Wildfire Smoke: Measurements, Communication and Protection

Lane Regional Air Protection Agency

Jo Niehaus, Public Affairs Manager

LRAPA

WHAT IS LRAPA?

Lane Regional Air Protection Agency (LRAPA) is a local government agency that monitors and regulates air quality.

VISION

Community partners working together to ensure clean air for everyone

MISSION

To protect public health, quality of life, and the environment as a leader and advocate for the continuous improvement for air quality in Lane County.

HISTORY

1955
Air Pollution Control Act of 1955 was passed

1968
LRAPA was founded

1969
ODEQ was founded

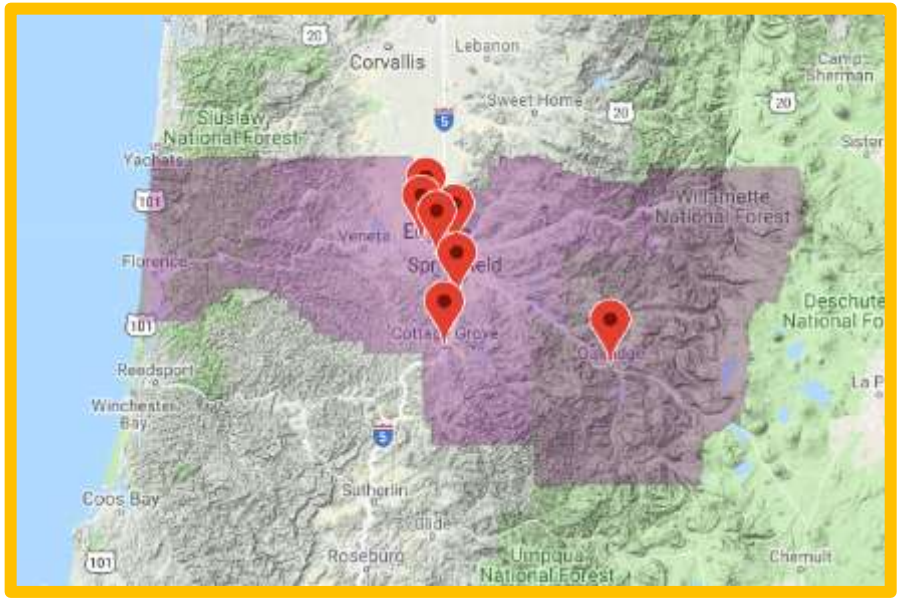
1970
EPA founded and Clean Air Act passed

2019
LRAPA is the only local air agency in Oregon

AIR QUALITY IN LANE COUNTY

LRAPA has eight air monitoring stations in Lane County

Air quality in Lane County has steadily improved over the last decades despite exceptional events



LRAPA monitors criteria pollutants at these stations, specifically

PM 2.5 and O

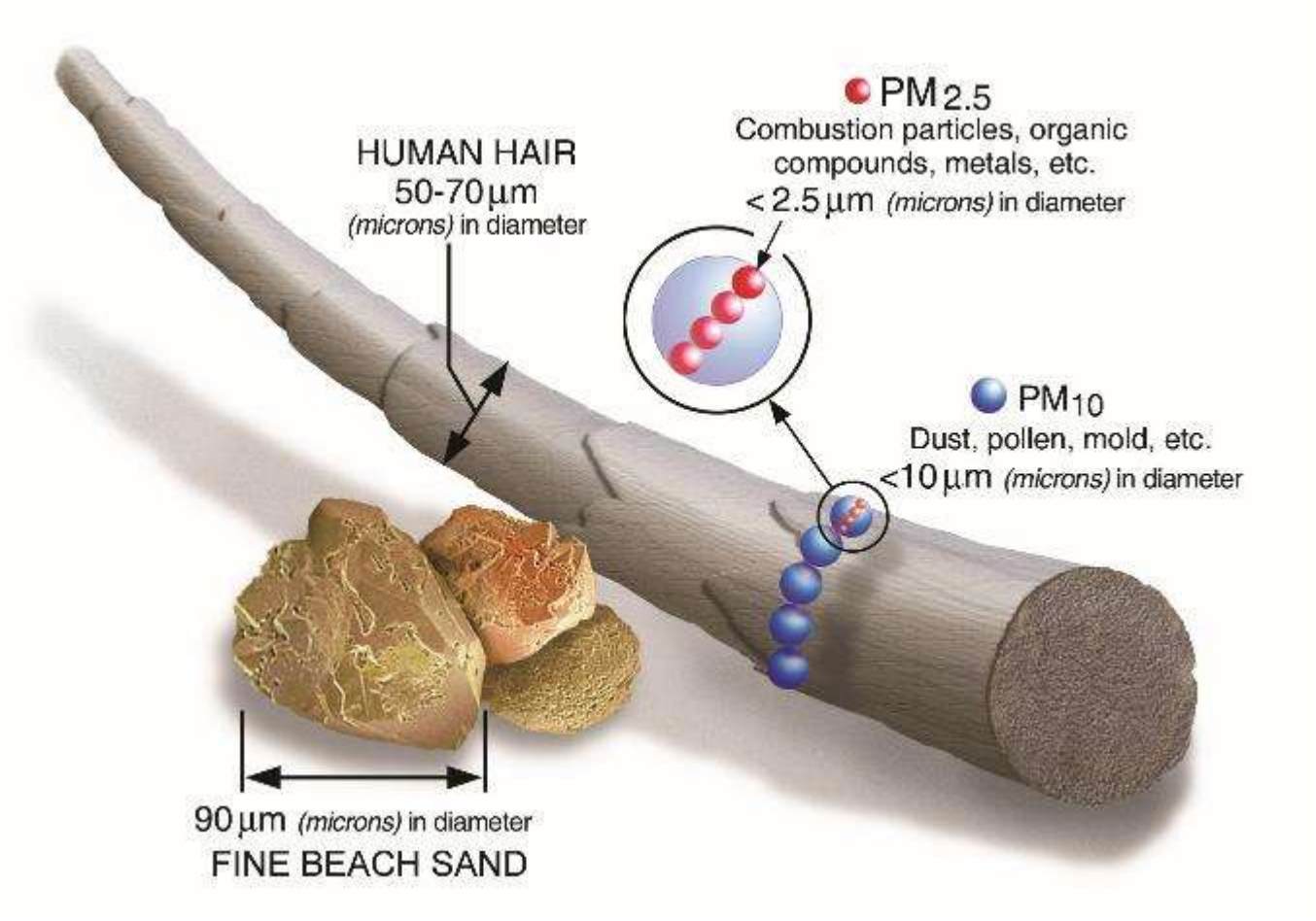
PARTICULATE MATTER (PM)

PM_{10} – inhalable particles that are 10 microns or smaller.

$PM_{2.5}$ – respirable particles that are 2.5 microns or smaller.

Linked to a variety of problems, including:

- Heart and lung disease
- Non-fatal heart attacks
- Aggravated asthma
- Decreased lung function
- Other respiratory symptoms
- Visibility
- Ground soil and water damage



HEALTH EFFECTS

WHO DOES PM AFFECT

People more susceptible to negative health impacts:

- Children under 12
- Seniors
- Pregnant women
- People with pre-existing heart and lung conditions
- People with respiratory issues
- Everyone… at a certain point!

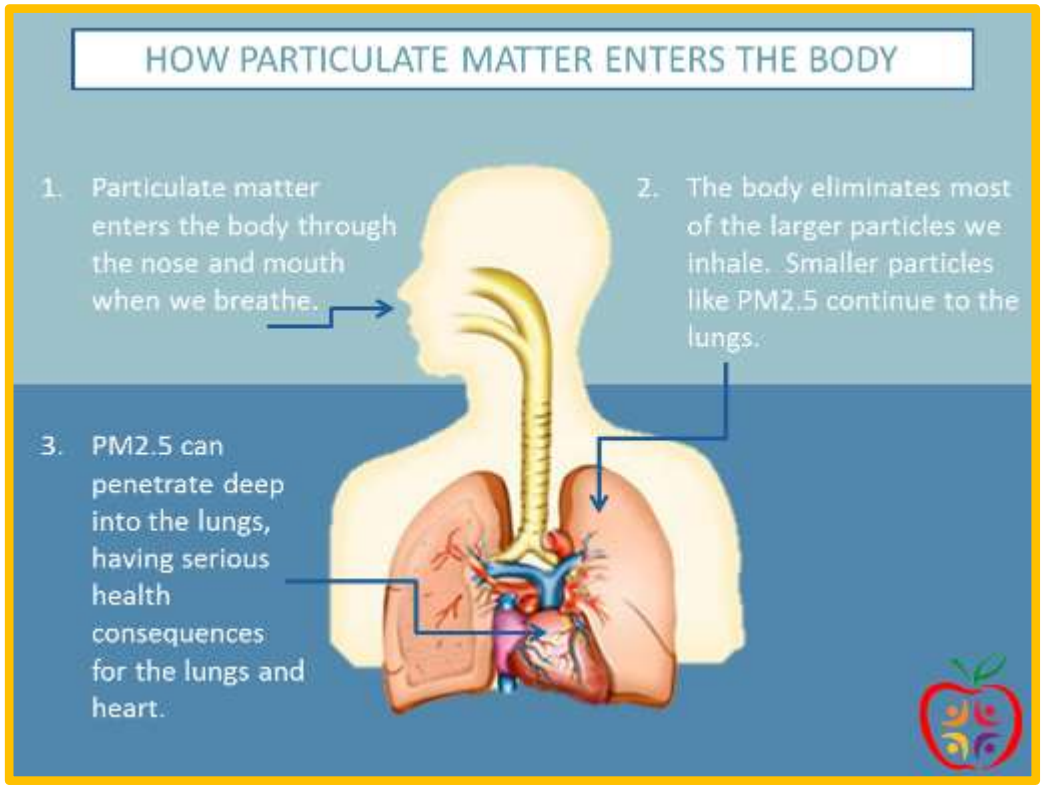


Figure from Utah Department of Health

HEALTH EFFECTS

MINIMIZING RISK

Protecting yourself and your family:

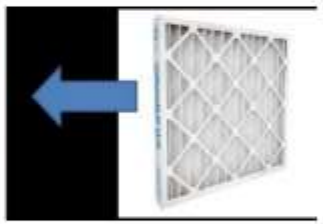
- Check the AQI often! If it is in the unhealthy for sensitive group range, choose indoor activities
- Consider a mask. N95 masks are the only ones that filter out PM, but **does not work well for everyone**
- Have a plan! Cleaner air spaces, health care plans, and getting air filters in advance.

How to Build an Inexpensive Room Filter

1. Shopping list:
   - 20" inch 3-speed box fan. Retails at $20-$25.
   - 20" x 20" x 1" Air Filter with at least a **MERV-13 rating.** Retails at $15-$20.
     - Note that you can use up to 3 filters per fan
   - Duct tape

2. Use the duct tape to attach the 20" x 20" x 1" air filter to the back of the fan.

   There are arrows marked on the filter to indicate the proper direction for airflow. The arrows should point towards the fan.



3. Check the filter: You can tell when it's time to change the filter by its color - as dust and particulates get caught in the filter, it will turn from white to brown."

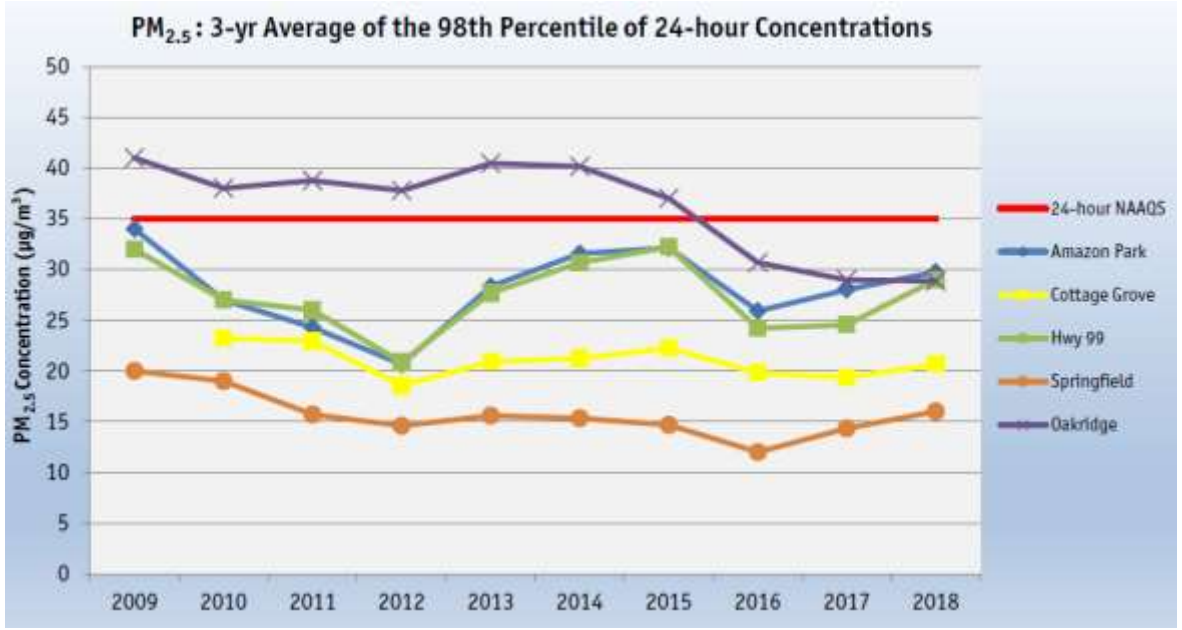
CONSULT YOUR PHYSICIAN: If you or a family member have heart or lung disease, if you are an older adult, or if you have children, talk with your doctor about whether and when you should leave the area when air quality is unhealthy.

Courtesey of Mariposa County, CA:
http://www.mariposacounty.org/DocumentCenter/View/66513/DIY_RoomAirFilter201807_FERGUSON?bidId

National Ambient Air Quality Standards (NAAQS)

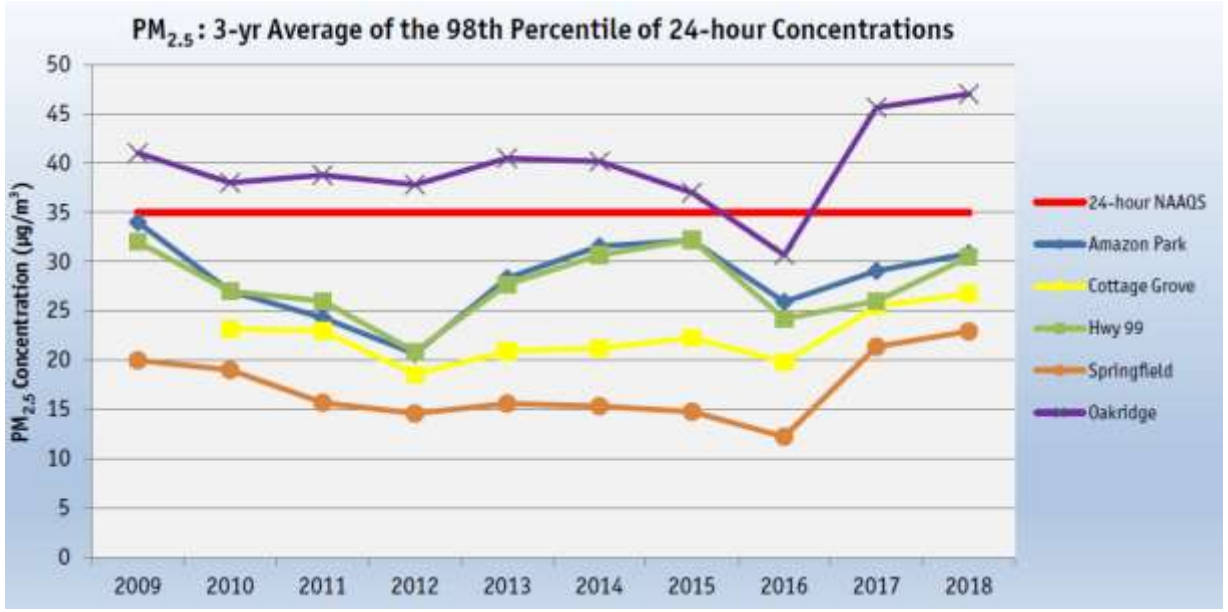
Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide	primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead	primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide	primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	primary and secondary	Annual	53 ppb	Annual Mean
Ozone	primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution $PM_{2.5}$	primary and secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

RECENT DATA – PM 2.5



PM 2.5 data,
excluding 2018

wildfire data

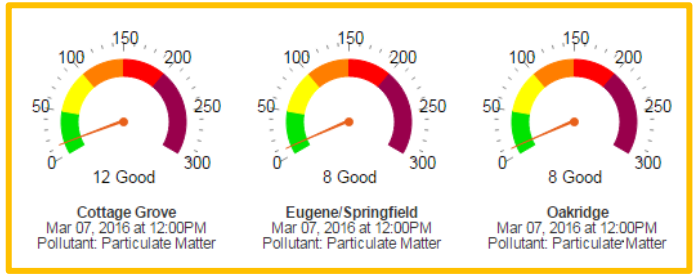


PM 2.5 data,
including 2018

wildfire data

UNDERSTANDING THE DATA

The Air Quality Index, or AQI, is a standardized scale that allows us to compare the different criteria pollutants.



The AQI is measured by calculating the levels of air pollutants, which LRAPA does from its seven air monitoring stations in Lane County

The AQI can fall into six categories: Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy, VERY Unhealthy and HAZARDOUS.

The AQI for Lane County was hazardous at times during the 2017 summer season for a few hours.

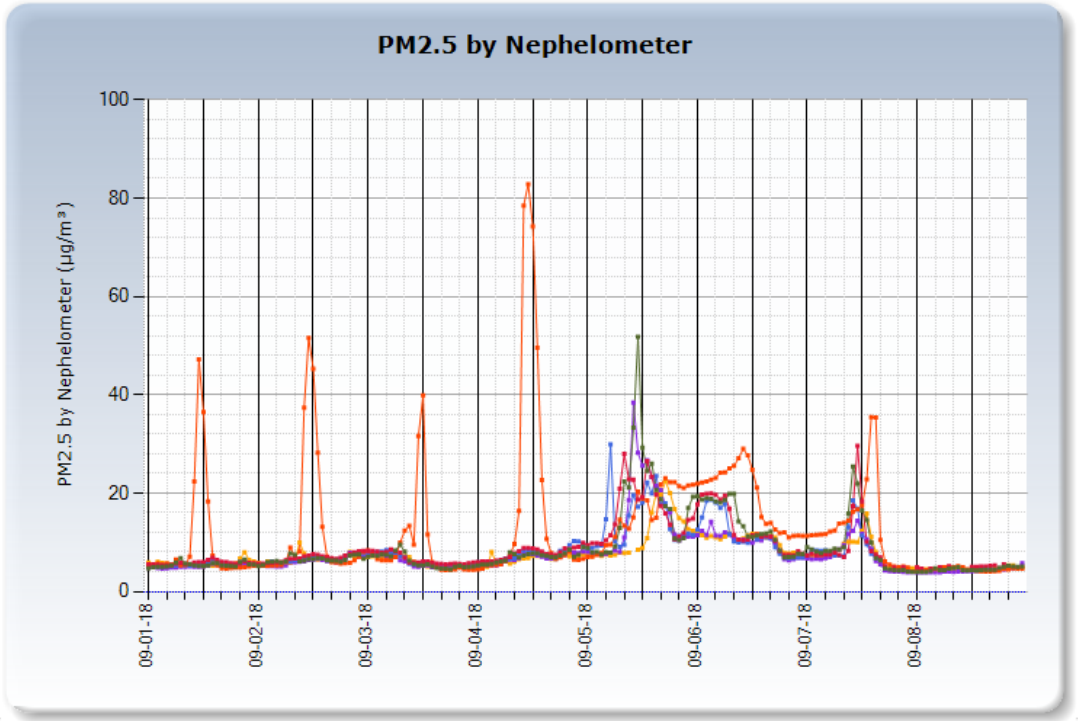
AIR QUALITY INDEX

The local AQI can be found at www.lrapa.org

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects.
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

Note: Values above 500 are considered Beyond the AQI. Follow recommendations for the "Hazardous category." Additional information on reducing exposure to extremely high levels of particle pollution is available here.

Data from 09/01/2018 to 09/08/2018
Download Chart (PDF) || Chart Instructions



	Site	Parameter	MIN	MAX	AVG	SUM
■	Cottage Grove - Cottage Grove	PM2.5 by Nephelometer	4.3	22.4	7.4	
■	Eugene - Amazon Park - Eugene	PM2.5 by Nephelometer	3.9	38.4	7.6	
■	Eugene - Highway 99 - Eugene	PM2.5 by Nephelometer	4.6	29.9	8.6	
■	Oakridge - Oakridge	PM2.5 by Nephelometer	4.0	82.8	12.8	
■	Santa Clara - Madison Middle School - Eugene	PM2.5 by Nephelometer	4.7	29.6	9.0	
■	Springfield - City Hall - Springfield	PM2.5 by Nephelometer	4.0	51.8	8.7	

AQI Calculator - US EPA Scale convertor

SELECT A POLLUTANT:

$PM_{2.5}$	Particulate <2.5 microns
PM_{10}	Particulate <10 microns
O_3	Ozone (1hr avg)
O_3	Ozone (8hr avg)
SO_2	Sulfur Dioxide (1hr avg)
SO_2	Sulfur Dioxide (24hr avg)
NO_2	Nitrogen Dioxide
CO	Carbon Monoxide

CONCENTRATION:

82.8

(expressed in $\mu g/m^3$)

AQI: **164**

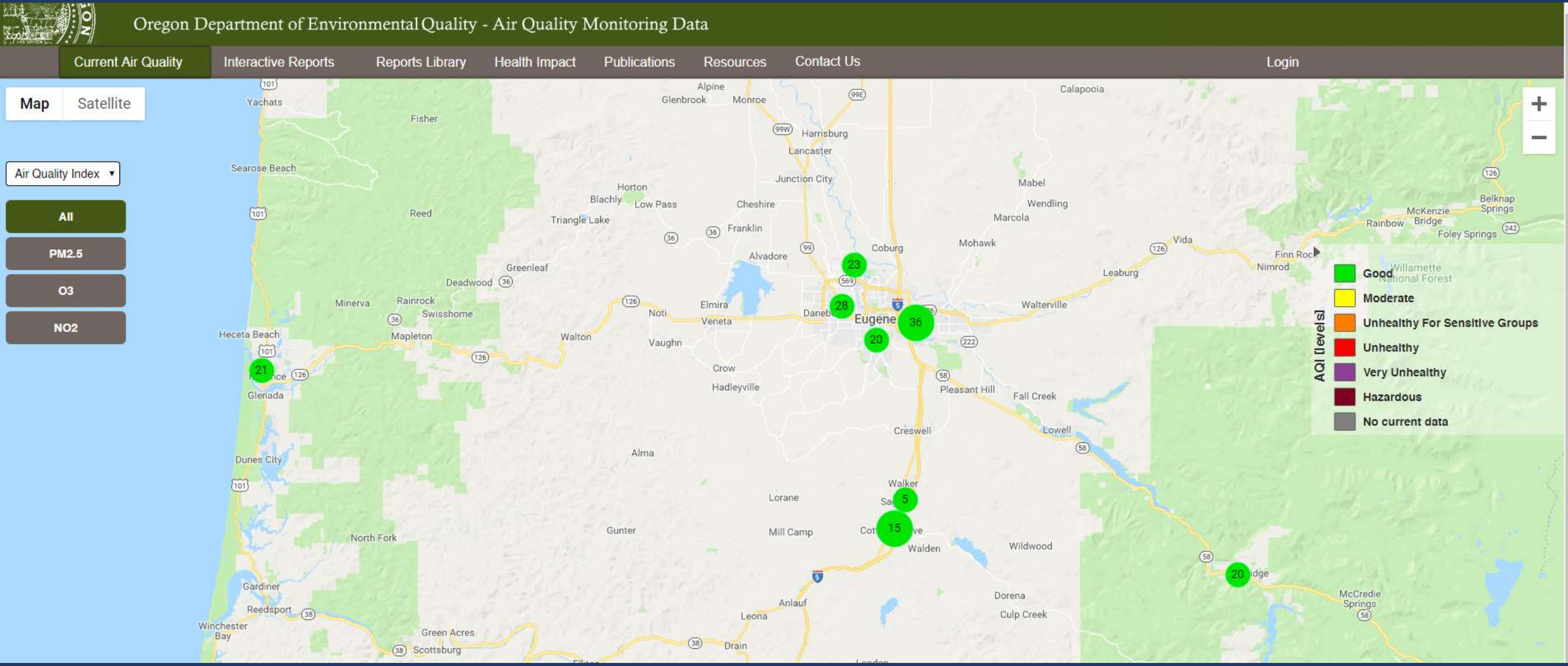
Unhealthy

Sensitive Groups: People with respiratory or heart disease, the elderly and children are the groups most at risk.

Health Effects Statements: Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.

Cautionary Statements: People with respiratory or heart disease, the elderly and children should avoid prolonged exertion; everyone else should limit prolonged exertion.

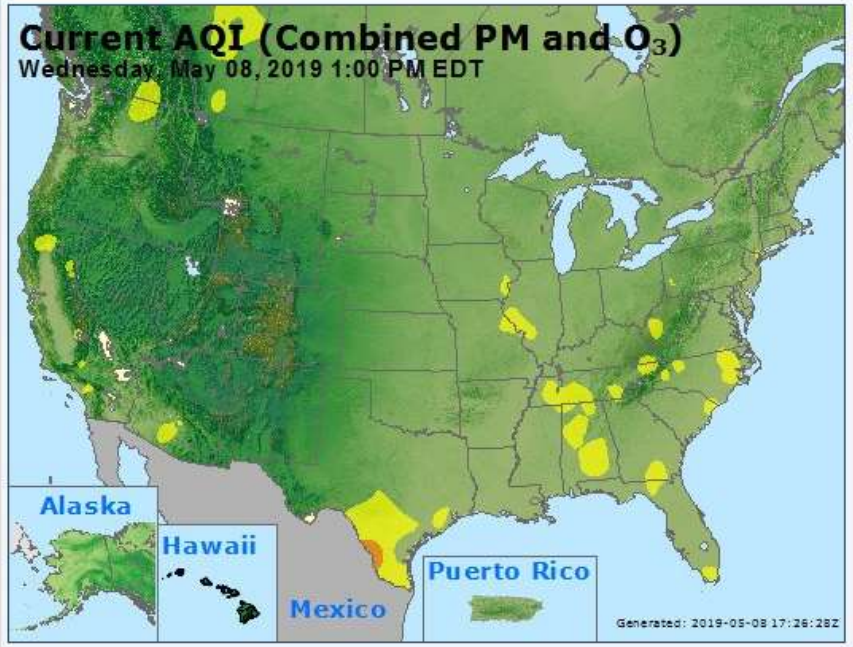
https://www.lrapa.org



Statewide information:
https://oraqi.deq.state.or.us/home/map

A mobile app is also now available for smart phones. Simply search for **OregonAir** in your app store.

Current AQI | Forecast | AQI Loop | More Maps



Good | Moderate | USG | Unhealthy | Very Unhealthy | Hazardous | ! Action Day

Highest 5:

About the Highest 5

Current AQI | Today's Forecasts | Tomorrow's Forecasts

Laredo, TX	106
Metro Riverside CO, CA	93
Norco/Corona, CA	93
Birmingham, AL	90
Hamilton County, FL	79

Note: Values above 500 are considered Beyond the AQI. Follow recommendations for the Hazardous category. Additional information on reducing exposure to extremely high levels of particle pollution is available.

Fires: Current Conditions

Click to see map

U.S. Embassies and Consulates
Data from air quality monitors at select U.S. embassies and consulates around the world

Announcements

Air Quality Awareness Week (AQAW) is April 29 – May 3, 2019. This year's theme is: Check the AQI & Get Outside.

3/26/19 - To help you get ready for fire season there are two new Wildfire Guide factsheets available: Protect Your Pets from Wildfire Smoke (PDF), and Protect Your Large Animals and Livestock from Wildfire Smoke (PDF).

more announcements

Air Quality Basics

Air Quality Index | Ozone | Particle Pollution | Smoke from fires | What You Can Do

Health

Learning Center

Apps | EnviroFlash | Facebook | Widgets | Webcams | RSS | Videos | Twitter | AirNow on Google Earth | Developer Tools

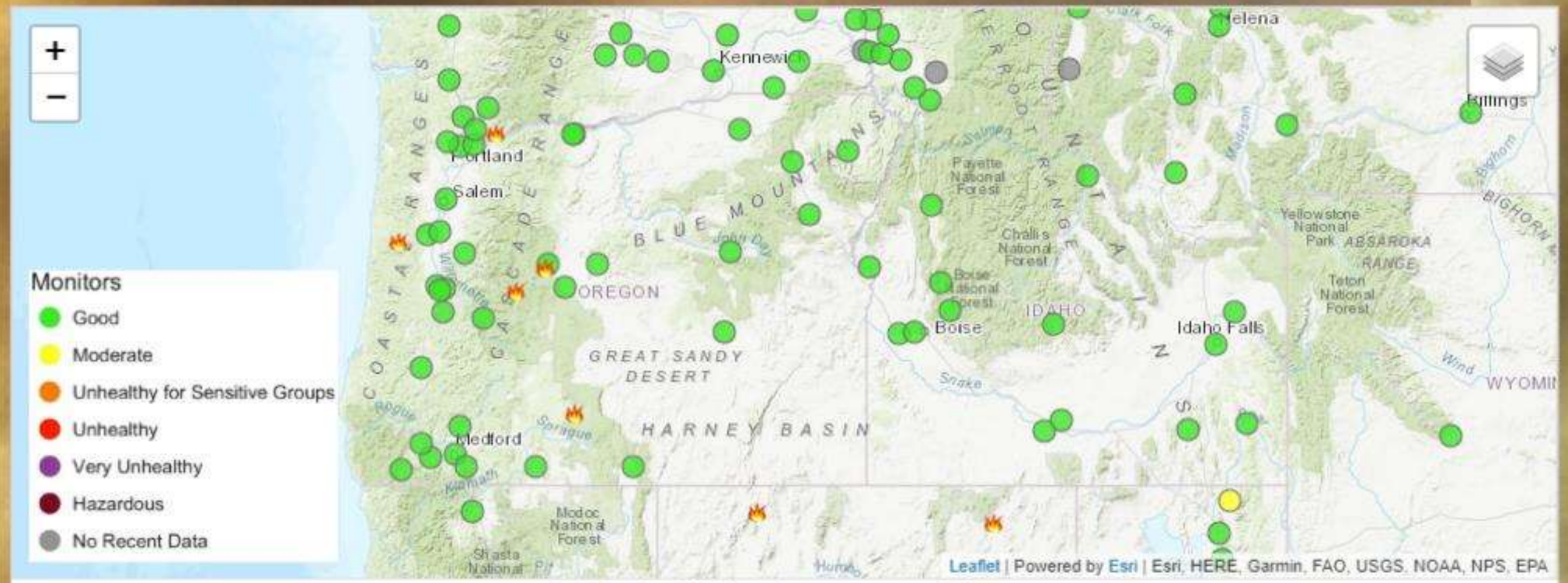
Popular Links

- AirNow Action Days
- AirNow International
- AQI Calculator
- FAQs
- Flag Program
- Publications | Publicaciones (en español)

National information:
https://www.airnow.gov

Oregon Smoke Information

This site is an effort by many city, county, tribal, state and federal agencies to coordinate and aggregate information for Oreg
communities affected by wildfire smoke. The information is posted here by the agencies themselves while volunteers built and
are maintaining the page.



Published by PNW smoke cooperators -- full map

The map above is not able to show all state air quality monitors. To see the whole set, go to the left column, under Hot Links and click on DEQ Air Quality map which will bring up a map with many additional state monitors. Round icons represent permanent state air quality monitors, triangular icons represent temporary smoke monitors (when deployed).

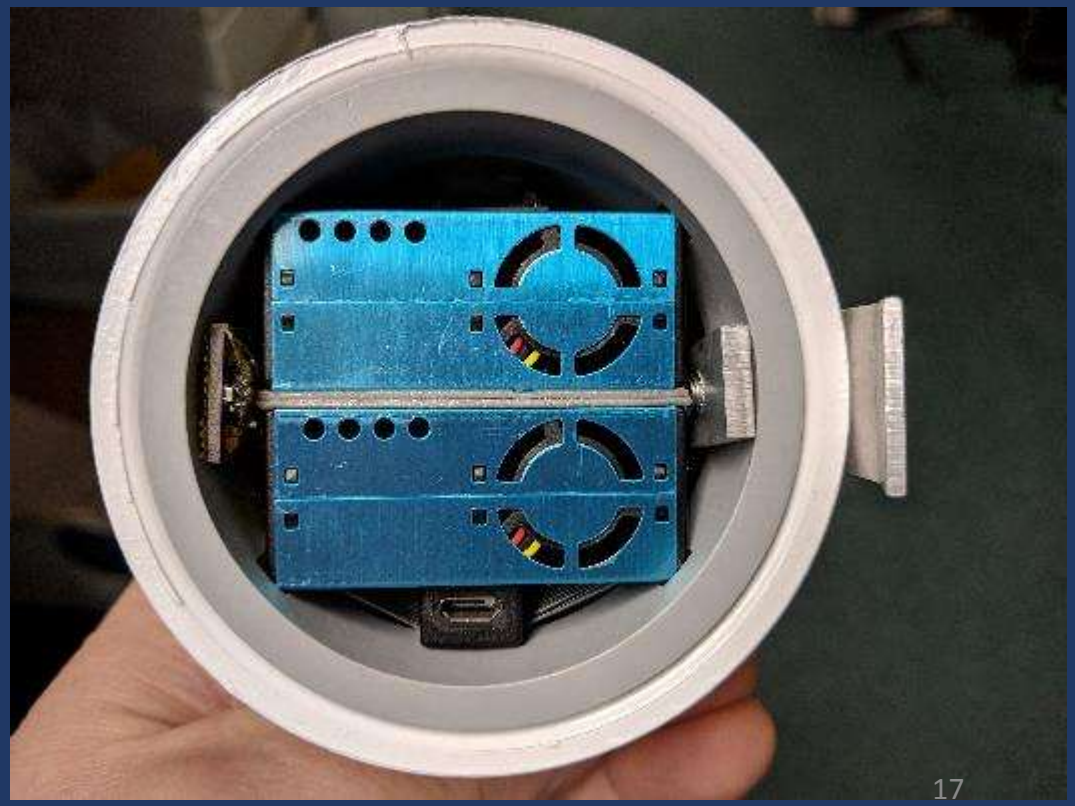
http://oregonsmoke.blogspot.com/

Purple Air PM Sensor

Optical Sampler

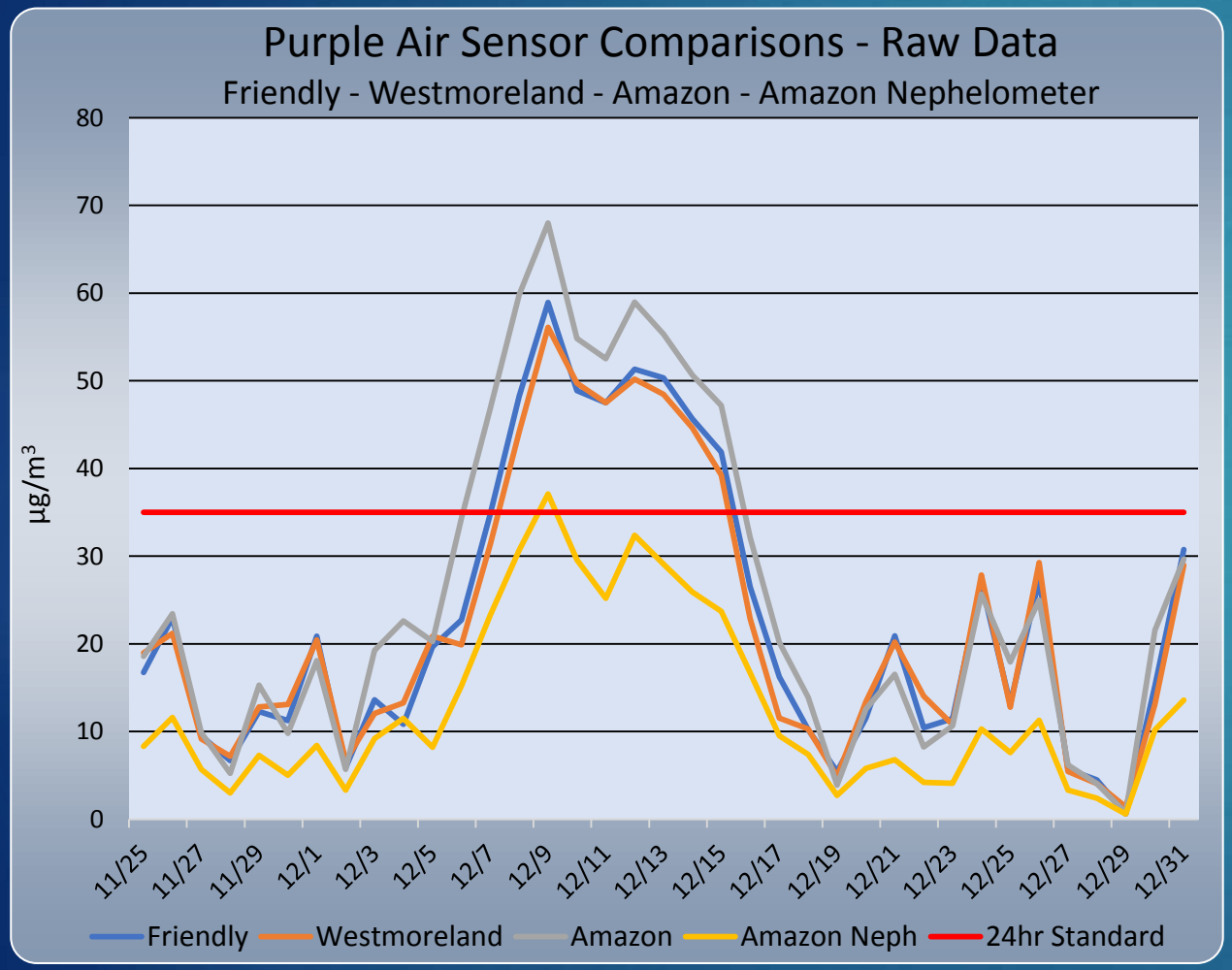
Light Scattering - Purple Air Sensor

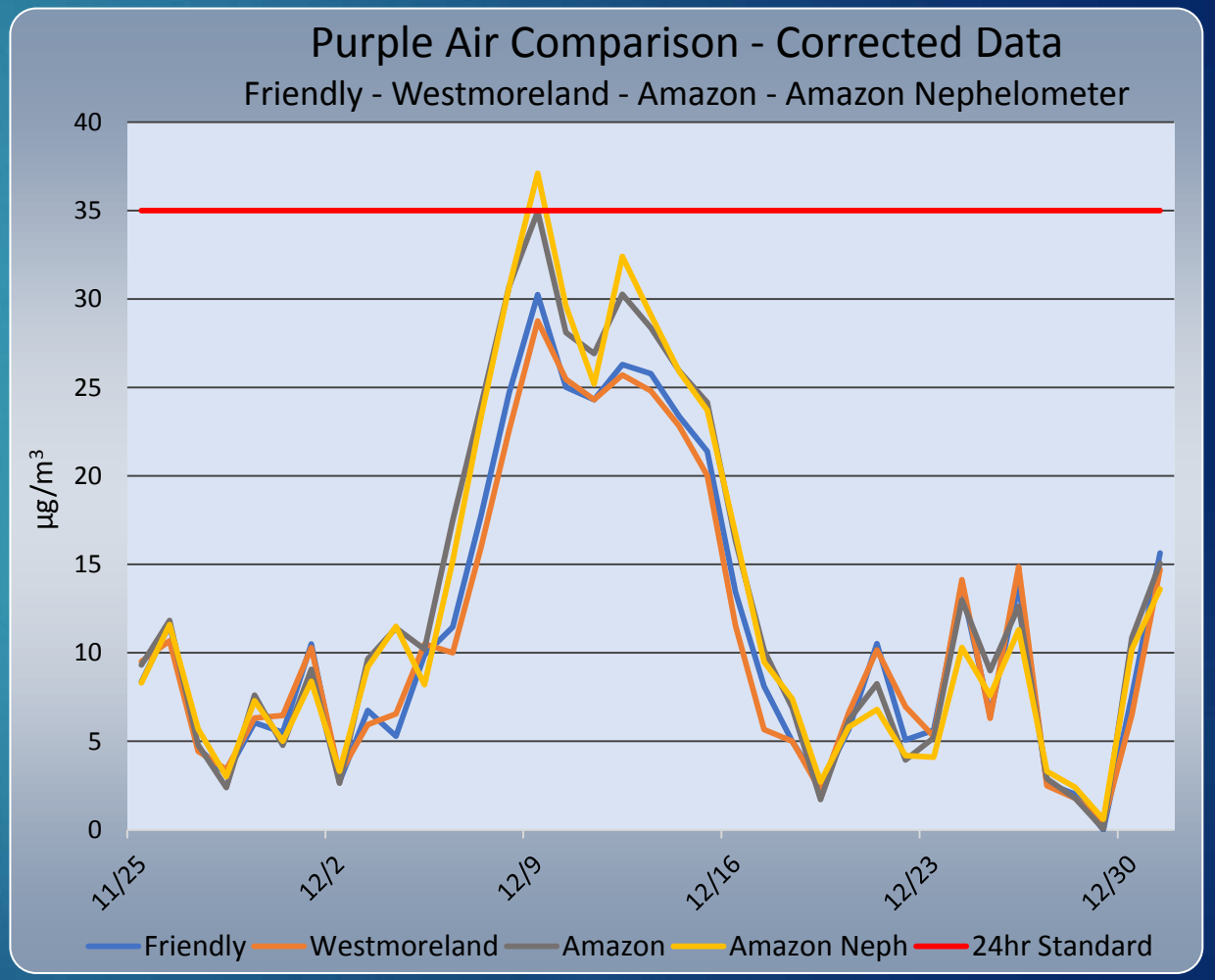
Cost ~ $250

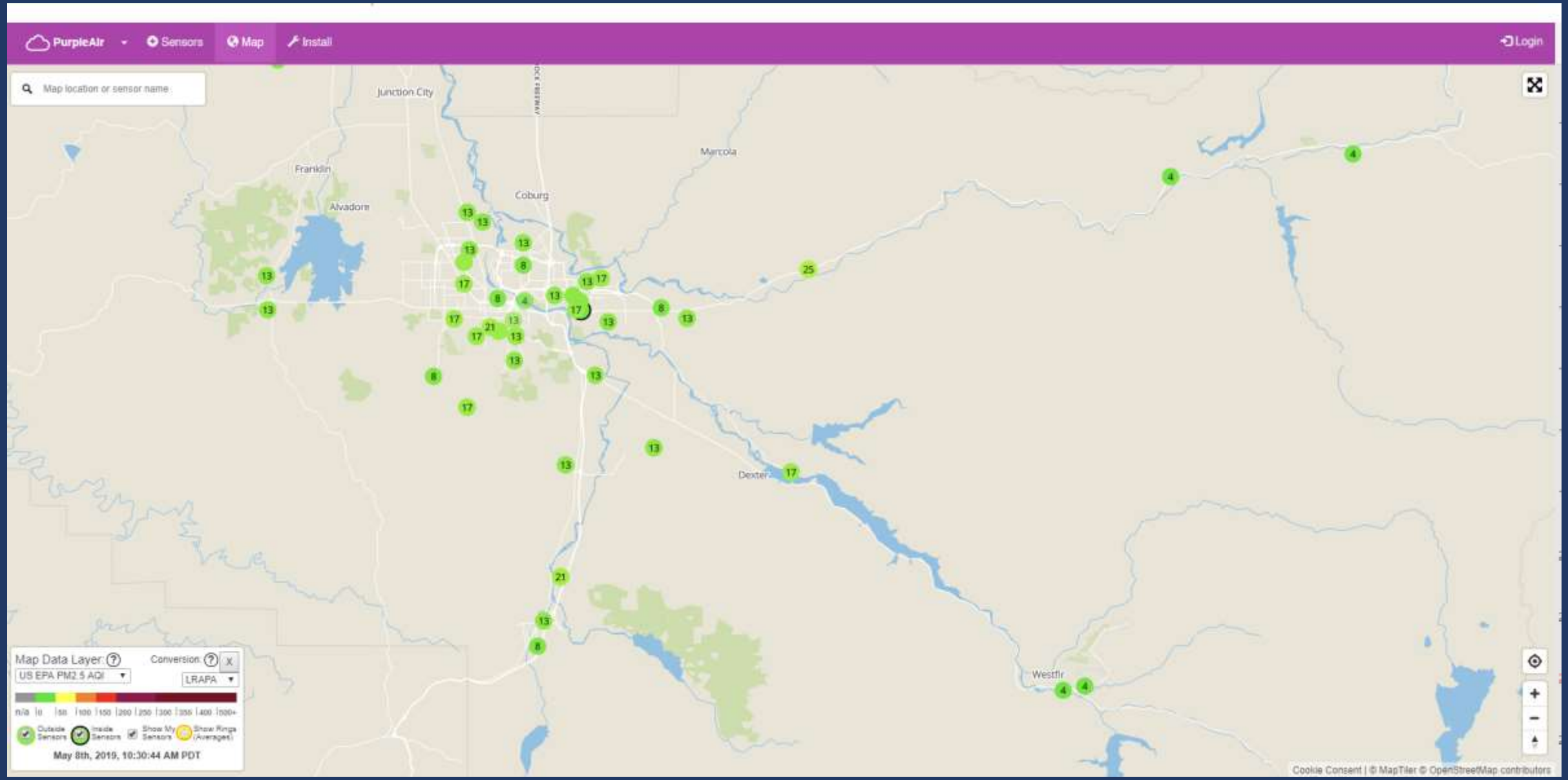


Purple Air Sensor Data

- Comparison of Amazon Park to Friendly Neighborhood





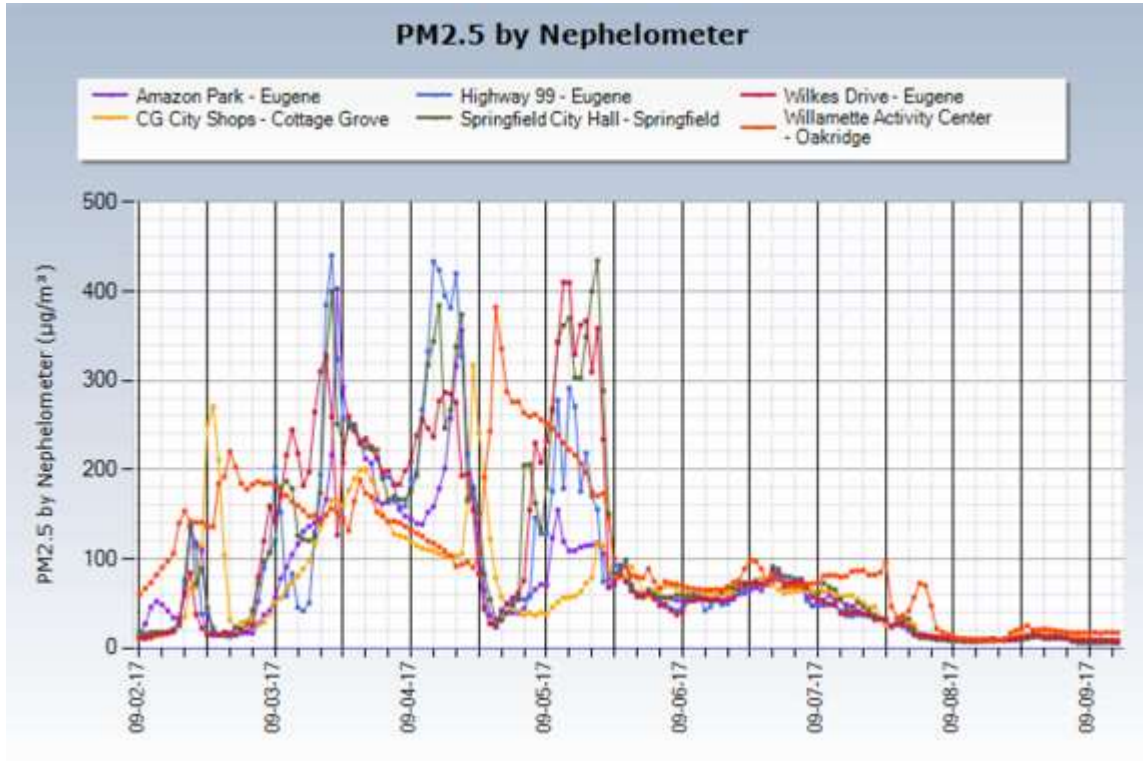


https://www.purpleair.com/

SUMMER 2017 WILDFIRES

Historical highs in PM 2.5 from wildfire smoke

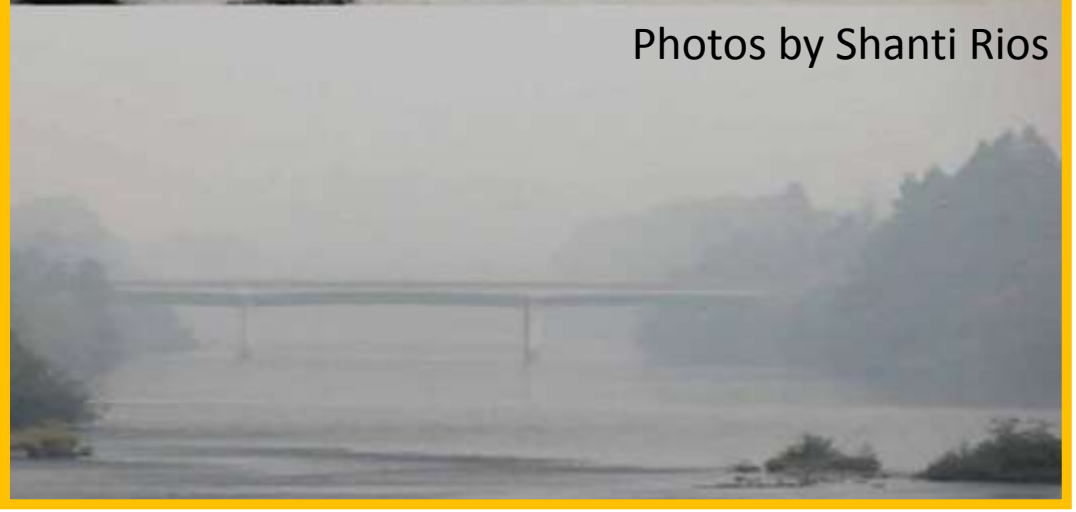
caused unhealthy air quality



AQI for Last 45 Days

Date	Cottage Grove	Eugene/Springfield	Oakridge
09/08/2017	53 Moderate (Particulate Matter)	43 Good (Particulate Matter)	57 Moderate (Particulate Matter)
09/07/2017	105 Unhealthy (Particulate Matter)	100 Moderate (Particulate Matter)	155 Unhealthy (Particulate Matter)
09/06/2017	156 Unhealthy (Particulate Matter)	158 Unhealthy (Particulate Matter)	160 Unhealthy (Particulate Matter)
09/05/2017	159 Unhealthy (Particulate Matter)	240 Unhealthy (Particulate Matter)	198 Unhealthy (Particulate Matter)
09/04/2017	177 Unhealthy (Particulate Matter)	239 Unhealthy (Particulate Matter)	236 Unhealthy (Particulate Matter)
09/03/2017	191 Unhealthy (Particulate Matter)	250 Unhealthy (Particulate Matter)	206 Unhealthy (Particulate Matter)
09/02/2017	153 Unhealthy (Particulate Matter)	118 Unhealthy (Particulate Matter)	197 Unhealthy (Particulate Matter)
09/01/2017	58 Moderate (Ozone)	61 Moderate (Ozone)	166 Unhealthy (Particulate Matter)
08/31/2017	38 Good (Ozone)	37 Good (Ozone)	102 Unhealthy (Particulate Matter)
08/30/2017	20 Good (Particulate Matter)	22 Good (Particulate Matter)	78 Moderate (Particulate Matter)
08/29/2017	103 Unhealthy (Particulate Matter)	115 Unhealthy (Particulate Matter)	166 Unhealthy (Particulate Matter)
08/28/2017	164 Unhealthy (Particulate Matter)	174 Unhealthy (Particulate Matter)	179 Unhealthy (Particulate Matter)
08/27/2017	152 Unhealthy (Particulate Matter)	142 Unhealthy (Particulate Matter)	161 Unhealthy (Particulate Matter)
08/26/2017	53 Moderate (Particulate Matter)	49 Good (Ozone)	110 Unhealthy (Particulate Matter)
08/25/2017	40 Good (Ozone)	39 Good (Ozone)	47 Good (Particulate Matter)

SUMMER 2017

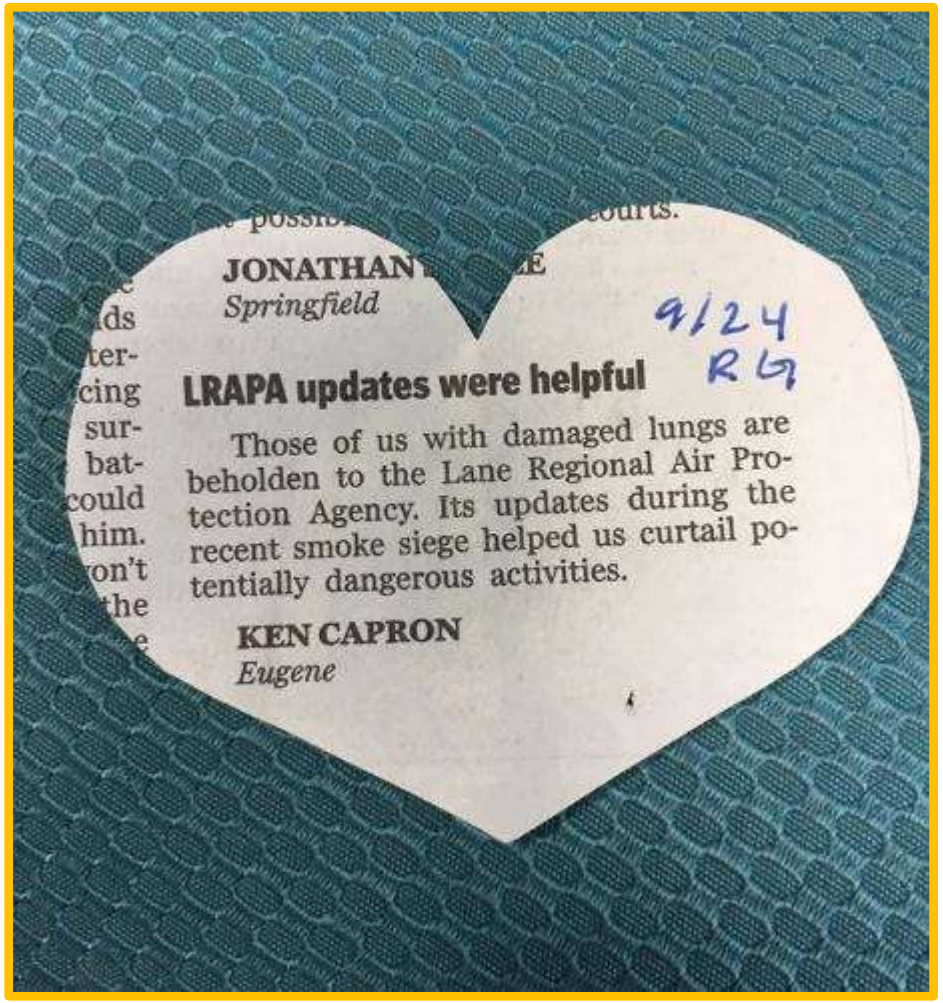


Photos by Shanti Rios

FOR THE PUBLIC

COMMUNICATION

- LRAPA expanded communication to deliver reliable, accurate information to Lane County residents
- Traditional and non-traditional news outlets
- Push on social media

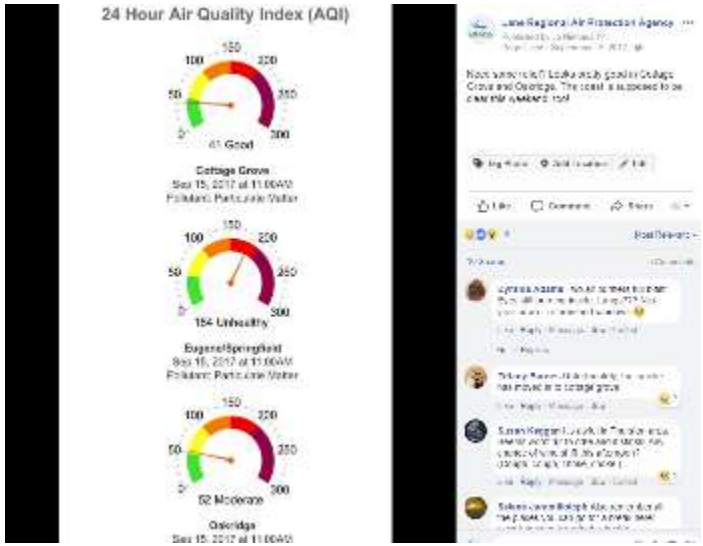


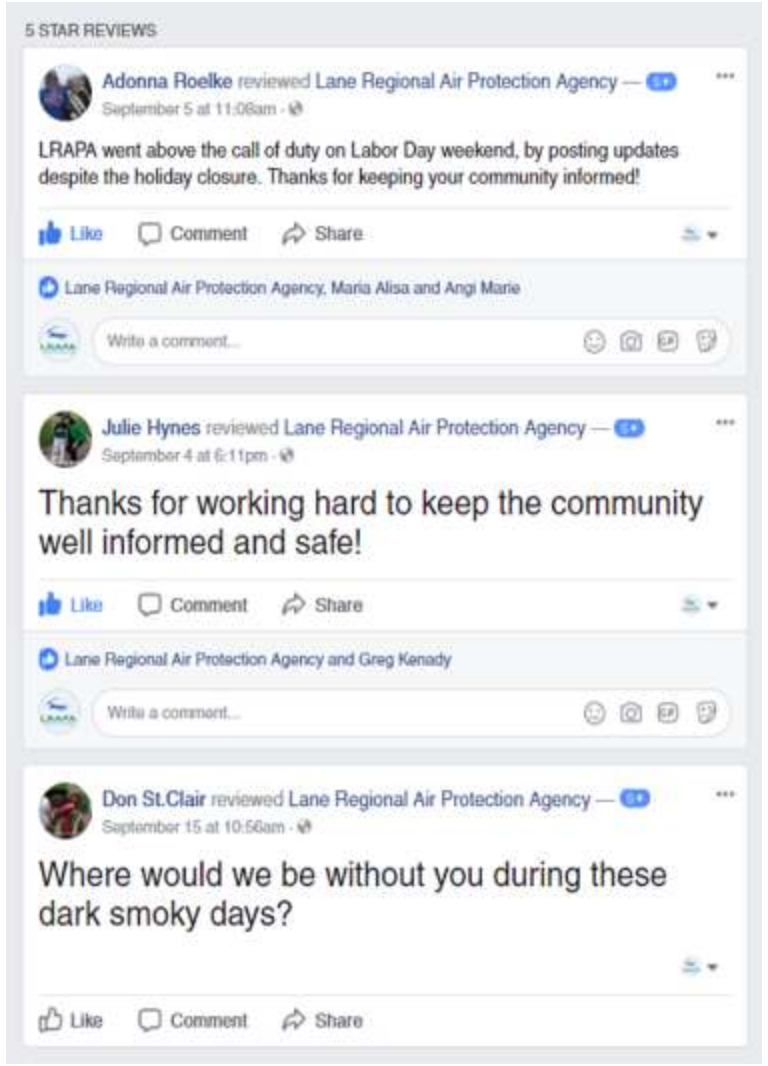
GO DUCKS!

FOR THE PUBLIC

SOCIAL MEDIA

- Updated Facebook and Twitter accounts multiple times a day
- Provided safety information and air quality data
- Huge increase in people visiting social media accounts and webpage





FOR THE PUBLIC

PARTNERSHIPS

- Partnered and collaborated with many local, state, and federal government agencies to spread accurate information and pool resources
- Directed people to the Oregon Smoke Blog so residents could see what areas were being impacted from smoke and where they could go to escape

Oregon Health Authority



Public Health Guidance: School Outdoor Activities During Wildfire Events

Check the local Air Quality Index (AQI) online (http://www.deq.state.or.us/aqi/) and do a visual inspection outside.* Compare the AQI and visibility test to determine the air conditions in your community. Then, use the guide below to determine activity level for your students.**

Air Quality Index	Visibility Scale	Recess (15 min)	P.E. (1 hr)	Athletic events and practices (2–3 hrs)
Good	Over 5 miles	Great day to be active outdoors!	Great day to be active outdoors!	Great day to be active outdoors!
Moderate	5–15 miles	It is a good day for students to be active outside. • Watch students who are unusually sensitive to air pollution for symptoms of shortness of breath or coughing.	• Watch students who are unusually sensitive to air pollution. • Look for symptoms of shortness of breath or coughing. • Monitor symptoms and reduce or cease activity if symptoms arise.	• Watch students who are unusually sensitive to air pollution. • Look for symptoms of shortness of breath or coughing. • Increase rest periods and make substitutions for these students as needed. • Monitor symptoms and reduce or cease activity if symptoms arise.
Unhealthy for sensitive groups	3–5 miles	It is an OK day for students to be active outside. • Allow students who are unusually sensitive to air pollution to stay indoors if they'd like.	• Move activities indoors for students sensitive to air pollution. • Limit other students to light outdoor activities or move the activities indoors. • Increase rest periods and make substitutions. • Monitor symptoms and reduce or cease activities if symptoms arise.	• Move activities indoors for students sensitive to air pollution. • Limit other students to light outdoor activities or move the activities indoors. • Increase rest periods and make substitutions. • Monitor symptoms and reduce or cease activities if symptoms arise.
Unhealthy	1–3 miles	• Consider keeping all students indoors or allowing only light outdoor activity. • Move activities indoors for students sensitive to air pollution.	• Move activities indoors for students sensitive to air pollution. • Consider moving all activities indoors. • Limit all students to light activities. • Increase rest periods and make substitutions.	Consider any of the following: • Cancel the event. • Move the event indoors. • Postpone the event. • Move the event to an area with "good" air quality.
Very unhealthy/ hazardous	1 mile or less	Keep all students indoors.	• Move all activities indoors. • Limit all students to light activities. • Increase rest periods and make substitutions.	Do any of the following: • Cancel the event. • Move the event indoors. • Postpone the event. • Move the event to an area with "good" air quality.

* If you get conflicting results when you compare the AQI to your visual inspection, err on the side of caution. Follow the recommendations for the worse of the two assessments.

**Students with asthma action plans should follow them closely. They should monitor their breathing and exposure to wildfire smoke. Anyone experiencing symptoms should contact a health care provider for further advice. They should call 911 in an emergency.

https://apps.state.or.us/Forms/Served/le8815h.pdf

Watch for symptoms

Wildfire smoke can make asthma symptoms worse. It can trigger asthma attacks. Symptoms of asthma include coughing, shortness of breath, wheezing and chest tightness. Even students without known asthma can have symptoms when exposed to unhealthy levels of wildfire smoke pollution.

Students with asthma should follow their Asthma Action Plan. This will help them decide if they need to take special precautions while engaging in outdoor activities. Athletes with asthma should have rescue inhalers readily available. Use should be as directed by their health care provider. Anyone experiencing symptoms should contact a health care provider. Call 911 in an emergency.

Air Quality Index

How clean or polluted the air is and the level of health concern is in the Air Quality Index (AQI). The AQI categorizes air quality based on air measures collected from Department of Environmental Quality (DEQ) air monitors. For more about AQI in Oregon and how the AQI is calculated, go to http://www.deq.state.or.us/aqi/.

Visibility Scale

In addition to the AQI, you can use your own observations to determine the air conditions in your area. To do a visual inspection:

- Go outside.
- Face away from the sun.
- Determine the limit of your visible range by looking at objects at known distances (miles). Visible range is the point at which even high contrast objects totally disappear.

School closures

School closures are the decision of the individual school district, usually in consultation with the local health department. Consult your local health department if you have questions about air pollution and health.

More information

For more information on how wildfire can affect your health, see http://public.health.oregon.gov/Preparedness/Prepare/Pages/PrepareForWildfire.aspx.

Consult with your local or tribal health authority if you have questions about air pollution and health.

Children and air pollution

Children are particularly sensitive to smoke because their respiratory systems are still developing. In addition, their airways are smaller, and they breathe in more air per pound body weight. Children who may be more sensitive to air pollution include those with:

- Asthma
- Respiratory infection
- Lung or heart disease

Parents of these children should follow their health care providers' advice about prevention and treatment of symptoms. Parents should also watch the smoke forecast to decide when to limit their child's activities.

Oregon Health Authority
PUBLIC HEALTH DIVISION
Health Security, Preparedness and Response
Phone: 971-673-1315
Fax: 971-673-1309

OHA website: http://public.health.oregon.gov/Preparedness/Prepare/Pages/PrepareForWildfire.aspx
OHA Facebook: www.facebook.com/OregonHealthAuthority
OHA Twitter: www.twitter.com/OHAOregon

You can get this document in other languages, large print, braille or a format you prefer. Contact Health Security, Preparedness and Response at 971-673-1315 or email health.security@state.or.us. We accept all relay calls or you can dial 711.

PLANNING AHEAD

Wildfires are not going away, so we need to prepare for this year's wildfire season.

Where to get info for you and your clients:

- LRAPA for AQI and other local air quality data
- EPA for more information on PM 2.5, ozone, and other pollutants
- DOH to learn about health risks from air pollution
- Firewise for fire safety and wildfire prevention

CONCLUSIONS

Air quality is often ignored until conditions are dire – be aware of the air and take necessary precautions.

Know the resources available to you and utilize them