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Diapositivas en español disponibles a pedido.

Department of Environmental Quality

Division of Air Quality

Informational Webinar: August 19th, 2024

North Carolina Fine Particulate Matter ($PM_{2.5}$) Update

Agenda

- Welcome & “Why are we here?”
  - Overview of Department & Division + Regional Offices helping local communities
- National Ambient Air Quality Standards (NAAQS)
  - Air Quality trends in North Carolina
- Revised $PM_{2.5}$ Standard
  - $PM_{2.5}$ Monitoring Network and NC status based on revised standard for $PM_{2.5}$
- Where is $PM_{2.5}$ coming from?
  - Sources and components
- Clean Air Act Designation Process (attainment vs non-attainment)
  - Role of Exceptional Events Rule (Opportunities to comment & Public Hearing)
- DAQ Protecting Public Health and Communicating Air Quality Information

Why are we here?

Fine particulate matter, or $PM_{2.5}$, is a type of air pollution created by cars, industry, fires and other sources. It consists of miniscule particles that can contribute to heart and lung conditions if breathed in at high levels for prolonged periods.

- In May, EPA tightened the **federal health-based standard** for $PM_{2.5}$ from 12.0 micrograms per cubic meter ($\mu g/m^3$) of air to 9.0 $\mu g/m^3$ (averaged over 3 consecutive years of monitoring data). The annual average amount of $PM_{2.5}$ in your air is supposed to be below this new level.

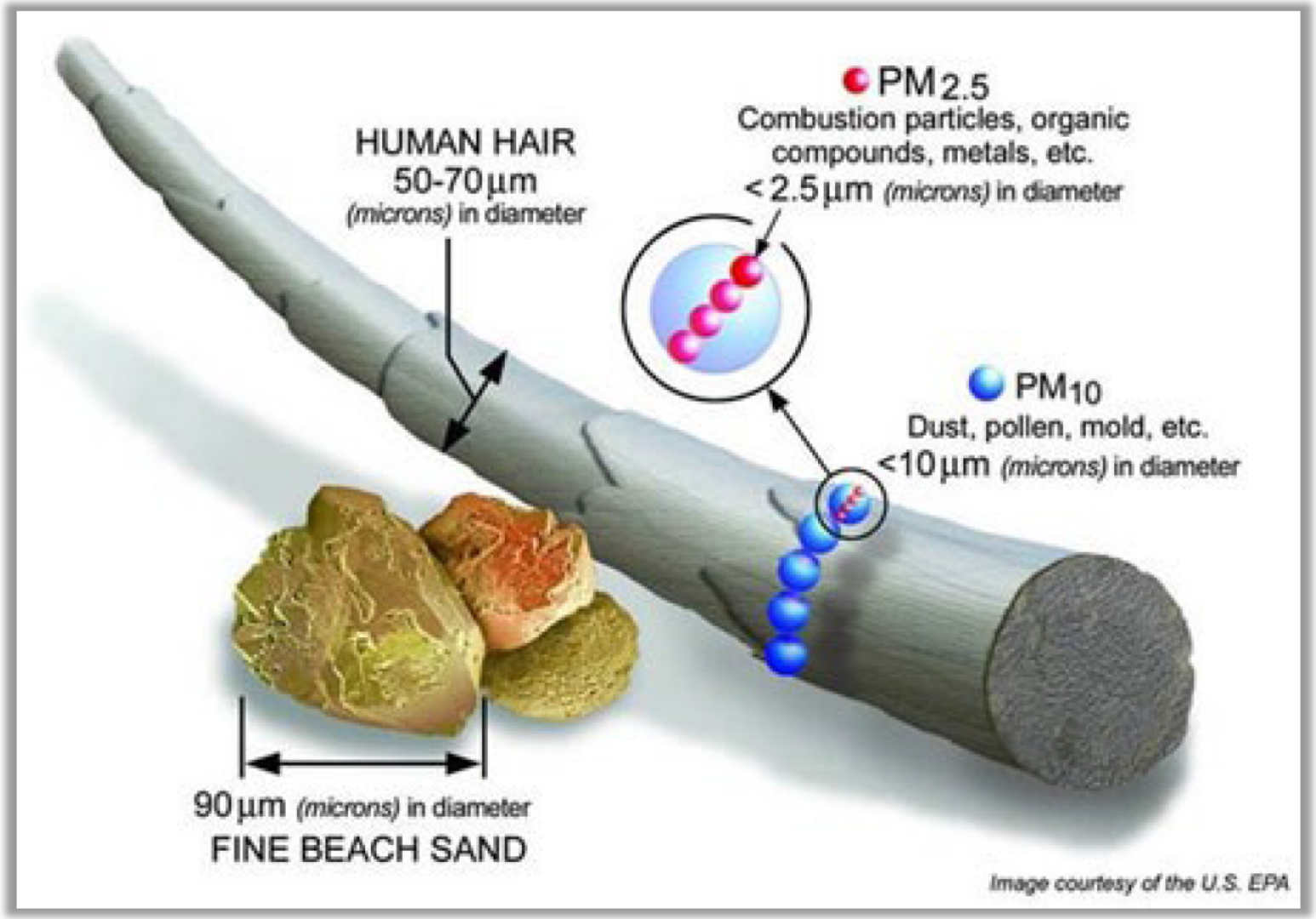
- North Carolina has seen a 49% decline in $PM_{2.5}$ emissions between 1990 and 2020 and maintained statewide compliance with the previous $PM_{2.5}$ standard.

- The revised standard starts a 2-year process. The state works with the EPA as part of a formal designation process. At the end of the process, EPA designates area as meeting (attainment) or not meeting (nonattainment) the revised standard.

What is $PM_{2.5}$?

- Fine particulate matter
- Fine particle pollution
- Soot

- $PM_{2.5}$ vs. PM_{10}



Why should you care about the Air Quality & fine particulate matter ($PM_{2.5}$) air quality standards?

Air pollution can impact your health. In North Carolina, asthma or respiratory problems are one major reason our students miss school, and adults miss work. Air pollution knows no boundaries and impacts many of our friends, family, and neighbors.

Human Impacts

Environmental Impacts

Air pollution can damage sensitive forest and farm crops, affects diversity of ecosystems, and can contribute to acid rain effects.

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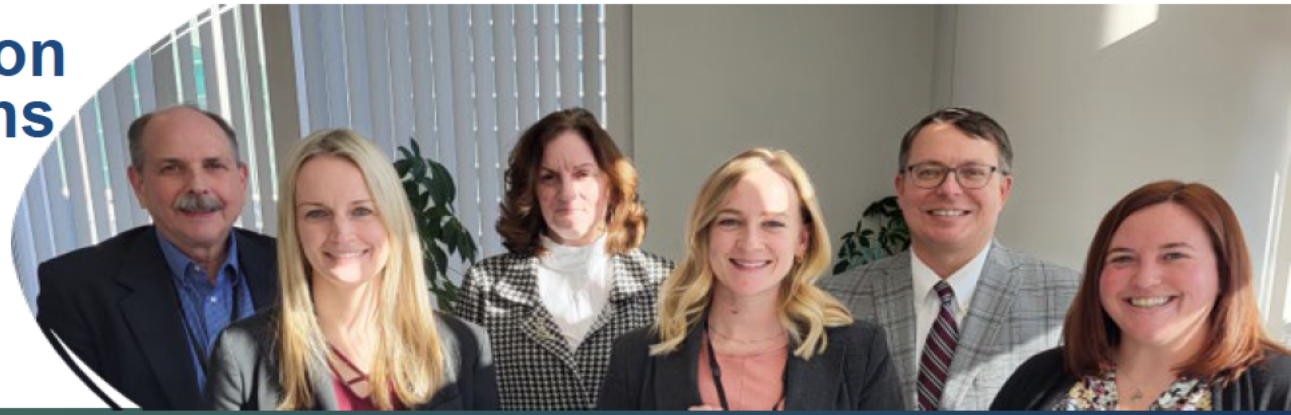
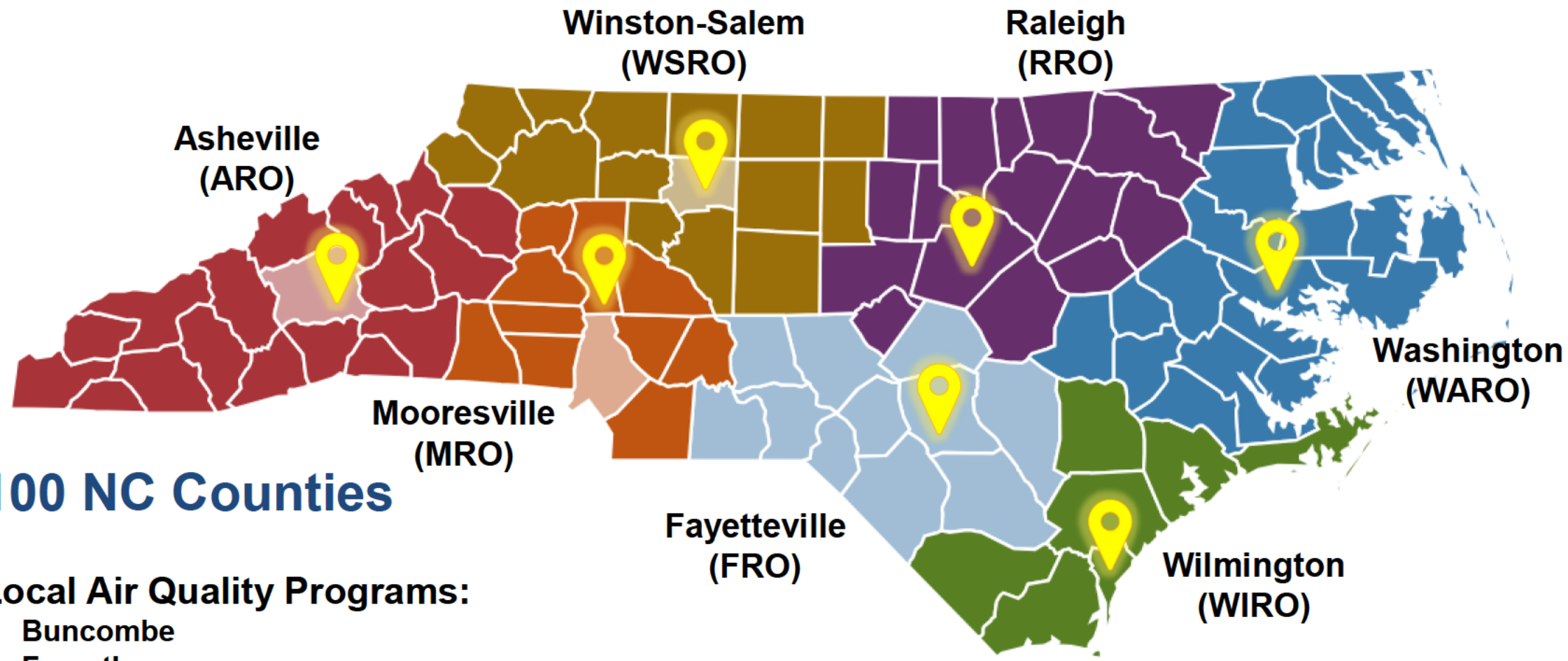
Division of Air Quality

The Division of Air Quality (DAQ) works with the state's residents to protect and improve outdoor, or ambient, air quality in North Carolina for the health, benefit and economic well-being of all.

- **Operate a statewide network of air quality monitors**
- **Develop and implement plans/rules**
- **Consistently develop clear and enforceable permits**
- **Educate, inform and assist the public on air quality issues**
- **Ensure compliance with air quality rules**
- **Communicates air quality information and forecasts to all North Carolinians**



Division of Air Quality – Regional Offices



100 NC Counties

Local Air Quality Programs:

- Buncombe
- Forsyth
- Mecklenburg

https://www.deq.nc.gov/about/divisions/air-quality/about-air-quality/daq-organizational-structure/air-quality-regional-offices

Regional Offices

Anytime during the year, **if you have any air quality concerns or questions** …

- Please contact your closest regional office
- You can call 919-707-8400 to find your closest office
- Or find it online at www.ncair.org and click on the Regional Offices map image at bottom of the page

Local Air Quality Agencies

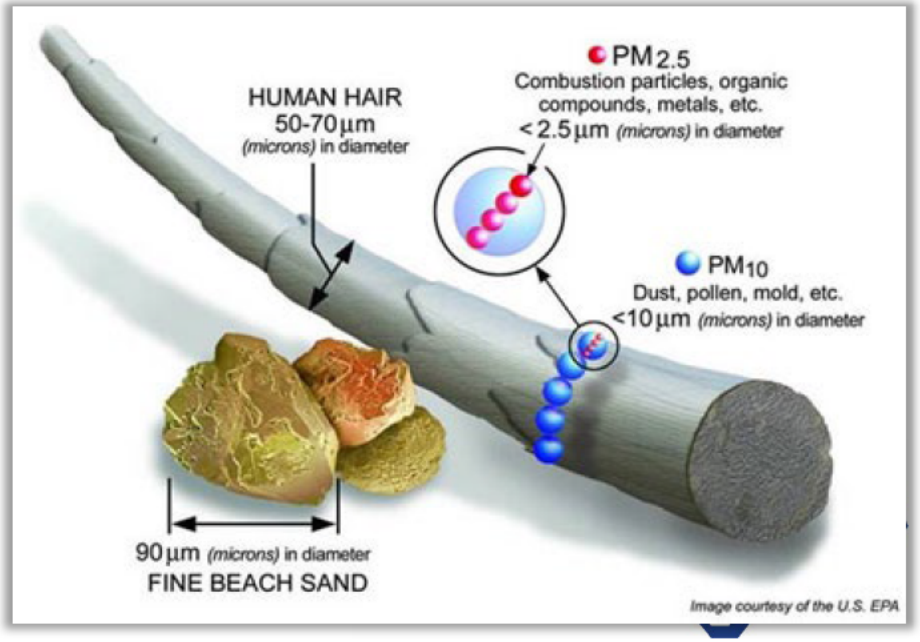
- Three North Carolina counties — **Buncombe**, **Forsyth** and **Mecklenburg** — have local air programs that enforce federal, state and local regulations for protecting air quality.

- NC Division of Air Quality works closely with these partners throughout the year.

- You can also contact these local air programs for information on air quality permits, facility compliance and enforcement, air quality complaints and air monitoring if you live in their coverage area.

National Ambient Air Quality Standards (NAAQS)

- What are the National Ambient Air Quality Standards?
- Has our air quality been getting better or worse?
- Air Quality trends in North Carolina



What are the National Ambient Air Quality Standards (NAAQS)

- Criteria Air Pollutants
  - Ozone
  - Particle Pollution ($PM_{2.5}$ and PM_{10})
  - Sulfur Dioxide (SO_2)
  - Carbon Monoxide (CO)
  - Nitrogen Dioxide (NO_2)
  - Lead
- Primary Standards – health based
  - Protect public health including health of "sensitive" populations such as asthmatics, children, and older adults
- Secondary Standards – welfare based
  - Protect against decreased visibility and damage to animals, crops, vegetation, and buildings

- See EPA's NAAQS Table for details
  - https://www.epa.gov/criteria-air-pollutants/naaqs-table

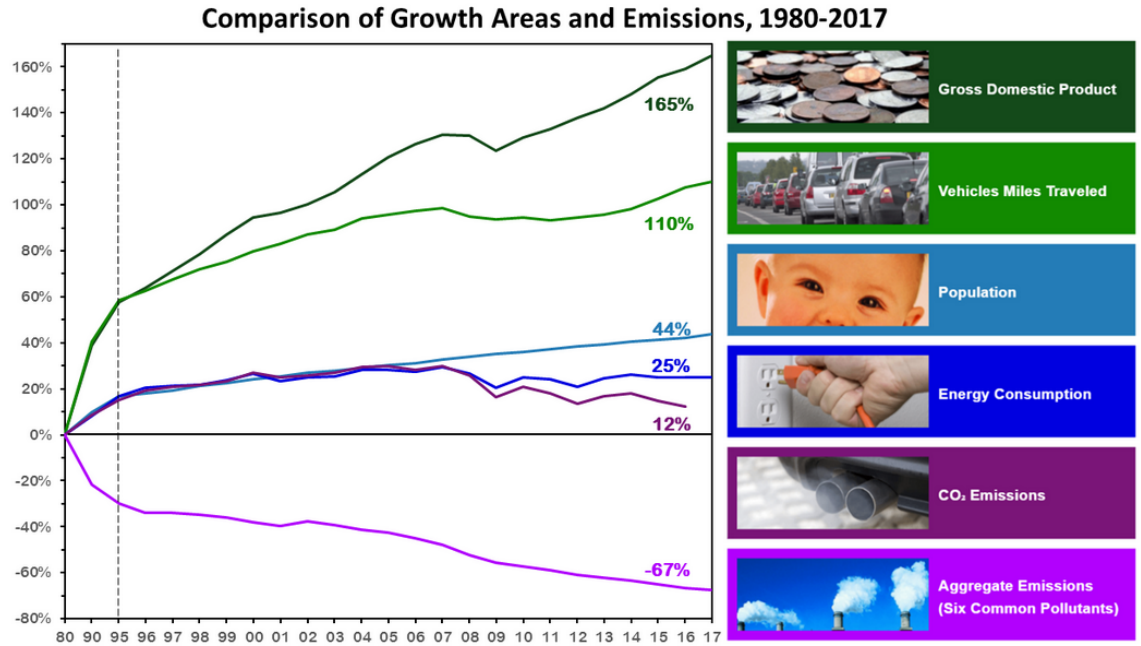
Trends in Air Quality
Has our air been getting better or worse?

- North Carolinians are breathing the cleanest air in decades!
- State leaders, regulatory agencies, electric utilities, industry, and the public have significantly addressed air quality concerns in recent years. Their collective efforts are achieving impressive results to reduce pollution.
- From 1990 through 2020, statewide emissions fell:
  - 94% for sulfur dioxide (SO_2)
  - 73% for carbon monoxide (CO)
  - 72% for oxides of nitrogen (NOx)
  - 49% for fine particulate matter ($PM_{2.5}$)
  - 68% for volatile organic compounds (VOCs)

Trends in Air Quality

The Emissions Reductions efforts have been successful in North Carolina! How did it happen?

- 55 years of partnerships
- Regulatory / non-regulatory actions
- Clean Smokestacks Act (NC)
- Well timed market trends
- Transformation in the energy sector
- Mobile sector: engine and fuel standards



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Department of Environmental Quality

North Carolina and the National Ambient Air Quality Standards

Attaining all federal public health air quality standards for:

days…

and counting!

as of Aug. 19, 2024

- Ozone
- Particulate Matter
- Sulfur Dioxide
- Lead
- Carbon Monoxide
- Nitrogen Dioxide

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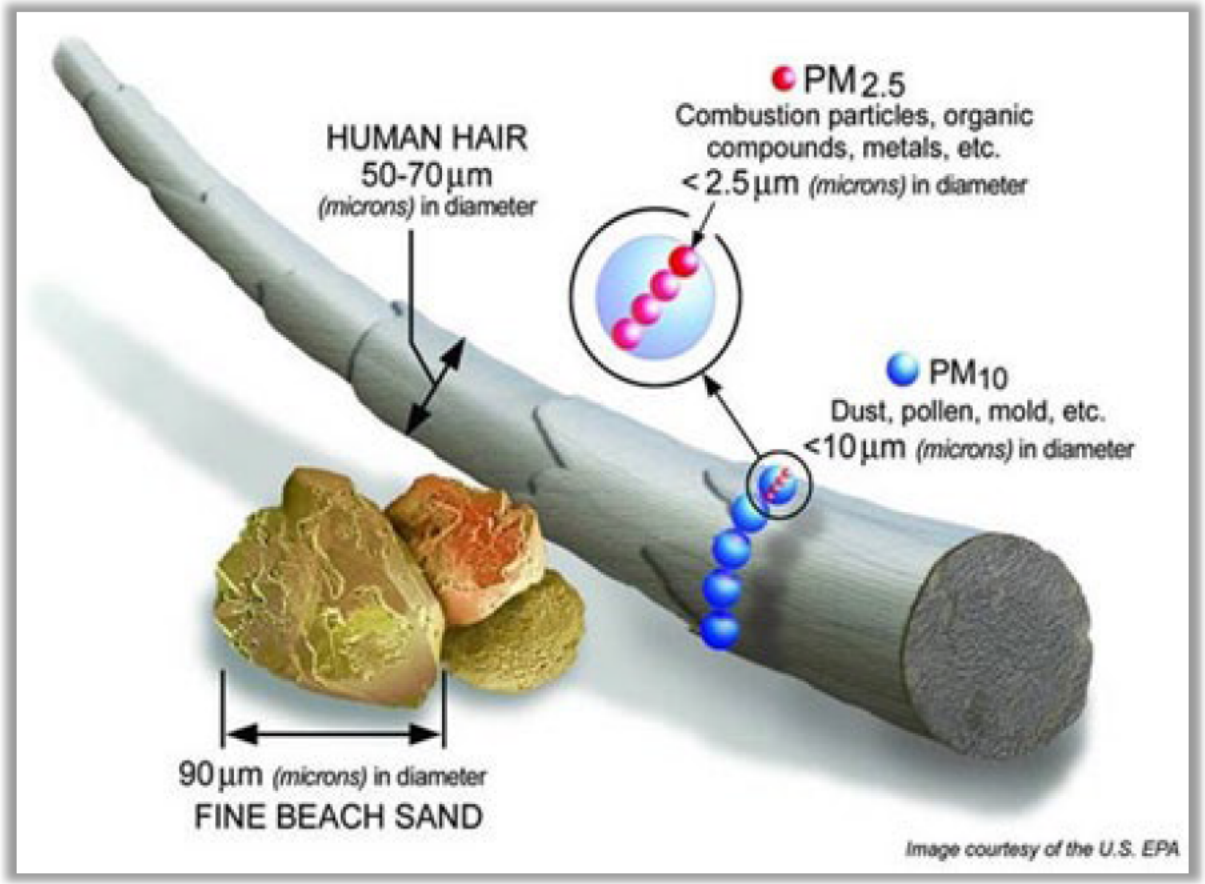
Revised $PM_{2.5}$ Standard – what has changed?



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Revised $PM_{2.5}$ Air Quality Standard

- In May 2024, EPA tightened the annual health-based National Ambient Air Quality Standard for fine particulate matter ($PM_{2.5}$) from 12.0 µg/m^3 to 9.0 µg/m^3.
- This change was made after a review of the available scientific evidence, technical information, and advice of an independent scientific panel.
  - "EPA's Final Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM)"
- EPA says will result in significant public health benefits, advance the economy and improve quality of life.

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Designation Timeline

Year 1

Revising State rule for $PM_{2.5}$ to match the Federal standard already in place

- NCDAQ has proposed revisions to Rule 02D .0410, *$PM_{2.5}$ Particulate Matter*, to incorporate the lower annual $PM_{2.5}$ NAAQS in the State's air quality rules.
  - July 11, 2024 – the Environmental Management Commission approved the draft rule and regulatory impact analysis to proceed to public comment.

- This process is underway and is required to update our state rules with the already in place Federal air quality standard.
  - Public comment period tentatively scheduled for September 3, 2024 – November 4, 2024.
  - Public hearing tentatively scheduled for October 17, 2024.

North Carolina $PM_{2.5}$ Data and Design Values

- EPA must designate areas as meeting (attainment/unclassifiable) or not meeting (nonattainment) the revised NAAQS.

- To know what's in our air, DAQ uses a robust network of monitors to collect data throughout the year

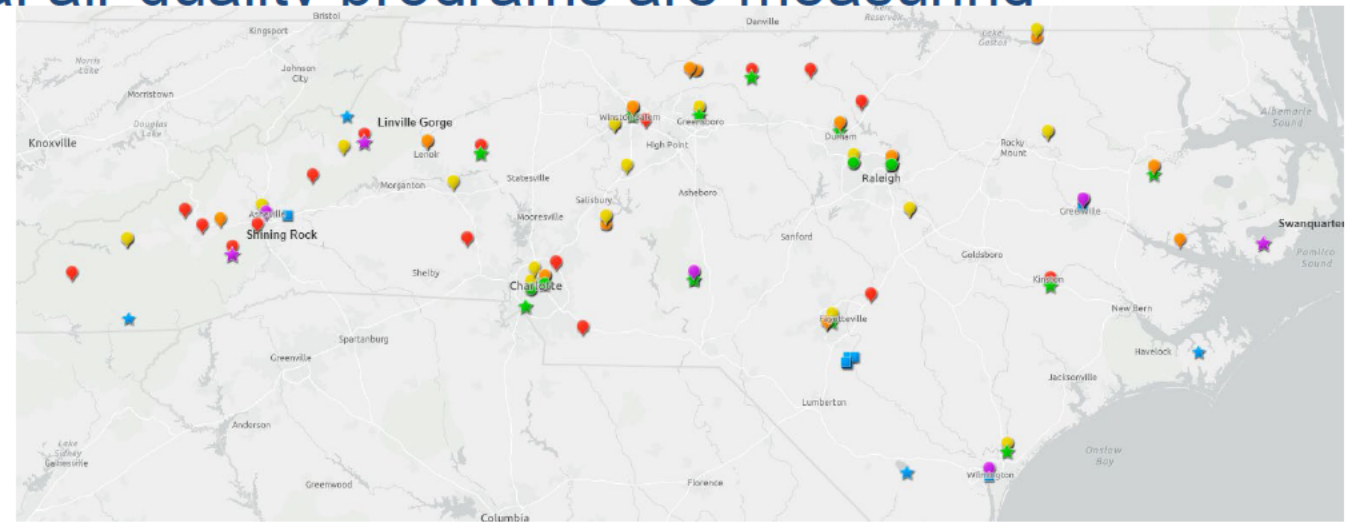
- One important number DAQ and EPA look closely at is the three-year average, or Design Values, at each monitoring site to see how we are doing in relation to the NAAQS.

  - "Design value is a statistic derived from ambient monitor concentration measurements that describes the air quality status of a given location relative to the level of the NAAQS." Design value based on annual mean averaged over 3 years.

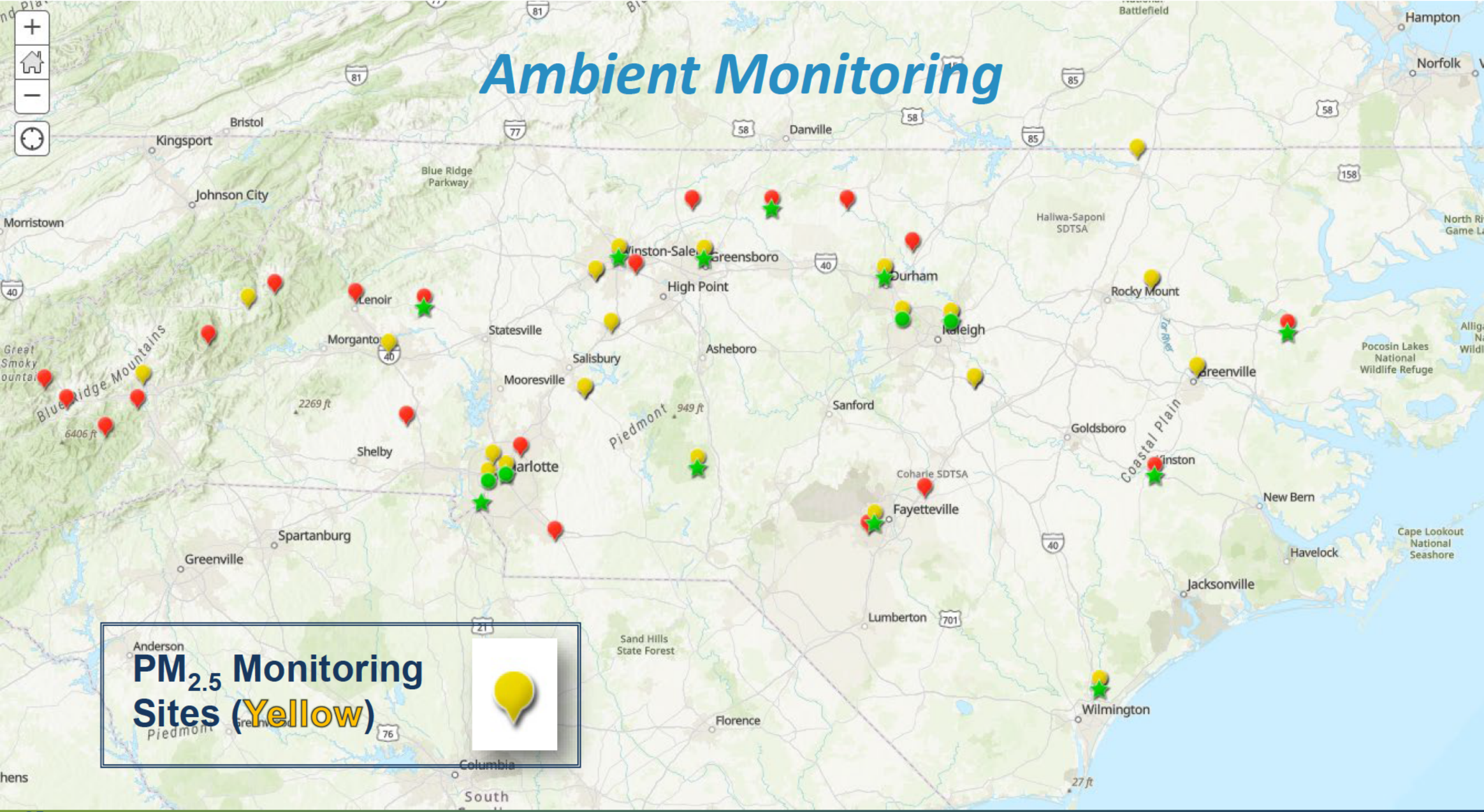
Ambient Monitoring

How do we know what's in the air?

- Every day DAQ works to collect the best available data from our network of monitors.
  - Every year our data is certified through a rigorous QA process.
- DAQ maintains a network of 50 regulatory monitoring stations across the state
- 21 sites including 6 run by local air quality programs are measuring $PM_{2.5}$

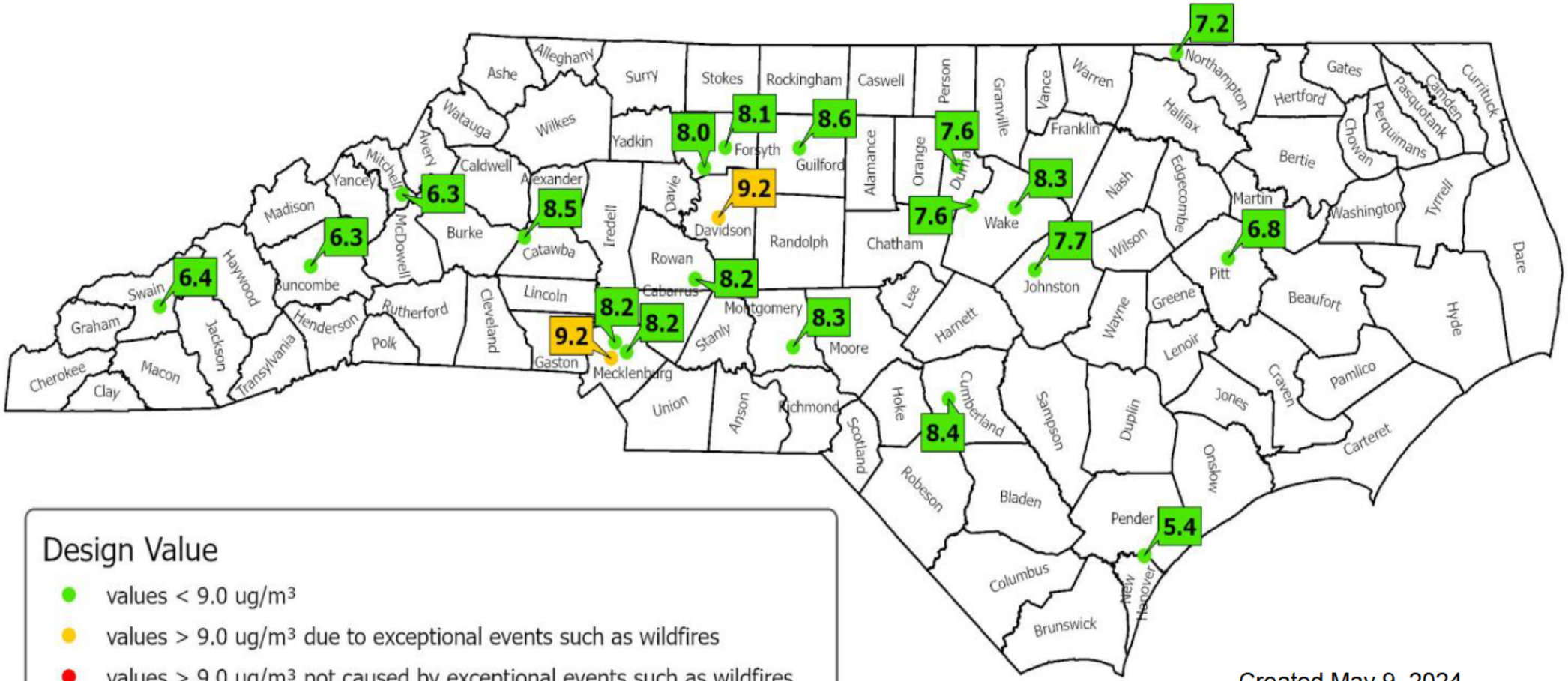


Ambient Monitoring



$PM_{2.5}$ Monitoring Sites (Yellow)

NC PM2.5 Annual Design Values (2021-2023)*



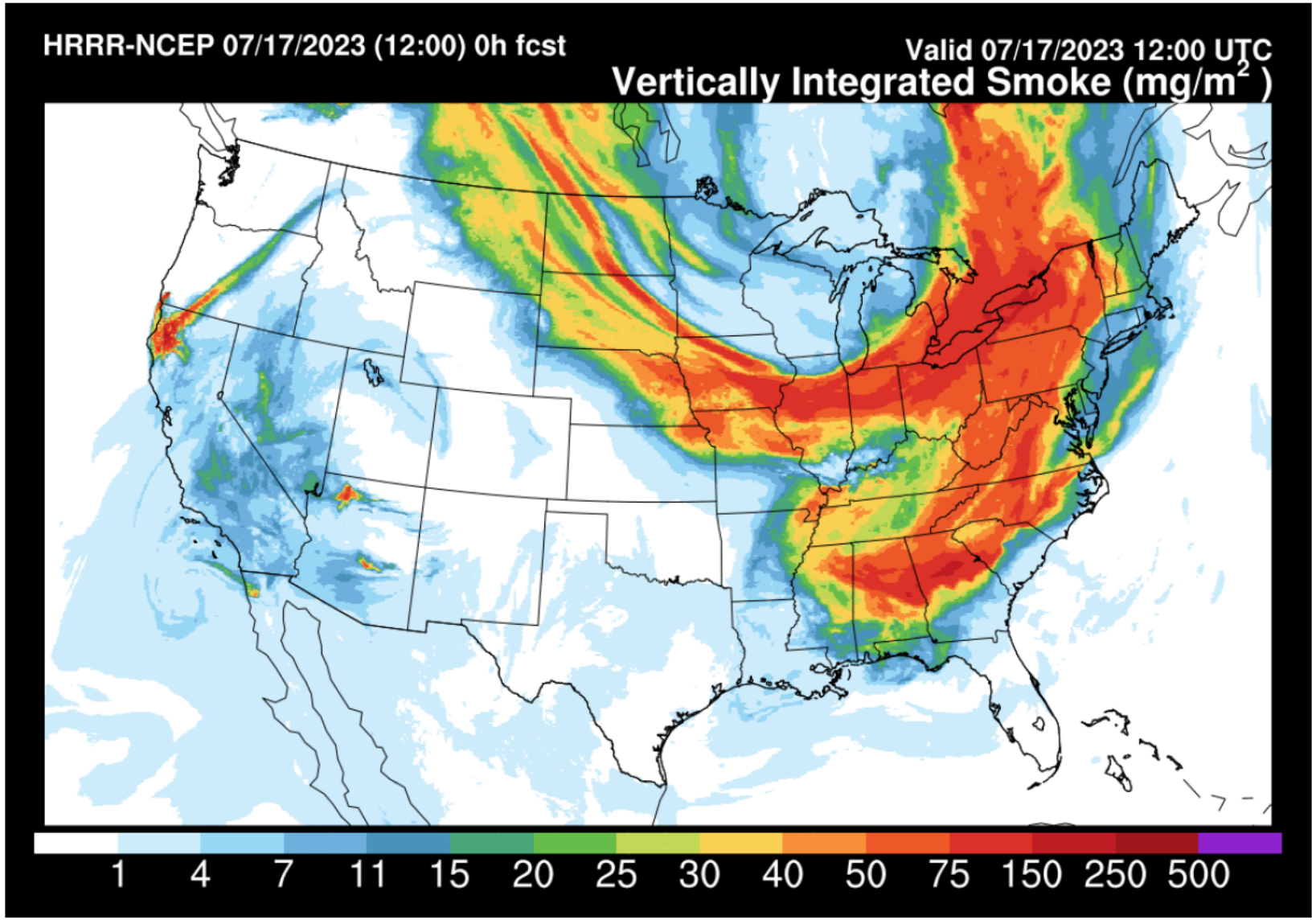
Design Value

- values < 9.0 ug/m³
- values > 9.0 ug/m³ due to exceptional events such as wildfires
- values > 9.0 ug/m³ not caused by exceptional events such as wildfires

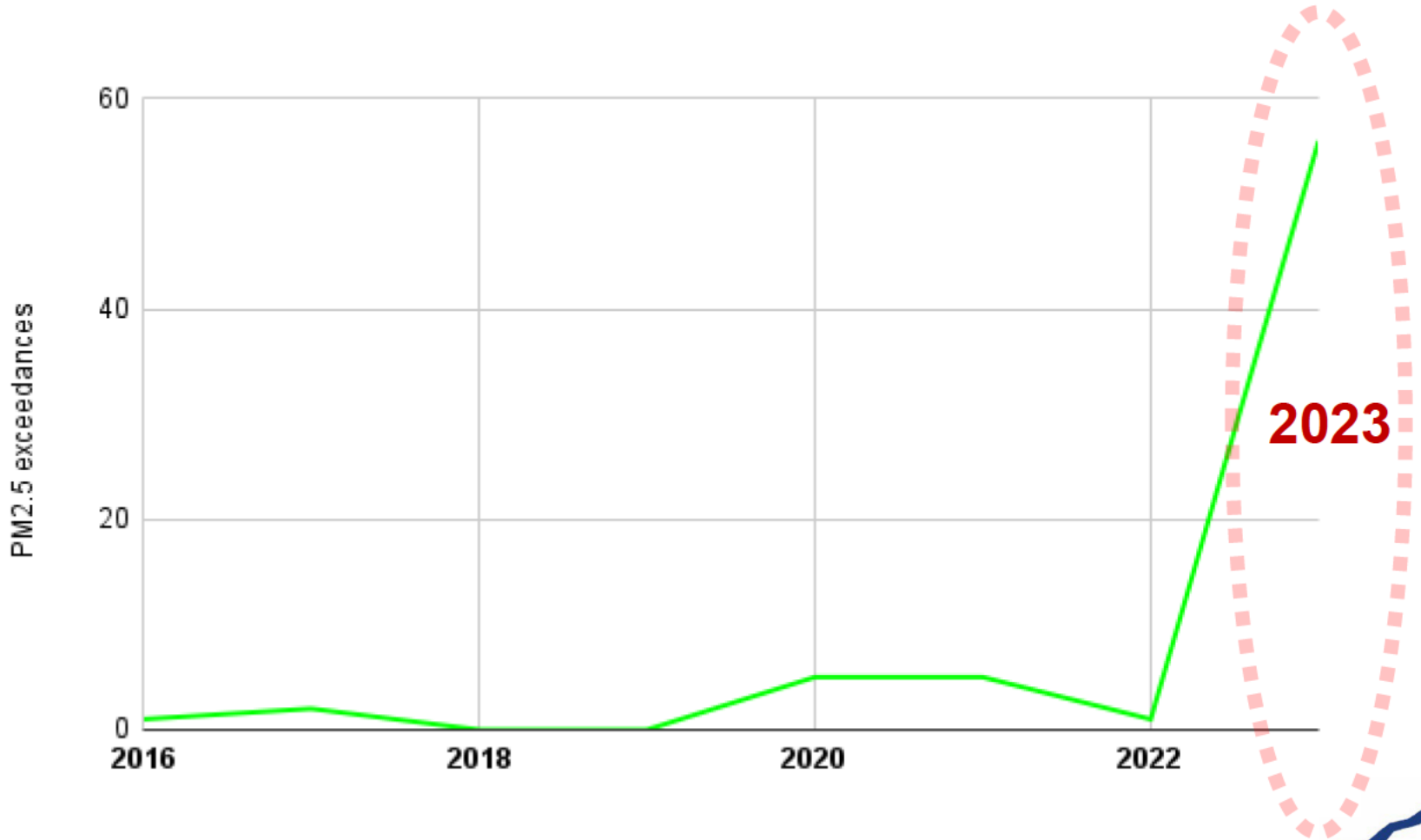
Created May 9, 2024

* Based on certified monitoring data for 2021-2023.

Canadian Wildfires Influence NC Air Quality



Canadian Wildfires Influence NC Air Quality



NC PM2.5 2023 Exceedances (24-hr.)

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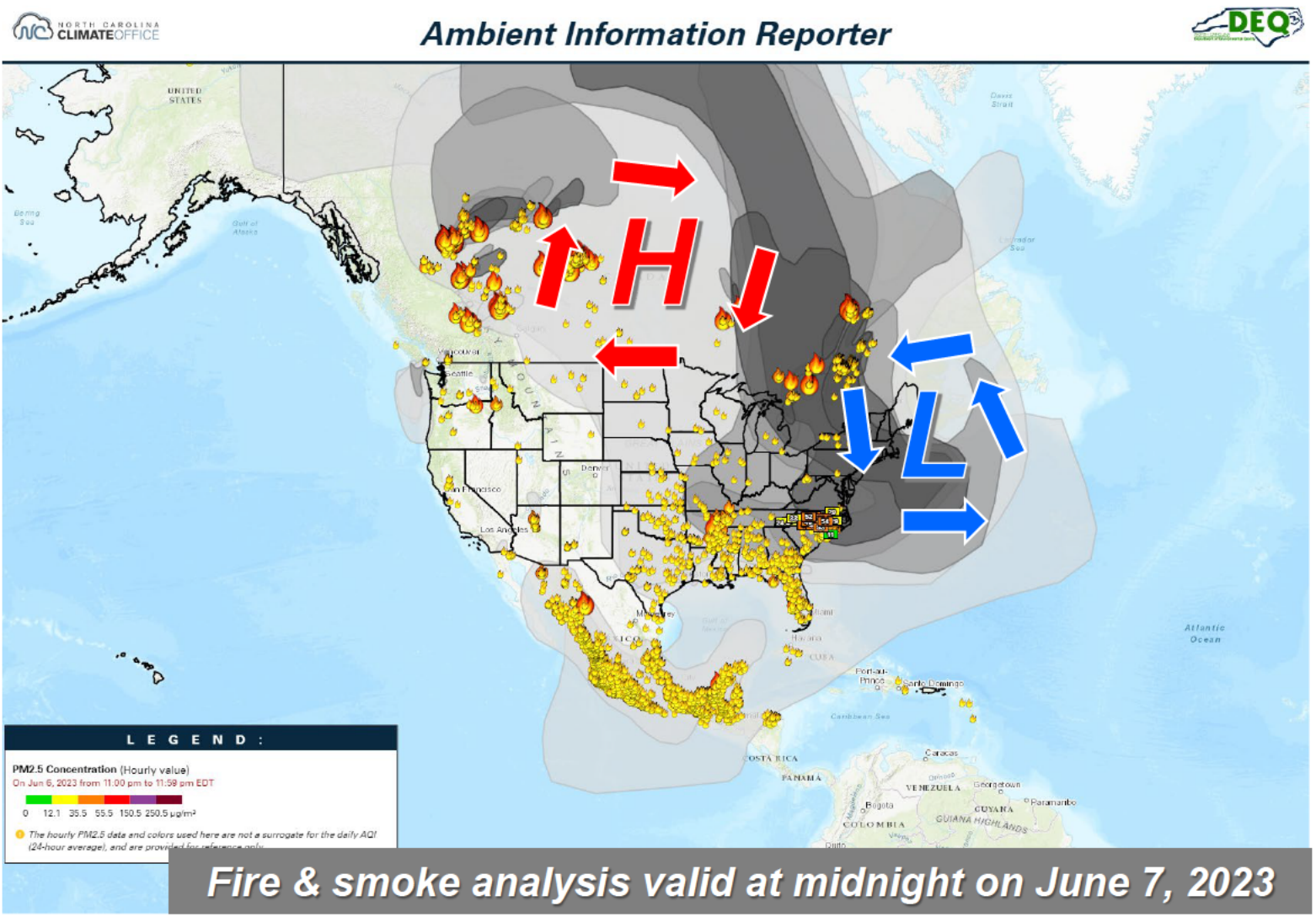
Canadian Wildfires Influence NC Air Quality

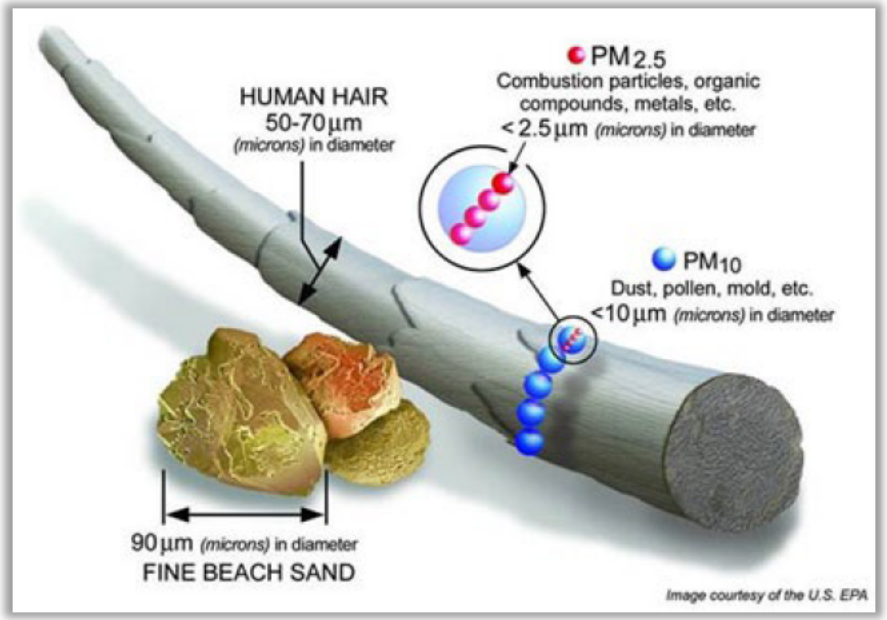


Fire & smoke analysis valid at midnight on June 7, 2023

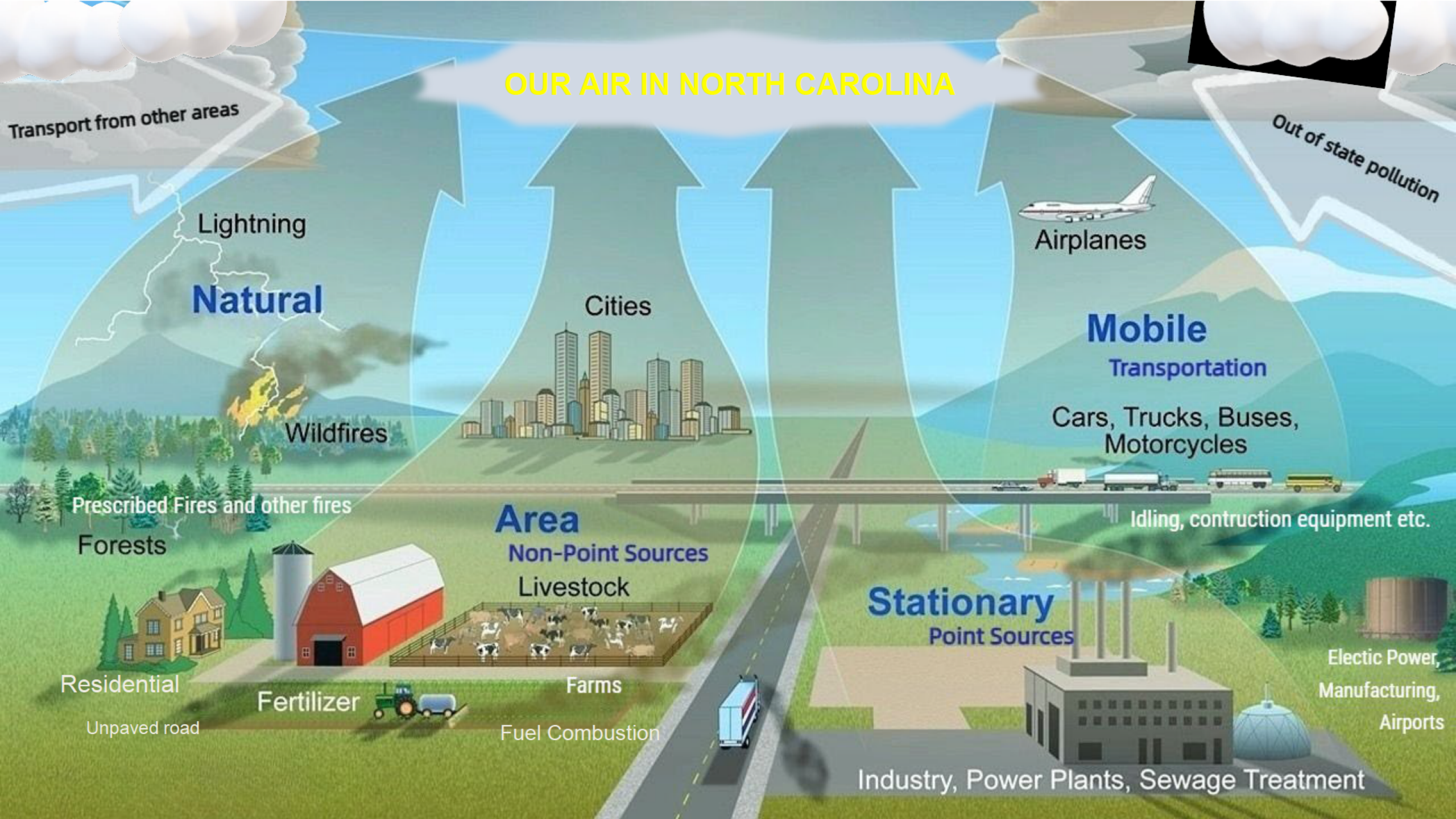
- Anomalous June pattern that featured **strong northerly transport** of Canadian air led to ***well-below normal temperatures*** across the eastern U.S.
- Unfortunately, this **simultaneously** led to the intrusion of heavy Canadian wildfire smoke into the eastern U.S., including North Carolina.

Where is $PM_{2.5}$ coming from + components of $PM_{2.5}$

- Sources of $PM_{2.5}$
- 'Primary' vs 'Secondary' $PM_{2.5}$
  - PM is referred to as "primary" if it is directly emitted into the air as solid or liquid particles, and is called
  - “Secondary" if it is formed by chemical reactions of gases in the atmosphere.
- Components of $PM_{2.5}$



https://www3.epa.gov/region1/airquality/pm-what-is.html


OUR AIR IN NORTH CAROLINA
Transport from other areas
Out of state pollution
Lightning
Natural
Wildfires
Prescribed Fires and other fires
Forests
Cities
Airplanes
Mobile
Transportation
Cars, Trucks, Buses, Motorcycles
Idling, contruction equipment etc.
Area
Non-Point Sources
Livestock
Residential
Unpaved road
Fertilizer
Farms
Fuel Combustion
Stationary
Point Sources
Electic Power, Manufacturing, Airports
Industry, Power Plants, Sewage Treatment

Where is $PM_{2.5}$ coming from?

Sector	Definition
Biogenics	**Plant vegetation, soils, lightning** that are developed using a specialized model (Biogenic Emission Inventory System)
Nonpoint* (Area)	Stationary sources (at fixed locations) that are too small to inventory on an individual basis (e.g., residential natural gas combustion, consumer products)
Nonroad	**Off-road vehicles** not licensed to operate on highways (e.g., construction equipment, lawn and garden equipment)
Onroad	Light-, medium-, and heavy-duty **vehicles** licensed to operate on highways (includes idling)
Other Fires	**Planned fires** occurring on natural lands (i.e., agricultural field burns, open burning, and prescribed fires for forest and ecosystem management)
Point	Stationary, **permitted sources** that occur at fixed locations (e.g., electric power plants, manufacturing facilities, and airports)
Wildfires	**Unplanned burning**

EPA 2022v1 Emissions Modeling Platform Sectors

* Includes commercial marine vessel and railroad locomotive emissions.

Primary vs Secondary

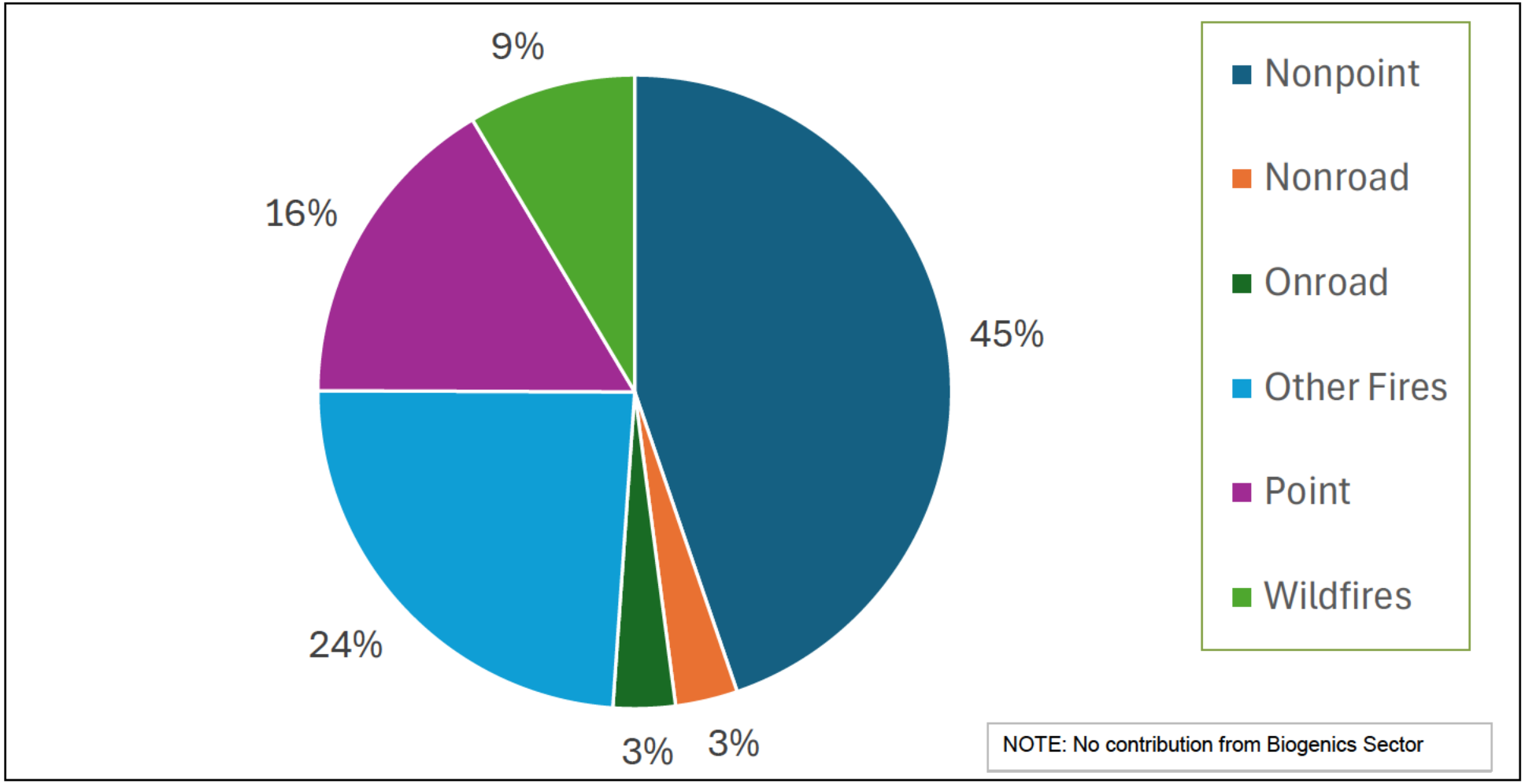
- We need to clarify the difference between **primary** and **secondary** PM2.5

- PM2.5 is often referred to as either "**primary**," if it is directly emitted into the air as solid or liquid particles and

- It is called "**secondary**" if it is formed by chemical reactions of gases in the atmosphere.

https://www3.epa.gov/region1/airquality/pm-what-is

2022 Statewide $PM_{2.5}$ Emissions by Sector (62,784 tons)

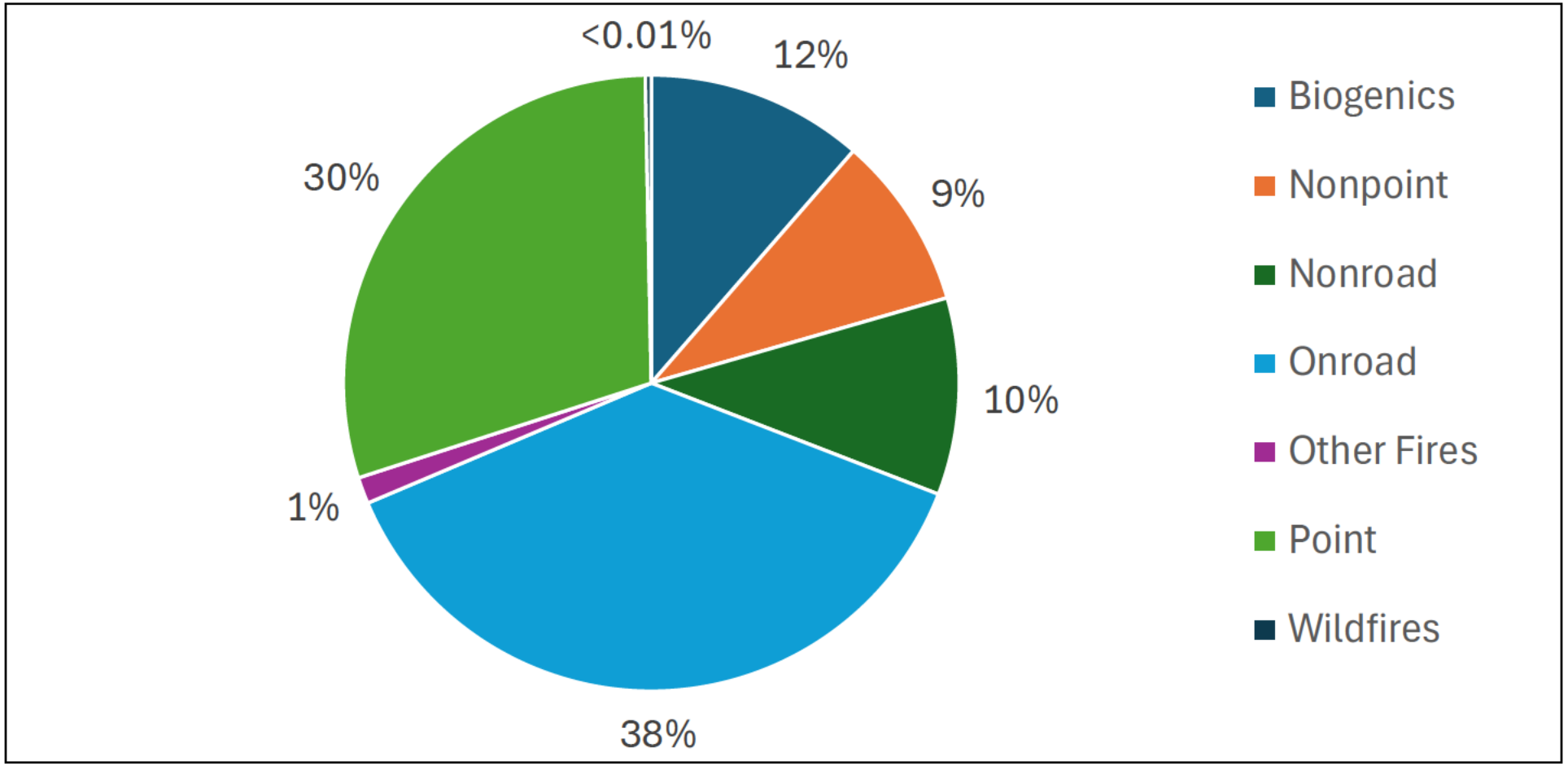


Primary /Direct Emission

Department of Environmental Quality

Reference: USEPA, 2022v1 Emissions Modeling Platform, https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

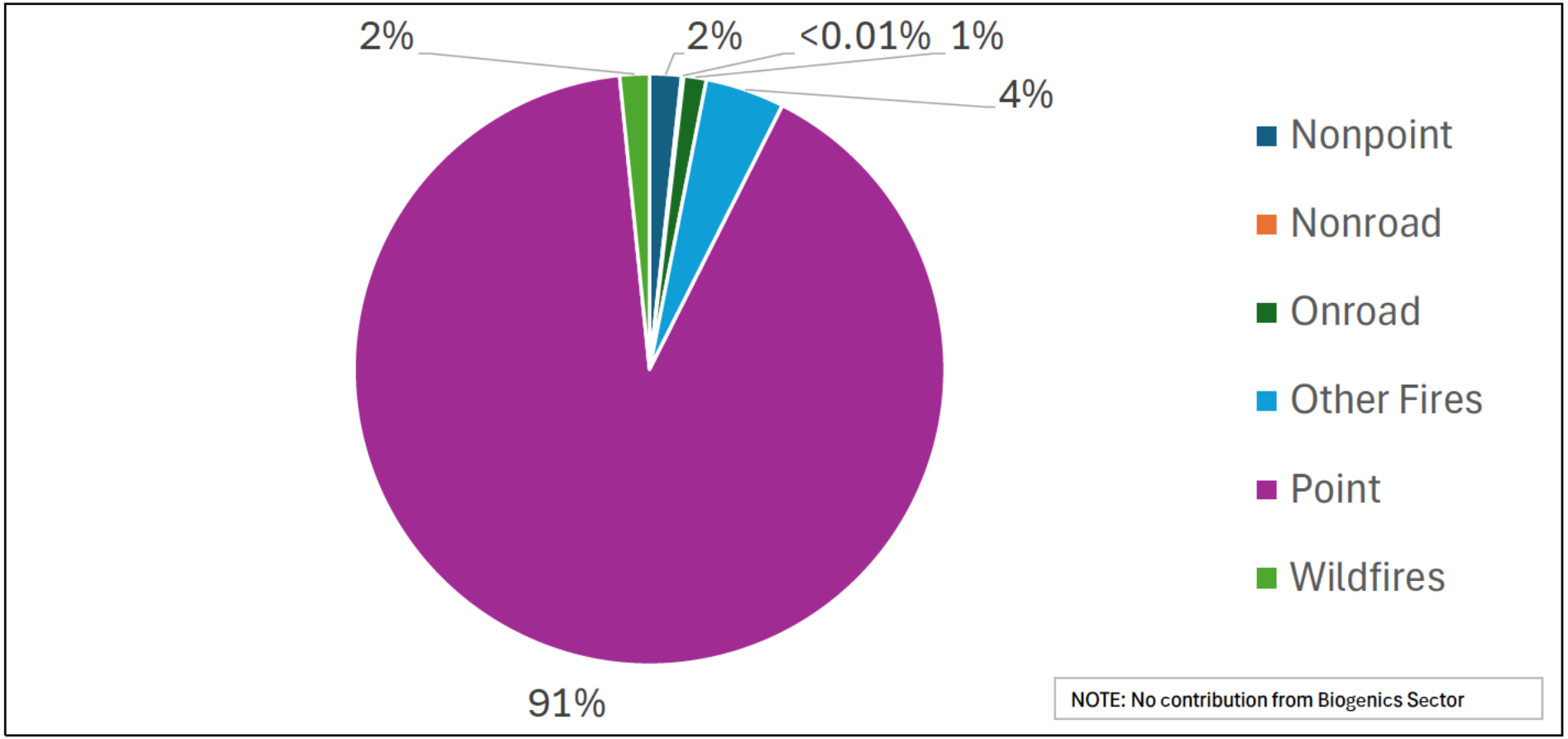
2022 Statewide NOx Emissions by Sector (197,593 tons)



Secondary

Reference: USEPA, 2022v1 Emissions Modeling Platform, https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

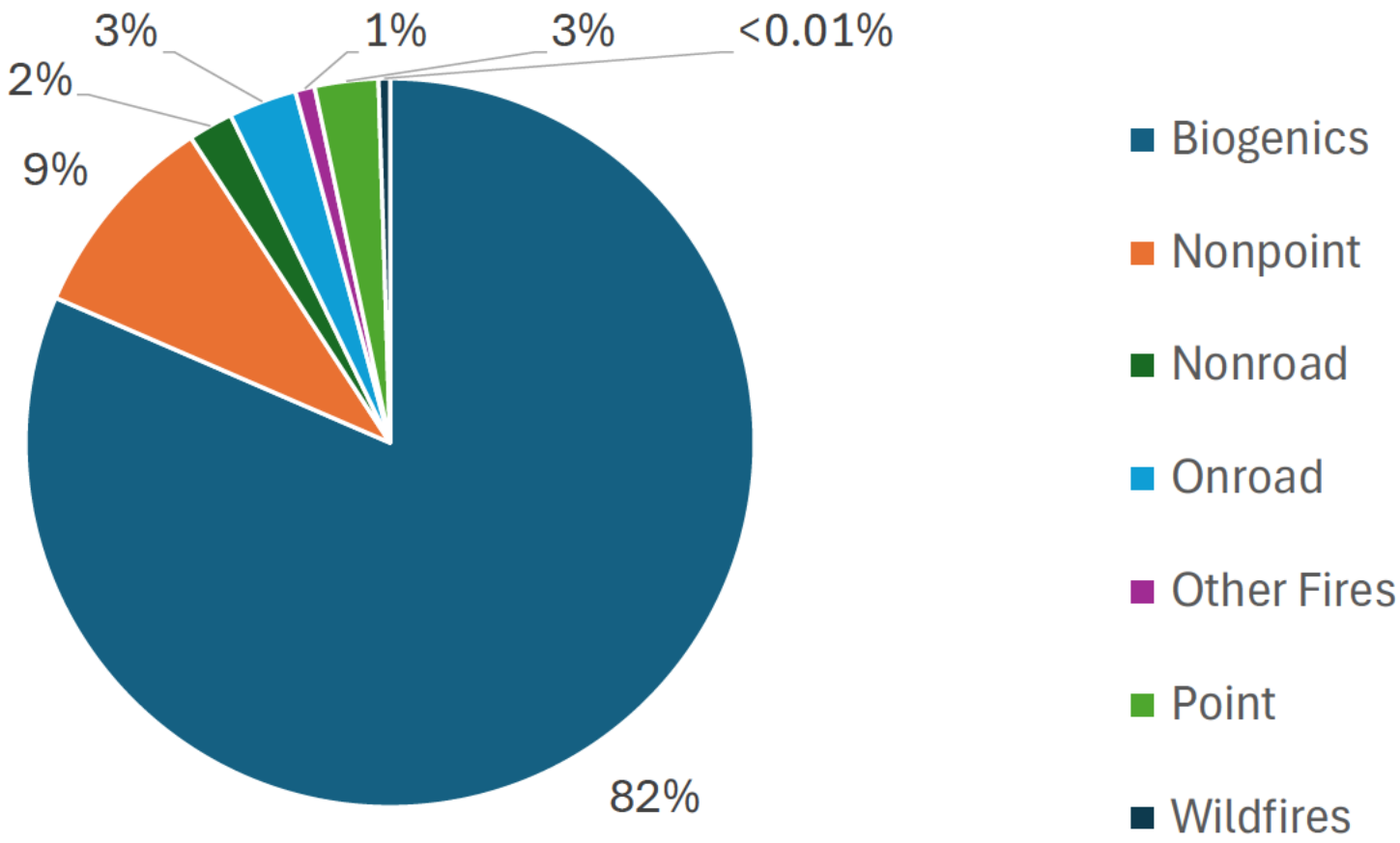
2022 Statewide SO_2 Emissions by Sector (22,780 tons)



Secondary

Reference: USEPA, 2022v1 Emissions Modeling Platform, https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

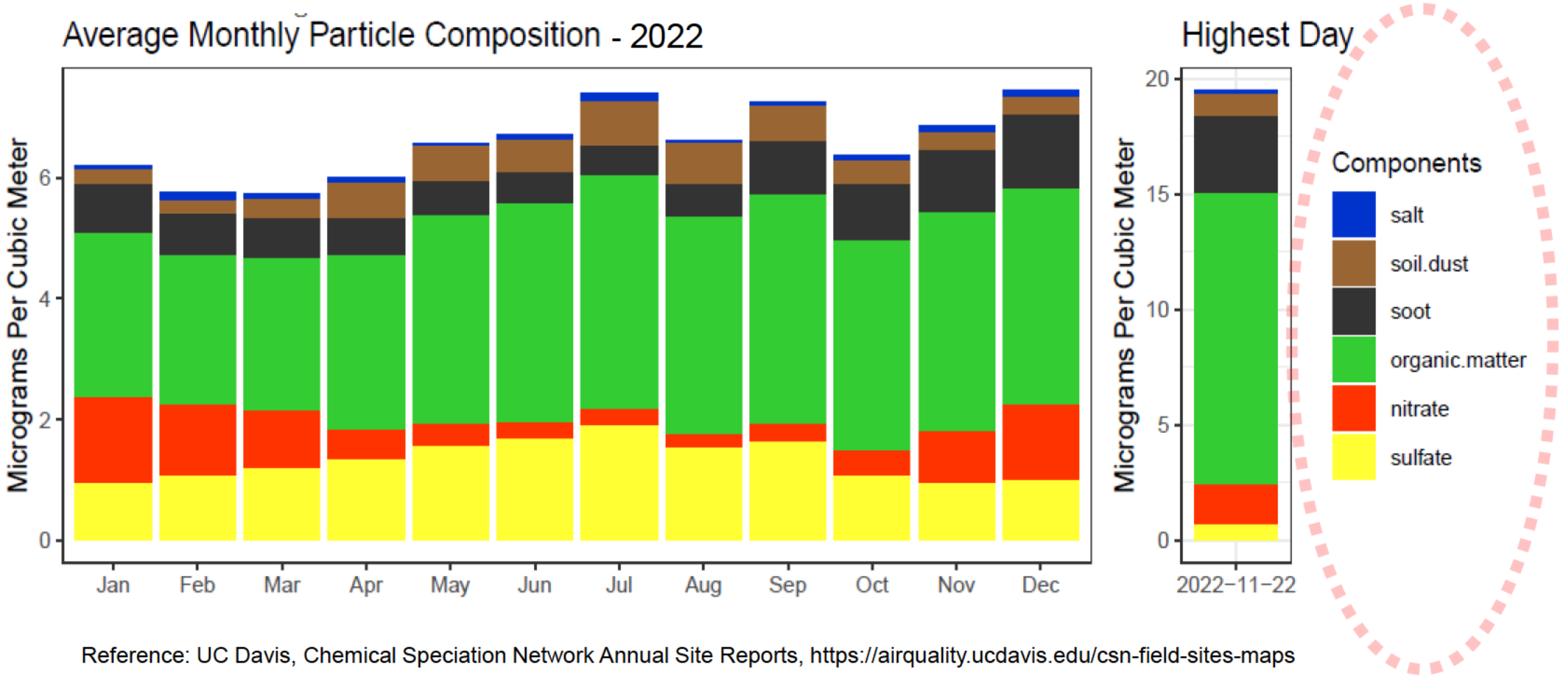
2022 Statewide VOC Emissions by Sector (1,389,179 tons)



Secondary

Reference: USEPA, 2022v1 Emissions Modeling Platform, https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Components of $PM_{2.5}$



Reference: UC Davis, Chemical Speciation Network Annual Site Reports, https://airquality.ucdavis.edu/csn-field-sites-maps

(Location: Garinger High School, Mecklenburg County)

Components of $PM_{2.5}$

Components	Manmade	Natural
Elemental carbon (soot)	Motor vehicles, open burning	Wildfires
Organic matter	Motor vehicles, cooking oils, household cleaners	Plants, animals, wildfires
Nitrate	Fertilizer, stock yards, chemical manufacturing	Plants, animals
Sulfate	Coal-fired power plants, chemical manufacturing	Volcanism
Salt	Chemical manufacturing, lake consumption	Ocean spray, dry lakebeds
Soil Dust	Construction, agriculture, deforestation, unpaved roads	Soil resuspension, dust storms (long-range transport)

Reference: UC Davis, Chemical Speciation Network Annual Site Reports, https://airquality.ucdavis.edu/csn-field-sites-maps

Clean Air Act Designation Process

Designation Process

- Follow EPA designations guidance (Particle Pollution Designations Memorandum and Data for the 2024 Revised Annual $PM_{2.5}$ NAAQS), February 7, 2024.
- By February 7, 2025, State Governors required to submit initial designation recommendations (i.e., attainment/unclassifiable, or nonattainment) to EPA based on 2021-2023 certified monitoring data.
- EPA completes designations by February 6, 2026, based on 2022-2024 certified monitoring data.
- EPA expects states to use Exceptional Events rule to support designations.

What are Exceptional Events?

- Defined as an event(s) and its resulting emissions that affect air quality in such a way that:
    - There exists a **clear causal relationship** between the specific event(s) and the monitored exceedance(s) or violation(s),
    - Is **not reasonably controllable or preventable**,
    - Is an event **caused by human activity that is unlikely to recur at a particular location or a natural event(s)**, and
    - is determined by the **Administrator**...to be an exceptional event." (40 CFR 50.1(j))

Exceptional Events Demonstration

DAQ will submit an exceptional events demonstration with our designation recommendation by Feb 7, 2025

- The Exceptional Events demonstration will ask EPA to remove certain days strongly influenced by Canadian wildfire smoke when calculating the design value for two monitors.
- By submitting this Exceptional Event demonstration, DAQ expects to show the entire state is attaining the revised $PM_{2.5}$ standard.
- This will help DAQ focus its regulatory attention on $PM_{2.5}$ sources within our control.
  - Keeping our state in attainment, or meeting all standards, provides a variety of health and economic benefits for our residents

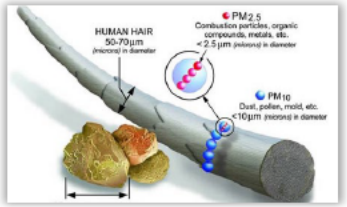
Exceptional Events Demonstration

- Public Hearing and Public Comment Period
  - Interested in sharing your ideas or comments regarding this exceptional events demonstration?
  - There will be a public comment period to provide written comments to DAQ in November 2024.

Learn more about these events here: www.deq.nc.gov/pm2.5updates

DAQ Protecting Public Health + Communicating Air Quality

- What is the air quality forecast and how do I find it?
  - Air Quality Portal
- Revised Air Quality Index (AQI)
- How can the public learn about smoke, wildfires, or prescribed fire events and potential impacts?
  - Smoke webpage and links to NCFS resources
- How should you stay informed about this topic in the future?
  - Revised PM2.5 Standard webpage will be updated over the coming months with additional information and resources



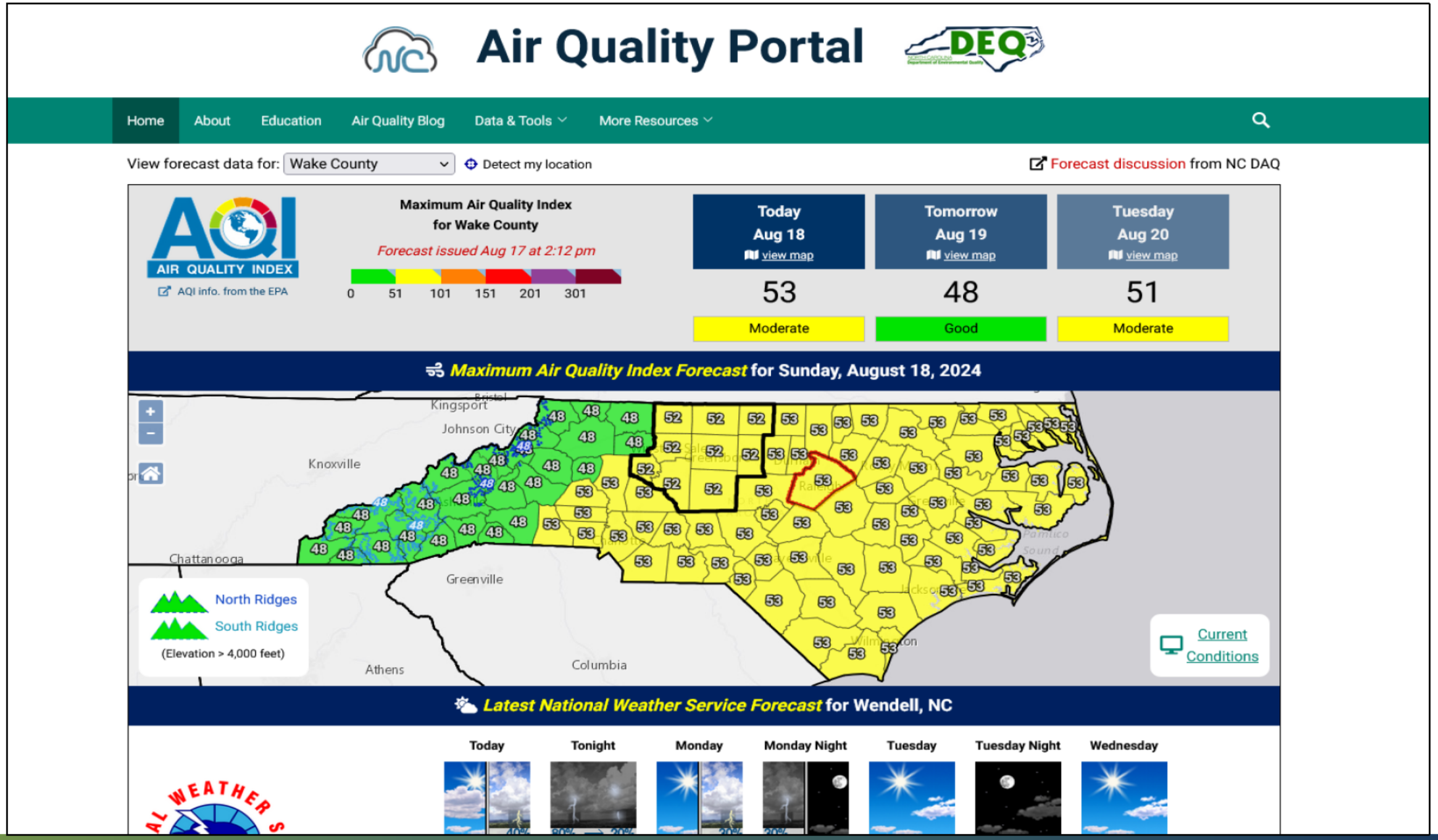
NORTH CAROLINA
Department of Environmental Quality

Air Quality Index

Color-coded tool easily shows air quality info with public

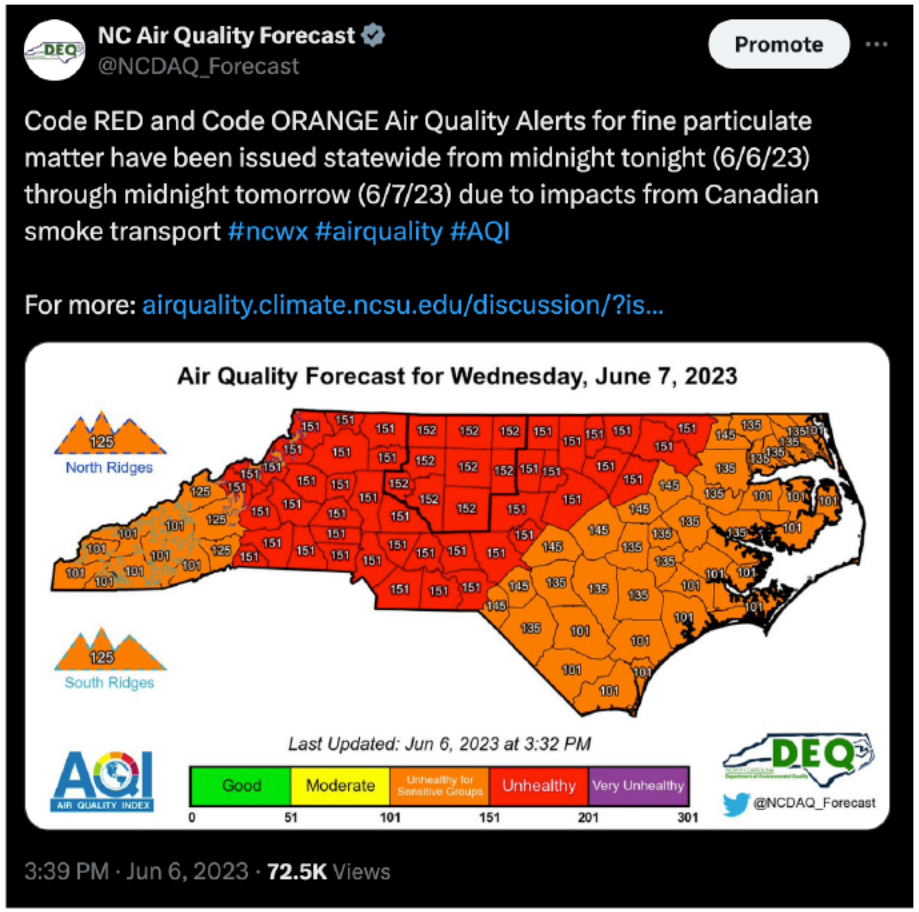
Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

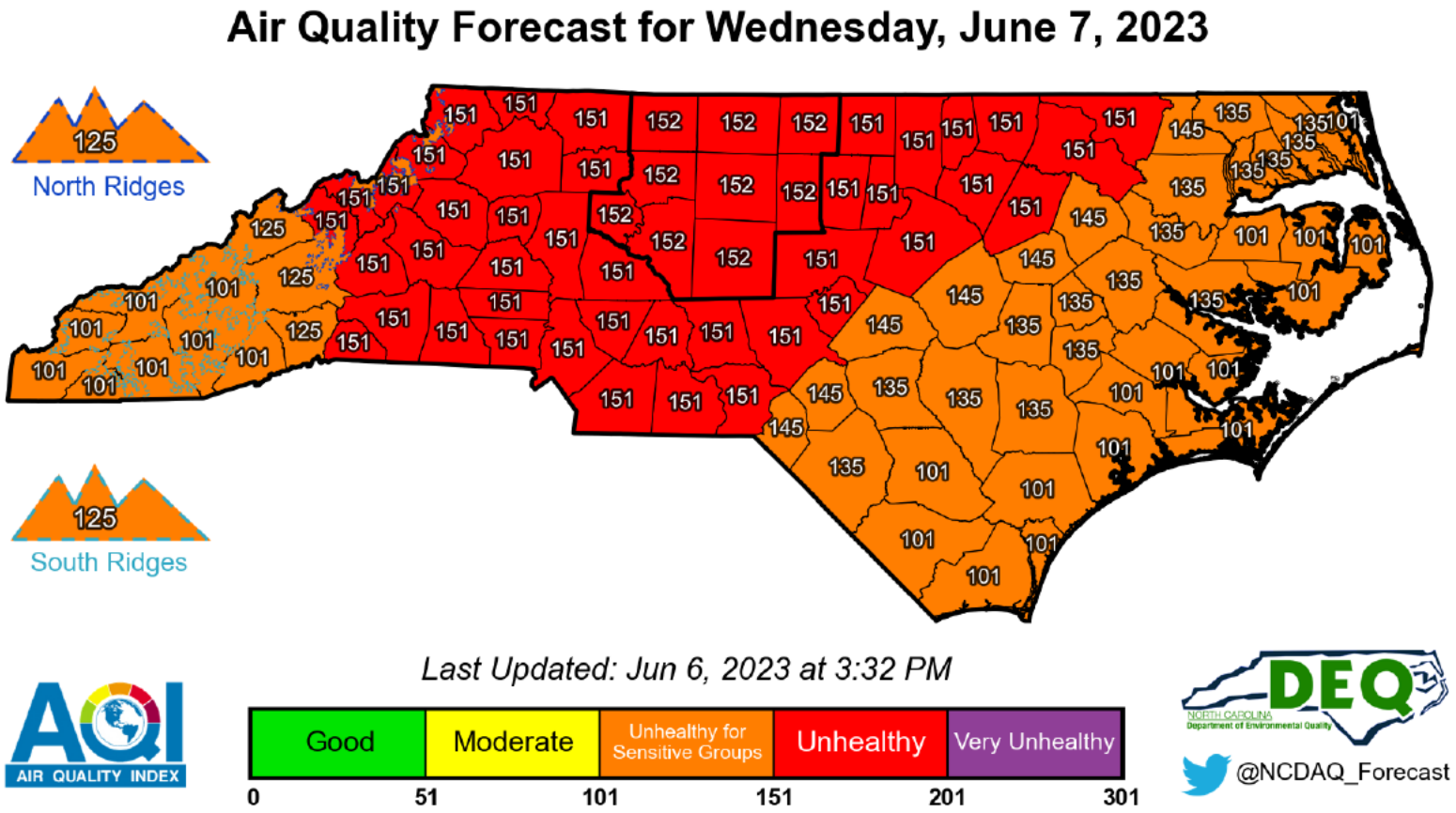
deq.nc.gov/AQPortal



Forecasting Air Quality for All Counties

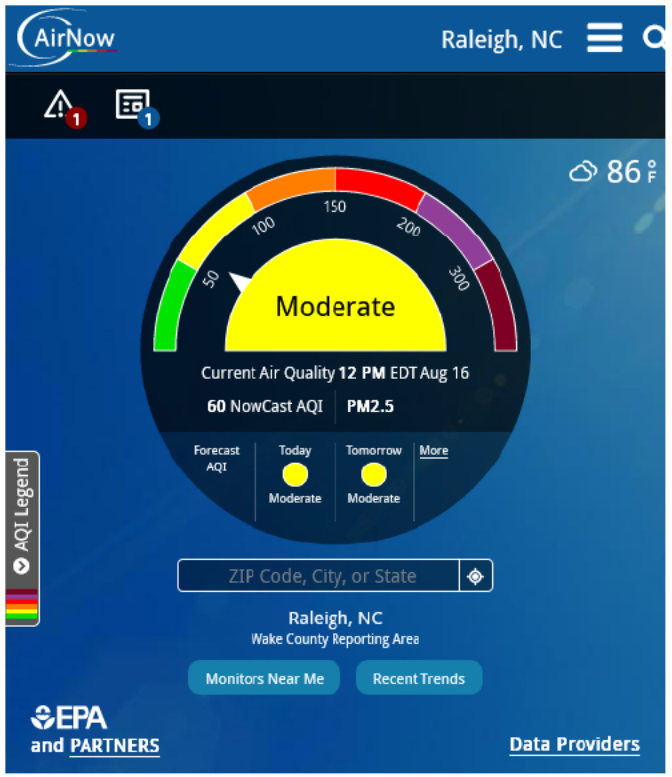
Code Red and Code Orange forecast due to Canadian wildfire impacts

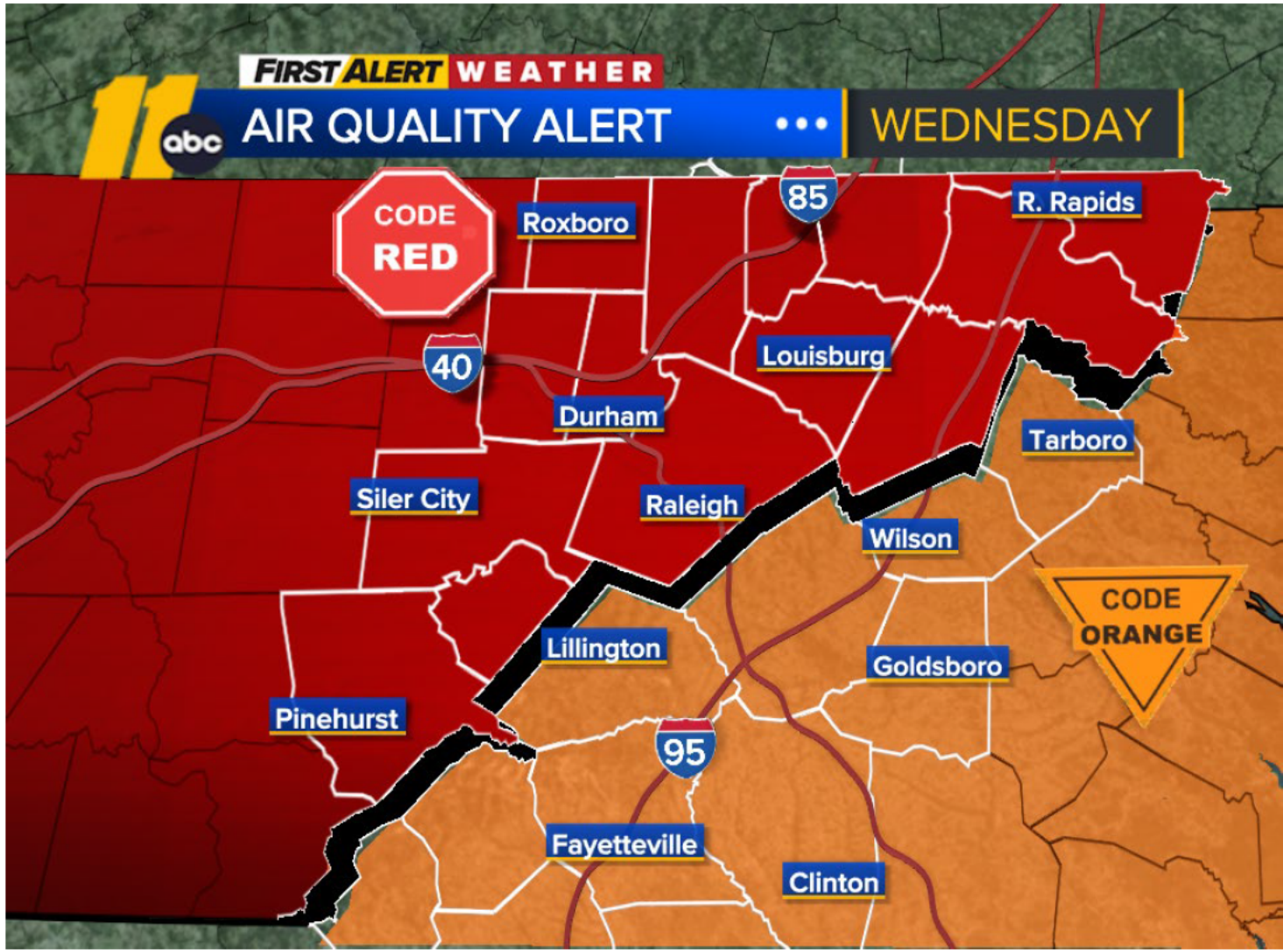




Sharing Air Quality Info with Partners

airnow.gov





Updates to the AQI

AQI Category and Index Value	Previous AQI Category Breakpoints	Updated AQI Category Breakpoints	What changed?
Good (0 – 50)	0.0 to 12.0	0.0 to 9.0	EPA updated the breakpoint between Good and Moderate to reflect the updated annual standard of 9 micrograms per cubic meter
Moderate (51 – 100)	12.1 to 35.4	9.1 to 35.4	
Unhealthy for Sensitive Groups (101 – 150)	35.5 to 55.4	35.5 to 55.4	No change, because EPA retained the 24-hour fine PM standard of 35 micrograms per cubic meter.
Unhealthy (151 – 200)	55.5 to 150.4	55.5 to 125.4	EPA updated the breakpoints at the upper end of the unhealthy, very unhealthy, and hazardous categories based on scientific evidence about particle pollution and health. The Agency also collapsed two sets of breakpoints for the Hazardous category into one.
Very Unhealthy (201 – 300)	150.5 to 250.4	125.5 to 225.4	
Hazardous (301+)	250.5 to 350.4 and 350.5 to 500	225.5+	

(Breakpoints are in micrograms per cubic meter)

- The Air Quality Index (AQI) was updated for $PM_{2.5}$
- Breakpoints changed
  - Tightened range of "good" air quality
  - Wider range of "moderate" air quality

AQI Factsheet

Smoke & PM2.5 Impacts on Our Communities

- DAQ receives many calls and questions about smoke during the year
- During larger wildfire or smoke events, DAQ shares information with the public on our AIR tool, social media, and through various partners
- Resources and tips on how to protect your health during a smoke event are available online:

https://www.deq.nc.gov/about/divisions/air-quality/smoke-wildfires-prescribed-burns

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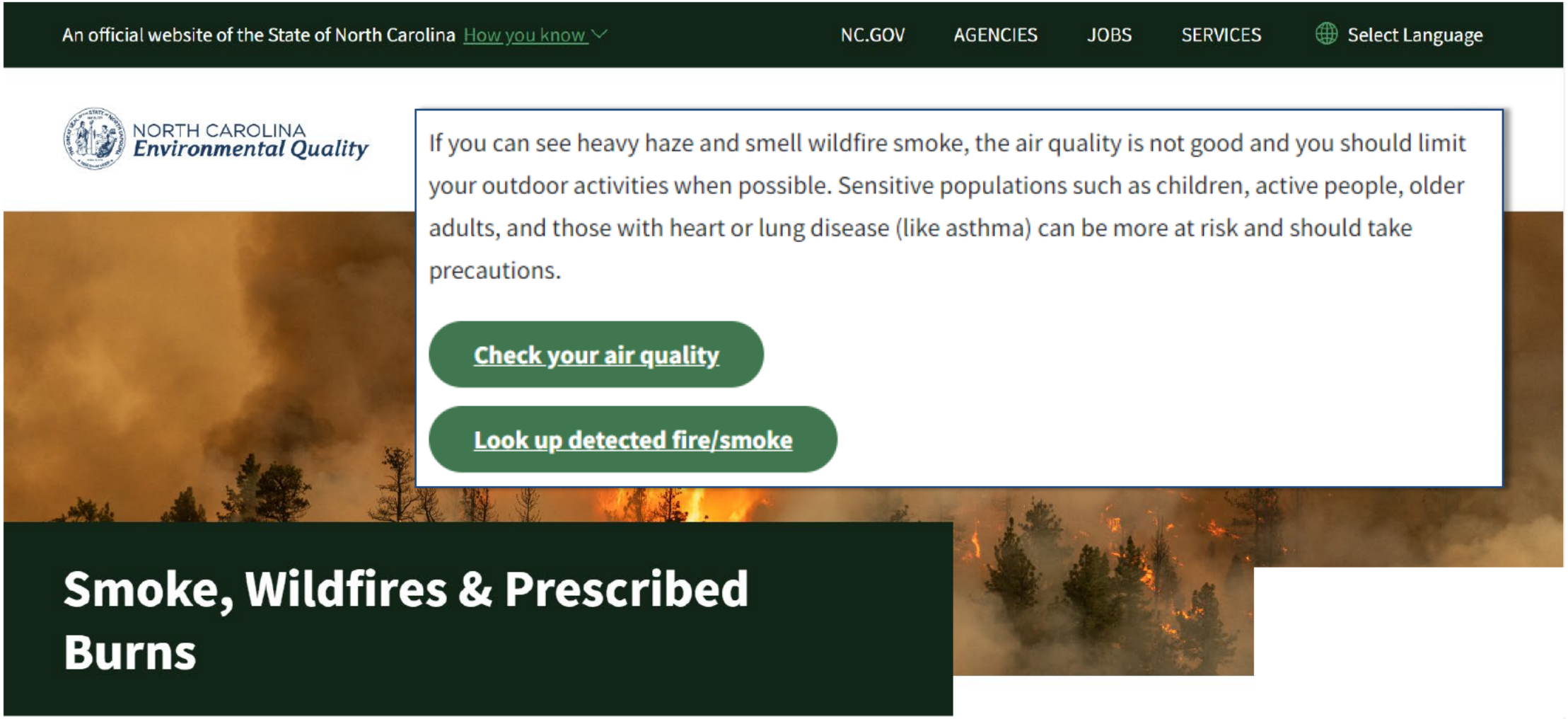
Smoke, Wildfires, and Prescribed Burns

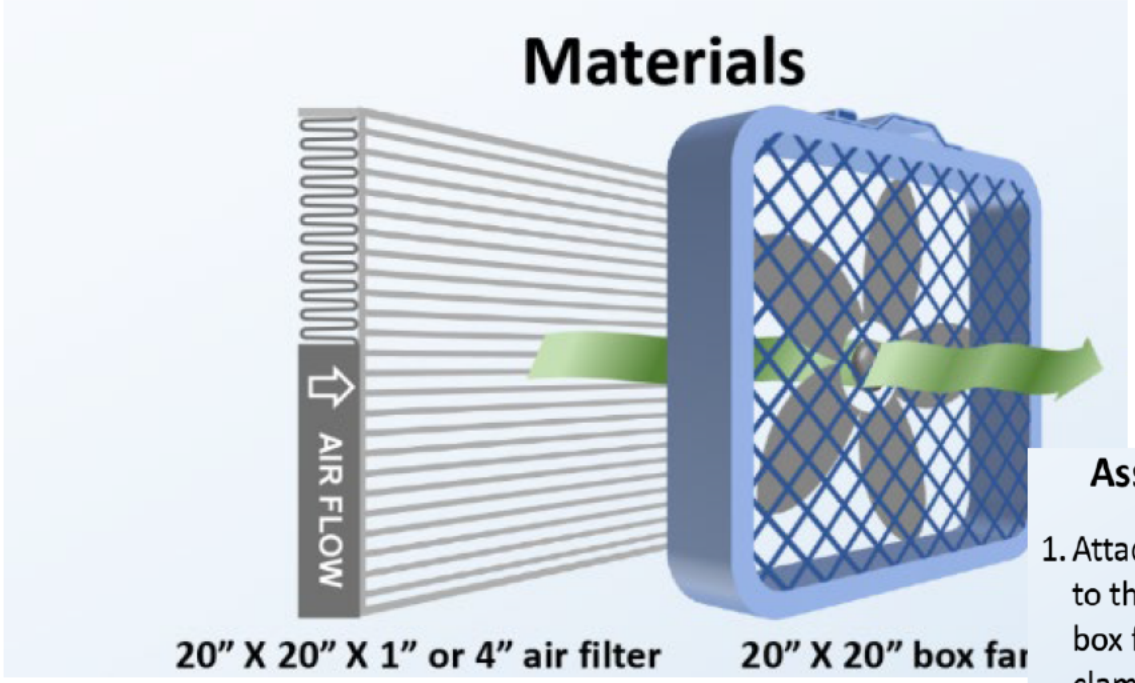
- https://www.deq.nc.gov/about/divisions/air-quality/smoke-wildfires-prescribed-burns

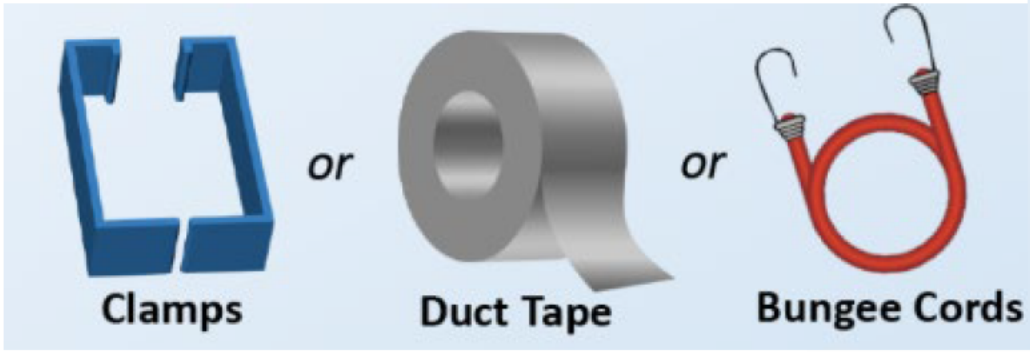


Practical Tips for handling smoke

During major smoke events, it is usually better to stay indoors if you have a central AC / HVAC circulating air through a filter.

- If you don't have central air, try to create a "clean room."
- A DIY air filter made with a box fan could be a lower-cost air filter option:
  - https://www.epa.gov/air-research/research-diy-air-cleaners-reduce-wildfire-smoke-indoors





Assembly

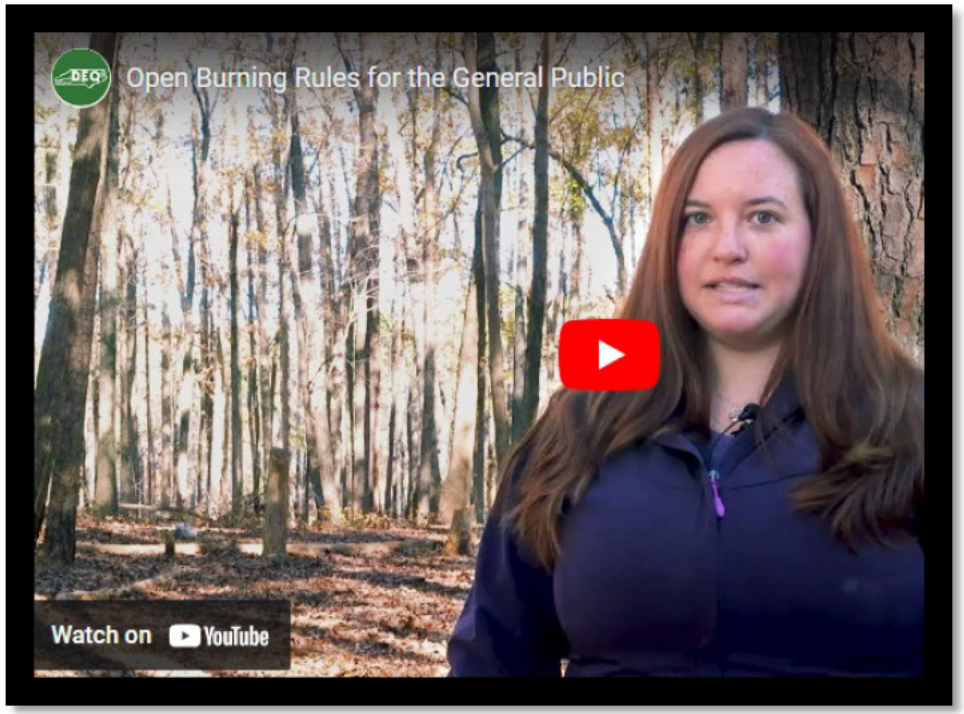
1. Attach the air filter to the back of the box fan using either clamps, duct tape or bungee cords.
2. Check the filter for the direction of the air flow (marked on the side of the filter).
3. Replace filters when dirty.

Prescribed Burning

Illegal Open Burning

North Carolina law prohibits burning trash and non-vegetative materials.

Leaves, branches and other plant growth can be burned under certain conditions.



deq.nc.gov/openburning

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How can you stay informed about new PM2.5 standard information and related information?

- ncair.org
- deq.nc.gov/pm2.5updates

NORTH CAROLINA Department of Environmental Quality

DAQ is Committed to Clean Air

- We value your voice! Send us any questions or comments.
- DAQ is working with partners to engage communities in Mecklenburg and Davidson counties.
- Environmental Justice Impact Analysis in development.
  - Report will look at demographics in Mecklenburg and Davidson counties (race/ethnicity, poverty, language, health outcomes, and more).
- DAQ works every day to improve and protect our air!

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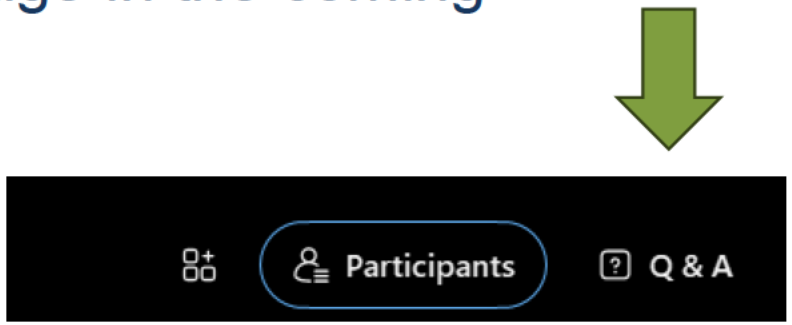
Questions & Answers (Q&A)

- To ask a questions to our panel, please use the Q&A feature on WebEx and type in the questions there
  - If you need to select in drop down menu, please select “All Panelist”

- A moderator will read the questions aloud to share with the audience then a panelist from DAQ will be able to respond.

- If you want to submit a question to DAQ in the future about this topic a question form will be available on this webpage in the coming (https://www.deq.nc.gov/pm2.5updates)



Resources

Links and resources for additional information

Health

- Health and Environmental Effects of Particulate Matter (PM)
- Wood Smoke & Your Health

DAQ

- 2024 $PM_{2.5}$ Standard - Updates
- Smoke, Wildfires & Prescribed Burns

Air Quality Forecasts

- Air Quality Portal
- Air Now

Monitoring

- Annual Network Plan

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Thank you!

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