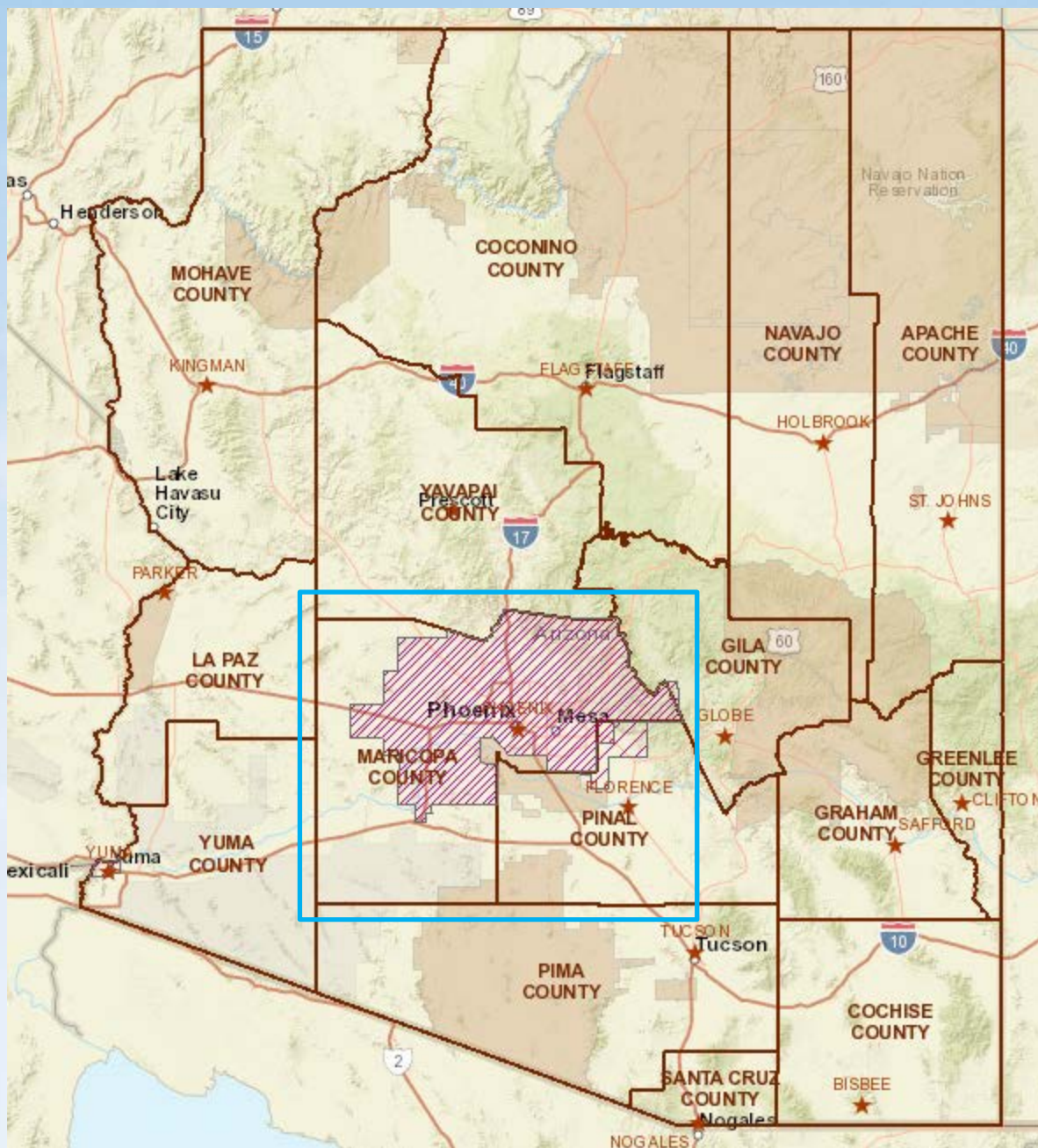


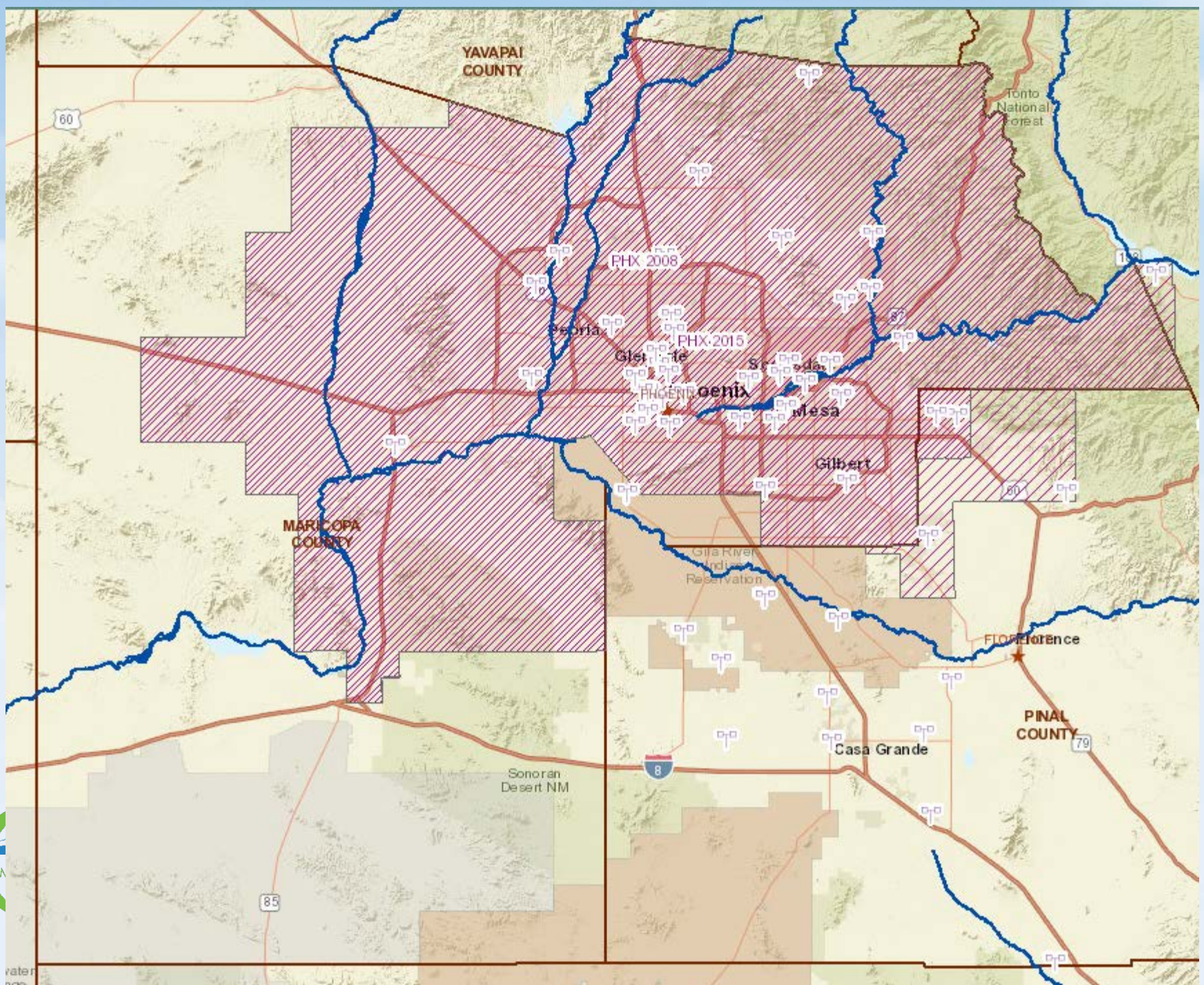


Air Quality Issues in the Phoenix Metro Area

Ira Domskey, Planning Consultant
Maricopa County Air Quality Department
HAQAST Annual Meeting, Madison WI
July 17, 2018

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VERMONT

★ Montpelier

YAVAPAI COUNTY

Tonto National Forest

PHX 2008

PHX 2015

Phoenix

Mesa

fact360

85

Major Air Pollution Issues

- PM₁₀, primarily from geologic dust, year-round
 - Roadways, construction, vacant lots, agriculture, windblown dust events
- PM_{2.5}, largely smoke and soot, wintertime
 - Recreational wood burning, fireworks, occasionally windblown dust
- Ozone
 - April through September

Particulate Matter

- DEVELOP PM₁₀ and health impacts project
 - 3 project teams spring & summer of 2016
 - Developed a draft model to correlate AOD from MODIS, MISER & CALYPSO data with fixed monitoring network
 - Project completed and is unfunded
- PM_{2.5}
 - Highest concentrations in the urban core
 - Ongoing monitoring studies to characterize sources
 - More work needed on origins and fate of wood smoke emission
 - Do upslope emissions contribute to urban core concentrations?

What a great picture of our haboob (dust storm) in Arizona on August 11, 2015!

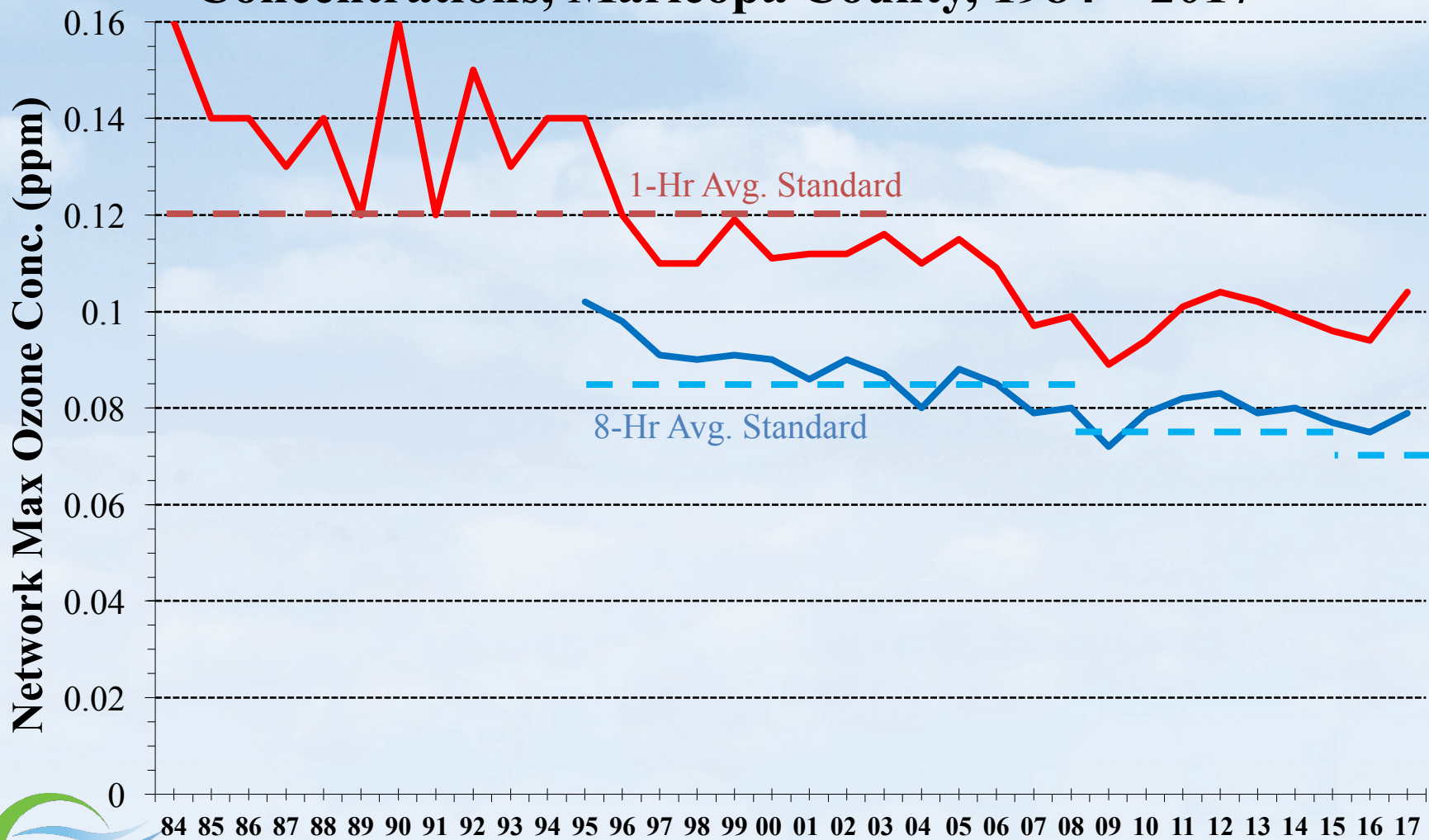
Courtesy of Walter Unger



Ozone

- Nonattainment persists
 - Driven in part by more stringent NAAQS
 - Major emission reductions strategies implemented
 - Improvement continues, but progress has slowed
 - Additional controls are difficult to identify and implement

Network Max 1-Hour & 8-Hour Average Ozone Concentrations, Maricopa County, 1984 – 2017



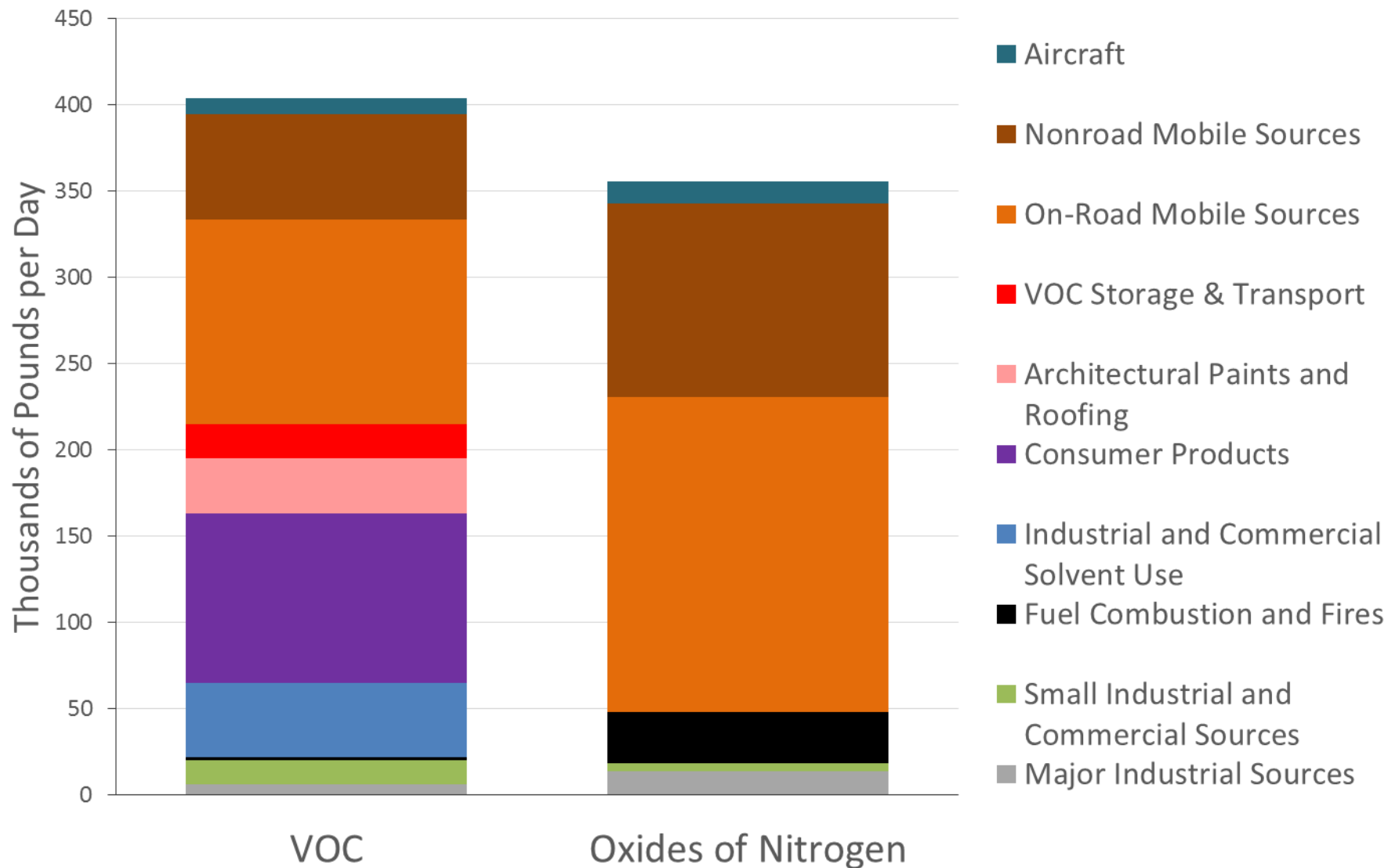
— Fourth Hi 8-Hr — Second Hi 1-Hr

Source: EPA Air Data 5/18/18

Ozone Emissions Inventory

- MCAQD, in partnership with MAG, create area-wide, top-down emissions inventories (EI) every 3 years
 - Industrial sources report emissions annually
 - Categories of minor sources surveyed periodically
 - Mobile sources estimated using EPA models and traffic data
 - Other sources estimated using surrogates such as populations and sector employment
 - Biogenics (BVOCs) estimated using models driven by land use classifications and their coverage
- NO_x emissions almost entirely from combustion, and more or less well understood
- VOC emissions come from a multitude of sources

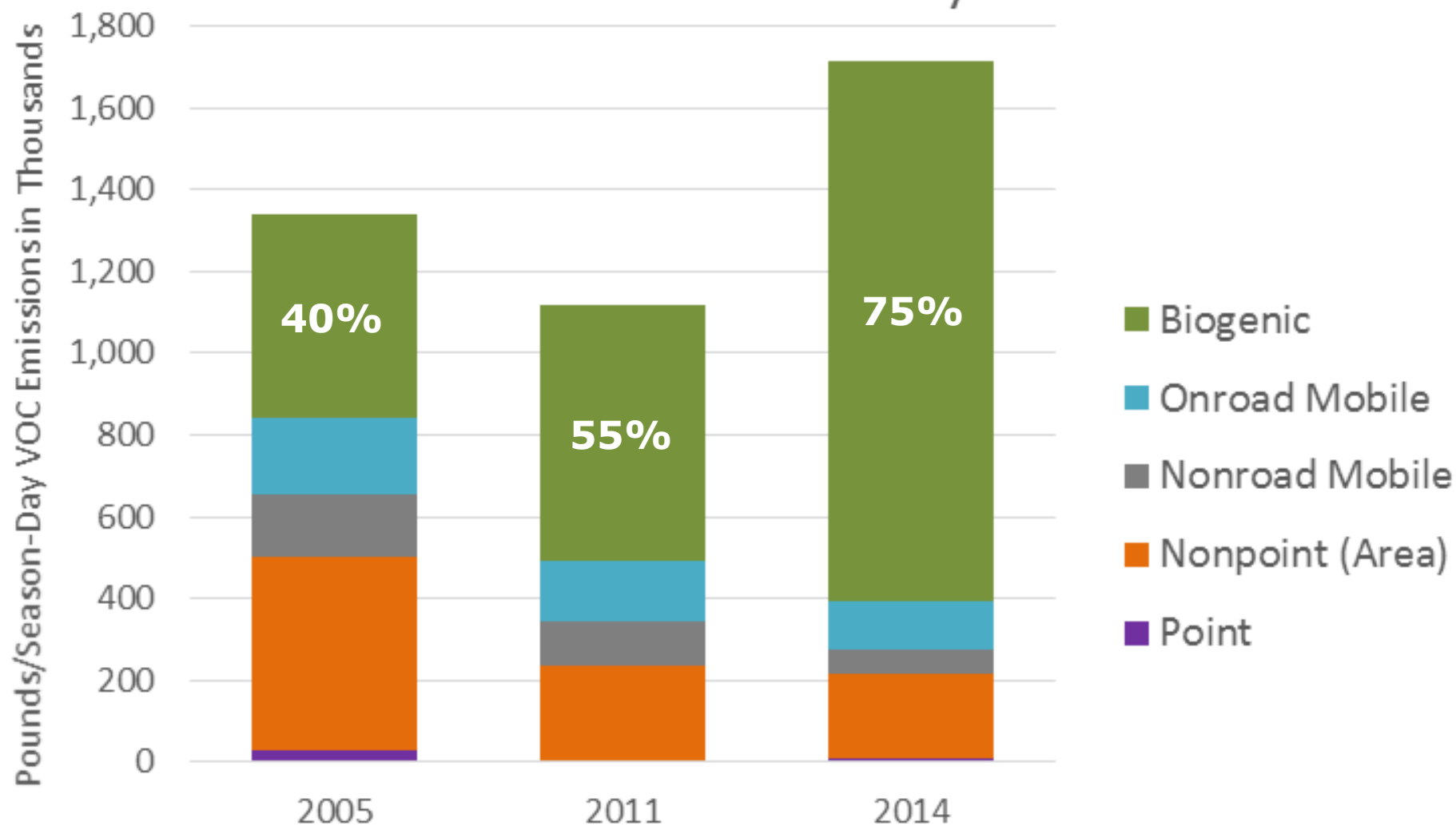
2014 Periodic Ozone Emissions Inventory for Maricopa County, Anthropogenic Emissions



Biogenic VOC Emissions

- Most of the BVOC emissions come from trees and shrubs
 - Models estimate emissions using land use and vegetation type classifications
 - Emissions factors developed based on field sampling
 - Until the 2011 periodic emissions inventory, emissions factors did not include Southwestern plant species
- Emissions estimation methods are updated frequently
 - MAG's 2006 field study developed emission factors for Sonoran Desert and chaparral plants
 - Multiyear VOC inventory comparisons demonstrates this

Comparison of Maricopa County Nonattainment Area VOC Inventories by Year



Implications of the EI Change

- The amount of biogenic emissions estimated begs the question as to whether the airshed is NO_x limited; prior modeling showed it was not
- Dominance of biogenic VOC emissions is counterintuitive
- Photochemical Assessment Monitoring Station (PAMS) data never analyzed to test the top-down inventory
- MCAQD sponsored a project to use PAMS data to develop a “top-down” inventory assessment
 - Results showed isoprene at 4% of total VOC; with terpenes and secondary aldehydes, maximum may be 10-15%

Applied Research Approaches

- The ozone monitoring instruments on several satellites is capable of measuring formaldehyde as a surrogate for reactive VOC, and NO_x
 - Formaldehyde is found in higher concentrations than almost all the other VOCs measured at Phoenix Supersite
 - Geospatial quantification of VOC distribution based upon land use/cover overlays
 - Multiple year record of OMI measurements
 - Peer reviewed literature is very recent and sparse - opportunities for publication of results
- Additional ambient sampling
 - Existing sampling, while rigorous, is very localized
 - Could be used to validate satellite measurements



Thank You for Your Time and Attention

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