
# WRAP Region Emissions Inventories for Air Quality Planning Analysis

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Regional Planning Organizations
WRAP
CENRAP
Midwest RPO
MANE-VU
VISTAS

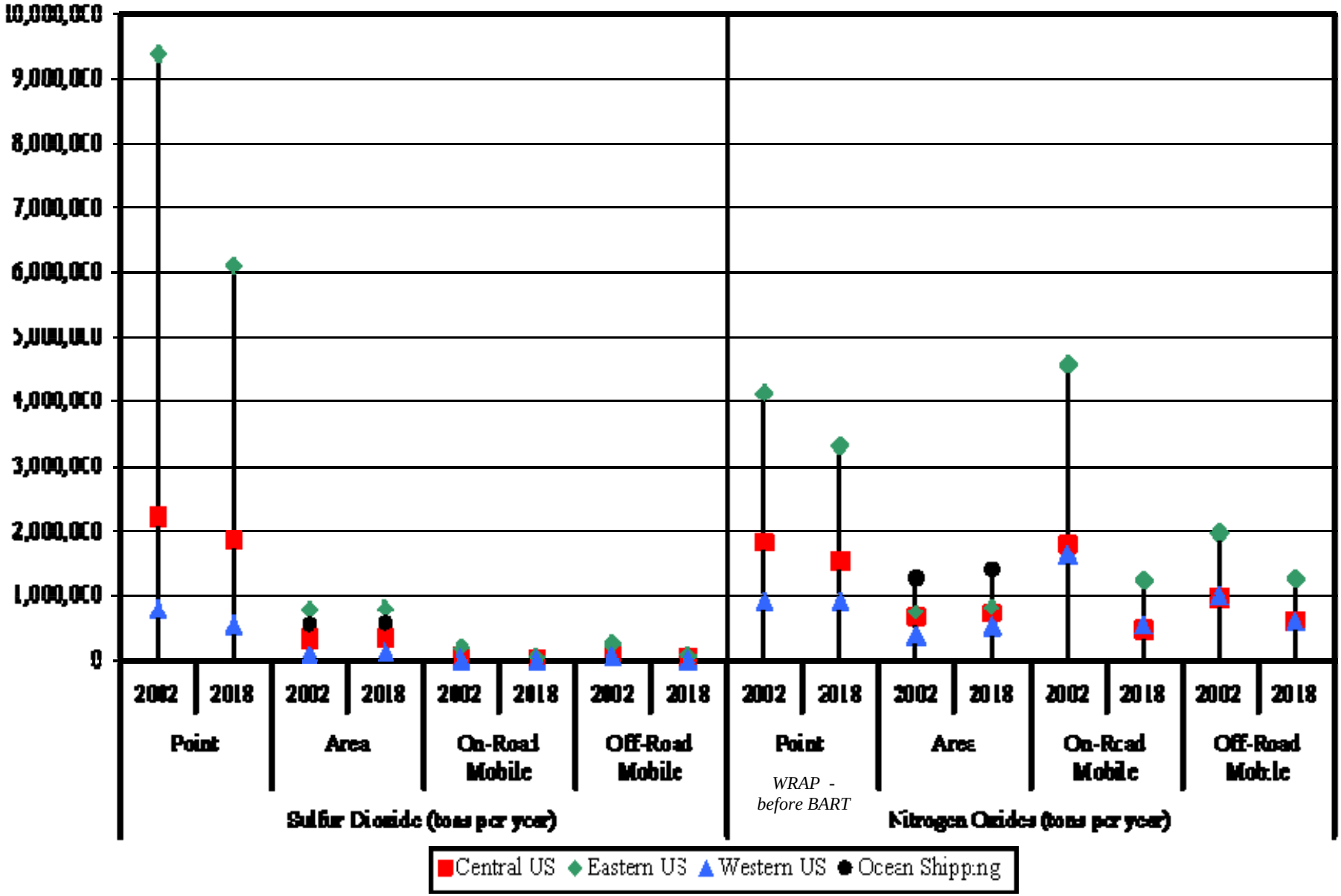
# WRAP purpose & membership

- Identify regional or common air management issues, develop and implement strategies to address these issues, and formulate and advance western regional policy positions on air quality
  - Develop data, tools, & policies needed by states & tribes to improve visibility in parks & wilderness areas
  - Implement Grand Canyon Visibility Transport Commission recommendations
- Western states, tribes, and federal agencies
  - 15 states
  - Over 400 tribes in WRAP region – dozens active
  - NPS, FWS, USFS, EPA

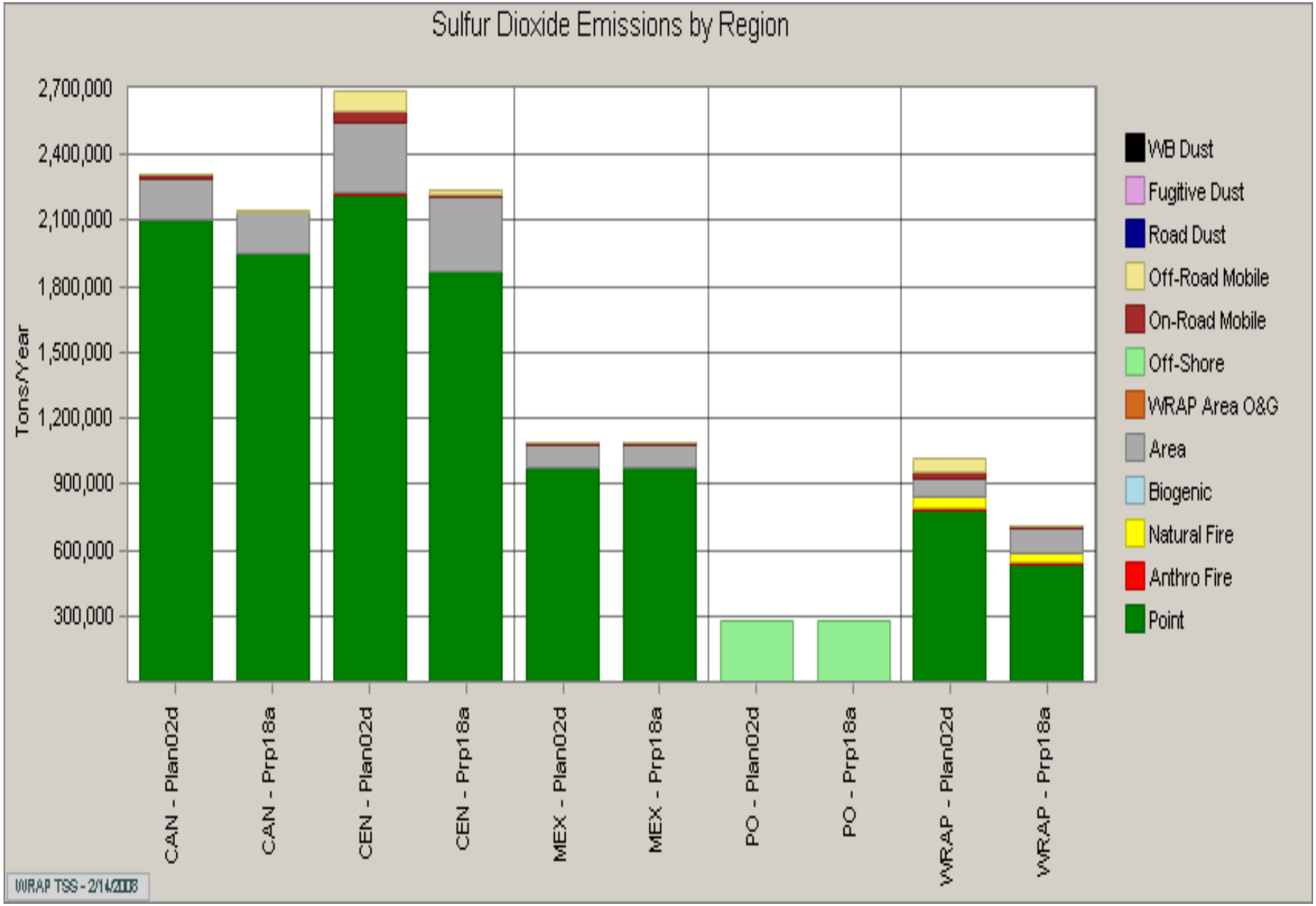
# Collaboration on Western Air Quality

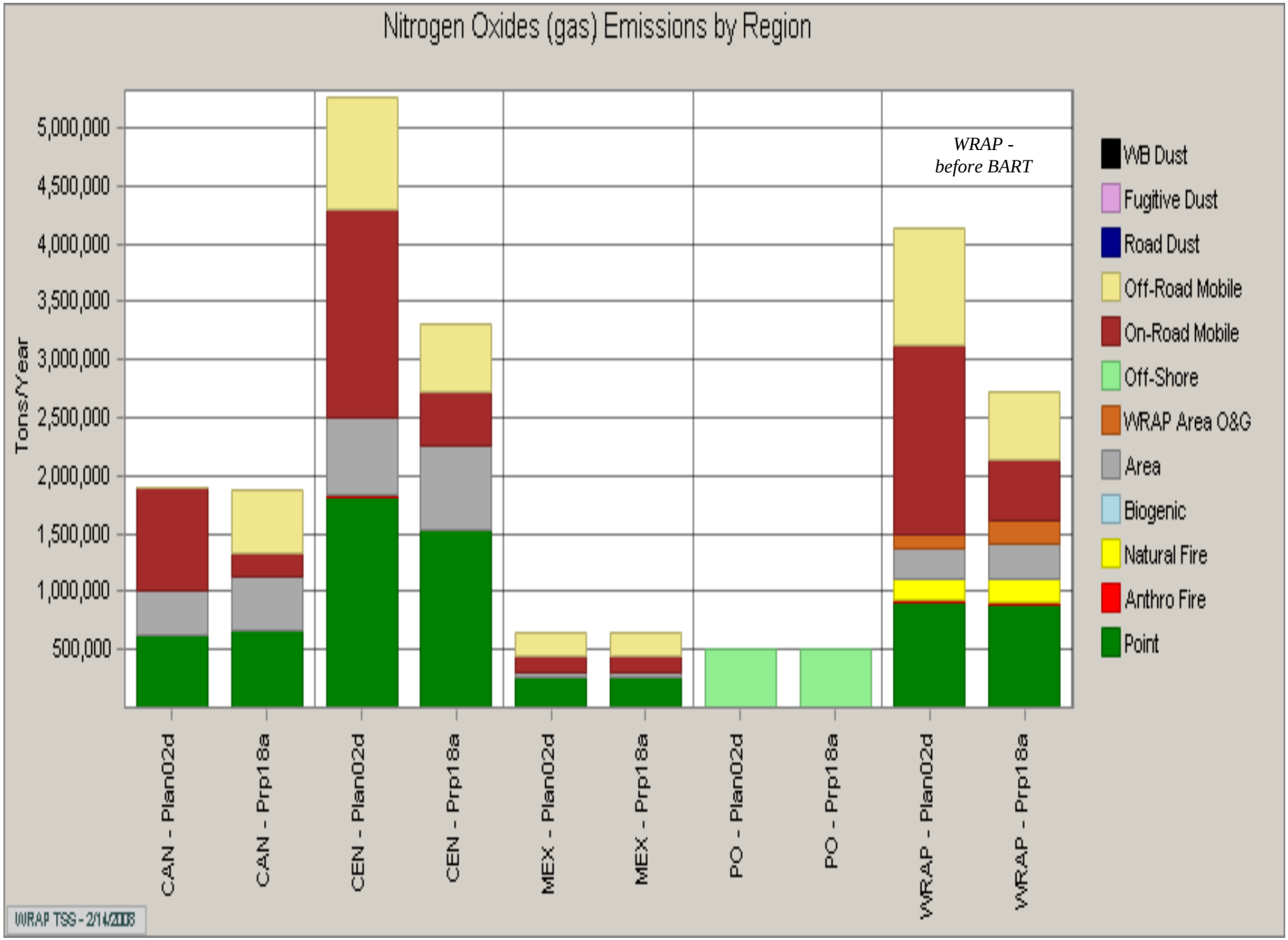
- Characteristics of the West
  - Land use/ownership
  - Emissions sources
  - Scales of Transport
- Air Quality Management & Planning
  - State programs
  - Federal responsibilities
  - Tribal sovereignty
  - Systems approach (VIEWS-TSS, FETS, EDMS)

# U.S. Regional Emissions Changes 2002-18

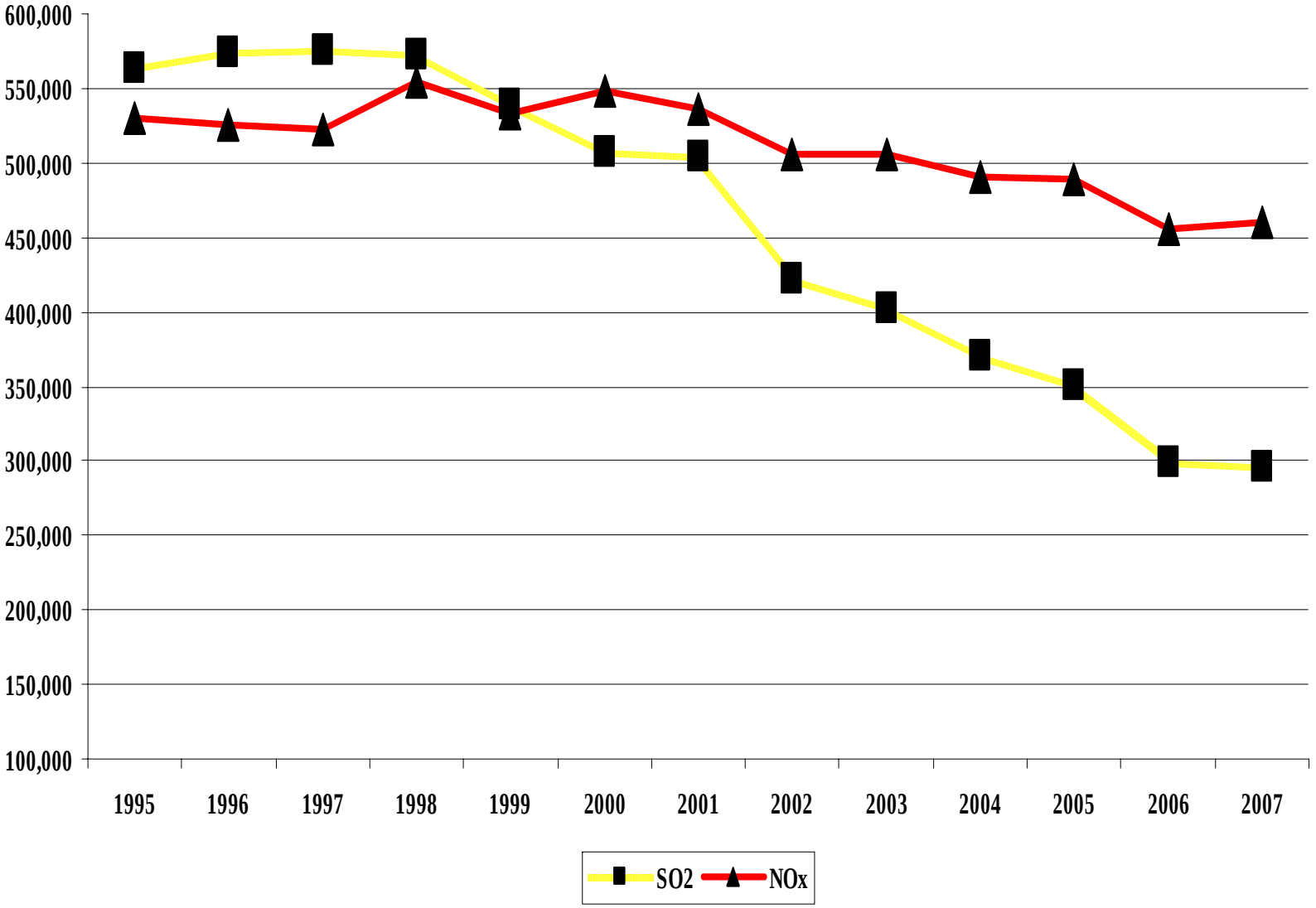



*WRAP - before BART*


Sulfur Dioxide Emissions by Region
Tons/Year
2,700,000
2,400,000
2,100,000
1,800,000
1,500,000
1,200,000
900,000
600,000
300,000
CAN - Plan02d
CAN - Prp18a
CEN - Plan02d
CEN - Prp18a
MEX - Plan02d
MEX - Prp18a
PO - Plan02d
PO - Prp18a
WRAP - Plan02d
WRAP - Prp18a
WB Dust
Fugitive Dust
Road Dust
Off-Road Mobile
On-Road Mobile
Off-Shore
WRAP Area O&G
Area
Biogenic
Natural Fire
Anthro Fire
Point
WRAP TSS - 2/14/2008


Nitrogen Oxides (gas) Emissions by Region
Tons/Year
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
WRAP - before BART
WB Dust
Fugitive Dust
Road Dust
Off-Road Mobile
On-Road Mobile
Off-Shore
WRAP Area O&G
Area
Biogenic
Natural Fire
Anthro Fire
Point
CAN - Plan02d
CAN - Prp18a
CEN - Plan02d
CEN - Prp18a
MEX - Plan02d
MEX - Prp18a
PO - Plan02d
PO - Prp18a
WRAP - Plan02d
WRAP - Prp18a
WRAP TSS - 2/14/2018

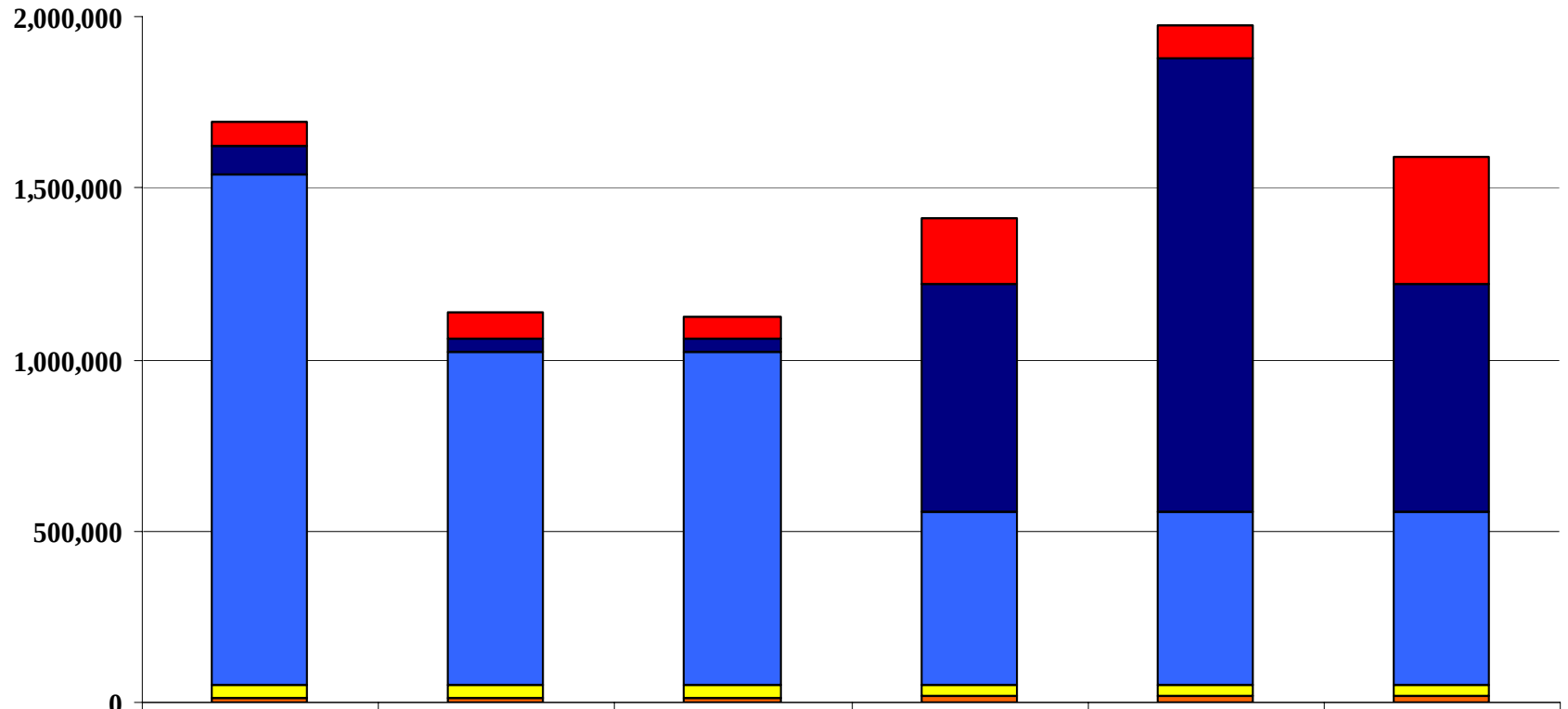
# Western State Power Plant Emissions (1995-2007)



# WRAP Region BART Sources *(aka the Don't CAIR region)*

| State | # EGU Plants | # EGU Units | # Non-EGU Plants |
|---|---|---|---|
| **AK** | 2 | 4 | 3 |
| **AZ** | 4 | 12 | 5 |
| **CA** | 0 | 0 | 1 |
| **CO** | 8 | 14 | 1 |
| **HI** | 6 | 6 | 2 |
| **ID** | 0 | 0 | 1 |
| **MT (by EPA R8)** | 2 | 3 | 3 |
| **NV** | 4 | 10 | 1 |
| **NM** | 1 | 4 | 0 |
| **ND** | 4 | 7 | 0 |
| **OR** | 2 | 7 | 3 |
| **SD** | 1 | 1 | 0 |
| **UT** | 2 | 4 | 0 |
| **WA** | 1 | 2 | 7 |
| **WY** | 5 | 13 | 3 |
| **Tribal (by EPA R9)** | 2 | 8 | 0 |
| **Totals** | 44 | 95 | 30 |

# WRAP Region Fire PM2.5 Emissions Scenarios (tpy)




| | 2002 Actual | 2000-04 Baseline Average | 2018 Planning - Baseline Average with ERTs | 2018 Projection A - FLM-proposed activities | 2018 Projection B - Climate conditions/ resource limited | 2018 Projection C - Max. application of Prescribed Fire |
|---|---|---|---|---|---|---|
| Prescribed Fire | 71,421 | 72,218 | 64,170 | 195,020 | 97,347 | 376,206 |
| Wildland Fire Use | 81,505 | 41,171 | 41,171 | 659,594 | 1,319,189 | 659,594 |
| Wildfire | 1,489,886 | 971,453 | 971,453 | 504,654 | 504,654 | 504,654 |
| Agricultural Fire | 34,571 | 34,590 | 34,590 | 34,590 | 34,590 | 34,590 |
| N-F Rangeland Fire | 15,454 | 15,454 | 15,454 | 18,643 | 18,643 | 18,643 |

# Fires and Ozone

**(urban contributor to urban impacts, direct formation from fire event(s), precursor transport?)**




## EASTERN UTAH

2006 Oil and Gas Production

BLM proposed leasing for oil shale development

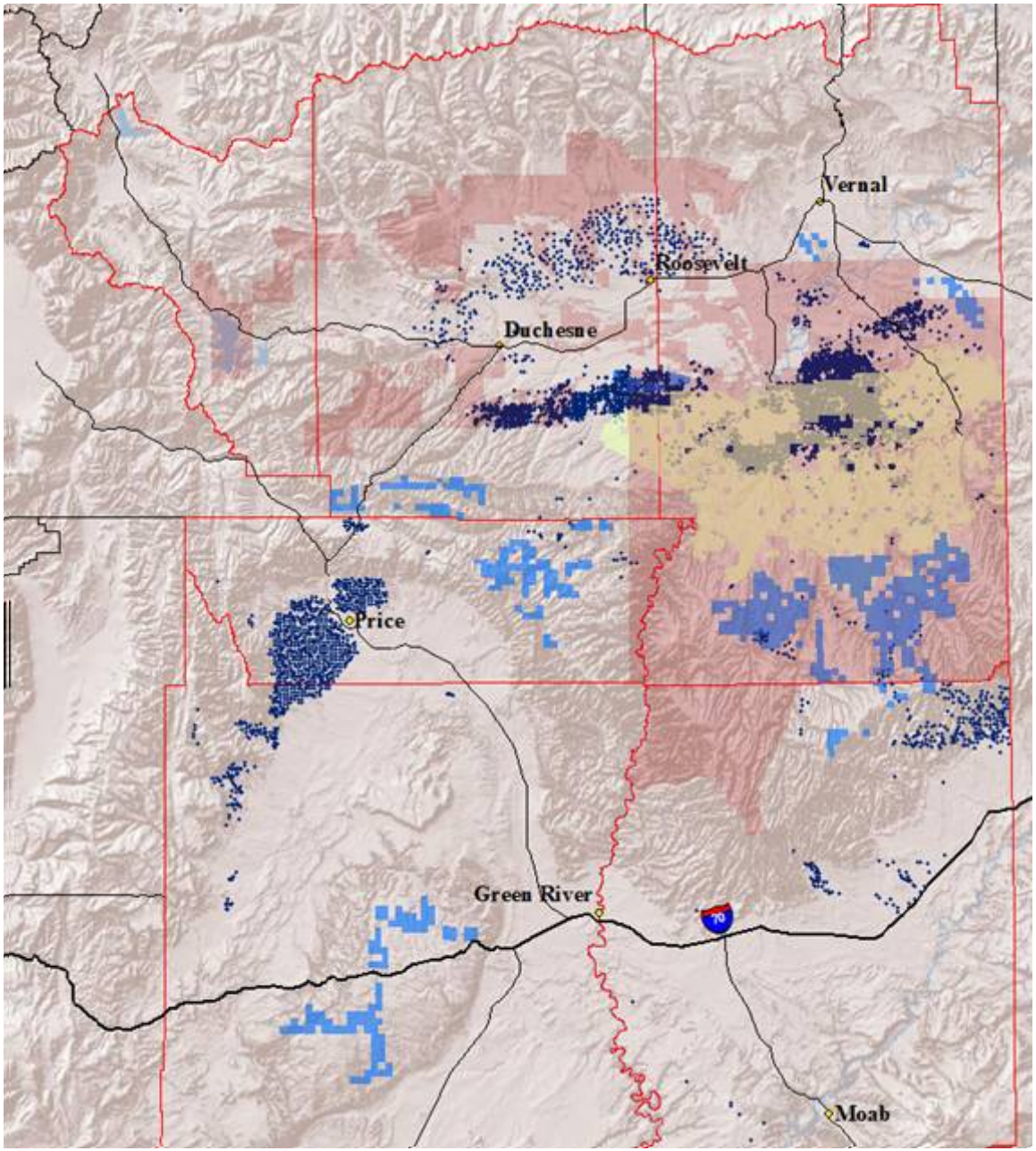
BLM proposed leasing for tar sands development

"Indian Country" – Regulatory authority controlled by the Tribes and EPA

Oil Shale Leasing

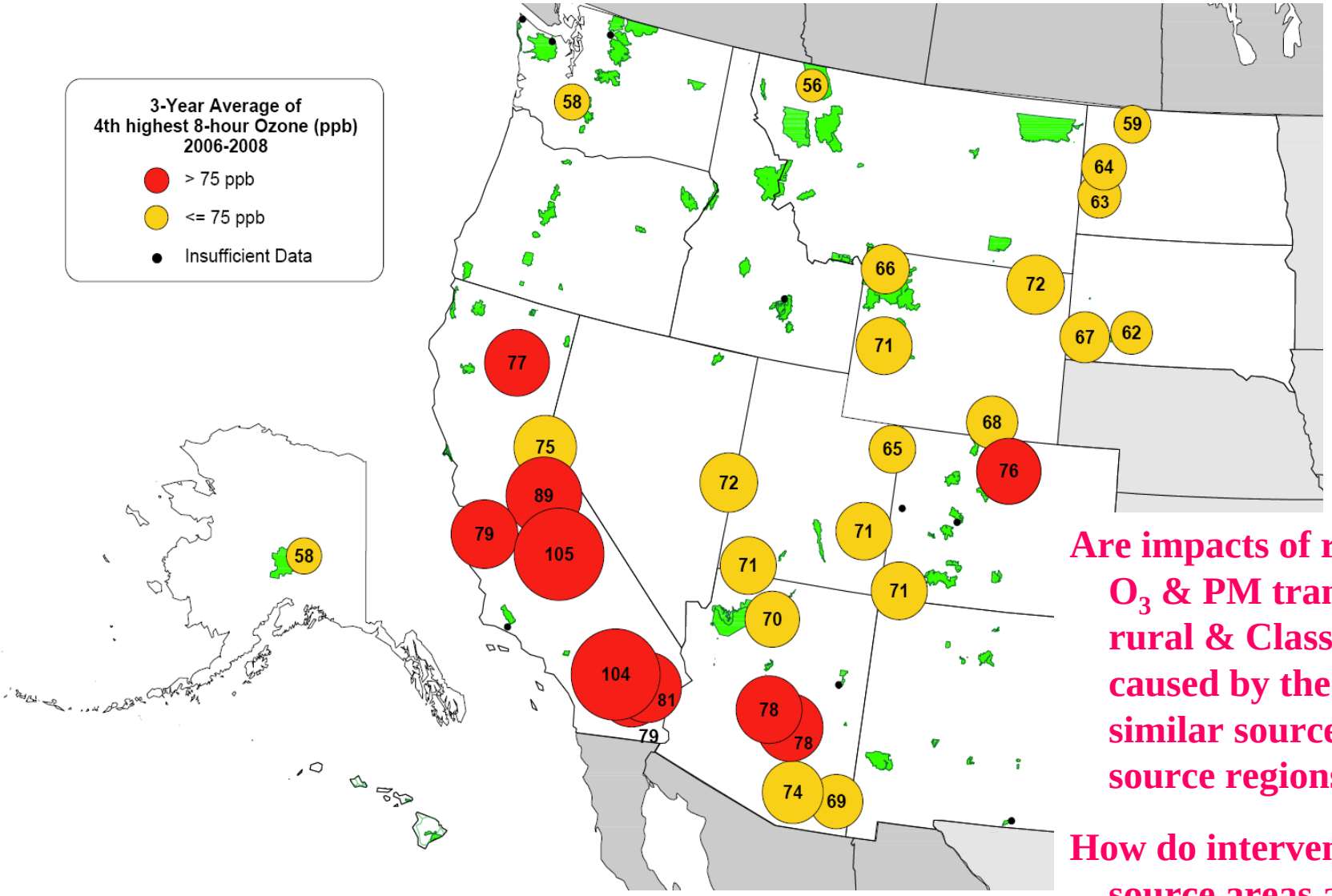
Tar Sands Leasing

"Indian Country"



# 2006-08:

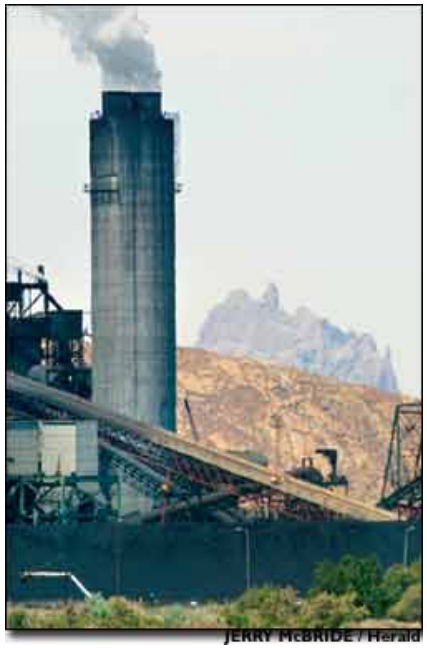
3-year average of 4th highest daily monitored max 8-hr average at rural/Class I sites




**Are impacts of regional $O_3$ & PM transport to rural & Class I sites caused by the same or similar sources & source regions?**

**How do intervening source areas affect $O_3$ & PM formation, titration, & transport?**

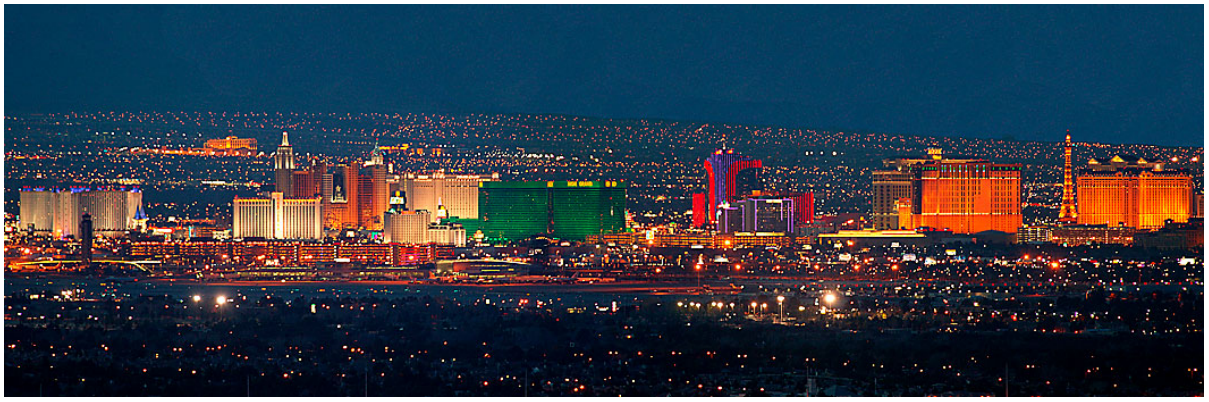
# Case Study: $NO_x$ Emissions from Western US Power Plants and Cities



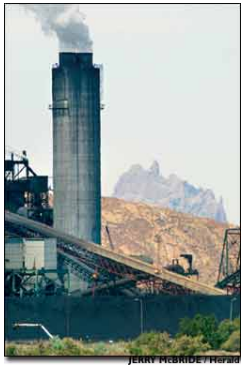

Use discrete satellite signals in Western US to evaluate $NO_x$ emissions from individual power plants and urban areas

- Steady, well-known power plant emissions
  - "Calibrate" satellite and model algorithms
- Rapidly growing urban areas with lots of motor vehicles
  - How well are mobile source $NO_x$ emissions understood?
  - Are overall $NO_x$ emissions declining?

*S.-W. Kim et al., manuscript to be submitted (2008)*

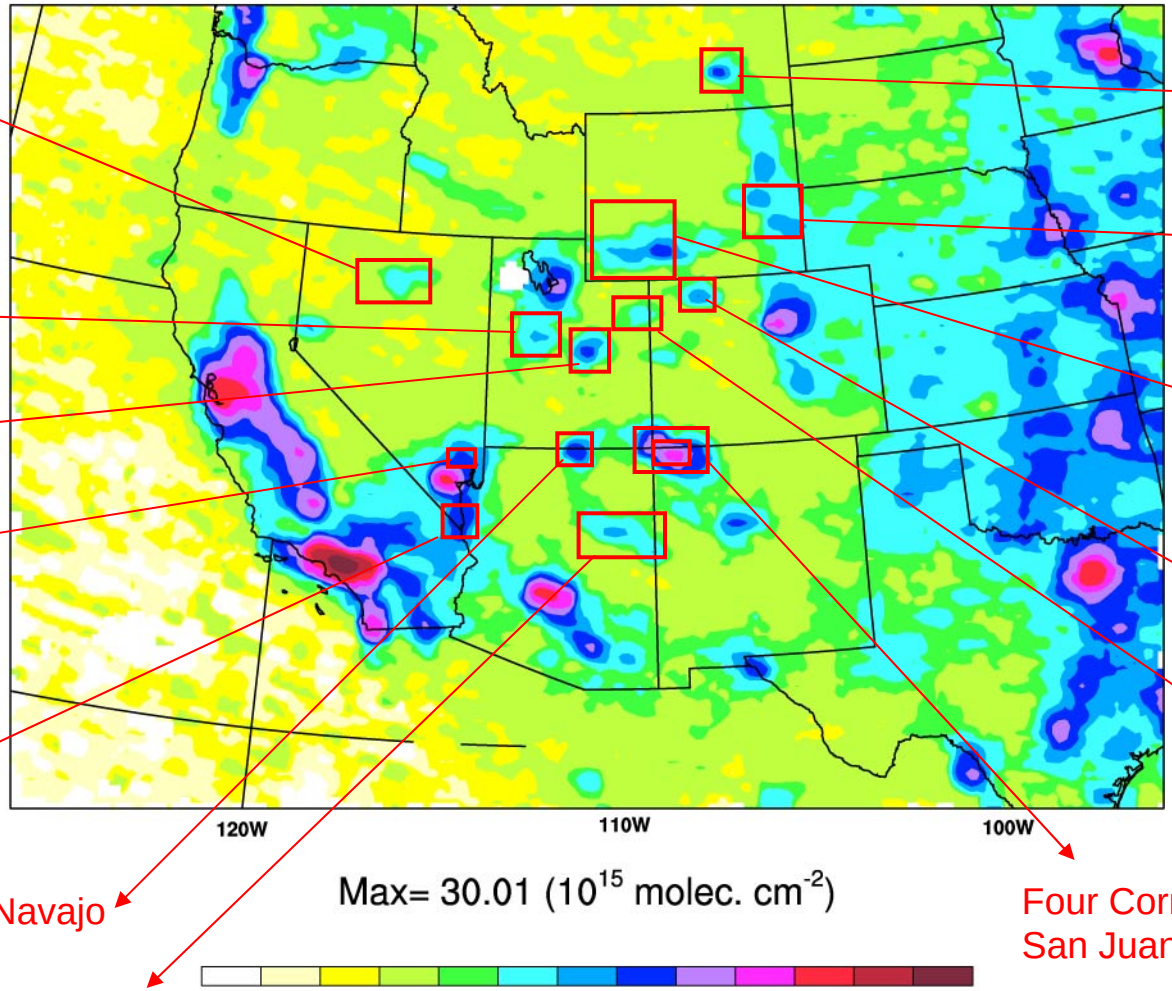


Kim, Frost et al.



# $NO_x$ Emissions from Western US Power Plants

- *Isolated plants have discrete signatures in satellite retrievals*
- *Power plant emissions are measured continuously at each stack*
- *Currently no $NO_x$ pollution controls on large coal-burning plants*
- ➢ *"Calibration" for satellite-model comparison*




North Valmy

Colstrip

Dave Johnston/
Laramie River

Intermountain

Jim Bridger/
Naughton

Hunter /
Huntington

Craig/Hayden

Reid Gardener

Bonanza

Mohave

Navajo

Four Corners/
San Juan

Cholla/Coronado/
Springerville

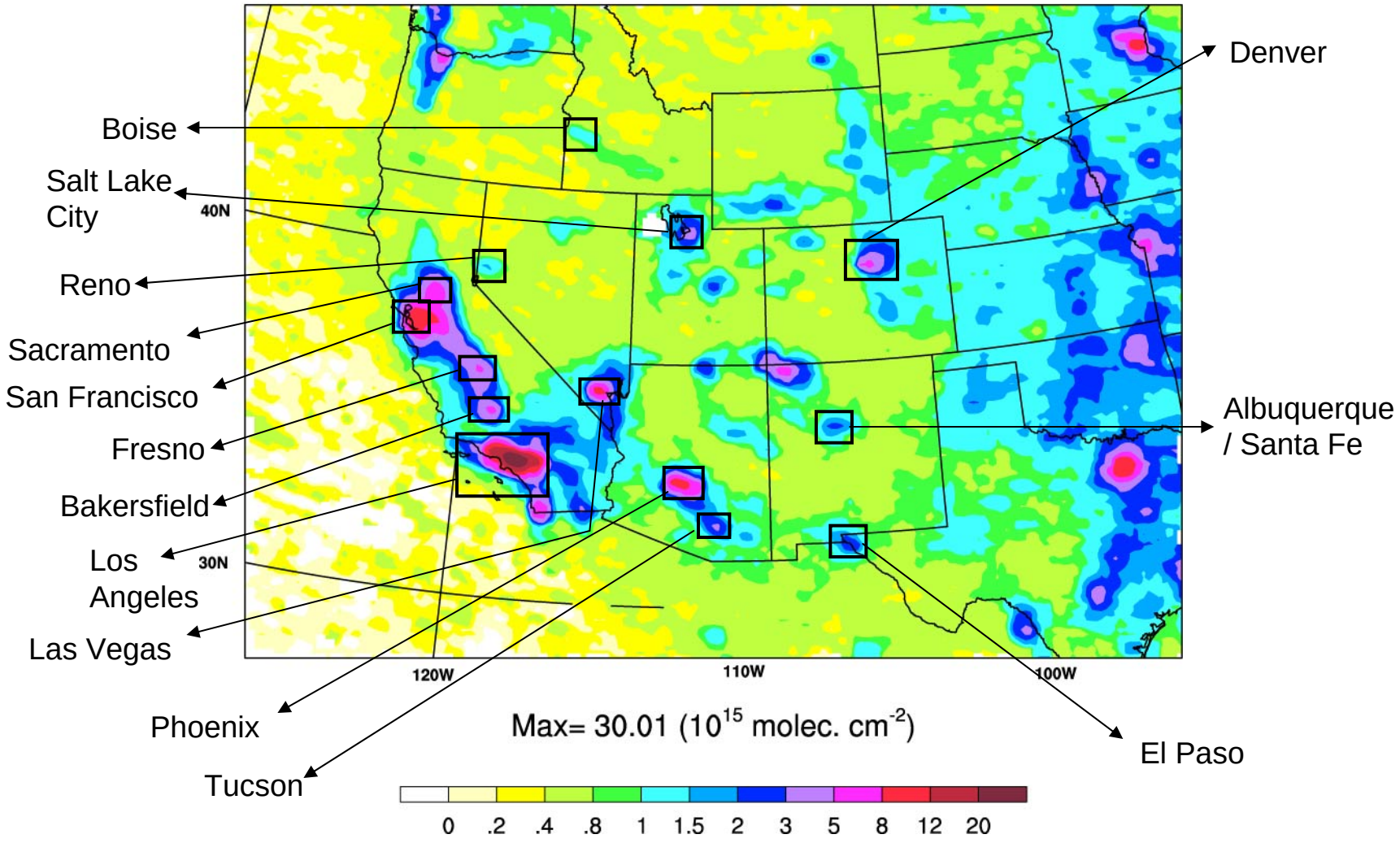
*SCIAMACHY, Summer 2005*

Kim, Frost et al.

# $NO_x$ Emissions from Western US Urban Areas

*Build on satellite-model comparisons for power plants*

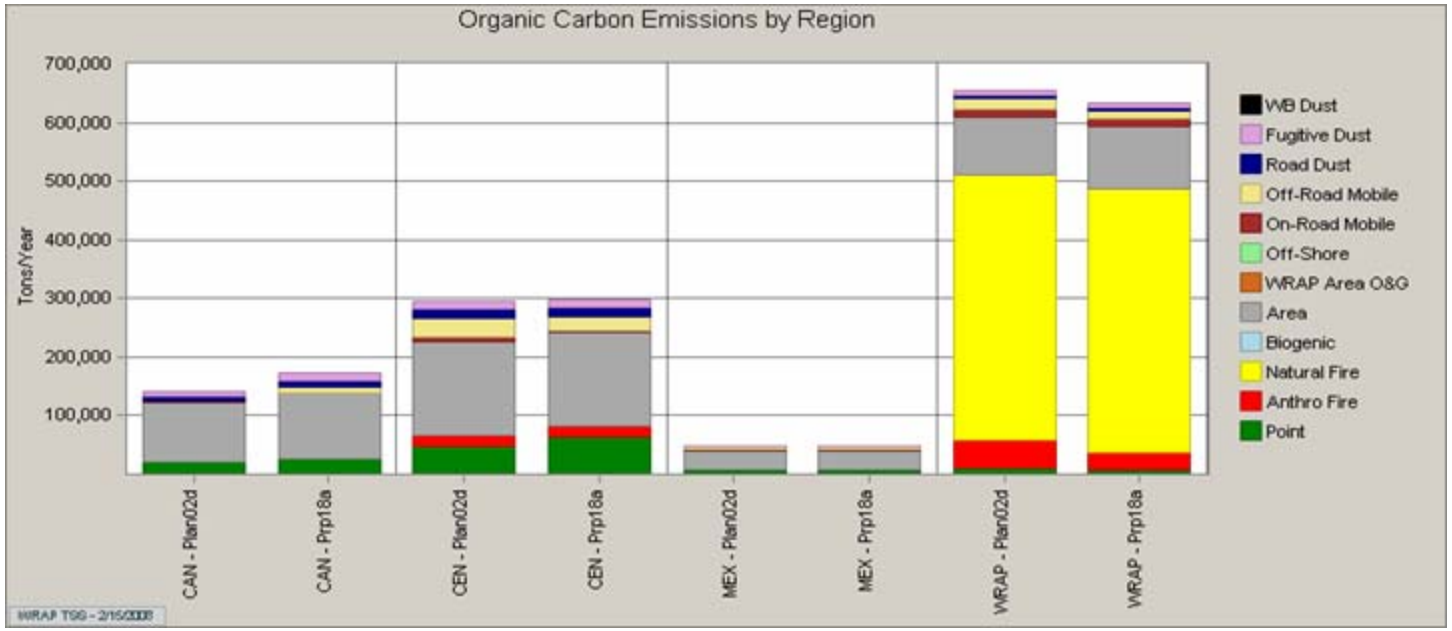
➢*Evaluate urban area emission inventories and monitor changes*

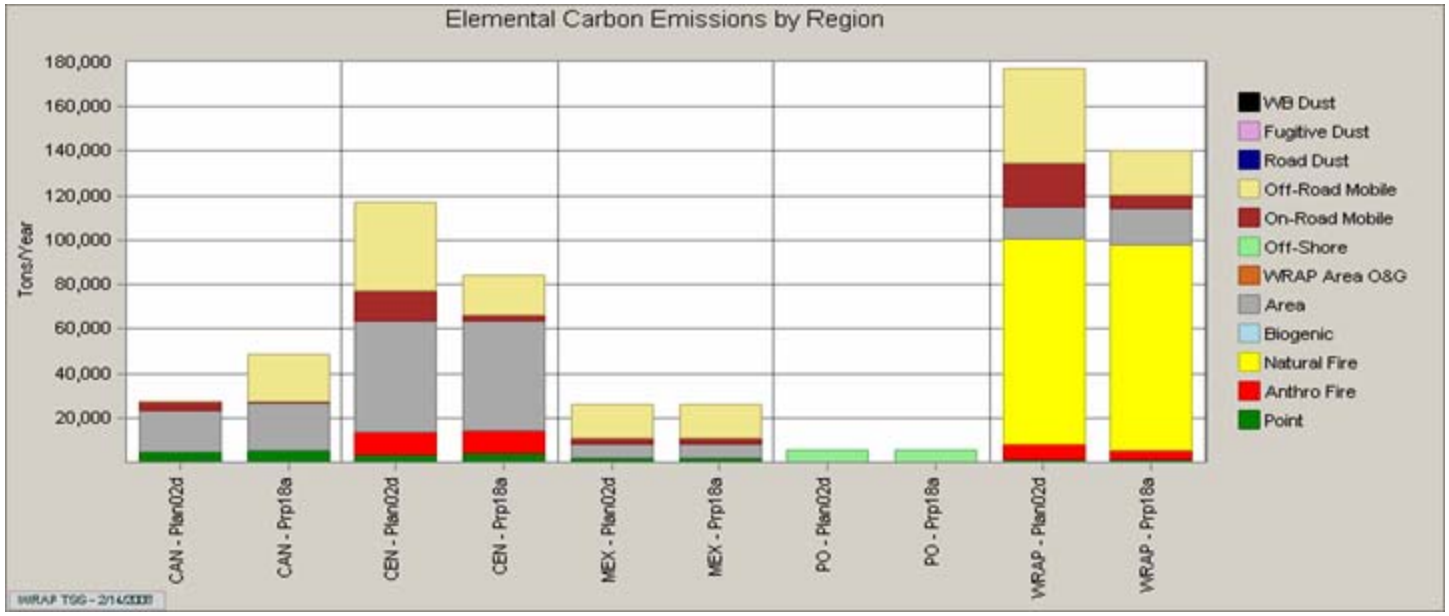



*SCIAMACHY, Summer 2005*

Kim, Frost et al.

# Carbon PM emissions used in WRAP regional haze analysis



# Dust PM emissions used in WRAP regional haze analysis