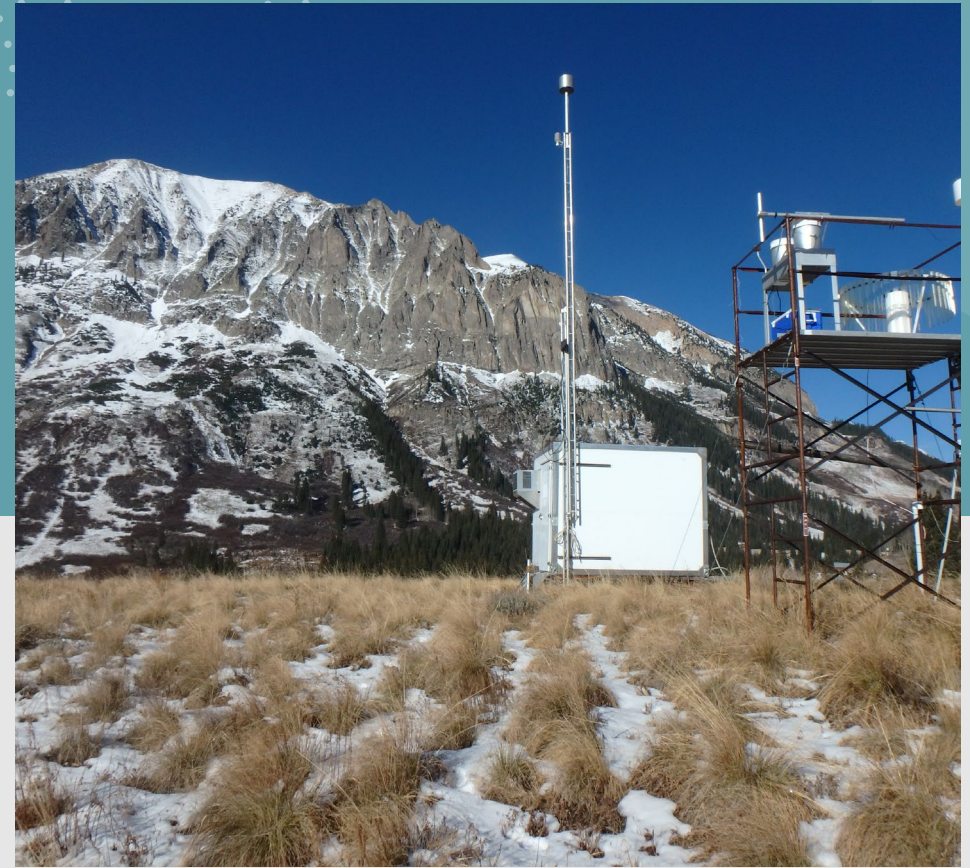


EPA's Office of Atmospheric Programs (OAP) Update



High elevation CASTNET + NADP wet deposition
monitoring site Gothic, CO

National Ambient Air Monitoring Conference
August 23, 2022

Melissa Puchalski, US Environmental Protection Agency

Outline

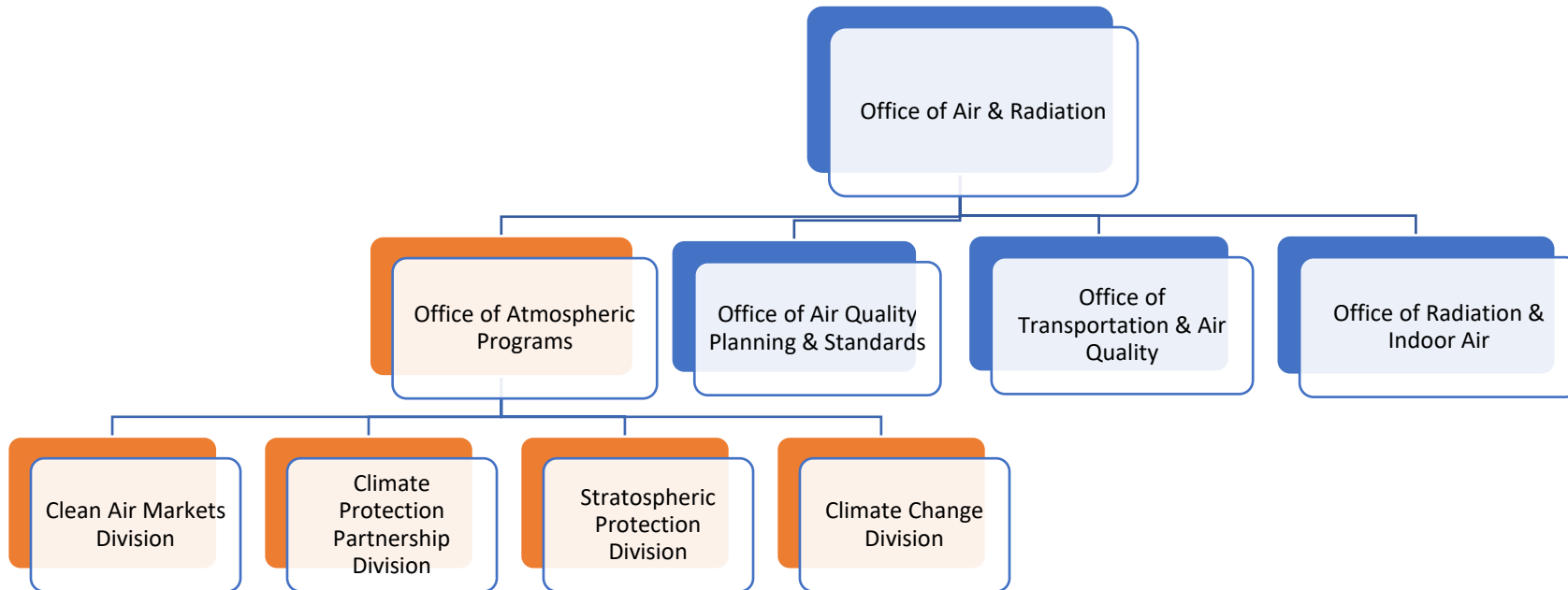
- **OAP Organization**
- **OAP Monitoring Programs**
- **New Measurements to Address Emerging Environmental Issues**
- **Fiscal Impacts on Rural Monitoring Programs**



EPA/NPS co-located CASTNET sites at Rocky Mountain National Park, CO

OAP's Organizational Chart

Mission: To reduce harmful air pollution and protect the global environment

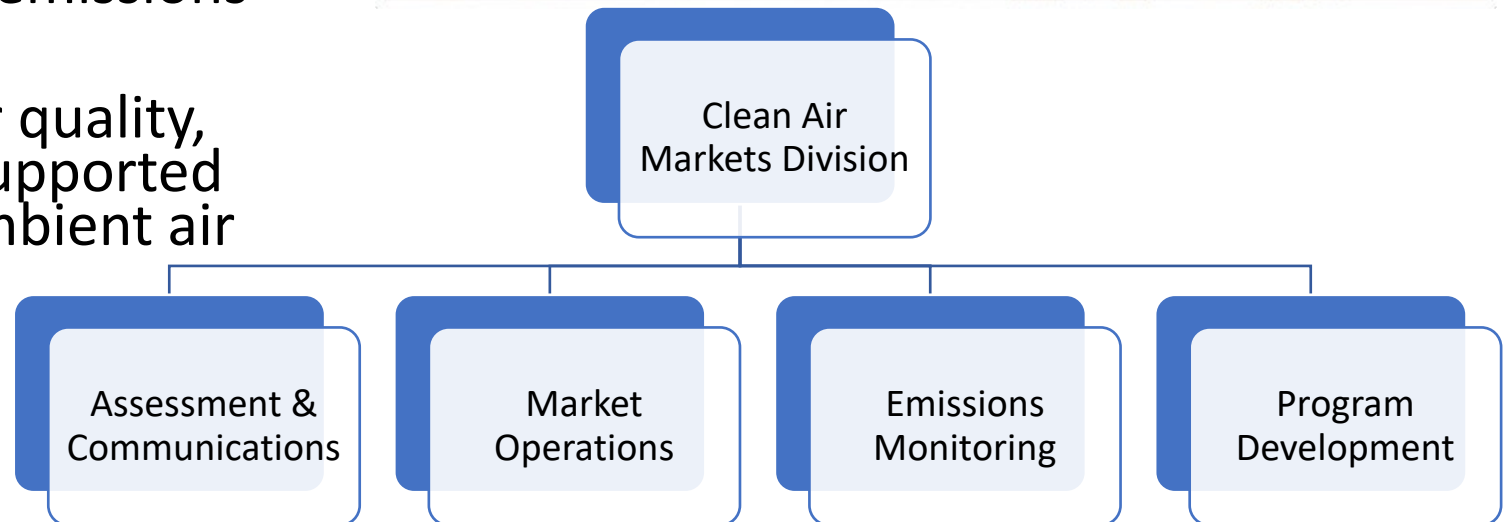


Areas of Expertise include:

- *Emissions accounting and electronic reporting*
- *Environmental monitoring and atmospheric chemistry*
- *Energy and economic modeling*
- *Impact analysis to support rulemakings*
- *Climate and stratospheric ozone science*
- *Partnership programs*

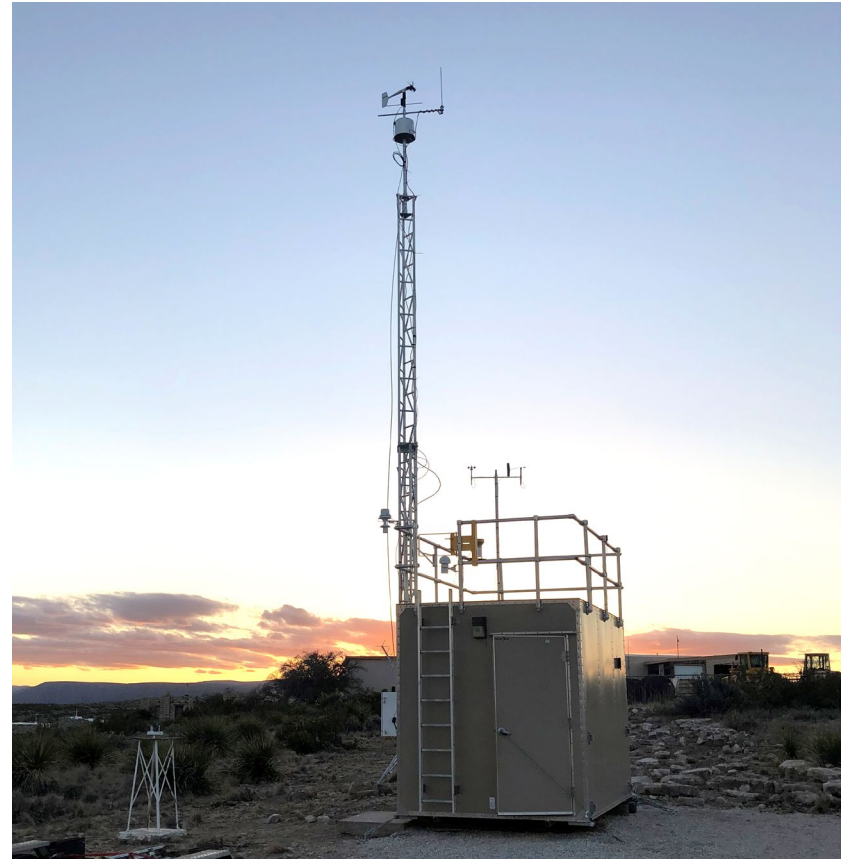
OAP/Clean Air Markets Division

- Implementation of power plant emission reduction programs:
 - Acid Rain Program
 - Cross-State Air Pollution Rules for ozone and PM NAAQS
 - Mercury and Air Toxics Standards
- Online tools for reporting, data, analysis and visualization of emissions and implementation data
- Assessment of emissions, air quality, and environmental results supported by CAMD's emissions and ambient air monitoring programs



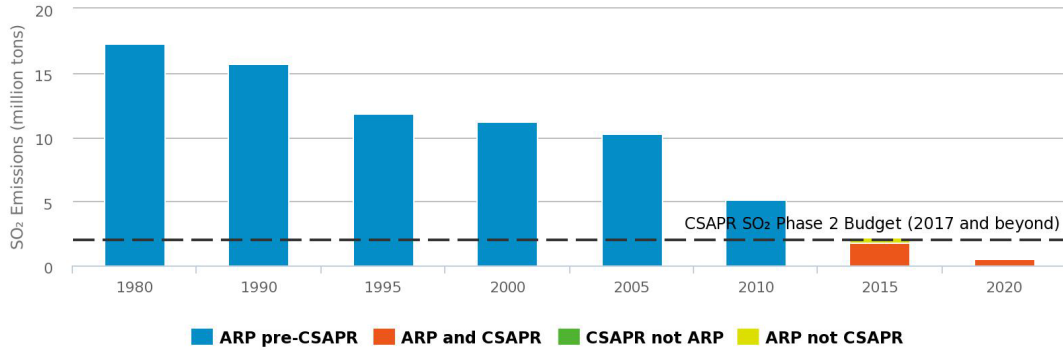
Clean Air Markets Division (CAMD)

- Manages **OAP's environmental (air quality, surface water, and deposition) monitoring programs** to:
 - Develop and implement innovative, transparent, adaptive, results-driven regulatory programs
 - Evaluate human and environmental health impacts under current and future emission reduction programs
 - Assess program effectiveness using high-quality, consistent data
- CAMD's air quality programs provide data in rural areas/communities, on tribal lands, and within National Parks and other Class I areas to improve understanding of atmospheric transport, secondary aerosol formation and emerging environmental issues



Connection between Policy and Environmental Results

SO₂ Emissions from CSAPR and ARP Sources, 1980–2020

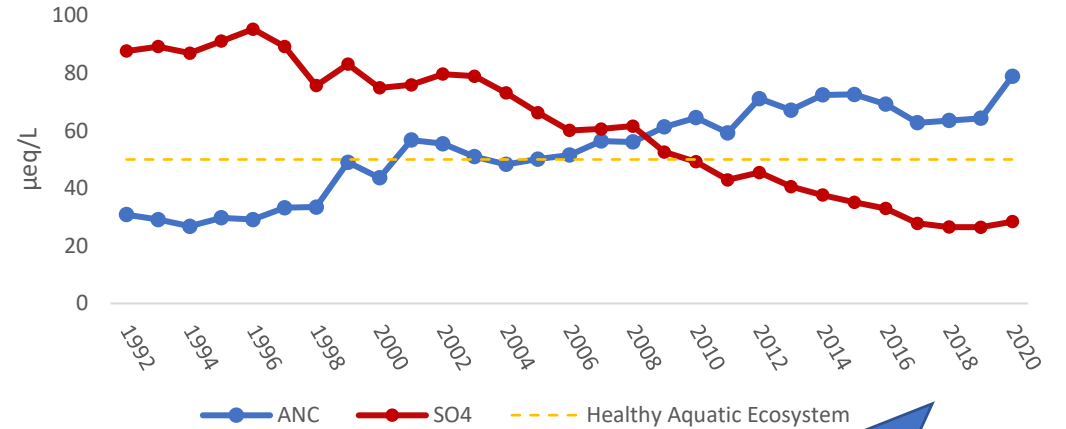


Notes:

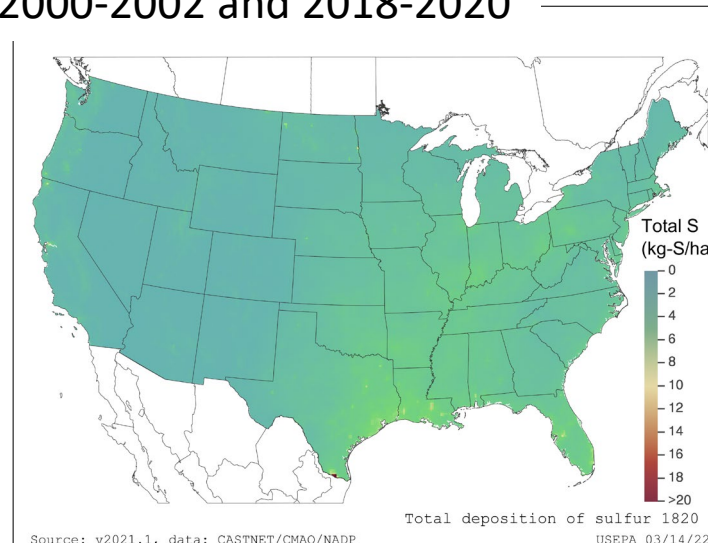
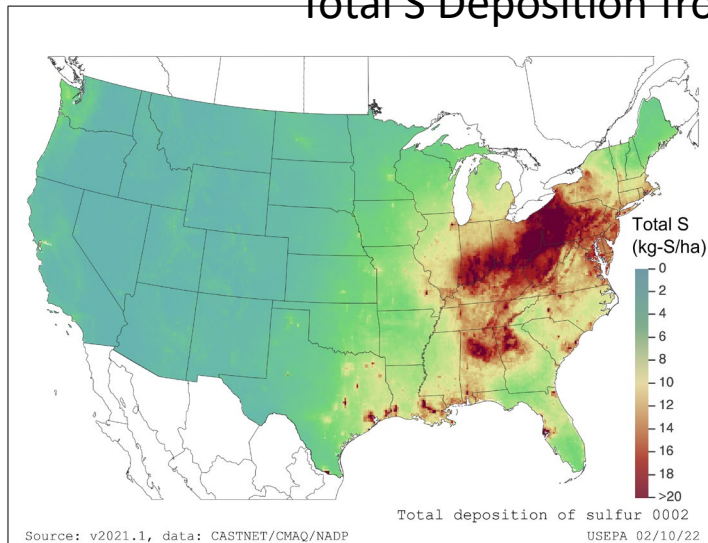
- SO₂ values are shown as millions of tons.
- The data shown here reflect totals for those units required to comply with each program in each respective year. This means that the CSAPR-only SO₂ program units are not included in the SO₂ data prior to 2015.
- There are a small number of sources in CSAPR but not in the ARP. Emissions from these sources comprise about 1 percent of total emissions and are not easily visible on the full chart.

Source: EPA, 2021

Trends in Sulfate and Acid Neutralizing Capacity (ANC) from Big Hope Pond, NY

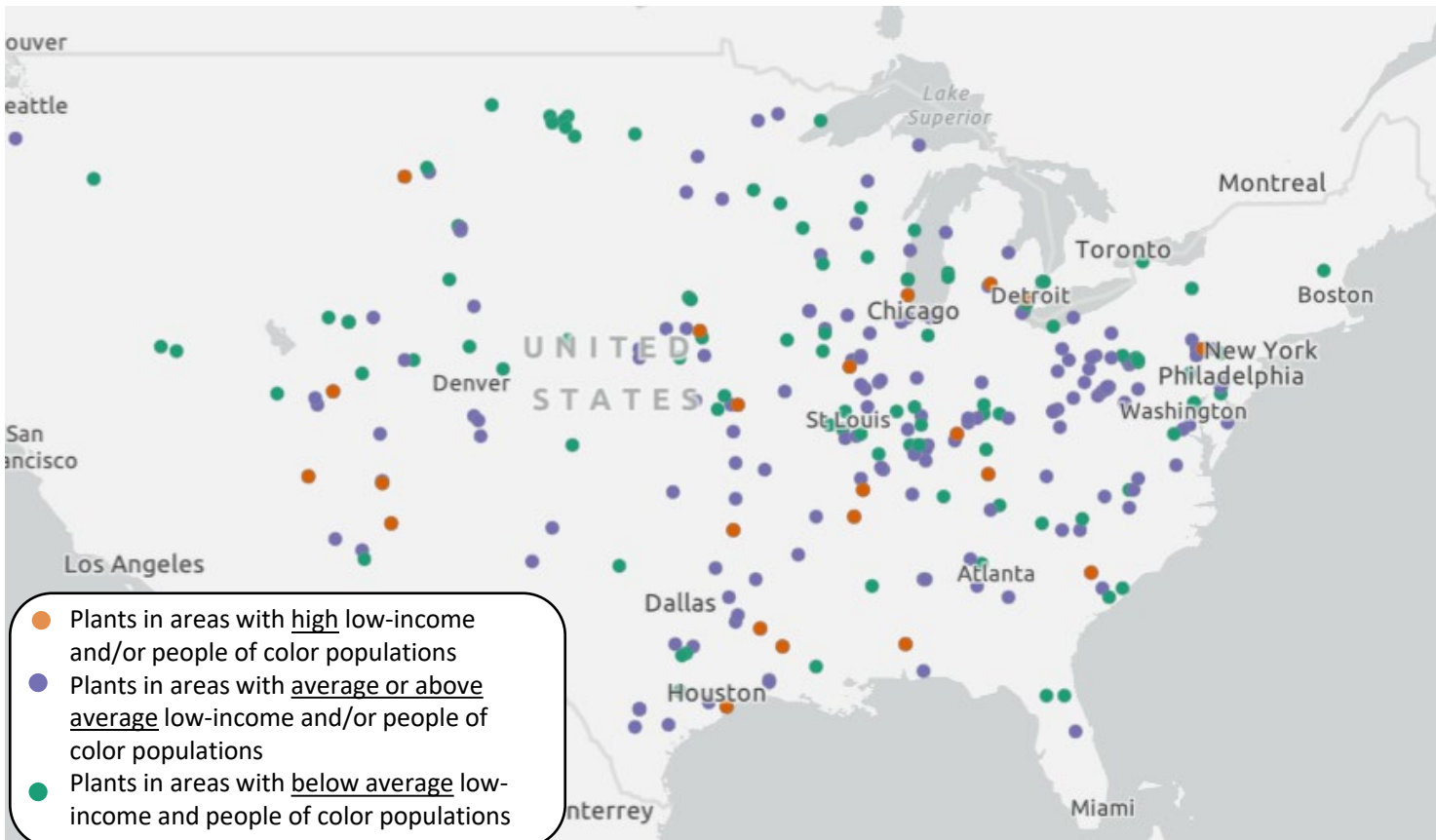


Total S Deposition from 2000-2002 and 2018-2020



OAP's emissions & environmental monitoring data provide scientific accountability for policy implementation

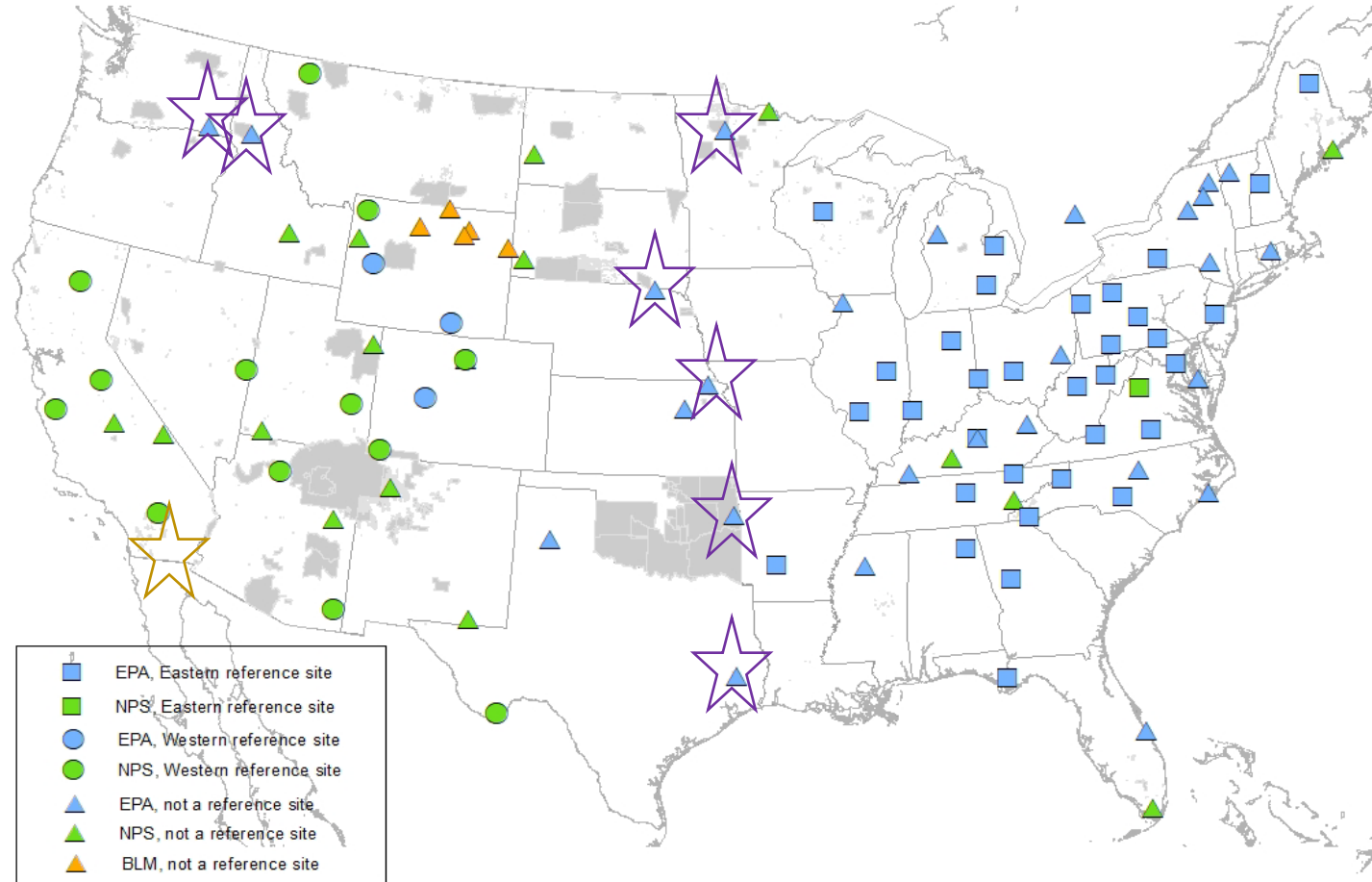
Enhanced Portfolio: Climate and Environmental Justice



- Increased focus on evaluating how CAMD emission reduction programs and monitoring networks can help inform climate policy and assessments
- Power Plants & Neighboring Communities – combines power plant emissions data with demographic information to help identify a community’s potential vulnerability to environmental concerns
 - Tool shows power plants (all plants supplying electricity to the grid) located in or near communities with one or more of the 6 key demographics at or above the 80th percentile nationally

Ambient Air Quality Monitoring

- What is CASTNET
 - Rural ambient air quality monitoring network measuring weekly concentrations of reactive nitrogen, sulfur, base cations, chloride and hourly ozone
 - Program is supported by EPA/OAP, National Park Service (NPS), and Bureau of Land Management Wyoming State Office (BLM)
 - Operations and laboratory services supported through EPA and NPS/BLM contracts
 - Quality Assurance program – follow the requirements in 40 CFR, laboratory is accredited, robust independent audit program
- What makes CASTNET unique from SLAMS?
 - Provides air quality and atmospheric deposition results in **rural communities**
 - **Only network providing data to evaluate deposition fluxes** and subsequent environmental impacts (critical load exceedances)
 - OAP works directly with tribes, EPA Regions and OAR IO to **build tribal monitoring capacity**
 - EPA's contract is used to support S/L/T agencies in implementing and improving their regulatory monitoring programs

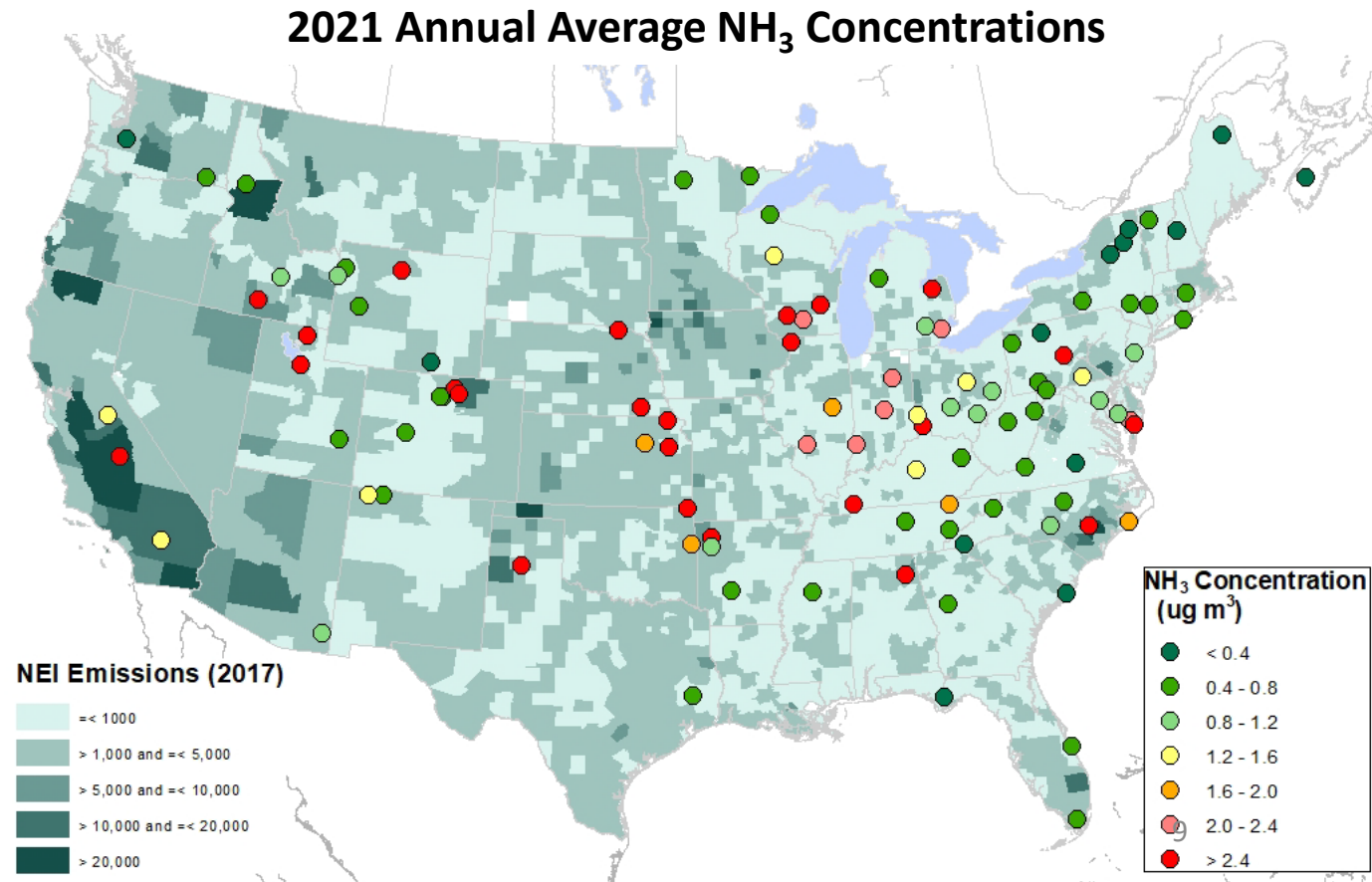


Wed.
8am

Addressing Air Quality Collaboratively

- **National Atmospheric Deposition Program (NADP)** is a cooperative hosted by the Wisconsin State Laboratory of Hygiene at the University of Wisconsin-Madison
 - Supported by federal, tribal, state and local agencies, universities, NGOs, and private companies
 - Monitoring changes in pollutants (e.g., nitrogen, sulfur, pH) in precipitation since 1978
- Five sub-networks with sites primarily located in rural areas
 - **National Trends Network (NTN)** – 30 sites supported by OAP
 - Mercury Deposition Network (MDN)
 - **Ammonia Monitoring Network (AMoN)** – 71 sites supported by OAP
 - Atmospheric Mercury Network (AMNet)
 - Mercury Litterfall Network (MLN)
- Program provides a forum for scientific research including
 - critical loads,
 - pollutant loadings to urban landscapes,
 - measurement model fusion techniques, and
 - addressing global assessment of mercury concentrations and deposition

- **AMoN is the only source of routine, consistent NH_3 concentrations in the United States**
 - Increasing trends
 - High spatial variability
 - Precursor to PM formation in rural and urban areas

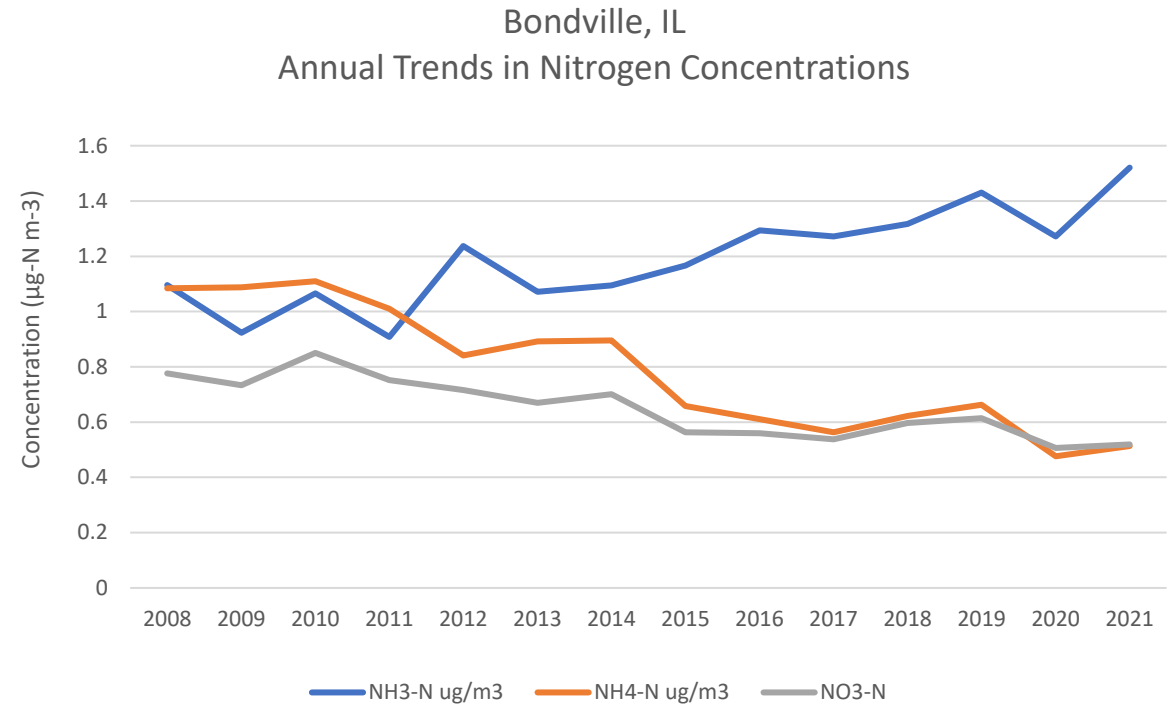
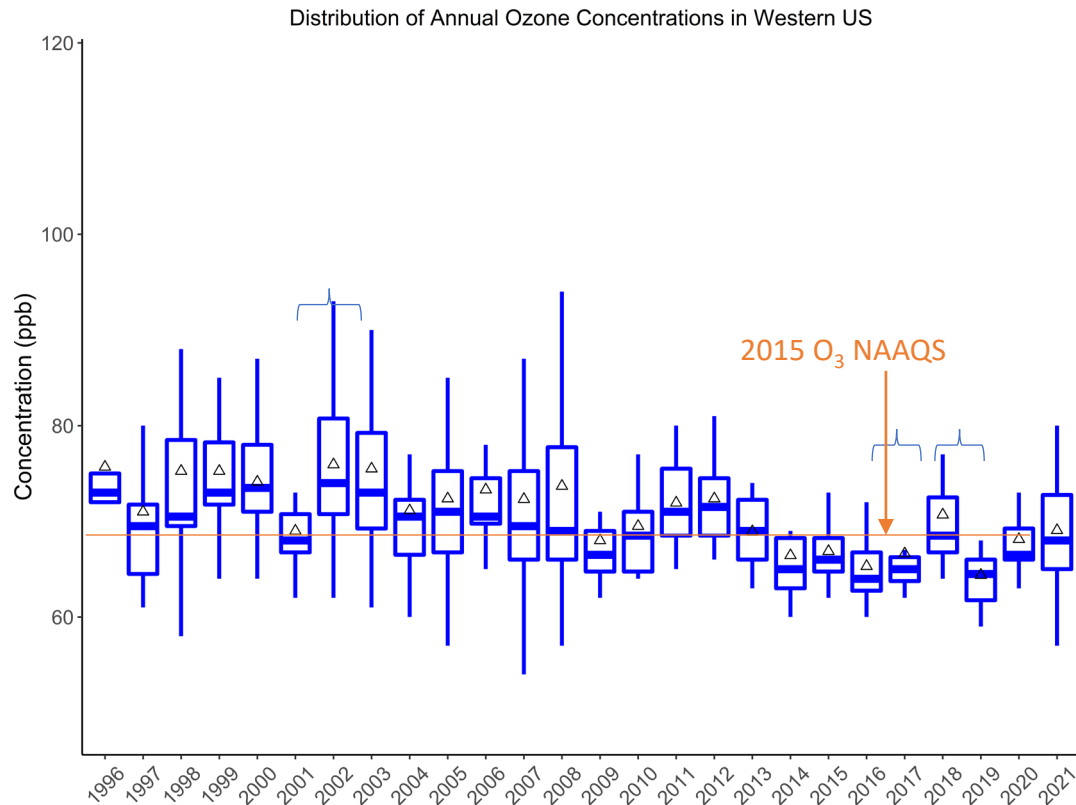


Addressing Persistent and New Air Quality Issues

Wed.
3:30pm

- CASTNET sites are uniquely situated in areas impacted by area emission sources (e.g., agriculture, burning)
- Oil & gas impacts on O₃
 - VOCs and NO_y
- Wildfire impacts

- Increasing gaseous reduced nitrogen concentrations
 - Driver for PM formation
 - Gas-particle partitioning is important for improving model performance
 - Eutrophication & linkages to HABs



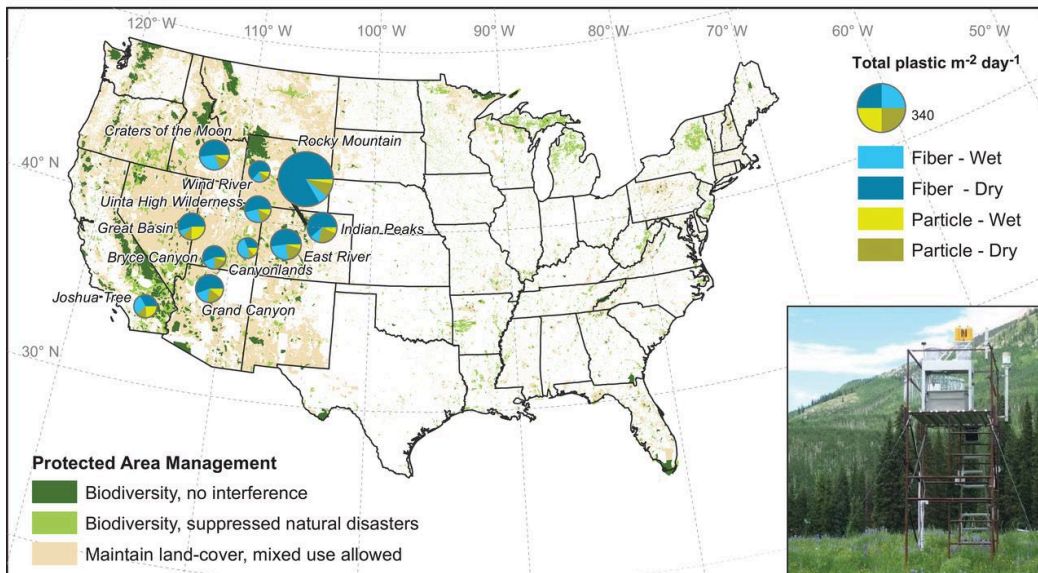
CASTNET and NADP address emerging scientific questions

Wed.
8:40am

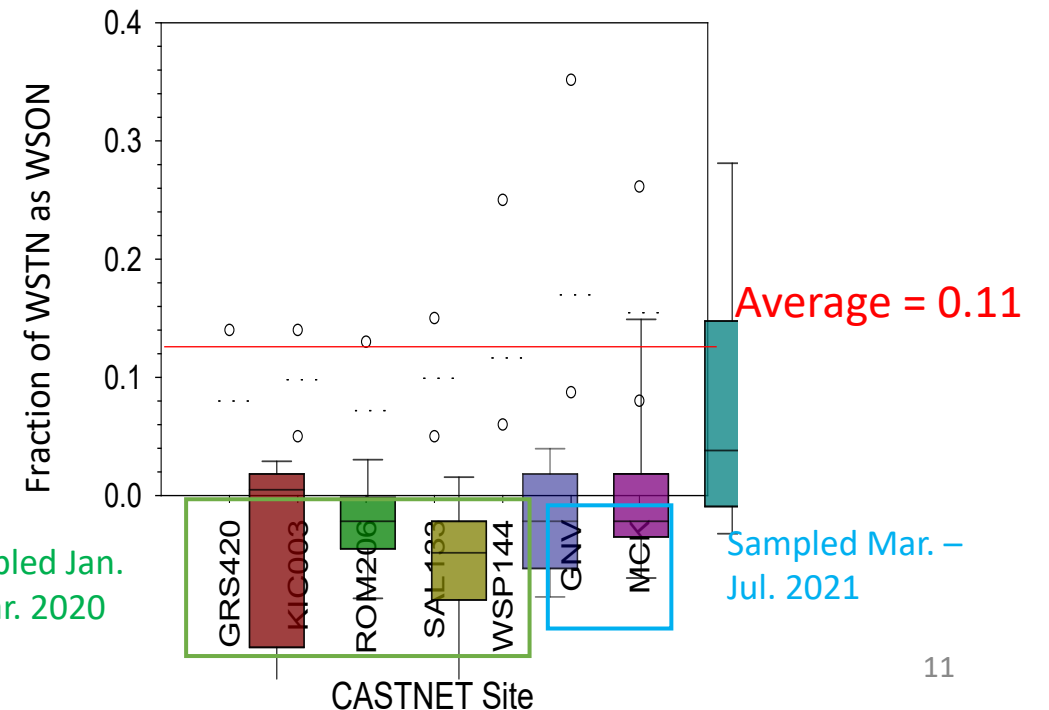
- **Black Carbon** in Precipitation (Dr. Ross Edwards, U. of WI & NADP)
 - 12-month study of BC in precipitation at 13 existing NADP/NTN sites (August 2022 – July 2023)
 - Spatial and temporal distribution of BC in precipitation – thought to be the main removal process
- **Microplastics** – found in 98% of wet and dry deposition samples collected in protected areas in the western US
 - Type and size of microplastic pollution
 - Fate and transport to understand aquatic and terrestrial impacts

- **Organic N** constitutes ~25% total N budget globally but sources, concentrations, deposition, and ecological impacts are poorly understood
- Total N/Water Soluble Organic N Study – develop robust methods to constrain spatial and temporal variability of ON and incorporate routine measurements into CASTNET

Average Wet + Dry Plastic Deposition in 2018



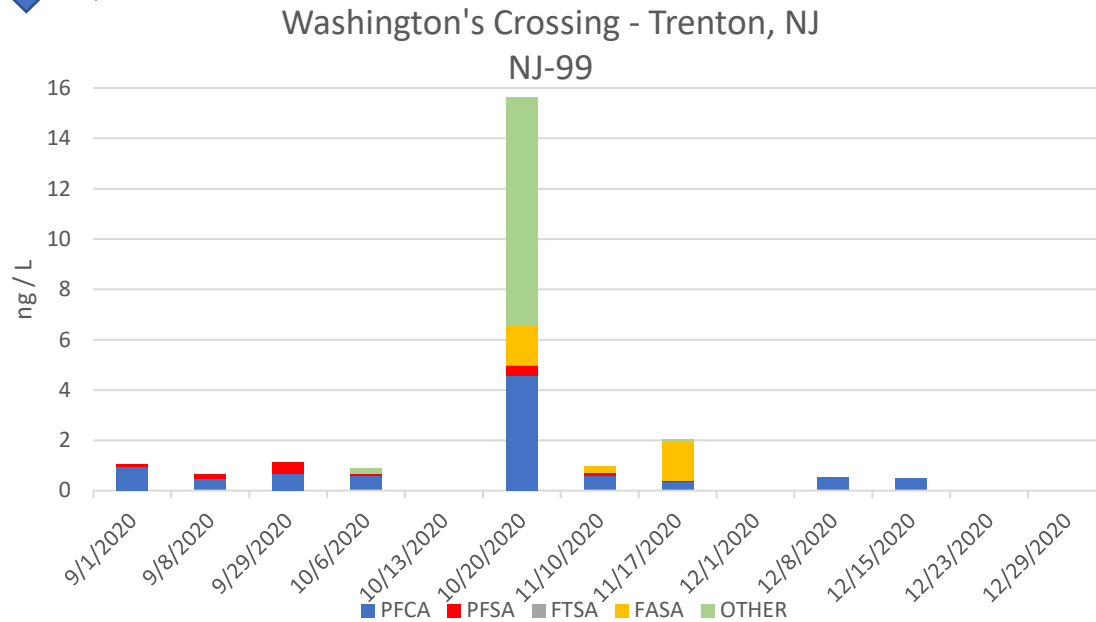
Brahney et al., 2020



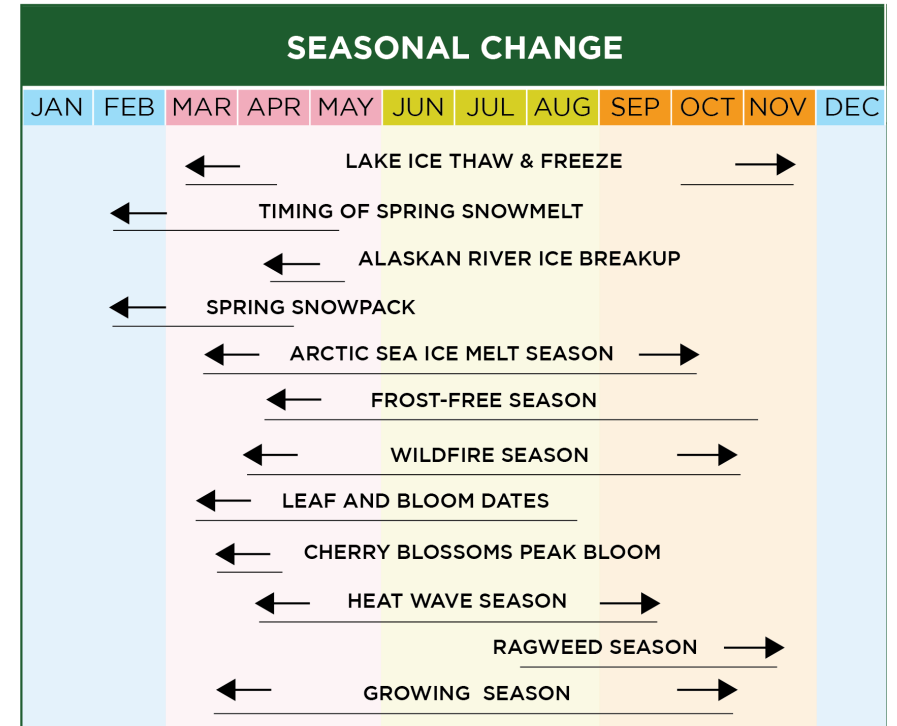
CASTNET and NADP address emerging scientific questions

Wed.
3:30pm

Per- and polyfluoroalkyl substances



- Pilot study to assess fate, transport, and transformation of **PFAS compounds** in precipitation (ORD, WSLH, OAP, NY, NJ, ME, Kickapoo Tribe, WI DNR)
- 2020 precipitation-weighted concentrations and fluxes will be released this fall
- Interest in understanding total loadings to drinking water and other aquatic systems

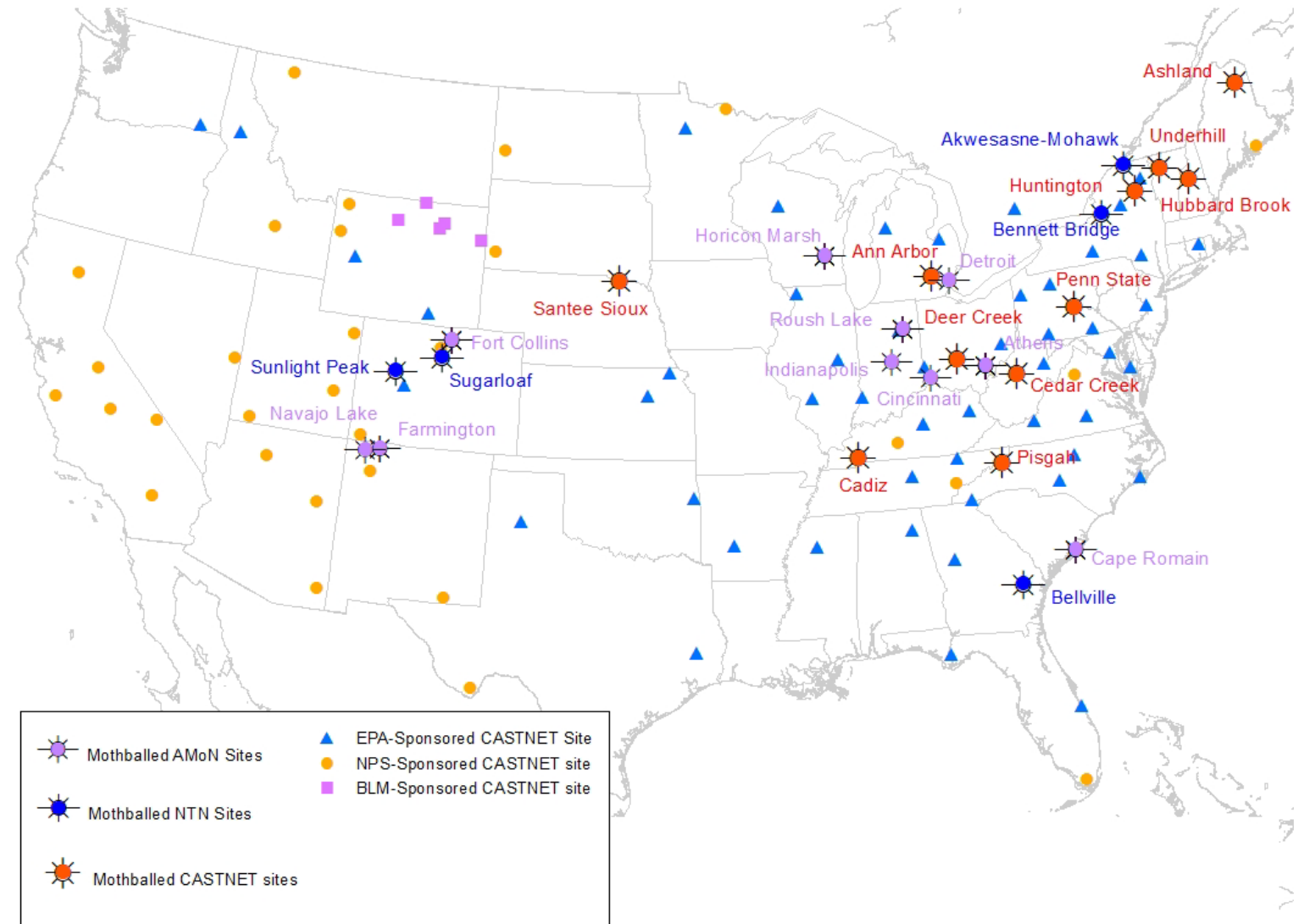


Observed evidence of changes in seasonality. Solid lines represent time of year when indicators typically occur, and arrows denote earlier and later shifts in the season.

- **Aeroallergen** Pilot Study Conducted in 2021 to evaluate sensor methodology as compared to NAB manual methods
- Potential for deploying real-time sensors at CASTNET sites to assess changing seasons and health impacts

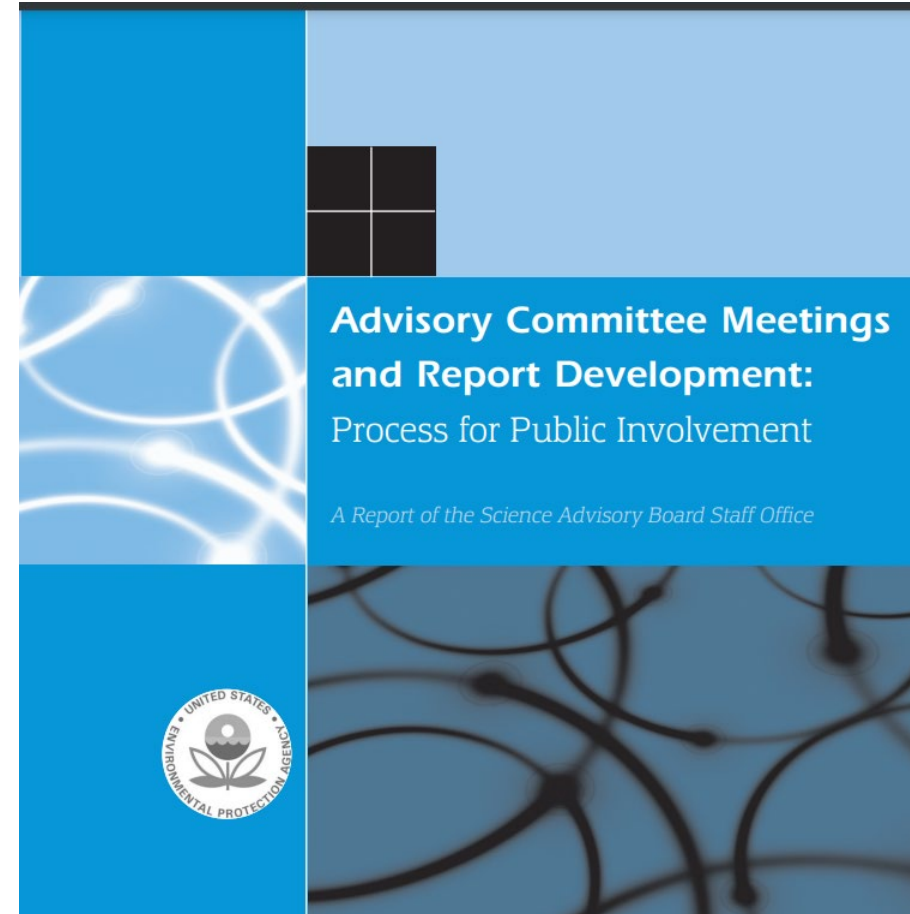
FY 22 Budget Implications for Ambient Monitoring

- Due to FY 22 budget constraints, OAP suspended operations (“mothballed”) at 26 locations on May 10th 2022
 - CASTNET and NADP sites impacted
 - Executed suspensions quickly to realize maximum cost savings and keep remaining sites operating
 - If the FY 23 budget is at the FY 22 level OAP will need to take additional steps to operate the programs under the enacted budget (e.g., close additional sites)
- Gaps as a result of sites
 - CASTNET data allow the Agency to assess air quality impacts to rural communities – often lacking other air quality monitors
 - CASTNET & NADP provide data on ozone concentrations and PM (NH₃) and ozone precursors not measured by other networks (e.g. NH₃, HNO₃, NH₄)
 - Data are used to develop, evaluate, and validate air quality models used to assess future air quality under potential emissions and climate scenarios
 - Some sites have been operating for more than 30 years



Independent Scientific Review

- EPA will conduct a review of the CASTNET program and OAP's contribution to NADP through the EPA's Science Advisory Board (SAB)
 - Open access to meetings and records, with opportunities for public comments to the committee
 - Report with recommendations will be available on the SAB website
- Requesting the panel comment on (draft charge questions):
 - Do the presented options address the most important new scientific questions
 - The continuation of existing monitoring sites and data collection and the key questions they address
 - Under the current fiscal constraints do the options presented address Agency's air quality monitoring priorities
- Current status of the review (Aug. 2022)
 - *SAB will begin collecting nominations for panelists*
 - *Preparing background documents and presentations*
 - *Defining final charge questions*



Round Robin – Thursday @
10:30am

Visit the NADP booth

Several presentations and
posters using CASTNET +
NADP data

Questions

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