

# Analysis of 2000-2011 Arizona Dust-Related Traffic Incidents

Ken Waters  
Ken.waters@noaa.gov  
National Weather Service, Phoenix

March 5, 2013  
Dust Storm Workshop

# Data Source

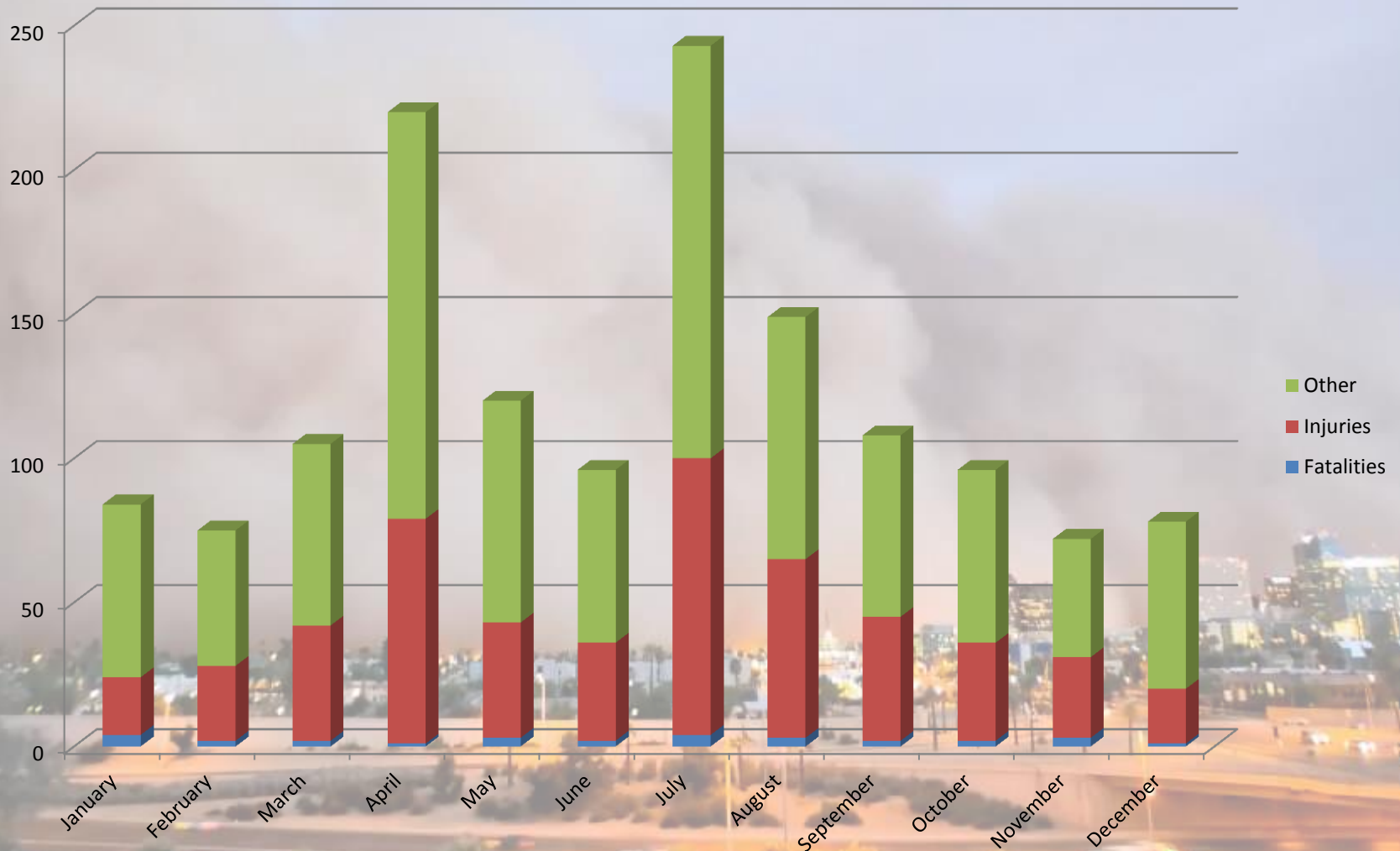
- Annual Traffic Incident Database compiled by Arizona Department of Transportation (ADOT), Risk Management Section
- Data are stored in CSV format with one year's worth of data on one CD
- Years used: 2000-2011
- Public request sent to ADOT

# Data Methodology, 2000-2011

- Total incidents statewide: **1,531,331**
- Records were screened for the “Weather” flag
- Latitude and Longitude values required for Geographic Information Systems (GIS) analysis
- After weather and lat/long filters applied, **1,446** were flagged with weather factor identified as dust/sand
  - 29 incidents had 1+ fatalities
  - 520 incidents had 1+ injuries with no fatalities
  - 897 incidents had no reported injuries/fatalities

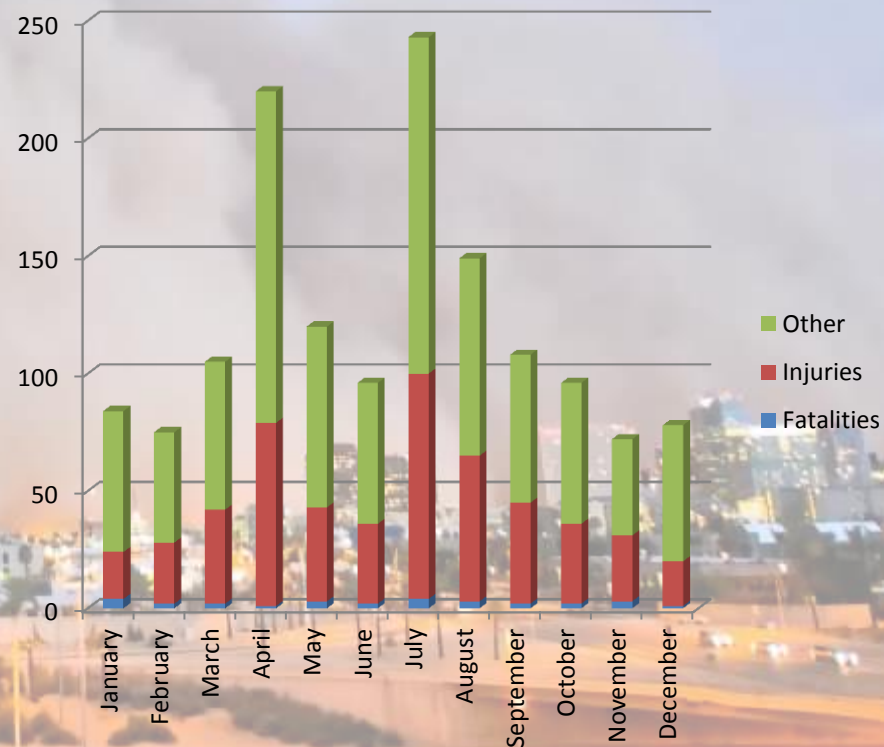
Weather Flag	Meaning
0	No weather
1	Clear
2	Cloudy
3	Sleet/Hail/Freezing Rain
4	Rain
5	Snow
6	Severe crosswinds
7	Dust or sand
8	Fog or smoke
9	Blowing Snow
97	Other
99	Unknown

# Dust-Related Incidents by Month

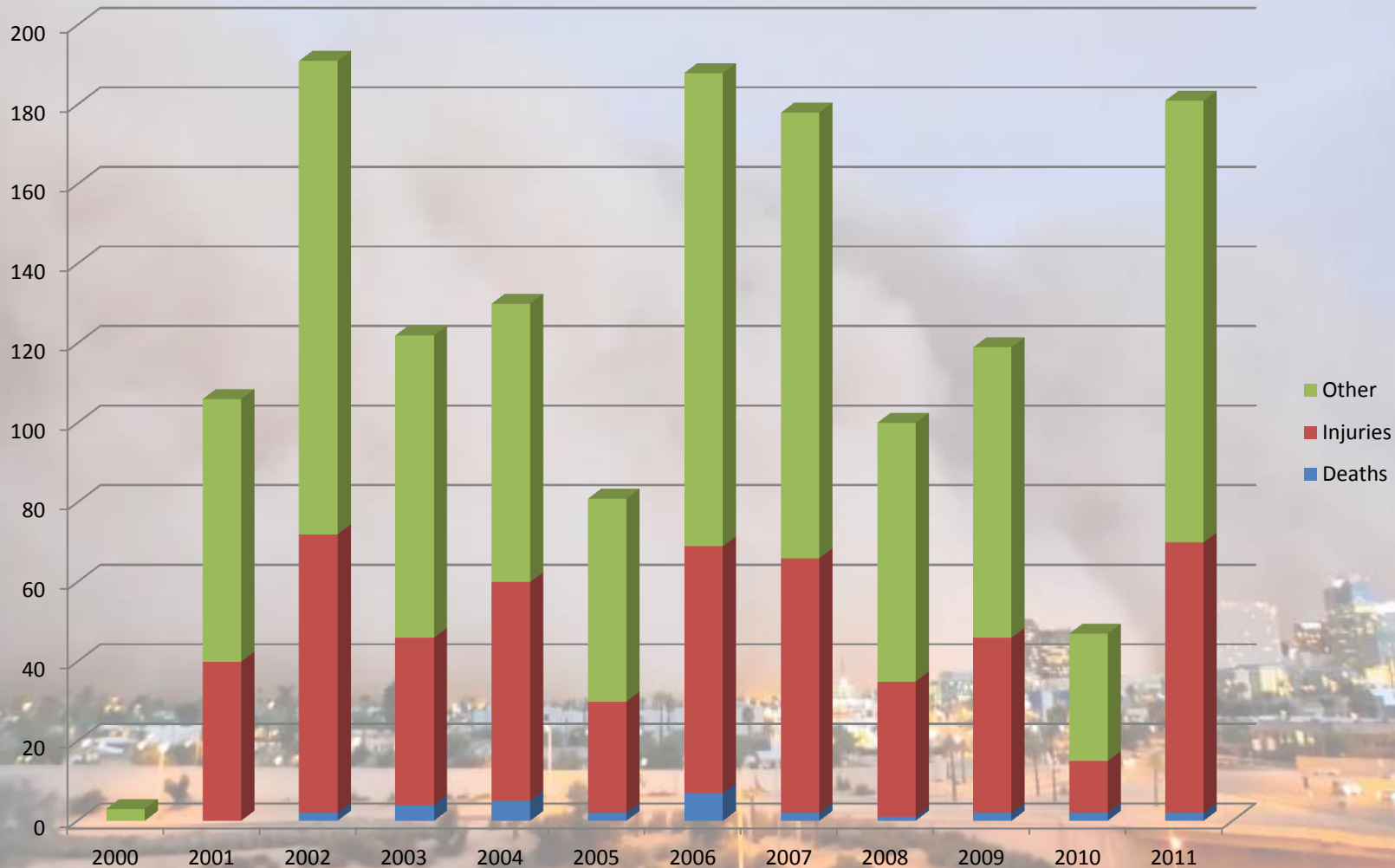


# Monthly Analysis

- Two peaks
  - April: likely due to synoptic spring wind events, especially across Northern Arizona [e.g., I-40]
  - July: definitely due to high frequency of monsoon thunderstorms --- downbursts producing dust storms
- Note that dust-related incidents occur **year-round**



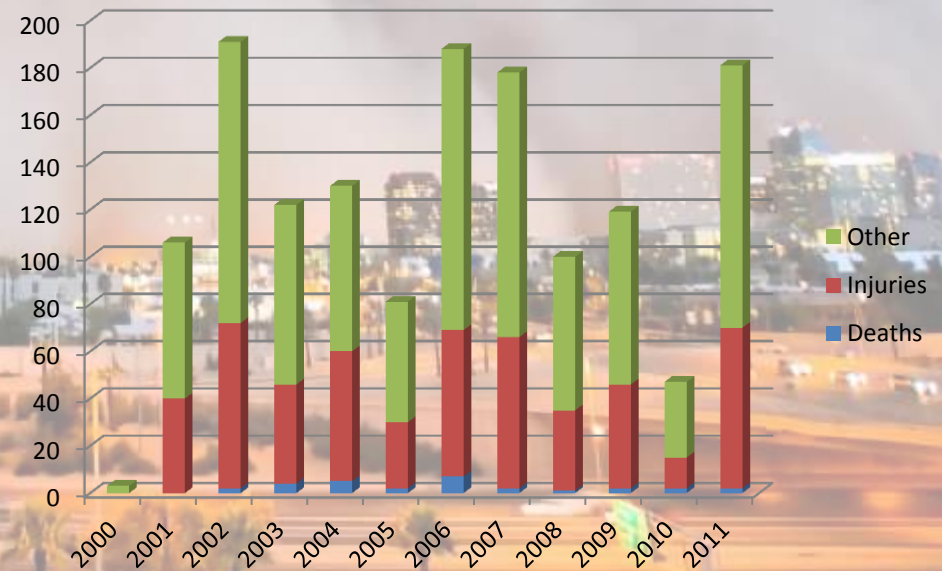
# Dust-Related Incidents by Year



NOTE: Only a few reports from the year 2000 included latitude and longitude and so those records could not be used in this study. Ken Waters, NWS Phoenix, [ken.waters@noaa.gov](mailto:ken.waters@noaa.gov), March 5, 2013

# Yearly Analysis

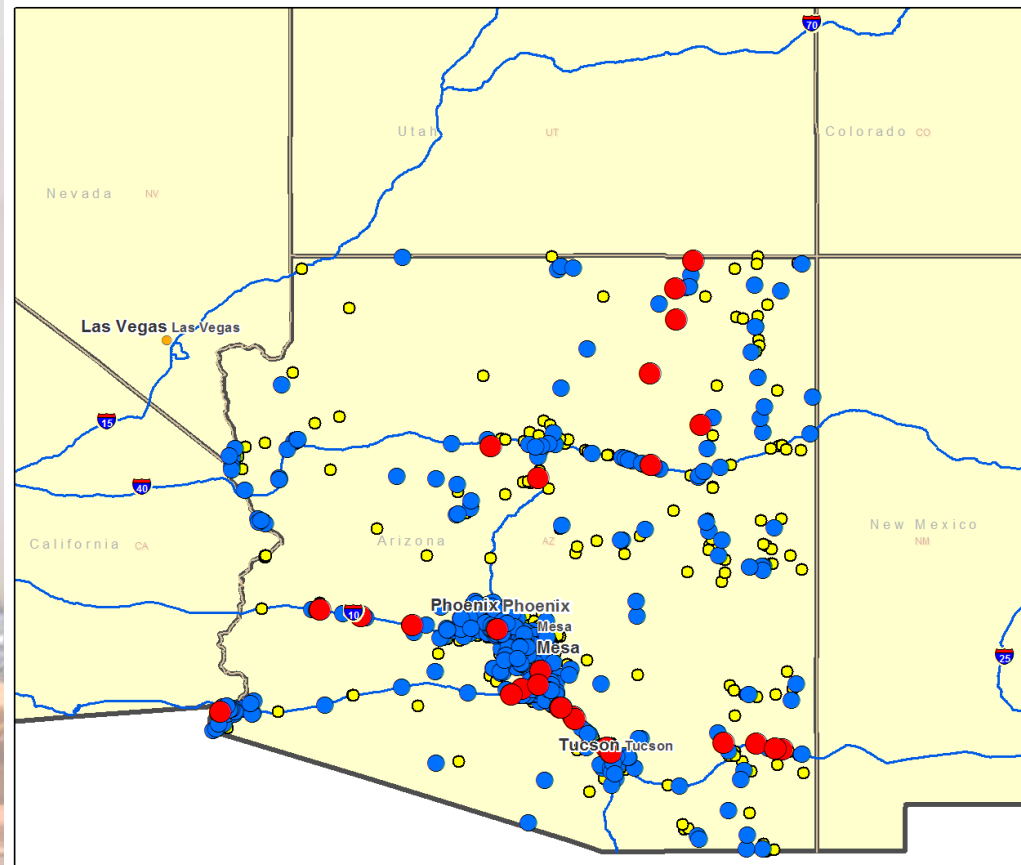
- High values in 2002, 2006, 2007, and 2011
- Seems to correlate well with drought/precipitation pattern



# Geographic Analysis

- Initial Observations:
  - As expected, strong correlation with traffic density (greatest numbers in Phoenix and Tucson and points between)
  - Some indication of “clumping” of reports indicating possible trouble spots --- more apparent after zooming

Arizona Dust-Related Traffic Incidents  
2000-2011

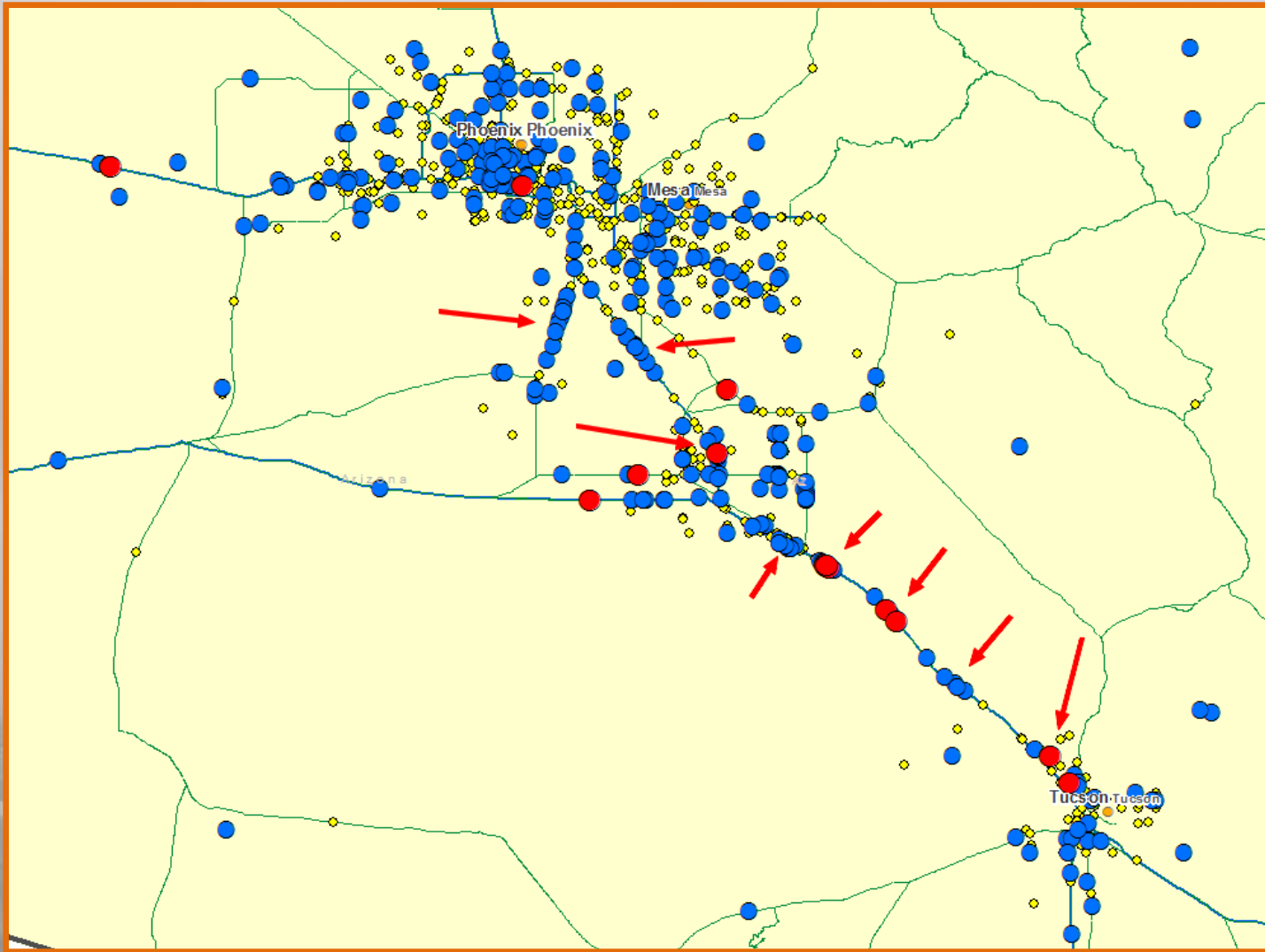


## Legend

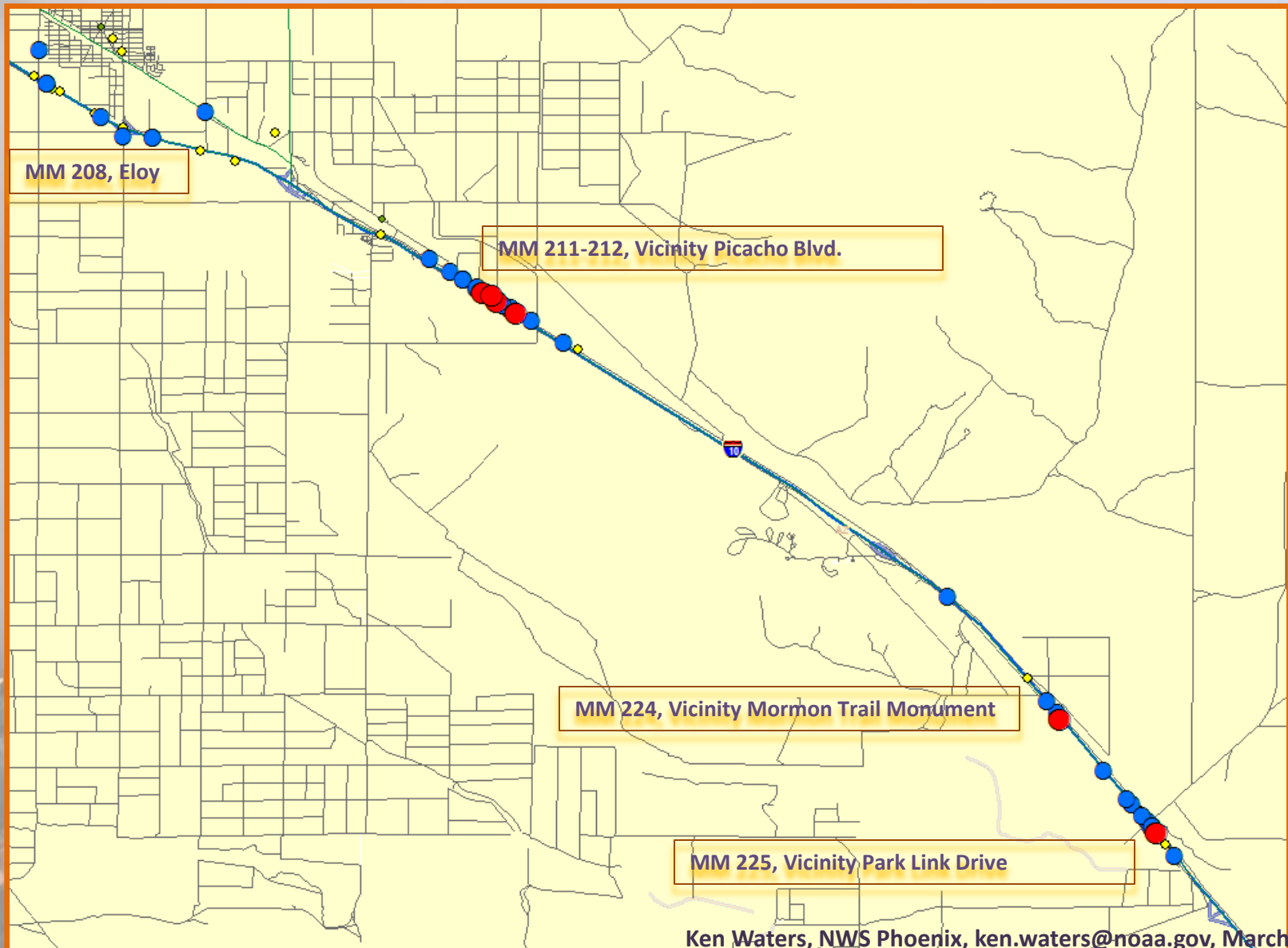
- ADOT-2000-2011 - Deaths.csv Events
- ADOT-2000-2011 - Injuries.csv Events
- ADOT-2000-2011 - No Inj-Deaths.csv Events



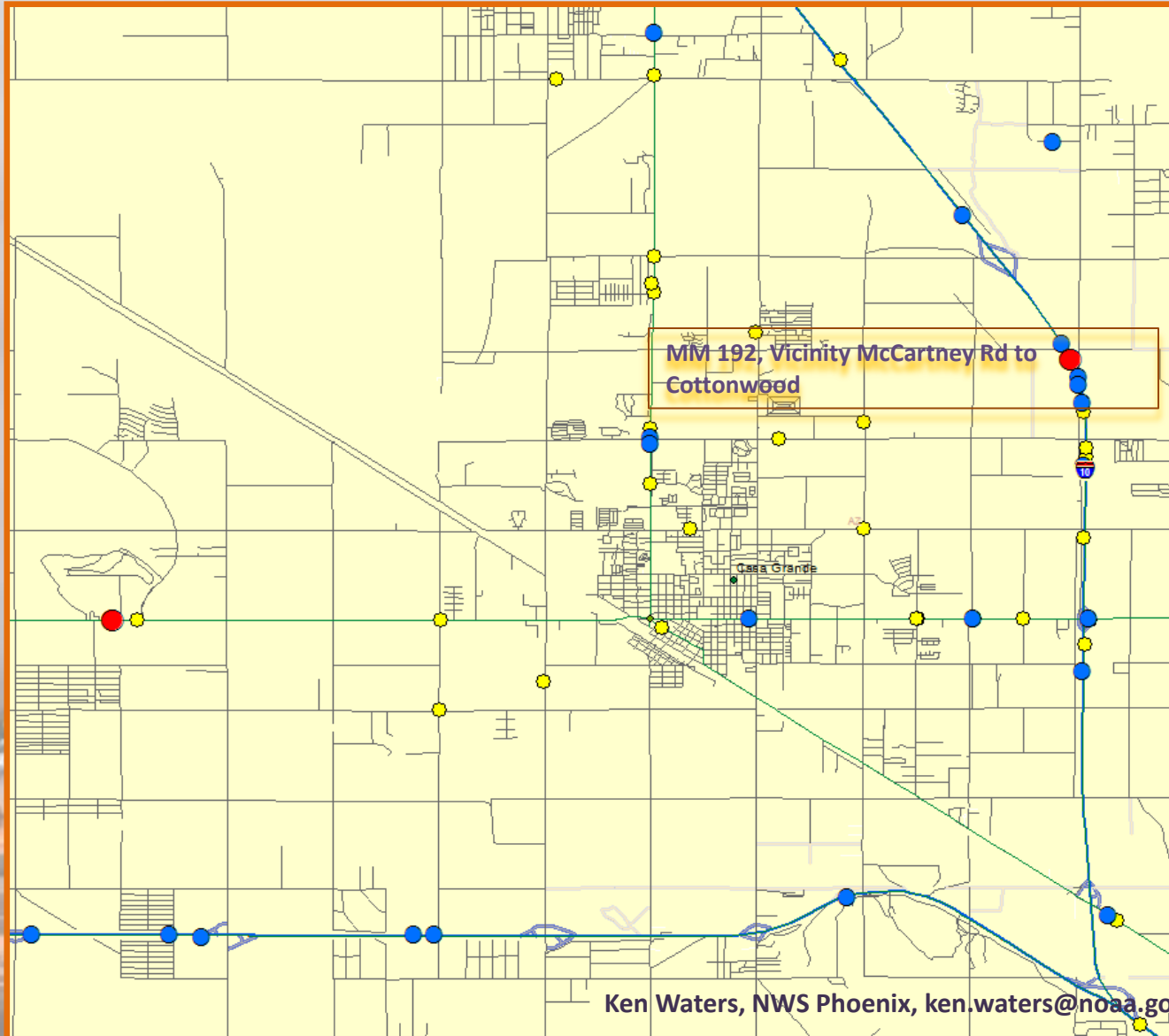
# Problem Area Identification



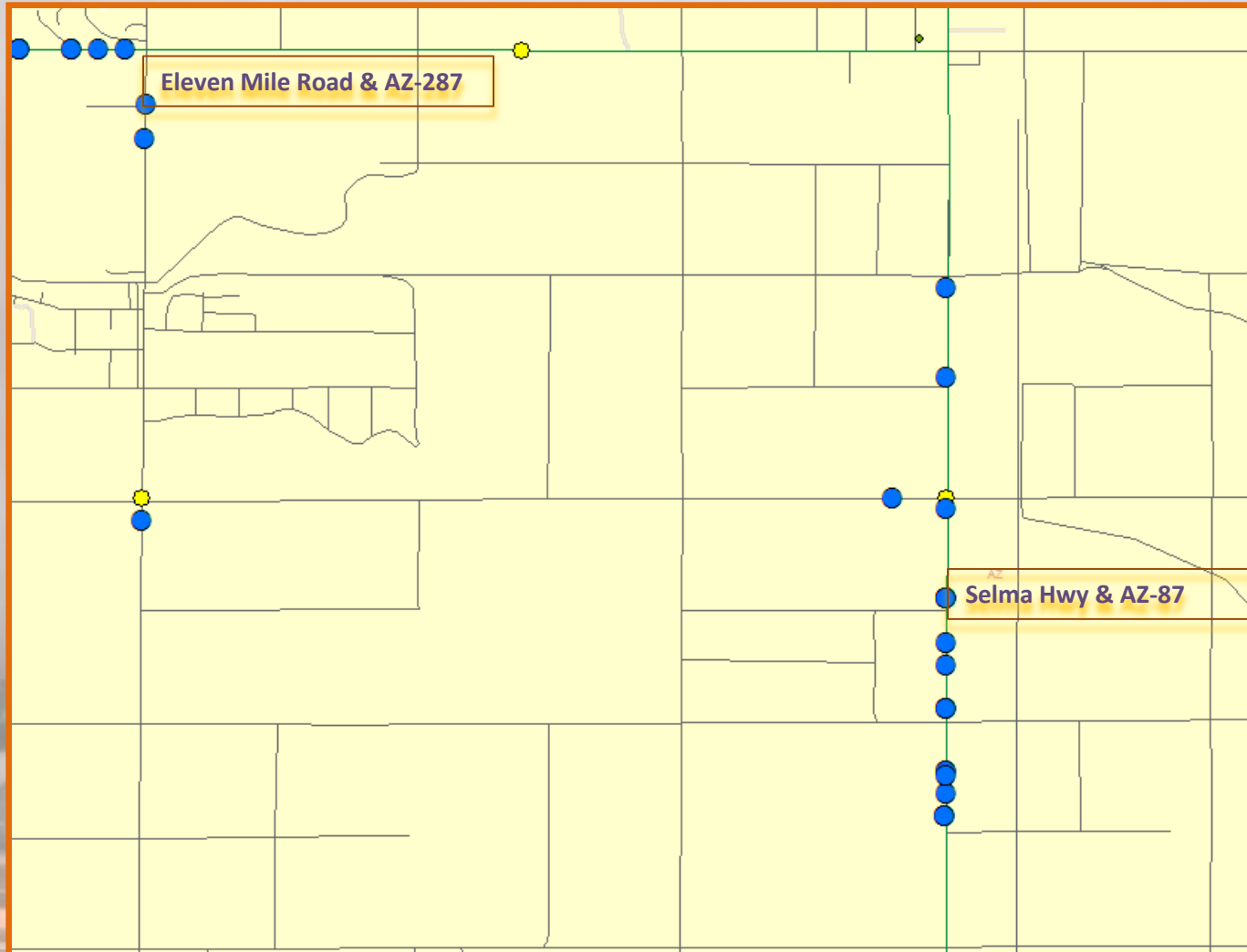
# I-10 Corridor Phoenix-to-Tucson



# Casa Grande



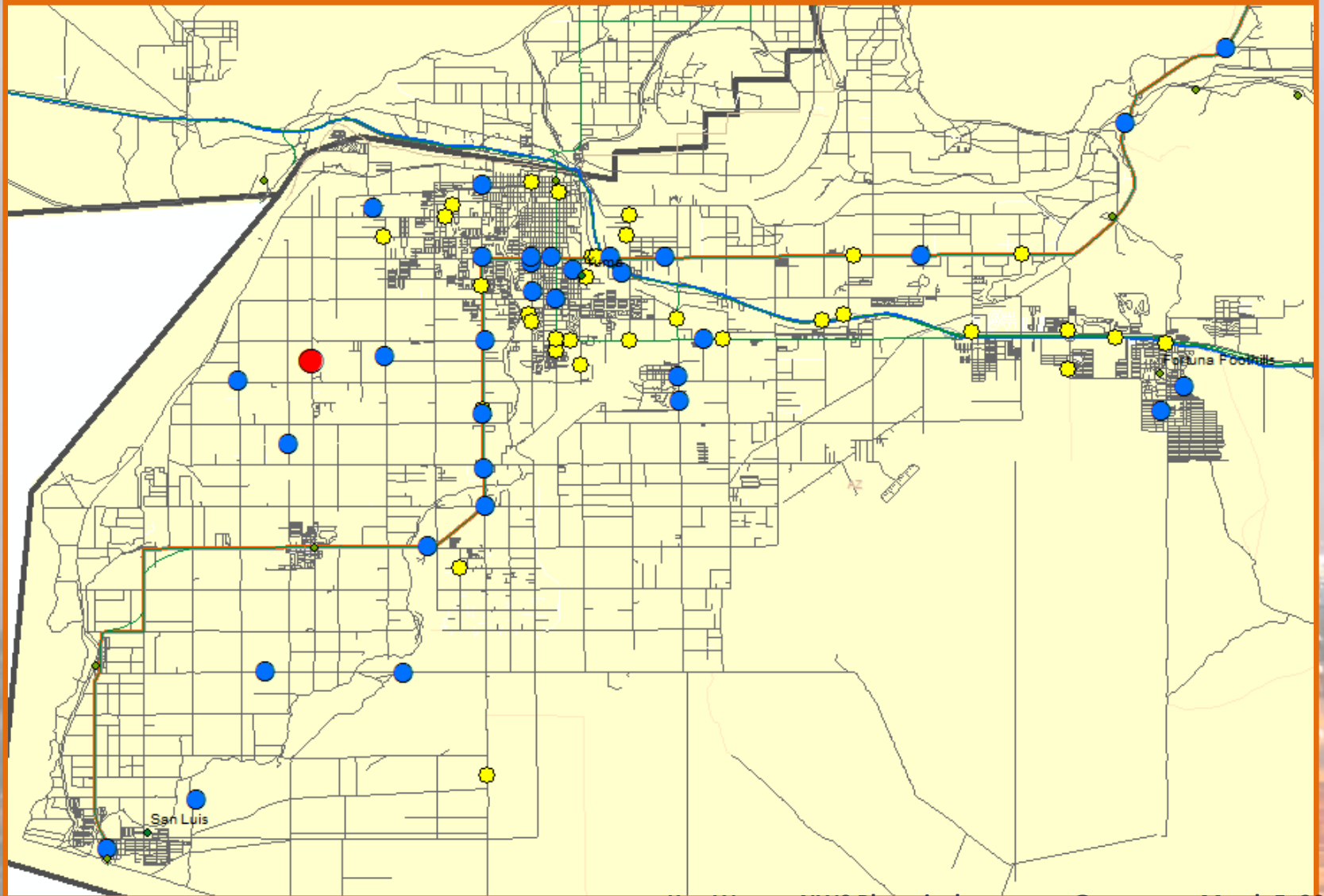
# Northeast of Eloy, East of Casa Grande



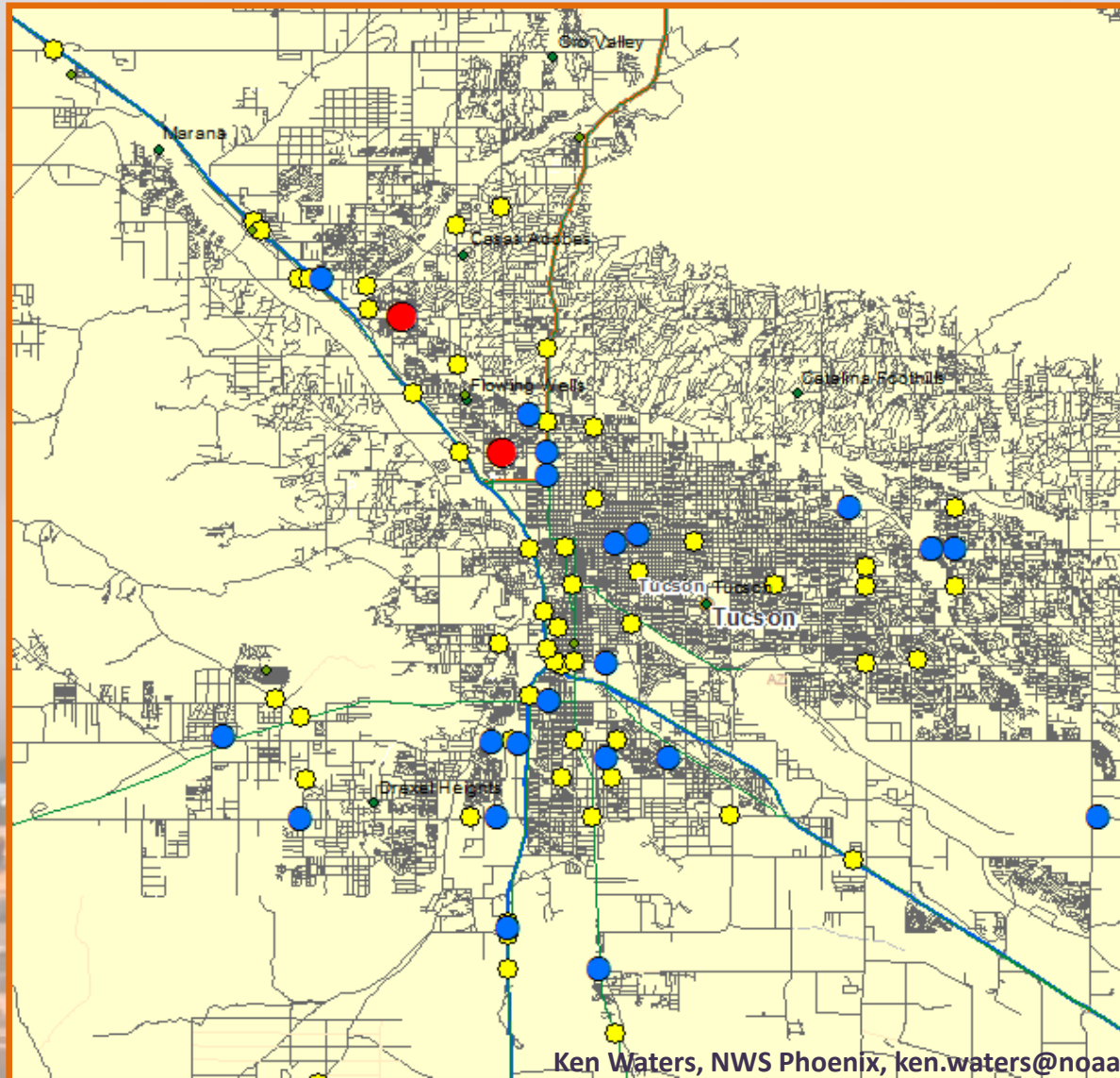
# Maricopa to Sun Lakes



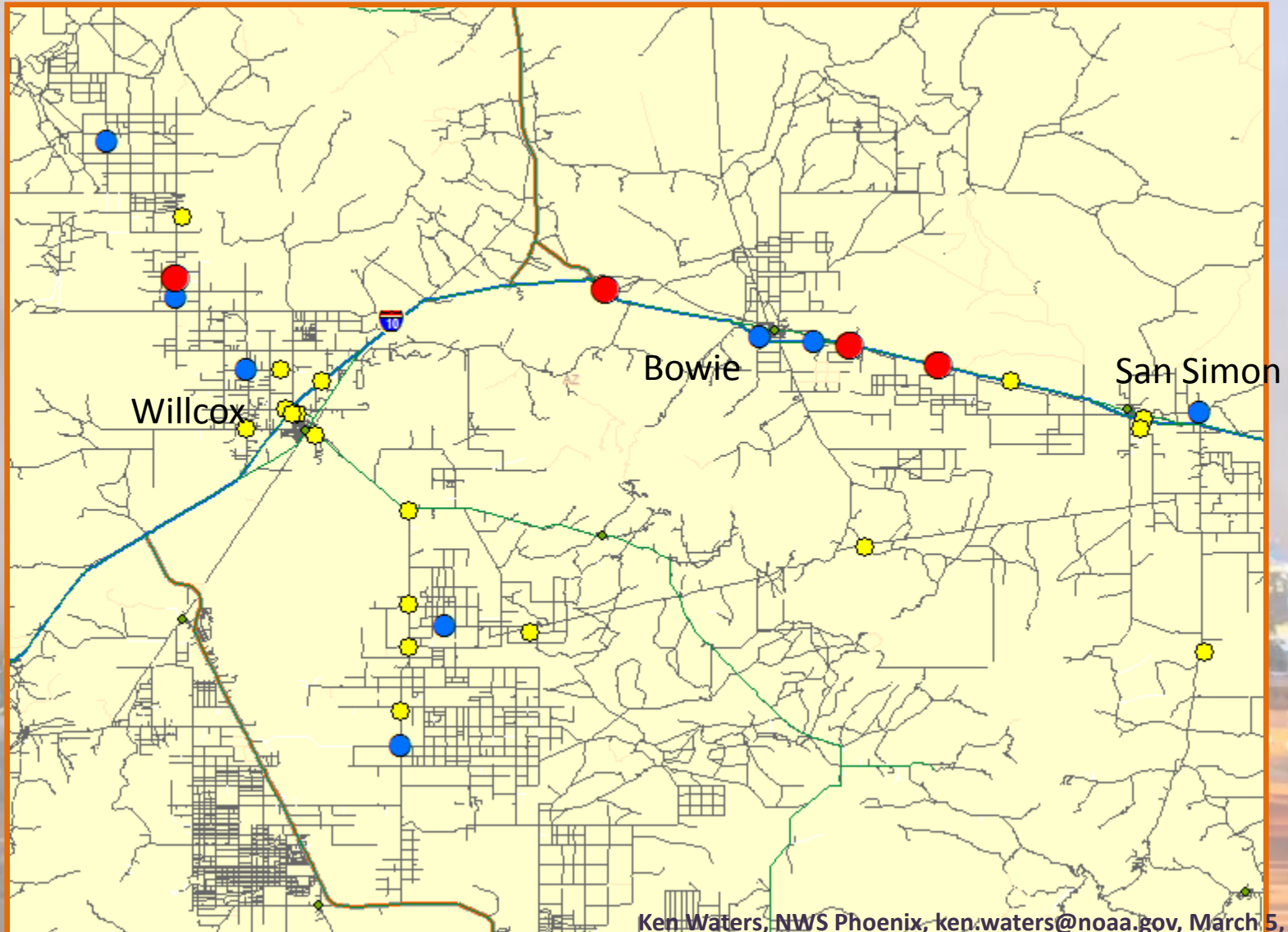
# Yuma



# Tucson



# I-10 Willcox to San Simon







# Conclusion

- ADOT Accident Database useful to find temporal and geospatial trends
  - Common problem locations with high frequency of accidents
    - Linked with land use data can be used for mitigation
    - Helps identify locations where dynamic alert signs would be useful
  - Linked to drought/precipitation patterns
- Questions?
  - Ken Waters, Warning Coordination Meteorologist (WCM)
  - [Ken.waters@noaa.gov](mailto:Ken.waters@noaa.gov)
  - National Weather Service, Phoenix
  - 602-275-0073

# Dust Origins Project

Glenn Lader and Ken Waters  
Glenn.e.lader@noaa.gov or Ken.waters@noaa.gov  
National Weather Service Tucson and Phoenix

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# Goal

- Develop a database of Dust Events for 2011 and 2012 to determine “Dust Origin” locations from thunderstorms.



# Methodology

- Define events from 2011 and 2012 using Dust Warning issuances and reports.
- Review radar data using GR-Analyst to determine locations of initial outflow resulting in dust.
- Plot the data using ESRI GIS online explorer

# 2011 and 2012 Dust Origins



# Caveats

- The single point referenced was the first initiation of strong winds originating from the early thunderstorm(s) of the day.
- As the cold outflow air is pushed away from these initial storm(s), new storms then form thus creating new outflow and additional dust.
- The secondary or third series/clusters of storms are not plotted for both simplicity and because they are too numerous.

# Future Work Possibilities

- Combine the “Dust Origin” data with land use data to determine similarities.
- Create data sets for additional years.
- Differentiate event types





# Questions?

- Glenn Lader, Operational Forecaster
- Glenn.e.lader@noaa.gov
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