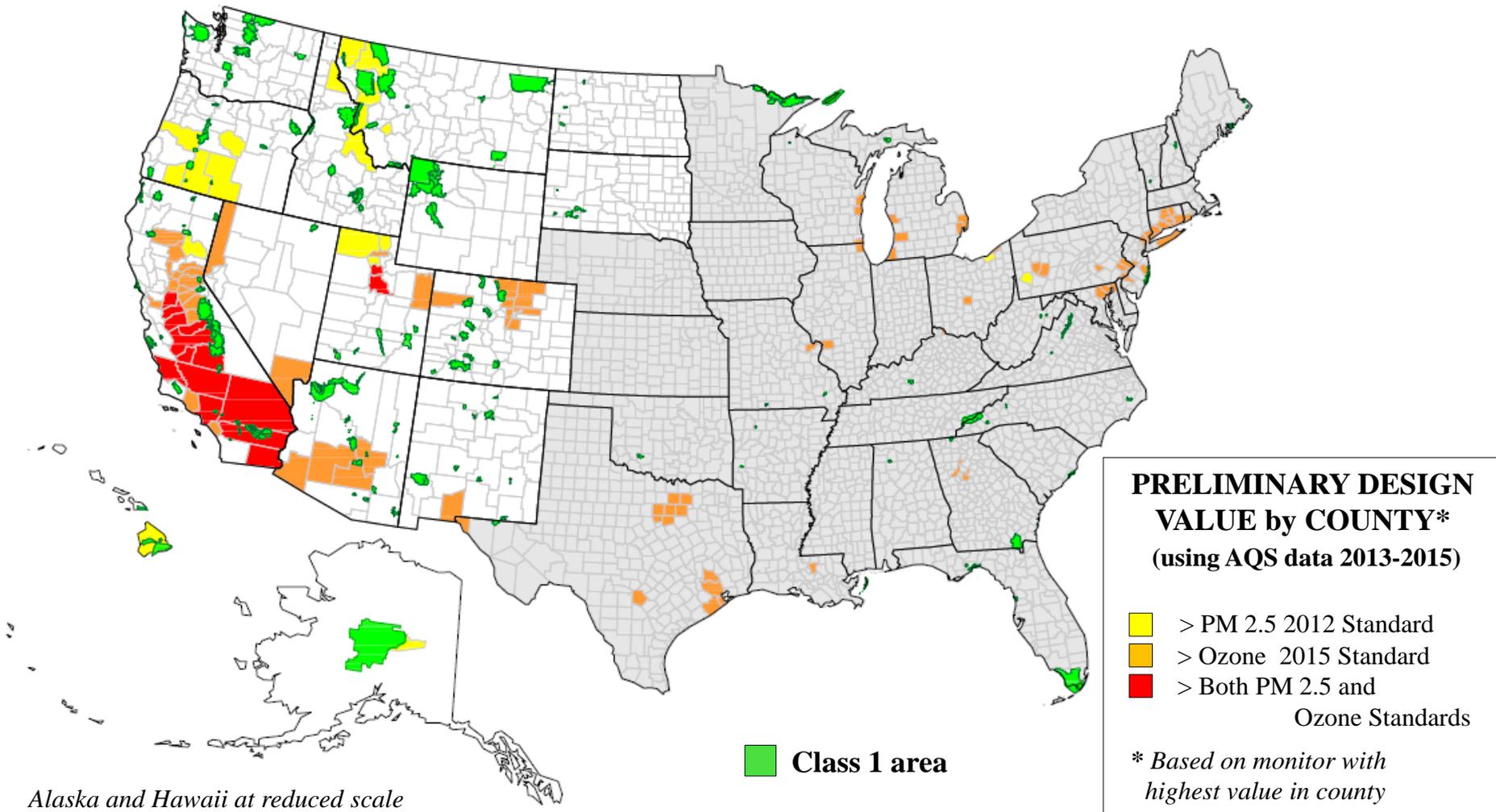# Regional Analysis steps to support western Regional Haze planning

Tom Moore

4 Corners Air Quality Group Meeting

**Sept. 13, 2017**

Western Class 1 area Environment

Alaska and Hawaii at reduced scale

PRELIMINARY DESIGN VALUE by COUNTY*
(using AQS data 2013-2015)

- 🟨 > PM 2.5 2012 Standard
- 🟧 > Ozone 2015 Standard
- 🟥 > Both PM 2.5 and Ozone Standards

* Based on monitor with highest value in county
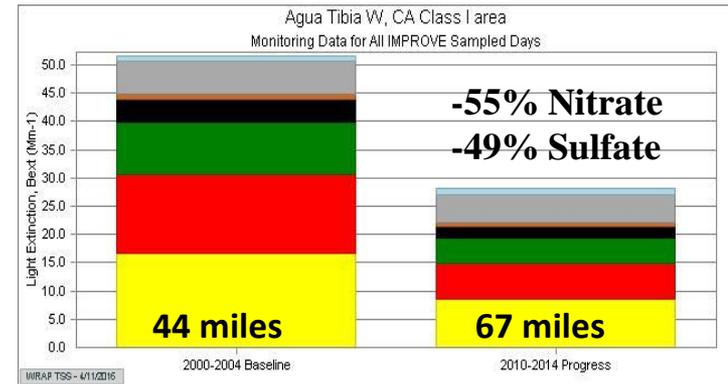
🟩 **Class 1 area**

Western region characterized by complex terrain, several climactic zones, oceanic and international source transport, dispersed population centers, large land mass, mix of nonattainment areas, unique geologic sources

2

Benefits of NOx and SOx reductions

Mt. Rainier, near Seattle

-44% Nitrate
-37% Sulfate

73 miles   96 miles
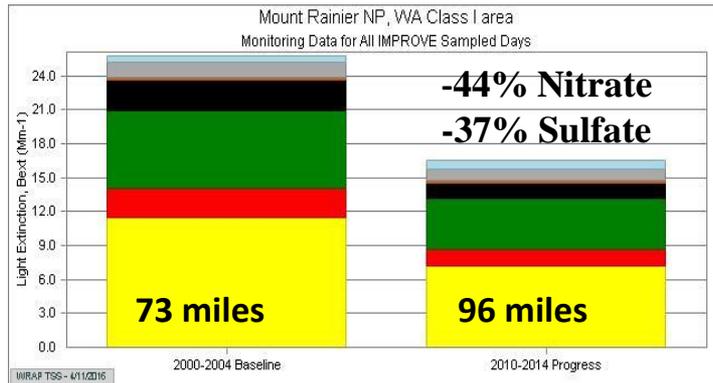
Agua Tibia, near the Los Angeles Basin

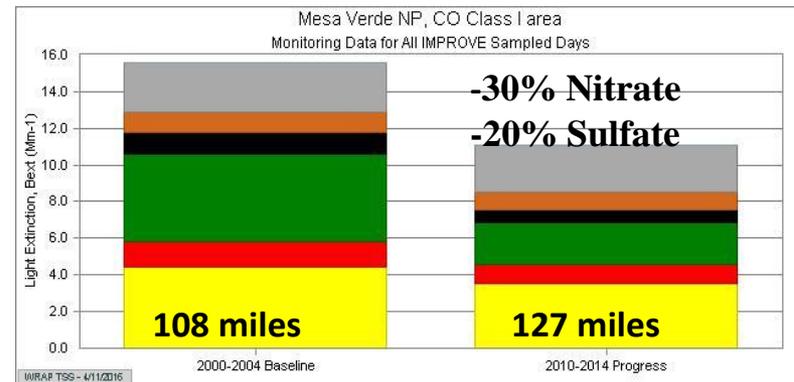-55% Nitrate
-49% Sulfate

44 miles   67 miles

- **After a decade of annual anthropogenic NOx and SOx reductions in <u>nearby</u> urban areas, particle Light Extinction and Visual Range improve more than 20% on "average" days at Class 1 areas.**

Theodore Roosevelt NP, western North Dakota

-18% Nitrate
-17% Sulfate

71 miles   79 miles
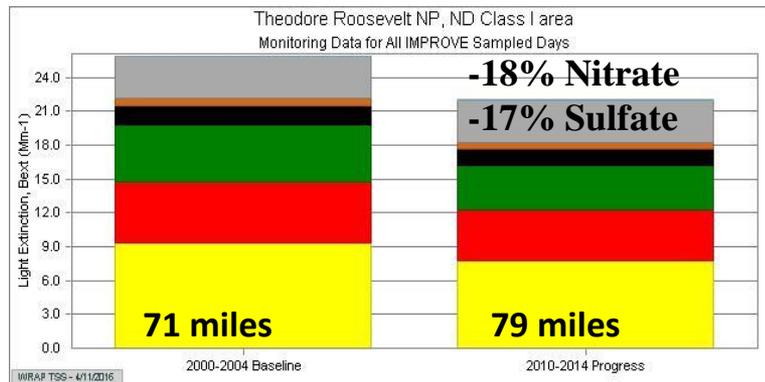
Mesa Verde, near "Four Corners"

-30% Nitrate
-20% Sulfate

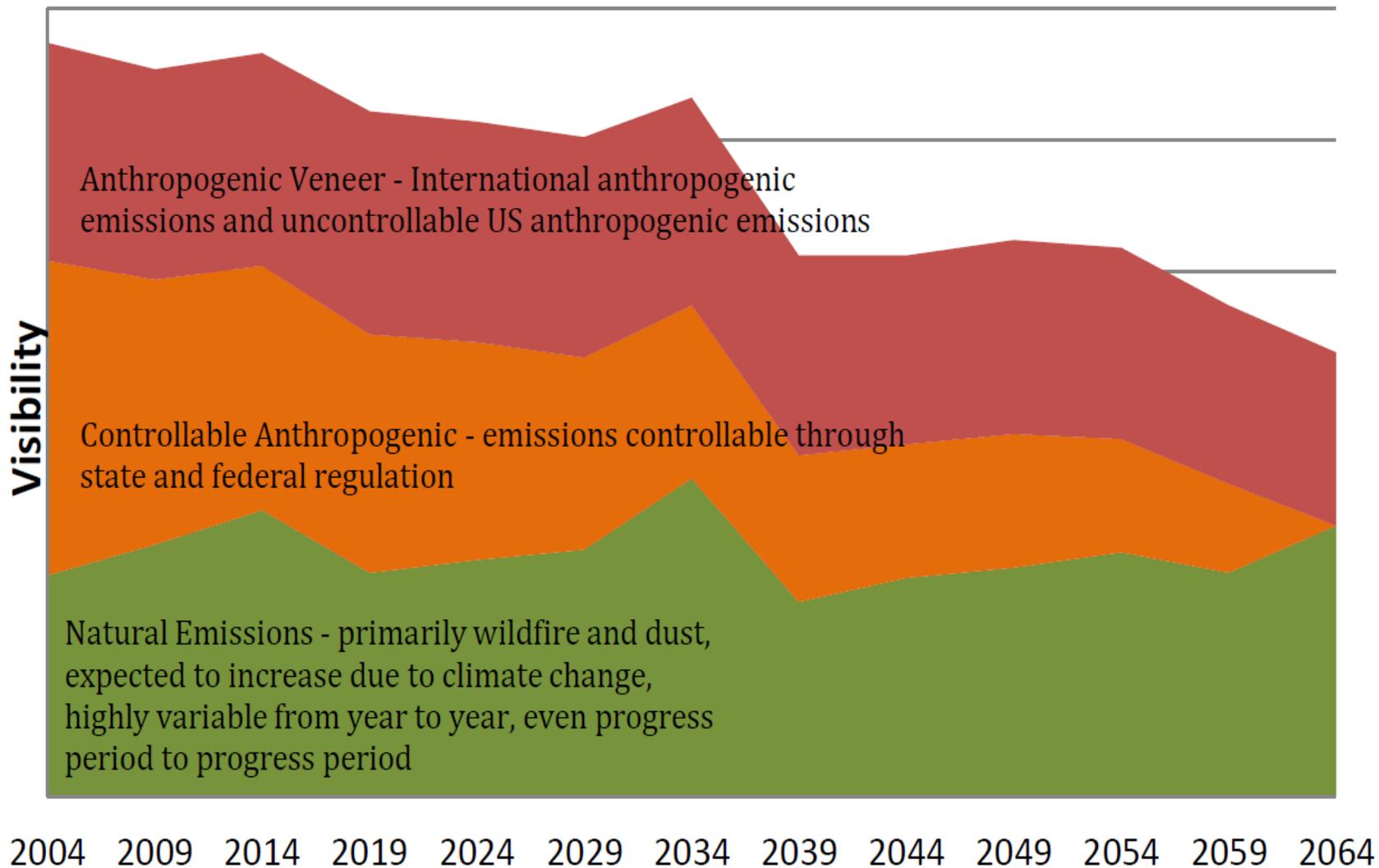108 miles   127 miles

- **On "average" days at Class 1 Areas not near urban areas, there is still measurable benefit from ongoing BART reductions of NOx and SOx at large facilities relatively nearby.**
- **Farther from urban areas and large anthropogenic sources, the smaller "controllable" anthropogenic emissions are overwhelmed by uncontrollable natural sources and international transport.**

Area Burned for U.S. Wildfires (NIFC)
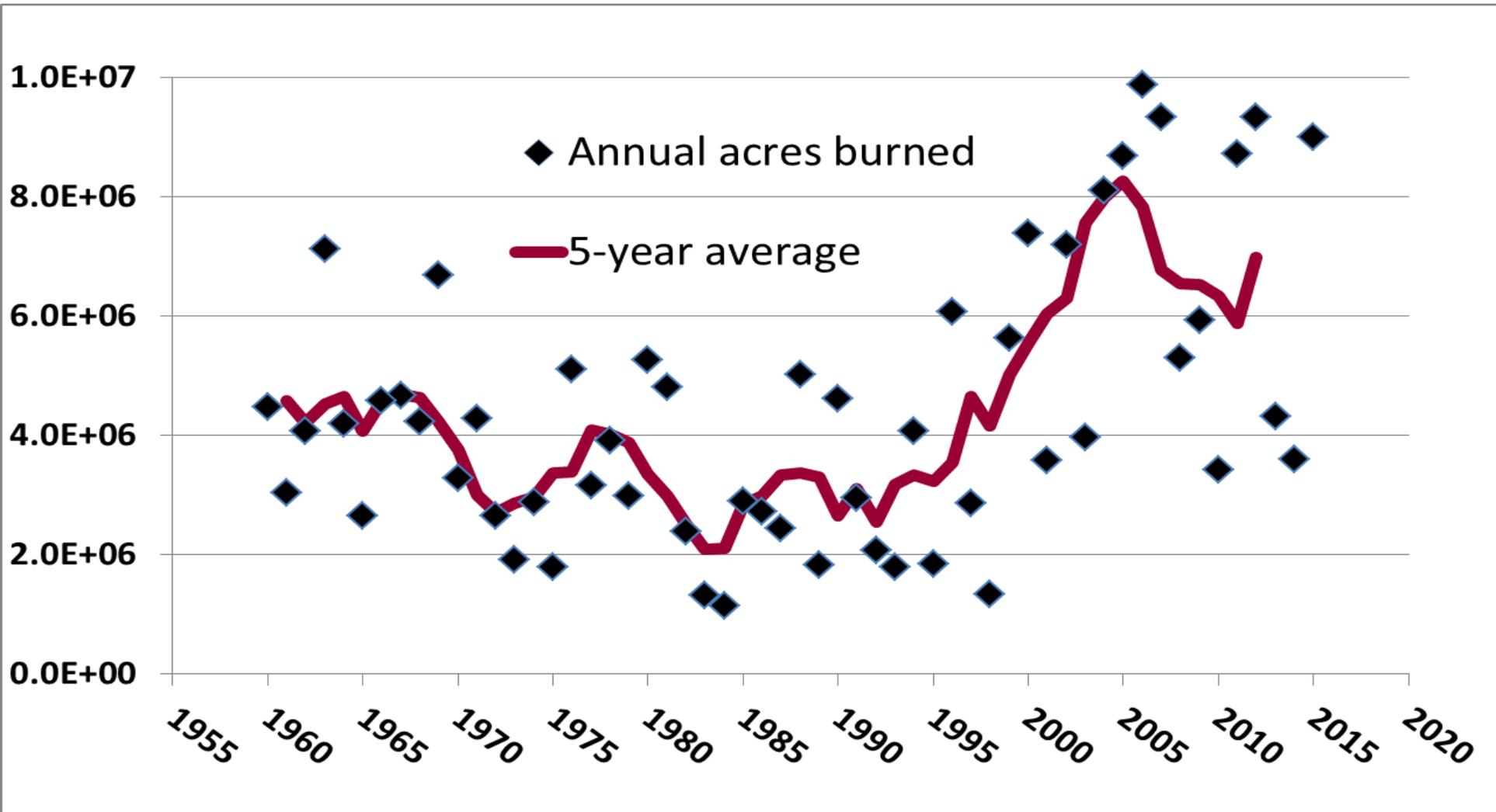
The last decade has seen a significant increase in the area burned. Approximately 70% of these fires are in the Western U.S.

Conceptual Progress in Reducing Visibility Impairment

Anthropogenic Veneer - International anthropogenic
emissions and uncontrollable US anthropogenic emissions

Controllable Anthropogenic - emissions controllable through
state and federal regulation

Natural Emissions - primarily wildfire and dust,
expected to increase due to climate change,
highly variable from year to year, even progress
period to progress period

Visibility

2004 2009 2014 2019 2024 2029 2034 2039 2044 2049 2054 2059 2064

Typical Sources affecting Visibility

	Source	Controllability	Trend	Variability
Anthropogenic	US Anthropogenic	Some emissions are controllable	Downward as sources are controlled	Relatively stable
		Some emissions will remain after all reasonable controls implemented	Could rise because of population increases	Relatively stable
	International Anthropogenic	Not controllable by state or federal regulations	Likely increasing due to increased development worldwide and rising population	Relatively stable
Natural	Fire, Dust, Sea Salt	Natural, not controllable	Increases due to climate change	Highly variable
	Volcanic	Natural, not controllable	Unpredictable	Highly variable
	Other Natural Sources	Not controllable	Potentially affected by climate change, e.g., changes in temperature	Relatively stable

Table Note: Shaded areas represent emissions that states cannot control.

WESTAR and WRAP Regional Haze Planning Approach

- Western states will achieve considerable efficiency though continuing the long-term implementation efforts and experience in assessing progress by the Partnership. Commensurate benefit would accrue to the EPA and FLMs in the continuing effort to protect visibility and assure progress toward the national visibility goal by utilizing WRAP and WESTAR experience and expertise.

WESTAR and WRAP Regional Haze Planning Analysis

- The causes of visibility impairment are changing because of the increasing impacts on western Class I areas from uncontrollable and international air pollution sources at a time when western air agencies and EPA are reducing "controllable" anthropogenic emissions. As a result, there is an emerging need for integrated multi-pollutant regional analysis and planning for urban and rural western areas.

Regional analysis timelines for regional haze planning support

- ## Regional Haze
  - Final Rule late 2016
  - Final guidance? in 2017?
  - Regional analyses starting in early 2018
    - 2016 base year
    - 2028 rules on the books
    - Associated air quality modeling
  - Analyses during 2018 and 2019
    - Evaluation of reasonable progress controls
    - Associated air quality modeling
  - Plans due July 2021

Regional Analysis steps (#1)

WRAP Regional Haze monitoring and emissions analysis to support planning (118 visibility-protected Class I areas)

- **Assess revised Regional Haze Program Requirements**

- **IMPROVE Monitoring Data Analysis for revised metric**

- **Regional Emissions Analysis – work covers list below**
    a. **Emissions Inventories**
    b. **Emission Inventory Method Changes**
    c. **Sector Methods**
    d. **Additional (critical) Emission Inventory Studies**
    e. **Emission Inventory Projections**

    - **Includes separate work for Alaska and Hawaii as those states direct**

Funding in hand by end of 2017

Work to be completed in 2018

Regional Analysis steps (#2)

Contiguous WESTAR and WRAP region (112 Class I areas)

- **Regional Modeling – solves transport contributions at each area by source**

a. **Meteorological and Emissions Modeling**

b. **Visibility Modeling - Reasonable Progress Goals for each Class I area**
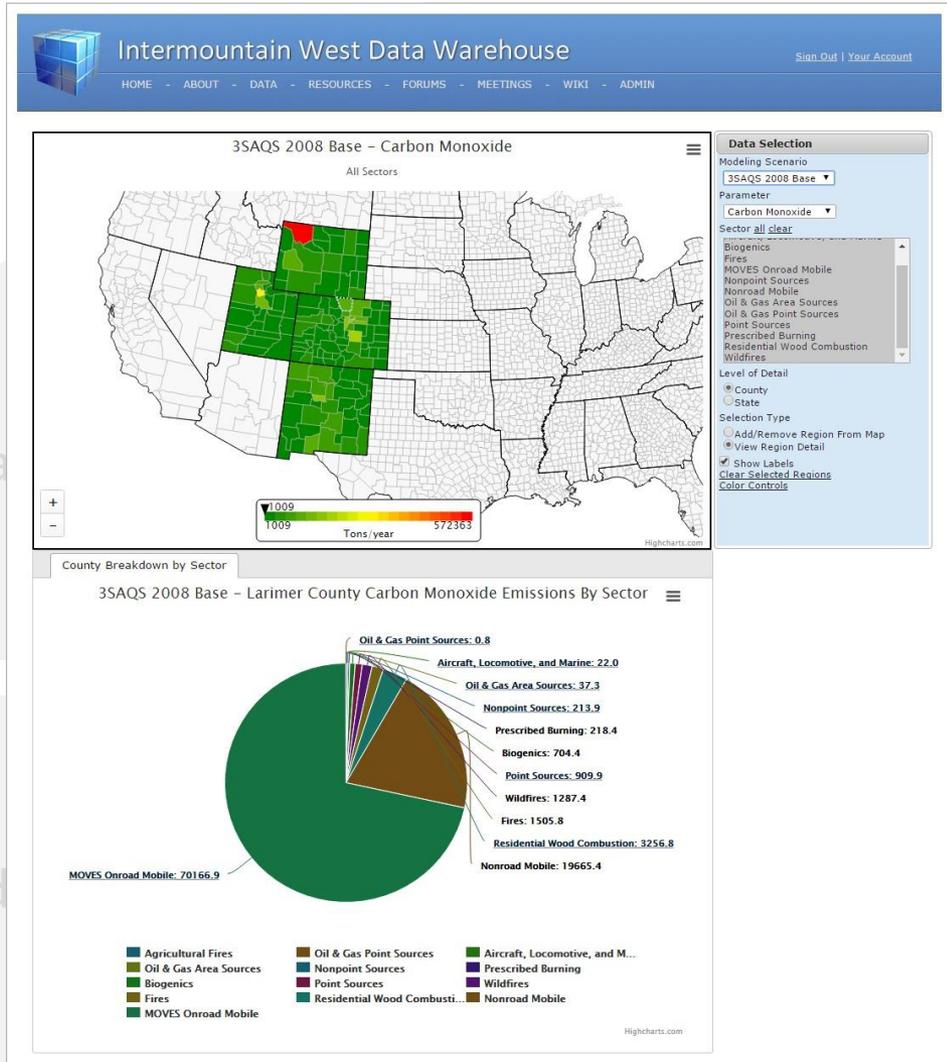
c. **Source Apportionment and Sensitivity Analyses**

Funding in hand in 2017 with supplements in 2018

Modeling continues for 2 years

Final modeling done late 2019

NPS Air Quality
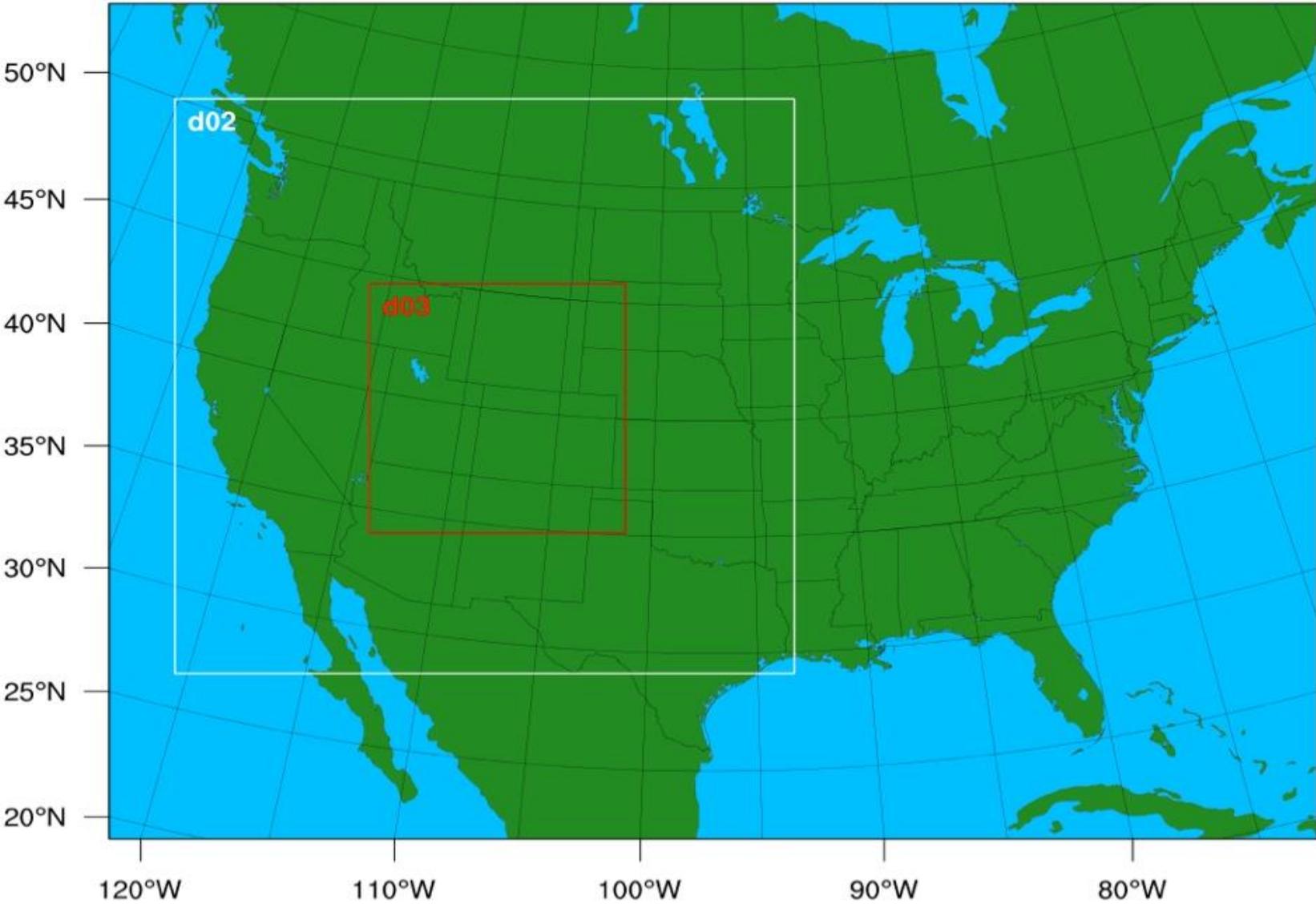Conditions & Trends Tools
(nps.gov)

Partners: NPS

Data

Hard

Intermountain West
Data Warehouse
(IWDW)

Partners: NPS, BLM, USFS, EPA,
CO, WY, UT, NM

http://views.cira.colostate.edu/iwdw

ager
ase

s, USFS

stern
and
ning
(SEMAP)

Partners: AL, FL, GA, KY, MS, NC, SC, TN

12

IWDW-WAQS nested 36/12/4-km WRF/CAMx and CMAQ domains

Regional Analysis steps (#3)

Assessing Emission Reduction Strategies and Reasonable Progress Goals (118 visibility-protected Class I areas)

- **Four-Factor Analysis**
- **Potential Visibility Effects of 4-factor controls**
- **Setting each Class I area's Reasonable Progress Goal – transparent / documented across region**
- **other planning support as needed**

Funding supplements in 2018

Analyses completed late 2019

2017 Teach-In series

Thanks.

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