

Western U.S. Regional Haze analysis and planning program

AAPCA Webinar: The Future of Regional Haze

September 24, 2020

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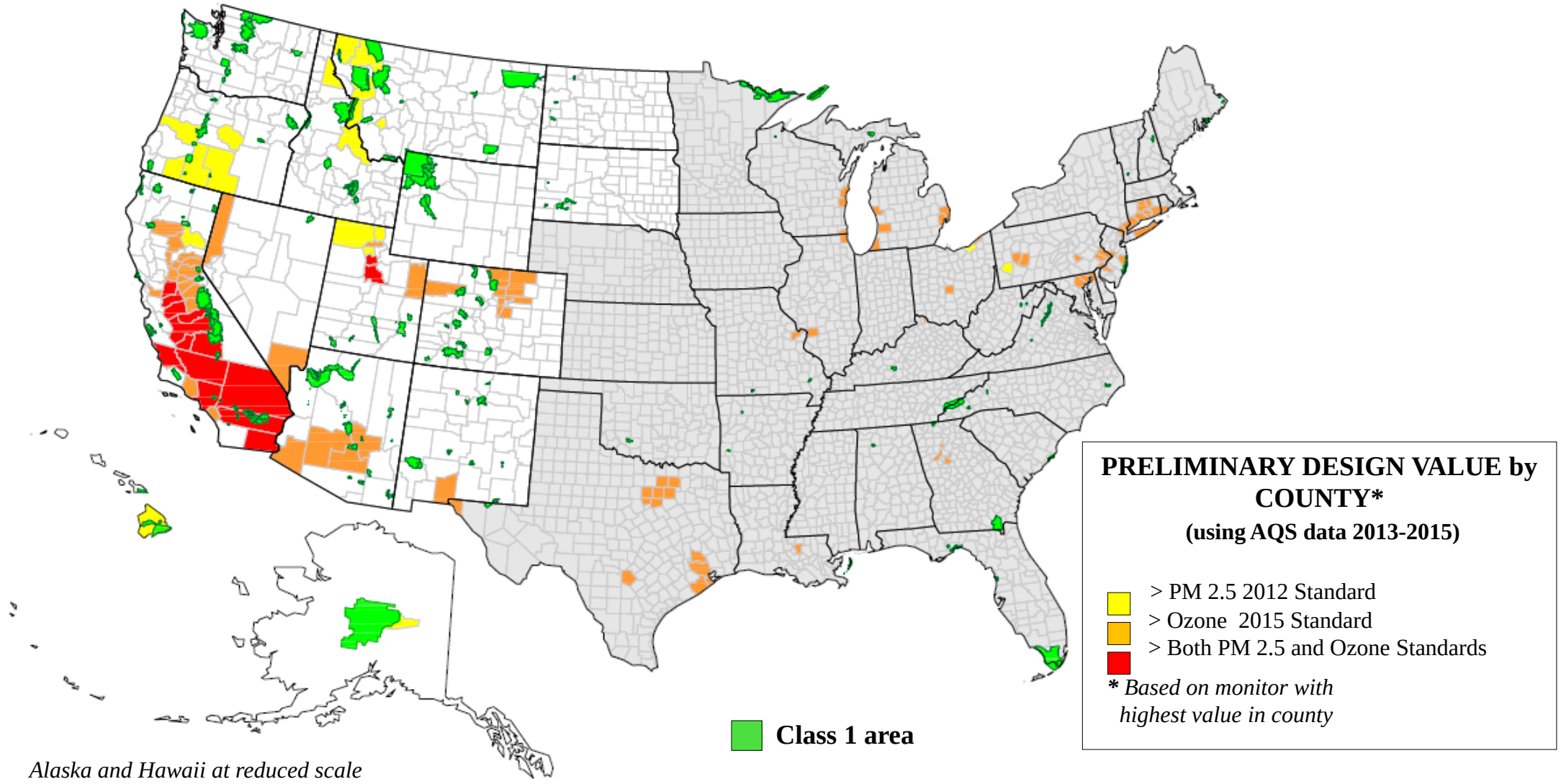
WESTAR
Western States Air Resources Council

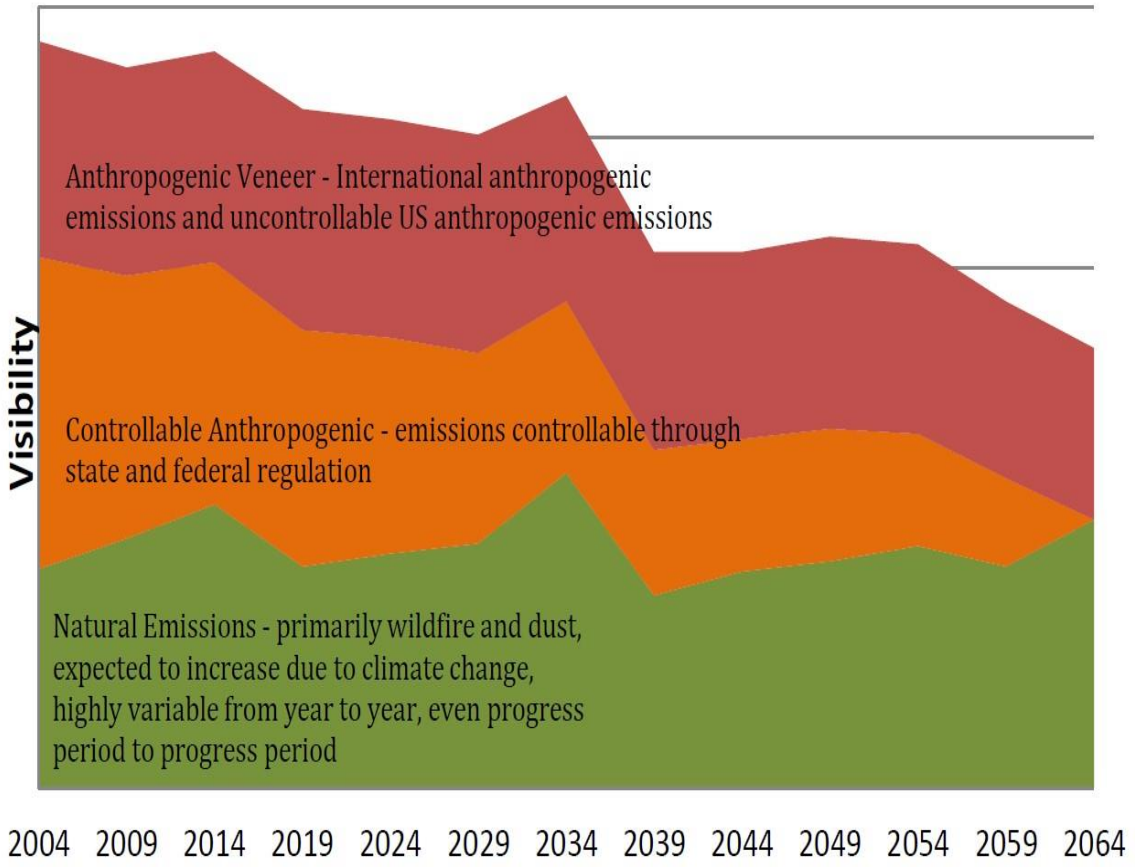
WRAP
Western Regional Air Partnership

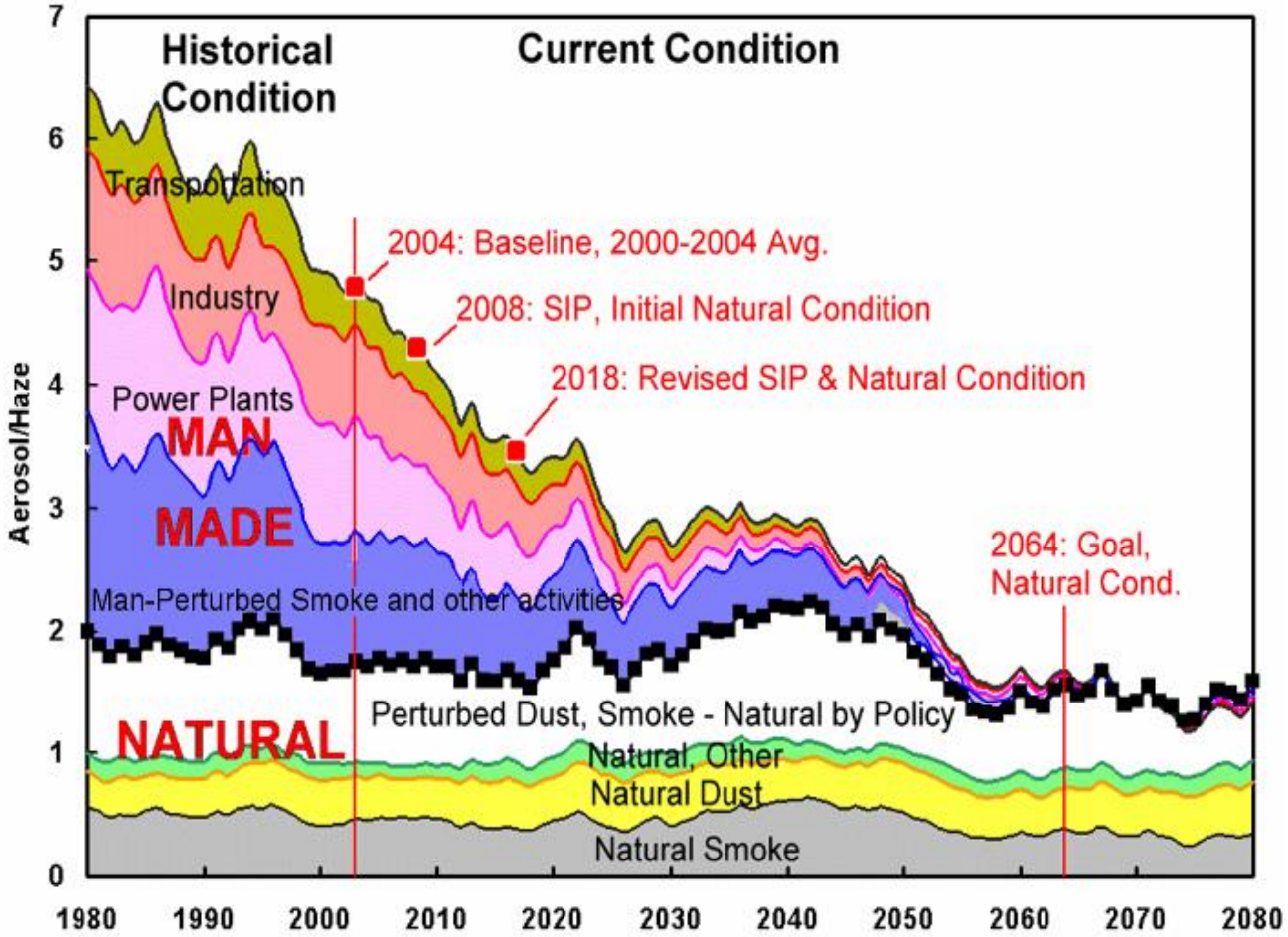
Western Class 1 area Environment



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

Regional Haze program – desired trend in emissions and haze

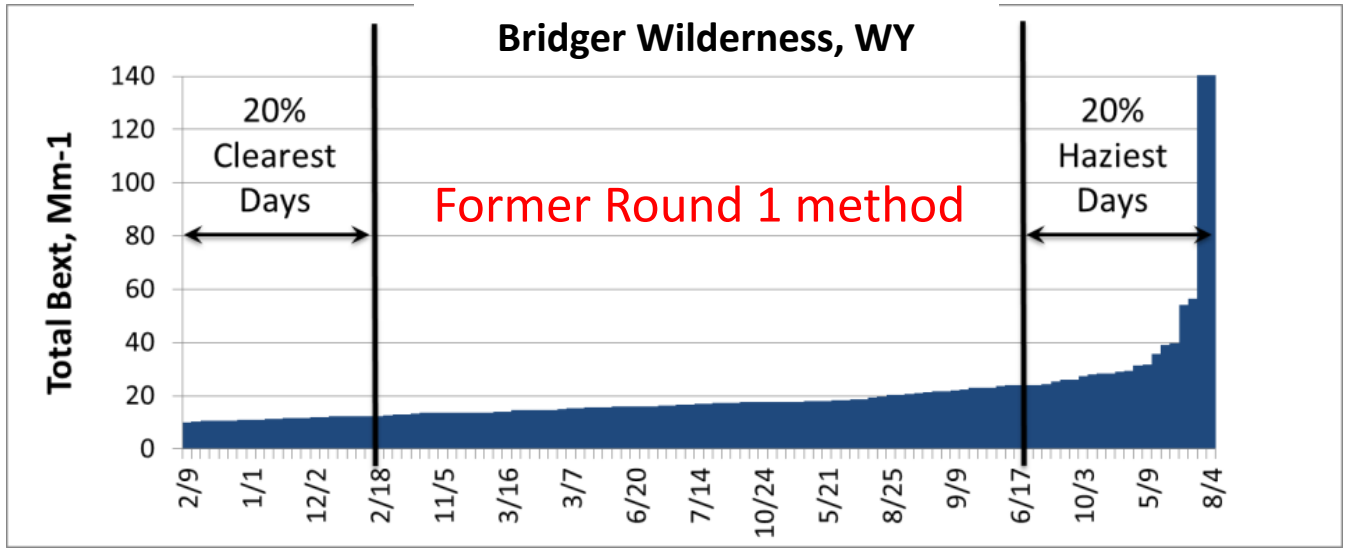


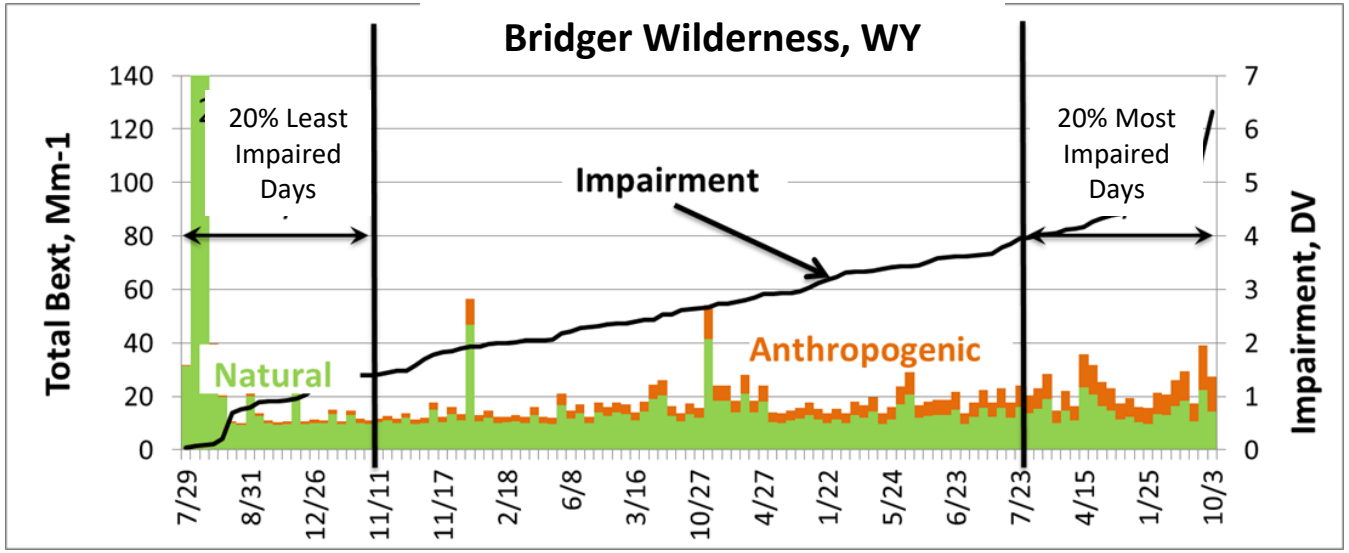


Emissions sources – western U.S. air quality planning

	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.

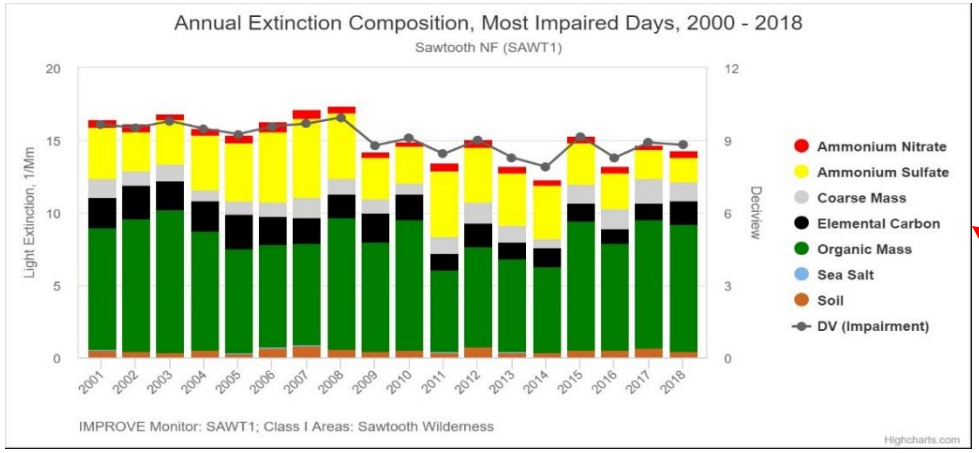


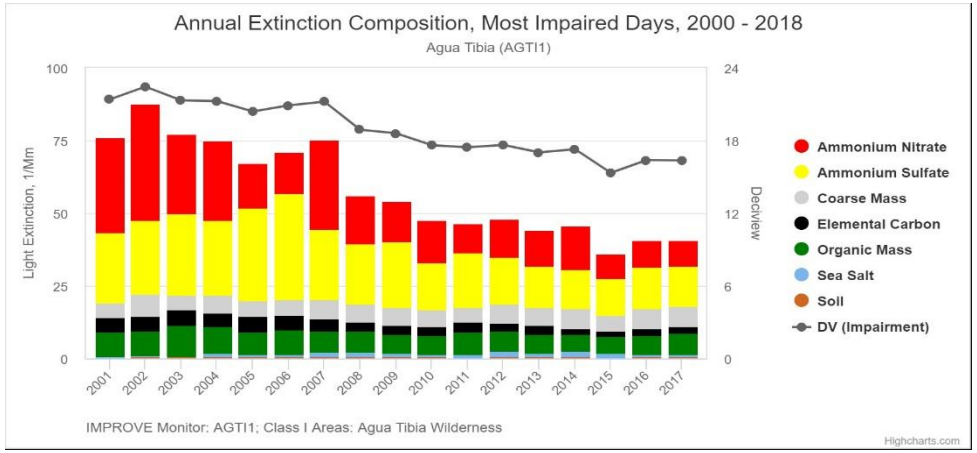


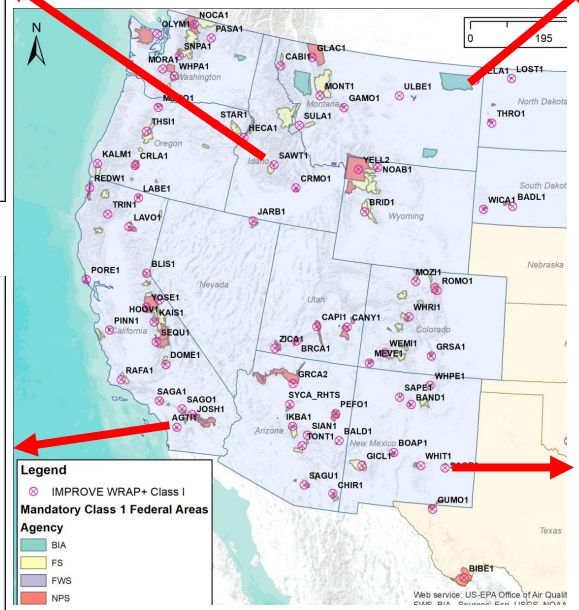
- Sorting by "Most Impaired Days" (MIDs) defined as impaired by anthropogenic sources, intended to be principally from sulfate and nitrate, dramatically shifts the days tracked
- The haziest, smoke-impaired days, are among the least anthropogenically-impaired
- Days with the highest anthropogenic b_{ext} are not necessarily most impaired
- Least impaired days can also be most anthropogenically-impaired
- Assumptions for long-term goal of "natural conditions" important

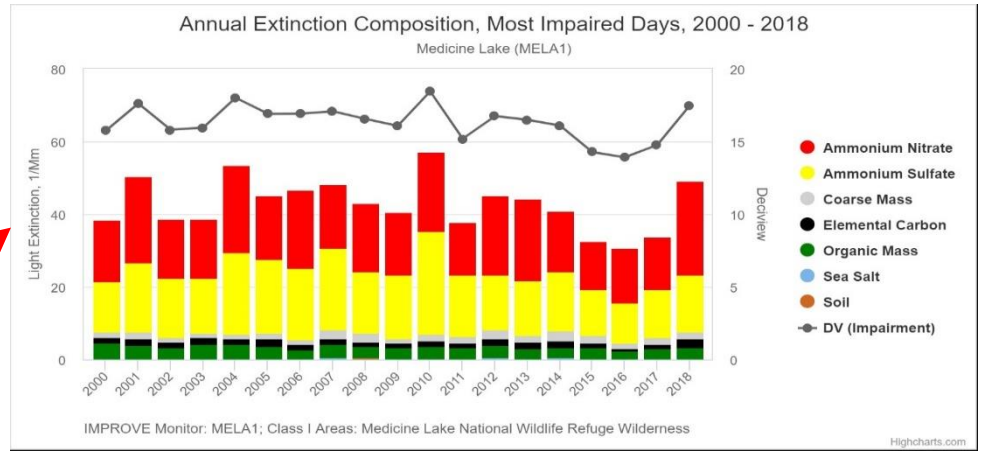
Current Round 2 method (MIDs, lower panel) will be used in Regional Haze plans due July 2021

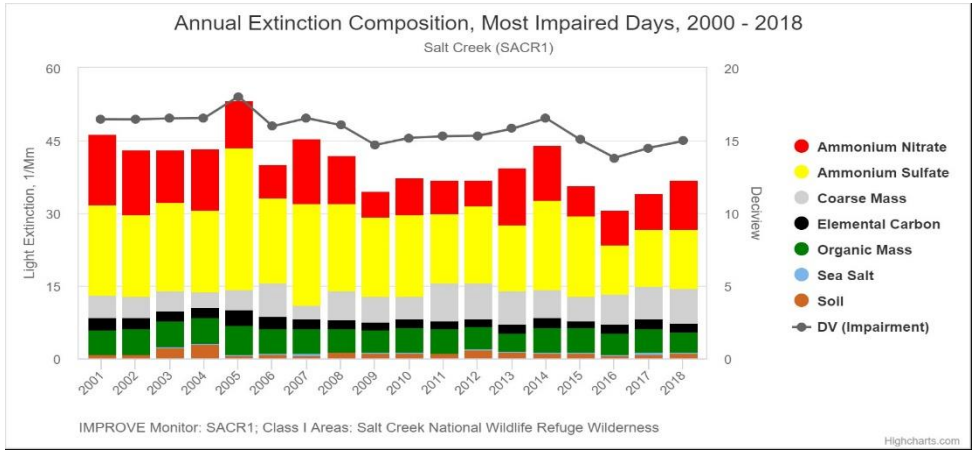
Lots of chemical species variability at Class I areas in the western U.S.



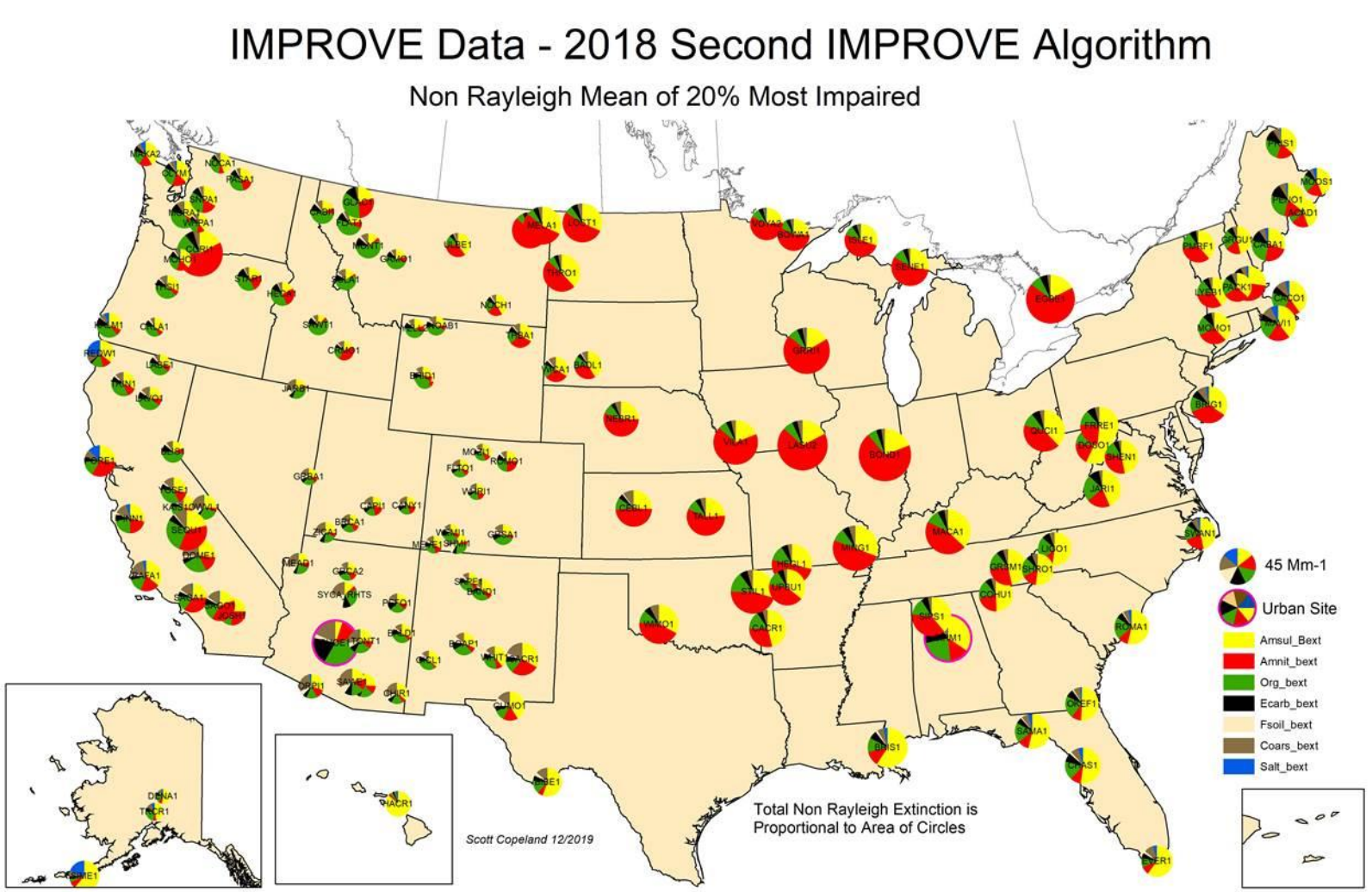








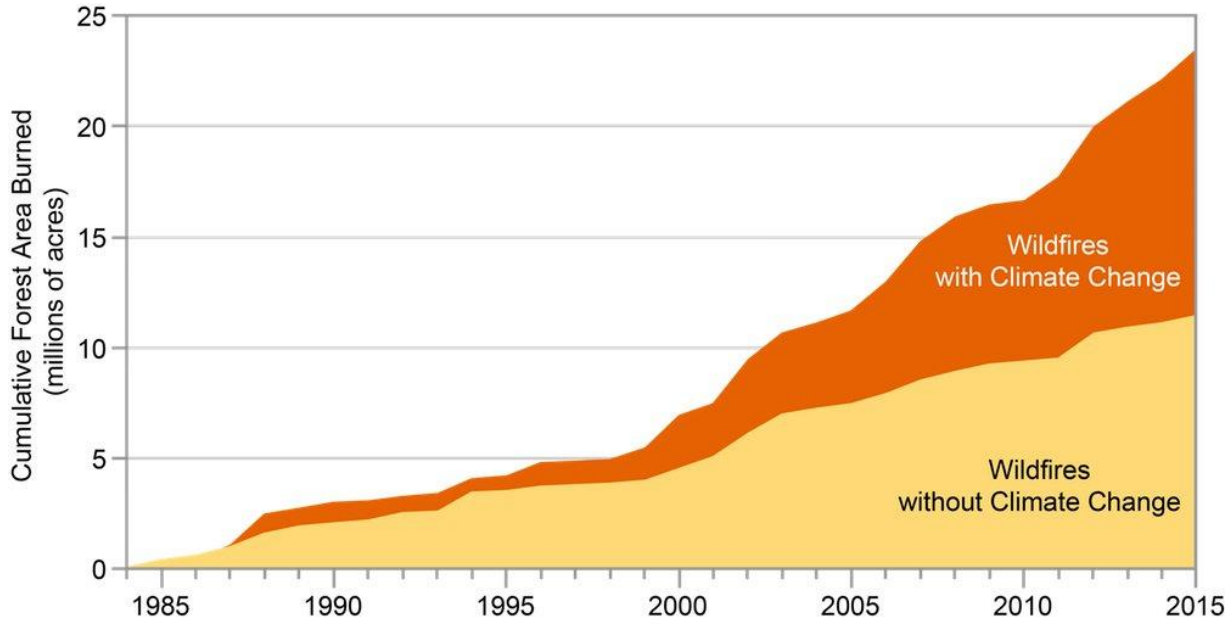
- Differences in magnitude, trends, species mix


IMPROVE Data - 2018 Second IMPROVE Algorithm
Non Rayleigh Mean of 20% Most Impaired
45 Mm-1
Urban Site
Amsul_Bext
Amnit_bext
Org_bext
Ecarb_bext
Fsoil_bext
Coars_bext
Salt_bext
Total Non Rayleigh Extinction is
Proportional to Area of Circles
Scott Copeland 12/2019

and

unplanned natural?! wildfire

planned prescribed fire

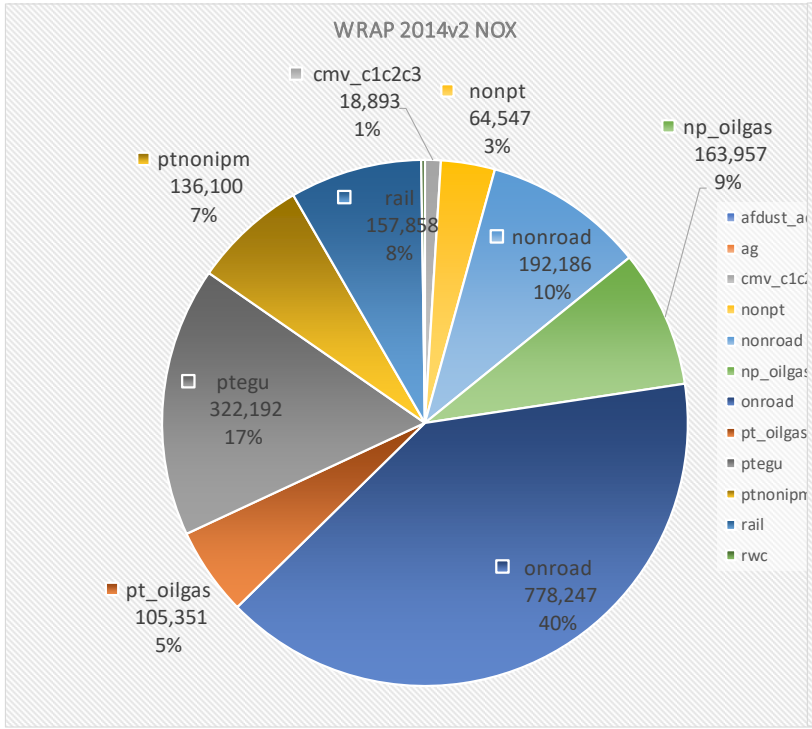


Climate change is driving wildfires in the western U.S., and not just in California

Adapted from Reference #99 in USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

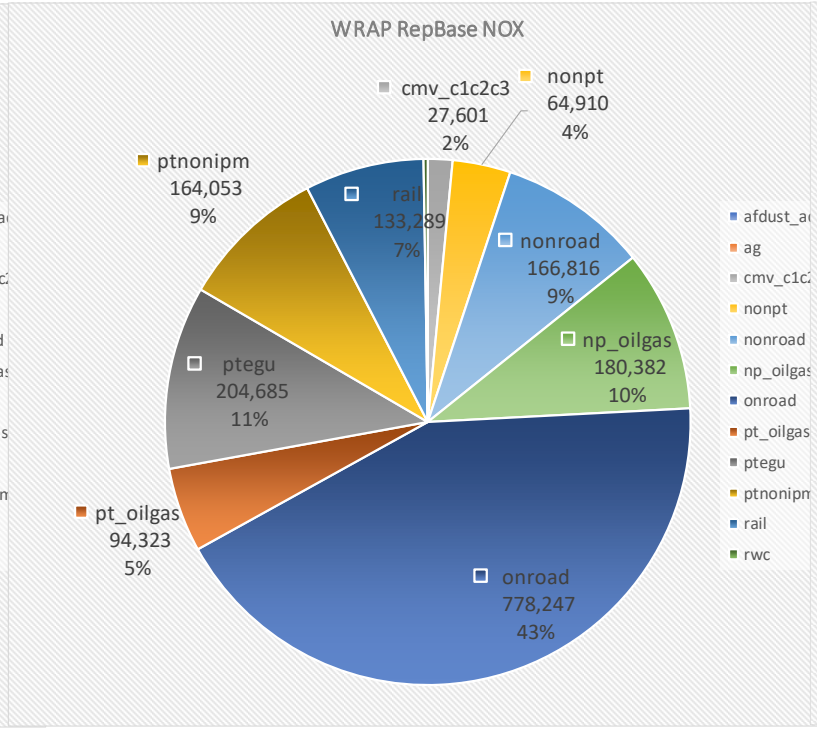
2028OTB vs. RepBase/2014v2 (anthro only) [NOx]

2014v2



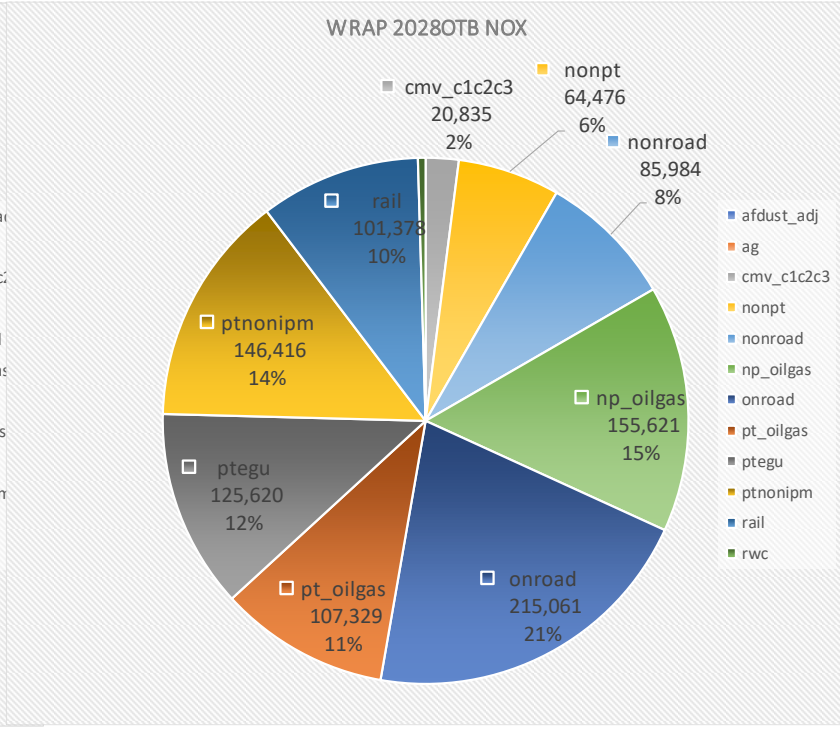
5,110,678 TPY

RepBase



4,619,443 TPY

2028OTB

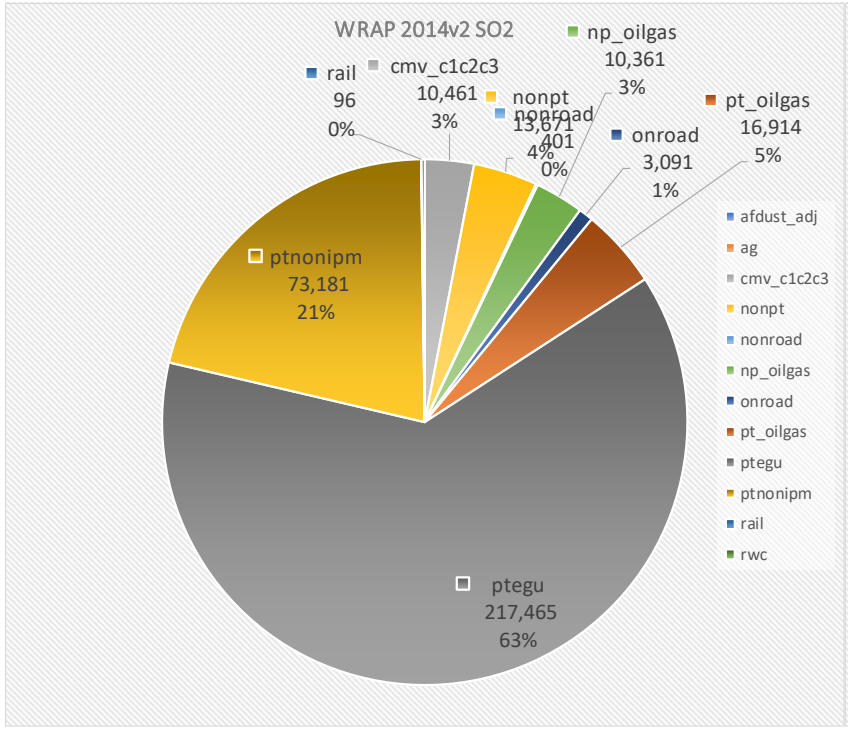


2,360,887 TPY

All WRAP region states except CA, AK and HI

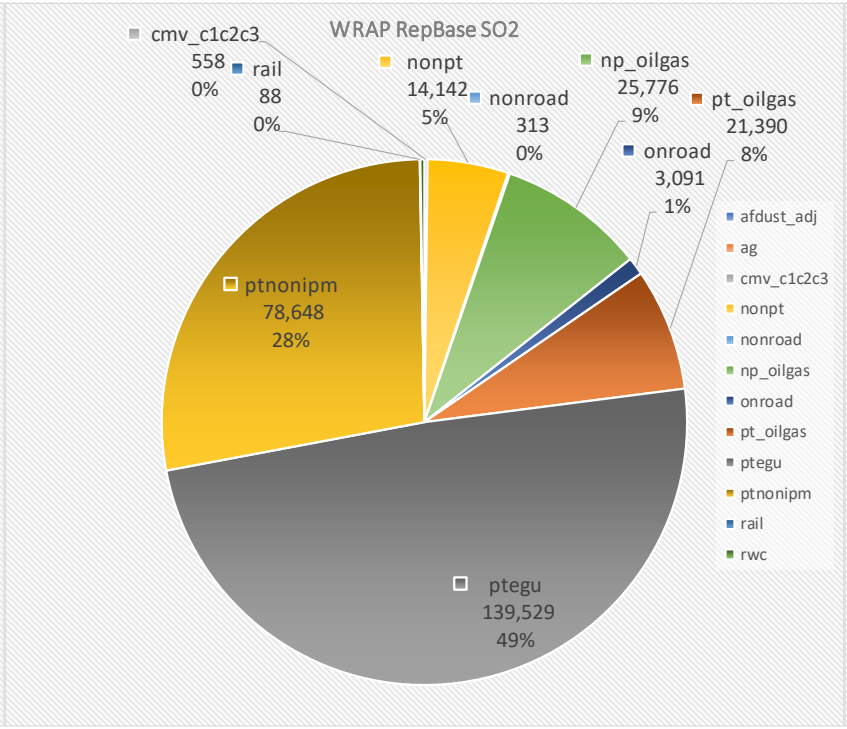
2028OTB vs. RepBase/2014v2 (anthro only) [SO2]

2014v2



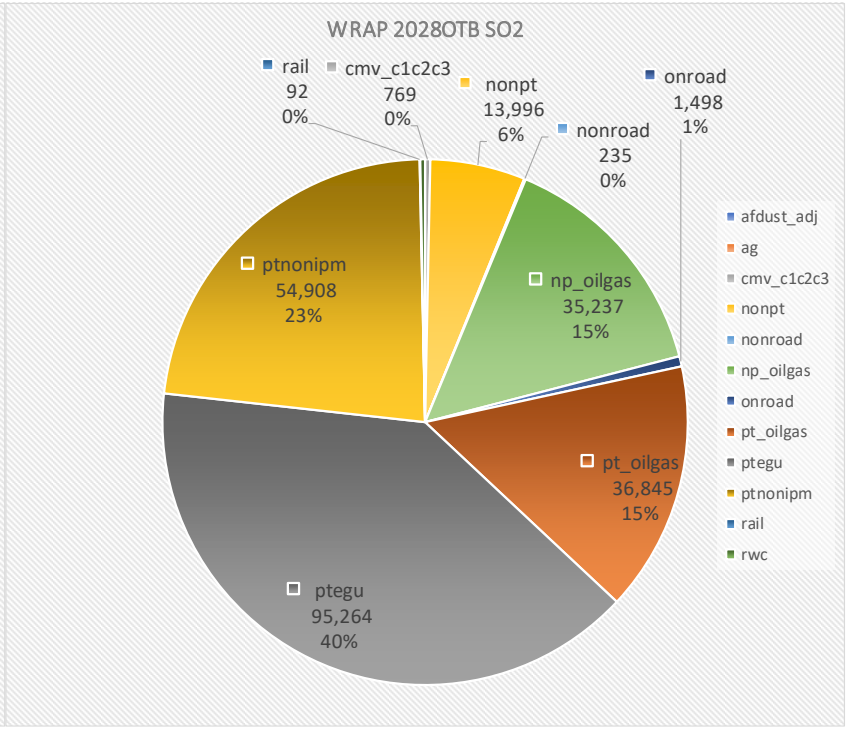
1,325,288 TPY

RepBase



1,007,463 TPY

2028OTB

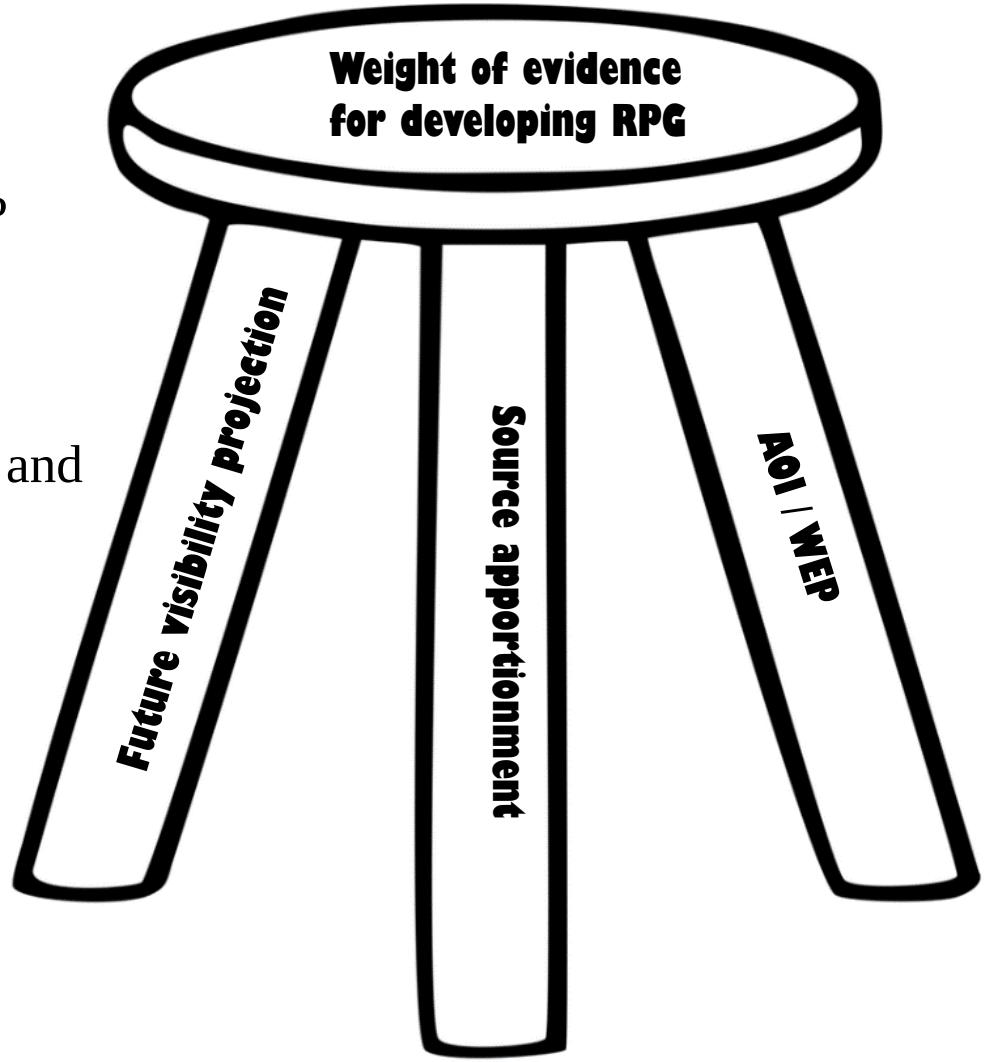


612,918 TPY

All WRAP region states except CA, AK and HI

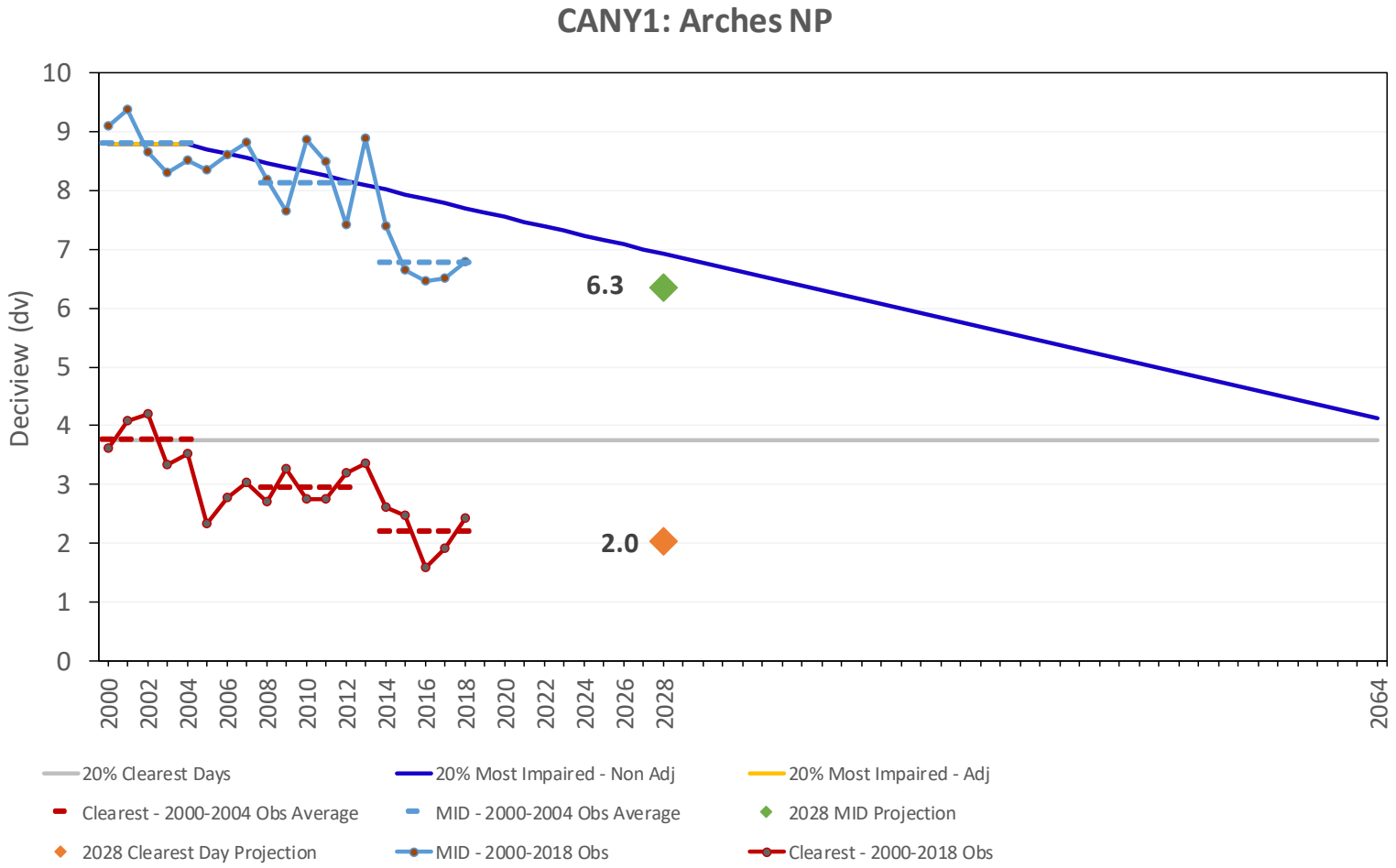
Developing ‘weight of evidence’ with model analyses

- Future visibility projection
  - How does haze respond to changes in future emissions?
- Source apportionment
  - Which states and sectors are contributing to haze?
  - What is the contribution from prescribed wildland fires and international sources?
- Area of influence / weighted emissions potential (AOI/WEP)
  - Which significant emission sources are upwind?

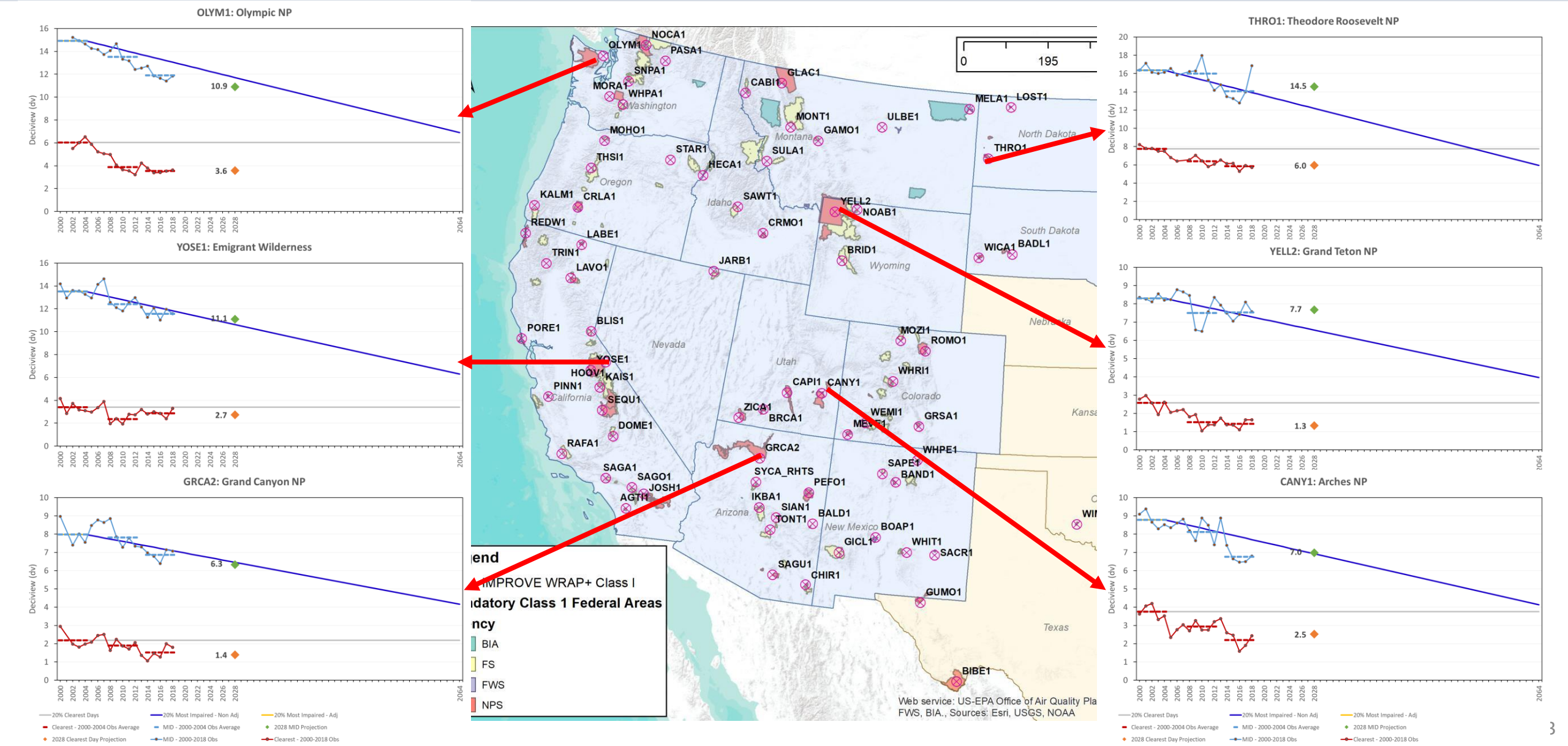


Canyonlands UT – EPA Method using 2014v2/2028OTBb

- 2028 Visibility Projection at Canyonlands
  - Most Impaired Days (MID) Glidepath from 2000-2004 to Natural conditions in 2064
  - No worsening in visibility from 2000-2004 20% Clearest Days



2028 most impaired and clearest projections and IMPROVE data record



The Future of Regional Haze Analysis in the West

- Continued state/local/tribal collaboration on emissions data is critical
- As anthropogenic emissions decline, where will future reductions come from?
- How does the west address environmental justice in the regional haze program?
- What about the myriad of climate change impacts to regional haze?
- Are the modeling tools reaching their limits of utility?
- Should we focus on an emissions glide slope instead of a modeled glide slope?
- How can states effectively manage/reduce emissions in and near large parks with gateway communities and mobile sources that may have a significant impact at monitors?

Photo Courtesy of Rocky Mountain National Park

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