

Where does the dust come from?

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2019 Arizona Dust Storm Workshop

Central Arizona College

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Desert pavement



Photographer: Wendy Van Norden
<http://epod.usra.edu/blog/2015/02/desert.pavement.html>

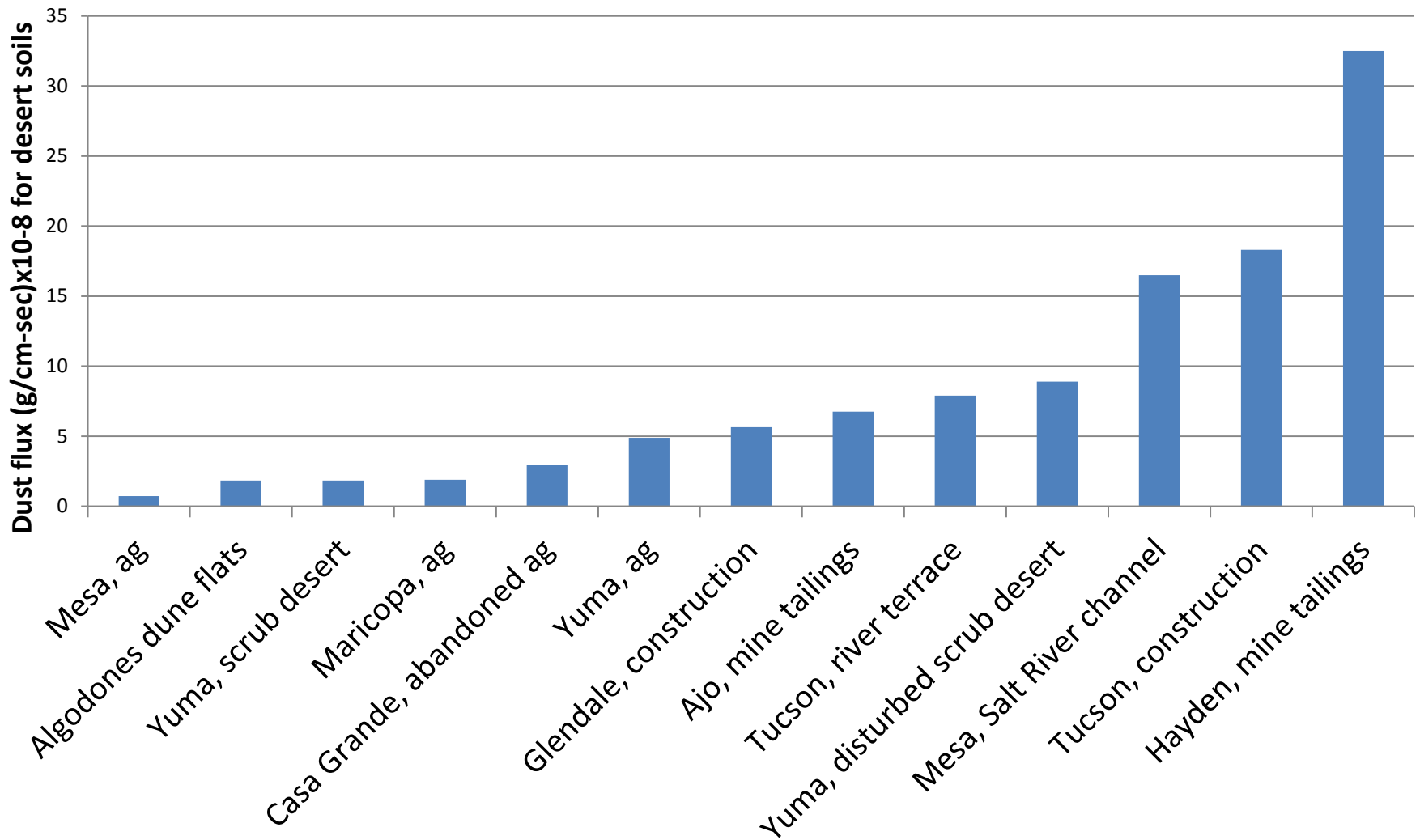
Interstate & international transport?

- Yes, occasionally, but rarely
- Of 45 dust storms studied by ADEQ for “exceptional events”: 2011 – 2014, one was interstate
- Other 44 events the dust was locally produced and transported within the region

Sonoran Desert dust storm frequencies: 1948 - 1982

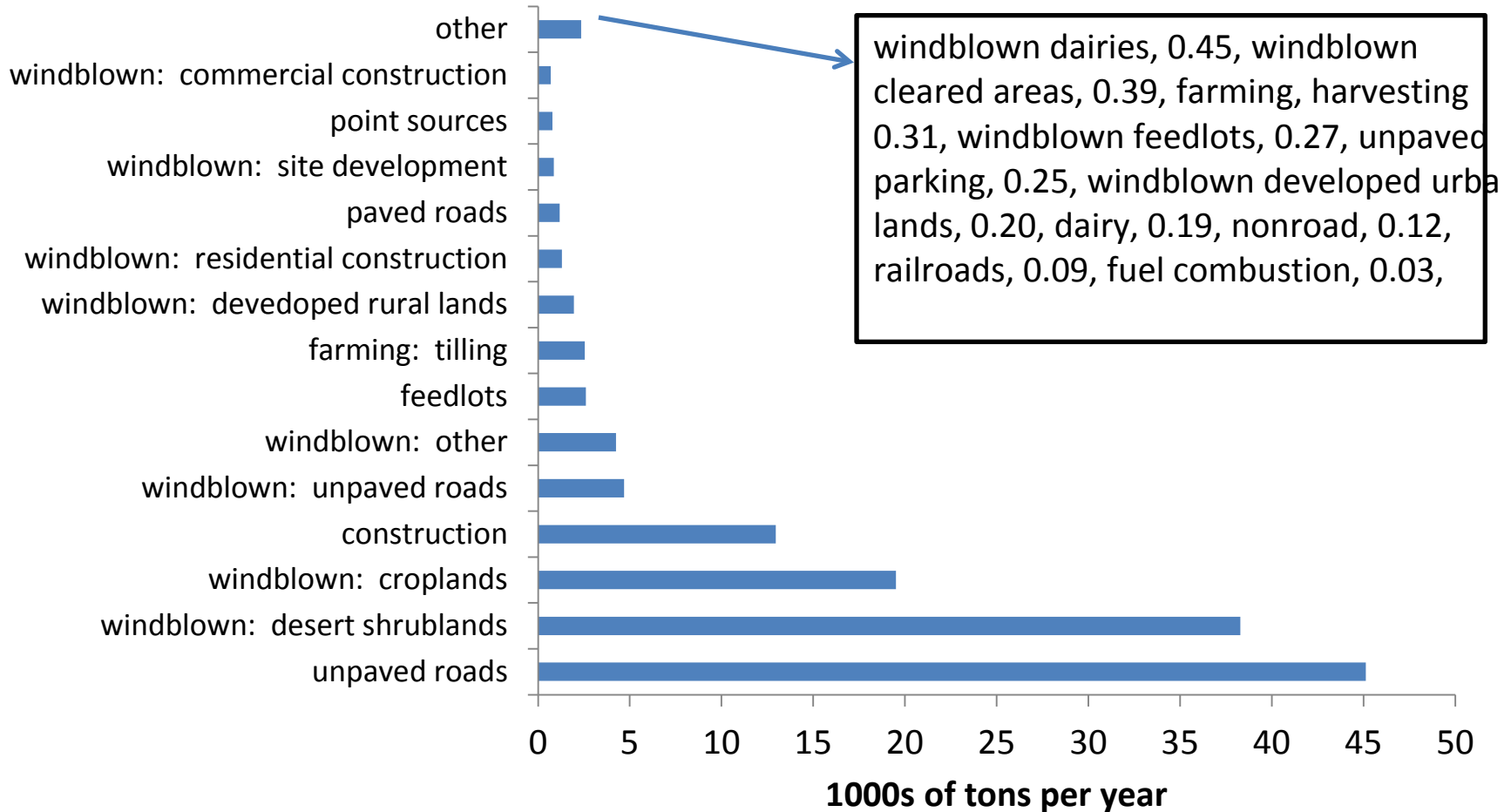
site	frequency per year		
	11.3 km	1 km	ratio: 1km/11.3 km
Thermal	35.6	5.1	0.14
Yuma	23.9	4.7	0.19
Imperial	22.8	2.5	0.11
Phoenix	18.1	1.6	0.08
Blythe	12.7	3	0.23
Gila Bend	10.8	2.1	0.19
Tucson	3.8	0.3	0.08

A. J. Brazel, "Dust and climate in the American Southwest", in *Paleoclimatology and Paleometeorology: Modern and Past Patterns of Global Atmospheric Transport*, eds. M. Leinen & M. Sarnthein, Kluwer Academic Publishers, pp 65 - 96



Nickling & Gillies, "Emission of fine-grained particulates from desert soils", in
 Paleoclimatology and Paleometeorology: Modern and Past Patterns
 of Global Atmospheric Transport, eds. M. Leinen and M. Sarnthein,
 Kluwer Academic Publishers, Dordrecht, 1989, pp 133 - 165

Western Pinal County PM10 Emissions 2008



“Appendix B:

Pinal County PM10 Nonattainment Area Emissions Inventories for 2008 and 2018 Base Years and Design Days”, Sierra Research, Inc. August, 2014; revised by Arizona Department of Environmental Quality, Air Quality Division

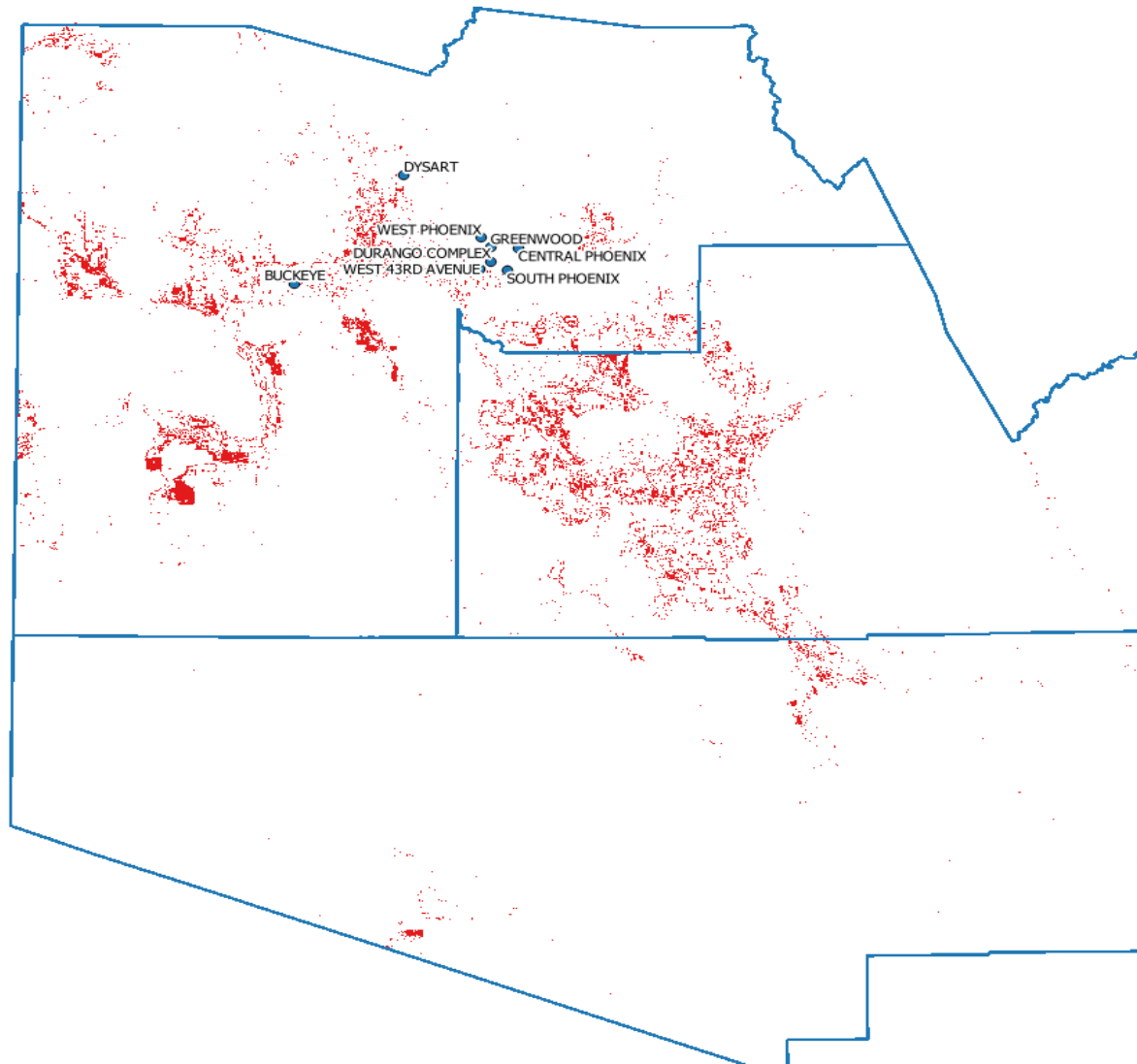
Fallow agricultural lands

- Western Pinal County: 168,000 acres (2009 – 2014 average)
- Maricopa County: 166,145 acres (2011)
- Unregulated (Agricultural Best Management Practices do not apply)
- Likely to increase with hotter, drier climate and with reduced deliveries of Central AZ Project water and restrictions on groundwater pumping

Drought Contingency Plan

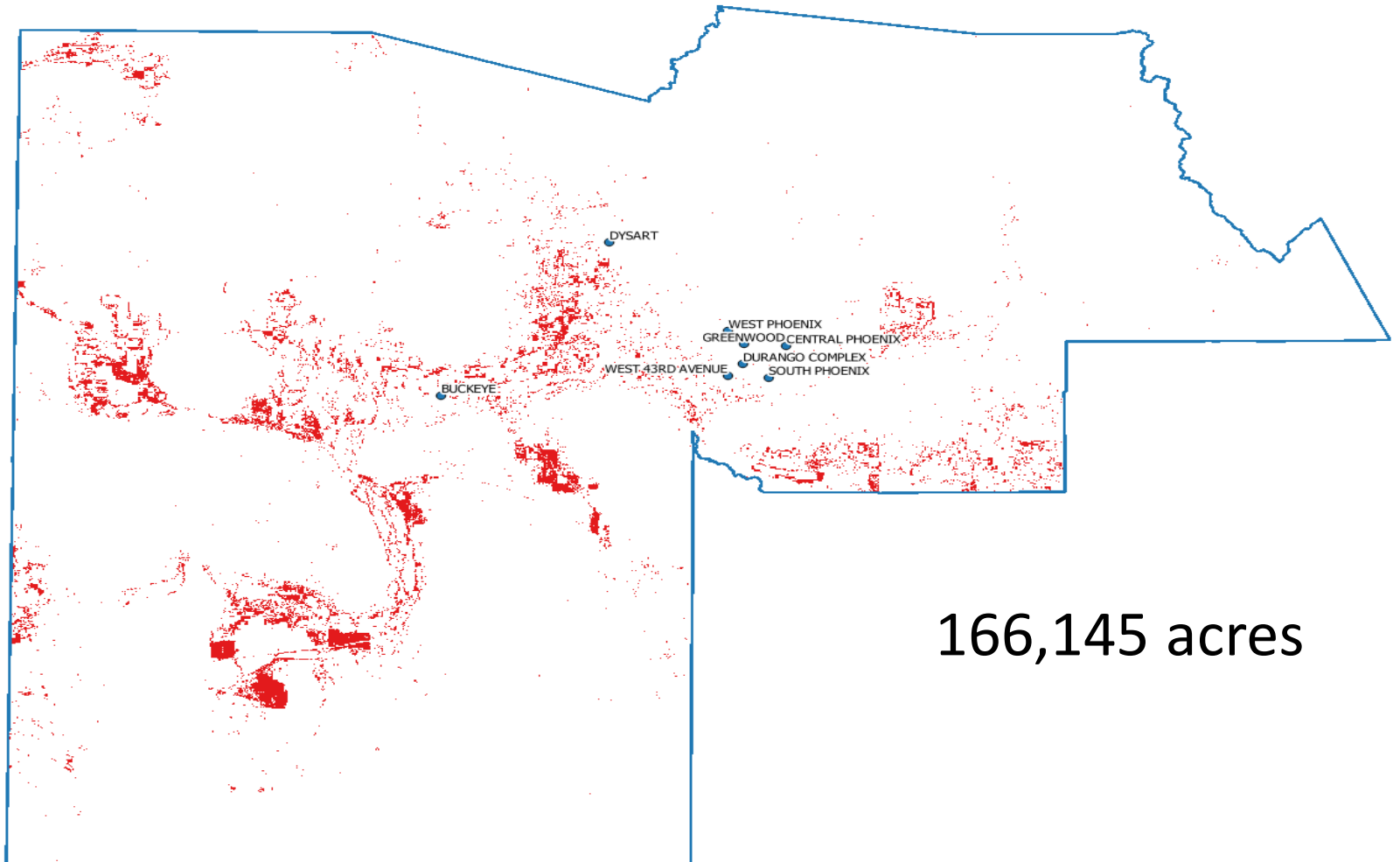
- Still somewhat uncertain in its effects on Pinal County farming
- Some predictions call for a 40% increase in fallowed lands within a few (2 – 3) years
- Result: more frequent and more severe dust storms, should these predictions come true

Fallow/idle cropland in 2011: Maricopa, Pinal and Pima Counties



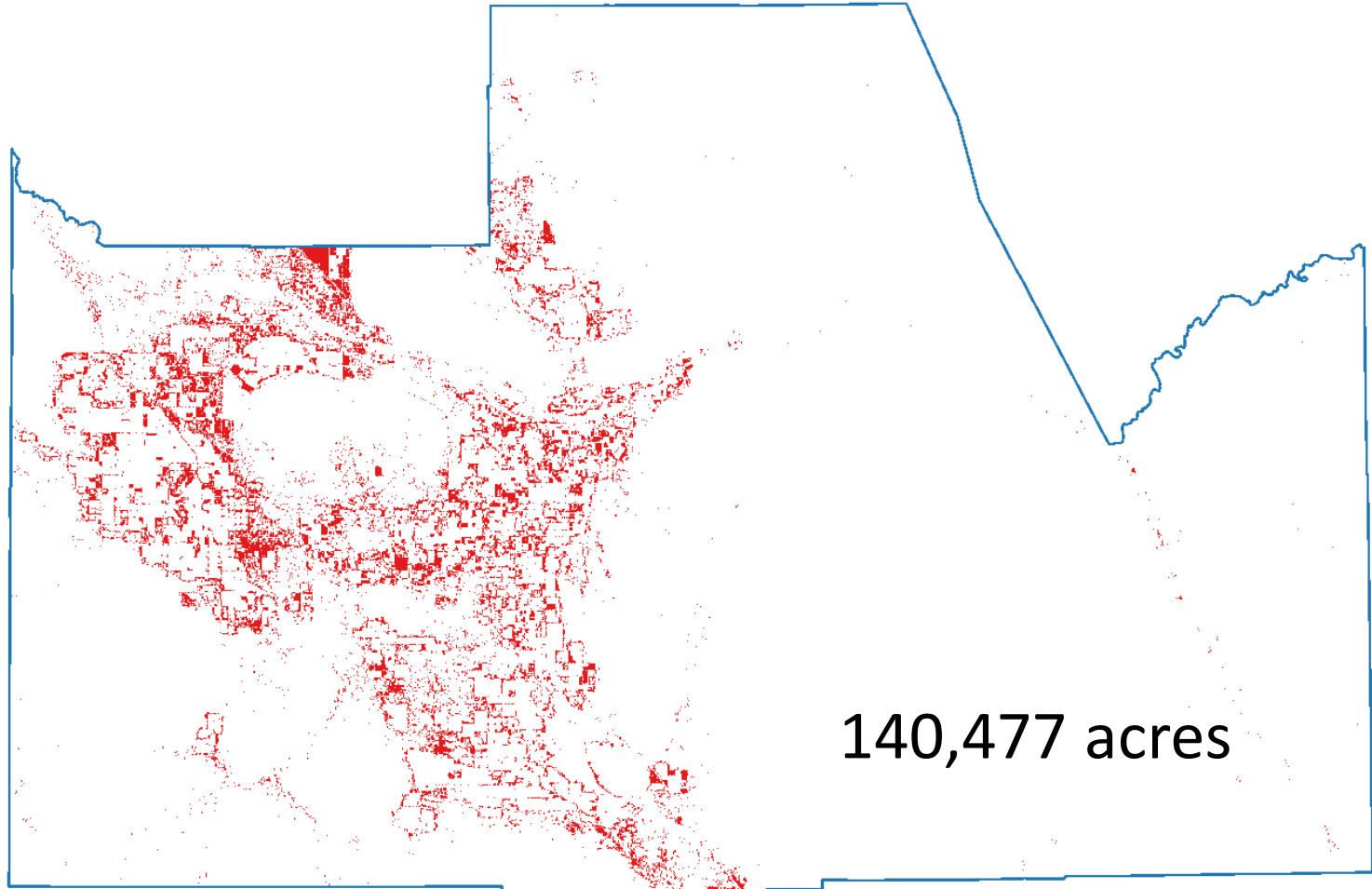
Fallow/idle cropland 2011

Maricopa County



Fallow/idle cropland 2011

Pinal County



Outflow pathway:

Casa Grande to Buckeye PM10 monitor (July 18th 2011)

- Fallow/idle cropland within 93 x 1.6 kilometers

Category	Acreage
Fallow	9,980.4
Barren	83.2
Shrubland	41,139.2



Thank you

Conclusions

- High PM10 concentrations measured at Phoenix monitors likely due to the widespread fallow/idle croplands within Maricopa and Pinal Counties.
- Local dust sources likely responsible for PM10 exceedances during 2011 dust storms

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