

AirNow Redesign and Wildfire Smoke Tools

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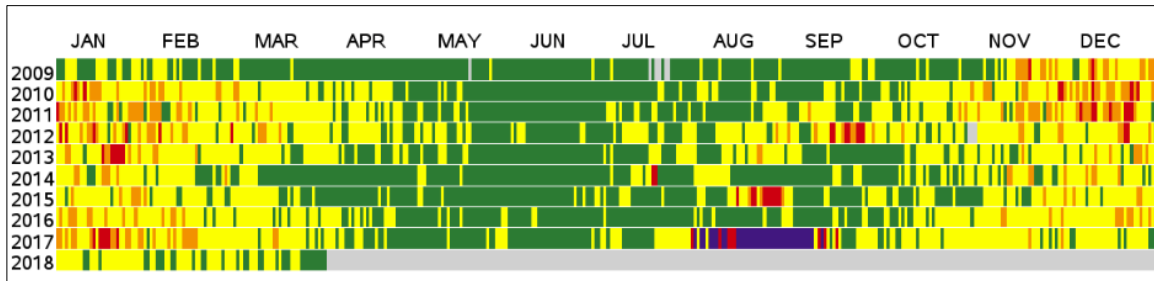
U.S. EPA – Office of Air Quality Planning and Standards

CSTE Climate & Respiratory Health Workgroup Bi-Monthly Call

October 2, 2018

Air Quality Index - Linking Air Quality and Health

- EPA's color-coded tool for communicating daily air quality and health information to the public
 - Nationally uniform – used by federal/state/tribal/local agencies
 - Used for all FRM/FEM monitors
 - Updated to reflect the latest standards and science
- The daily Air Quality Index (AQI) for fine particle pollution is a 24-hour index
- AQI is used for
 - Next-day forecasting
 - Current air quality (NowCast)
- Daily AQI reports for particle pollution show previous day's air quality



The Air Quality Index	
Index Values	AQI Category
0 - 50	Good
51 - 100	Moderate
101 - 150	Unhealthy for Sensitive Groups
151 - 200	Unhealthy
201 - 300	Very Unhealthy
301 - 500	Hazardous

PM2.5 Daily AQI Values 2009-2018, Missoula Co, MT
Data Viz (www.airnow.gov)

Air Quality Index

- Pollutant-specific health effects and cautionary statements address question “who will be affected”
- Based on health information supporting the NAAQS – uses health relevant averaging periods
 - Controlled human exposure, epidemiological studies exposure/risk assessments used to set breakpoints
 - Epidemiological studies useful for identifying risk factors and more serious effects
 - Controlled human exposure studies useful for identifying proportion of healthy population affected, symptoms, mechanisms of effects, genetic variability

How to use the AQI to lower the dose of inhaled pollution when air quality is poor:

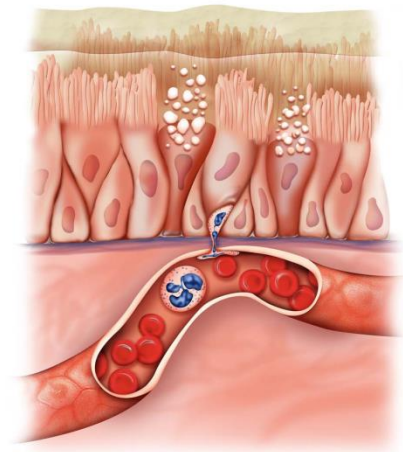
Dose = Concentration x Ventilation rate x Time

C - be active outdoors when air quality is better

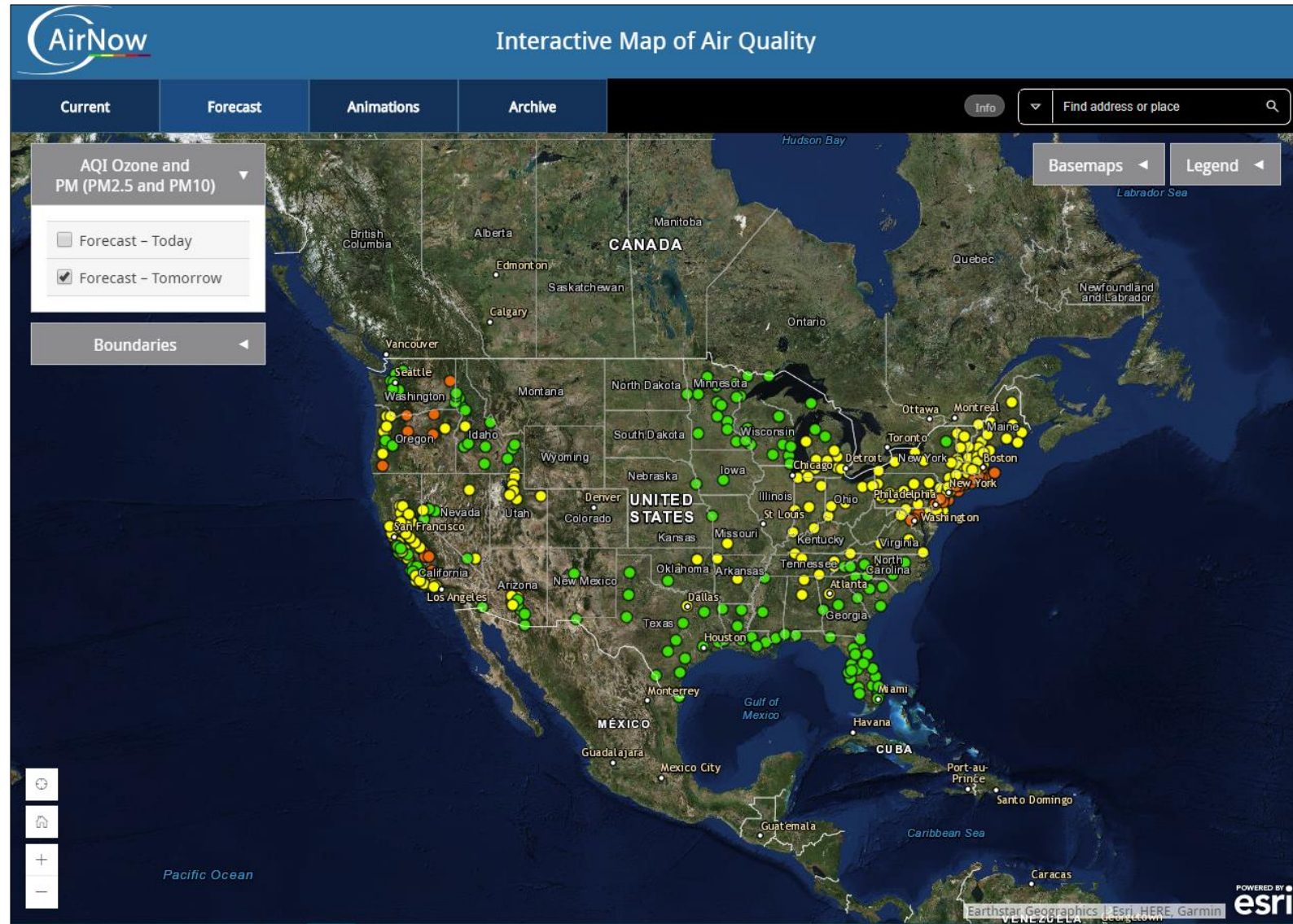
V - take it easier when active outdoors

T - spend less time being active outdoors

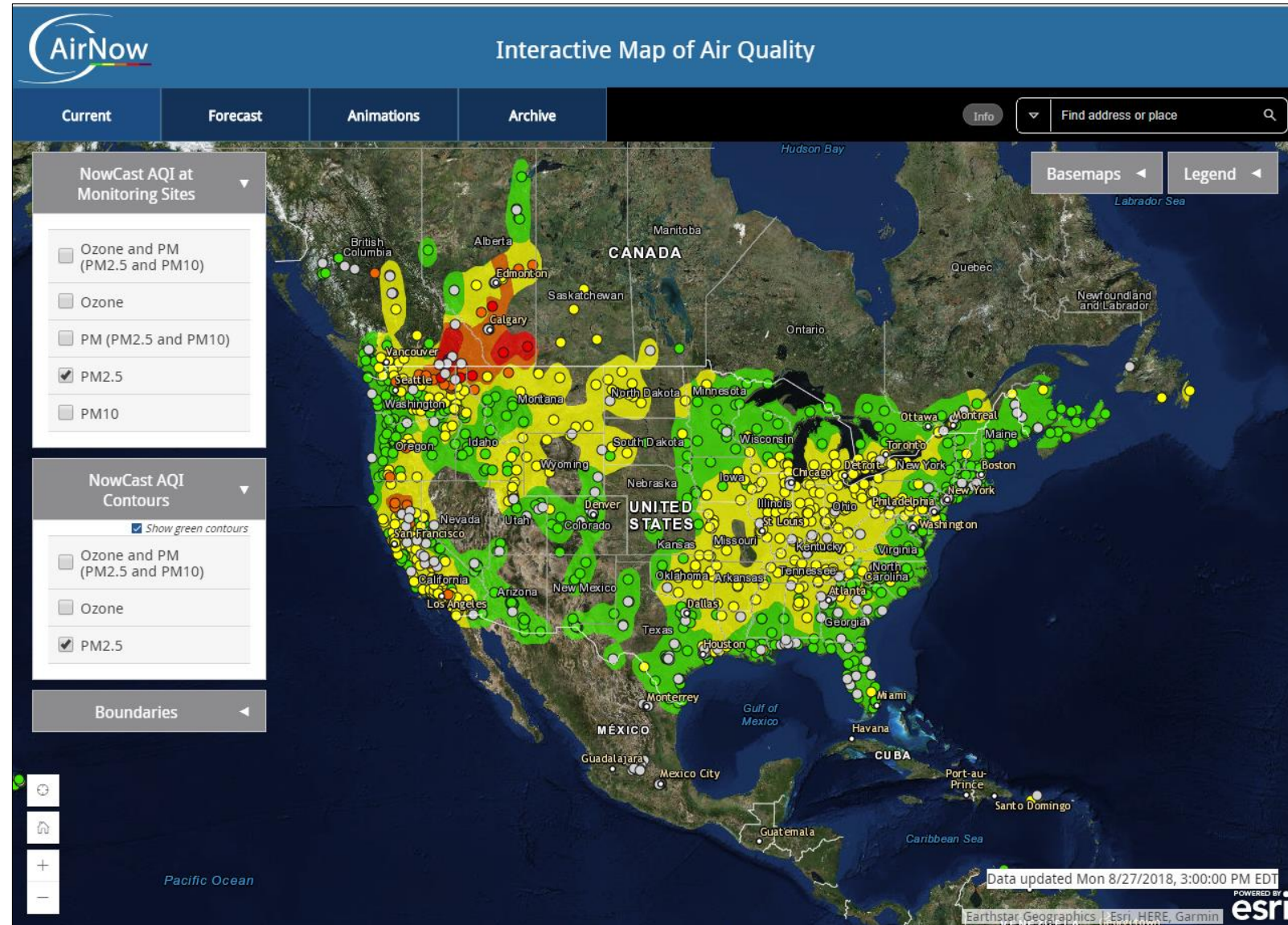
Since people respond differently - PAY ATTENTION TO SYMPTOMS!



Forecast AQI



Real-time AQI



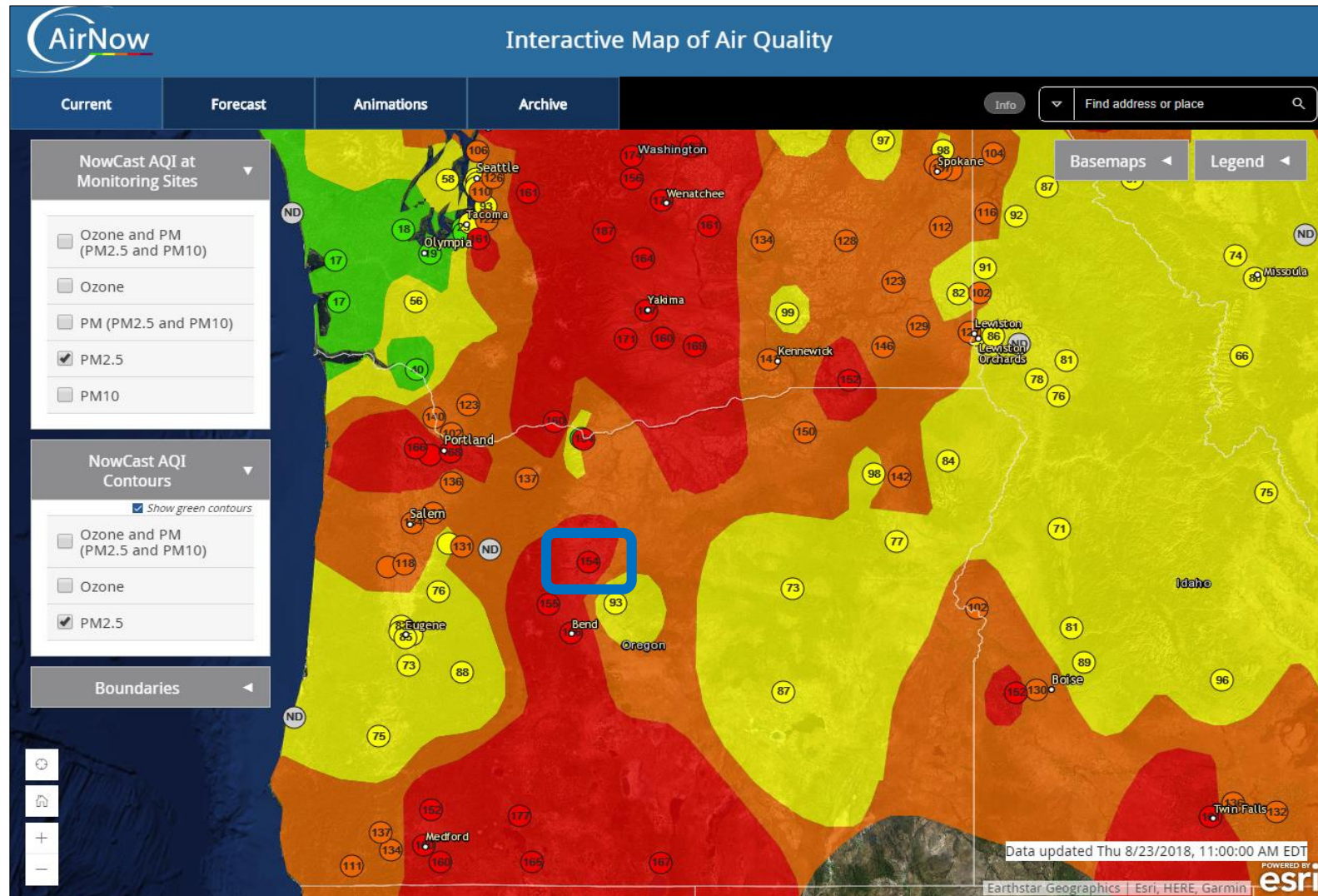
Real-time AQI – the Dial

- Mobile-friendly website
- Front page provides real-time and forecast AQI, map and box plot of hourly AQI values

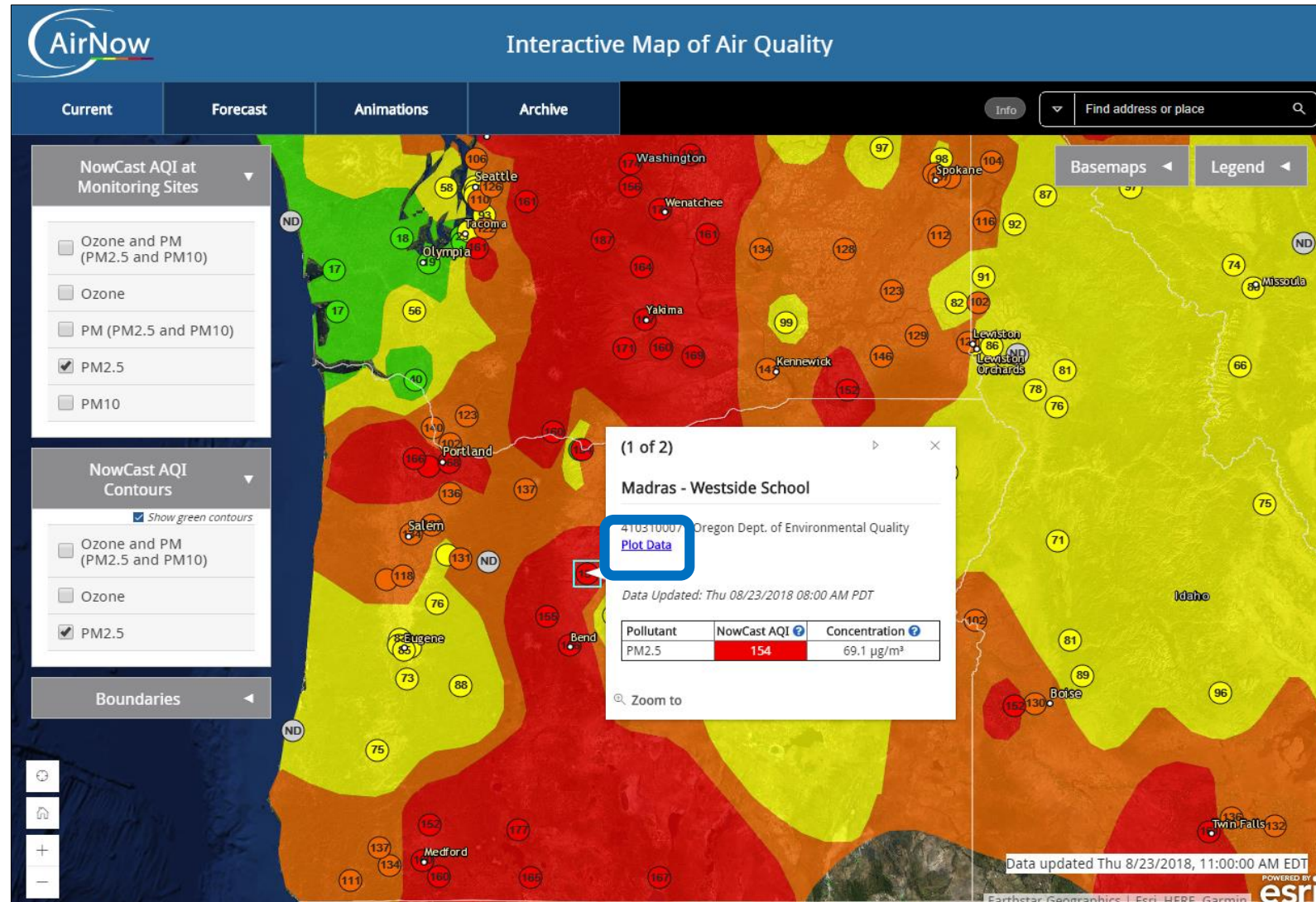


www.airnow.gov , 8/27/18

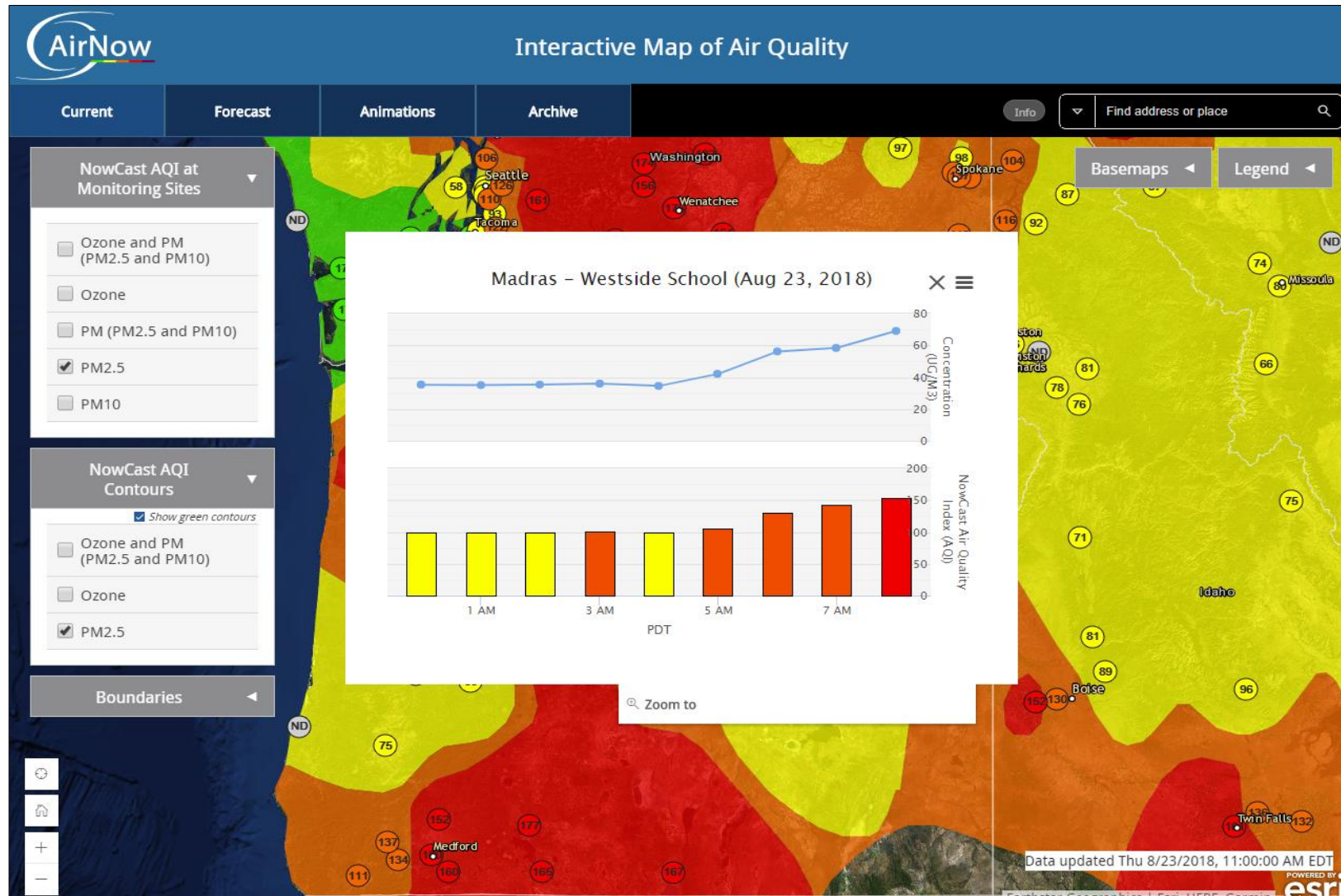
Tools to Interpret Sensor Data – Spatial Resolution



Tools to Interpret Sensor Data – Spatial Resolution



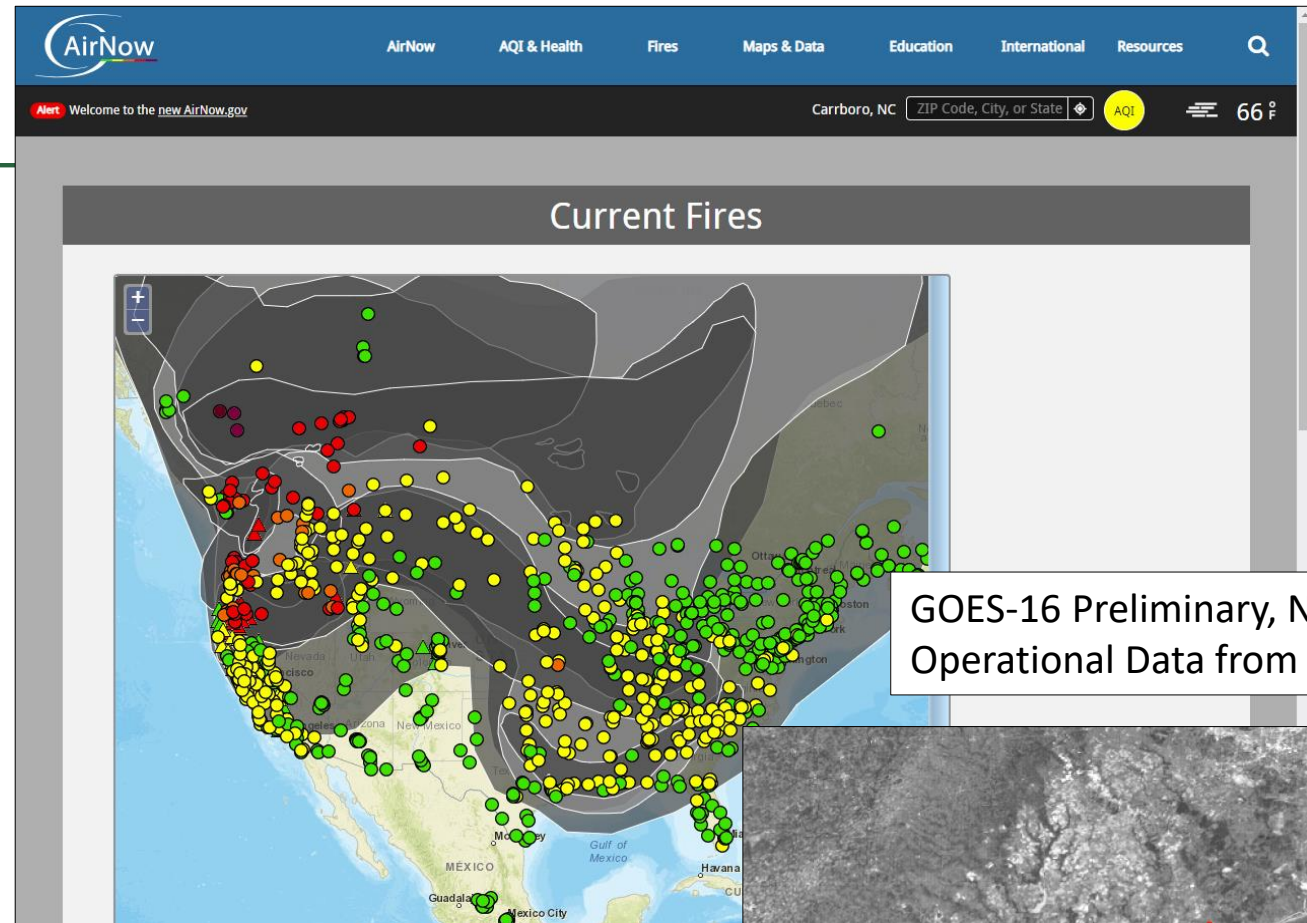
Tools to Interpret Sensor Data – Spatial Resolution



Satellite Data

NOAA Hazard Mapping System

- 10 satellites send images every 15 minutes
- NOAA analysts work 24/7 to update maps
- Reflects smoke in entire column
- Different temporal and spatial scales than the ambient monitoring network, but the association with the AQI and monitored data is evident
- GOES-16 provides higher resolution images to detect smoke from most fires
- Satellite imagery may also identify other potential air quality concerns



Air Resource Advisor Smoke Outlooks

Smoke Outlook for Southern Oregon and Northern California Border for Saturday and Sunday Aug. 25-26, 2018



Smoke Outlook for 8/25 - 8/26
California-Oregon Border
Issued at: 2018-08-25 07:38 PDT

Outlook for California-Oregon Border

Special Statement

This air quality forecast predicts potential particulate matter levels, not ozone. Forecast is based on 24 hour average.

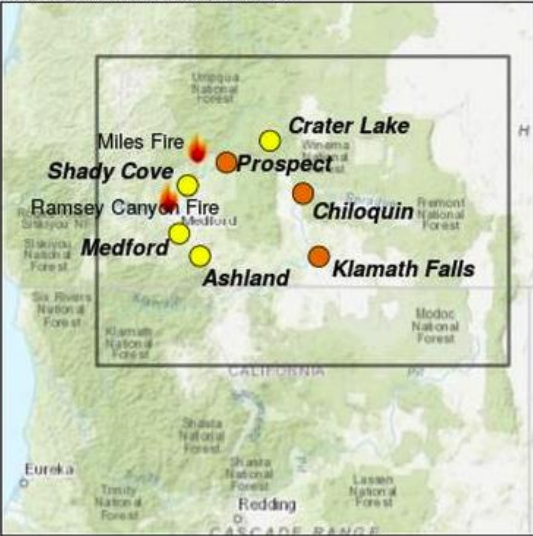
Fire

Miles and Columbus fires: 301 acres burned in the last 24 hours. Columbus is burning southern flank and Miles is burning north and northwest of the fire. The crew are working securing the fire perimeter. Ramsey Canyon fire is at 1,329 acres with 17% containment. The fire is burning tall grass, timber, and shrub and burning into 1994 fire scar. Watson Creek fire (not pictured on map) is burning 13 miles west of Paisley, OR. Watson Creek fire is at 46,525 acres with 10% containment. The crew are working on holding the line and conducting firing operation today.

Smoke

Air quality has improved significantly yesterday as the cooler temperature and gusty wind pushes the smoke out of the area. Northwest wind will continue today 5-12 mph with gusts up to 18 mph in some area. Watson Creek Fire will experience variable wind with westerly wind becoming north westerly by this evening then shifting to north easterly wind. Paisley will experience more smoke with west winds. Smoke conditions of varying densities are expected to continue for the next few days until the inversion breaks and gusty wind picks up pushing the smoke out.

Daily AQI Forecast for Aug 25, 2018



Station	Yesterday hourly	Fri 8/24	Forecast Comment for Today -- Sat, Aug 25	Sat 8/25	Sun 8/26
Ashland			Moderate smoke impact continues through Sunday.		
Medford			Moderate smoke impact continues through Sunday.		
Shady Cove			Air quality has improved in the morning and should be moderate for most of the day.		
Prospect			Due to close proximity to the fire, smoke impact will continue.		
Crater Lake			Air quality has improved in the morning and should be moderate for most of the day.		
Chiloquin			Smoke impact will continue due to northwest winds.		
Klamath Falls			Smoke impact will continue due to northwest winds.		

Issued 2018-08-25 07:38 PDT by Nicole Bringolf, Air Resource Advisor, not

Air Resource Advisor Smoke Outlook,
OR and Northern CA border, 8/25-
26/18

ARA Smoke Outlooks

- Issued for smoke from major fires
- Available on AirNow

Wildfire Smoke A Guide for Public Health Officials

- Updated look
- Health effects section
 - Addition of ozone
 - Prolonged exposures
 - Heat and smoke
 - Smoke vs urban particles
- New sections
 - PM web course for health professionals
 - Sensor use
 - After the fire and ash clean-up



Wildfire Guide Factsheets

Available now:

- Prepare for Fire Season
- Reduce Your Smoke Exposure
- Indoor Air Filtration
- Protect Your Lungs from Wildfire Smoke or Ash
- Protecting Children from Wildfire Smoke and Ash
- Protect Yourself from Ash

In development:

- Protect Your Pets
- Protect Your Large Animals and Livestock
- After the Fire

WILDFIRE SMOKE FACTSHEET

Protect Your Lungs from Wildfire Smoke or Ash

Wildfire smoke and ash can irritate your eyes, nose, throat, and lungs. They can make you cough or wheeze, and can make it hard to breathe. A respirator is a device (mask) that covers your nose and mouth, fits tightly to your face, and can filter out smoke or ash particles before you breathe them in. Respirators are not sized for children.

Protecting Your Health
The most effective way to protect yourself during wildfire emergencies is to stay indoors or limit your time outdoors when there is smoke in the air. This is especially important if you have heart or lung disease and are at higher risk for adverse health effects. Reducing physical activity and using HEPA-filtered air cleaners indoors are other ways to reduce your smoke exposure. Consider temporary relocation out of the smoky area if possible. By limiting your

How Do I Know if I Need to Wear a Respirator?

- People who stay indoors or limit their time outdoors during wildfire emergencies are doing the most effective thing to avoid exposure to smoke.
- People with heart or lung disease, older adults, and people with heart or lung disease.

WILDFIRE SMOKE FACTSHEET

Indoor Air Filtration

When wildfire smoke gets inside your home it can make your indoor air unhealthy, but there are steps you can take to protect your health and improve the air quality in your home. Reducing indoor sources of pollution is a major step toward lowering the concentrations of particles indoors. For example, avoid burning candles, smoking tobacco products, using aerosol products, and avoid using a gas or wood-burning stove or fireplace. Another step is air filtration. This fact sheet discusses effective options for filtering your home's indoor air to reduce indoor air pollution.

Filtration Options
There are two effective options for improving air filtration in the home: 1) upgrading the central air system filter, and 2) using high efficiency portable air cleaners. Before discussing filtration options, it's important to understand the basics of filter efficiency. The standard for filter efficiency is the Minimum Efficiency Reporting Value, or MERV. For residential use, a MERV 13-16 can reduce indoor particles by as much as 95 percent. Filters with a High Efficiency Particulate Air (HEPA) rating, (or MERV 17-20) are the most efficient. You may need to consult with a local heating and air technician or the manufacturer of your central air system to confirm which (or if) high efficiency filters will work with your system. If you can't switch to a more efficient filter, running the system continuously by switching the thermostat fan from "Auto" to "On" has been shown to reduce

WILDFIRE SMOKE FACTSHEET

Protect Yourself from Ash

Protect yourself from harmful ash when you clean up after a wildfire. Cleanup work can expose you to ash and other products of the fire that may irritate your eyes, nose, or skin and cause coughing and other health effects. Ash inhaled deeply into lungs may cause asthma attacks and make it difficult to breathe. Ash is made up of larger and tiny particles (dust, dirt, and soot). Ash deposited on surfaces both indoors and outdoors can be inhaled if it becomes airborne when you clean up. Ash from burned structures is generally more hazardous than forest ash.

Avoid Ash Exposure
Avoid direct contact with ash. If you get ash on your skin, in your eyes, or in your mouth, wash it off as soon as you can.

People with heart or lung disease, including asthma, older adults, children, and pregnant women should use special caution around ash.

Children and pets: Children should not be nearby while you clean up ash. Do not allow children to play in ash. Clean ash off all children's toys before use. Clean ash off pets and other animals. Keep pets away from contaminated sites.

Recommended Actions
Clothing: Wear gloves, long-sleeved shirts, long pants, shoes and socks to avoid skin contact. Goggles are also a good idea. Contact with wet ash can cause chemical burns or skin irritation. Change your shoes and clothing before you leave the cleanup site to avoid tracking ash offsite, into your car, or other places.

WILDFIRE SMOKE FACTSHEET

Reduce Your Smoke Exposure

When wildfires create smoky conditions, there are things you can do, indoors and out, to reduce your exposure to smoke. Reducing exposure is important for everyone's health — especially children, older adults, and people with heart or lung disease.

Reduce smoke exposure indoors

- **Stay inside** with the doors and windows closed. Whether you have a central air conditioning system or a room unit, use high efficiency filters to capture fine particles from smoke. Ask an air conditioning professional what type of high efficiency filter your air conditioner can accept.
- **Seek shelter elsewhere** if you do not have an air conditioner and it is too warm to stay inside with the windows closed.
- **Do not add to indoor air pollution.** Do not burn candles or use gas, propane, wood-burning stoves, fireplaces, or aerosol sprays. Do not fry or broil meat, smoke tobacco products, or vacuum. All of these can increase air pollution indoors.
- **Use a portable air cleaner** to reduce indoor air pollution. Make sure it is sized for the room and that it does not make ozone, which is a harmful air pollutant. Portable air cleaners can be used along with efficient central air systems with efficient filters to maximize the reduction of indoor particles.

WILDFIRE SMOKE FACTSHEET

Prepare for Fire Season

If you live in an area that is regularly affected by smoke or where the wildfire risk is high, take steps to prepare for fire season. Know how to get ready before a wildfire. Know how to protect yourself from smoke exposure during a wildfire. Being prepared for fire season is especially important for the health of children, older adults, and people with heart or lung disease.

Prepare Before a Wildfire

- **Stock up** so you don't have to go out when it's smoky. Have several days of medications on hand. Buy groceries that do not need to be refrigerated or cooked, because cooking can add to indoor particle levels.
- **Create a "clean room"** in your home. Choose a room with as few windows and doors as possible, such as a bedroom. Use a portable air cleaner and avoid indoor sources of pollution.
- **Buy a portable air cleaner** before there is a smoke event. High-efficiency particulate air (HEPA) filter air cleaners, and electrostatic precipitators that do not produce ozone, can help reduce indoor particle levels.
- **Understand** how you will receive alerts and health warnings, including air quality reports and public service announcements, from local officials.

- **If you have heart or lung disease**, check with your doctor about what you should do during smoke events.
- **If you have asthma or another lung disease**, update your respiratory management plan.
- **Have a supply of N95 masks** and learn how to use them. They are sold at many home improvement stores and online.
- **Organize** your important items ahead of time and know where to go in case you have to evacuate.

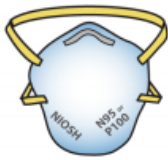
Infographics

 **Reduce health risks in areas with wildfire smoke:**

Follow these tips, especially if someone in your family (including you!) has heart or breathing problems, is an older adult or child, or is pregnant.

DO

- Stay inside
- Pay attention to local advisories and check air quality (airnow.gov)
- Set car A/C on recirculate (to keep smoke out)
- Keep a supply of medicine and non-perishable food
- Use a well-fitted N95 or P100 respirator if you go outside when it is smoky
- Prepare to evacuate if smoke levels get too high



KEEP AIR CLEAN	
Close windows and doors. Close fresh intake on A/C units. If your home is too warm, try to stay with friends or relatives.	Use a portable air cleaner with HEPA filters properly sized for a specific room.

DON'T

- X Play or exercise outdoors
- X Fry or broil foods, which can add particles to indoor air
- X Use a fireplace, gas logs or gas stove
- X Smoke indoors
- X Vacuum, it can stir up dust



airnow.gov

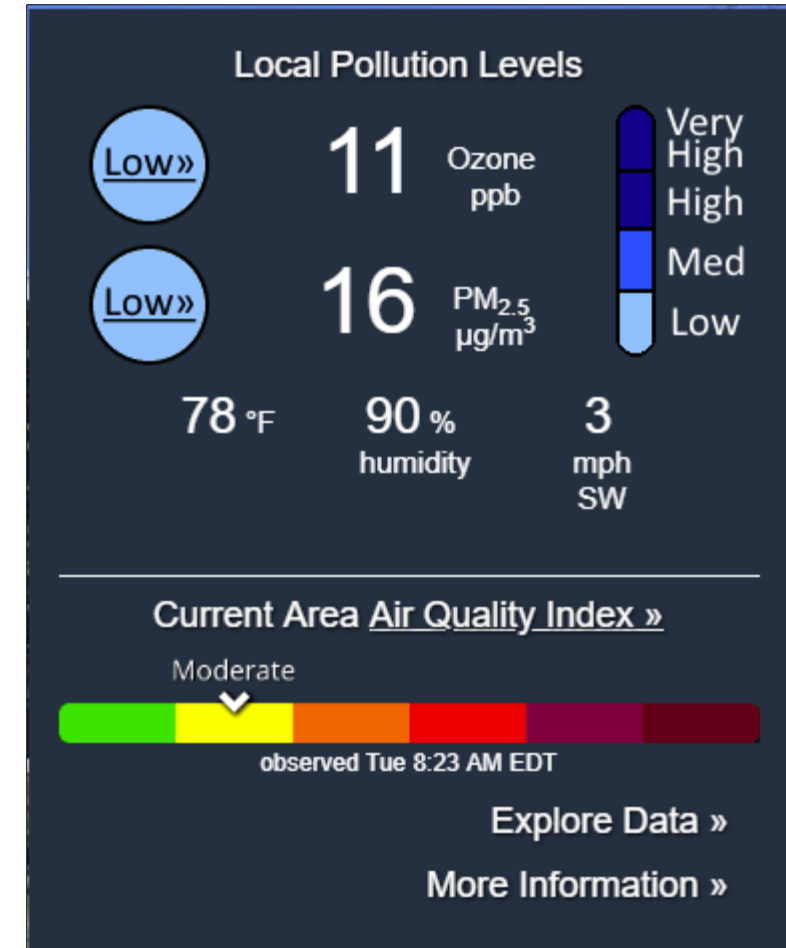
Air Quality Sensors

- Sensors may provide local air quality information at the current moment
- Sensors can provide information about whether air quality is getting better or worse, whether it is better inside or outside
- Sensor readings are associated with behavioral messages using EPA's pilot Sensor Scale

Pilot Sensor Scale and the AQI

Based on air quality analyses of 1-hr peak to 24-hr mean PM ambient air quality data:

- A “low” sensor reading outdoors corresponds to a 24-hour average concentration below the level of the 24-hour NAAQS and in the “good” or “moderate” AQI categories.
Enjoy your outdoor activities.
- A “medium” sensor reading generally corresponds to the “moderate” or “unhealthy for sensitive groups” AQI categories.
If medium readings continue (for an hour or more), use the Air Quality Index to plan outdoor activities.
- A “high” or “very high” sensor reading corresponds to concentrations that can occur near sources, such as a smoke event.
You may be near a source of particle pollution like dust, smoke or exhaust. Check the Air Quality Index to plan outdoor activities.



Village Green station, Durham NC, 8/28/18, 8:30 am

<https://www.airnow.gov/index.cfm?action=airnow.villagegreen>

Future Opportunities with Sensors

- Along with rapidly improving air quality sensors, strides are being made in biometric sensors for health parameters
 - For example, sensors for heart rate, blood pressure, temperature, blood oxygen saturation, ECG are readily available
 - NIH – National Institute of Biomedical Imaging and Bioengineering (<https://www.nibib.nih.gov/science-education/science-topics/sensors>)
- Sensor development may allow us to study the health and physiological effects of smoke
 - Brief exposures or prolonged exposures (cumulative effects)
 - At-risk populations
 - Effectiveness of interventions at modifying behaviors, including those related to indoor air quality

National Interagency Fire Council (NIFC) Outlooks

