AQI Forecasting and the changing National Ambient Air Quality Standards (NAAQS)

Air Quality Focus Group Workshop
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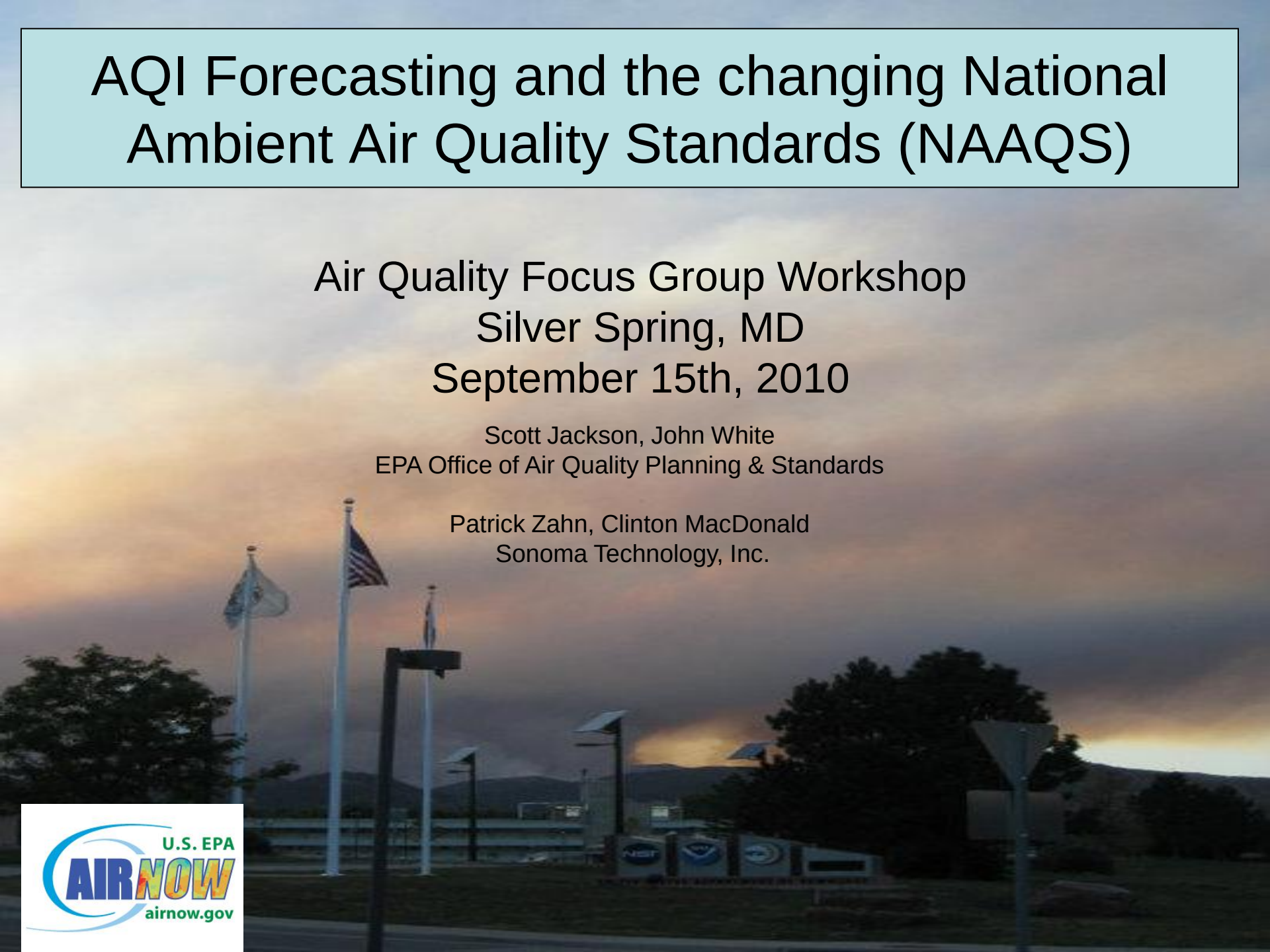
Scott Jackson, John White
EPA Office of Air Quality Planning & Standards

Patrick Zahn, Clinton MacDonald
Sonoma Technology, Inc.



Outline

- Ozone season recap
- National Ambient Air Quality Standards (NAAQS) Revisions and AQI Forecasting
  - Background
  - NAAQS Revision Schedule
  - SO_2 and NO_2
  - Future Ozone Non-Attainment and Forecasting
- Increased need for forecasting resources?
- Role of NOAA model
- Conclusions

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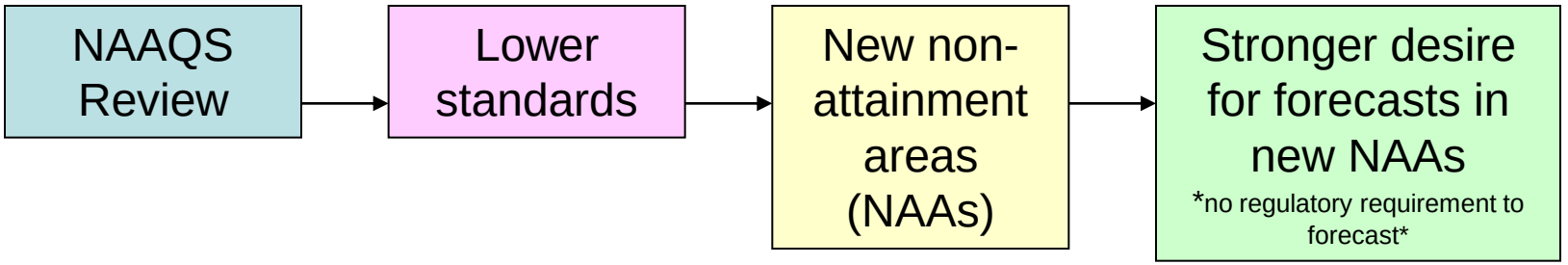
Ozone Season Recap

- Placeholder for graphic

NAAQS Revisions & AQI Forecasting

- Background:
  - EPA required to review NAAQS every 5 years
  - EPA is currently reviewing or proposing several new NAAQS
  - Relevance to air quality forecasting?



NAAQS Revisions & AQI Forecasting

Revision schedule for 2010:

- NO_2 – Final on January 22, 2010
- SO_2 – Final on June 2, 2010
- O_3 Reconsideration – Final in late October 2010
- CO – Proposal in Oct 2010
- PM – Proposal in Nov 2010

What does this mean for AQI forecasting?

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NO_2 AQI

- NO_2
  - 1/22/10 NO_2 rule established a new 1-hour NAAQS
  - Previously no short term NO_2 NAAQS existed so no AQI <200
  - New rule provides basis for calculation of hourly AQI:

	Equal these AQIs	
NO_2 (ppm) 1-hour	AQI	Category
0–0.053	0–50	Good.
0.054–0.100	51–100	Moderate.
0.101–0.360	101–150	Unhealthy for Sensitive Groups.
0.361–0.64	151–200	Unhealthy.
0.65–1.24	201–300	Very Unhealthy.
1.25–1.64	301–400	Hazardous.
1.65–2.04	401–500	Hazardous.

  - Questions linger over whether to report data from near-road vs. community wide monitors.
  - NO_2 forecasting is recommended but not required.

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SO_2 AQI

- SO_2
  - EPA finalized a new SO_2 NAAQS on June 2, 2010
  - 100 level of the AQI is at the same level as the revised primary SO_2 NAAQS.
  - Similar to NO_2, will pose new challenges for forecasting and reporting AQI.

Old AQI (24-hour) SO_2 (ppm)	Proposed AQI SO_2 (ppm) 1-hour	Final AQI SO_2 (ppm) 1-hour	AQI	Category
0.000–0.034	0–(0.025–0.050)	0–0.035	0–50	Good.
0.035–0.144	(0.026–0.051)–(0.050–0.100)	0.036–0.075	51–100	Moderate.
0.145–0.224	(0.051–0.101)–(.175–.200)	0.076–0.185	101–150	Unhealthy for Sensitive Groups.
0.225–0.304	(0.176–0.201)–(.304)	[4] 0.186–0.304	151–200	Unhealthy.
0.305–0.604	0.305–0.604	[4] 0.305–0.604	201–300	Very Unhealthy.
0.605–0.804	0.605–0.804	[4] 0.605–0.804	301–400	
0.805–1.004	0.805–1.004	[4] 0.805–1.004	401–500	Hazardous.

[4] 1-hr SO2 values do not define higher AQI values (≥200). AQI values of 200 or greater are calculated with 24-hour SO2 concentrations.

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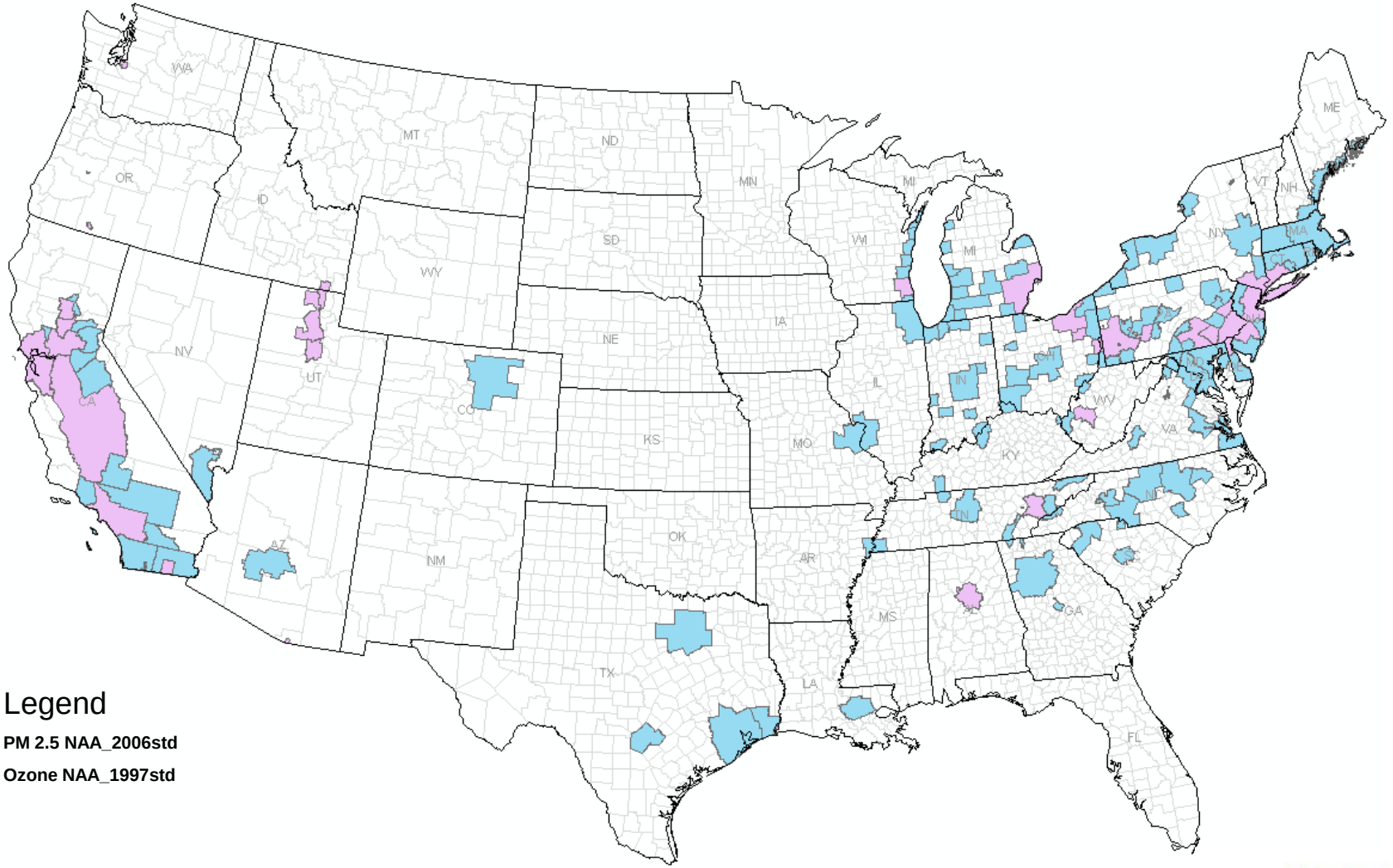
Ozone

Status of Ozone NAAQS

- Reconsideration of O_3 NAAQS issued on January 19, 2010.
- Proposes a standard between 60-70 ppb, current standard is 75 ppb
- Proposes setting the 100 level of the AQI at the same level as that set for the primary O_3 standard.
- Proposes making proportional adjustments to AQI breakpoints at the lower end of the range (AQI of 50 and 150).

Currently designated Non-Attainment Areas (NAAs)



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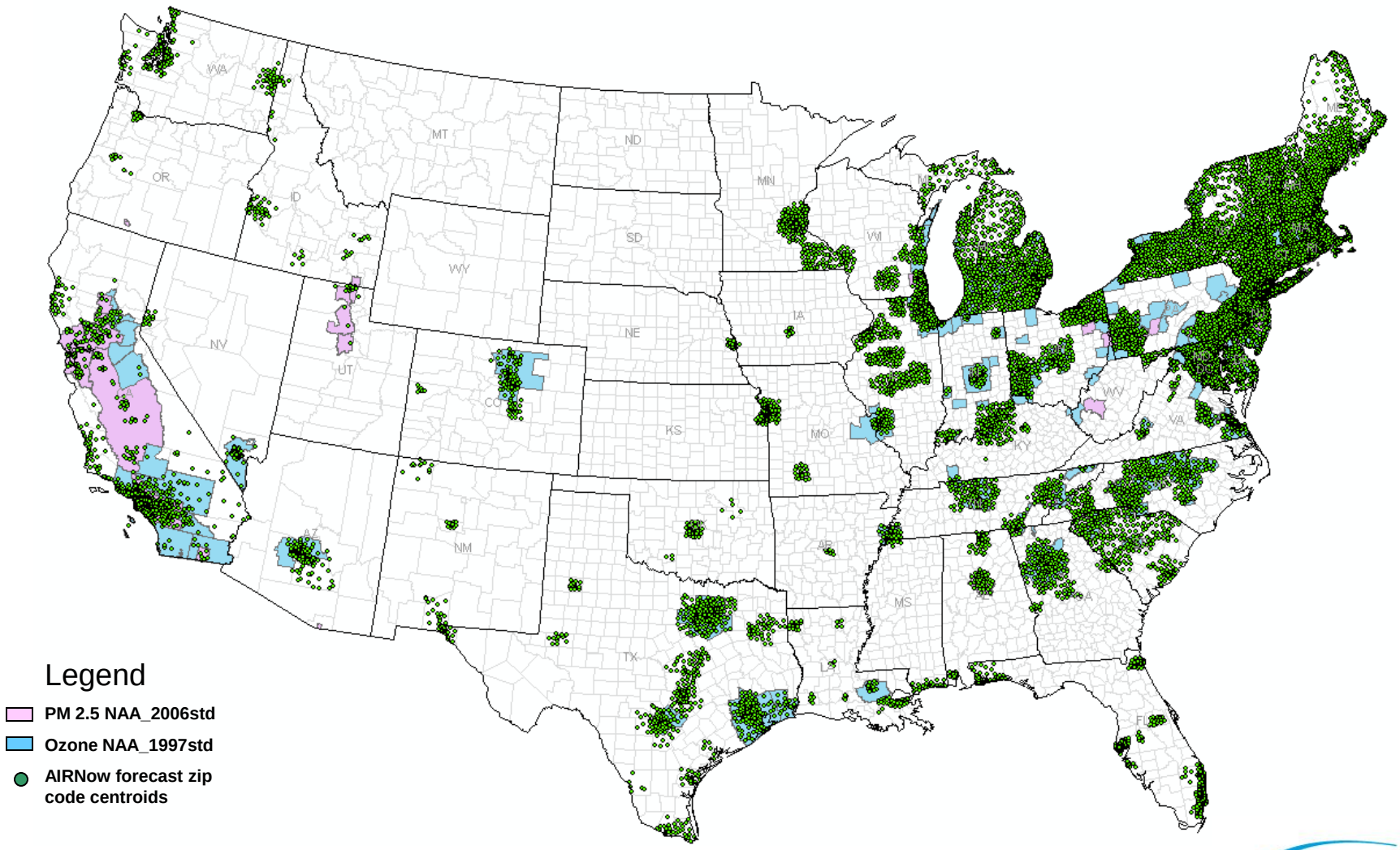
Currently designated Non-Attainment Areas (NAAs) and AIRNow zip code centroids



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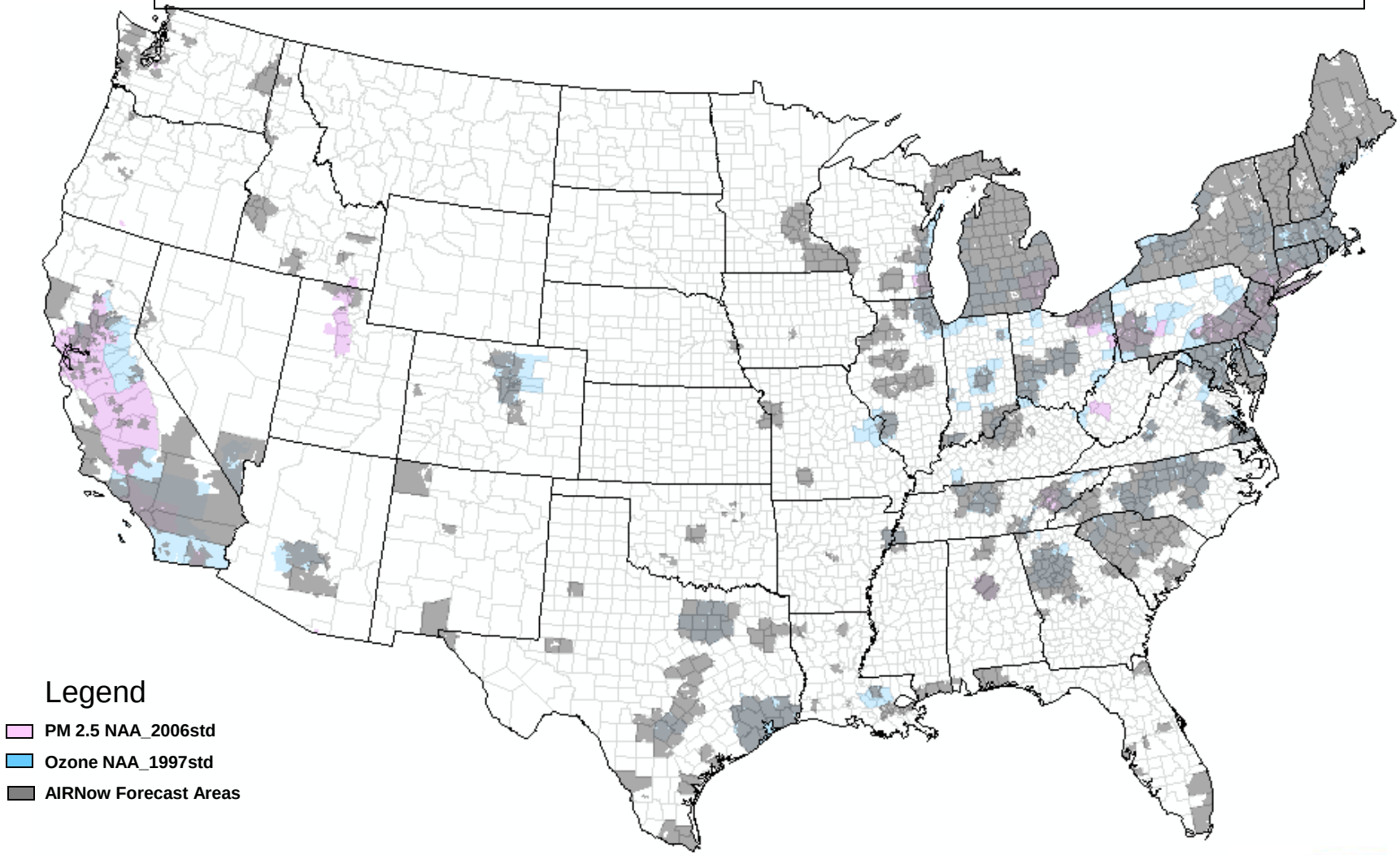
Currently designated Non-Attainment Areas (NAAs) and AIRNow Forecast Boundaries (by zip code)



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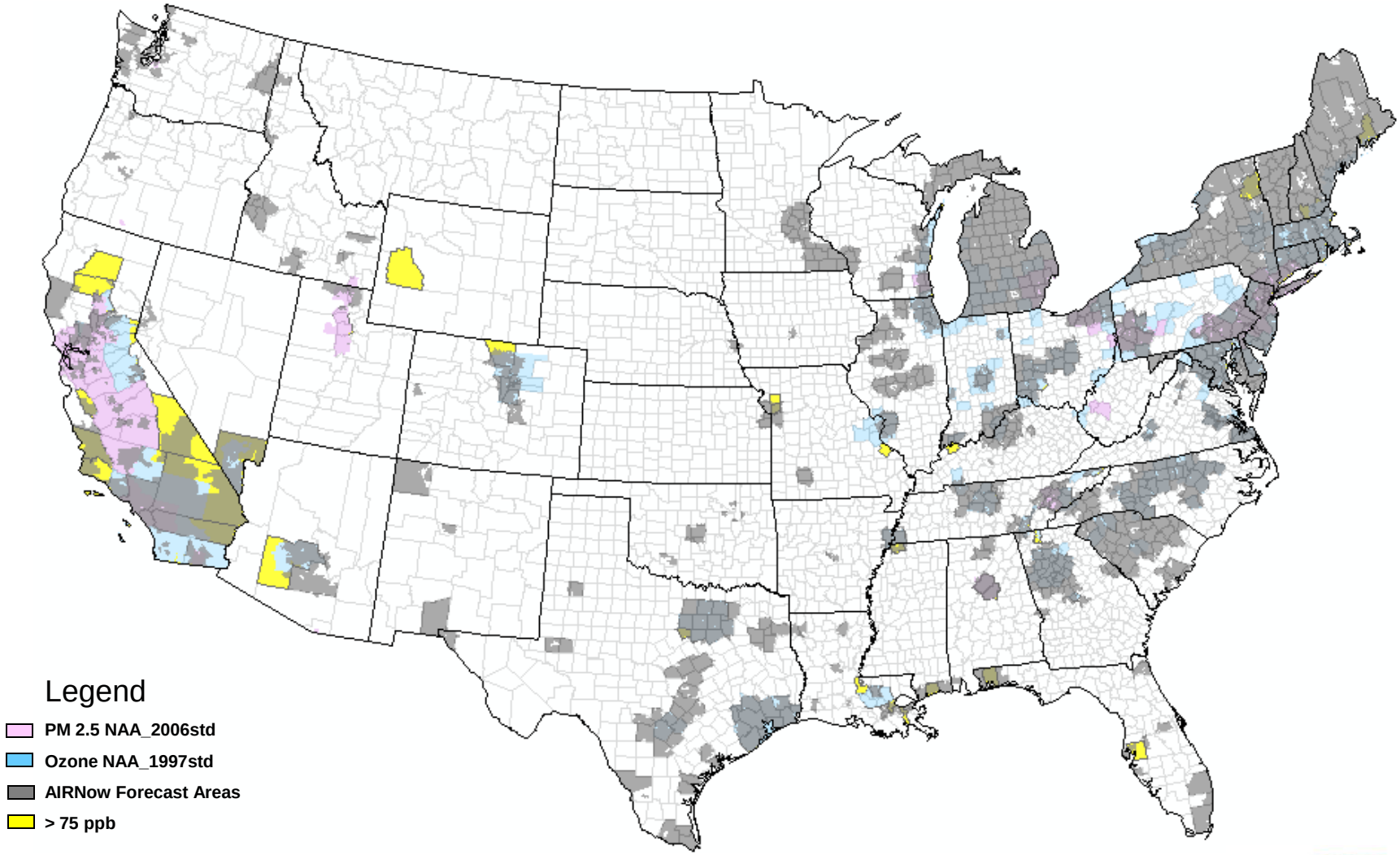
Counties with a monitor design value > .075 ppm



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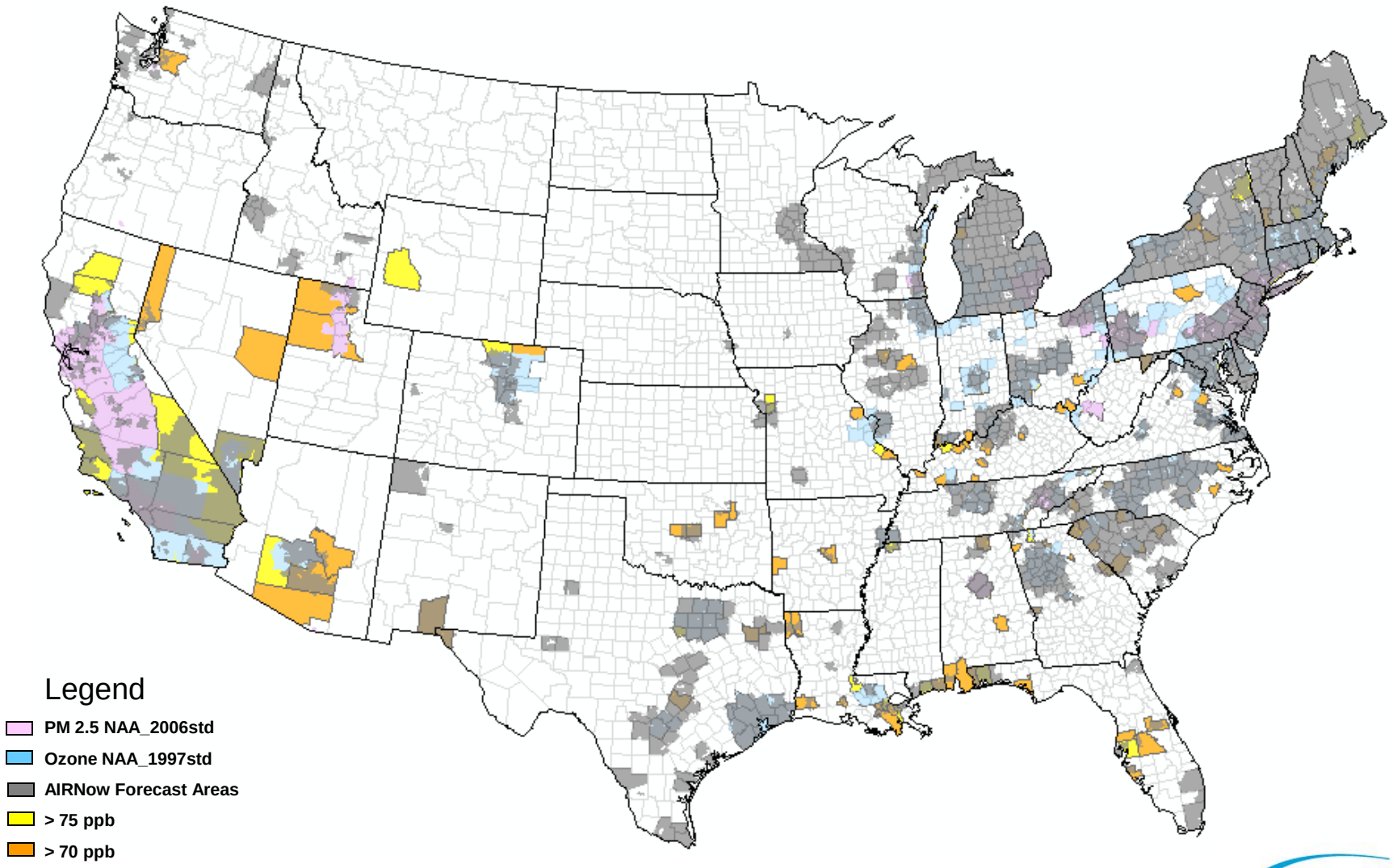
Counties with a monitor design value > .070 ppm



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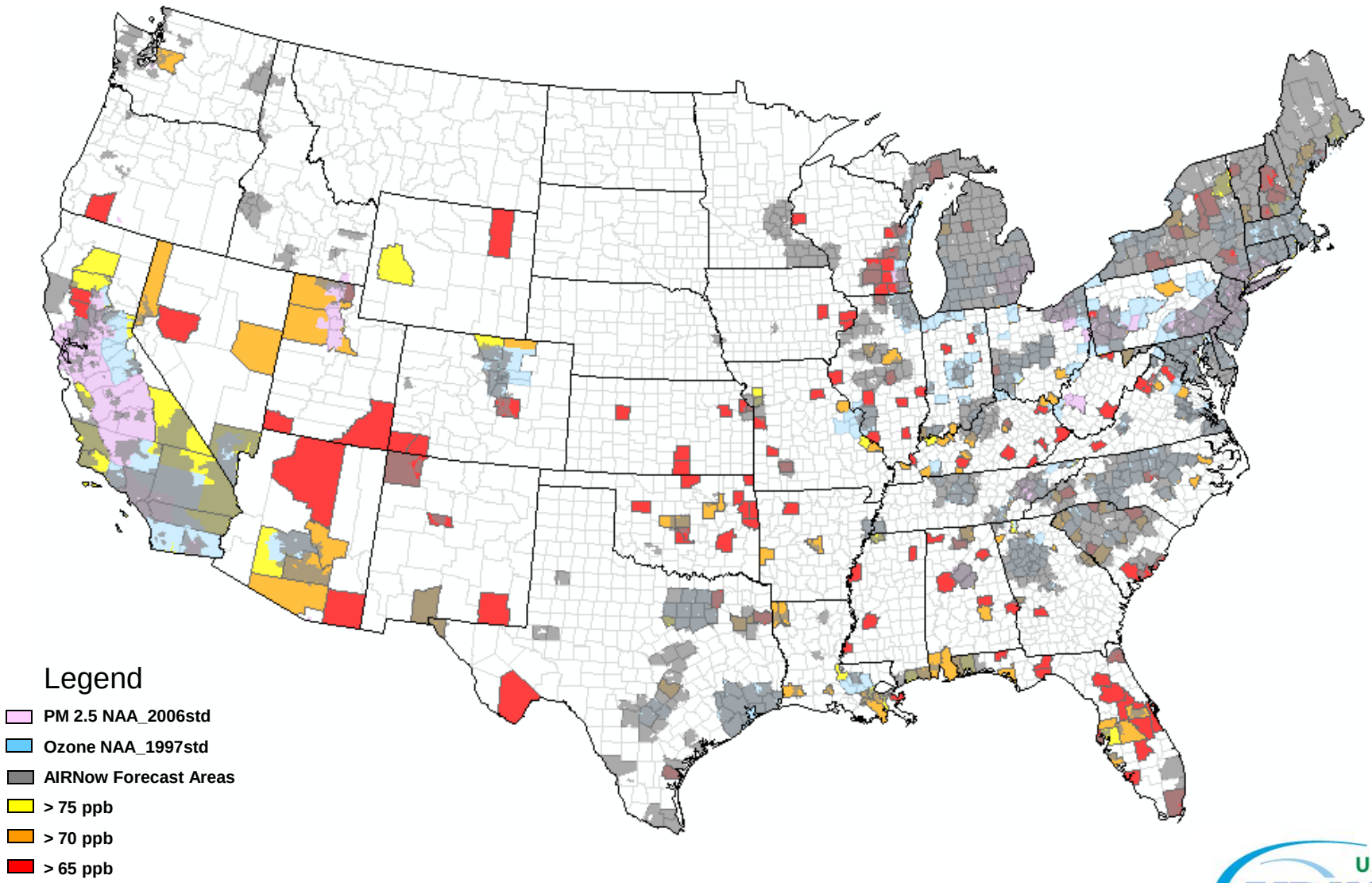
Counties with a monitor design value > .065 ppm



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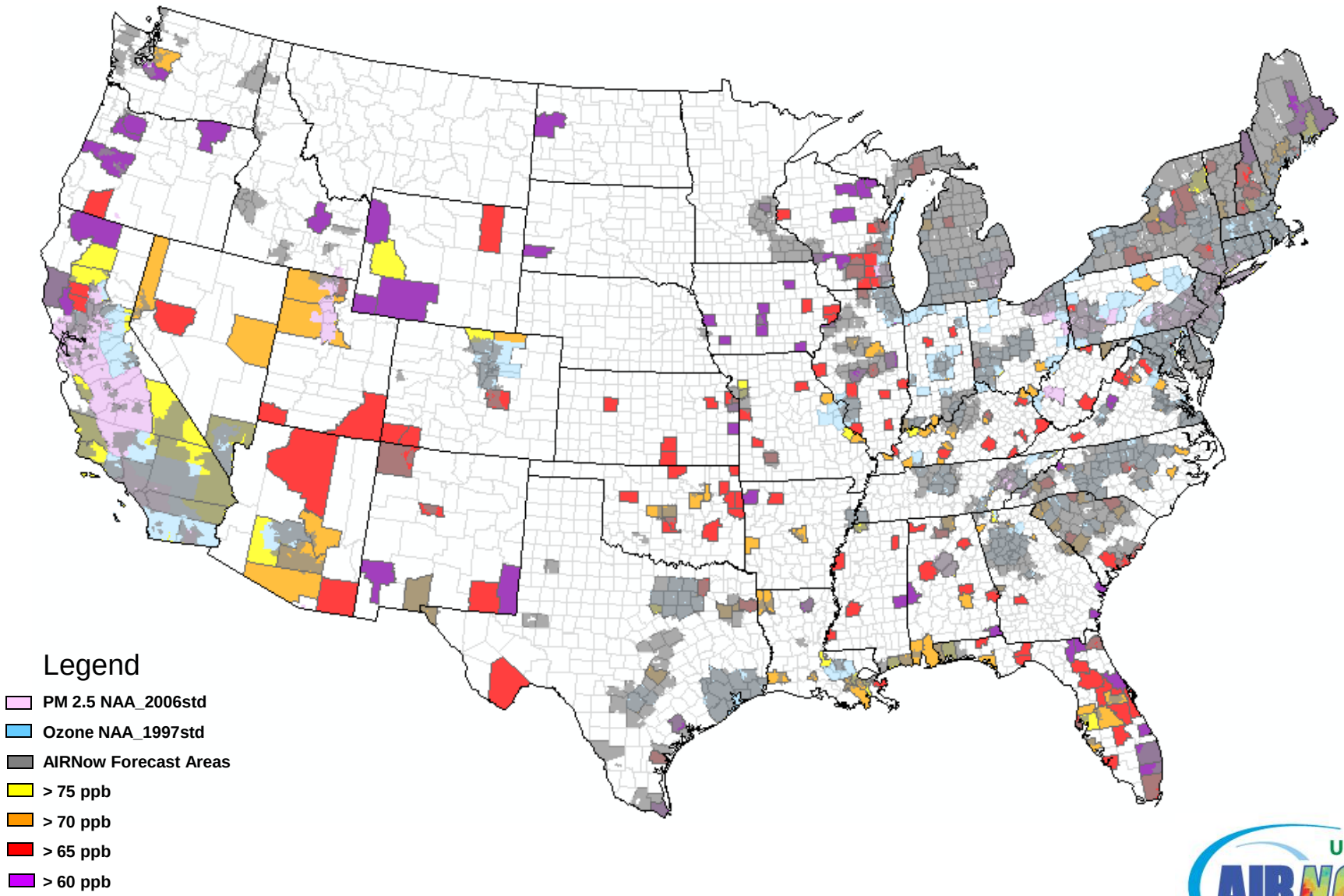
Counties with a monitor design value > .060 ppm



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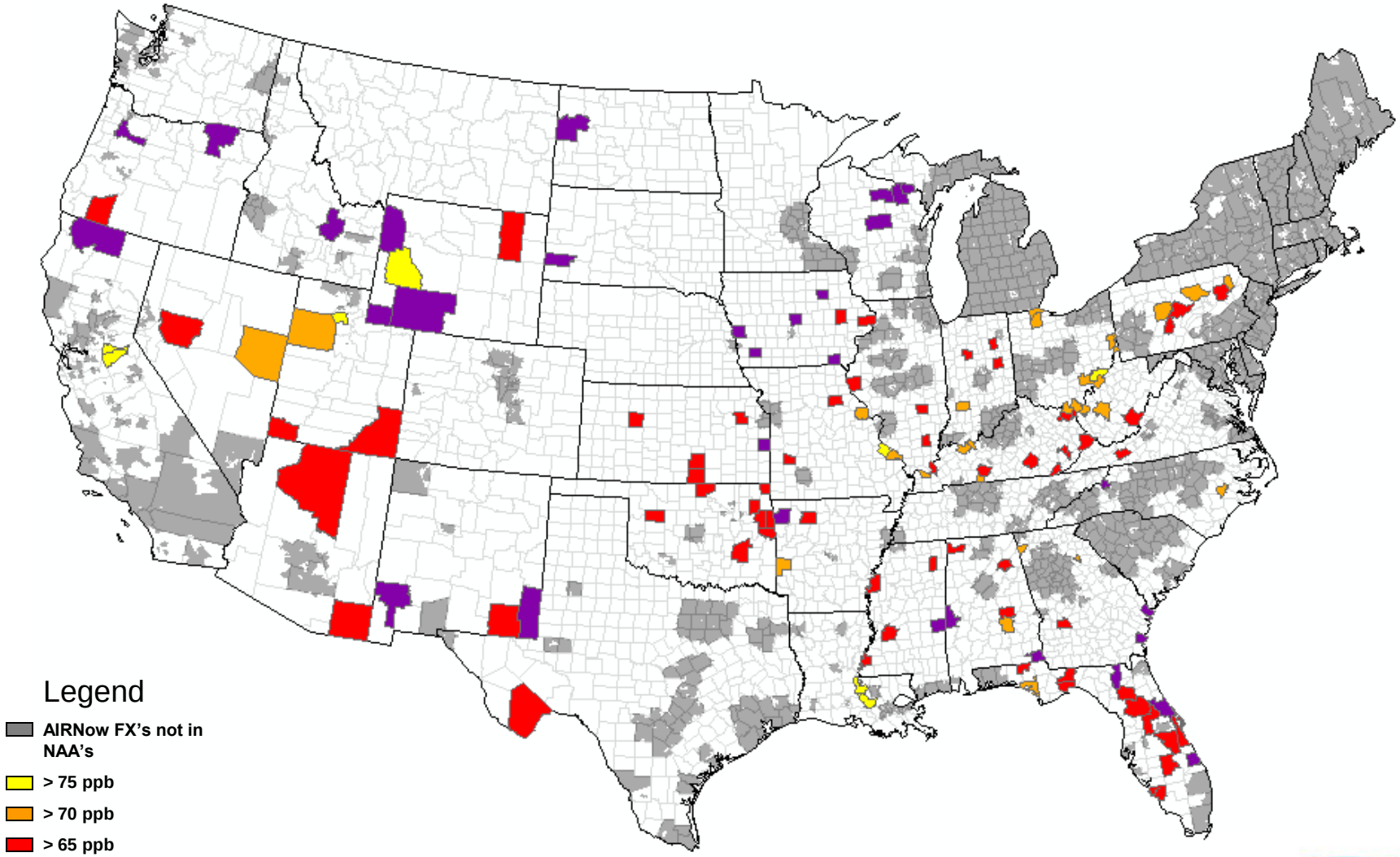
Counties with a violating monitoring and no forecast



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Areas where there is a forecast but no county with a violating monitor

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Need for more forecasting resources?

Possible levels of O_3 standard	Number of counties with a violating monitor and no forecast*
75 ppb	8
70 ppb	37
65 ppb	100
60 ppb	131

Proposed Range

*Based on 07-09 design values

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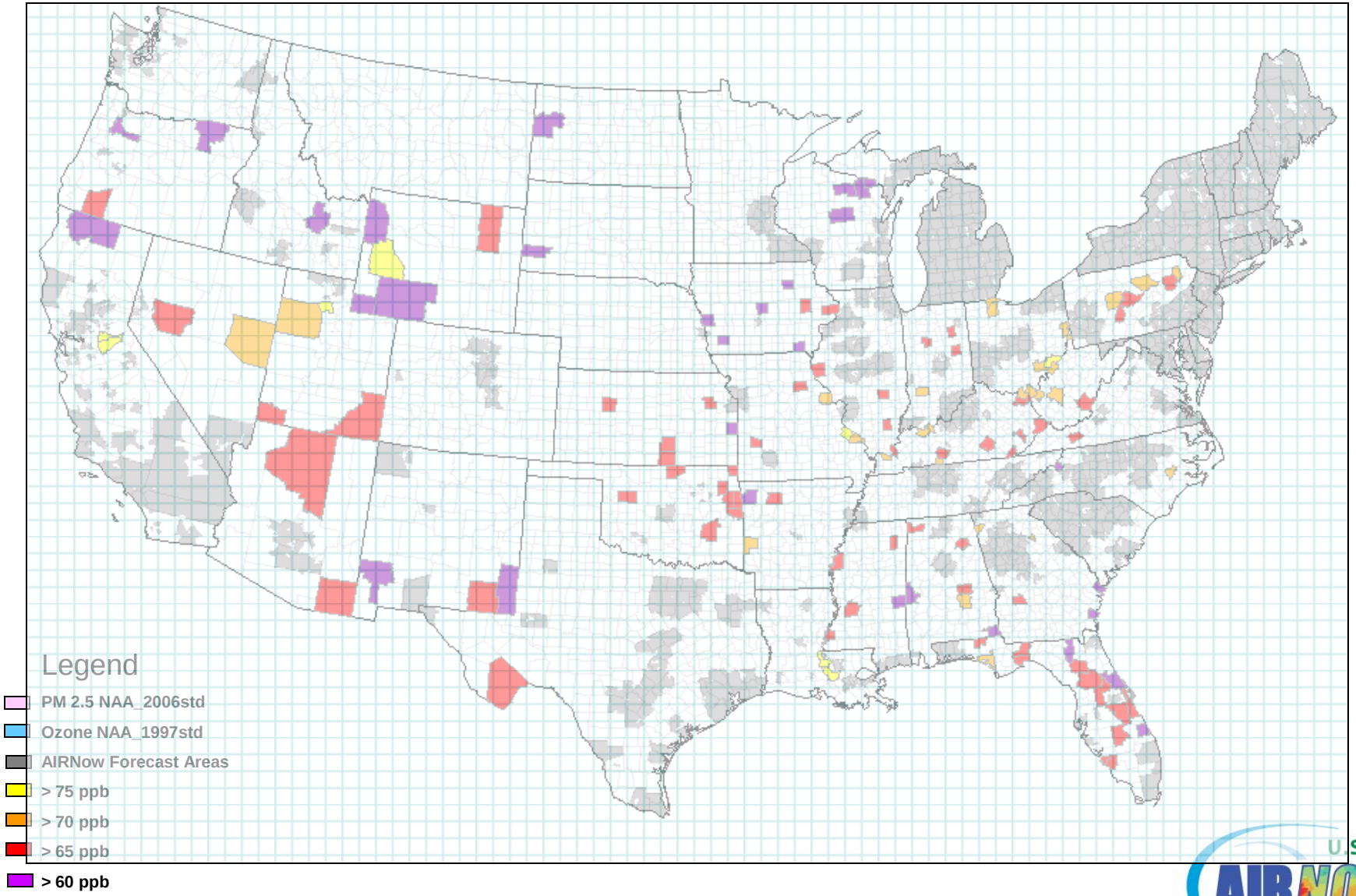
Role of NOAA model



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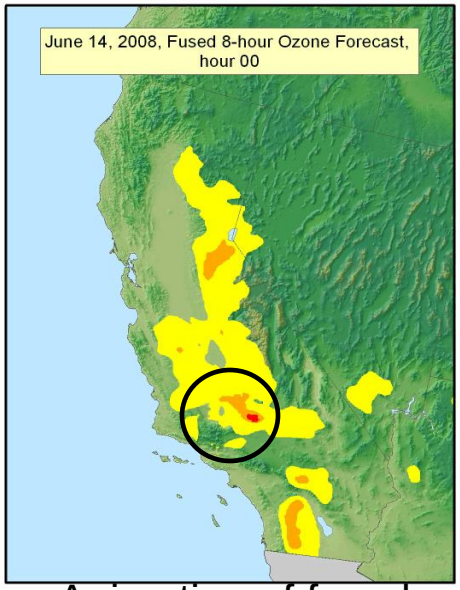
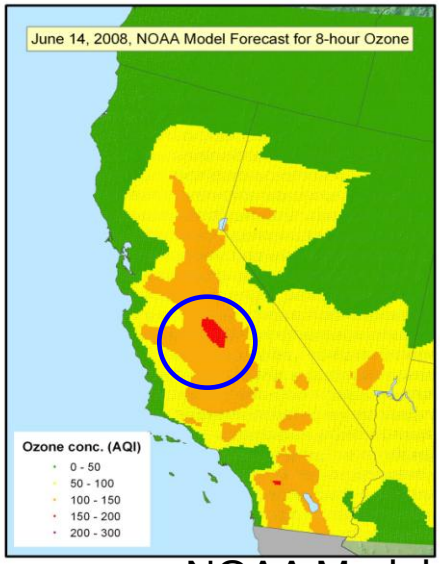
Results for Fusion of NOAA Ozone Model Data with Agencies' Forecasts (2 of 2)

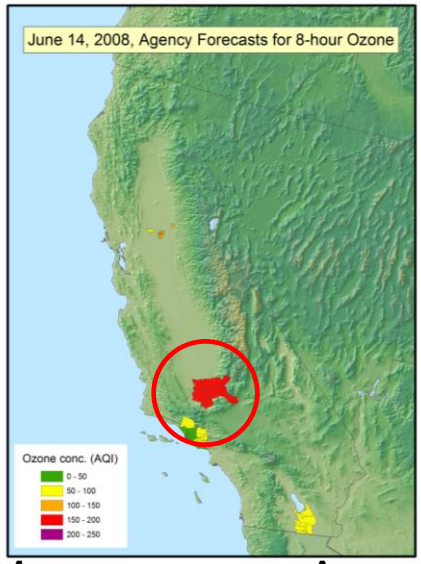
One obvious adjustment to the model output was in the southern San Joaquin Valley (black circle at far left), where the model output needed to be scaled to match the agency's forecast. For this case, the agency's forecast of Unhealthy (red circle) was closer to the observed values (shown in the map at far right) than the model prediction. In addition, the NOAA model was able to provide a reasonable forecast of Unhealthy near Fresno (farther north, blue circle), where no agency forecasts were available.



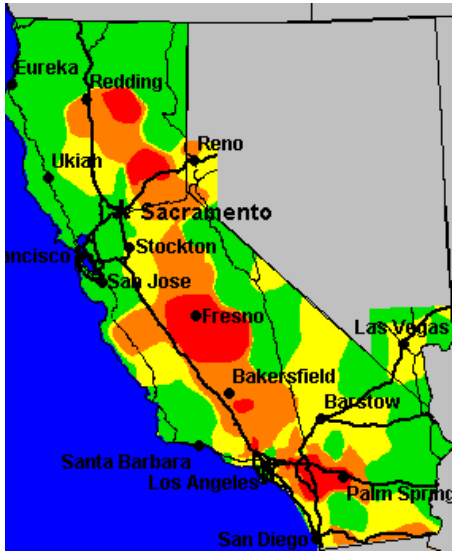
Animation of fused model and agency forecasts



NOAA Model Max



Agency Max



Observed Max

Conclusions

- Revised standards for SO_2 and NO_2 will impact forecasting.
- Lower ozone standard may put pressure on more areas to provide air quality forecasts
  - Some states in western US don't have forecast programs that may desire them.
  - Some forecast areas in eastern US may need to expand.
- NOAA model could support gaps in human forecasts.

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Contact Information

- Scott Jackson
  jackson.scott@epa.gov
  303-312-6107

- John White
  white.johne@epa.gov
  919-541-2306

Upper End of AQI Range

Air Quality Index Categories	Index Values
Good	0 – 50
Moderate	51 – 100
Unhealthy for Sensitive Groups	101 – 150
Unhealthy	151 – 200
Very Unhealthy	201 – 300
Hazardous	301 – 400
	401 – 500

Emergency Episode Plans

- **Alert Level**
- **Warning Level**
- **Emergency Level**
- **Significant Harm Level (SHL)**