agricultural season peaks during the winter.[70] This is because of agricultural worker travel from Mexico into the Yuma area to work, and because of other agricultural traffic related flows during planting and harvesting seasons. YMPO states that "aggregate traffic volumes in February 2012 were 33 percent higher than in July 2012."[71] This indicates that mobile source emissions are likely lower during the warmer ozone season months.

According to 2014 HPMS data, the proposed nonattainment area captures approximately 19% of the total county VMT, or 379,091,328 annual VMT out of 1,996,740,940 annual VMT for the entire county. See Figure 4-6 below for an image of AADT in the Yuma area and the locations of the two ports of entry.

[66] YMPO, *2014-2037 Regional Transportation Plan (RTP)*, p. 111 (2013), *available at* http://ympo.org/wp-content/uploads/2013/01/YMPORTP_FINAL_5-LOW-RES.pdf
[67] *Id*. at. 105.
[68] U.S. Department of Transportation, *Border Crossing Query Detailed Statistics* (recent data from January – March 2016) http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html.
[69] http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html
[70] *Yuma RTP supra* note 66 at 38-39.
[71] *Yuma RTP supra* note 66 at 38-39.

Figure 4-6 Yuma Nonattainment Area Traffic



4.2.3 Population Data

Population may be relevant in identifying areas that should be included in a nonattainment boundary. Figure 4-7 and Figure 4-8 represent the change in population density in the Yuma area between the years 2000 and 2010, according to the U.S. Census. Table 4-3 shows the change in actual population in the Yuma area between 2000 and 2010. Table 4-4 also represents the change in population of the Census Designated Place (CDP) Fortuna Hills. While the area of the proposed nonattainment area only captures approximately 1% of the area of Yuma County, (52 square miles out of 5,523 square miles), the area still encompasses the main population center, capturing approximately 45% of year 2010 Yuma County population (87,348 out of 195,751 people).

Figure 4-7 Yuma Nonattainment Area 2000 Population Density

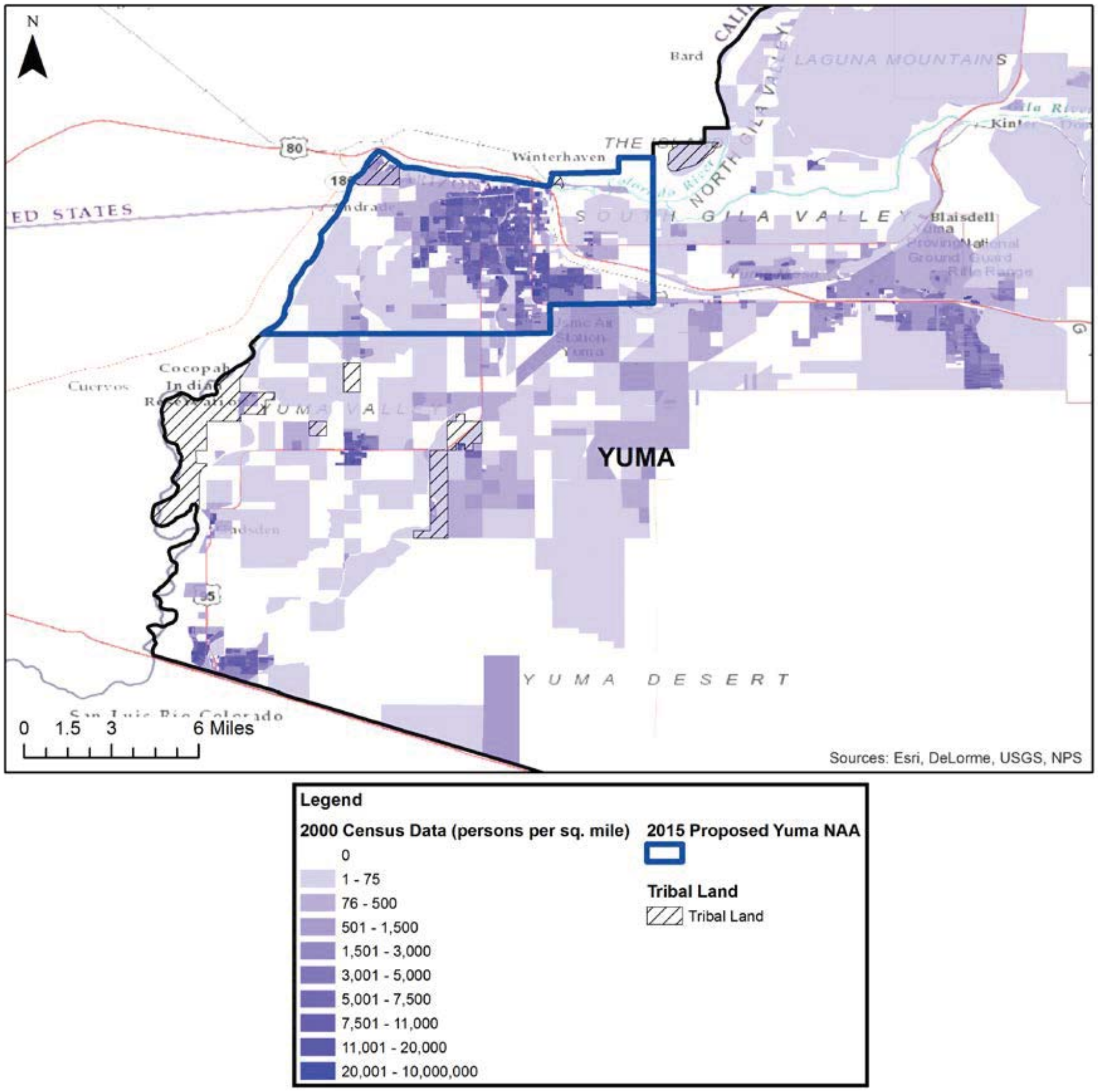


Figure 4-8 Yuma Nonattainment Area 2010 Population Density

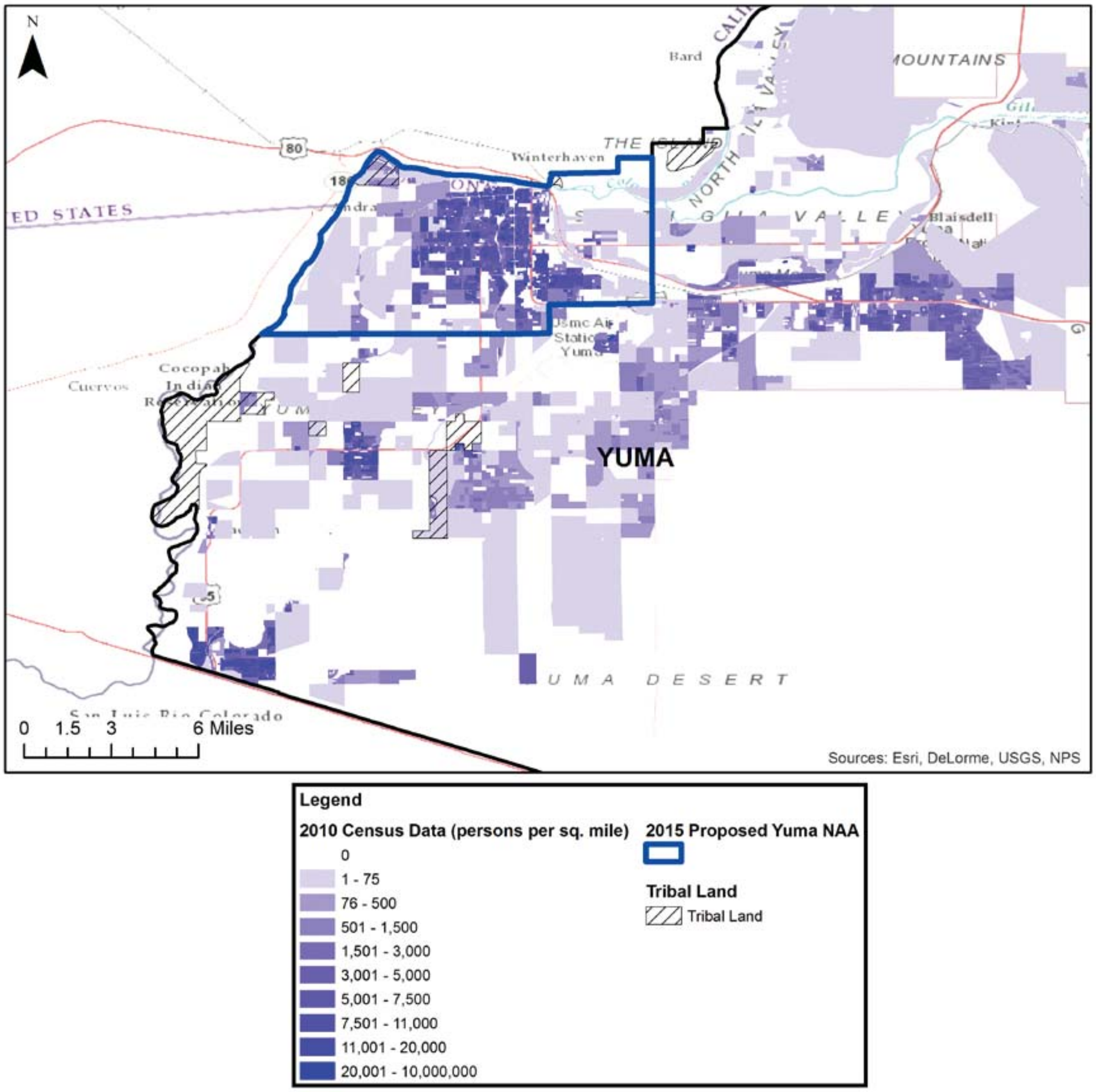


Table 4-3 Yuma Area Population Changes between 2000 and 2010

	Municipality	2000 Persons	2010 Persons	Percent Growth
Population	San Luis	15,322	25,505	66.5%
	Somerton	7,266	14,287	96.6%
	Wellton	1,829	2,882	57.6%
	Yuma	77,515	93,064	20.1%
	Balance of County	58,094	60,013	3.3%
	Yuma Total	**160,026**	**195,751**	**22.3%**

Table 4-4 Yuma Area CDPs Population Change between 2000 and 2010

Area Name	2000 Population	2010 Population	% Growth
Fortuna Hills (CDP*)	20,478	26,265	28%

4.2.4 Transport Data

Transport and background, such as that described in Section 2.3.2 clearly affects nonattainment at the Yuma monitor. Evidence shows that emissions are transported to the Yuma area and affect concentrations at the monitor. There is relatively little population or industry in the area, and yet concentrations at the monitor are several parts per billion higher than the standard.

EPA has estimated that about 7% of 2017 projected concentrations at the Yuma monitor are attributable to manmade sources from within Arizona.[72]

In a separate assessment,[73] but likely using the same data, EPA also projected ozone concentrations out to 2017 for the 2008 standard, for exceedance days of 76 ppb and higher, and modeled that Arizona manmade sources would contribute 6% of the projected concentration at the Yuma monitor, California manmade sources would contribute 20%, Mexico and Canada would contribute 7%, and biogenics would contribute 4% (Table 4-5). These modeling results indicate that Yuma County concentrations are highly impacted by transported emissions, instead of by local sources.

Table 4-5 EPA Transport Modeling Results for Yuma

County	2017 Avg. DV (ppb)	AZ (ppb) and % of projected DV		CA (ppb) and % of projected DV		Canada & Mexico (ppb) and % of projected DV		Initial[74] & Boundary[75] (ppb) and % of projected DV		Biogenics (ppb) and % of projected DV		Everything Else (other states, tribal, fires, offshore, etc.) (ppb) and % of projected DV	
Yuma	70.7	4.32	6%	13.81	20%	5.08	7%	43.36[76]	61%	2.69	4%	1.30	2%

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[72] *Background White Paper*, *supra* note 19 at 11 and Table 2c.

[73] EPA, *Air Quality Modeling TSD for the 2008 Ozone NAAQS Cross-State Air Pollution Rule Proposal, Data File with 2017 Ozone Contributions* (November 2017), *available at* https://www.epa.gov/airmarkets/proposed-cross-state-air-pollution-update-rule.

[74] Initial condition for this model's purposes is "the time-varying chemical state of the atmosphere just outside the edges of the modeling domain." EPA, *Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM25, and Regional Haze, Memorandum from Richard Wayland, Air Quality Assessment Division Director to Regional Air Division Directors Regions 1-10*, p. 58 (Dec. 3, 2014), *available at* https://www3.epa.gov/scram001/guidance_sip.htm (last visited May 18, 2016).

[75] Boundary condition for this model's purposes is the "specification of the initial state of the chemical conditions within the [modeling] domain at the first step of the modeling period." *Id*.

[76] "Given limitations in available ambient data, it is impossible to exactly specify the complex three dimensional chemical characteristics of the initial or boundary conditions." *Id*.

4.3 Meteorology

Temperatures in Yuma, Arizona are similar to those in the Phoenix area with highs during ozone season ranging from about 86 to 107 degrees Fahrenheit, but Yuma has even less precipitation overall. See Table 4-6 for a general climatic summary:

Table 4-6 Climate Summary at Yuma Proving Ground, AZ[77]

Years 1955-2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F)	68.6	72.9	78.6	85.6	94.1	103.2	106.7	105.5	100.6	89.8	76.9	67.8	87.5
Avg. Min. Temp. (F)	43.3	46.8	51.4	57.2	64.8	72.9	80.8	80.8	74.2	62.1	50	42.7	60.6
Avg. Total Precip. (in.)	0.51	0.42	0.33	0.14	0.03	0.04	0.23	0.53	0.42	0.31	0.25	0.45	3.64

4.3.1 Wind Roses

Figure 4-9 presents wind roses showing the annual wind patterns at the Yuma Supersite monitor for 2013-2015. The average wind rose shows a split between northerly and southerly winds. Northerly winds are more frequent in the winter.

Figure 4-9 Yuma Supersite Monitor – Annual Winds

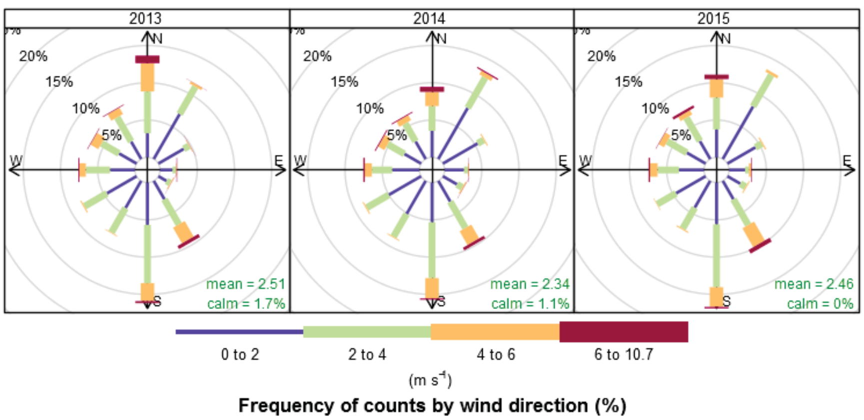
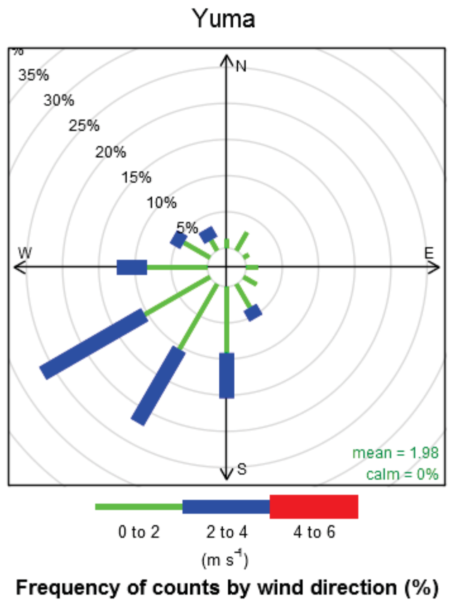


Figure 4-10 presents a wind rose showing the 24 hour wind patterns for the 10 highest days in 2013-2015 at the Yuma Supersite monitor. The wind rose shows a strong pattern of southwesterly winds during ozone exceedance days.

[77] WESTERN REGIONAL CLIMATE CENTER, *Yuma Proving Grounds*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?az9654 (last visited May 27, 2016).

Figure 4-10 Yuma Supersite Monitor – 10 Highest Ozone Concentration Day Winds



4.3.2 HYSPLIT Analyses

Pictured in Figure 4-11 and Figure 4-12 are 24 hour HYSPLIT back trajectories to the Yuma Supersite ozone monitor in Yuma County. The images reflect a trajectory for each hour in the 8 hour exceedance day average for the 10 highest ozone concentration days between 2013 and 2015.

Figure 4-11 Yuma Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories

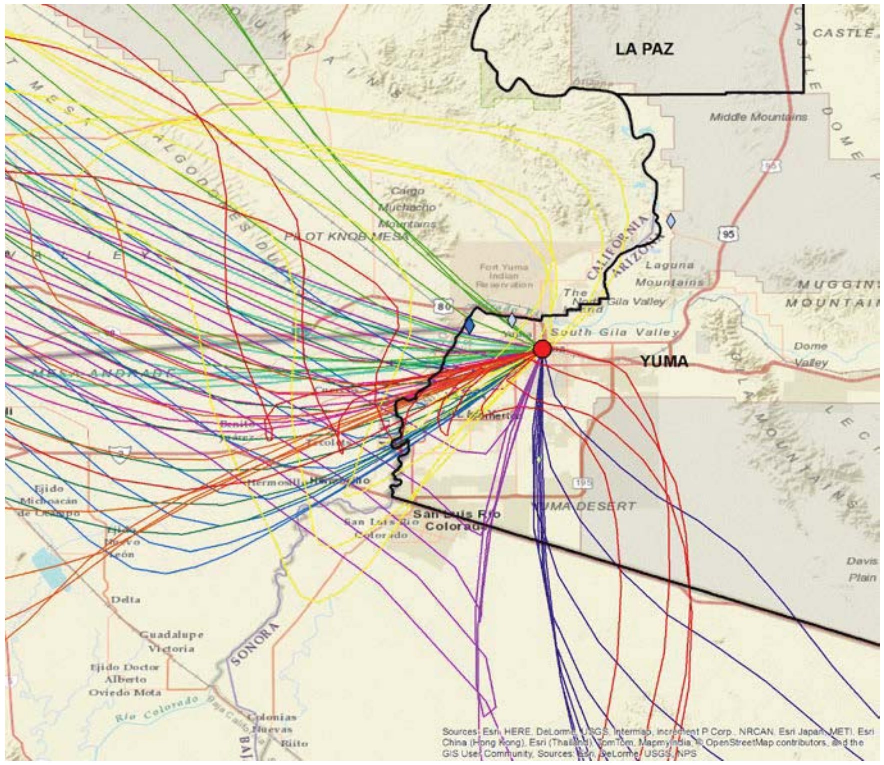


Figure 4-12 Yuma Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories Broad View

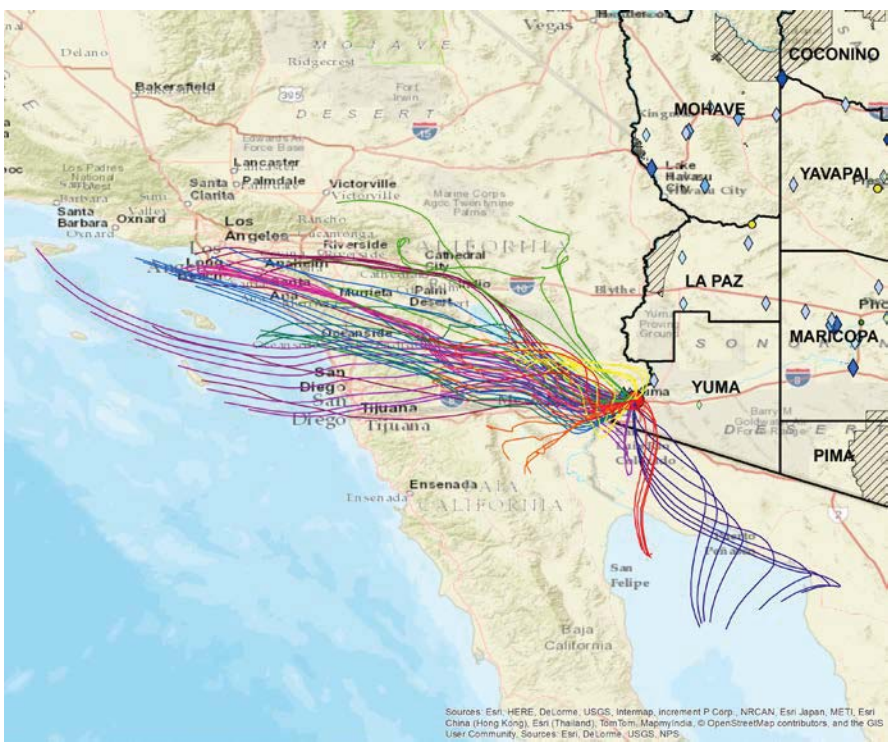
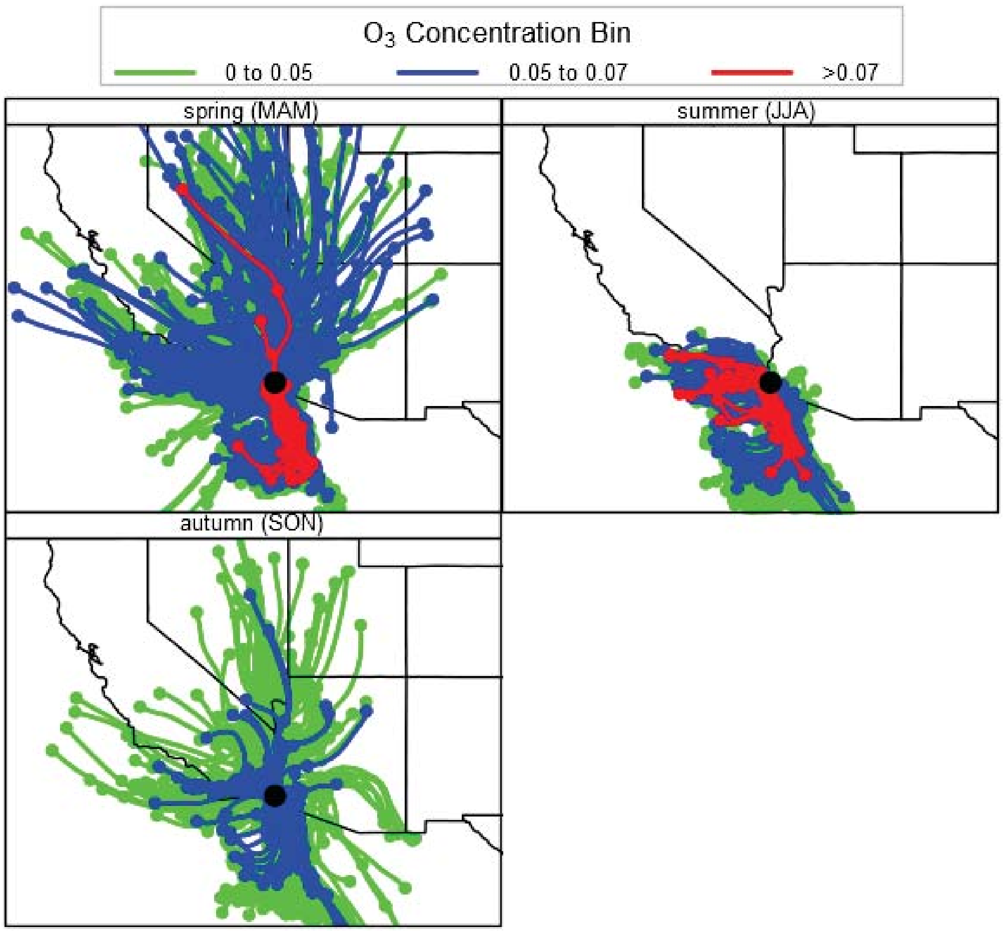


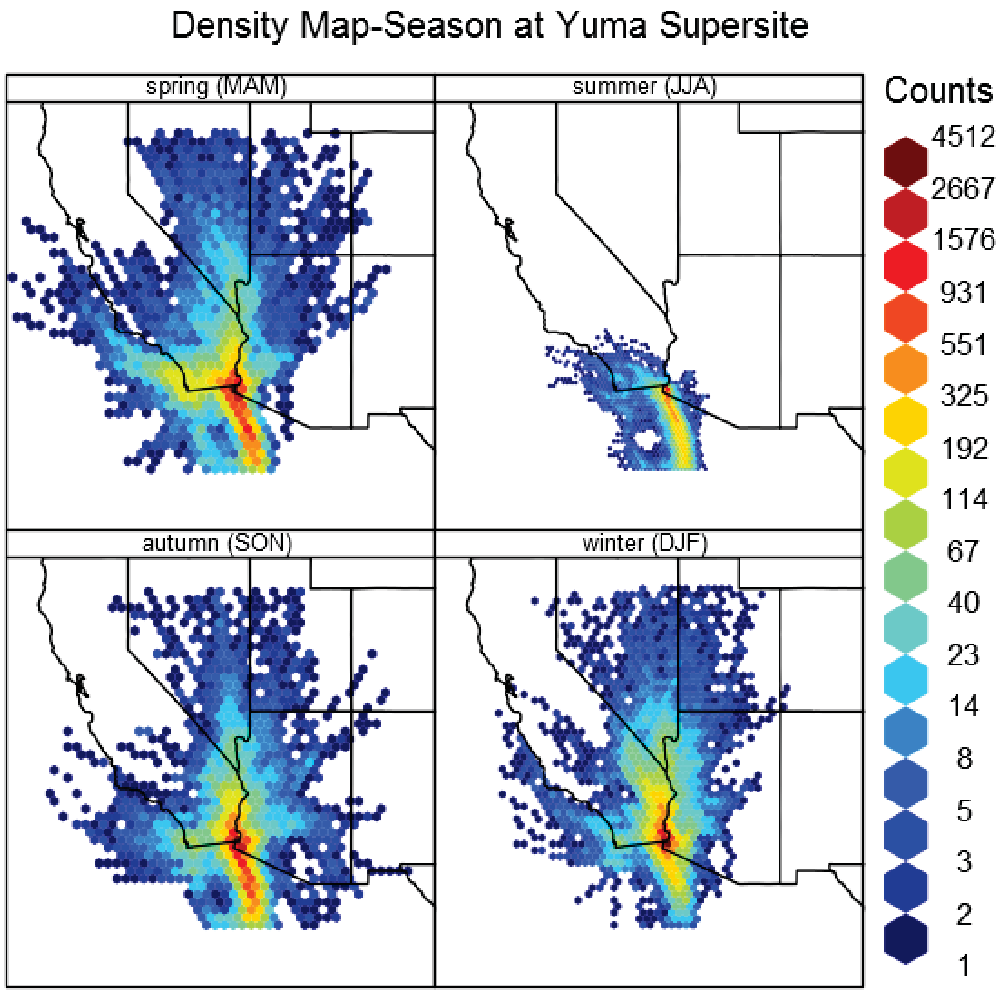
Figure 4-13 below is a diagram representing HYSPLIT 24 hour back trajectories. A trajectory is drawn to represent every third hour in a two year period (2013-2014), and color-coded by concentration. The image is provided in order to give an overall contextual picture of modeled incoming meteorology over the course of a year. Note that during 2013 and 2014, Yuma Supersite did not report monitoring values for November through February.

Figure 4-13 Yuma Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map



In Figure 4-14 below, see a back-trajectory density analysis showing how frequently modeled wind trajectories passed through gridded area sections on their way to the Yuma Supersite monitor between 2013 and 2014. A 24 hour trajectory is drawn to represent every third hour in a two year period (2013-2014)

Figure 4-14 Yuma Supersite Seasonal HYSPLIT Density Map

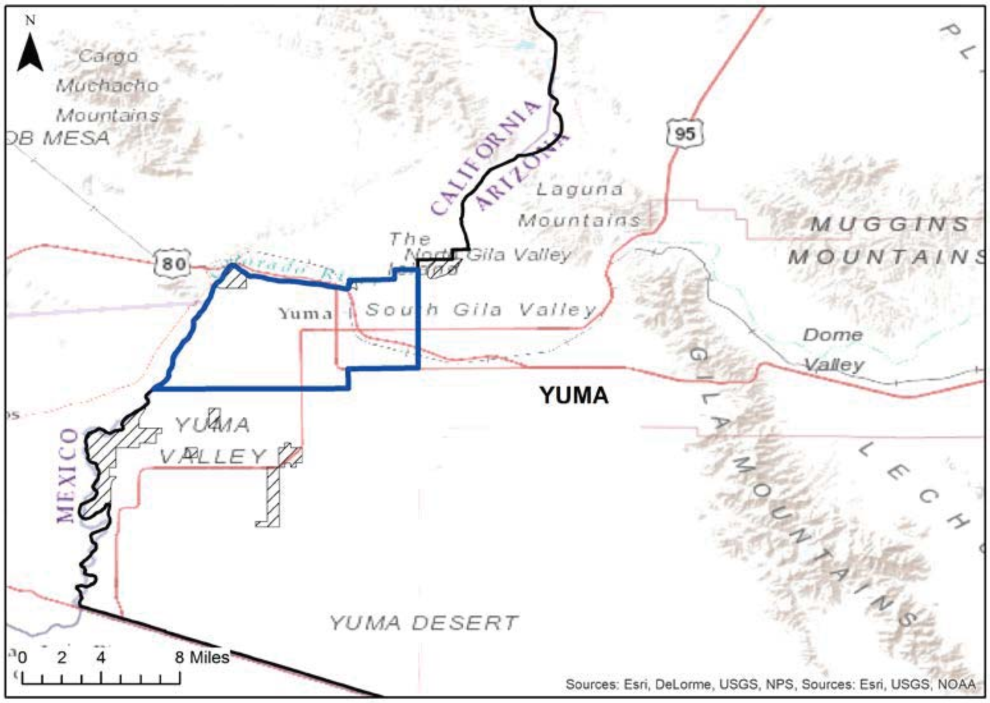


For methodology and additional HYSPLIT model results please see Appendix A, section 3 and Exhibit A1, Section 16.

4.4 Topography

Yuma is located along the Interstate 8, where the Gila River meets the Colorado River, in the Yuma Desert, which is a low elevation section of the Sonoran Desert in the southwestern most corner of Arizona. The Yuma Desert has several masses of sand dunes, south and southeast of the city and near the border, which house very little vegetation. However, much of the land in the City of Yuma area, I-8 corridor, and continuing into both Mexico and California is used for agricultural purposes. Yuma is bordered by California to the west and Mexico to the south. The 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 approximately 26 miles long, 5 miles wide, peaking at 3,156 feet, and run south from the Gila River to fade into the Tinajas Atlas Mountains, which follow the same vector south to the Mexican border. The Laguna Mountains are a circular mountain range north of the City of Yuma, north of the Gila River, ranging approximately 7 miles by 7 miles, peaking at approximately 1,080 feet, and are bordered on the west by the Colorado River. See an overall topographic view of the area in Figure 4-15.

Figure 4-15 Yuma Area Topography



4.5 Jurisdiction

Yuma Metropolitan Planning Organization (YMPO) is the MPO for the Yuma region. YMPO is designated as a bi-state MPO because the region includes all of Yuma County, Arizona and the community of Winterhaven in Imperial County, California (Figure 4-16). ADEQ has sole air quality planning, permitting, and enforcement authority in Yuma County at this time, except on tribal land. There are two points of entry south of the City of Yuma in San Luis,[78] both of which facilitate border traffic to and from Mexico. Both point of entries are manned by U.S. Customs and Border Protection. The City of Yuma and the I-8 corridor is sandwiched between vast U.S. military occupied lands: Yuma Proving Grounds to the north and east and the Barry M. Goldwater Range Air Force Base to the south and east (Figure 4-17). The southeast corner of Yuma County houses the Cabeza Prieta National Wildlife Refuge (adjacent to and below the Goldwater Range).[79]

[78] One point of entry facilitates general border traffic only, and the other facilitates commercial traffic only.
[79] Not shown in Figure 4-17. The refuge is further south of the Goldwater Range.

Figure 4-16 Yuma Area Jurisdiction and Tribal

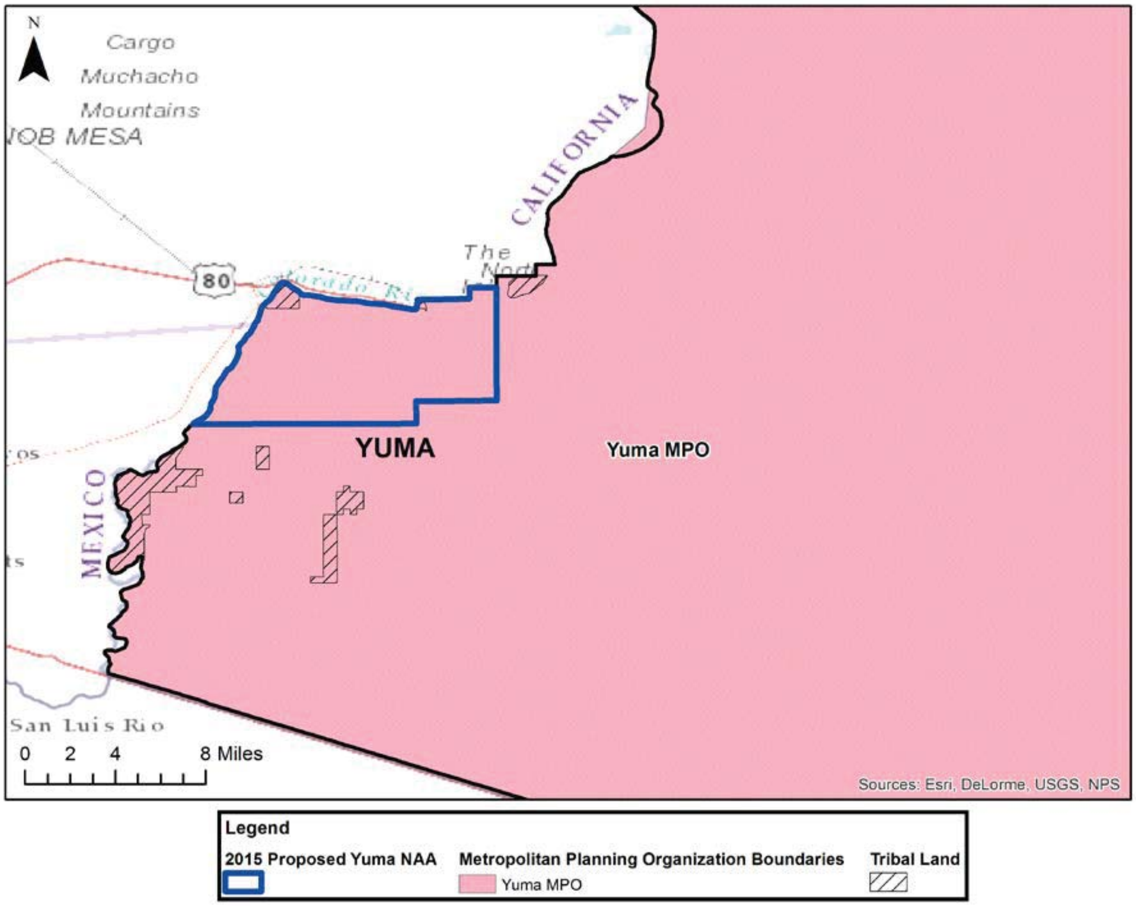
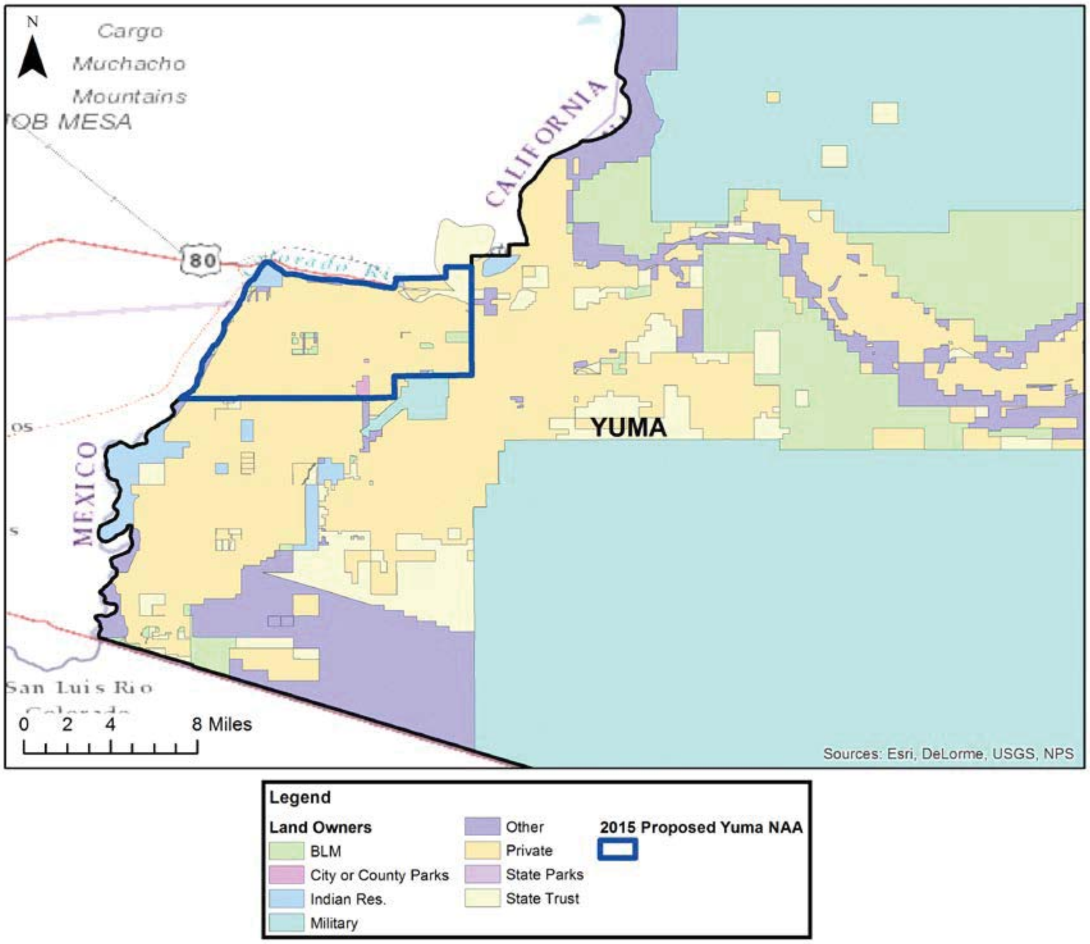


Figure 4-17 Yuma Area Land Owners



4.6 Weight of Evidence Analysis and Recommendation Summary

The Boundary Guidance's recommended five factors may inform the boundary of the nonattainment area, but Yuma is not an urban area that substantially contributes to its own nonattainment.[80] The Yuma area does not likely contribute to its own nonattainment on high ozone days and for this reason, ADEQ recommends a smaller nonattainment boundary.

There are few permanent point sources of ozone precursors in Yuma, and few controllable sources otherwise. Much of the emissions in Yuma are likely transported in, given the above HYSPLIT analyses in Section 4.3.2 and EPA modeling. Approximately 27% of the concentration at the monitor is attributable to emissions from California and Mexico according to EPA's transport modeling as compared to only 6% of monitor impacts being attributable to anthropogenic

[80] EPA's model indicates that Arizona state's contribution to ozone concentrations at the Yuma monitor is 6%, compared to an estimated average 39% from Arizona manmade contribution to monitors in Maricopa County. *EPA's Transport Modeling*, *supra* note 73.

Arizona emissions.[81] Not only are much of the emissions affecting Yuma's high concentrations transported in, almost all nonpoint VOC emission are attributable to biogenic emissions. Also, a significant chunk of the annual onroad emissions, which are approximately 50% of overall NOx in the area and the highest source of NOx in the Yuma area, are likely most attributable to transient traffic (as opposed to local traffic) because Yuma is a port city. There is no way to control Mexican car emissions locally or federally. Additionally, as stated above, Yuma's highest traffic volumes occur in the winter, and not during ozone season.

While ADEQ can appreciate the five factor analysis as a valuable tool for many areas with controllable and local sources, ADEQ does not believe the factors can be reasonably applied and weighed in the Yuma area. Instead, ADEQ finds it reasonable that the area be drawn smaller than might be drawn when strictly applying the five factors. The area should be reasonably limited to the highest populated area and include the existing major and possibly impactful point sources to the monitor. Given the recommended area, 45% of the county's population is captured, 19% of the total county VMT is captured, and the highest emitting and only real possibly contributing permitted point sources are captured.

To establish a larger area would not protect public health or the environment because there would be minimal benefits from future controls on what few emissions there are outside of the recommended boundary. It has been stated in the Regional Impact Analysis that even given "large regional NO_x and VOC reductions," the Yuma area shows a limited response. [82] This means that in the meantime, the area will be bumped up to higher nonattainment classifications in the future, and subject to limited economic development, through little fault of its own. If this is the case, then it is unreasonable to subject the Yuma area to more economic burdens than necessary. Therefore, as suggested in EPA's Background White Paper,[83] ADEQ recommends a smaller nonattainment boundary for the Yuma area because the Yuma monitor is likely minimally impacted by nearby sources on high ozone days, as substantiated by EPA's background modeling.

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[81] *EPA's Transport Modeling*, *supra* note 73.

[82] *Background White Paper*, *supra* note 19 at 2; *see also* EPA, *Regulatory Impact Analysis of the Final Revisions to the NAAQS for Ground-Level Ozone*, p. 2A-33 - 2A-34 (2015), *available at* https://www3.epa.gov/ttnecas1/ria.html.

[83] *Background White Paper*, *supra* note 19 at 12 ("At monitor locations exceeding the 70 ppb standard where there are no or few nearby permanent sources of O3 precursors, or where nearby sources are shown to be unlikely contributors on days with high O3, states can recommend, and EPA may be able to finalize, a nonattainment area boundary that includes a limited area associated with a reasonable jurisdictional boundary, for example, a park boundary for a monitor located in a national park.").

5 Attainment/Unclassifiable Areas in Arizona

5.1 Attainment/Unclassifiable Areas (Including Mohave County)

All other areas within the state that are not otherwise discussed in Sections 3 and 4 above and which are under Arizona's jurisdiction (e.g. excluding tribal land areas) are recommended as attainment/unclassifiable areas.

Recommended attainment areas meet the NAAQS for ozone. Unclassifiable areas are those areas for which ADEQ does not have enough information to designate as either attainment or nonattainment. The rest of the state of Arizona not recommended for nonattainment is recommended as attainment/unclassifiable,[84] including the following:

- Remainder of Maricopa, Pinal, Gila, and Yuma Counties
- Apache County
- Cochise County
- Coconino County
- Greenlee County
- Graham County
- La Paz County
- Mohave County
- Navajo County
- Pima County
- Santa Cruz County
- Yavapai County

Should monitors in any of the above counties become nonattaining monitors given future design values, ADEQ will revise these recommendations to reflect the appropriate boundary.

5.2 Mohave Specific Attainment/Unclassifiable Discussion

ADEQ does not believe that any part of Mohave County should be designated nonattainment. According to EPA guidance, EPA may examine nearby areas that are in the same Combined Statistical Area (CSA) or in the same Core Based Statistical Area (CBSA) (i.e. metropolitan statistical areas (MSA) or micropolitan statistical areas) for possible inclusion in a nonattainment area. Mohave County encompasses the Lake Havasu City-Kingman, AZ MSA, while Clark County encompasses the Las Vegas-Henderson-Paradise, NV MSA. Both MSAs are contained within the Office of Management and Budget delineated Las Vegas-Henderson, NV-AZ CSA. However, just

[84] For more information see Appendix A (2015 Ozone Boundary Recommendation TSD), Section A2.1: Ozone Design Values.

because the counties are in the same CSA, does not mean that Mohave County is contributing to nonattainment in Clark County, or vice versa.

First, despite being 67% larger in area, emissions from Mohave County are much lower than those from Clark County (except for biogenic emissions). See Table 5-1 and Table 5-2 for 2011 NEI information.

Table 5-1 Clark County, Nevada Emissions Totals

Clark County, Nevada (TPY)					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	8,676	3,870	28,965	10,179	51,690
VOC	967	162,177	12,176	8,368	183,688

Table 5-2 Mohave County, Arizona Emissions Totals

Mohave County, Arizona (TPY)					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	376	5,057	8,920	1,406	15,760
VOC	94	229,299	3,374	5,023	237,790

Table 5-3 below represents Mohave County emissions as a percentage of Clark County emissions. In the nonpoint VOC emissions category, biogenics are much higher in Mohave County than Clark County. However, when excluding biogenic emissions, VOC emissions in Mohave County are actually 30% of Clark County VOC emissions.

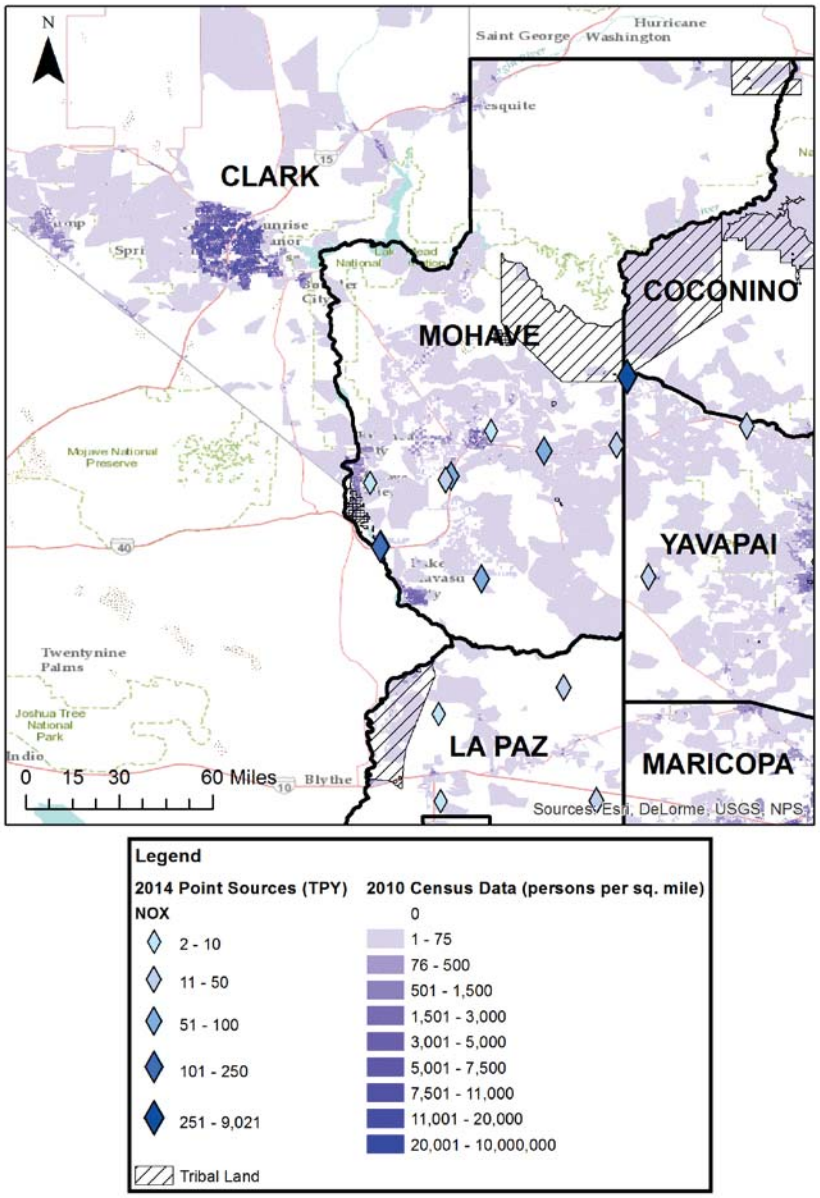
Table 5-3 Mohave County Emissions as Percentage of Clark County Emissions

Mohave County as Percentage of Clark County Emissions					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	4%	131%	31%	14%	30%
VOC	10%	141%	28%	60%	129%

Second, population centers of Mohave County are located in the middle and the southwestern portion of the county, near Lake Havasu City, Bullhead City/Laughlin area, and Kingman (see Figure 5-1). None of the population centers are located physically nearby the Las Vegas area in Clark County. Further, the 2010 population in Mohave County is 200,186 people, compared to 1,951,269 people in Clark County. Hence, Mohave County population is about 10% of Clark County's population.

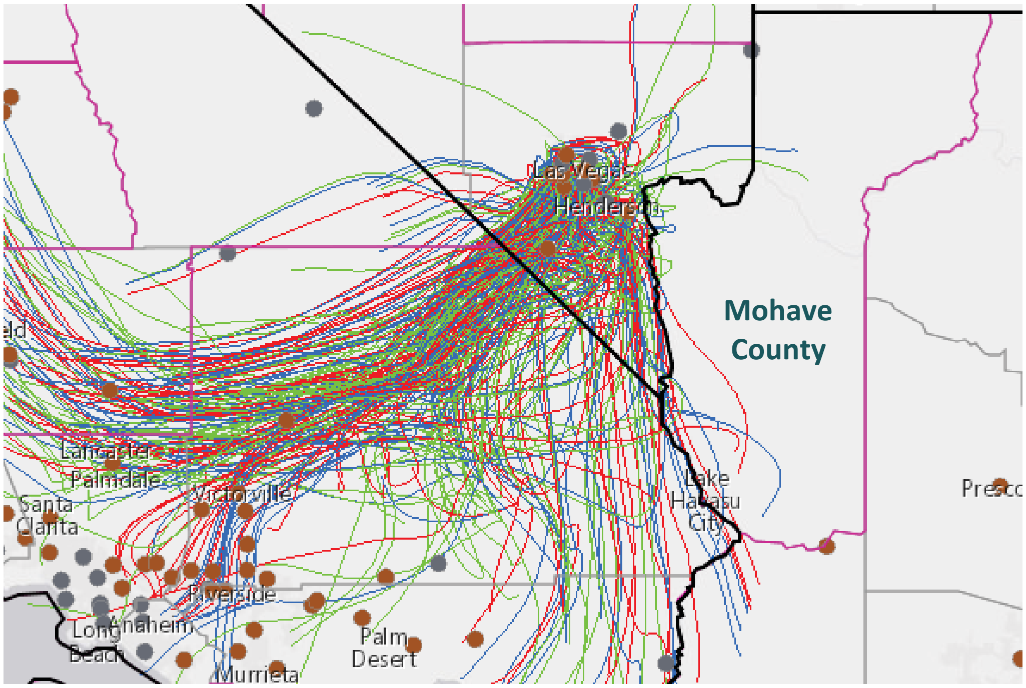
As for the county's few emitting permitted point sources, most of those are also located in the center and southwestern areas of the county (see Figure 5-1), and none are physically nearby the Las Vegas area.

Figure 5-1 Mohave County 2010 Population Density and 2014 Permitted NOx Point Sources



In addition, because Arizona did not run any HYSPLITs for the Clark County area, ADEQ referred to EPA's Mapping Tool for HYSPLITs from the Clark County area (see Figure 5-2). The exceedance day HYSPLIT back trajectories stem from California and not Arizona. All of these facts indicate that none of the Mohave area should be considered nonattainment with the Las Vegas area, even if it is in the same Office of Management and Budget delineated statistical area.

Figure 5-2 Las Vegas Monitor HYSPLITs from EPA Mapping Tool



6 Alternative Data Contingent Nonattainment Areas in the Maricopa Area for the 2015 Ozone NAAQS

6.1 Maricopa-Pinal Alternative Boundary and Township Description

If, given future ozone design values, Pinal County's Queen Valley ozone monitor violates and Gila County's Tonto National Monument ozone monitor attains the 2015 Ozone NAAQS, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley. Figure 6-1 below shows the recommended boundary alternative, and Figure 6-2 shows the recommended boundary alternative in the context of other relevant data. Table 6-1 provides the township and range description of this alternative area.

Figure 6-1 Alternative Maricopa-Pinal Nonattainment Area

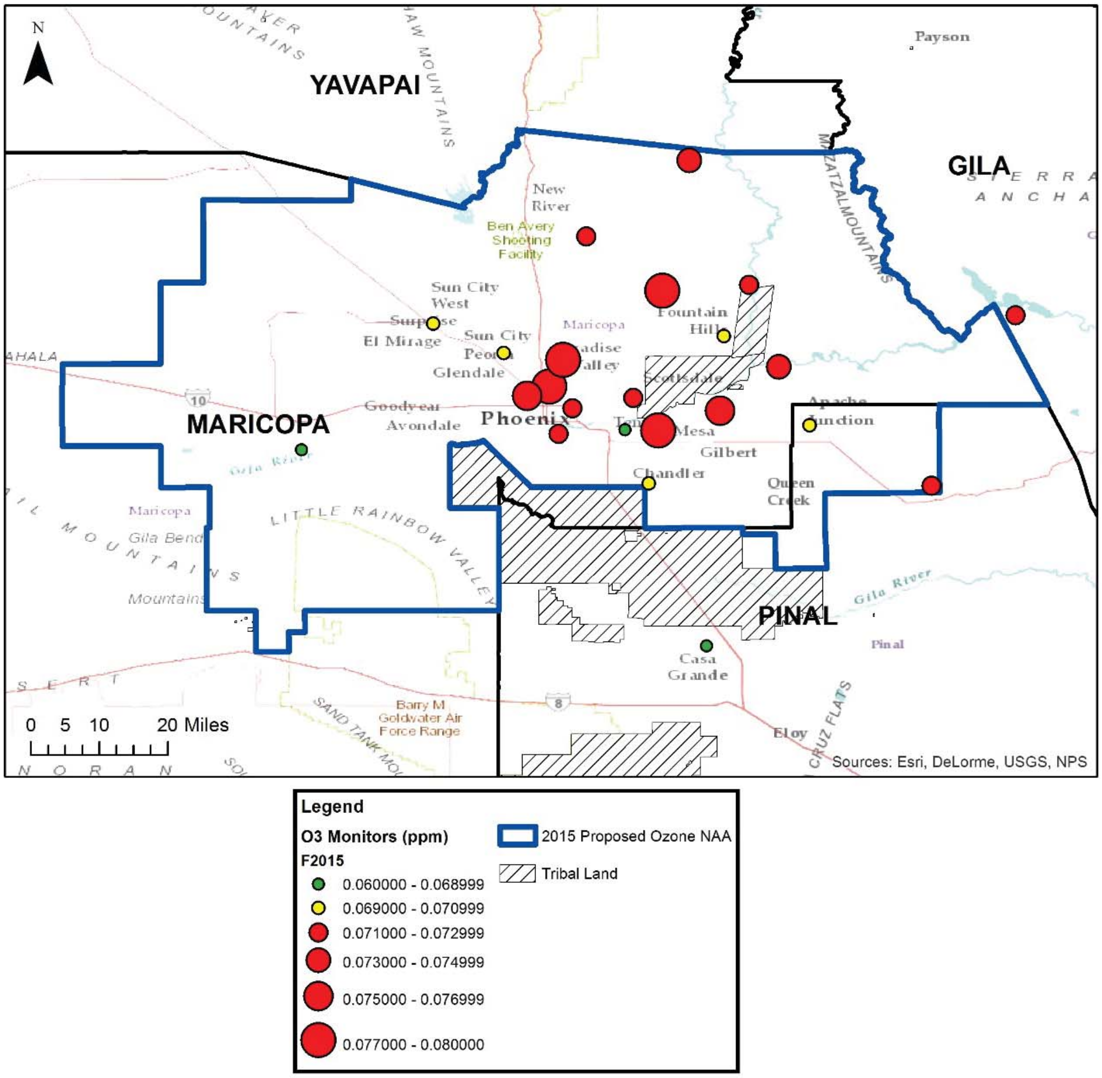


Figure 6-2 Alternative Maricopa-Pinal Nonattainment Area with Relevant Data

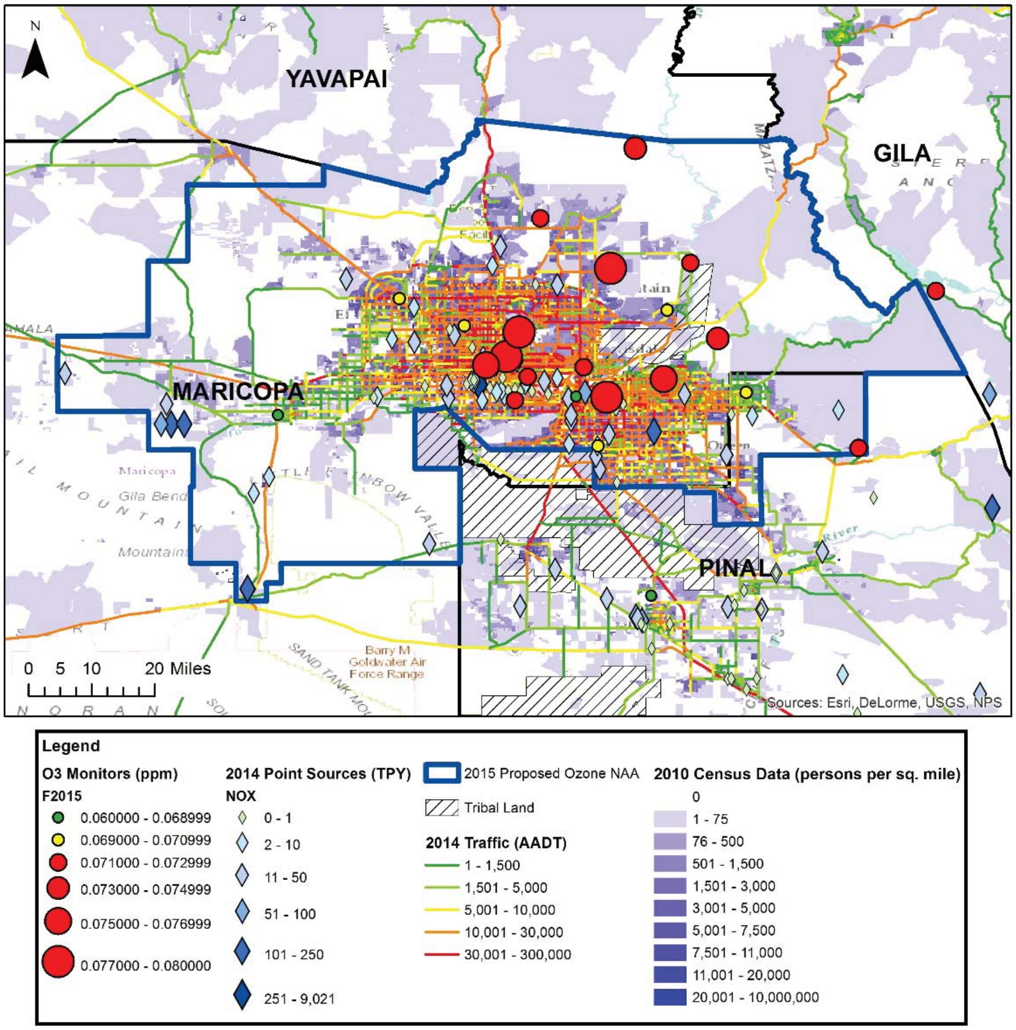


Table 6-1 Township and Range Description for Alternative Maricopa-Pinal Nonattainment Area

Designated Area[85]	Designation Type
Phoenix Area: Maricopa County (part)………………………… T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country)	Nonattainment

[85] All Arizona recommended areas exclude Indian Country.

Designated Area[85]	Designation Type
T1N, R5E (except that portion in Indian Country) T1N, R6E T1N, R7E T1N, R1W T1N, R2W T1N, R3W T1N, R4W T1N, R5W T1N, R6W T1N, R7W T1N, R8W T2N, R1E T2N, R2E T2N, R3E T2N, R4E T2N, R6E (except that portion in Indian Country) T2N, R7E (except that portion in Indian Country) T2N, R8E T2N, R9E T2N, R10E T2N, R11E T2N, R12E (except that portion in Gila County) T2N, R13E (except that portion in Gila County) T2N, R1W T2N, R2W T2N, R3W T2N, R4W T2N, R5W T2N, R6W T2N, R7W T2N, R8W T3N, R1E T3N, R2E T3N, R3E T3N, R4E T3N, R5E (except that portion in Indian Country) T3N, R6E (except that portion in Indian Country) T3N, R7E (except that portion in Indian Country) T3N, R8E T3N, R9E T3N, R10E (except that portion in Gila County) T3N, R11E (except that portion in Gila County) T3N, R12E (except that portion in Gila County)	

Designated Area[85]	Designation Type
T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E	

Designated Area[85]	Designation Type
T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W	

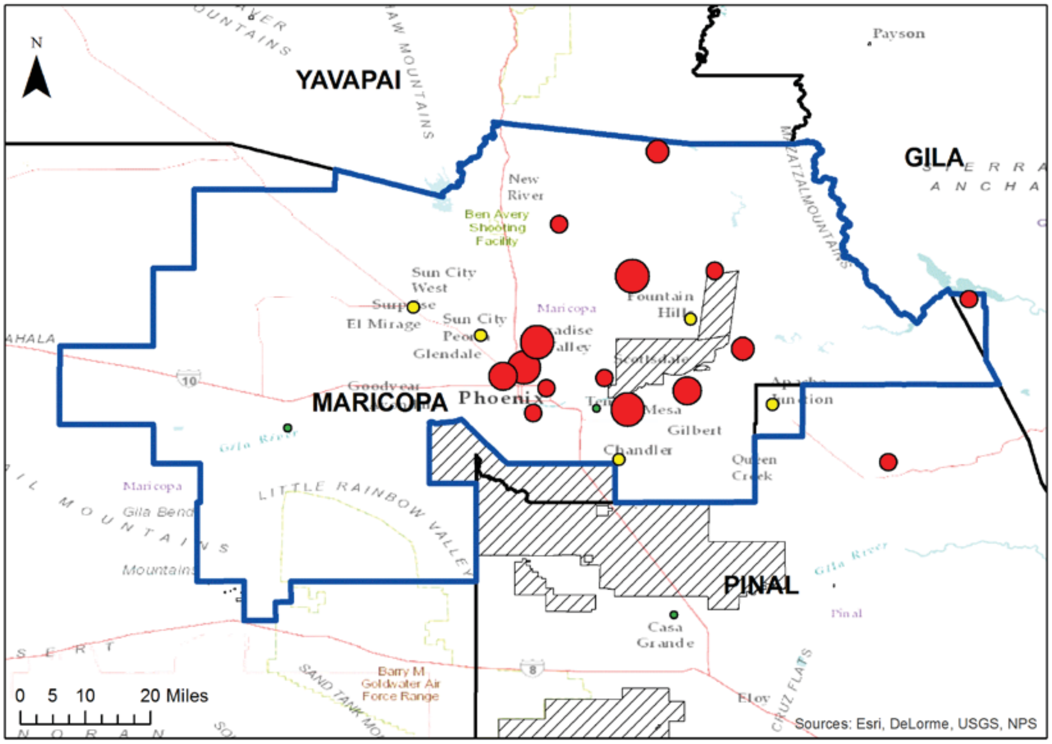
Designated Area[85]	Designation Type
T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34)	
Pinal County (part) ………………………… T1N, R8E T1N, R9E T1N, R10E T1S, R8E T1S, R9E T1S, R10E T2S, R8E (Sections 1 through 10, 15 through 22, and 27 through 34) T2S, R9E (Sections 1 through 6) T2S, R10E (Sections 1 through 6)	Nonattainment

Designated Area[85]	Designation Type
T3S, R7E (Sections 1 through 6, 11 through 14, 23 through 26, and 35 through 36) T3S, R8E (Sections 3 through 10, 15 through 22, and 27 through 34)	

6.2 Maricopa-Gila Alternative Boundary and Township Description

If, given future ozone design values, Gila County's Tonto National Monument ozone monitor violates the 2015 Ozone NAAQS and no other monitor in Pinal County (besides the Apache Junction monitor) violates the standard, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor. Figure 6-3 below shows the suggested boundary alternative, and Figure 6-4 shows the suggested boundary alternative in the context of other relevant data. Table 6-2 provides the township and range description of this alternative area.

Figure 6-3 Alternative Maricopa-Gila Nonattainment Area



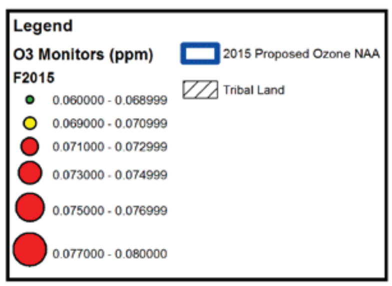


Figure 6-4 Alternative Maricopa-Gila Nonattainment Area with Relevant Data

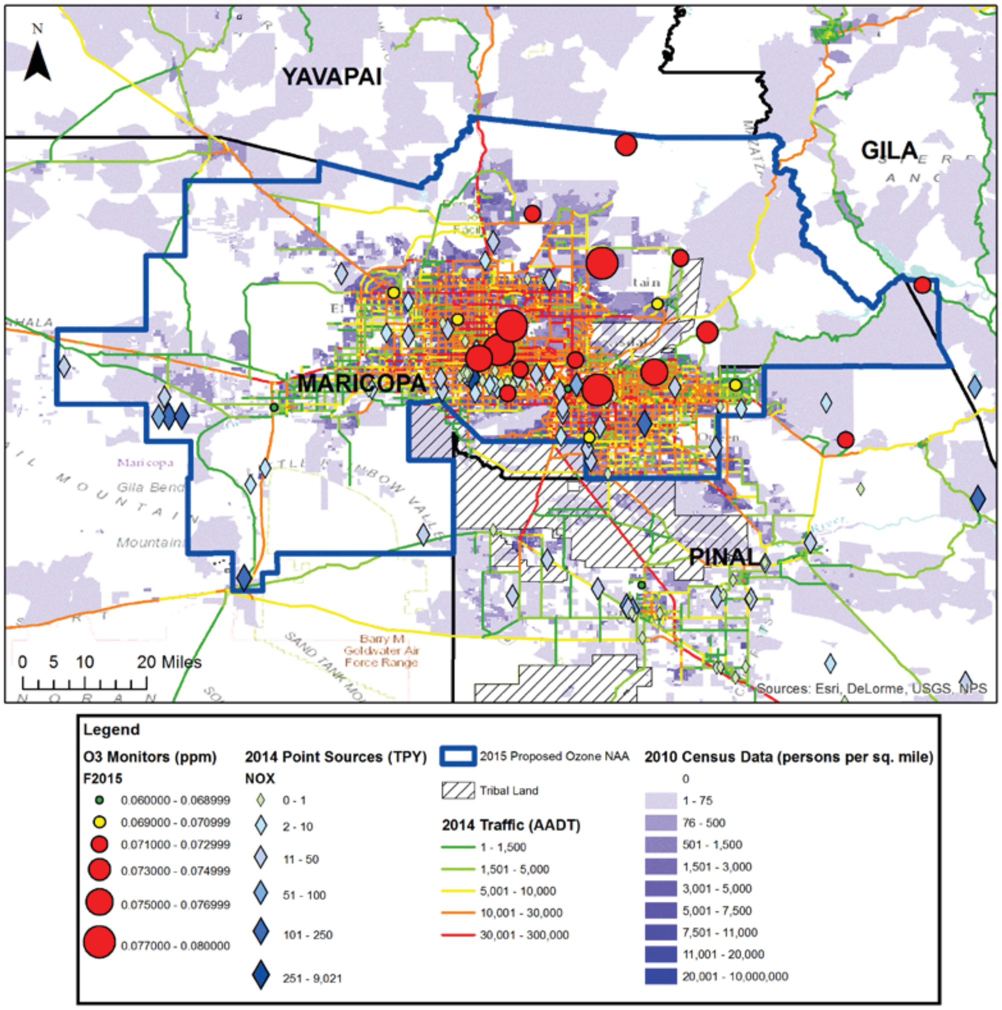


Table 6-2 Township and Range Description for Alternative Maricopa-Gila Nonattainment Area

Designated Area[86]	Designation Type
Phoenix Area: Gila County (part)…………………………… T2N, R12E (except that portion in Maricopa County) T3N, R12E (except that portion in Maricopa County) T4N, R12E (Sections 25 through 29 (except those portions in Maricopa County) and 33 through 36 (except those potions in Maricopa County)	Nonattainment

[86] All Arizona recommended areas exclude Indian Country.

Designated Area[86]	Designation Type
Maricopa County (part)……………………… T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country) T1N, R5E (except that portion in Indian Country) T1N, R6E T1N, R7E T1N, R1W T1N, R2W T1N, R3W T1N, R4W T1N, R5W T1N, R6W T1N, R7W T1N, R8W T2N, R1E T2N, R2E T2N, R3E T2N, R4E T2N, R6E (except that portion in Indian Country) T2N, R7E (except that portion in Indian Country) T2N, R8E T2N, R9E T2N, R10E T2N, R11E T2N, R12E (except that portion in Gila County) T2N, R13E (except that portion in Gila County) T2N, R1W T2N, R2W T2N, R3W T2N, R4W T2N, R5W T2N, R6W T2N, R7W T2N, R8W T3N, R1E T3N, R2E T3N, R3E T3N, R4E T3N, R5E (except that portion in Indian Country)	Nonattainment

Designated Area[86]	Designation Type
T3N, R6E (except that portion in Indian Country) T3N, R7E (except that portion in Indian Country) T3N, R8E T3N, R9E T3N, R10E (except that portion in Gila County) T3N, R11E (except that portion in Gila County) T3N, R12E (except that portion in Gila County) T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W	

Designated Area[86]	Designation Type
T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E	

Designated Area[86]	Designation Type
T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34)	
Pinal County (part) ………………………. T1N, R8E T1S, R8E (Sections 1 through 12)	Nonattainment

6.3 2008 Maricopa-Pinal Alternative Boundary and Township Description

If, given future ozone design values, neither Pinal County's Queen Valley ozone monitor or Gila County's Tonto National Monument ozone monitor violate the 2015 Ozone NAAQS, and no other monitor in Pinal County (besides the Apache Junction monitor) violates the standard, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary continue to be the nonattainment boundary for the 2015 Ozone NAAQS. Figure 6-5 below shows the suggested boundary alternative, and Figure 6-6 shows the suggested boundary alternative in the context of other relevant data. Table 6-3 provides the township and range description of this alternative area.

Figure 6-5 Alternative 2008 Maricopa-Pinal Nonattainment Area

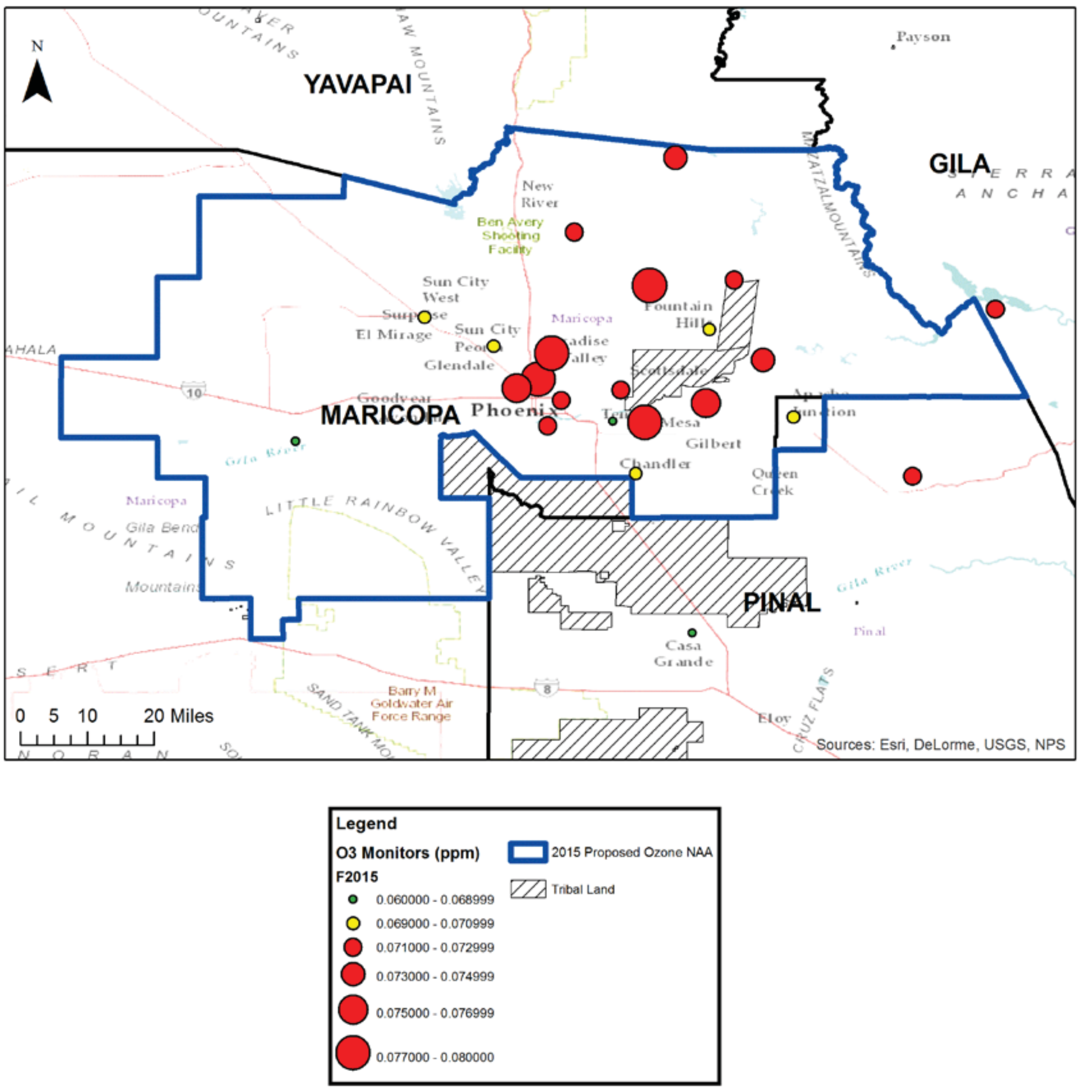


Figure 6-6 Alternative 2008 Maricopa-Pinal Nonattainment Area with Relevant Data

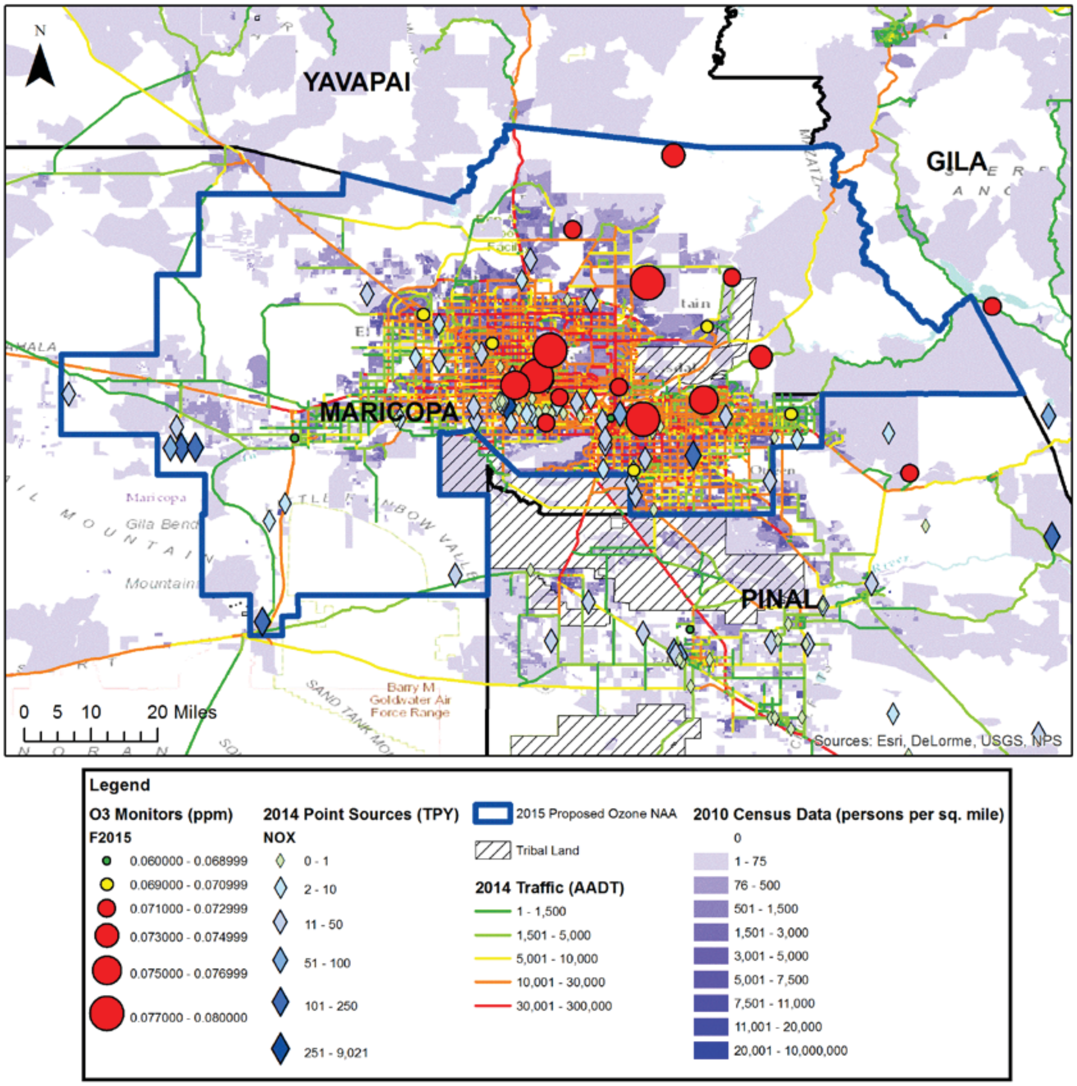


Table 6-3 Township and Range Description for Alternative 2008 Maricopa-Pinal Nonattainment Area

Designated Area[87]	Designation Type
Phoenix Area: Maricopa County (part)………………………… T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country)	Nonattainment

[87] All Arizona recommended areas exclude Indian Country.

Designated Area[87]	Designation Type
T1N, R5E (except that portion in Indian Country) T1N, R6E T1N, R7E T1N, R1W T1N, R2W T1N, R3W T1N, R4W T1N, R5W T1N, R6W T1N, R7W T1N, R8W T2N, R1E T2N, R2E T2N, R3E T2N, R4E T2N, R6E (except that portion in Indian Country) T2N, R7E (except that portion in Indian Country) T2N, R8E T2N, R9E T2N, R10E T2N, R11E T2N, R12E (except that portion in Gila County) T2N, R13E (except that portion in Gila County) T2N, R1W T2N, R2W T2N, R3W T2N, R4W T2N, R5W T2N, R6W T2N, R7W T2N, R8W T3N, R1E T3N, R2E T3N, R3E T3N, R4E T3N, R5E (except that portion in Indian Country) T3N, R6E (except that portion in Indian Country) T3N, R7E (except that portion in Indian Country) T3N, R8E T3N, R9E T3N, R10E (except that portion in Gila County) T3N, R11E (except that portion in Gila County) T3N, R12E (except that portion in Gila County)	

Designated Area[87]	Designation Type
T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E	

Designated Area[87]	Designation Type
T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W	

Designated Area[87]	Designation Type
T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34)	
Pinal County (part) ……………………….. T1N, R8E T1S, R8E (Sections 1 through 12)	Nonattainment

Arizona Department of Environmental Quality

Appendix A
2015 Ozone Boundary Recommendation Technical Support Document

Air Quality Division
August 30, 2016 Final

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A1 Data Sources

The tables below (Table A1-1, Table A1-2, Table A1-3, Table A1-4, and Table A1-5) list the data sets and sources of all data collected and used for the five factor analysis.

Table A1-1 Data Sources for Ambient Air Data

Air Quality Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Ozone Design Values for All Sites in Arizona	1995-2015	EPA Air Quality System (AQS) Design Value Reports	03/31/2016
Hourly Ozone Concentrations for All Sites in Arizona	2013-2015	EPA Air Quality System (AQS) Hourly Data Reports	03/31/2016

Table A1-2 Data Sources for Emissions and Emissions Related Data

Emissions and Emissions Related Data			
Description	**Data Year**	**Data Source**	**Downloaded**
County NOx and VOC Emissions	2011	EPA National Emissions Inventory (NEI) version 2 https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data	04-11-2016
Census Population by County	2000 and 2010	Arizona Department Of Administration (ADOA) – Intercensal Estimates https://population.az.gov/population-estimates	04-11-2016
CDP Level Census Population	2000 and 2010	U.S. Census Bureau - http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_PL_GCTPL.ST10&prodType=table	03/04/2016
Arizona Population Estimates	2015	Arizona Department Of Administration (ADOA) - https://population.az.gov/population-estimates	03/04/2016
County to County Commuting Data	2009-2013	U.S. Census Commuting Patterns (American Community Survey) - http://www.census.gov/hhes/commuting/ YMPO Regional Transportation Plan MAG Regional Transportation Plan	04/11/2016
Arizona Prison Populations	2000 and 2010	Data provided by Arizona Department of Corrections	03/02/2016
EPA Transport Modeling Data	*2011 (base year) modeled forward to 2017	Air Quality Modeling TSD for the 2008 Ozone NAAQS Cross-State Air Pollution Rule Proposal and data files https://www.epa.gov/airmarkets/proposed-cross-state-air-pollution-update-rule	04/14/16
Traffic Data (Annual Average Daily Traffic)	2014	Data provided by Arizona Department of Transportation	11/02/2015

Census Block Level Population and # of Households	2000 and 2010	U.S. Census Bureau - ftp://ftp2.census.gov/geo/tiger/TIGER2010BLKPOPHU/	10/26/2015
ADEQ Point Source Data	2014	Major source data from SLEIS datasets.	10/26/2015
Maricopa County Point Source Data	2014	Maricopa County Air Quality Department provided a major and synthetic minor source list	02/04/2016
Pinal County Point Source Data	2014	Pinal County Air Quality Control District provided a major and synthetic minor source list	02/08/2016
Mexican Emissions Inventory data	2011	Eastern Research Group's Technical Documentation for Year 2015 Ozone Precursor Emission Inventory for U.S., Mexico, And Canada And Year 2011 Ozone Precursor Emission Inventory For Mexico - provided by the Maricopa Association of Governments	--
Southern California Counties' Point Source Data	2011	National Emissions Inventory (NEI) version 2 https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data	05/04/2016
Arizona Border Crossing Counts (Yuma and Nogales)	2013-2015	U.S. Department of Transportation - Bureau of Transportation Statistics http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BC_Index.html	05/04/2016

Table A1-3 Data Sources for Meteorological Data

Meteorological Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Hourly Meteorological Data (Wind speed and wind direction) for 7 selected sites	2013-2015	Air Quality System (AQS) Hourly Data Reports and internal ADEQ data	04/28/2016

Table A1-4 Data Sources for Geographic and Topographic Data

Geography and Topography Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Arizona Aerial Photography	2004-2013	ADEQ internal shapefiles	--
World Terrain Basemap	2009	Environmental Systems Research Institute (ESRI): http://goto.arcgisonline.com/maps/World_Terrain_Base	--
World Street Basemap	2016	Environmental Systems Research Institute (ESRI): http://goto.arcgisonline.com/maps/World_Street_Map	--

Table A1-5 Data Sources for Jurisdictional Boundary Data

Jurisdictional Boundary Data			
Description	**Data Year**	**Data Source**	**Downloaded**
CBSA/MSA Boundaries	2015	U.S. Census Bureau - http://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2015&layergroup=Core+Based+Statistical+Areas	10/26/2015
Arizona County Boundaries	2014	Arizona Land Resource Information System	10/26/2015
Arizona Tribal Boundaries	2013	Arizona Land Resource Information System	01/26/2016
Arizona Township, Range and Selection	2014	Arizona Land Resource Information System	01/26/2016
Arizona MPO Boundaries	2015	National Transportation Atlas Databases (NTAD) via USDOT - http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/polygon	10/26/2015
2008 Arizona 8-hour Ozone Boundary	2013	ADEQ internal shapefile	01/26/2016
Arizona Area A Boundary	2007	ADEQ internal shapefile	03/04/2016
Census Designated Places	2000 and 2010	U.S. Census Bureau - https://www.census.gov/geo/maps-data/data/cbf/cbf_place.html	03/04/2016
Public Land Ownership GIS layer	2012	Arizona Land Resource Information System	04/11/2016

A2 Ambient Air Data

A2.1 Ozone Design Values

Ambient ozone concentrations are monitored at numerous sites across Arizona. These monitoring sites are operated by the Arizona Department of Environmental Quality (ADEQ)[1], the Maricopa County Air Quality Department (MCAQD)[2], the Pima County Department of Environmental Quality (PCDEQ)[3], the Pinal County Air Quality Control District (PCAQCD)[4], and the Clean Air Status and Trends Network (CASTNET)[5]. Figure A2-1 below shows the locations of all of the ambient ozone monitors in Arizona. Table A2-1 below gives the site ID number, name, network, latitude, longitude, and the 2015 design value for all of the monitors in Arizona.

[1] Arizona Department of Environmental Quality. (2015, July 1). *State of Arizona Air Monitoring Network Plan for the Year 2015*. Retrieved from http://www.azdeq.gov/function/forms/download/air_monitoring_network_plan2015

[2] Maricopa County Air Quality Department. (2015, September). *2014 Air Monitoring Network Plan*. Retrieved from http://www.maricopa.gov/aq/divisions/monitoring/network.aspx

[3] Pima County Department of Environmental Quality. (2016). *2015 Ambient Air Monitoring Network Plan*. Retrieved from http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=61365

[4] Pinal County Air Quality Control District. (2015). *2015 Ambient Monitoring Network Plan and 2014 Data Summary*. Retrieved from http://pinalcountyaz.gov/AirQuality/Pages/MonitoringNetwork.aspx

[5] Clean Air Status and Trends Network (CASTNET). Retrieved from https://www.epa.gov/castnet

Figure A2-1 Arizona Ozone Monitoring Network

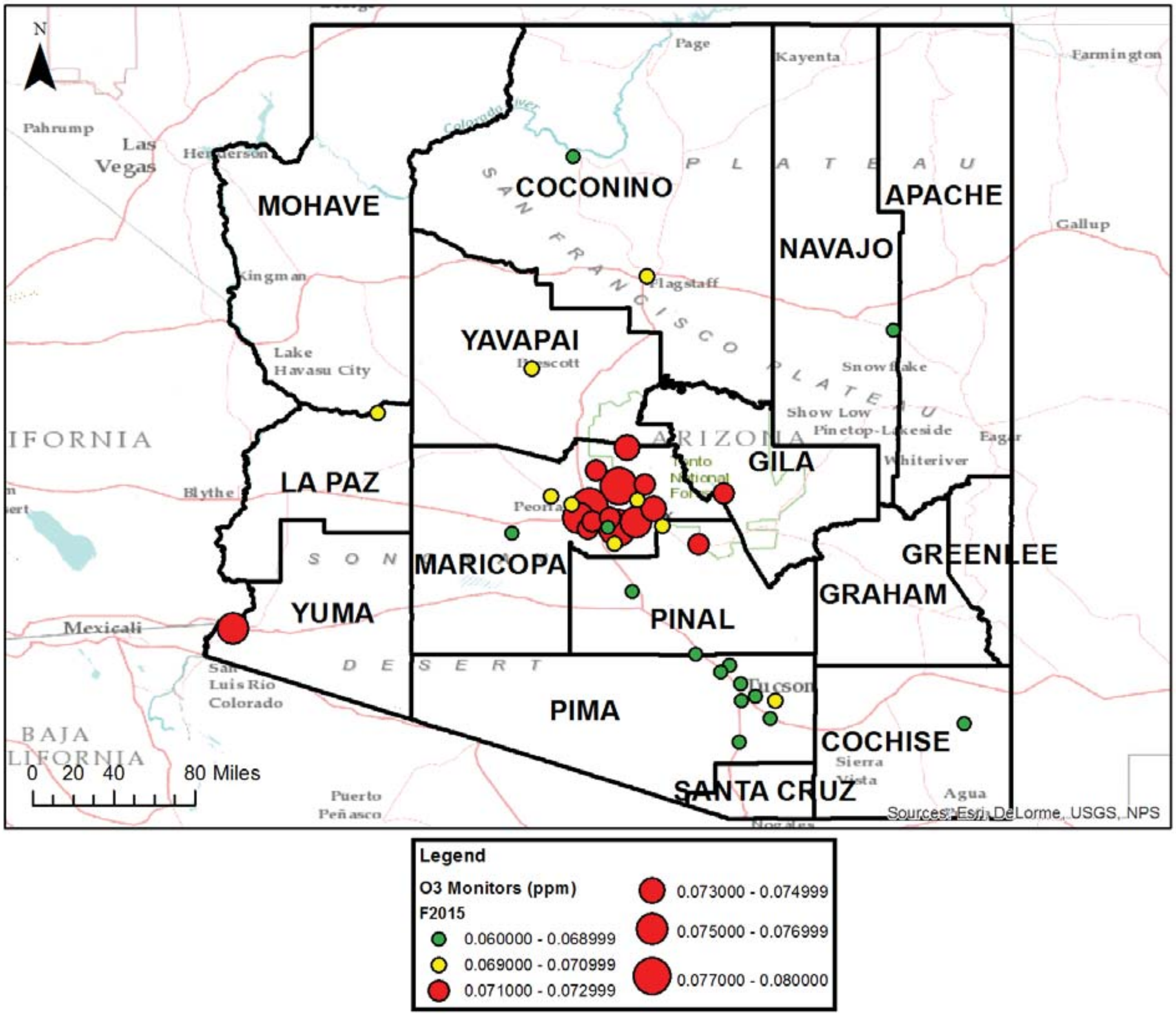


Table A2-1 Ozone Design Values

Site ID	Name	County	Network	Latitude	Longitude	2015 Design Value
04-003-8001	Chiricahua National Monument	Cochise	CASTNET	32.009405	-109.389058	0.068
04-005-1008	Flagstaff Middle School	Coconino	SLAMS	35.2061	-111.6528	0.070
04-005-8001	Grand Canyon National Park	Coconino	CASTNET	36.058642	-112.183575	0.068
04-007-0010	Tonto National Monument	Gila	SLAMS	33.6547	-111.1074	0.072
04-012-8000	Alamo Lake	La Paz	SLAMS	34.2439	-113.559	0.070
04-013-0019	West Phoenix	Maricopa	SLAMS	33.48385	-112.14257	0.075
04-013-1003	Mesa	Maricopa	SLAMS	33.41045	-111.86507	0.078
04-013-1004	North Phoenix	Maricopa	SLAMS	33.56033	-112.06626	0.077
04-013-1010	Falcon Field	Maricopa	SLAMS	33.45223	-111.73331	0.075
04-013-2001	Glendale	Maricopa	SLAMS	33.56936	-112.19153	0.070
04-013-2005	Pinnacle Peak	Maricopa	SLAMS	33.70655	-111.85557	0.078
04-013-3002	Central Phoenix	Maricopa	SLAMS	33.45793	-112.04601	0.072
04-013-3003	South Scottsdale	Maricopa	SLAMS	33.47968	-111.91721	0.071
04-013-4003	South Phoenix	Maricopa	SLAMS	33.40316	-112.07533	0.072
04-013-4004	West Chandler	Maricopa	SLAMS	33.29898	-111.88431	0.070
04-013-4005	Tempe	Maricopa	SLAMS	33.4124	-111.93473	0.064[6]
04-013-4008	Cave Creek	Maricopa	SLAMS	33.82169	-112.017	0.071
04-013-4010	Dysart	Maricopa	SLAMS	33.63713	-112.34184	0.070
04-013-4011	Buckeye	Maricopa	SLAMS	33.37005	-112.6207	0.060
04-013-9508	Humboldt Mountain	Maricopa	SLAMS	33.9828	-111.7987	0.073
04-013-9702	Blue Point	Maricopa	SLAMS	33.54549	-111.60925	0.074
04-013-9704	Fountain Hills	Maricopa	SLAMS	33.61103	-111.72529	0.069[7]
04-013-9706	Rio Verde	Maricopa	SLAMS	33.71881	-111.67183	0.071
04-013-9997	JLG Supersite	Maricopa	SLAMS	33.5038	-112.096	0.077
04-017-0119	Petrified Forest National Park	Navajo	CASTNET	34.822508	-109.892485	0.066
04-019-0021	Saguaro National Park	Pima	SLAMS	32.174538	-110.737116	0.069
04-019-1011	22nd & Craycroft	Pima	SLAMS	32.20442	-110.878067	0.063
04-019-1018	Tangerine	Pima	SPM	32.42525	-111.0635	0.065
04-019-1020	Fairgrounds	Pima	SPM	32.04768	-110.77435	0.066
04-019-1028	Children’s Park NCore	Pima	SLAMS	32.29515	-110.9823	0.066
04-019-1030	Green Valley	Pima	SPM	31.87952	-110.99644	0.064
04-019-1032	Rose Elementary	Pima	SPM	32.173	-110.980115	0.065
04-019-1034	Coachline	Pima	SPM	32.38082	-111.12716	0.063
04-021-3001	Apache Junction Maint. Yard	Pinal	SLAMS	33.4214	-111.544	0.069
04-021-3003	Casa Grande Airport	Pinal	SLAMS	32.95436	-111.762	0.065
04-021-3007	Pinal Air Park	Pinal	SLAMS	32.50831	-111.308	0.065
04-021-8001	Queen Valley	Pinal	SLAMS	33.2938	-111.286	0.071
04-025-8033	Prescott College	Yavapai	SLAMS	34.5451	-112.477	0.069
04-027-8011	Yuma Supersite	Yuma	SLAMS	32.6903	-114.614	0.076

[6] Design value is not valid due to incomplete data from 2013-2015.

[7] Design value is not valid due to incomplete data from 2013-2015.

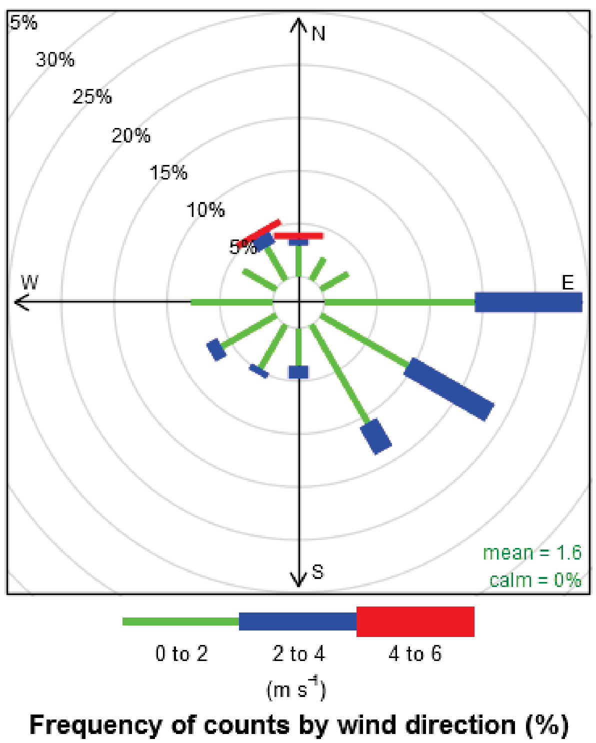
A3 Meteorological Analyses

A3.1 Wind Rose Analysis

Using 3 years of meteorological data for 2013-2015, ADEQ plotted wind roses to show the wind direction and wind speed for ambient ozone monitors, where meteorological data was available. Wind roses were plotted annually for each of the three years, as well as for the wind data for the ten highest monitored ozone days from 2013-2015.

For example, Figure A3-1 is the wind rose for the ten highest monitored ozone days at the JLG Supersite monitor in Phoenix, AZ for the 2013-2015 time period. This wind rose shows that around 25% of the winds are from the east, with an additional 35% from the southeast. For the winds from the east, around 15% of wind speeds are less than 2 m/s (about 4.5mph) and 10% are between 2 m/s and 4 m/s (about 4.5 to 9mph). The figure also shows that 0% of the winds are calm and that the average wind speed is 1.6 m/s (about 3.5mph).

Figure A3-1 JLG Supersite Wind Rose for the Ten Highest Ozone Days (2013-2015)



A3.2 HYSPLIT Analyses

A3.2.1 HYSPLIT Back Trajectory Analysis

The National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model[8] was used to perform back trajectory analyses for the ozone monitoring sites in Arizona with design values above the 2015 NAAQS. Back trajectories were modeled for the ten highest ozone exceedance days from 2013-2015 for each of the violating monitoring sites. ADEQ elected to run an ensemble of back trajectories beginning at the end of the highest eight hour exceedance period for each of the ten highest exceedance days. Starting with the eighth hour of the exceedance, a new trajectory begins every preceding hour until all eight hours in the daily max ozone exceedance is represented with a 24 hour back trajectory.

The North American Mesoscale (NAM)[9] 12km meteorological model was selected for the initial meteorological input to the model. Also, ADEQ selected "model vertical velocity" as the method for computing vertical motion. To best represent surface conditions, a starting height for the model was selected at 100 meters above ground level (AGL), and the model was only run for 24 hours backward.

The above method accords with HYSPLIT method suggested in the EPA Guidance on the Area Designations for the 2015 Ozone National Ambient Air Quality Standards[10]. U.S. county borders, the default projection, vertical plot height units in meters AGL, and the six hour interval labels were all used for the display output.

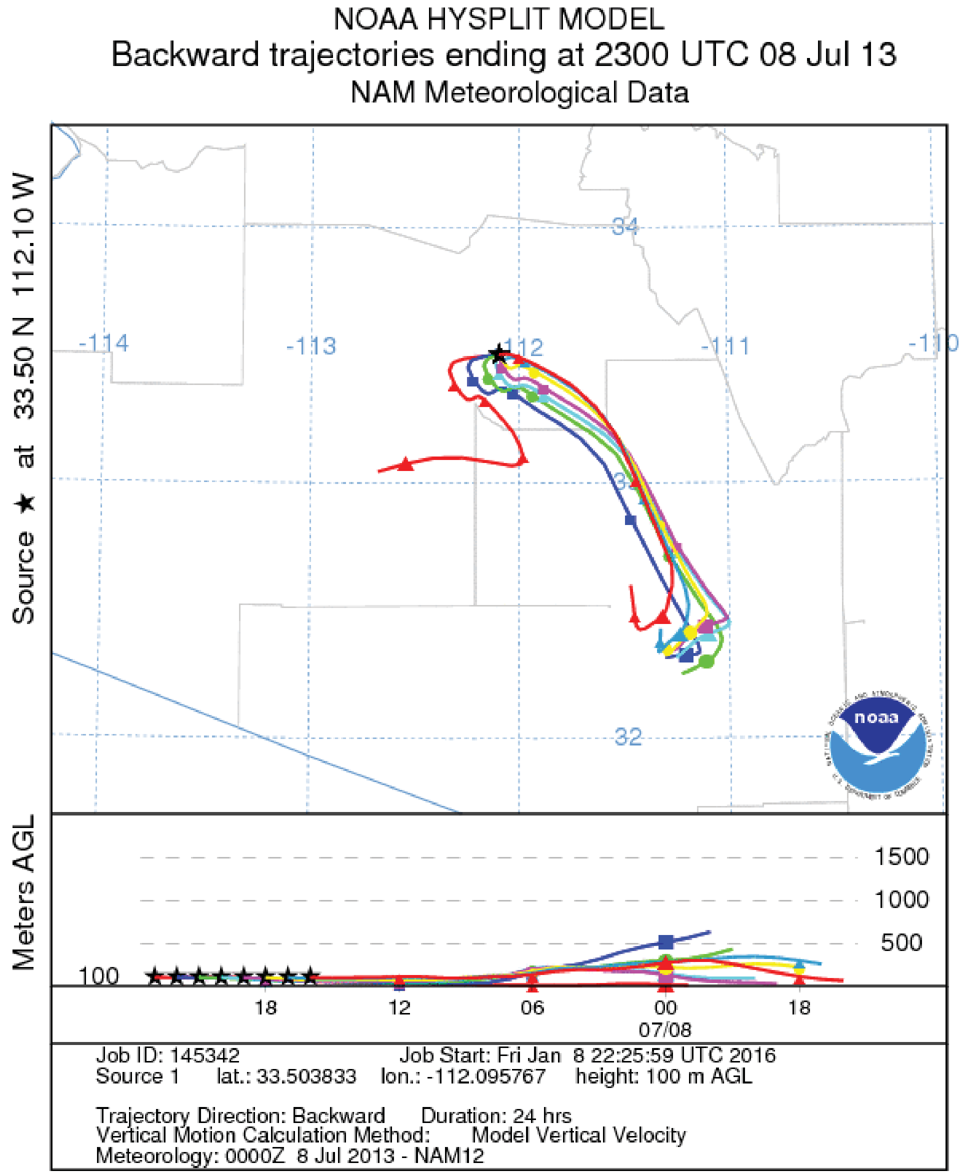
For example, Figure A3-2 is the HYSPLIT model output of back trajectories for the ozone exceedance at the JLG Supersite monitor on July 8th, 2013. The top half of the figure shows a different colored back-trajectory for each of the eight hours during the maximum 8-hour ozone exceedance and where it moves spatially in relation to the monitor (the star). This example shows that the majority of the back-trajectories came from the southeast. The bottom half of the image shows how the eight trajectories moved vertically in the atmosphere, with this example showing that only one of the eight trajectories reached an altitude of 500m above ground level.

[8] HYSPLIT - Hybrid Single Particle Lagrangian Integrated Trajectory Model. Retrieved from http://ready.arl.noaa.gov/HYSPLIT.php

[9] North American Mesoscale Forecast System (NAM). Retrieved from https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/north-american-mesoscale-forecast-system-nam

[10] *Area Designations [Guidance] for the 2015 Ozone National Ambient Air Quality Standards*, Memorandum from Janet G. McCabe, Acting Assistant Administrator, to Regional Administrators, Regions 1-10, dated February 25, 2016.

Figure A3-2 JLG Supersite HYSPLIT Back Trajectory for July 8th, 2013



A3.2.2 Openair HYSPLIT Analysis

In addition to using the HYSPLIT model for trajectory analysis, Openair[11] was utilized in conjunction with HYSPLIT to perform additional trajectory analyses. Openair is an R programming language package for air quality data analysis.

Openair was utilized to run a HYSPLIT back trajectory analysis for two full years, 2013 and 2014. The model was run to calculate air mass trajectories in the preceding 24 hours starting at 0:00

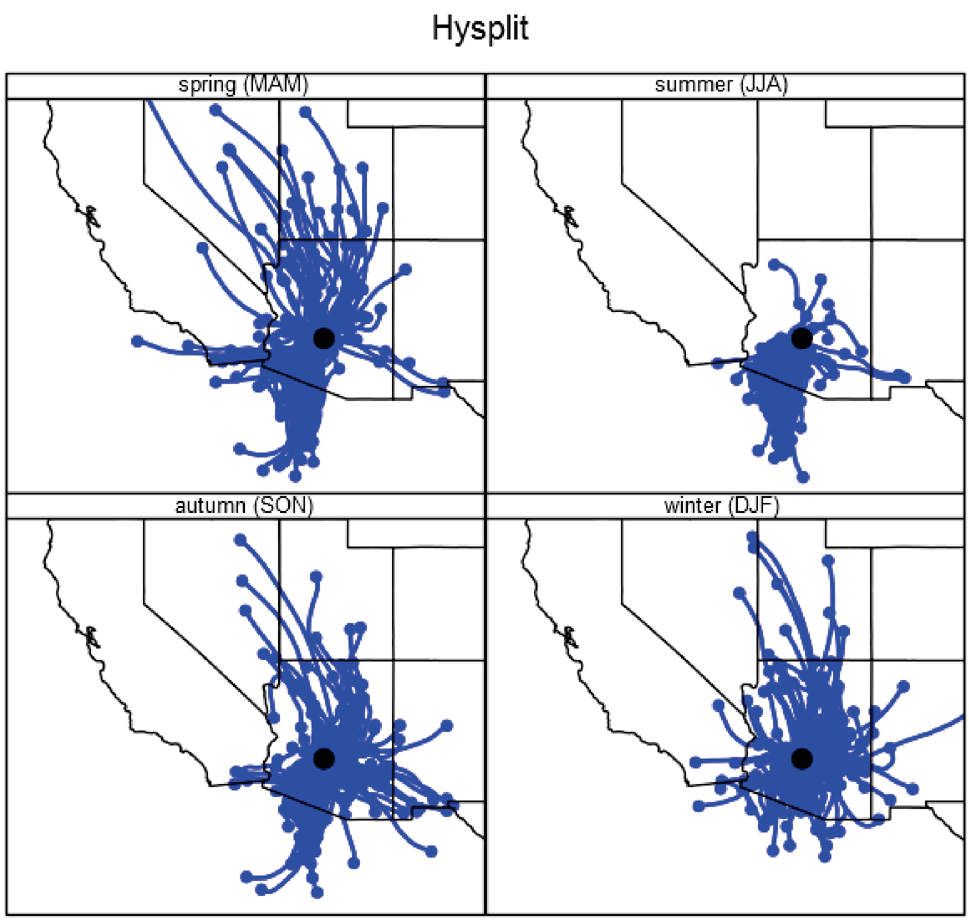
[11] Openair project: open-source tools for the analysis of air pollution data. NERC Knowledge Exchange Project. Retrieved from http://www.openair-project.org/Default.aspx

a.m. Arizona local time for each day in 2013 and 2014 at the receptor height (assumed to be 10 m). The HYSPLIT model was driven by the North American Regional Reanalysis[12] (NARR) meteorological dataset.

Seasonal variations were also plotted. For the season-specific ensembles, March, April and May were regarded as spring; June, July and August were treated as summer, September, October and November were treated as fall; December and the following January and February were regarded as winter.

Figure A3-3 below shows the back trajectory analysis for the JLG Supersite monitor in Phoenix. Every 24 hour back trajectory for every third hour in 2013 and 2014 is displayed by season, showing the general pattern of air-mass origin.

Figure A3-3 JLG Supersite Seasonal HYSPLIT Back Trajectories

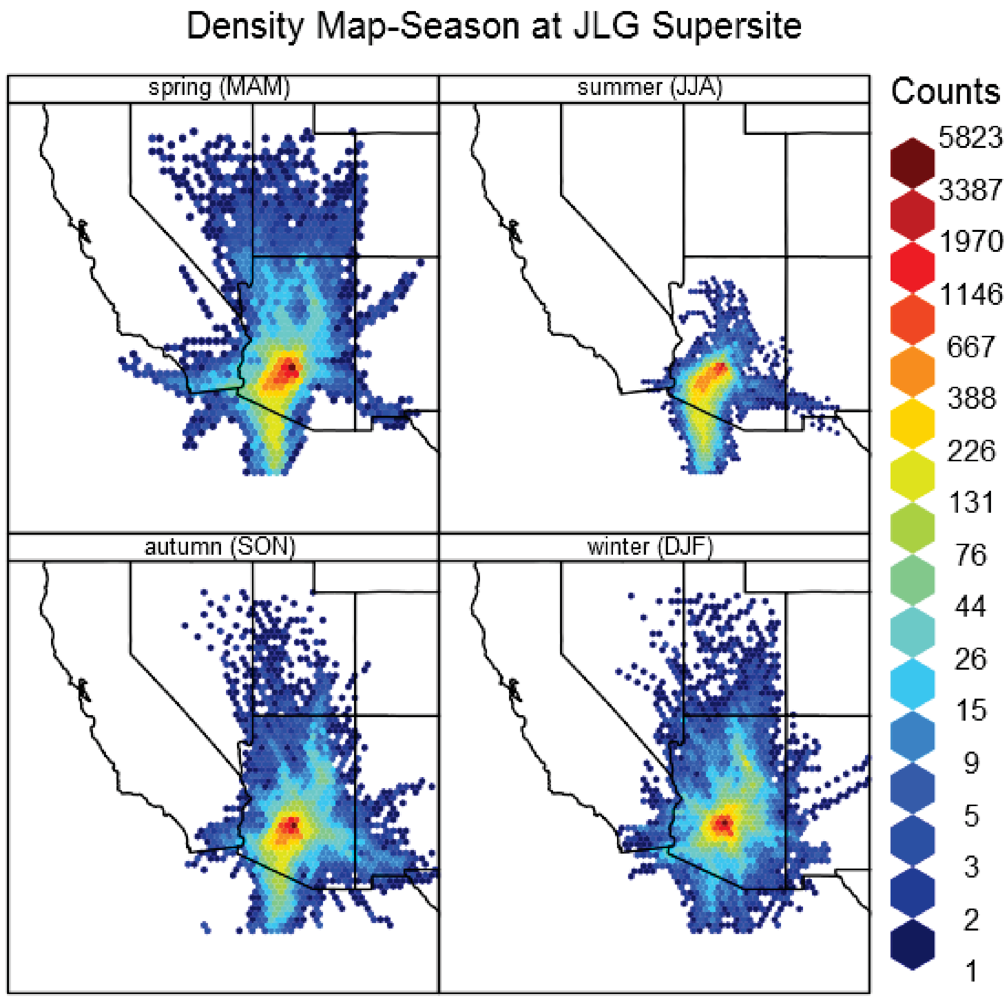


[12] North American Regional Reanalysis (NARR). Retrieved from https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/north-american-regional-reanalysis-narr

A3.2.2.1 HYSPLIT Density Analysis

ADEQ created a HYSPLIT density map by using the latitude and longitude of the two-year modeling trajectories produced in the analysis above. Using the trajectories' positions and a hexagonal gridded domain in Openair, the number of trajectories that passed through each hexagonal area are shown in Figure A3-4.

Figure A3-4 JLG Supersite Seasonal HYSPLIT Density Map



A3.2.2.2 Concentration Bin HYSPLIT Analysis

ADEQ merged hourly ozone data with two year HYSPLIT results from above to investigate the potential area contributions to O_3 production in Phoenix area. The trajectories were labeled with the hourly ozone concentration at the monitor at the start time for the backwards trajectory, allowing each trajectory to be represented by the resulting ozone concentration.

In Figure A3-5 below, the concentration labeled trajectories were grouped into three ranges, concentrations below 0.05ppm, concentrations between 0.05 ppm and 0.07 ppm, and concentrations above 0.07 ppm. Each group is represented with a different color, to help visualize trajectories resulting in particularly higher ozone concentrations (above 0.07 ppm).

Figure A3-5 JLG Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map

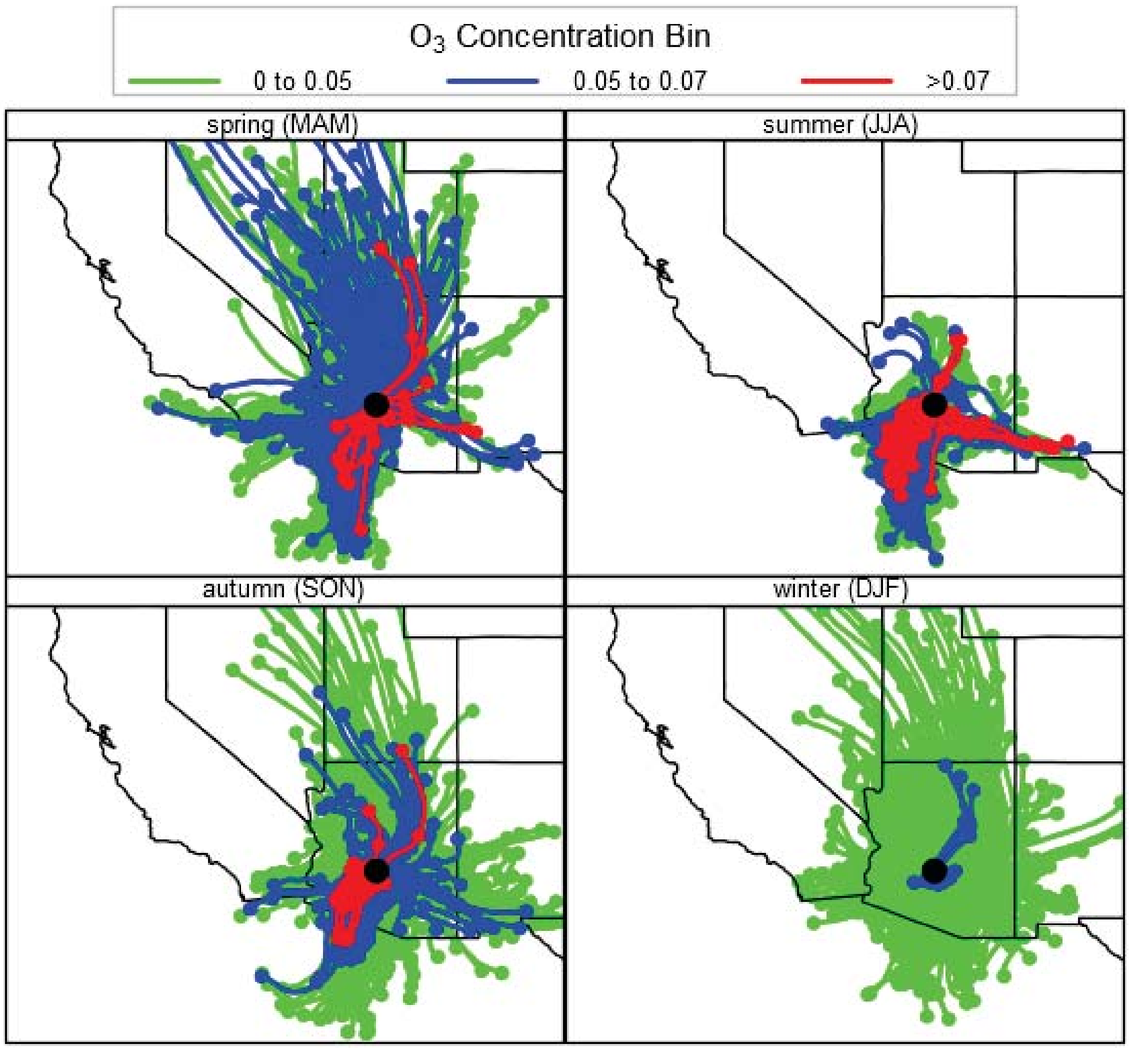
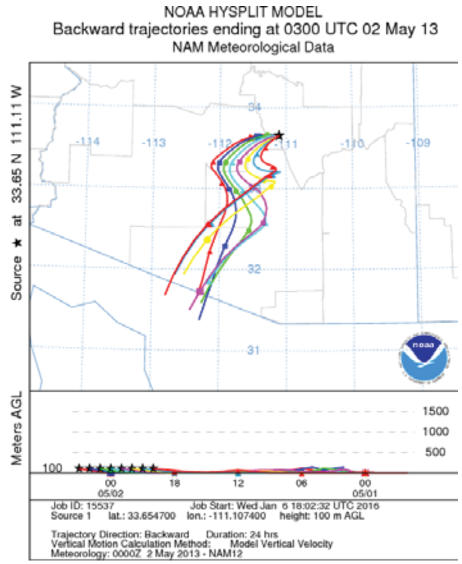
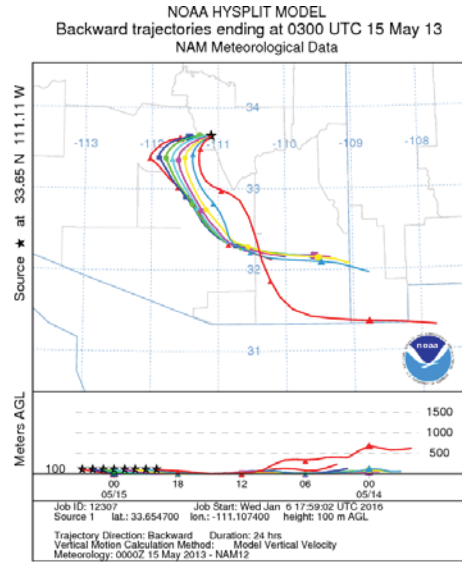
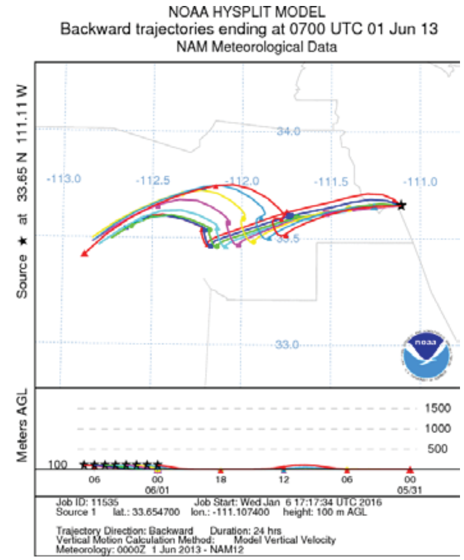


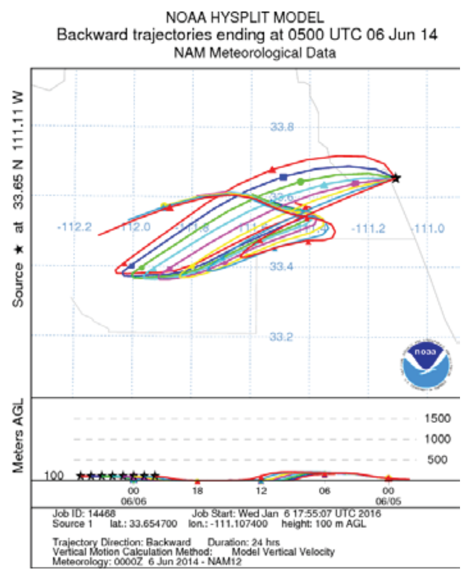
Exhibit AI – HYSPLIT Back Trajectories

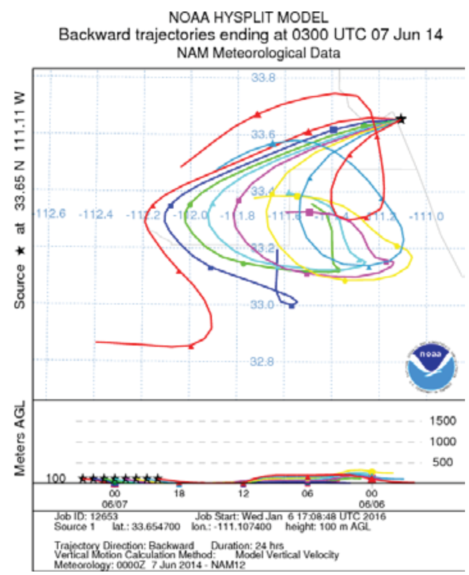
AI1 Tonto National Monument Monitor – Gila County (04-007-0010)

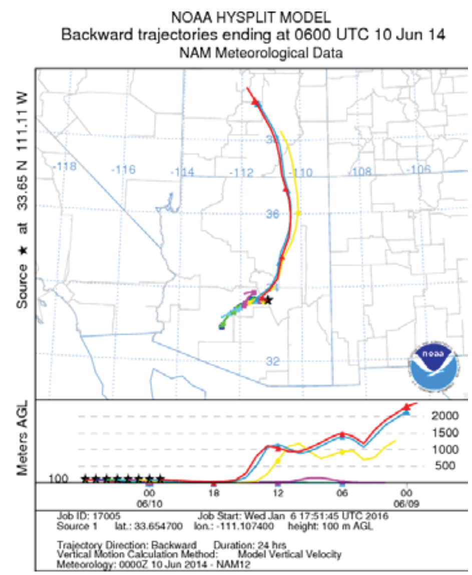


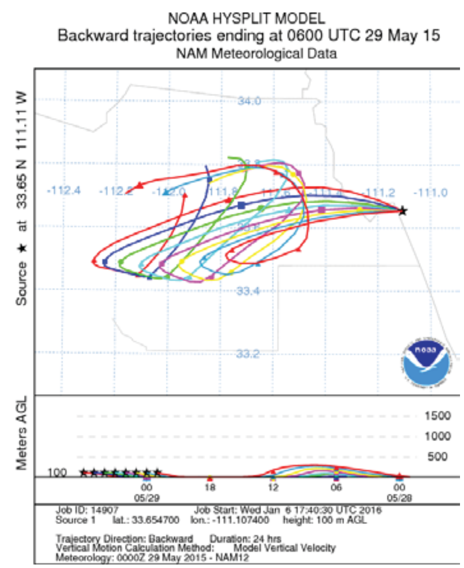


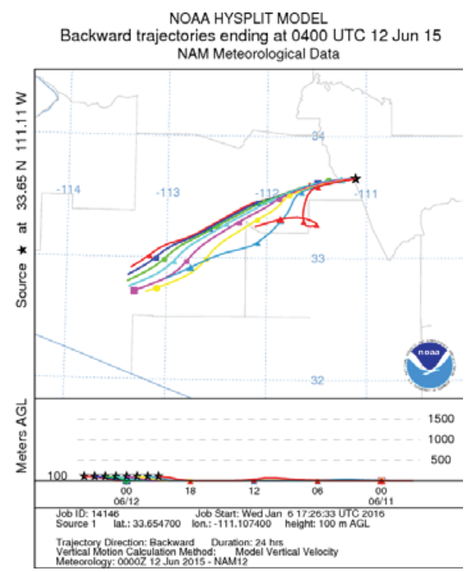


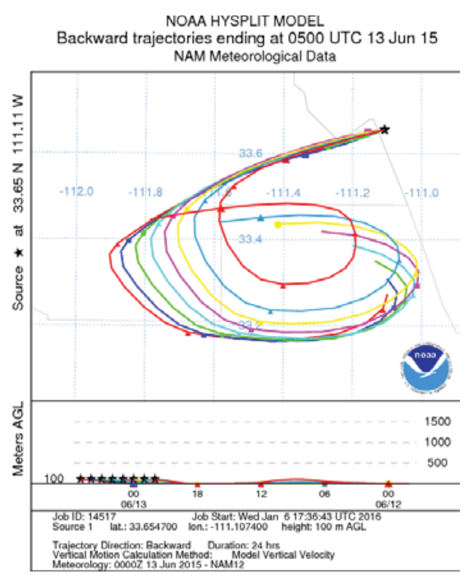


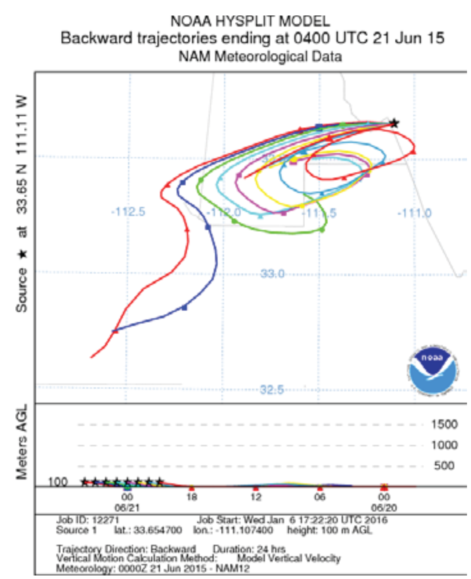




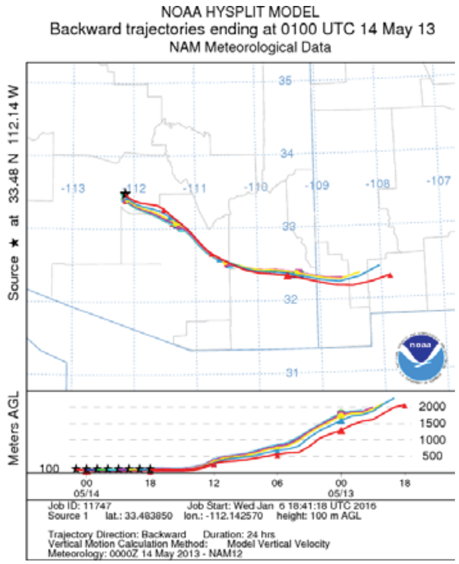

NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 29 May 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
Job ID: 14907 Job Start: Wed Jan 6 17:40:30 UTC 2016
Source 1 lat.: 33.654700 lon.: -111.107400 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 May 2015 - NAM12

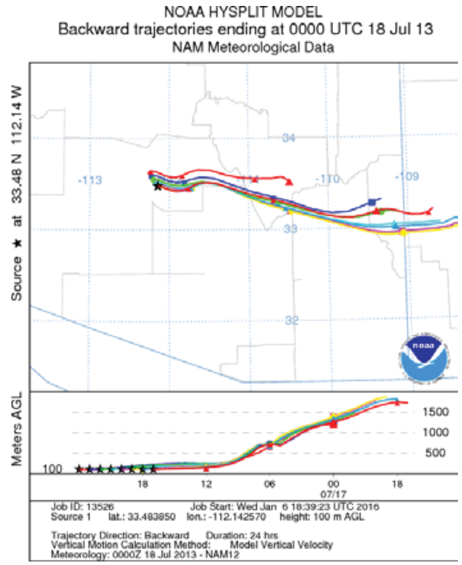

NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 12 Jun 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
Job ID: 14146 Job Start: Wed Jan 6 17:26:33 UTC 2016
Source 1 lat.: 33.654700 lon.: -111.107400 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 12 Jun 2015 - NAM12

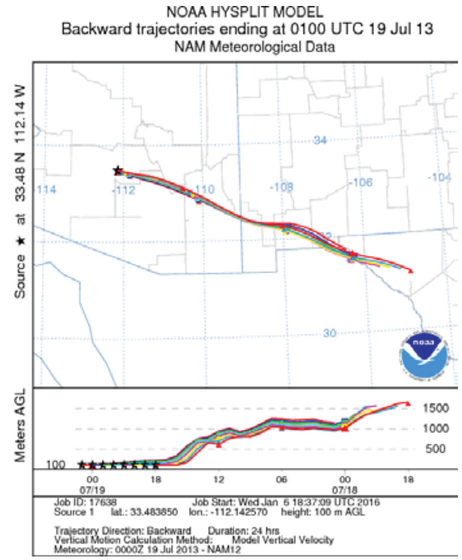

NOAA HYSPLIT MODEL
Backward trajectories ending at 0500 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
Job ID: 14517 Job Start: Wed Jan 6 17:36:43 UTC 2016
Source 1 lat.: 33.654700 lon.: -111.107400 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

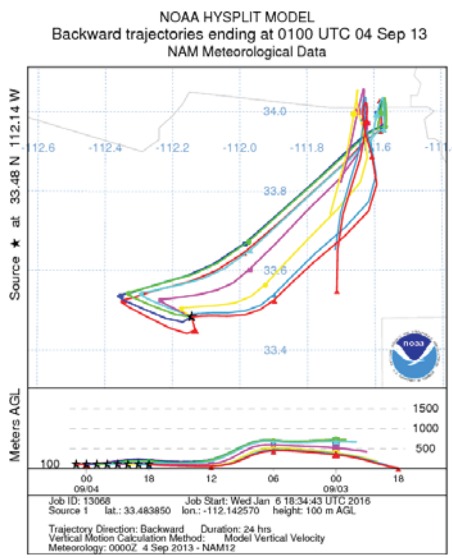

NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
Job ID: 12271 Job Start: Wed Jan 6 17:22:20 UTC 2016
Source 1 lat.: 33.654700 lon.: -111.107400 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 21 Jun 2015 - NAM12

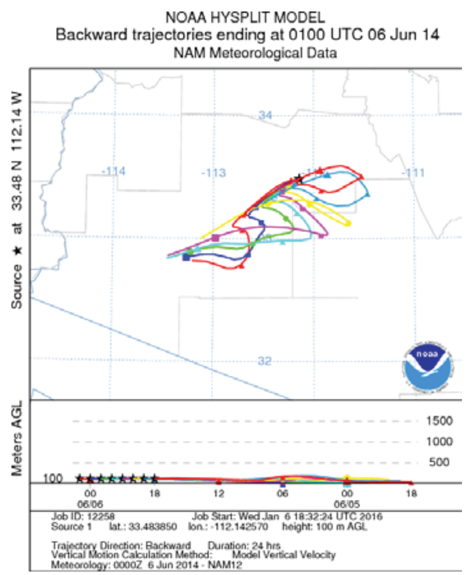
AI2 West Phoenix Monitor – Maricopa County (04-013-0019)

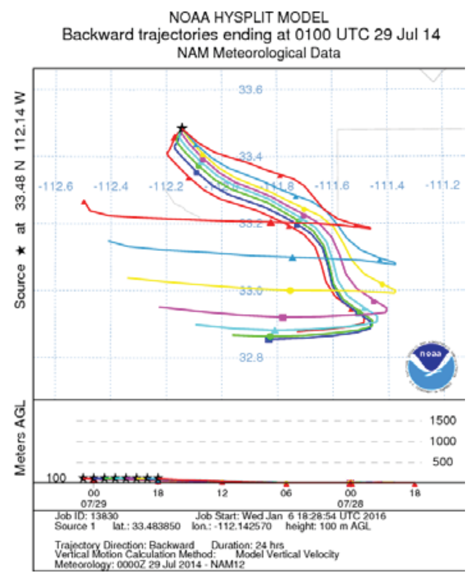


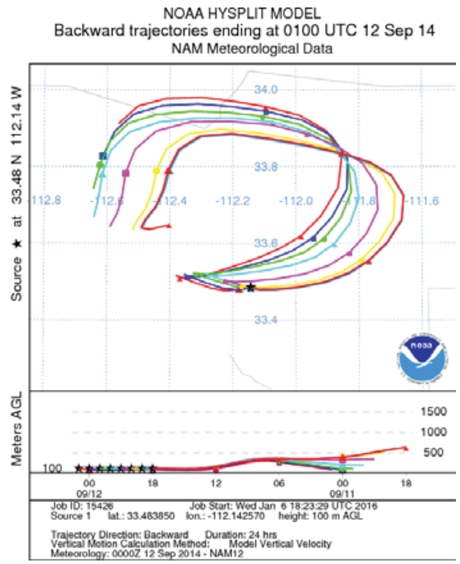


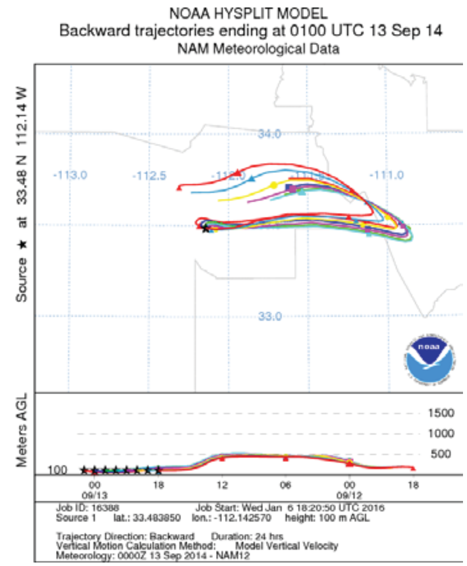


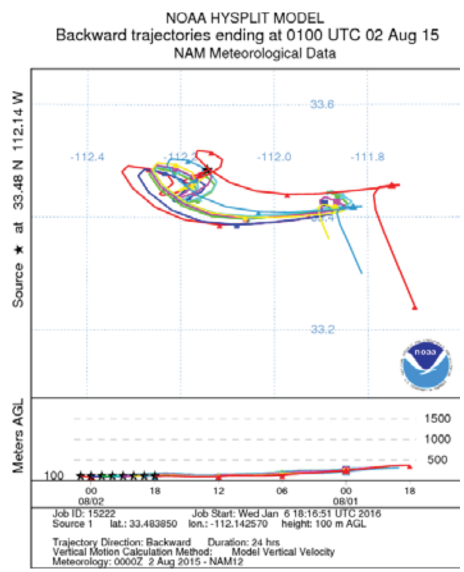


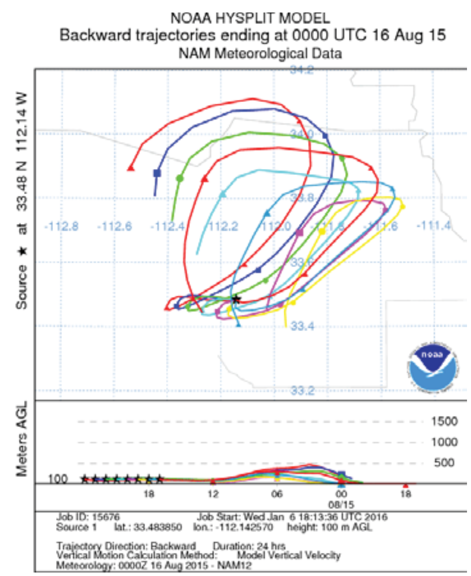




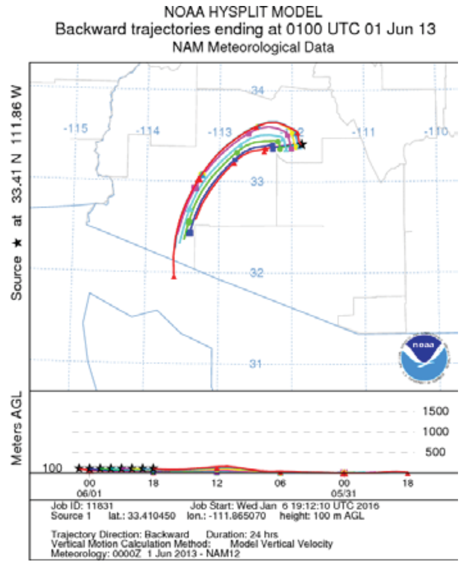

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 12 Sep 14
NAM Meteorological Data
Source ★ at 33.48 N 112.14 W
Meters AGL
Job ID: 15426 Job Start: Wed Jan 6 18:23:29 UTC 2016
Source 1 lat.: 33.483850 lon.: -112.142570 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 12 Sep 2014 - NAM12

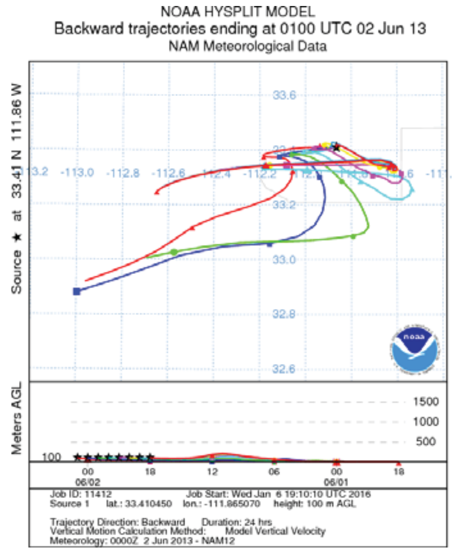

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
Source ★ at 33.48 N 112.14 W
Meters AGL
Job ID: 16388 Job Start: Wed Jan 6 18:20:50 UTC 2016
Source 1 lat.: 33.483850 lon.: -112.142570 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Sep 2014 - NAM12

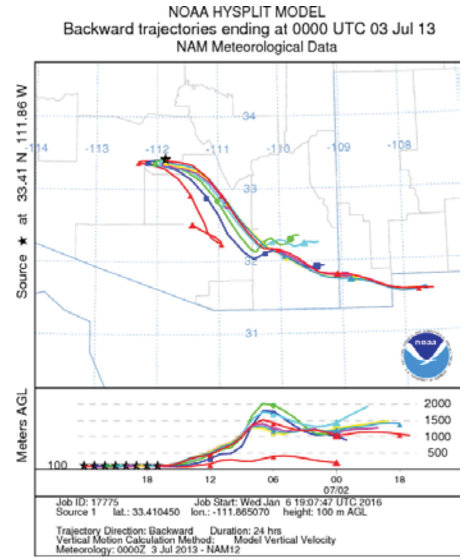

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 02 Aug 15
NAM Meteorological Data
Source ★ at 33.48 N 112.14 W
Meters AGL
Job ID: 15222 Job Start: Wed Jan 6 18:16:51 UTC 2016
Source 1 lat.: 33.483850 lon.: -112.142570 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 2 Aug 2015 - NAM12

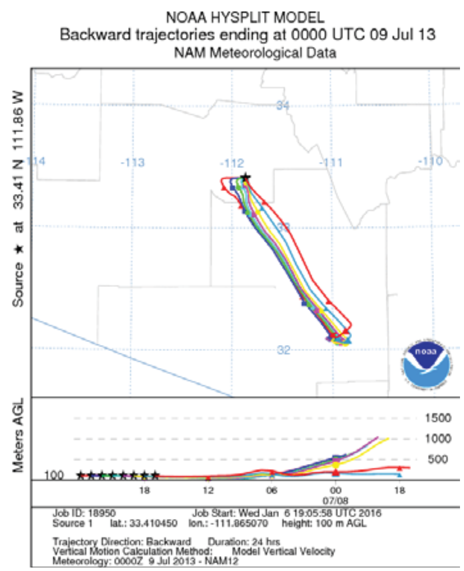

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 16 Aug 15
NAM Meteorological Data
Source ★ at 33.48 N 112.14 W
Meters AGL
Job ID: 15676 Job Start: Wed Jan 6 18:13:36 UTC 2016
Source 1 lat.: 33.483850 lon.: -112.142570 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Aug 2015 - NAM12

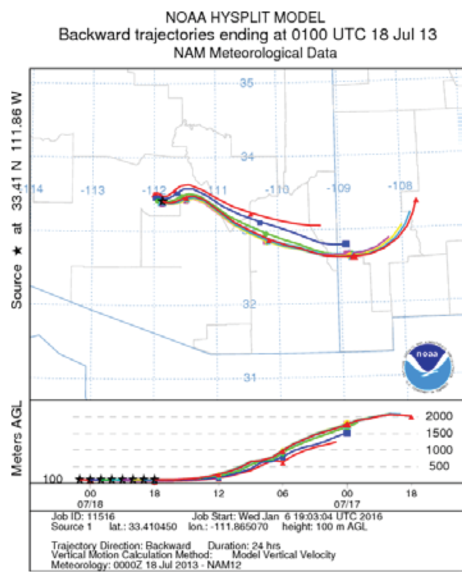
AI3 Mesa Monitor – Maricopa County (04-013-1003)

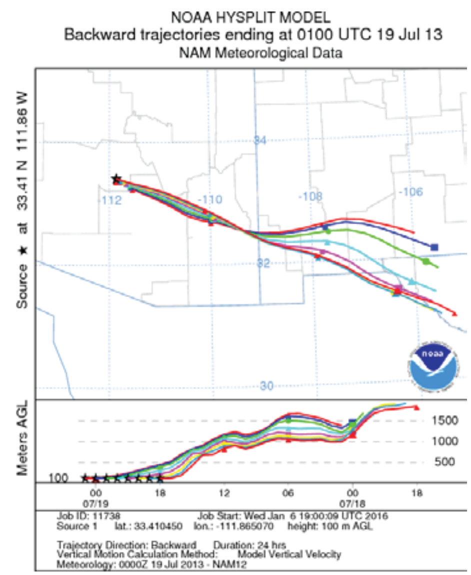


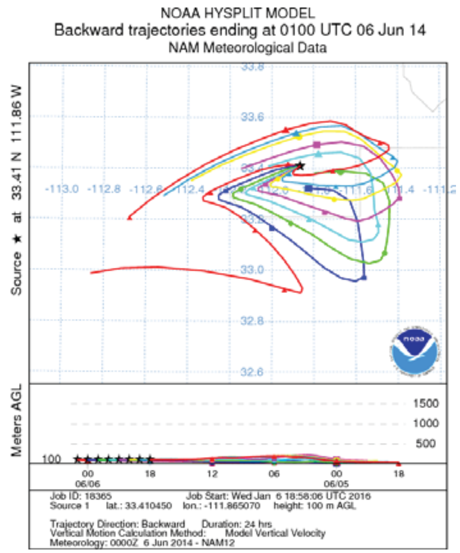


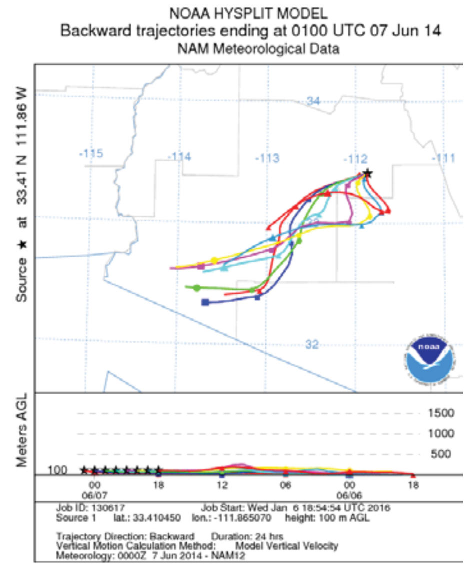


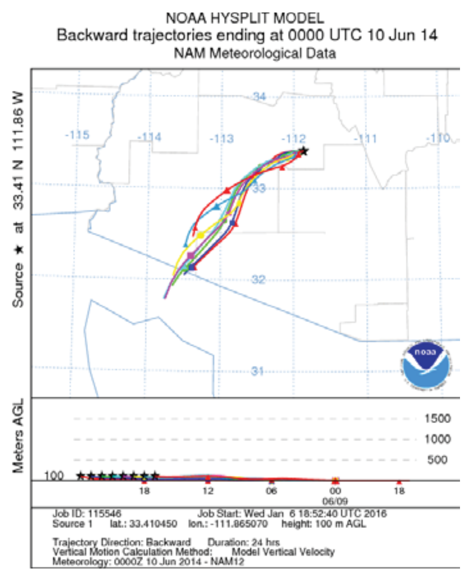


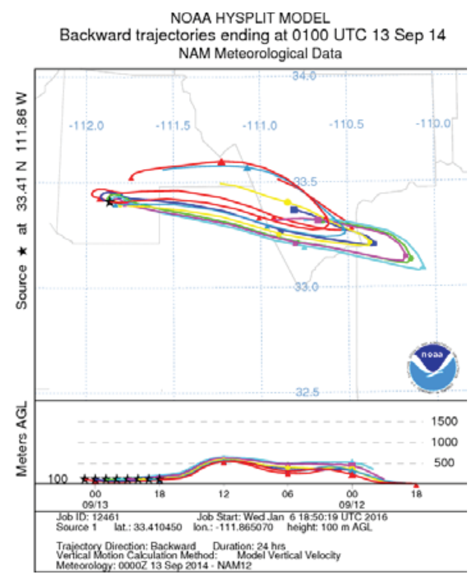




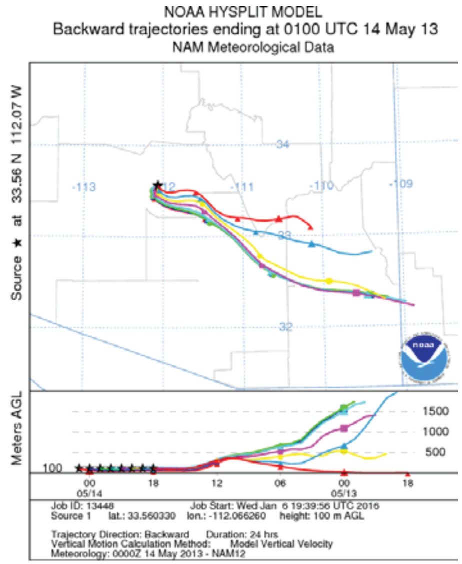

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
Job ID: 18365 Job Start: Wed Jan 6 18:58:06 UTC 2016
Source 1 lat.: 33.410450 lon.: -111.865070 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 6 Jun 2014 - NAM12

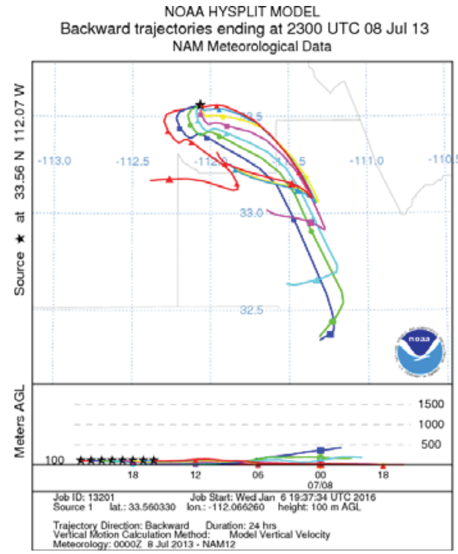

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
Job ID: 130617 Job Start: Wed Jan 6 18:54:54 UTC 2016
Source 1 lat.: 33.410450 lon.: -111.865070 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

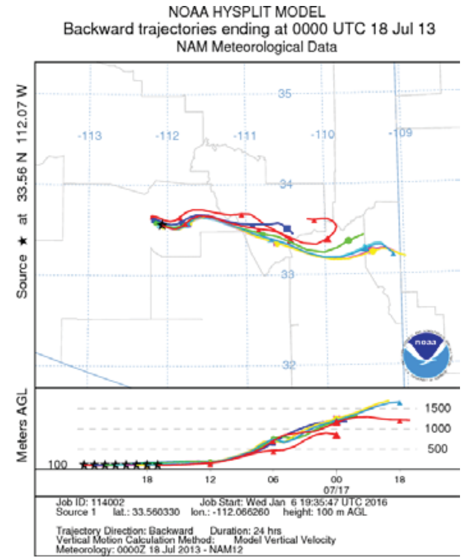

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
Job ID: 115546 Job Start: Wed Jan 6 18:52:40 UTC 2016
Source 1 lat.: 33.410450 lon.: -111.865070 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 10 Jun 2014 - NAM12

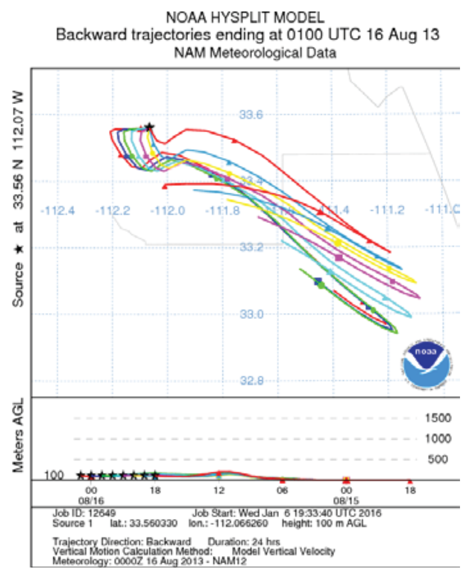

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
Job ID: 12461 Job Start: Wed Jan 6 18:50:19 UTC 2016
Source 1 lat.: 33.410450 lon.: -111.865070 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Sep 2014 - NAM12

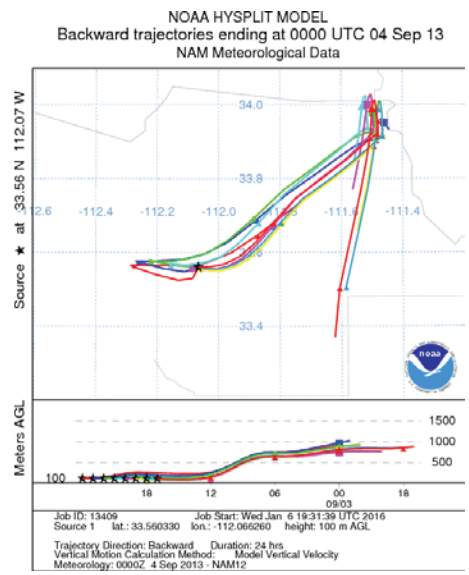
AI4 North Phoenix Monitor – Maricopa County (04-013-1004)

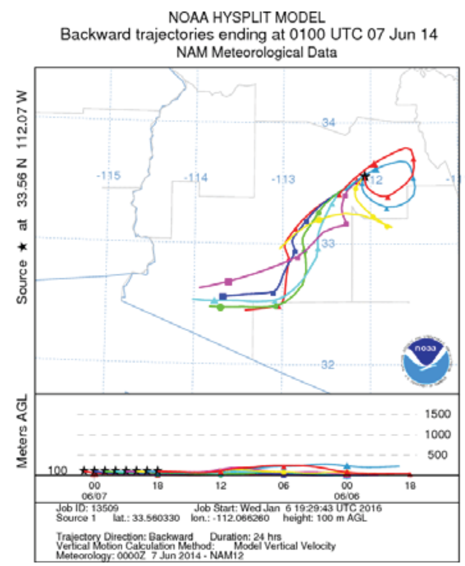




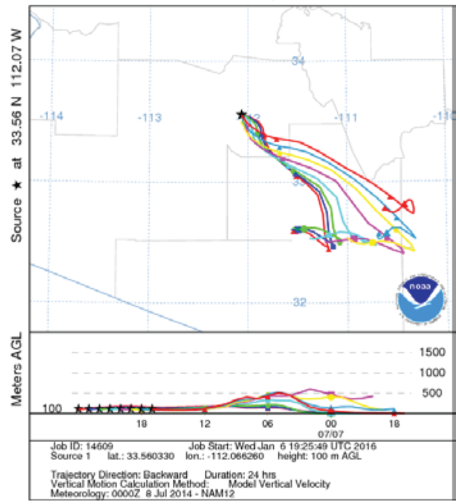




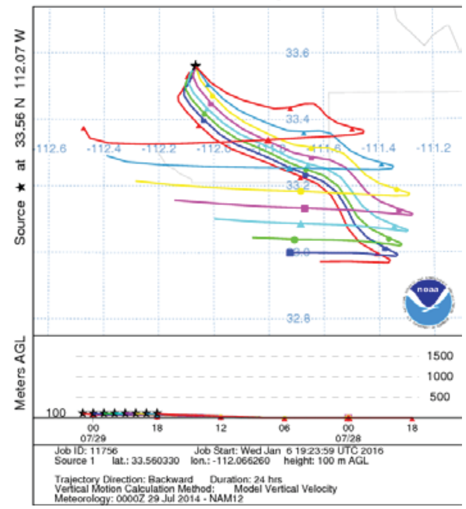




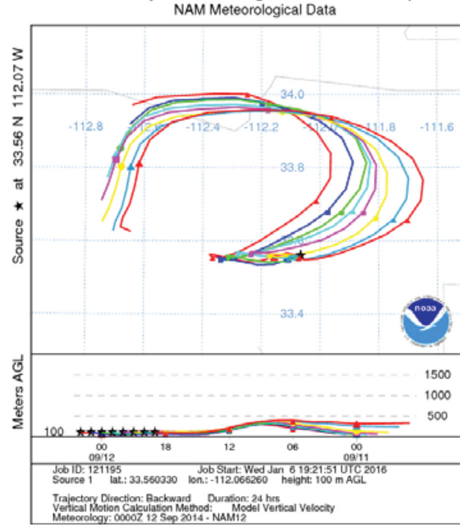
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jul 14
NAM Meteorological Data



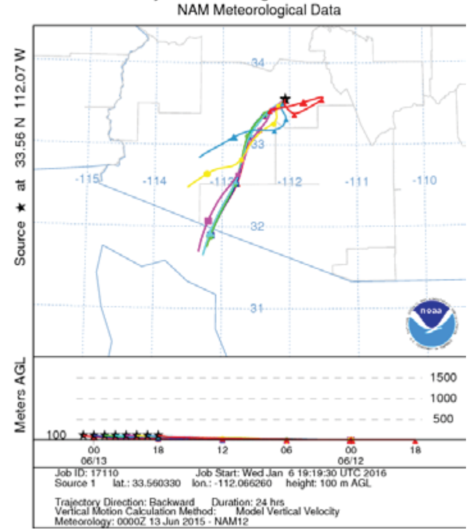
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 29 Jul 14
NAM Meteorological Data



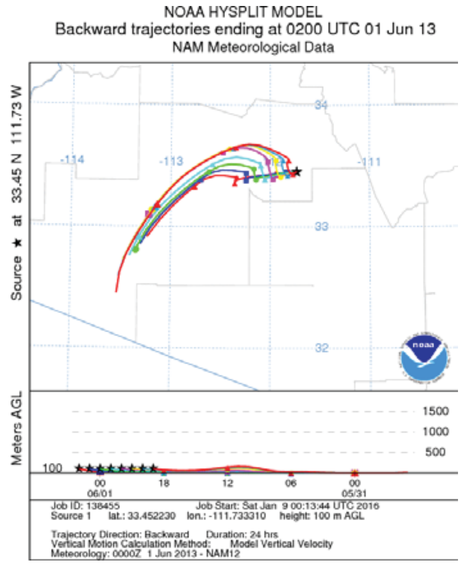
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 12 Sep 14
NAM Meteorological Data

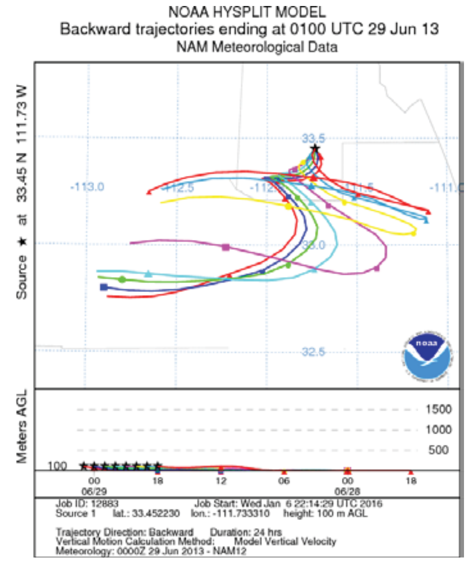


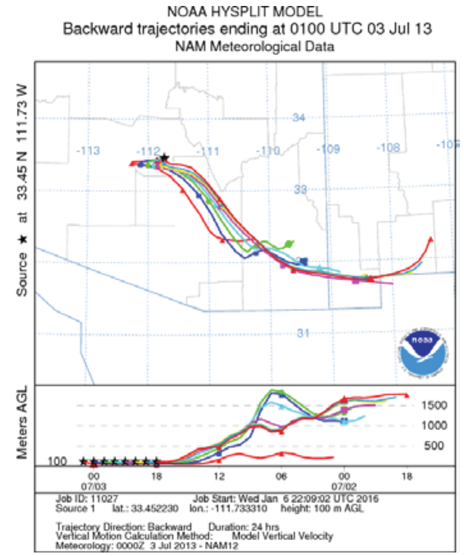
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Jun 15
NAM Meteorological Data

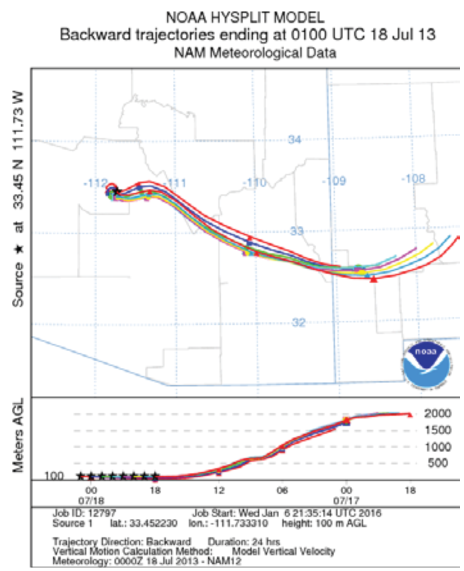


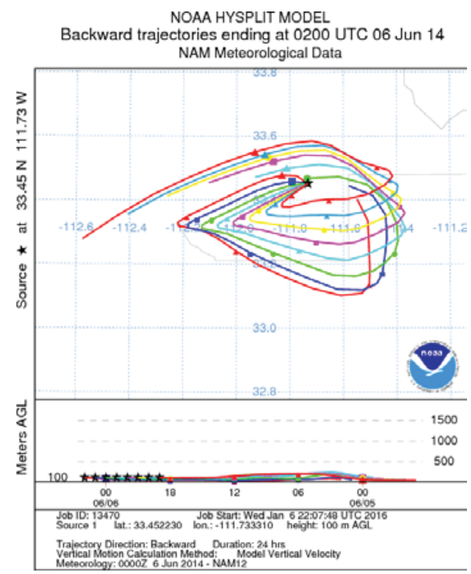
AI5 Falcon Field Monitor – Maricopa County (04-013-1010)

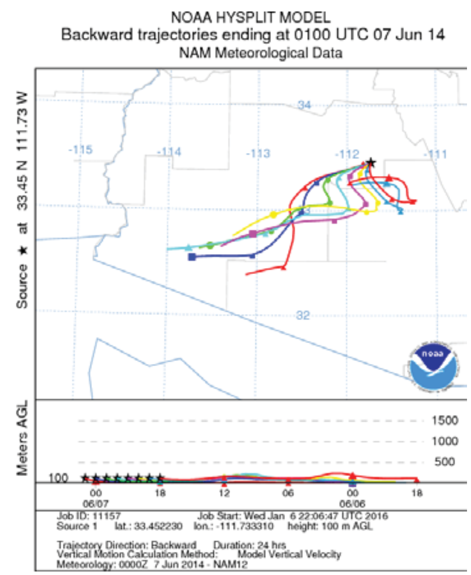


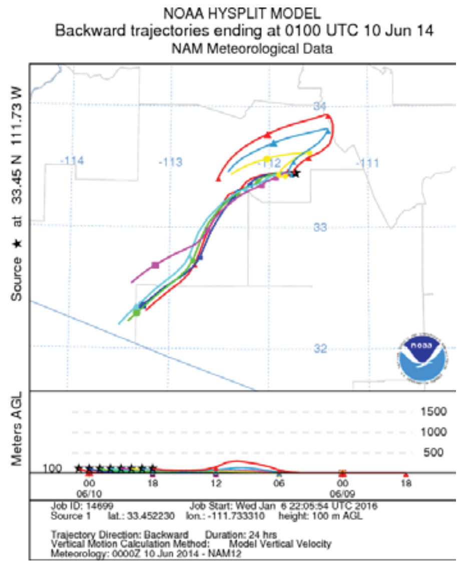


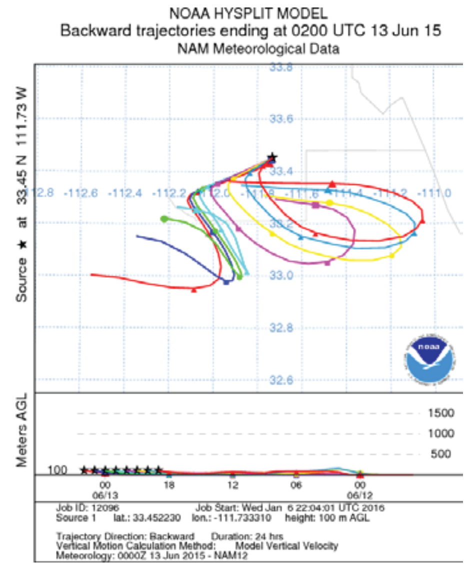


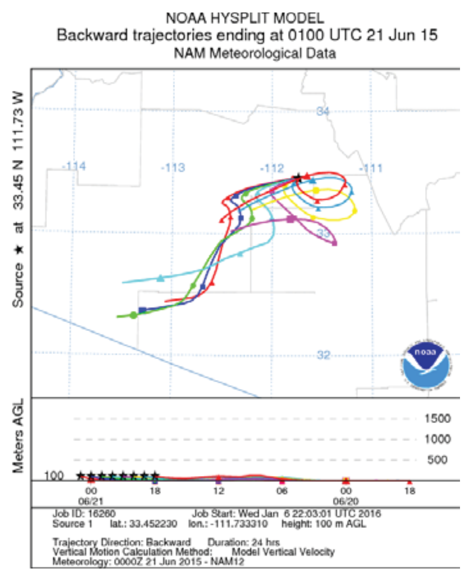


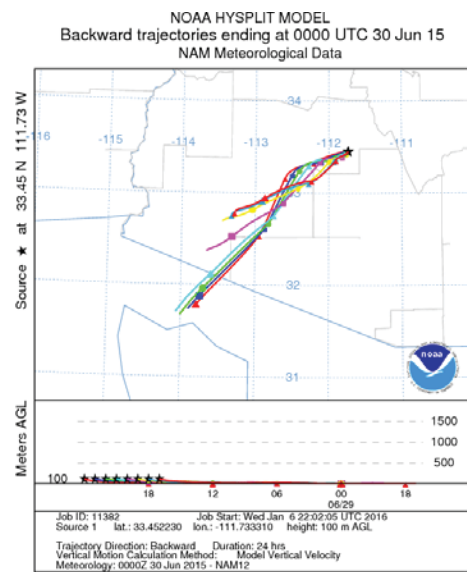




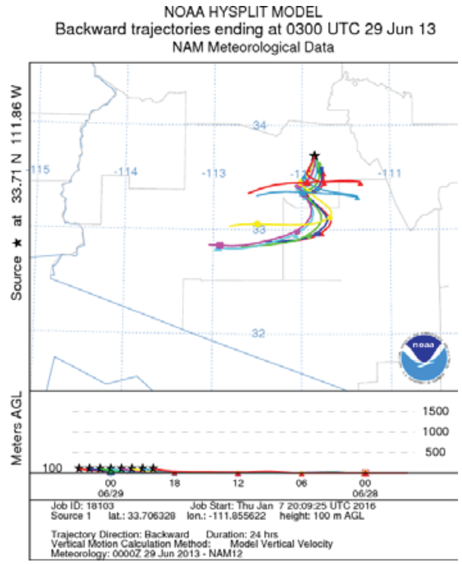

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
Job ID: 14699 Job Start: Wed Jan 6 22:05:54 UTC 2016
Source 1 lat.: 33.452230 lon.: -111.733310 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 10 Jun 2014 - NAM12

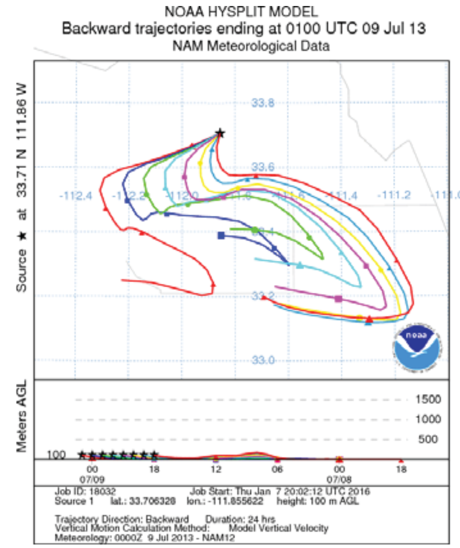

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
Job ID: 12096 Job Start: Wed Jan 6 22:04:01 UTC 2016
Source 1 lat.: 33.452230 lon.: -111.733310 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

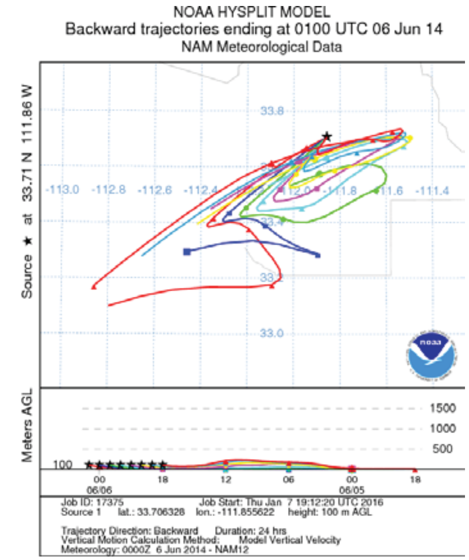

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
Job ID: 16260 Job Start: Wed Jan 6 22:03:01 UTC 2016
Source 1 lat.: 33.452230 lon.: -111.733310 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 21 Jun 2015 - NAM12

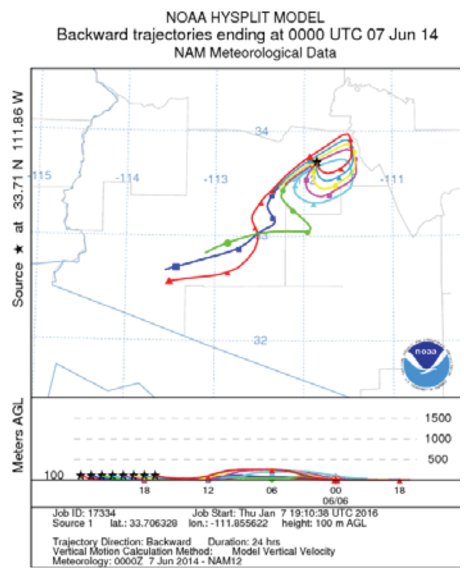

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 30 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
Job ID: 11382 Job Start: Wed Jan 6 22:02:05 UTC 2016
Source 1 lat.: 33.452230 lon.: -111.733310 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 30 Jun 2015 - NAM12

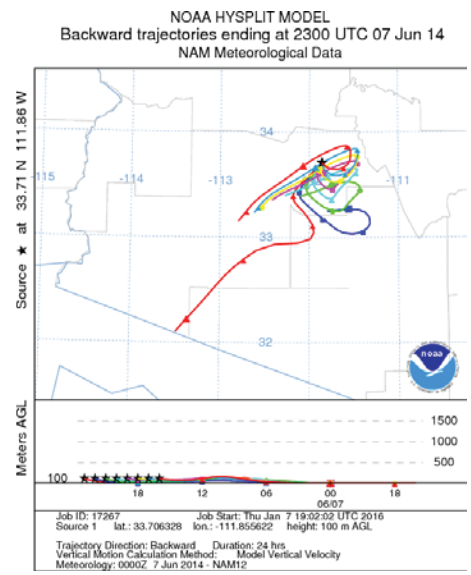
AI6 Pinnacle Peak Monitor – Maricopa County (04-013-2005)

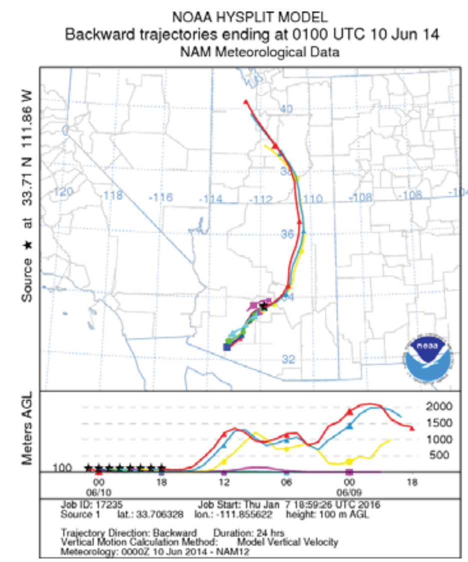


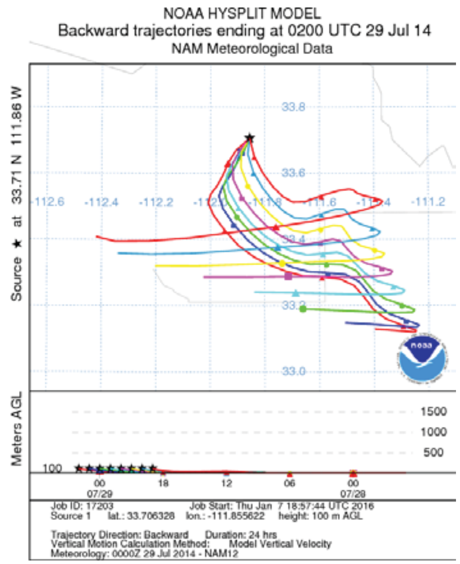


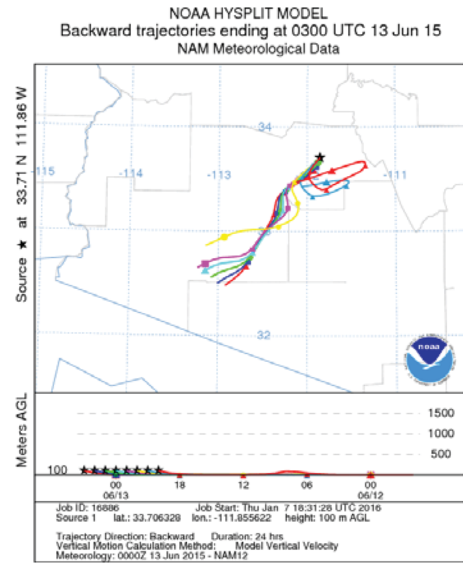


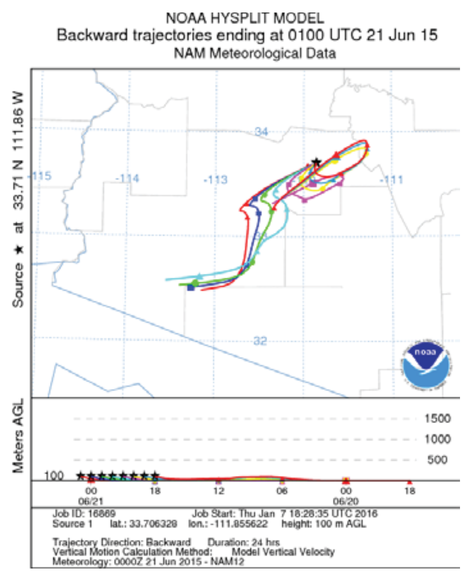


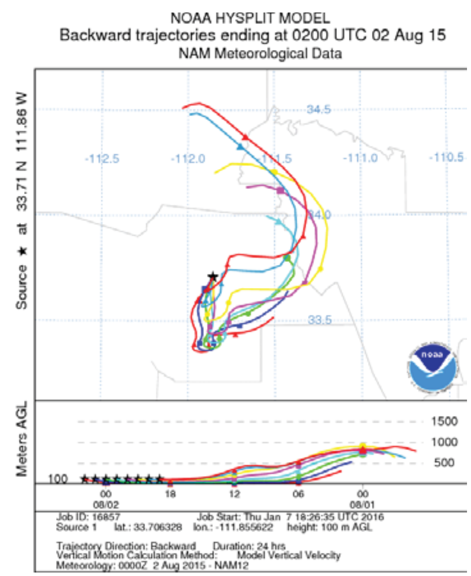




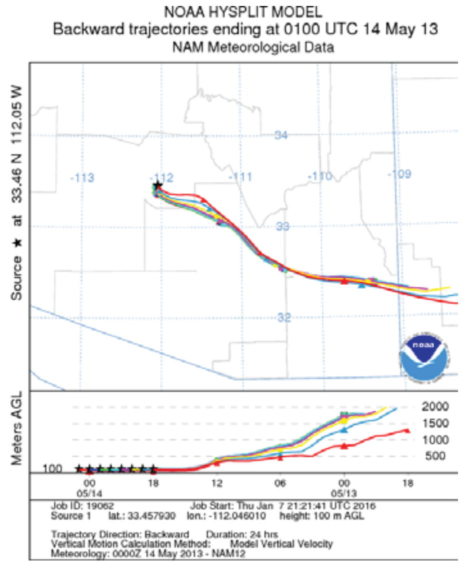

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
Job ID: 17203 Job Start: Thu Jan 7 18:57:44 UTC 2016
Source 1 lat.: 33.706328 lon.: -111.855622 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jul 2014 - NAM12

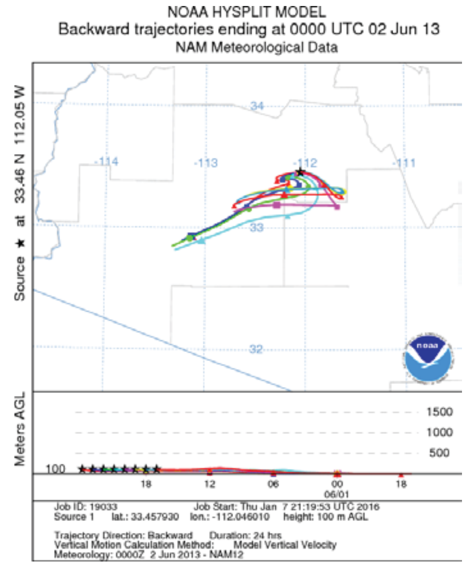

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
Job ID: 16886 Job Start: Thu Jan 7 18:31:28 UTC 2016
Source 1 lat.: 33.706328 lon.: -111.855622 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

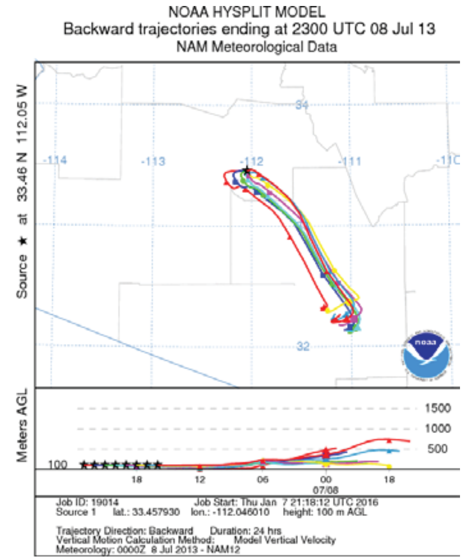

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
Job ID: 16869 Job Start: Thu Jan 7 18:28:35 UTC 2016
Source 1 lat.: 33.706328 lon.: -111.855622 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 21 Jun 2015 - NAM12

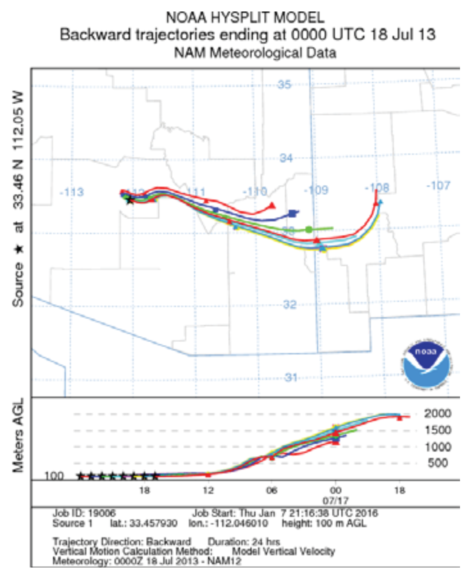

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 02 Aug 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
Job ID: 16857 Job Start: Thu Jan 7 18:26:35 UTC 2016
Source 1 lat.: 33.706328 lon.: -111.855622 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 2 Aug 2015 - NAM12

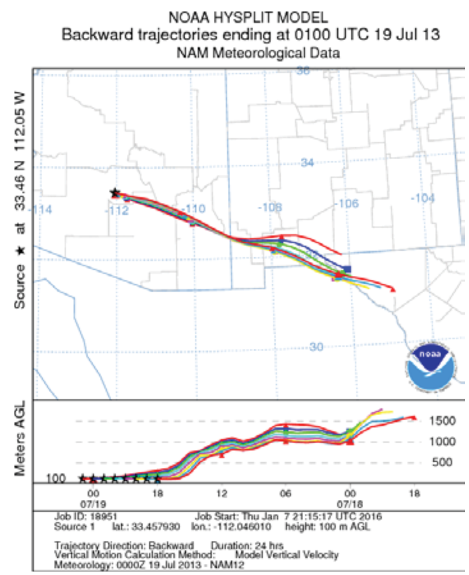
AI7 Central Phoenix Monitor – Maricopa County (04-013-3002)

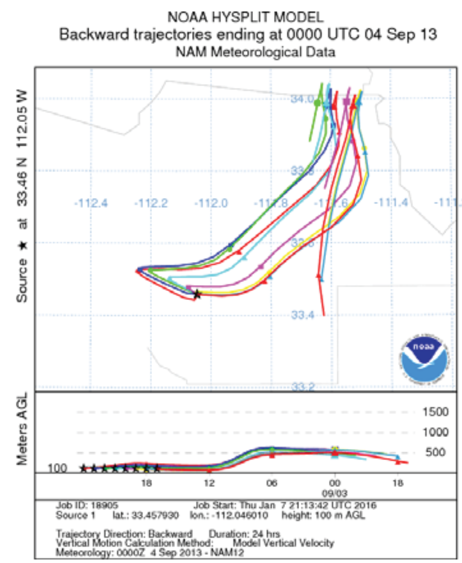


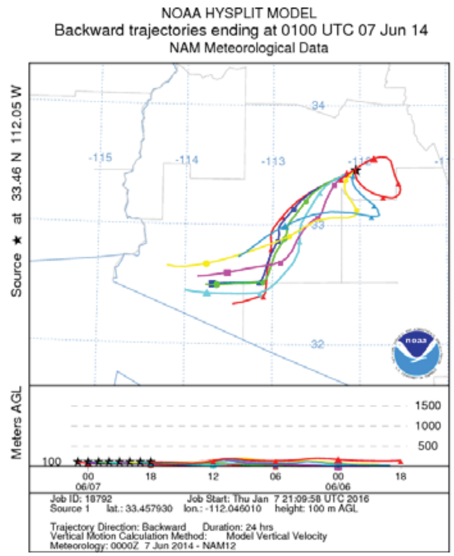


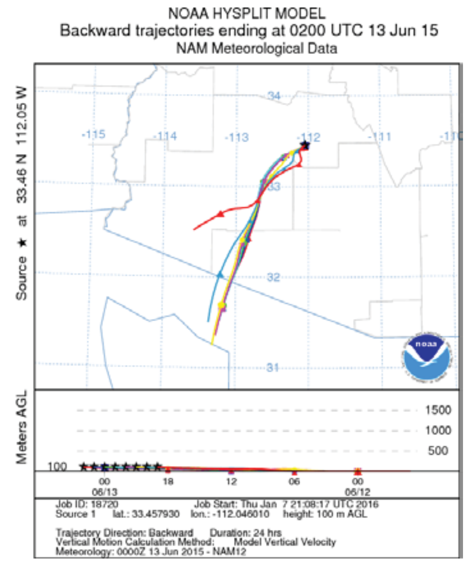


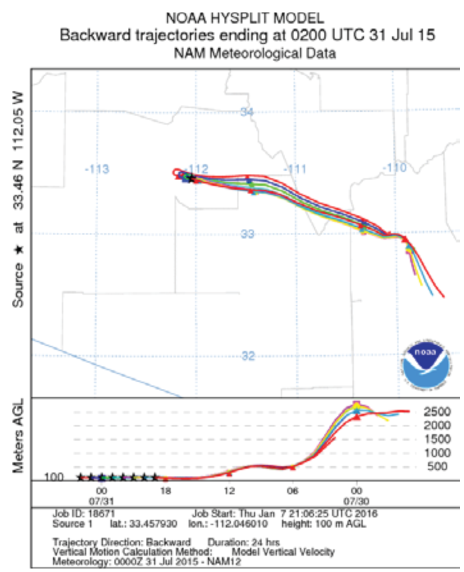


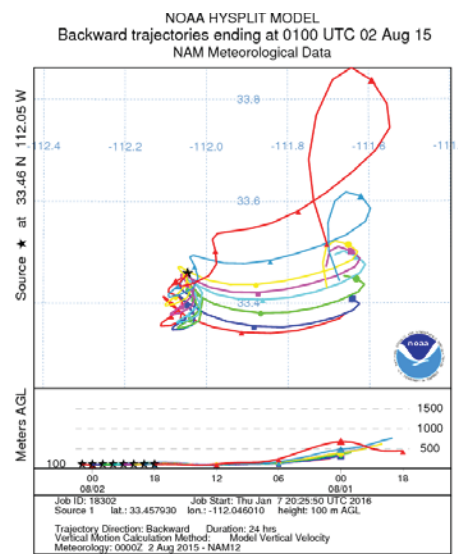




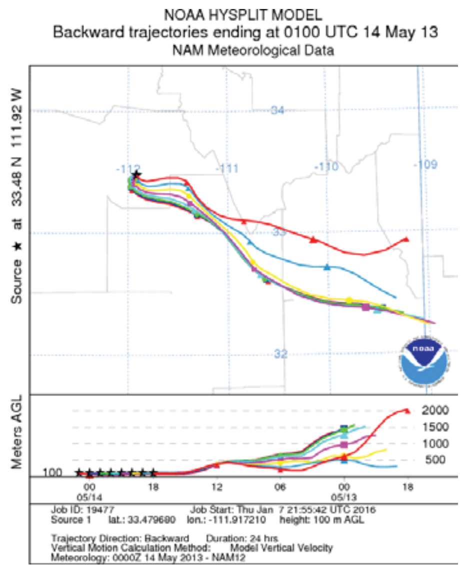

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.46 N 112.05 W
Meters AGL
Job ID: 18792 Job Start: Thu Jan 7 21:09:58 UTC 2016
Source 1 lat.: 33.457930 lon.: -112.046010 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

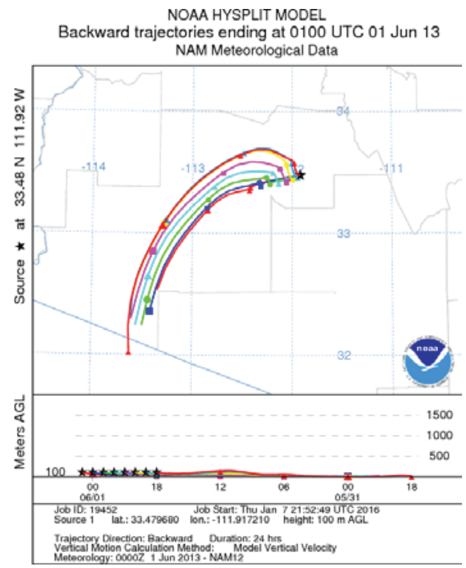

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.46 N 112.05 W
Meters AGL
Job ID: 18720 Job Start: Thu Jan 7 21:08:17 UTC 2016
Source 1 lat.: 33.457930 lon.: -112.046010 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

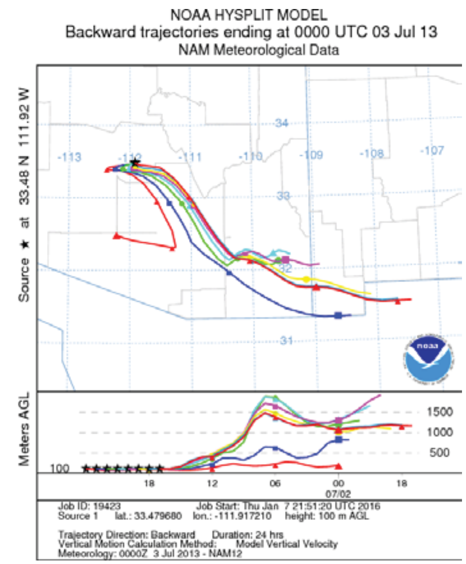

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 31 Jul 15
NAM Meteorological Data
Source ★ at 33.46 N 112.05 W
Meters AGL
Job ID: 18671 Job Start: Thu Jan 7 21:06:25 UTC 2016
Source 1 lat.: 33.457930 lon.: -112.046010 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 31 Jul 2015 - NAM12

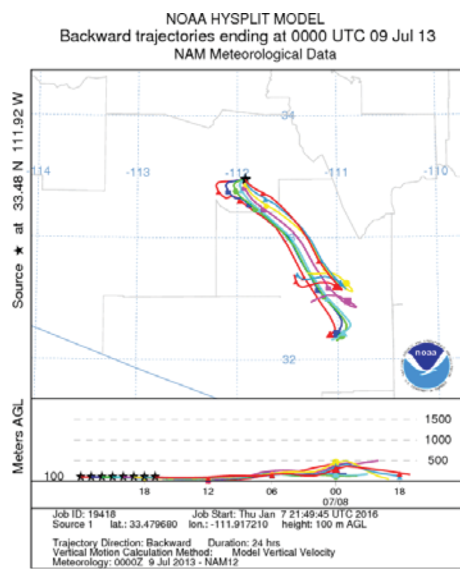

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 02 Aug 15
NAM Meteorological Data
Source ★ at 33.46 N 112.05 W
Meters AGL
Job ID: 18302 Job Start: Thu Jan 7 20:25:50 UTC 2016
Source 1 lat.: 33.457930 lon.: -112.046010 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 2 Aug 2015 - NAM12

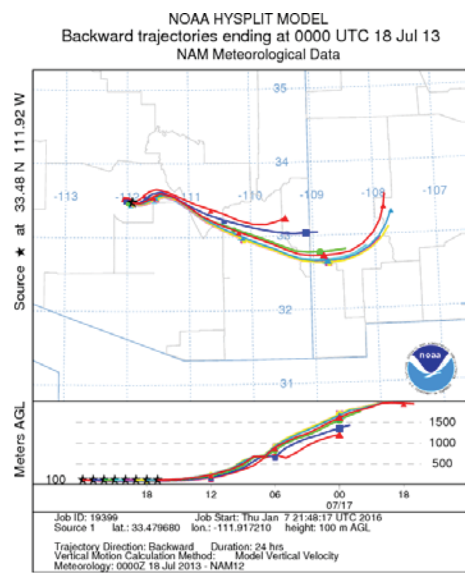
AI8 South Scottsdale Monitor – Maricopa County (04-013-3003)

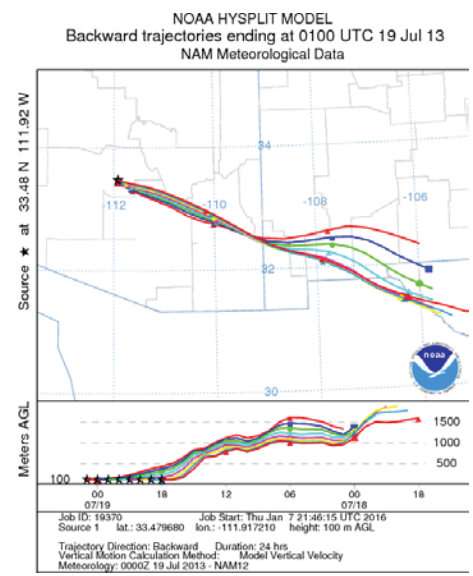




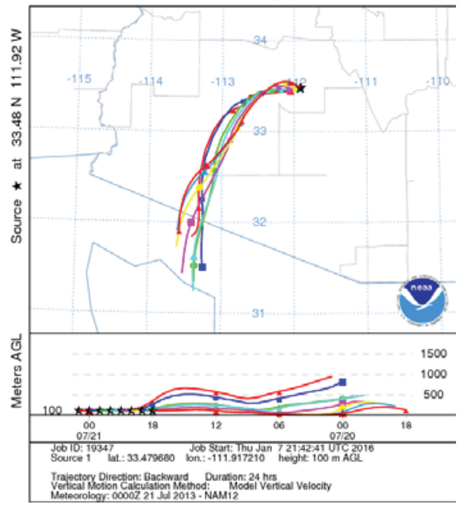




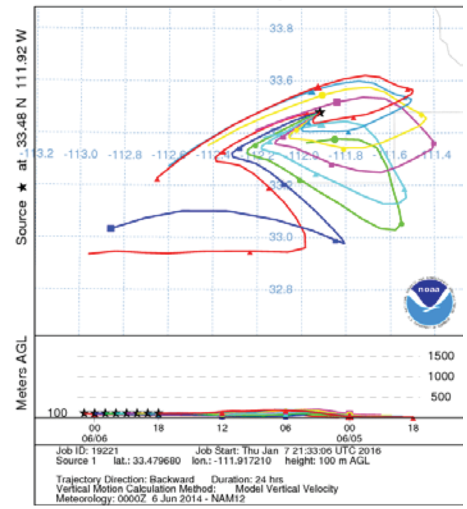




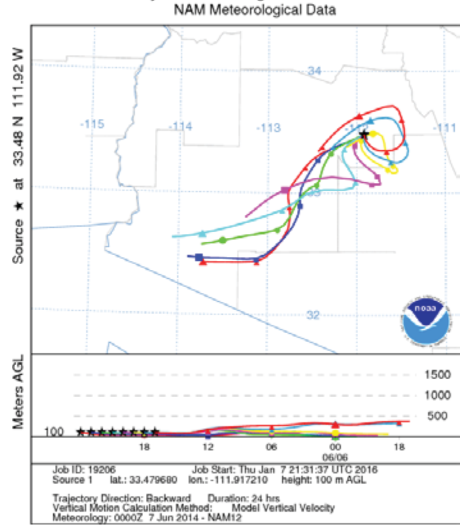
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jul 13
NAM Meteorological Data



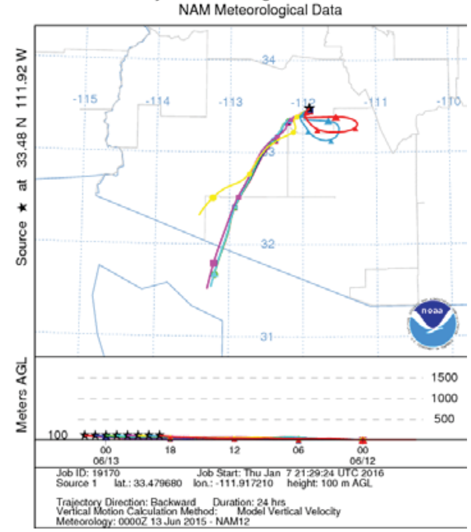
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data



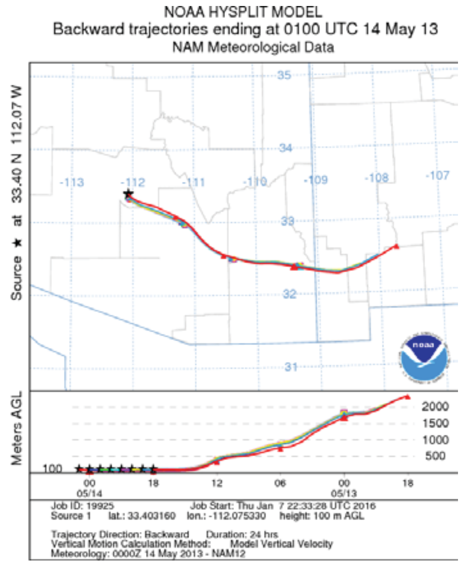
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data

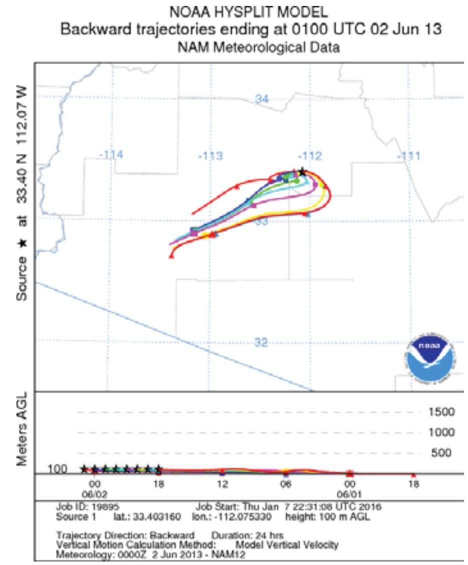


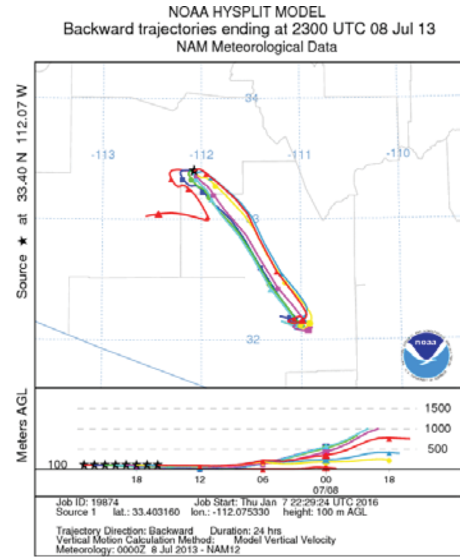
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data

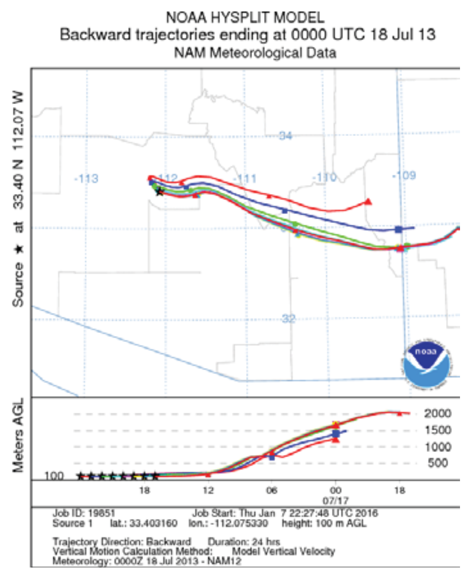


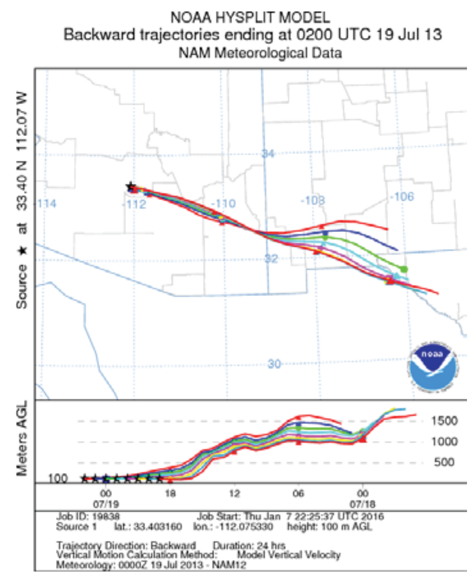
AI9 South Phoenix Monitor – Maricopa County (04-013-4003)

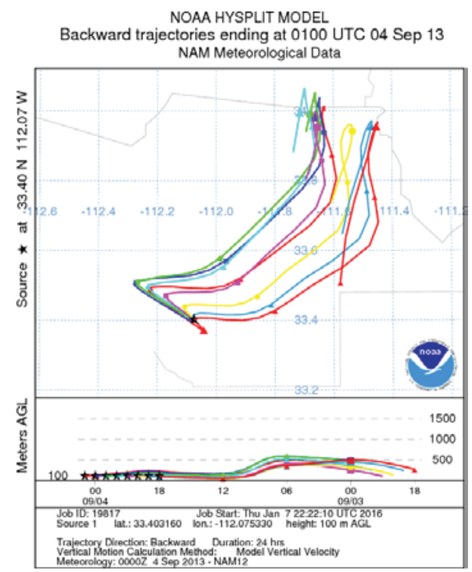


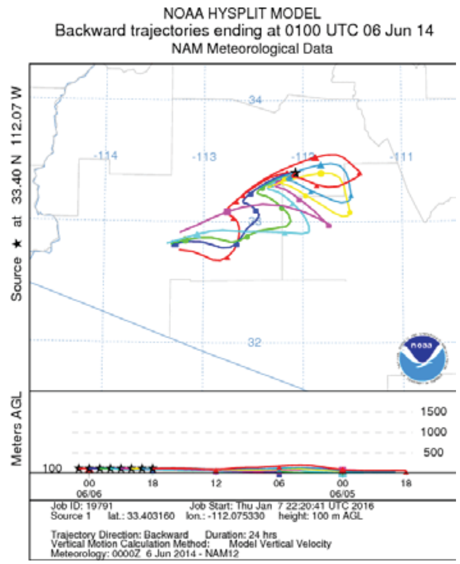


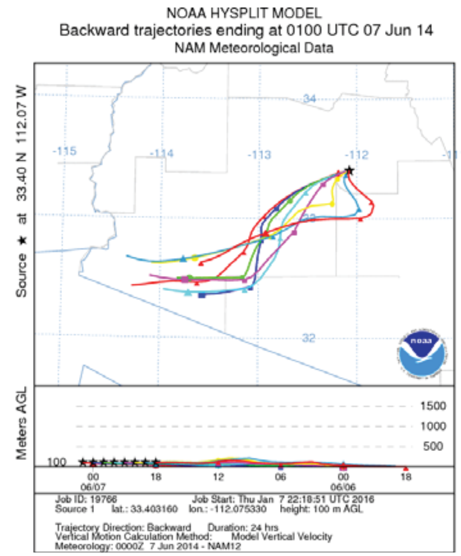


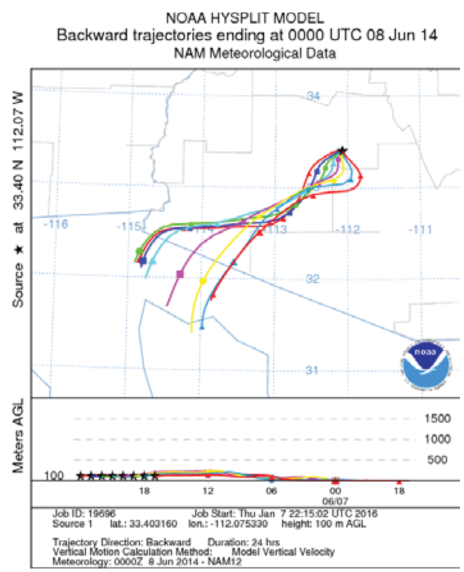


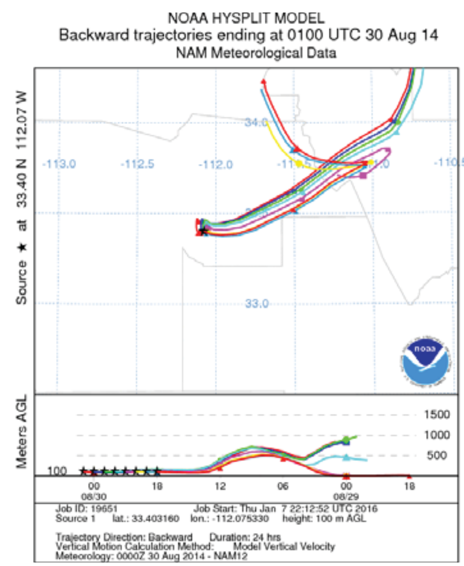




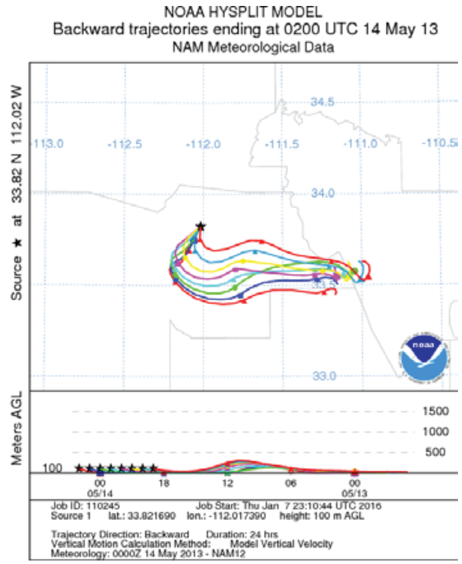

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
Job ID: 19791 Job Start: Thu Jan 7 22:20:41 UTC 2016
Source 1 lat.: 33.403160 lon.: -112.075330 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 6 Jun 2014 - NAM12

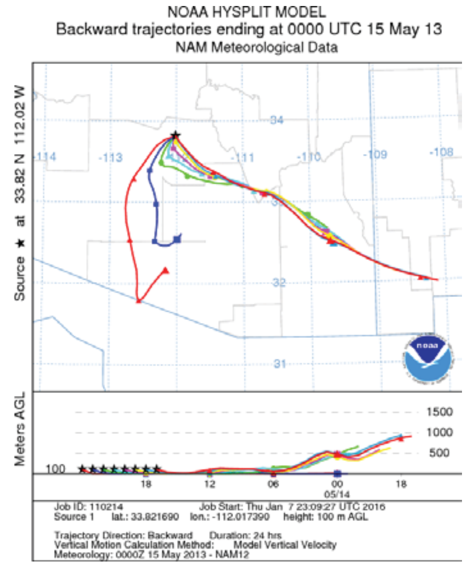

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
Job ID: 19766 Job Start: Thu Jan 7 22:18:51 UTC 2016
Source 1 lat.: 33.403160 lon.: -112.075330 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

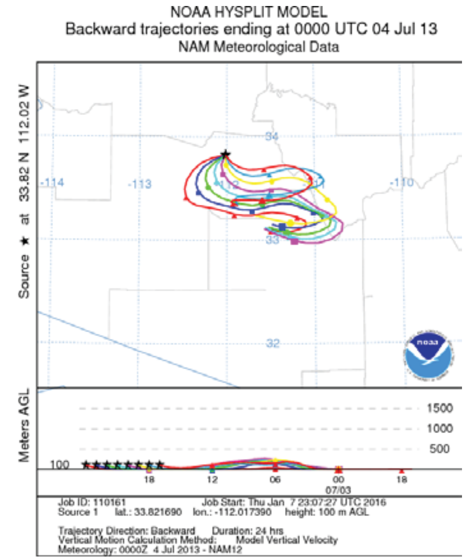

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
Job ID: 19696 Job Start: Thu Jan 7 22:15:02 UTC 2016
Source 1 lat.: 33.403160 lon.: -112.075330 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Jun 2014 - NAM12

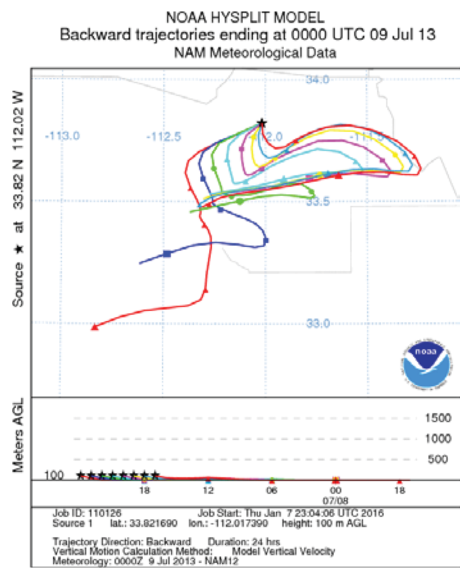

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 30 Aug 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
Job ID: 19651 Job Start: Thu Jan 7 22:12:52 UTC 2016
Source 1 lat.: 33.403160 lon.: -112.075330 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 30 Aug 2014 - NAM12

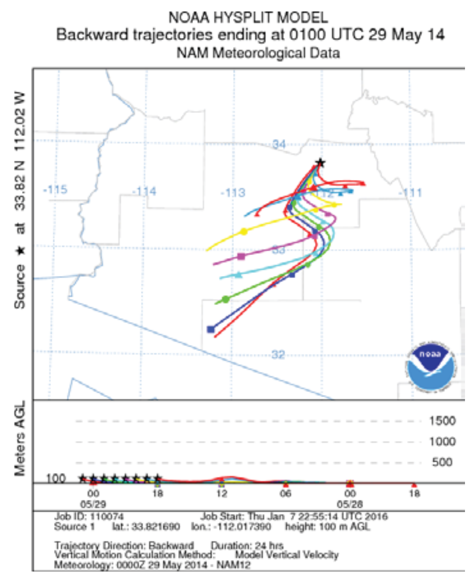
AI10 Cave Creek Monitor – Maricopa County (04-013-4008)

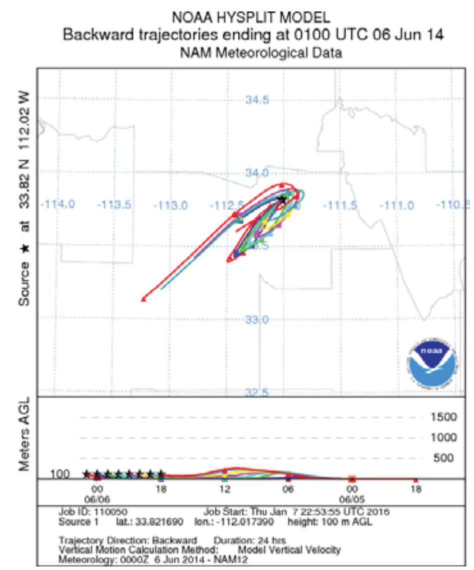


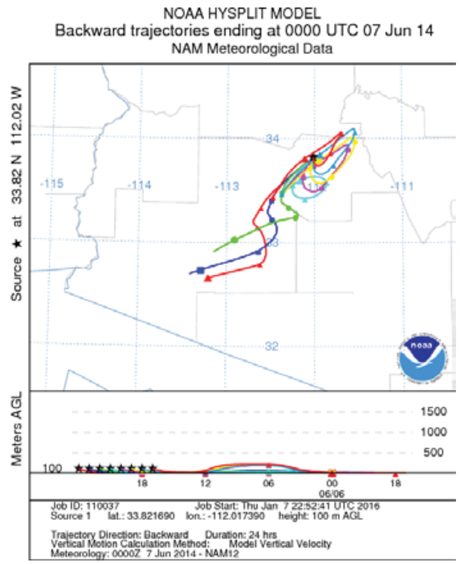


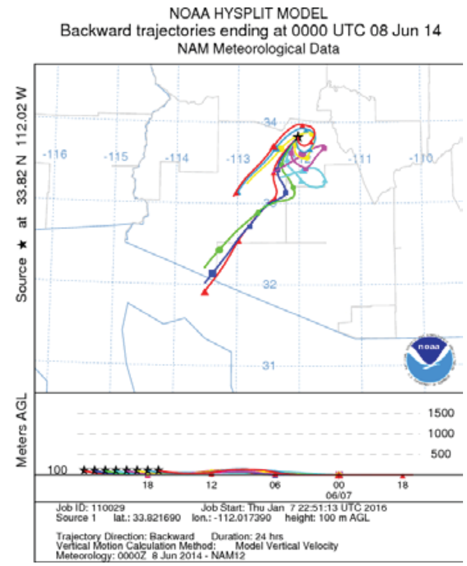


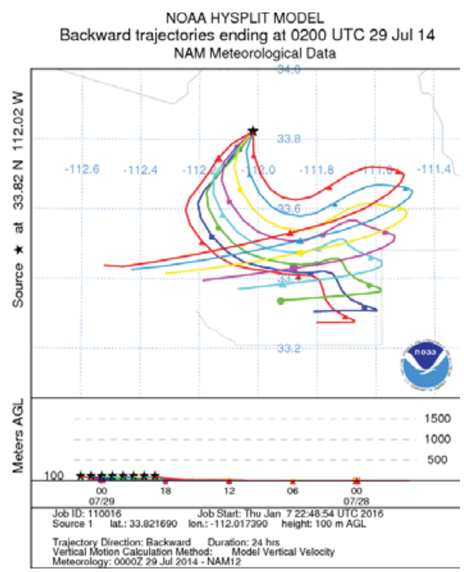


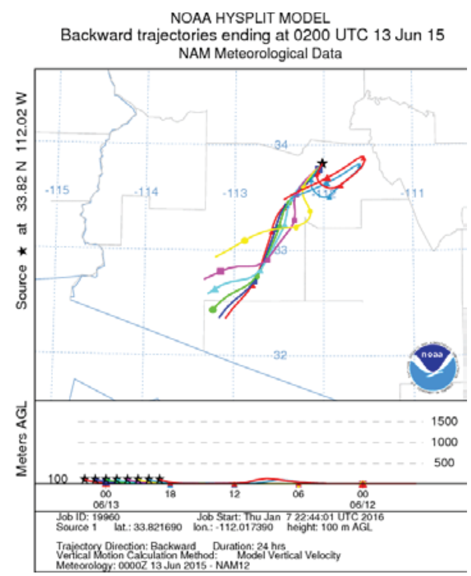




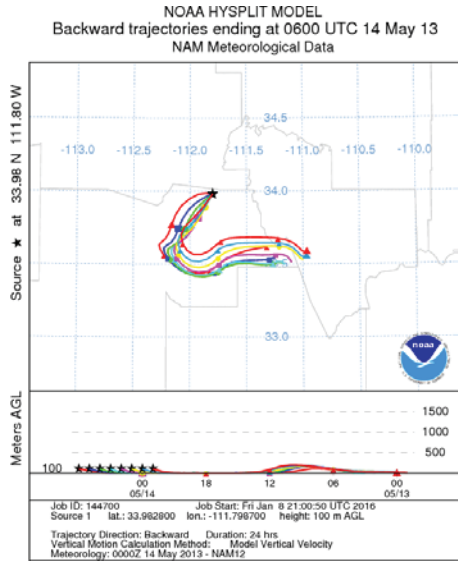

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.82 N 112.02 W
Meters AGL
1500
1000
500
100
18 12 06 00 18
06/06
Job ID: 110037 Job Start: Thu Jan 7 22:52:41 UTC 2016
Source 1 lat.: 33.821690 lon.: -112.017390 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

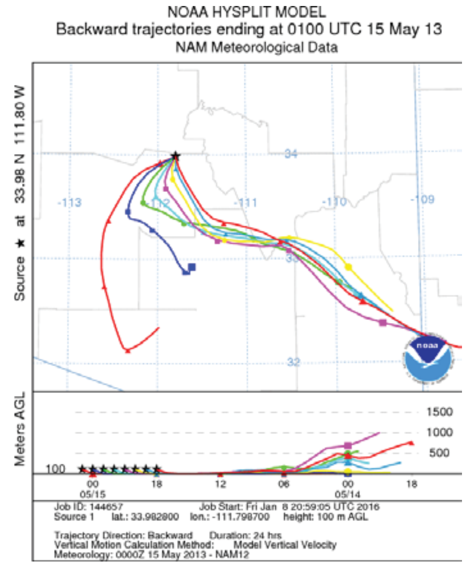

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jun 14
NAM Meteorological Data
Source ★ at 33.82 N 112.02 W
Meters AGL
1500
1000
500
100
18 12 06 00 18
06/07
Job ID: 110029 Job Start: Thu Jan 7 22:51:13 UTC 2016
Source 1 lat.: 33.821690 lon.: -112.017390 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Jun 2014 - NAM12

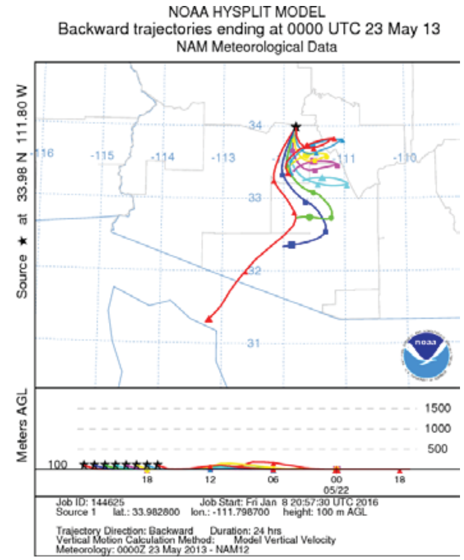

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.82 N 112.02 W
Meters AGL
1500
1000
500
100
00 18 12 06 00
07/29 07/28
Job ID: 110016 Job Start: Thu Jan 7 22:48:54 UTC 2016
Source 1 lat.: 33.821690 lon.: -112.017390 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jul 2014 - NAM12

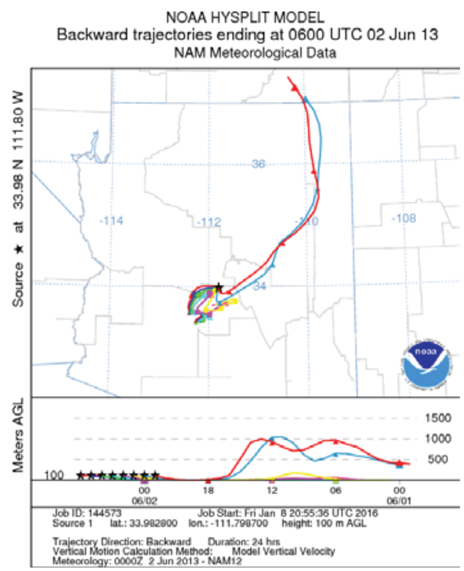

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.82 N 112.02 W
Meters AGL
1500
1000
500
100
00 18 12 06 00
06/13 06/12
Job ID: 19960 Job Start: Thu Jan 7 22:44:01 UTC 2016
Source 1 lat.: 33.821690 lon.: -112.017390 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

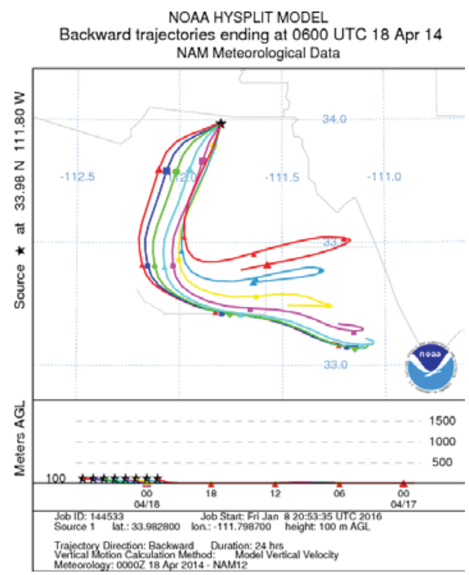
AI11 Humboldt Mountain Monitor – Maricopa County (04-013-9508)

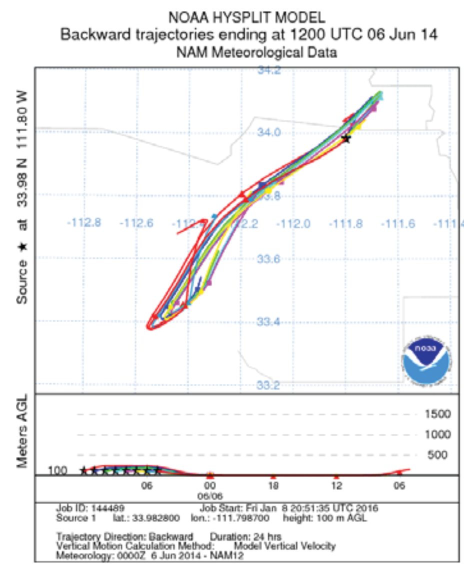


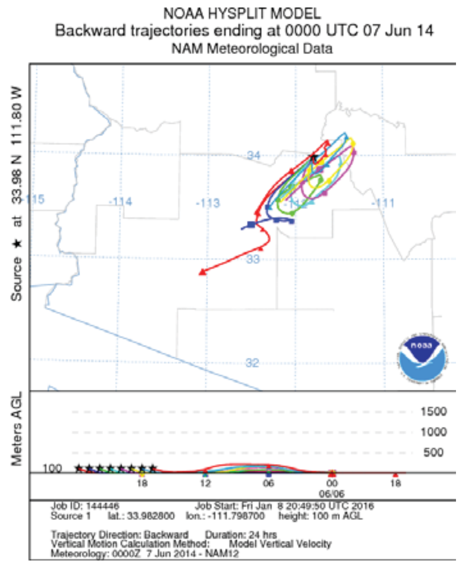


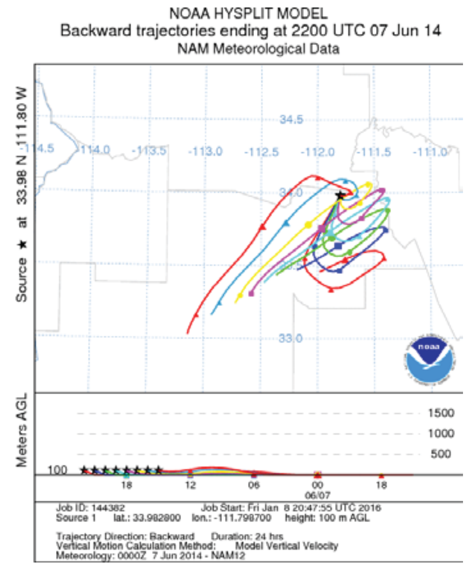


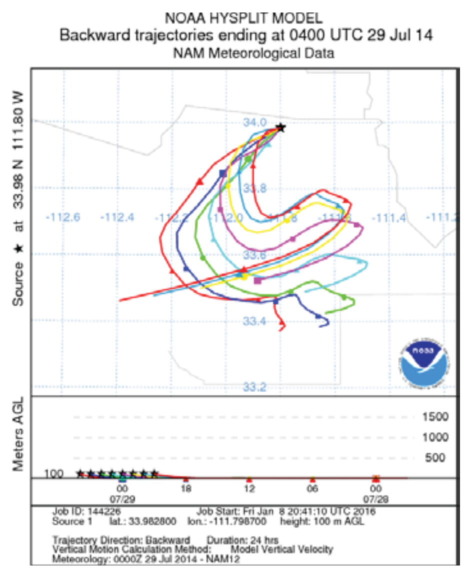


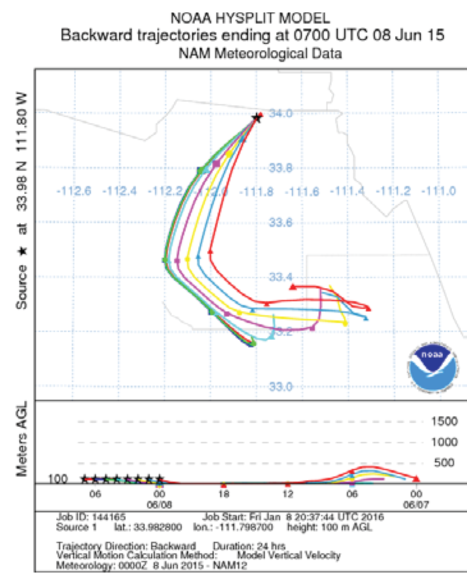




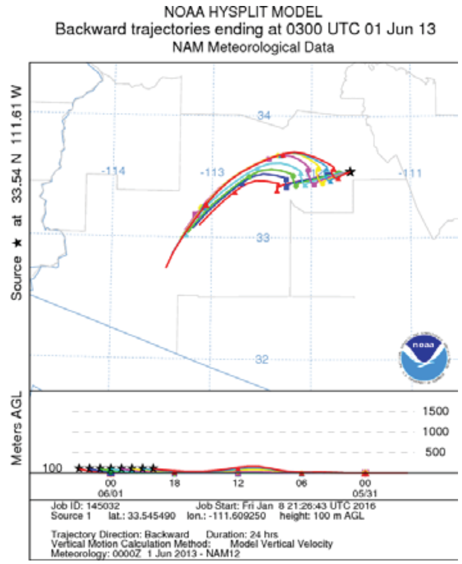

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
Job ID: 144446 Job Start: Fri Jan 8 20:49:50 UTC 2016
Source 1 lat.: 33.982800 lon.: -111.798700 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

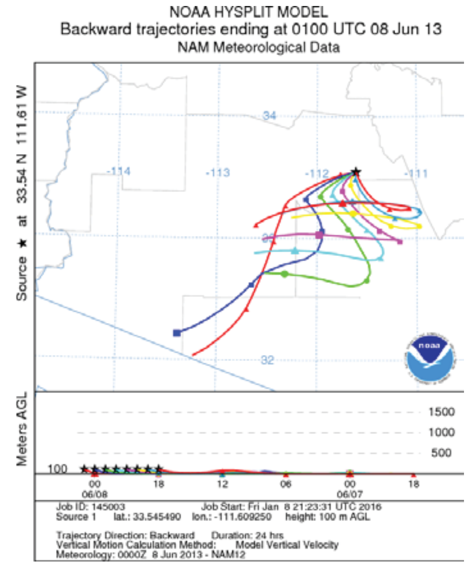

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
Job ID: 144382 Job Start: Fri Jan 8 20:47:55 UTC 2016
Source 1 lat.: 33.982800 lon.: -111.798700 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

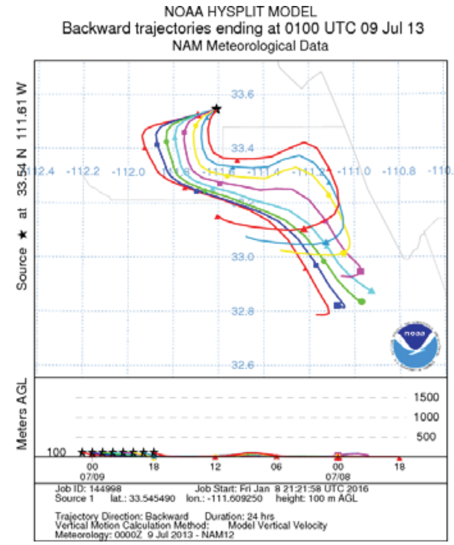

NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
Job ID: 144226 Job Start: Fri Jan 8 20:41:10 UTC 2016
Source 1 lat.: 33.982800 lon.: -111.798700 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 Jul 2014 - NAM12

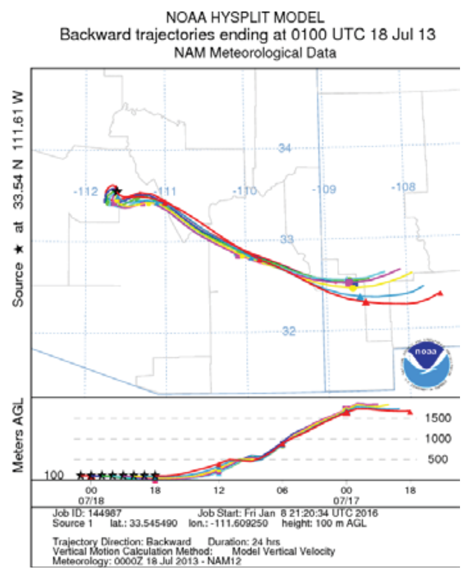

NOAA HYSPLIT MODEL
Backward trajectories ending at 0700 UTC 08 Jun 15
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
Job ID: 144165 Job Start: Fri Jan 8 20:37:44 UTC 2016
Source 1 lat.: 33.982800 lon.: -111.798700 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Jun 2015 - NAM12

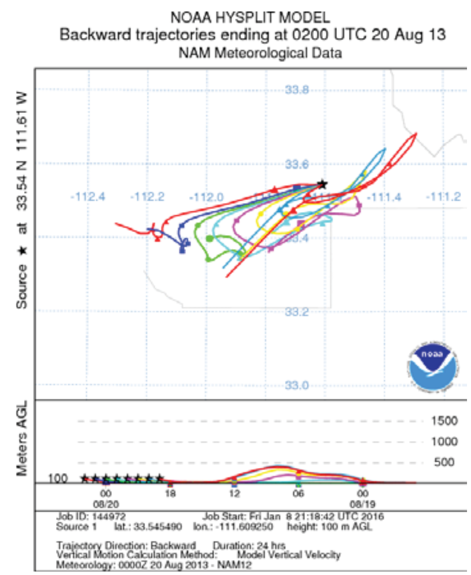
AI12 Blue Point Monitor – Maricopa County (04-013-9702)

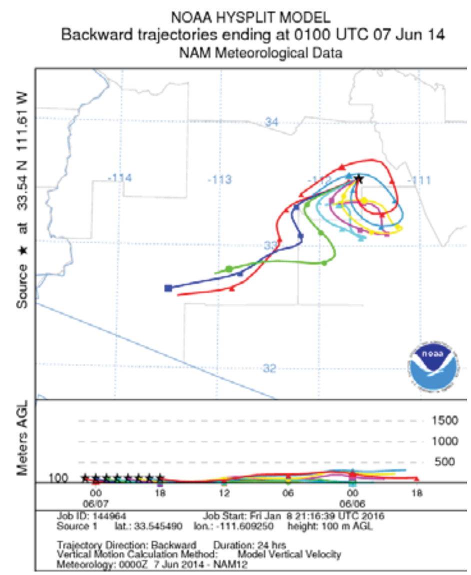


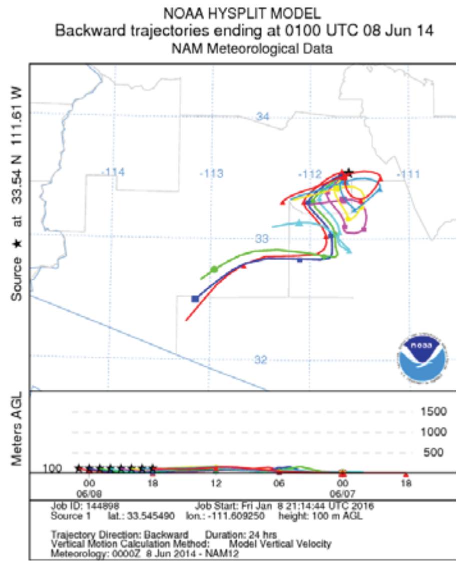


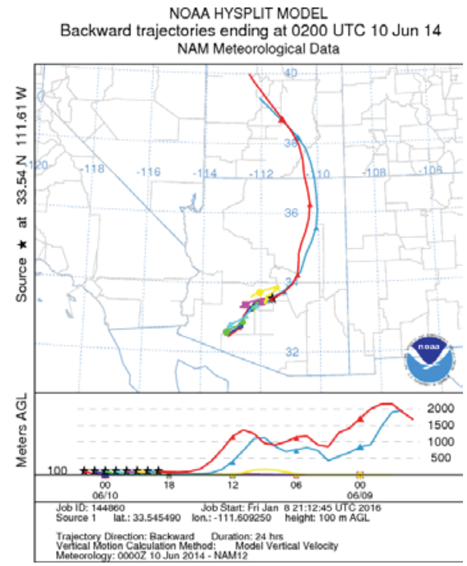


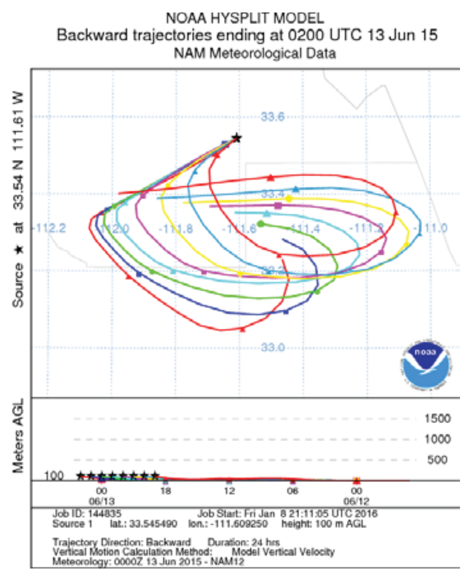


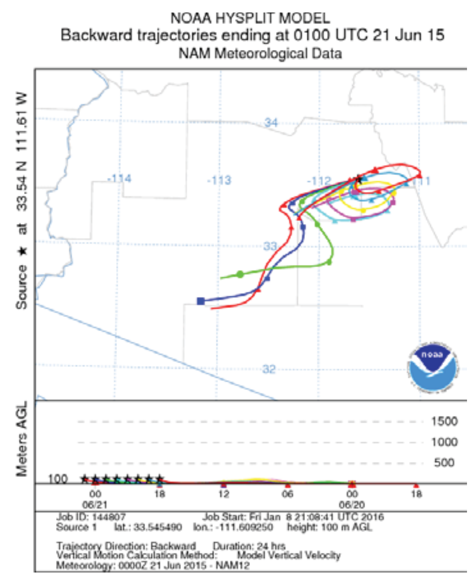




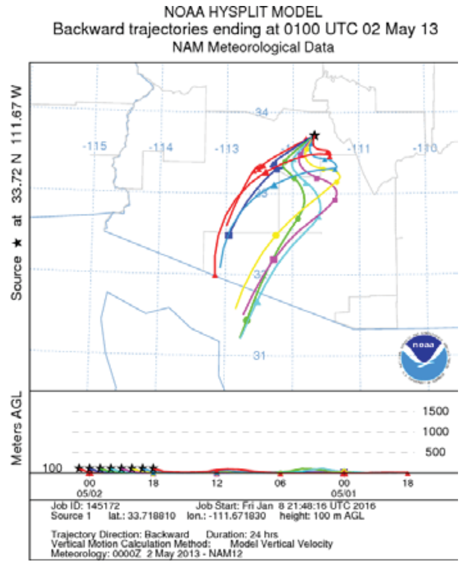

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 08 Jun 14
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
Job ID: 144898 Job Start: Fri Jan 8 21:14:44 UTC 2016
Source 1 lat.: 33.545490 lon.: -111.609250 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 8 Jun 2014 - NAM12

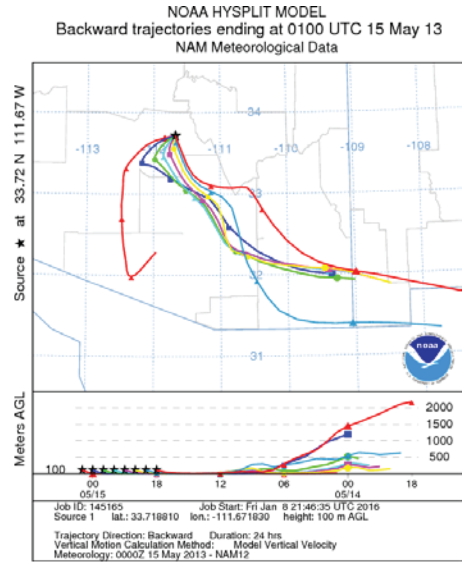

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
Job ID: 144860 Job Start: Fri Jan 8 21:12:45 UTC 2016
Source 1 lat.: 33.545490 lon.: -111.609250 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 10 Jun 2014 - NAM12

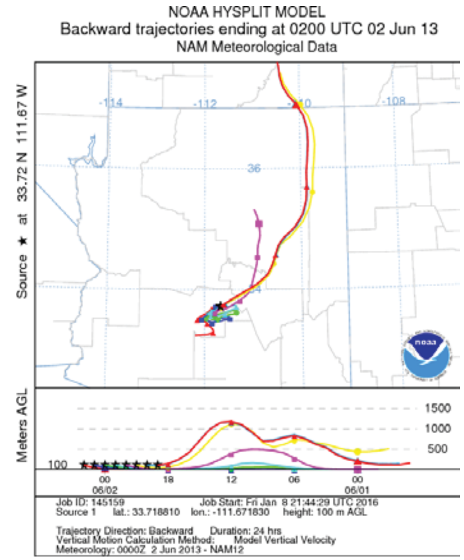

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
Job ID: 144835 Job Start: Fri Jan 8 21:11:05 UTC 2016
Source 1 lat.: 33.545490 lon.: -111.609250 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2015 - NAM12

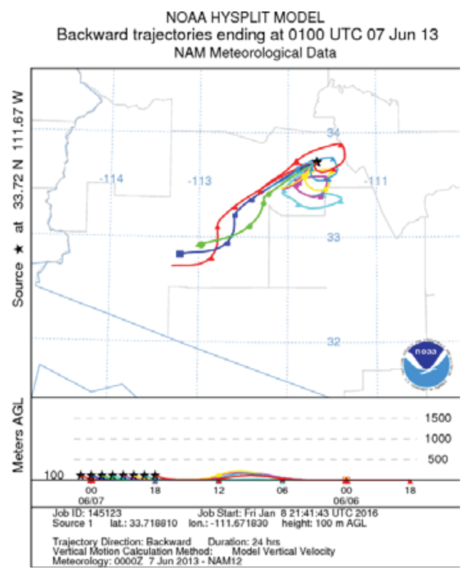

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
Job ID: 144807 Job Start: Fri Jan 8 21:08:41 UTC 2016
Source 1 lat.: 33.545490 lon.: -111.609250 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 21 Jun 2015 - NAM12

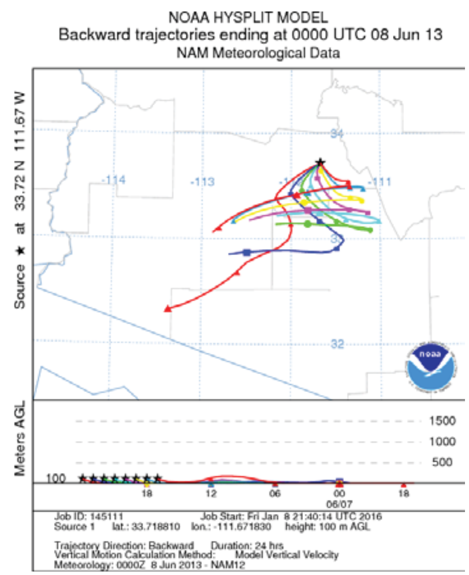
AI13 Rio Verde Monitor – Maricopa County (04-013-9706)

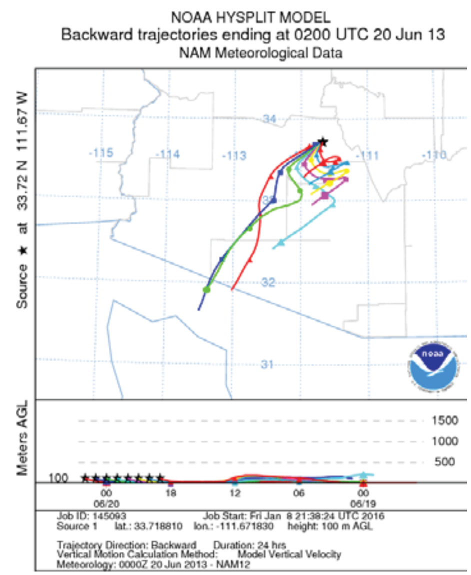


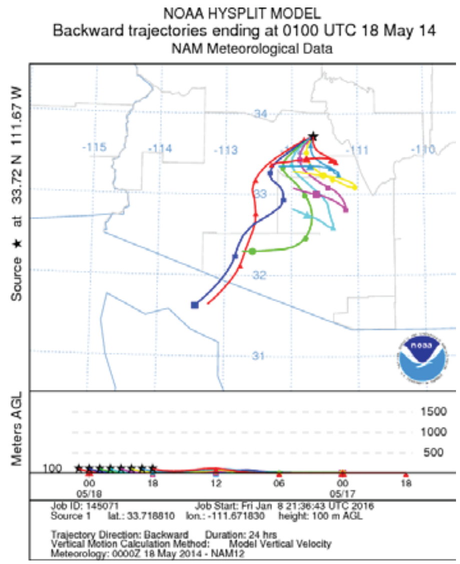


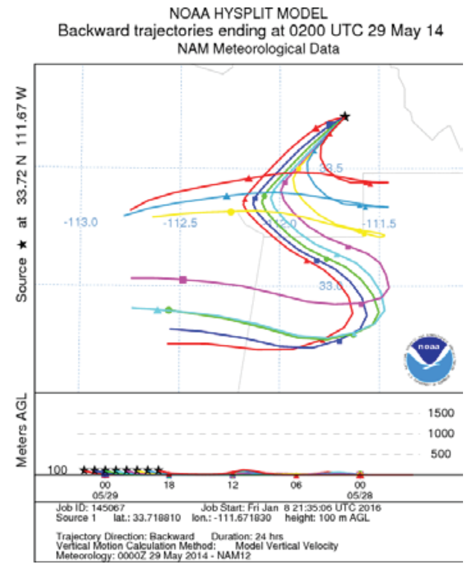


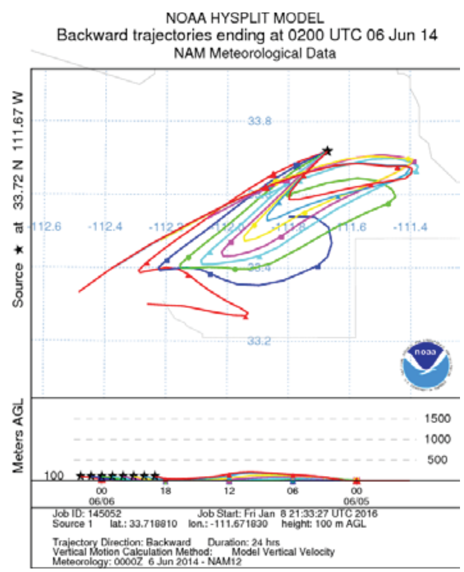


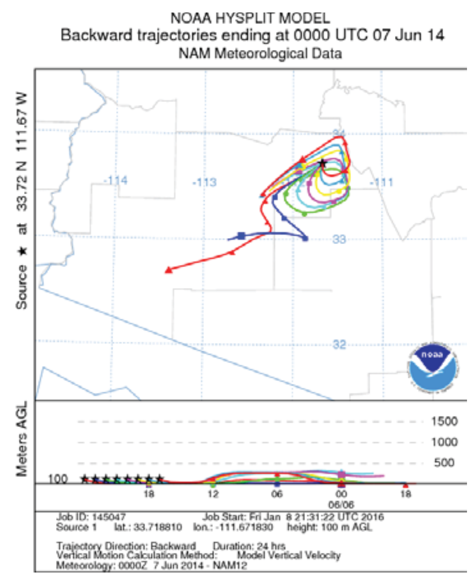




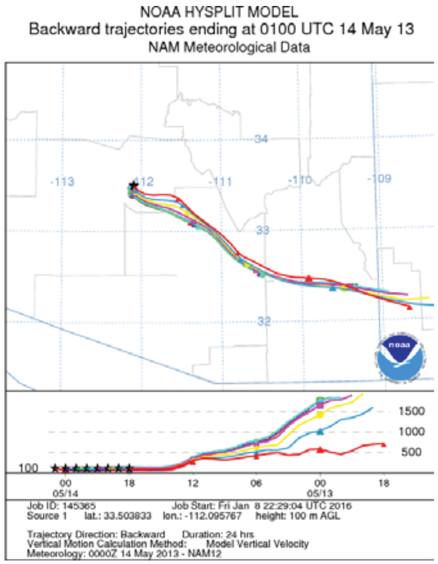

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 18 May 14
NAM Meteorological Data
Source ★ at 33.72 N 111.67 W
Meters AGL
Job ID: 145071 Job Start: Fri Jan 8 21:36:43 UTC 2016
Source 1 lat.: 33.718810 lon.: -111.671830 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 18 May 2014 - NAM12

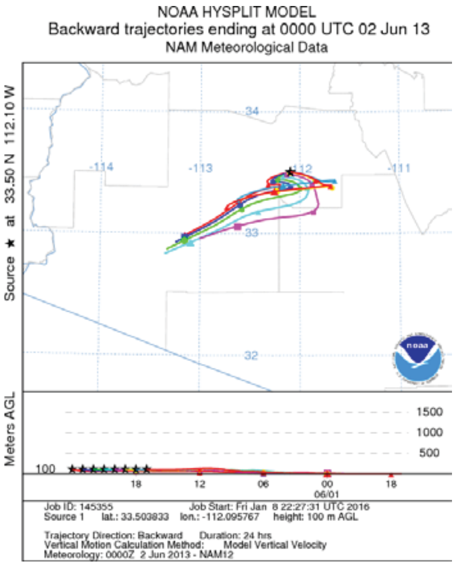

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 May 14
NAM Meteorological Data
Source ★ at 33.72 N 111.67 W
Meters AGL
Job ID: 145067 Job Start: Fri Jan 8 21:35:06 UTC 2016
Source 1 lat.: 33.718810 lon.: -111.671830 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 29 May 2014 - NAM12

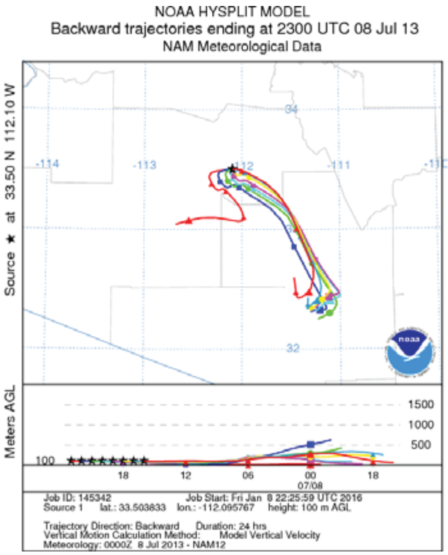

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.72 N 111.67 W
Meters AGL
Job ID: 145052 Job Start: Fri Jan 8 21:33:27 UTC 2016
Source 1 lat.: 33.718810 lon.: -111.671830 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 6 Jun 2014 - NAM12

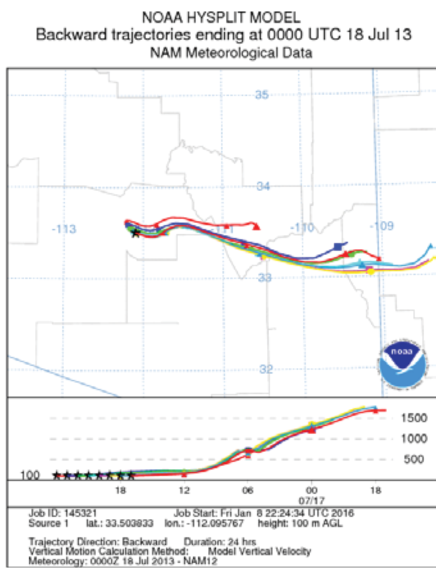

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.72 N 111.67 W
Meters AGL
Job ID: 145047 Job Start: Fri Jan 8 21:31:22 UTC 2016
Source 1 lat.: 33.718810 lon.: -111.671830 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

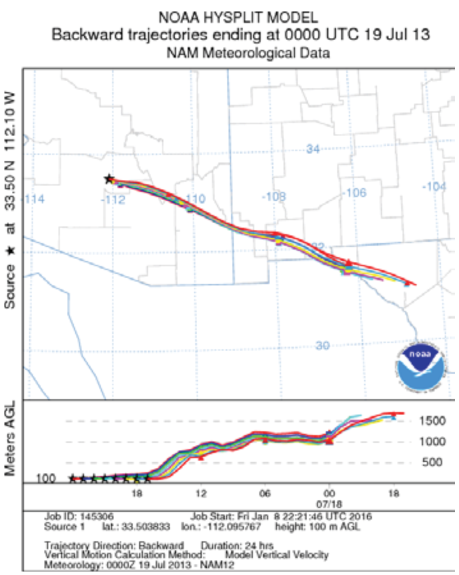
AI14 JLG Supersite Monitor – Maricopa County (04-013-9997)

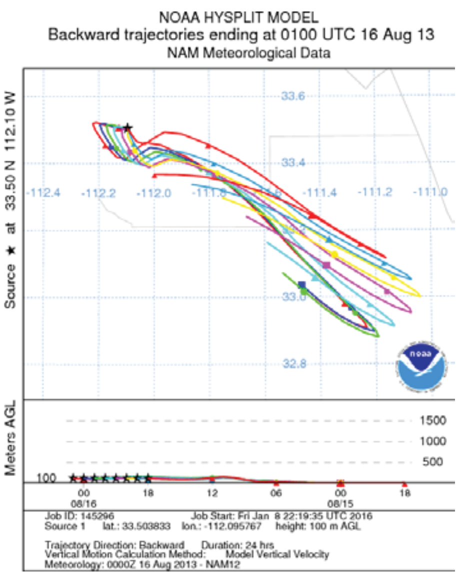


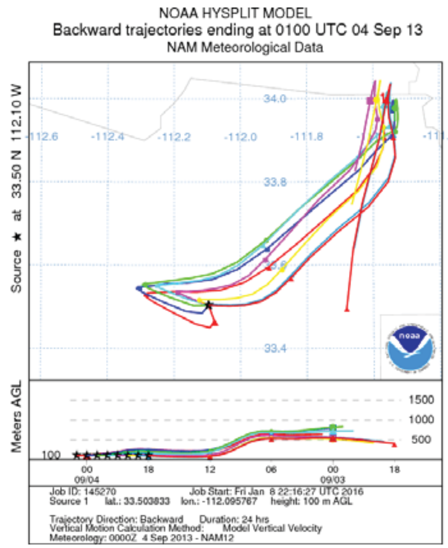


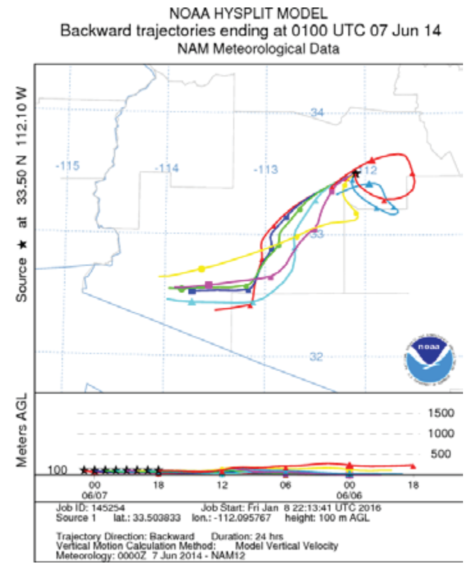


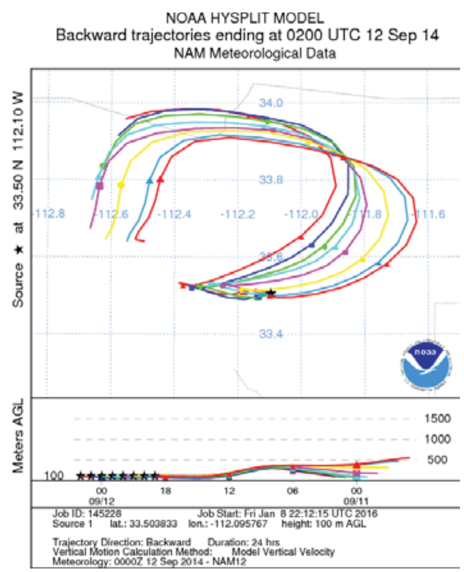


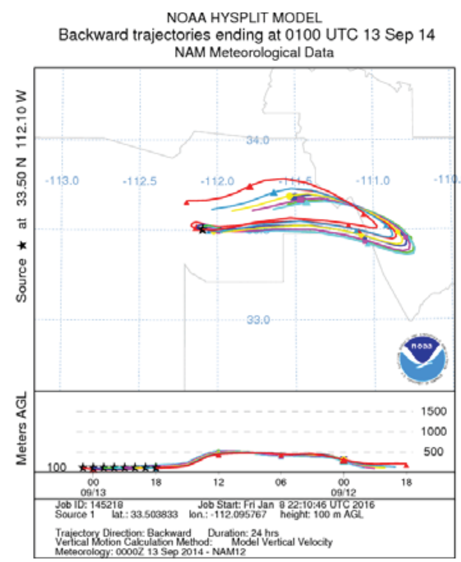




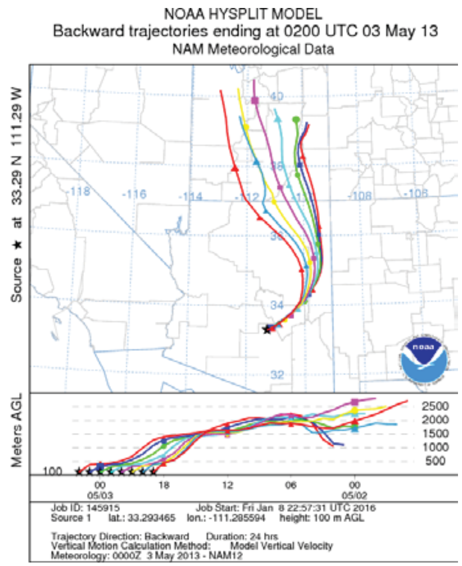

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 04 Sep 13
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
Job ID: 145270 Job Start: Fri Jan 8 22:16:27 UTC 2016
Source 1 lat.: 33.503833 lon.: -112.095767 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 4 Sep 2013 - NAM12

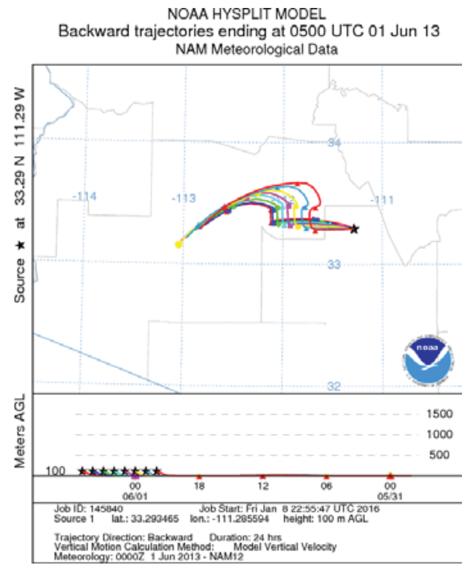

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
Job ID: 145254 Job Start: Fri Jan 8 22:13:41 UTC 2016
Source 1 lat.: 33.503833 lon.: -112.095767 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 7 Jun 2014 - NAM12

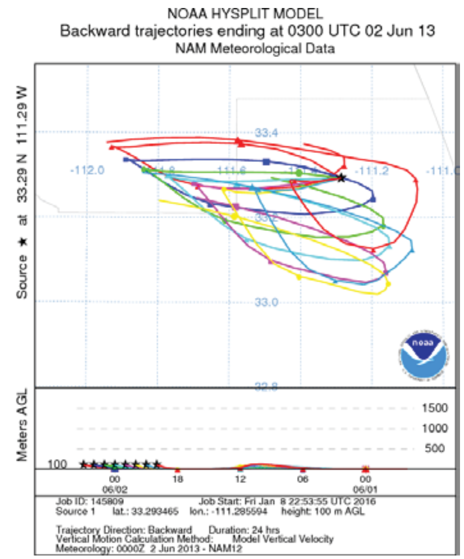

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 12 Sep 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
Job ID: 145228 Job Start: Fri Jan 8 22:12:15 UTC 2016
Source 1 lat.: 33.503833 lon.: -112.095767 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 12 Sep 2014 - NAM12

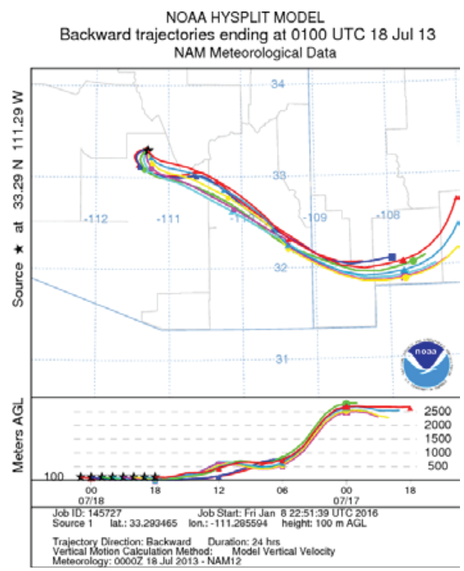

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
Job ID: 145218 Job Start: Fri Jan 8 22:10:46 UTC 2016
Source 1 lat.: 33.503833 lon.: -112.095767 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Sep 2014 - NAM12

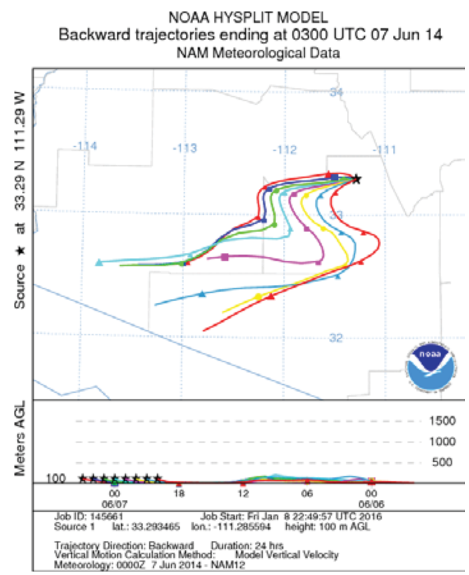
AI15 Queen Valley Monitor – Pinal County (04-021-8001)

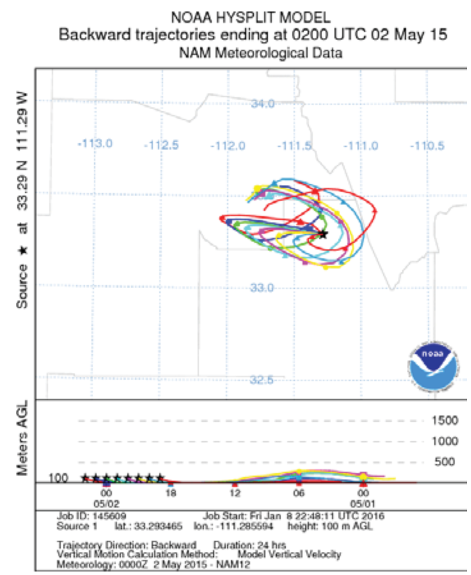


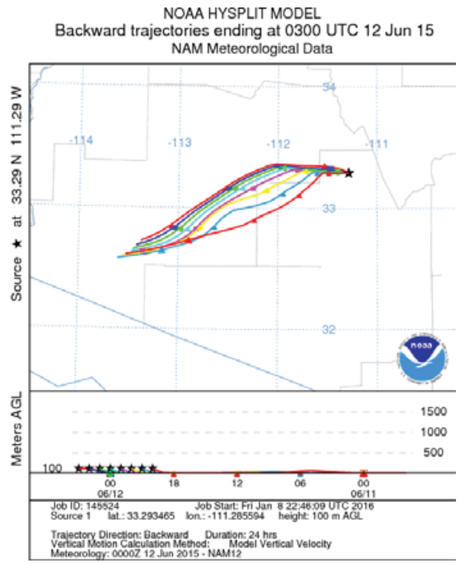


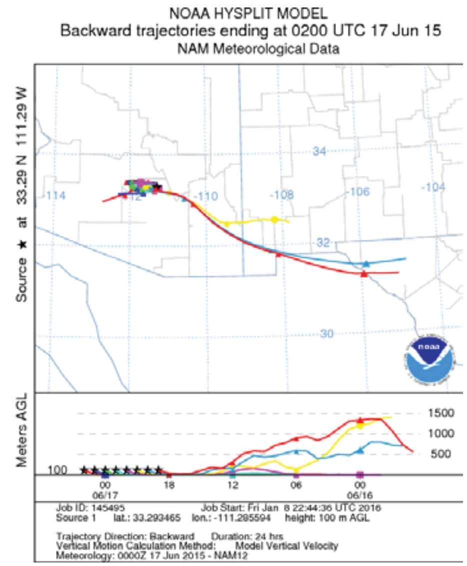


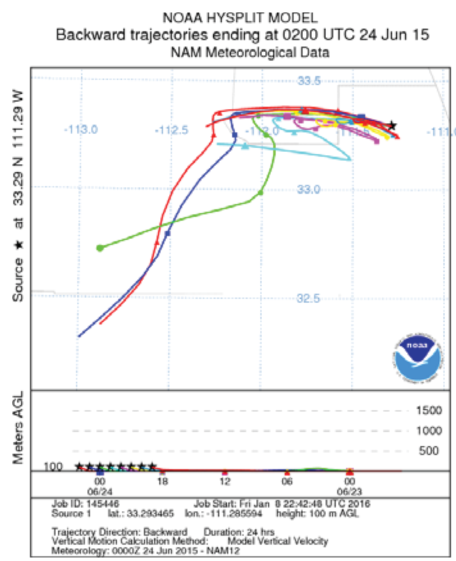


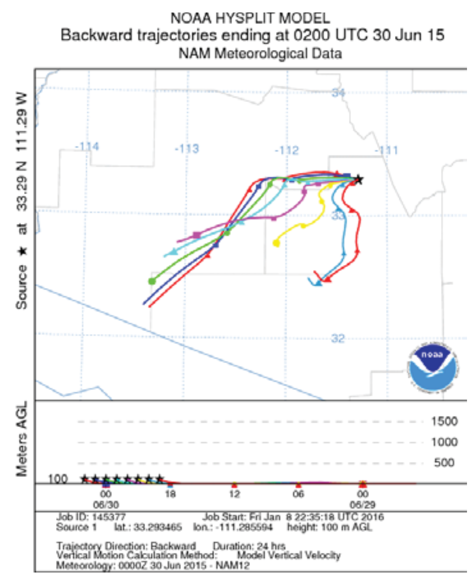




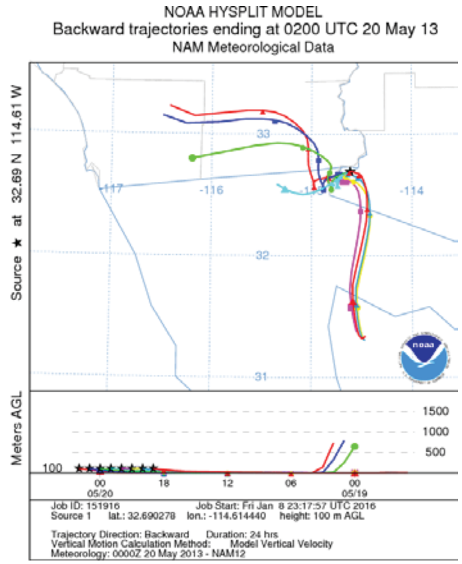

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 12 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500
100
00 06/12
18
12
06
00 06/11
Job ID: 145524 Job Start: Fri Jan 8 22:46:09 UTC 2016
Source 1 lat.: 33.293465 lon.: -111.285594 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 12 Jun 2015 - NAM12

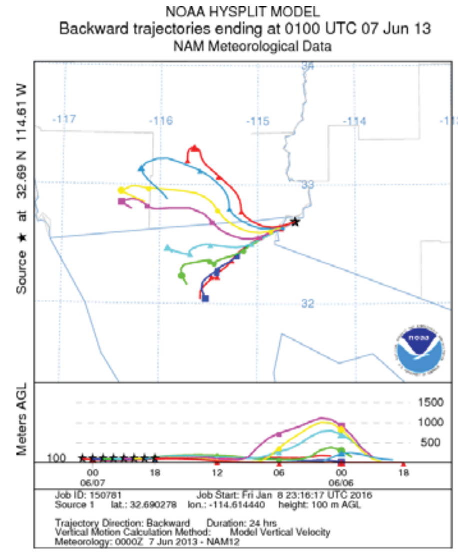

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 17 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500
100
00 06/17
18
12
06
00 06/16
Job ID: 145495 Job Start: Fri Jan 8 22:44:36 UTC 2016
Source 1 lat.: 33.293465 lon.: -111.285594 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 17 Jun 2015 - NAM12

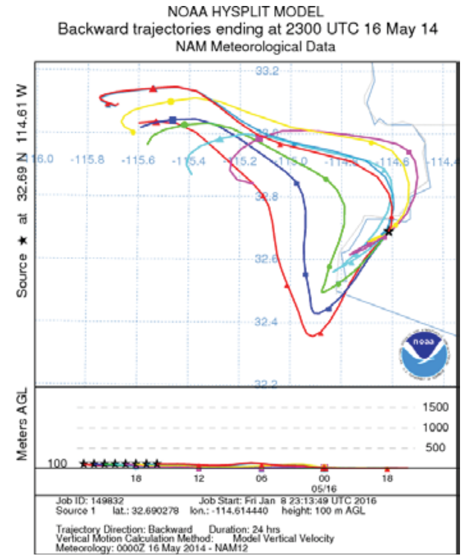

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 24 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500
100
00 06/24
18
12
06
00 06/23
Job ID: 145446 Job Start: Fri Jan 8 22:42:48 UTC 2016
Source 1 lat.: 33.293465 lon.: -111.285594 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 24 Jun 2015 - NAM12

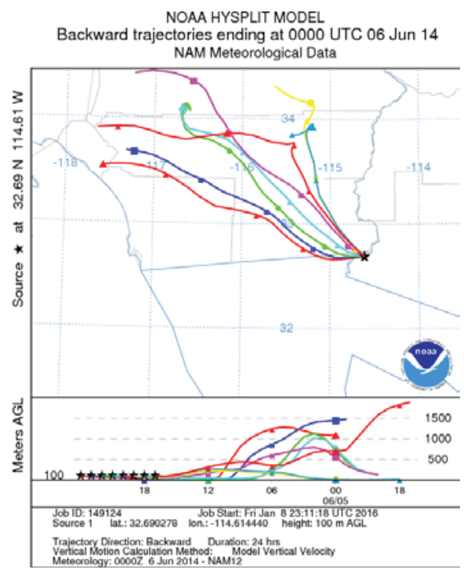

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 30 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500
100
00 06/30
18
12
06
00 06/29
Job ID: 145377 Job Start: Fri Jan 8 22:35:18 UTC 2016
Source 1 lat.: 33.293465 lon.: -111.285594 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 30 Jun 2015 - NAM12

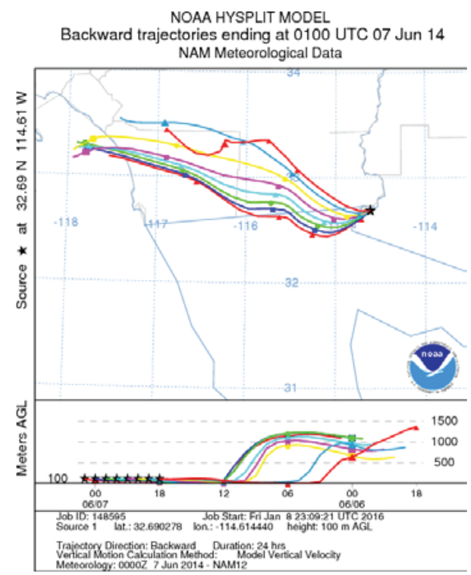
AI16 Yuma Supersite Monitor – Yuma County (04-027-8011)

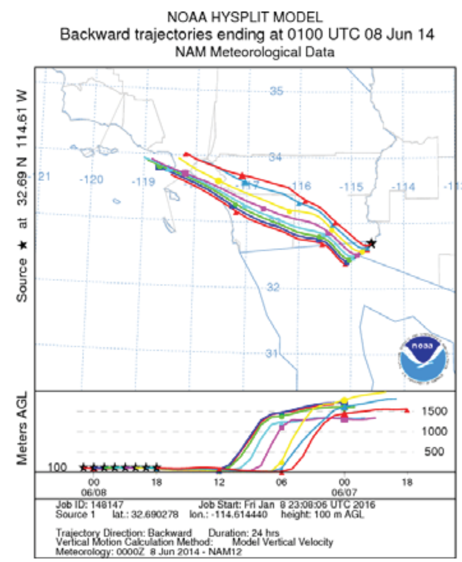


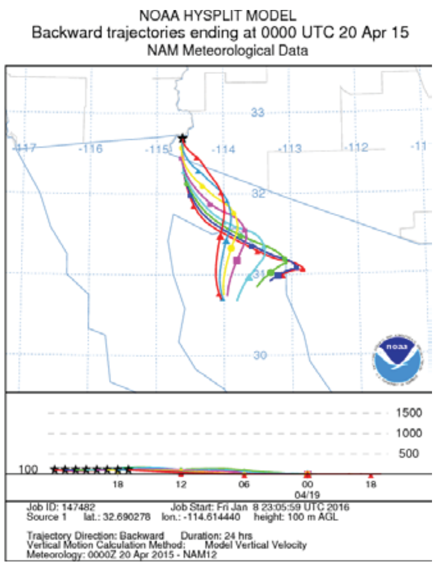


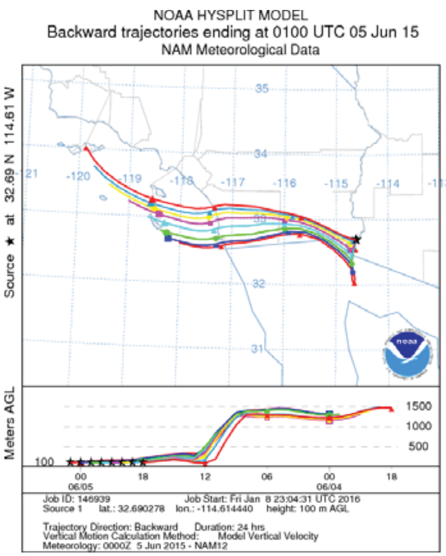


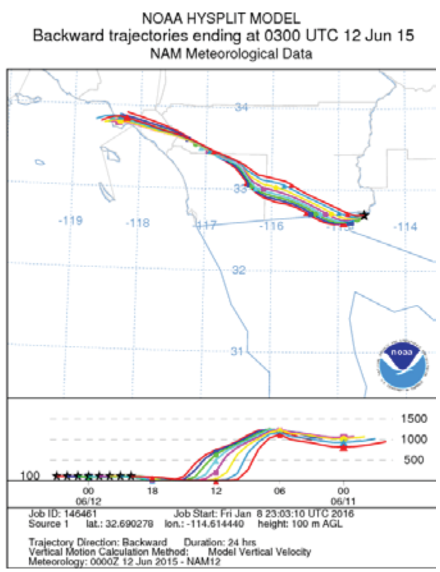


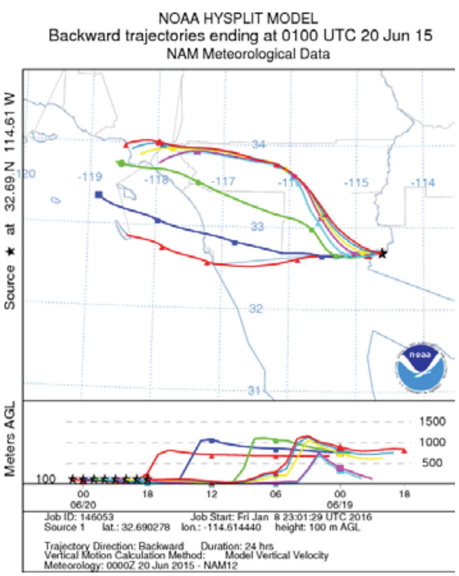





NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 20 Apr 15
NAM Meteorological Data
Source ★ at 32.69 N 114.61 W
Meters AGL
Job ID: 147482 Job Start: Fri Jan 8 23:05:59 UTC 2016
Source 1 lat.: 32.690278 lon.: -114.614440 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 20 Apr 2015 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 05 Jun 15
NAM Meteorological Data
Source ★ at 32.69 N 114.61 W
Meters AGL
Job ID: 146939 Job Start: Fri Jan 8 23:04:31 UTC 2016
Source 1 lat.: 32.690278 lon.: -114.614440 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 5 Jun 2015 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 12 Jun 15
NAM Meteorological Data
Source ★ at 32.69 N 114.61 W
Meters AGL
Job ID: 146461 Job Start: Fri Jan 8 23:03:10 UTC 2016
Source 1 lat.: 32.690278 lon.: -114.614440 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 12 Jun 2015 - NAM12


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 20 Jun 15
NAM Meteorological Data
Source ★ at 32.69 N 114.61 W
Meters AGL
Job ID: 146053 Job Start: Fri Jan 8 23:01:29 UTC 2016
Source 1 lat.: 32.690278 lon.: -114.614440 height: 100 m AGL
Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 20 Jun 2015 - NAM12