



WILDFIRE SMOKE



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Office of Environmental Health and Safety

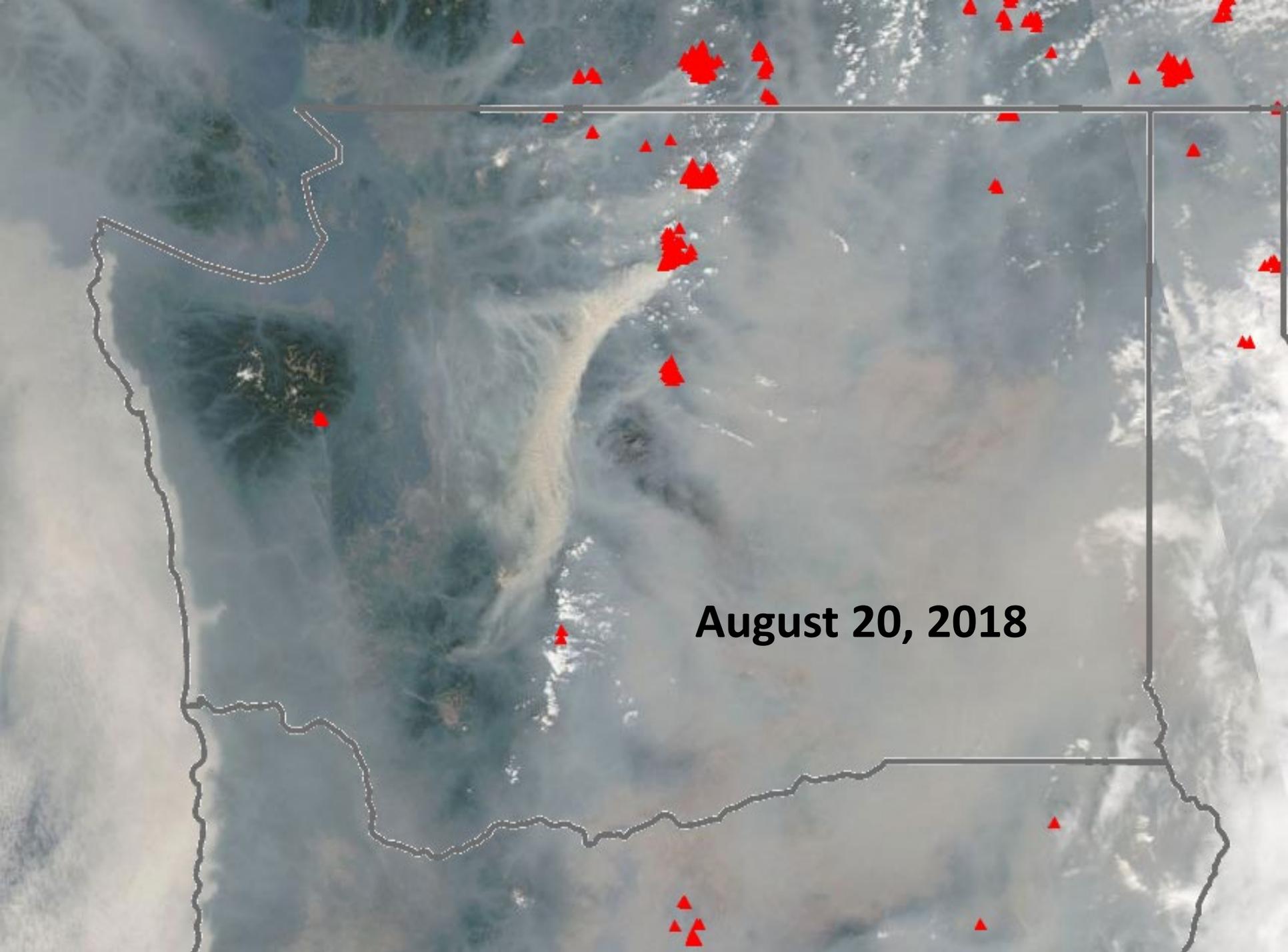
Fall 2019 School EHS Workshops

- Wildfire smoke is an increasing threat to public health in Washington.
- Climate change and forest management practices have led to longer wildfire seasons with increased fuels, resulting in more smoke and increased air pollution
- Increasing need for wildfire smoke preparedness to protect public health and provide consistent messages across the state.



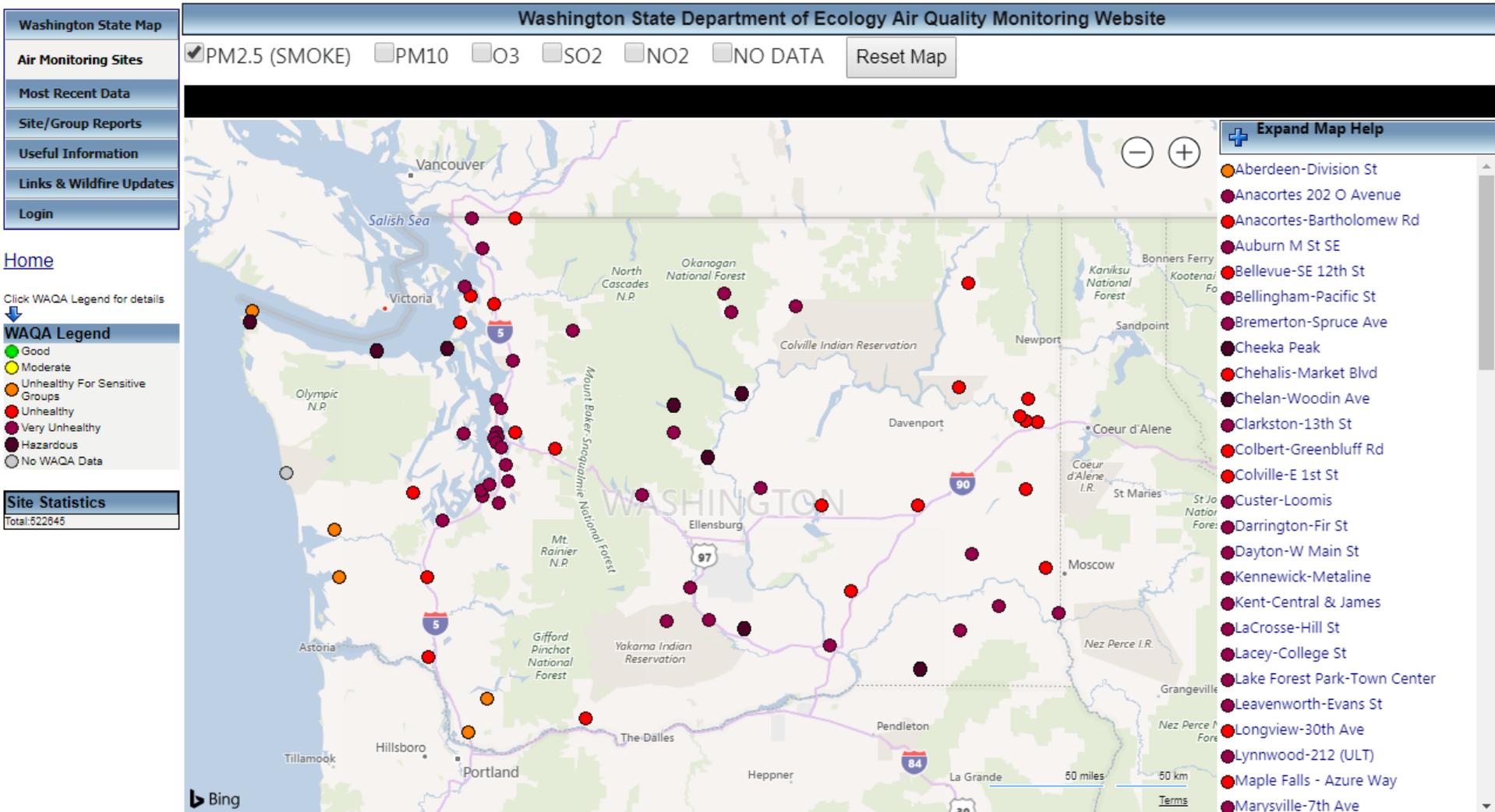


Seattle 2018



August 20, 2018

Ecology WAQA Map



August 20, 2018

Minor to deadly responses

- Eye irritation
- Cough, wheeze
- Cardiovascular morbidities
- Respiratory morbidities
- Overall increased hospitalizations & deaths



sore throat



headaches



burning eyes



coughing



wheezing



shortness of
breath

Groups vulnerable to smoke from fires

- People with cardiopulmonary disease (Asthma, COPD, heart conditions, etc.)
- Infants and children
- People 65 years and older (no matter how young we feel)
- Pregnant women
- People of low socioeconomic status



Photo credits: CDC/Dawn Arlotta 2009, www.pixabay.com

These groups make up >40% of Washington's population.

Steps to protect health from smoke

1. Stay informed about air quality

- Check the air quality hazard level

2. Limit exposure

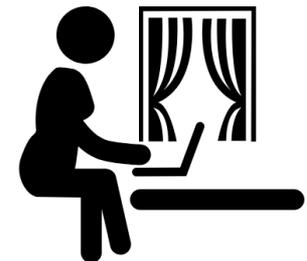
- Avoid strenuous outdoor activity
- Limit time outdoors
- Stay indoors

3. Keep indoor air clean

- Keep windows and doors closed
- Don't contribute to poor air quality
- Set AC on recirculate
- Use an air cleaner with a HEPA filter

4. Pay attention to symptoms

- Seek medical help if needed



DOH Wildfire Smoke Response

**Review
evidence &
best practices**



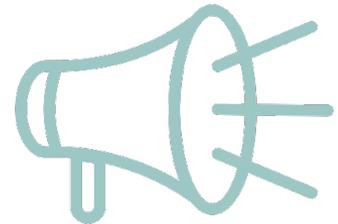
**Work with
partners**



**Develop
guidance &
materials**



**Share
resources**



Wildfire Smoke Impacts Advisory Group

- Formed at the request of local health jurisdictions
- 27 Members
Including WA Dept of Health, local health jurisdictions, WA Dept of Ecology, WA Labor & Industries, regional clean air authorities, tribal communities, University of Washington & EPA
- 3 Sub Workgroups to address 3 Priorities for the 2019 Wildfire Season

Communication Workgroup

Develop custom toolkit for local outreach and communication

Closures Workgroup

Develop guidance for school and outdoor event closures

Sensors Workgroup

Develop guidance for low-cost sensors to use for health decisions

Communication Workgroup

Developed Wildfire Response Communication Toolkit

- Catalogue of available resources for key messages
- Resources developed to fill identified gaps
- Template news releases and template letters for local use
 - Customizable for local branding (logos)
 - Format that allows additional local information
 - Ongoing updates and contributions from partners in Basecamp

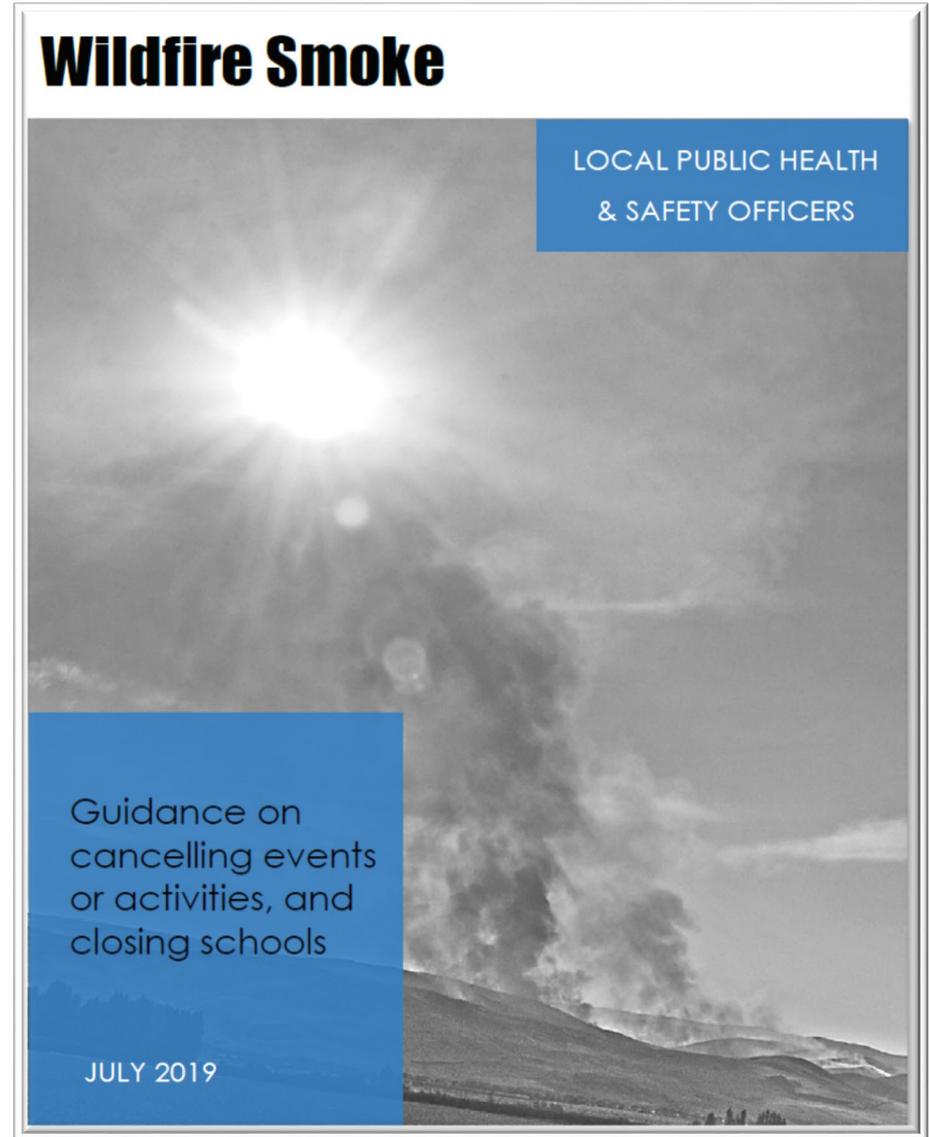


Target Audiences

- General public
- Healthcare providers
- Facility managers for outdoor camps and athletic activities
- School K-12 principals, superintendents & administrative staff
- School nurses & school health team
- Child care providers
- Long-term care and assisted living facilities
- Planners of public events

Closures Workgroup

Collaborated on development of guidance document about school closures and canceling outdoor events in smoke episodes



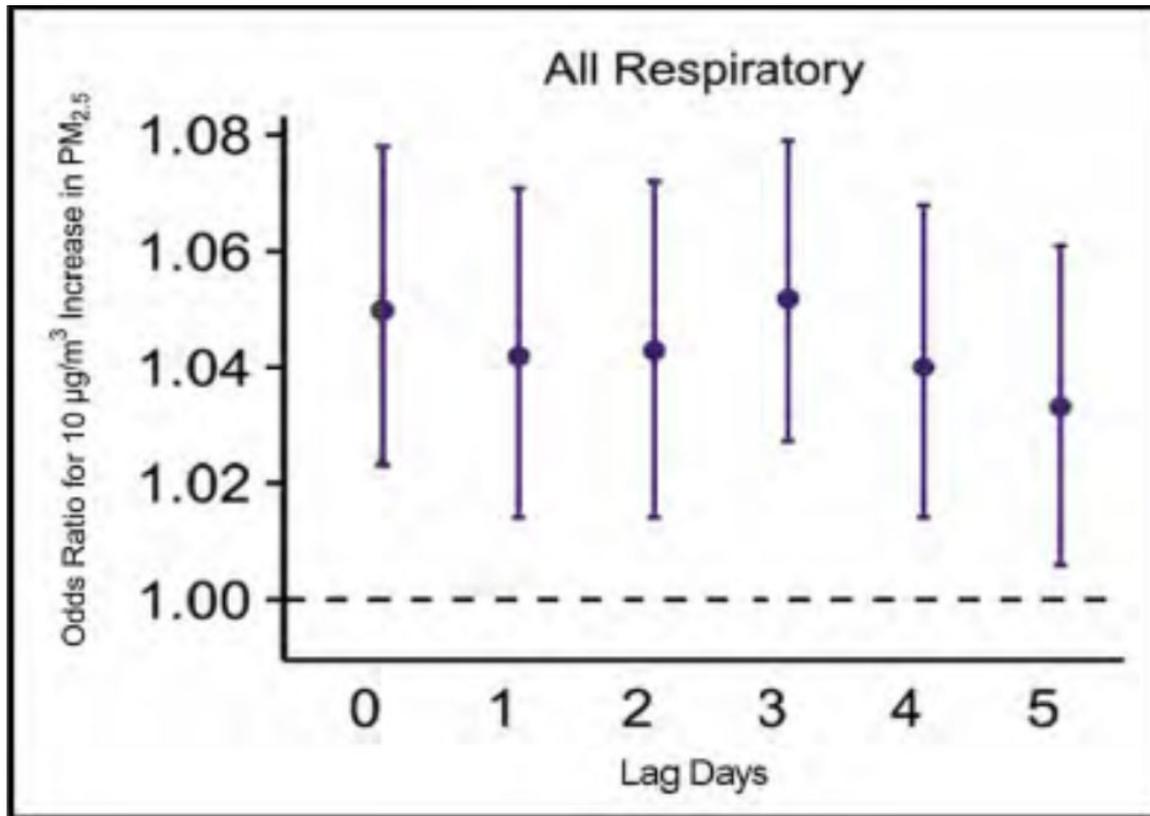
Health Effects Literature

- Non-trauma caused deaths
- Respiratory condition emergencies, hospitalizations and/or deaths
- Combined respiratory and cardiovascular emergencies, hospitalizations and/or deaths
- Societal economic burdens of morbidity and/or mortality

What health risks are most compelling to decision-makers and affected populations?

...What are the most robust results available that are relevant to the Washington wildfires and population?

Respiratory hospital admissions from WA wildfires 2012



For a 10 $\mu\text{g}/\text{m}^3$ increase in $\text{PM}_{2.5}$:

~5% increased risk in same-day respiratory hospitalization admissions

~8% increased risk in same-day asthma-related hospital admissions

Source: Gan RW et al. Comparison of wildfire smoke estimation methods and associations with cardiopulmonary-related hospital admissions. *Geohealth*. 2017 Mar;1(3):122-136. Figure adapted; limited to GWR estimation of smoke; WRF-Chem estimates obscured for clarity.

Reviewed Existing Guidance

Interagency, Wildfire Guide for Public Health Professionals (2019)



Table 5. Recommended actions for consideration by public health officials

AQI Category (AQI Values)	PM _{2.5} ¹ 24-hr avg µg/m ³	Recommended Actions for Consideration
Good (0-50)	0-12	If smoke event forecast, implement communication plan.
Moderate (51-100)	12.1-35.4	Prepare for full implementation of School Activity Guidelines (https://www2.epa.gov/airnow/flag/school-chart-2014.pdf). Issue public service announcements (PSAs) advising public about health effects, symptoms, and ways to reduce exposure. Distribute information about exposure avoidance.
Unhealthy for Sensitive Groups (101-150)	35.5-55.4	Evaluate implementation of School Activity Guidelines If smoke event projected to be prolonged, evaluate and notify about possible sites for cleaner air shelters. If smoke event projected to be prolonged, prepare evacuation plans for at-risk populations.
Unhealthy (151-200)	55.5-150.4	Full implementation of School Activity Guidelines Consider canceling outdoor events (e.g., concerts and competitive sports), based on public health and travel considerations.
Very Unhealthy (201-300)	150.5-250.4	Move all school activities indoors or reschedule them to another day. Cancel school physical activities (e.g., physical education, athletic practice) unless the school is able to provide cleaner indoor air for the students. Consider dosing some or all schools Cancel outdoor events involving activity (e.g., competitive sports). Consider canceling outdoor events that do not involve activity (e.g. concerts).
Hazardous (> 300)	250.5->500	Consider dosing schools. ² Cancel outdoor events (e.g., concerts and competitive sports). Consider air quality in indoor workplaces and take measures to protect workers as needed. ³ Consider curtailment of outdoor work activities unless the workers have a fully implemented respirator plan in place and clean air respite breaks. If PM levels are projected to remain high for a prolonged time, consider evacuation of at-risk populations.

Air Quality and Outdoor Activity Guidance for Schools

Regular physical activity — at least 60 minutes each day — promotes health and fitness. The table below shows when and how to modify outdoor physical activity based on the Air Quality Index. This guidance can help protect the health of all children, including teenagers, who are more sensitive than adults to air pollution. Check the air quality daily at www.airnow.gov.

Air Quality Index	Outdoor Activity Guidance
 GOOD	Great day to be active outside!
 MODERATE	Good day to be active outside! Students who are unusually sensitive to air pollution could have symptoms.*
 UNHEALTHY FOR SENSITIVE GROUPS	It's OK to be active outside, especially for short activities such as recess and physical education (PE). For longer activities such as athletic practice, take more breaks and do less intense activities. Watch for symptoms and take action as needed.* Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.
 UNHEALTHY	For all outdoor activities , take more breaks and do less intense activities. Consider moving longer or more intense activities indoors or rescheduling them to another day or time. Watch for symptoms and take action as needed.* Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.
 VERY UNHEALTHY	Move all activities indoors or reschedule them to another day.

Air Quality Guide for Particle Pollution

Harmful particle pollution is one of our nation's most common air pollutants. Use the chart below to help reduce your exposure and protect your health. For your local air quality forecast, visit www.airnow.gov.

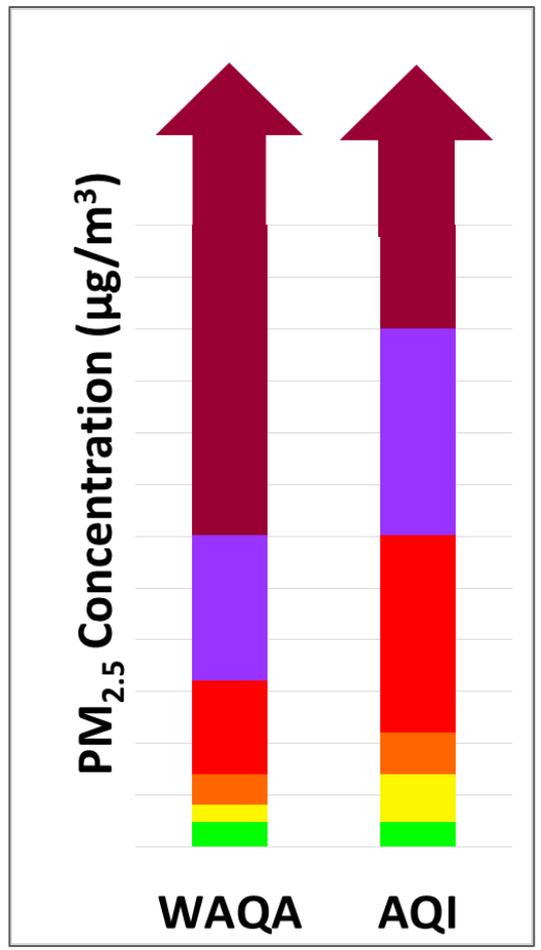
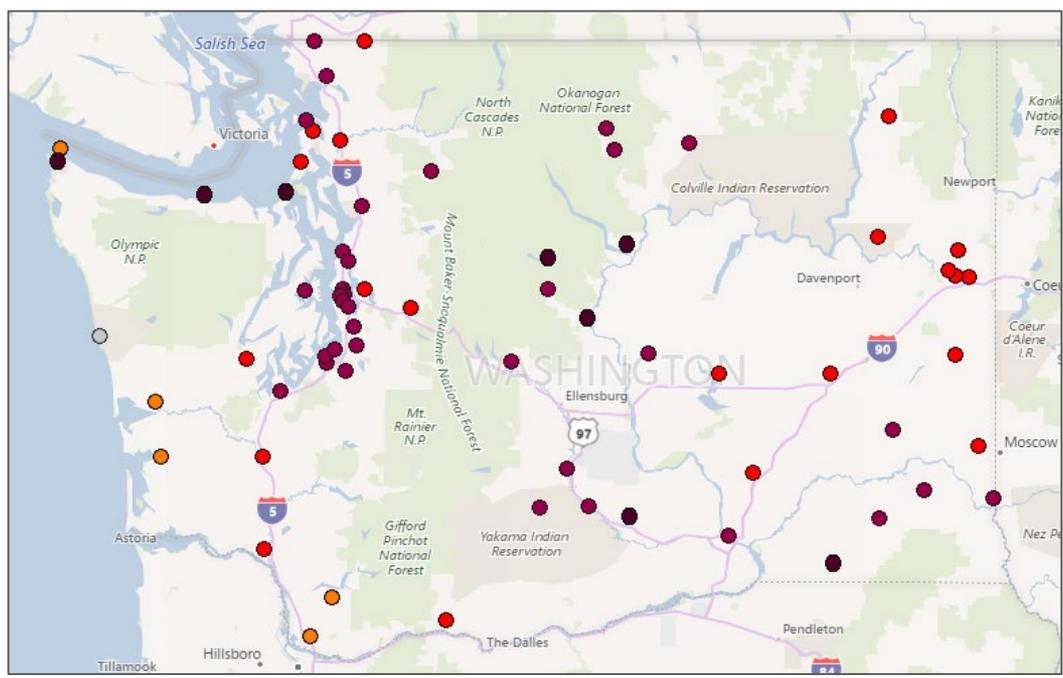
Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good (0-50)		It's a great day to be active outside.
Moderate (51-100)	Some people who may be unusually sensitive to particle pollution.	Unusually sensitive people: Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier. Everyone else: It's a good day to be active outside.
Unhealthy for Sensitive Groups (101-150)	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	Sensitive groups: Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. People with asthma should follow their asthma action plans and keep quick relief medicine handy. If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.
Unhealthy (151-200)	Everyone	Sensitive groups: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling. Everyone else: Reduce prolonged or heavy exertion. Take more breaks during outdoor activities.
Very Unhealthy (201-300)	Everyone	Sensitive groups: Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better. Everyone else: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.
Hazardous (301-500)	Everyone	Everyone: Avoid all physical activity outdoors. Sensitive groups: Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.

Sources: <https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf>, https://www3.epa.gov/airnow/air-quality-guide_pm_2015.pdf, <https://www3.epa.gov/airnow/flag/school-chart-2014.pdf>,

Washington Air Quality Advisory (WAQA) vs. Air Quality Index (AQI)

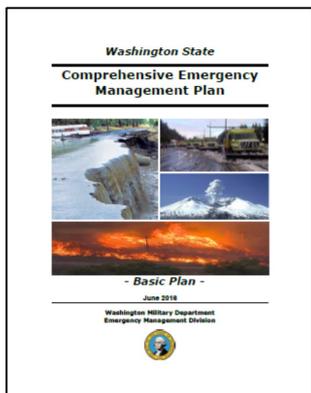
WAQA designed to be more health protective

WA PM_{2.5} Air Monitoring Network:



Washington Comprehensive Emergency Management Plan, 2018

Previously Recommended Public Health Actions



**Table 4
Recommended Public Health Actions**

Health Advisory Category	Sensitive Populations or Short Durations	Extended Smoke Duration
Good	If smoke incident is forecasted in your area, review the Washington Wildfire Response document for Severe Smoke Episodes, Frequently Asked Questions about Wildfire Smoke and Public Health (FAQ) webpage, and more health tips on the Washington State Department of Health wildfire webpage. The WA Smoke Blog has information about current air quality and wildfire information: http://wasmoke.blogspot.com/ .	
Moderate	<ul style="list-style-type: none"> - Distribute information (i.e., FAQ) to public health partners and the public. - Focus on identifying and getting information to vulnerable populations. - Refer people to the WA Smoke Blog for more information. 	<ul style="list-style-type: none"> - Distribute information (i.e., FAQ) to public health partners and the public. - Respond to media inquiries. - Refer people to the WA Smoke Blog for more information.
Unhealthy for Sensitive Groups	<p>Above, plus:</p> <ul style="list-style-type: none"> - Issue a press release, outlining sensitive groups and encouraging them to reduce exposure. (Use the FAQ document for guidance.) - If school is in session, refer to <i>Public Health Guidance for School Outdoor Activities during Wildfire Events</i>. 	<p>Above, plus:</p> <ul style="list-style-type: none"> - Issue a press release outlining sensitive groups and encouraging them to reduce exposure. (Use FAQ document for guidance.) - In the release, include consideration of spending time in a clean air setting in the community (i.e., air conditioned library) or leaving the area until air quality improves. - If school is in session, refer to <i>Public Health Guidance for School Outdoor Activities during Wildfire Events</i>. - Consider opening a clean air shelter for sensitive groups.
Unhealthy	<p>Above, plus:</p> <ul style="list-style-type: none"> - Consider cancelling outdoor public events. - Recommend that sensitive groups shelter-in-place, spend time in a clean air setting in the community (i.e., air conditioned library) or consider leaving the area until air quality improves. 	<p>Above, plus:</p> <ul style="list-style-type: none"> - Consider cancelling outdoor events. - Recommend public limit strenuous outdoor activities. - Recommend that sensitive groups shelter-in-place, spend time in a clean air setting in the community (i.e., air conditioned library) or consider leaving the area until air quality improves. - Open and publicize clean air shelters for sensitive groups.
Very Unhealthy	<p>Above, plus:</p> <ul style="list-style-type: none"> - Cancel outdoor public events. - If school is in session, discuss school closure with school administrators. <p>general population.</p> <ul style="list-style-type: none"> - Share info about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings (refer to DOH FAQ for more info). 	<p>Above, plus:</p> <ul style="list-style-type: none"> - Cancel outdoor public events - If school is in session, discuss school closure with school administrators. - Recommend shelter-in-place for general population. - Share info about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings (refer to FAQ for more info). - Open and publicize clean air shelters for the general public.
Hazardous	<p>Above, plus:</p> <ul style="list-style-type: none"> - Recommend voluntary evacuation for sensitive groups. 	<p>Above, plus:</p> <ul style="list-style-type: none"> - Recommend voluntary evacuation for the general public, especially sensitive groups (see DOH wildfire smoke FAQs for more info).

• Consider cancelling outdoor public events.

• Cancel outdoor public events.
• If school is in session, discuss school closure with school.

WA CEMP, Appendix 5, Attach 1, "Wildfire Response—Severe Smoke Episodes", <http://mil.wa.gov/uploads/pdf/PLANS/esf-8-appendix-5-attachment-1-severe-smoke-episodes-2017.pdf>

Washington Air Pollution and School Activities Guide

Air Quality Conditions*					
First, check local air conditions at https://fortress.wa.gov/ecy/enviwa/ and then use this chart.					
	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy/ Hazardous
Recess (15 minutes)	No restrictions.	Allow students with asthma, respiratory infection, lung or heart disease to stay indoors.	Keep students with asthma, respiratory infection, and lung or heart disease indoors.	Keep all students indoors and keep activity levels light.	Keep all students indoors and keep activity levels light.
P.E. (1 hour)	No restrictions.	Monitor students with asthma, respiratory infection, lung or heart disease. Increase rest periods or substitutions for these students as needed.	Keep students with asthma, respiratory infection, lung or heart disease, and diabetes indoors. Limit these students to moderate activities. For others, limit to light outdoor activities. Allow any student to stay indoors if they don't want to go outside.	Conduct P.E. indoors. Limit students to light indoor activities.	Keep all students indoors and keep activity levels light.
Athletic Events and Practices (Vigorous activity 2-3 hours)	No restrictions.	Monitor students with asthma, respiratory infection, lung or heart disease. Increase rest periods and substitutions for these students as needed.	Students with asthma, respiratory infection, lung and heart disease, or conditions like diabetes shouldn't play outdoors. Consider moving events indoors. If events are not cancelled, increase rest periods and substitutions to allow for lower breathing rates.	Cancel events. Or move events to an area with "Good" air quality — if this can be done without too much time spent in transit through areas with poor air quality.	Cancel events. Or move events to an area with "Good" air quality — if this can be done without too much time spent in transit through areas with poor air quality.

Cancel events. Or move events to an area with "Good" air quality

Source: WA Dept of Health, www.doh.wa.gov/Portals/1/Documents/Pubs/334-332.pdf

WAQQA WASHINGTON AIR QUALITY ADVISORY

Check air quality conditions at ecology.wa.gov/WAQA

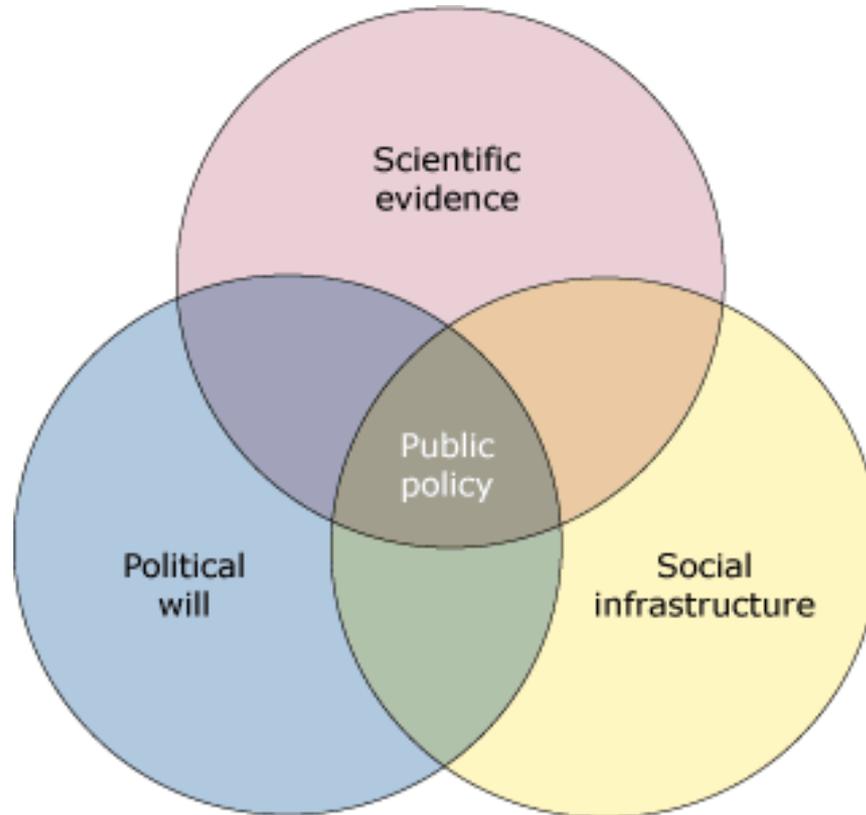
	<p>GOOD</p> <p>Air pollution is so low so there is little health risk. It's a great day for everyone to enjoy the outdoors!</p>	<p>SENSITIVE GROUPS INCLUDE:</p> <ul style="list-style-type: none"> • People with health conditions such as: <ul style="list-style-type: none"> - Asthma, COPD, diabetes, & other heart/lung diseases - Respiratory illnesses & colds - Stroke survivors • Children under 18 & adults over 65 • Pregnant women • People who smoke
	<p>MODERATE</p> <p>People with health conditions should limit spending any time outdoors & avoid strenuous outdoor activities. They may begin to have worsened symptoms.</p>	
	<p>UNHEALTHY FOR SENSITIVE GROUPS</p> <p>All of the above &: All sensitive groups should limit spending any time outdoors. People with health conditions may have worsened symptoms. Healthy people may start to have symptoms.</p>	<p>KNOW THE SYMPTOMS:</p> <ul style="list-style-type: none"> - Watery or dry eyes - Coughing/wheezing - Throat & sinus irritation - Phlegm - Shortness of breath - Headaches - Irregular heartbeat - Chest pain
	<p>UNHEALTHY FOR EVERYONE</p> <p>Everyone, especially sensitive groups, should limit time spent outdoors, avoid strenuous activities outdoors, & choose light indoor activities.</p>	
	<p>VERY UNHEALTHY FOR EVERYONE</p> <p>Everyone should stay indoors, avoid all strenuous activity, close windows & doors if it's not too hot, set your AC to recirculate, & use a HEPA air filter if possible.</p>	<p>If you are experiencing serious symptoms, seek immediate medical attention.</p>
	<p>HAZARDOUS FOR EVERYONE</p> <p>All of the above &: People with heart or lung disease, or those who have had a stroke, should consult their healthcare provider about leaving the area & wearing a properly-fitted respiratory mask* if they must go outdoors. Follow burn bans and evacuation orders.</p>	

Air pollution from dust, vehicles, woodstoves, wildfires, & industries can seriously impact your health.
 *For more health information & how to choose the proper respiratory mask, visit doh.wa.gov/smokefromfires.




Washington Air Quality Advisory: [English](#) / [Spanish](#) / [Arabic](#) / [Chinese](#) / [Korean](#) / [Punjabi](#) / [Russian](#) / [Somali](#) / [Tagalog](#) / [Ukrainian](#) / [Vietnamese](#)

Discussions with local health officers in Washington



Source: Wilcox LS. Worms and germs, drink and dementia: US health, society, and policy in the early 20th century. *Prev Chronic Dis* 2008;5(4). http://www.cdc.gov/pcd/issues/2008/oct/08_0033.htm

Recommended PM action levels: wildfire smoke closures and cancellations

When outdoor forecasted 24-hour or NowCast PM_{2.5} concentrations equal or exceed:

35.5 µg/m ³	Recommend cancelling children's outdoor recess, physical education, athletic practices and games, or moving them indoors or to an area with good air quality.
80.5 µg/m ³	Consider recommending cancelling outdoor public events and activities.
150.5 µg/m ³	Recommend cancelling outdoor public events and activities.

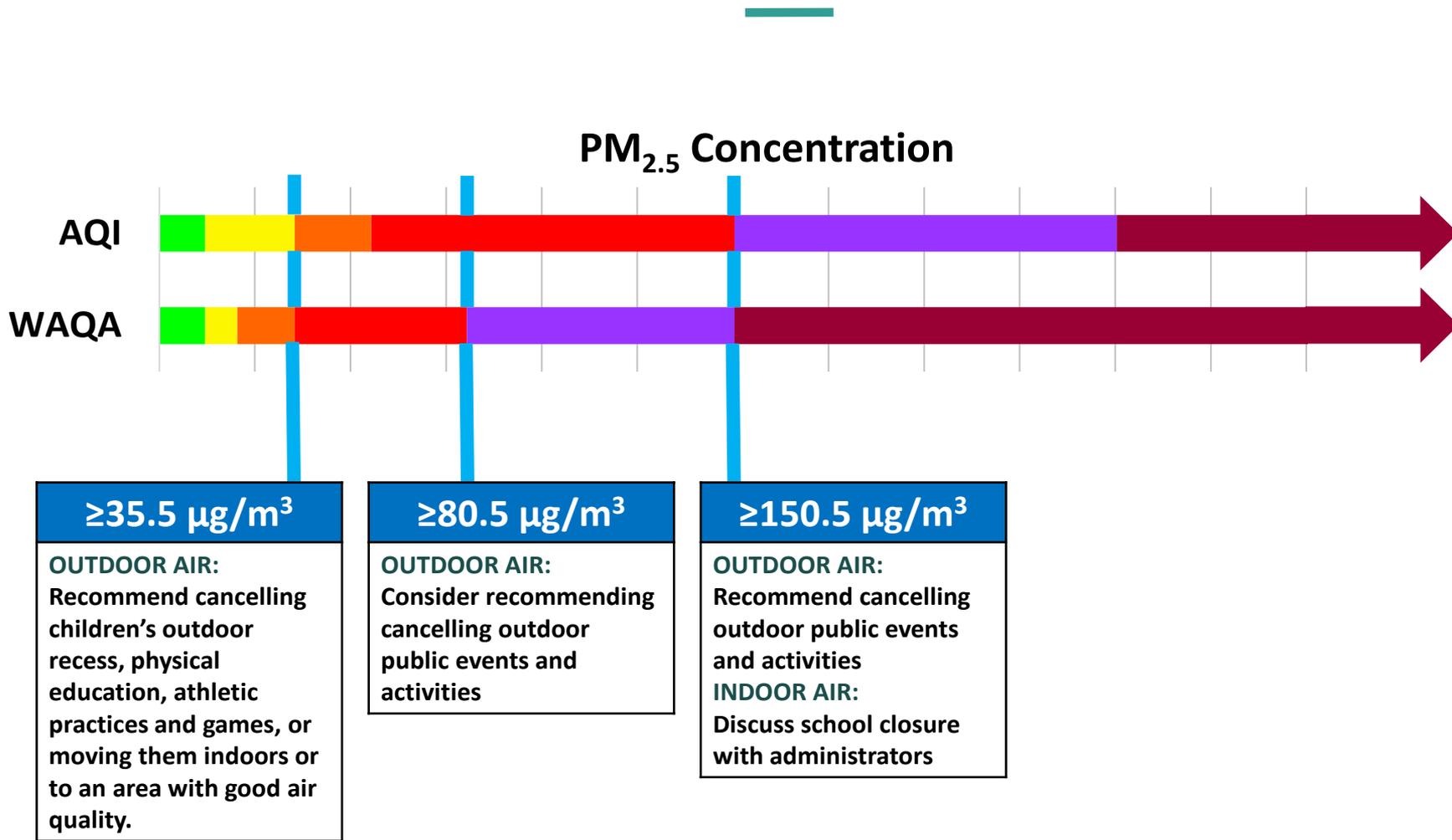
When school is in session and indoor PM_{2.5} concentrations equal or exceed:

150.5 µg/m ³	Discuss school closure with administrators.
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Updated recommendations July 2019

Health Advisory Category Forecasted 24-Hour Average or NowCast PM _{2.5} Concentration (µg/m ³)	Recommended Public Health Actions For use with Washington Air Quality Advisory PM _{2.5} NowCast values and forecasted 24 hour PM _{2.5} concentrations.
<p style="text-align: center;">Good</p> <p style="text-align: center;">PM_{2.5} 0 - 12.0</p>	<ul style="list-style-type: none"> • If smoke incident is forecasted in your area, review the Washington Wildfire Response document for Severe Smoke Episodes and the Wildfire Smoke Guide for Public Health Officials. More health tips on the Department of Health Smoke From Fires website. More information about wildfire and air quality at WA Smoke.
<p style="text-align: center;">Moderate</p> <p style="text-align: center;">PM_{2.5} 12.1 – 20.4</p>	<ul style="list-style-type: none"> • Distribute information to public health partners and the public. • Focus on identifying and getting information to vulnerable populations. • Refer people to the WA Smoke Blog for more information about status of wildfires. • Provide information about steps to take with health advisory categories: DOH Washington Air Quality Advisory Graphic (English).
<p style="text-align: center;">Unhealthy for Sensitive Groups</p> <p style="text-align: center;">PM_{2.5} 20.5 – 35.4</p>	<p>Above recommendations, plus:</p> <ul style="list-style-type: none"> • Issue press release, identify sensitive groups and encourage them to reduce exposure. • For extended duration of smoke recommend spending time in a cleaner air setting in the community (air-conditioned library) or leaving the area until air quality improves. • For extended duration of smoke, open a cleaner air shelter for sensitive groups. If school is in session, refer to the DOH Air Pollution and School Activities Guide.
<p style="text-align: center;">Unhealthy</p> <p style="text-align: center;">PM_{2.5} 35.5 – 80.4</p>	<p>Above recommendations, plus:</p> <ul style="list-style-type: none"> • Recommend cancelling children's outdoor athletic events and practices, or moving them indoors or to an outdoor space with good air quality. • Recommend the public limit strenuous outdoor activities. • Recommend that sensitive groups shelter-in-place, spend time in a cleaner air setting in the community (air-conditioned library) or leave the area until air quality improves. • For extended duration of smoke, open and publicize cleaner air shelters for sensitive groups.
<p style="text-align: center;">Very Unhealthy</p> <p style="text-align: center;">PM_{2.5} 80.5 – 150.4</p>	<p>Above recommendations, plus:</p> <ul style="list-style-type: none"> • Consider cancelling outdoor public events and activities. • Recommend shelter-in-place for the general population. • Share information about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings.
<p style="text-align: center;">Hazardous</p> <p style="text-align: center;">PM_{2.5}: >150.4</p>	<p>Above recommendations, plus:</p> <ul style="list-style-type: none"> • Cancel outdoor public events and activities. • If school is in session, discuss school closure with administrators if indoor air cannot be kept cleaner. • Recommend voluntary evacuation for sensitive groups.

Differences in hazard category breakpoints at each action level



www.doh.wa.gov/smokefromfires

Español

Air Quality

Indoor Air

Outdoor Air

Smoke From Fires

Smoke from Fires Toolkits

Smoke from Fires

Q&A

- [1. What health problems can smoke cause?](#)
- [2. Who is especially sensitive to smoke?](#)
- [3. How can I tell if smoke is affecting the air quality in my community?](#)
- [4. How can I tell if smoke is affecting my family?](#)
- [5. What can I do to protect myself and my family from outdoor smoke?](#)
- [6. What if I don't have air conditioning and it's hot indoors?](#)
- [7. Should I use a face mask when there is outdoor smoke?](#)
- [8. Can I use an air filter in my home to improve indoor air quality?](#)
- [9. Should I exercise when it's smoky?](#)
- [10. What should I do if I have to drive when it's smoky?](#)
- [11. What can schools do to protect students during smoky conditions?](#)
- [12. Smoke From Fires Information in Other Languages](#)

SUMMARY GUIDANCE: Wildfire Smoke

Cancelling Outdoor Public Events and Activities

This is a summary of the Washington State Departments of Health and Ecology guidance for cancelling or moving outdoor events or activities when smoke may be a health threat. For more information: [Guidance on cancelling events or activities, and closing schools - July 2019 \(PDF\)](#).

Health effects from smoke

Symptoms of smoke exposure range from minor irritation such as burning eyes, runny nose and coughing, to life threatening.

Sensitive populations include people with heart and lung diseases (like asthma and COPD), people with respiratory infections, people with diabetes, stroke survivors, infants, children, pregnant women, and people over 65.

Factors to consider: cancelling outdoor activities and events

- What is the forecast for how long wildfire smoke levels will remain high?
- Are smoke conditions getting worse, getting better, or staying about the same?
- Is there an option to relocate to an area with cleaner air?
- If children or others requiring care are involved, will adults be available as caretakers?
- Will there be impacts on economic or job security by cancelling the activity or event?

- Are there other weather factors to consider, like excessive heat or humidity, that would further increase risk of outdoor exposure?
- Is the visibility safe for driving?

Measuring wildfire smoke levels

The concentration of PM_{2.5} – particles less than 2.5 micrometers in diameter – is the most useful measurement of smoke levels to protect health.

Ecology and local clean air agencies routinely monitor these levels outdoors. PM_{2.5} concentrations are grouped in health hazard levels. Health and Ecology recommend making health decisions based on the Washington Air Quality Advisory (WAQA).



When outdoor forecasted 24-hour or NowCast PM_{2.5} concentrations:

- Equal or exceed 80.5 µg/m³ (WAQA value 201/AQI value 164) consider recommending cancelling outdoor public events and activities.
 - With the WAQA, this concentration is the lower level of the “very unhealthy” category.
 - With the AQI, this concentration is within the “unhealthy” category.
- Equal or exceed 150.5 µg/m³ (WAQA value 301/AQI value 201) recommend cancelling outdoor public events and activities.
 - With the WAQA, this concentration is the lower level of the “hazardous” category.
 - With the AQI, this concentration is the lower level of the “very unhealthy” category.

For more information about steps to reduce exposures: [DOH Smoke From Fires](#)

<https://www.doh.wa.gov/Portals/1/Documents/430/0/334-430-WildfireSmokeOUTDOORSsummary.pdf>

Page 2: WAQA Guidance for Public Health Actions

SUMMARY GUIDANCE: Wildfire Smoke

School Closure, Children's Outdoor Activities Cancellation

This is a summary of the Washington State Departments of Health and Ecology guidance for cancelling or moving outdoor children's activities and closing schools when smoke may be a health threat. For more information: [Guidance on cancelling events or activities, and closing schools - July 2019 \(PDF\)](#).

Factors to consider for school closures

- What is the forecast for how long wildfire smoke levels will remain high?
- Have all options to improve indoor air quality been attempted?
- Are students and staff who are sensitive to smoke allowed to stay home if it is safer?
- Is it safe to walk or bike to school?
- Is the visibility safe for driving?
- Are there other weather factors to consider, like excessive heat or humidity, that would further increase health risks?
- Where will children be relocated if schools are closed? Is the air quality better there?
- If children or others requiring care are involved, will adults be available as caretakers?
- Will there be impacts to economic or job security for parents missing work to attend to children?
- While moving to another location, will people be more exposed outdoors than if they had just stayed indoors?
- Are there other safety concerns about relocating people?

Symptoms of smoke exposure range from minor irritation such as burning eyes, runny nose and coughing, to life threatening. Sensitive populations include people with heart and lung diseases, people with respiratory infections, people with diabetes, stroke survivors, infants, children, pregnant women, and people over 65. Children with pre-existing diseases, such as asthma and diabetes, are especially at-risk for experiencing adverse health effects from smoke exposure.



Measuring wildfire smoke levels

The concentration of PM_{2.5} – particles less than 2.5 micrometers in diameter – is the most useful measurement of smoke levels to

protect health. Ecology and local clean air agencies routinely monitor these levels outdoors. PM_{2.5} concentrations are grouped in health hazard levels. Health and Ecology recommend making health decisions based on the Washington Air Quality Advisory (WAQA).

When outdoor forecasted 24-hour or NowCast PM_{2.5} concentrations:

- Equal or exceed 35.5 µg/m³ (WAQA value 151/AQI value 101) recommend cancelling children's outdoor recess, physical education, athletic practices and games, or moving them indoors or to an area with good air quality.
 - With the WAQA, this concentration is the lower level of the "unhealthy" category.
 - With the AQI, this concentration is the lower level of the "unhealthy for sensitive groups" category.

When school is in session and indoor PM_{2.5} concentrations:

- Equal or exceed 150.5 µg/m³ (WAQA value 301/AQI value 201) discuss school closure with administrators.
 - With the WAQA, this concentration is the lower level of the "hazardous" category.
 - With the AQI, this concentration is the lower level of the "very unhealthy" category.

For more information:

- [Air Pollution and School Activities Guide \(PDF\)](#)
- [Improving Ventilation and Indoor Air Quality during Wildfire Smoke Events \(PDF\)](#)
- [DOH Smoke From Fires](#)

<https://www.doh.wa.gov/Portals/1/Documents/4300/334-431-WildfireSmokeSCHOOLSsummary.pdf>

Page 2: WAQA Guidance for Public Health Actions



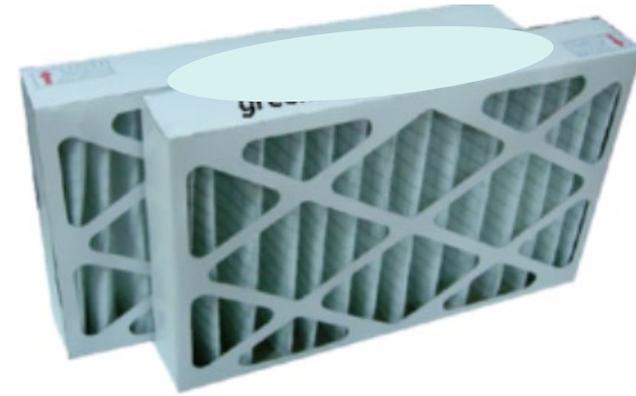
Factors to consider with closures & cancellations

- What is the forecast for how long wildfire smoke levels will remain high?
- Are smoke conditions getting worse, getting better, or staying about the same?
- Is there an option to relocate to an area with cleaner air?
- If children or others requiring care are involved, will adults be available as caretakers?
- Will there be impacts on economic or job security by cancelling the activity or event?

(see guidance document for more)

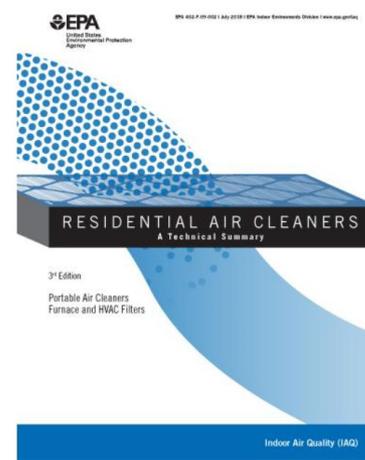
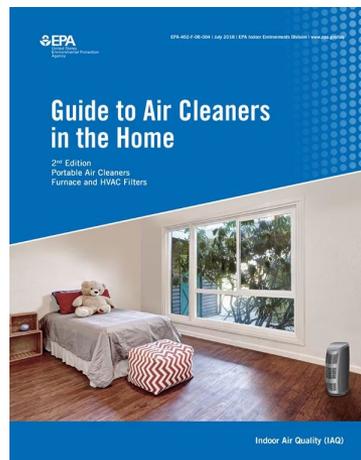
Keeping Smoke Out

- **Close up building, restrict entry**
 - “air lock” entries with plastic sheeting
 - Large air scrubbers near entries
- **Increase filtration efficiency – MERV 13**
 - **Secondary charcoal filter**
- **Change filters more frequently**
- **Keep buildings under positive air pressure**
- **Monitor CO₂**
- **Problems**
 - **Univentilators**
 - **Buildings with only windows for ventilation**
- **New/remodel:** Separate ventilation from heating/cooling/energy recovery. Bring in outside air through a minimum MERV 13. DOAS - Dedicated OA Systems.
- **DOH: Improving Ventilation & IAQ during WFS Events**
 - <https://www.doh.wa.gov/Portals/1/Documents/Pubs/333-208.pdf>



Portable Air Cleaners

- **Portable HEPA Filter / Charcoal Air Cleaners**
 - **California Air Resources Board Certified**
 - **No ozone**
 - <https://ww2.arb.ca.gov/our-work/programs/air-cleaners-ozone-products/air-cleaner-information-consumers>
 - **Size – Clean Air Delivery Rate (CADR)**
 - **Quiet**
- **EPA Wildfire Smoke Factsheet – Indoor Air Filtration**
 - https://www.epa.gov/sites/production/files/2018-11/documents/indoor_air_filtration_factsheet-508.pdf
- **EPA Air Cleaners and Air Filters in the Home**
 - <https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home>



Masks

Wildfire Smoke and Face Masks



Wildfire smoke can irritate your eyes, nose, throat, and lungs. It can make you cough and wheeze, and can make it hard to breathe. If you have asthma or another lung disease, or heart disease, inhaling wildfire smoke can be especially harmful. If you cannot leave the smoky area, good ways to protect your lungs from wildfire smoke include staying indoors and reducing physical activity. Wearing a special mask called a "particulate respirator" can also help protect your lungs from wildfire smoke. These masks should be used mostly by people who have to go outdoors.

Will a face mask protect me from wildfire smoke?

Respirator masks labeled N95 or N100 provide some protection – they filter-out fine particles but not hazardous gases (such as carbon monoxide, formaldehyde, and acrolein). This type of mask can be found at many hardware and home repair stores and pharmacies. Your local health agency may also have these masks.

- Choose an N95 or N100 mask that has two straps that go around your head. Don't choose a one-strap paper dust mask or a surgical mask that hooks around your ears – these don't protect against the fine particles in smoke.
- Choose a size that fits over your nose and under your chin. It should seal tightly to your face. These masks don't come in sizes that fit young children.
- Don't use bandanas or towels (wet or dry) or tissue held over the mouth and nose. These may relieve dryness but they won't protect your lungs from wildfire smoke.

Anyone with lung or heart disease or who is chronically ill should check with their health care provider before using any mask. Using respirator masks can make it harder to breathe, which may make existing medical conditions worse. The extra effort it takes to breathe through a respirator mask can make it uncomfortable to use them for very long. These masks should be used mostly by people who have to go outdoors.

Respirator masks shouldn't be used on young children – they don't seal well enough to provide protection. They also don't seal well on people with beards.

How do I use my respirator mask?

- Place the mask over your nose and under your chin, with one strap pil below the ears and one strap above. Adjust the mask so that air can't through at the edges.
- Pinch the metal part of the mask tightly over the top of your nose.
- The mask fits best on clean shaven skin.
- Throw away your mask when breathing through it gets difficult, if it's damaged, or if the inside gets dirty. Use a new mask each day if you can.
- If it's harder to breathe through a mask, so take breaks often if you wear one.
- If you feel dizzy or nauseated, go to a less smoky area, take off your mask, and get medical help if you don't feel better.

For more information, search for "wildfire smoke" on www.doh.wa.gov.

DOI: 334-353 July 2014

Adapted from California Department of Public Health.

For people with disabilities
To submit a request, visit www.doh.wa.gov



N95 respirators can help protect your lungs from wildfire smoke. Straps must go above and below the ears.



Watch this video on how to use a face mask.



Untwist the straps, position the N95 low on your nose

Wildfire Smoke and Dust Masks at Work



When smoke from wildfires enters your work environment you may have concerns about your comfort or health.

Should workers wear a dust mask?

When the amount of smoke exposure at work isn't likely to exceed occupational exposure limits, you can still ask your employer to allow you to voluntarily wear a dust mask.

Dust masks labeled as N95 or N100, also known as respirators, can provide some reliable protection by filtering out smoke particles in the air but they will not provide protection against the gases or vapors found in smoke.

You can find N95 or N100 dust masks online or at many hardware and home repair stores. Your local health department may also have some available.

Do employers have to provide dust masks for voluntary use?

No, but they may choose to provide them anyway.

Employers allowing voluntary use aren't required to provide a medical evaluation or fit-testing for voluntary users of dust masks, but they are required to provide a free copy of the advisory information sheet found in [\[VAC 296-842-11005\]](#) after determining voluntary use is a safe option for their workers.



N95 or N100 dust masks can provide some protection from wildfire smoke particles in the air. Straps must go above and below the ears.

Attention!

Using dust masks can make it harder to breathe and possibly make certain medical conditions worse. If you have lung or heart disease or are chronically ill, you should check with a doctor before using a dust mask.



Particle Filter Face Masks

- **NIOSH-Approved Respirator Masks**
 - **N95**, N100 or P100 commonly sold
 - N, P, R with 95% efficiency or greater are all appropriate
 - **2 straps**
 - Filter fine particulates, **not CO or other gases**
 - Surgical masks **not** effective
 - **Relief valve** – easier breathing
- Tight seal / self fit test
 - Correct size (and sometimes brand)
 - Requires clean shave
- Not appropriate for children
- Consult physician before use if have chronic condition



The right face mask can provide some protection for some people for a limited time when not possible to stay indoors.

Flyer with more information link on www.doh.wa.gov/smokefromfires and here:

<https://www.doh.wa.gov/Portals/1/Documents/Pubs/334-353.pdf>

NIOSH Guidance on particulate respirators: https://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/default.html

Low-Cost Portable Air Sensors

- Increasing public use
- Potentially helpful in areas without nearby monitors, but issues with reliability and accuracy
 - Testing indicates results differ from agency monitors by 2X
- Issues to consider in use:
 - EPA: <https://www.epa.gov/air-sensor-toolbox>
- Comparison of analytical capability
 - South Coast AQMD: <http://www.aqmd.gov/aq-spec>

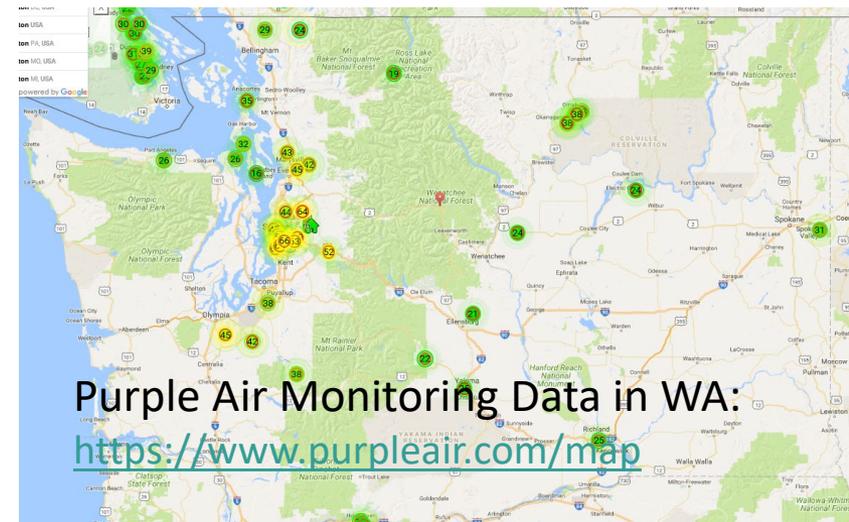


Image Source: EPA, <https://www.epa.gov/air-sensor-toolbox>



Others Using Low Cost Sensors

- California Air Resources Board
 - 200 PurpleAir PM Sensors – real time
 - Using to determine where to deploy portable Met One E Sampler Federal Reference Monitors
 - Appear to be ~1.7x higher than the FRM
- Lane Regional Air Protection Agency, Oregon
 - Supplement 7 Air Monitoring Stations with PurpleAirs
- Confederated Tribes of the Colville Reservation
 - Aerocet (IA)
- Methow Valley Clean Air Project
 - PurpleAir (OA)



Sensors Workgroup (ongoing)

Developing guidance for use of low-cost air sensors to assist in health decisions about indoor and outdoor activities during wildfire smoke episodes



Image Sources: SouthCoast AQMD <http://www.aqmd.gov/aq-spec/evaluations/summary-pm>, Aeroqual www.aeroqual.com

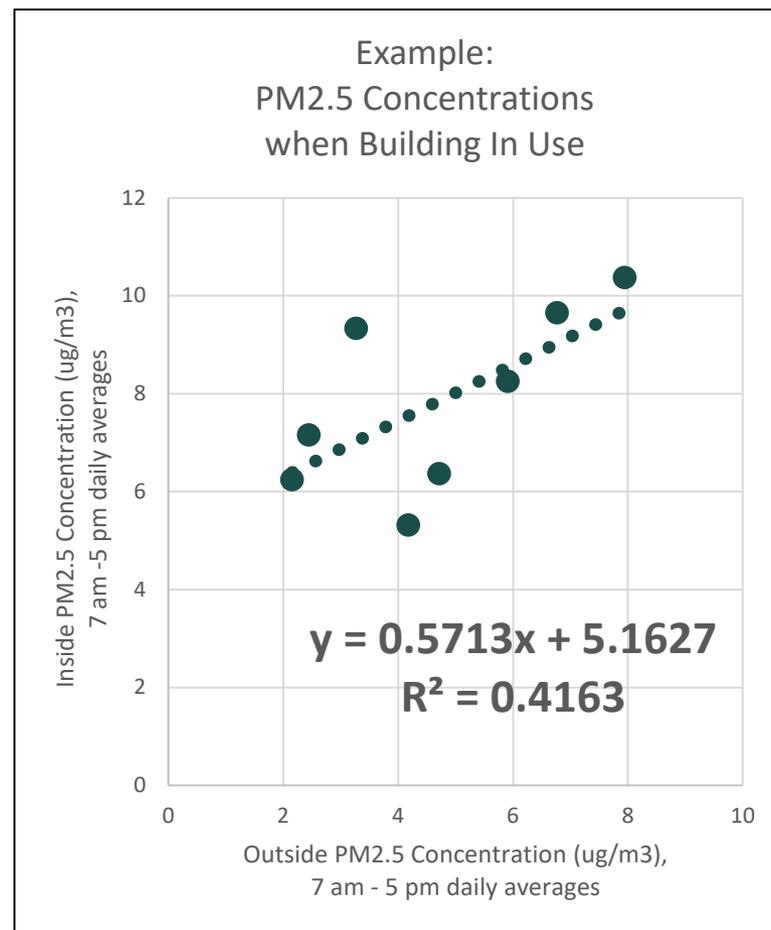
Local pilot test of low-cost sensor use for health decisions

- DOH purchased small number of selected low-cost PM_{2.5} sensors*
- Developed draft protocols for sensor use
- Local participating sites apply protocols to evaluate indoor air in a school with sensors (*in progress*)

*Grant (\$15K) from Council of State and Territorial Epidemiologists (CSTE)

Pilot Test: Indoor & Outdoor Paired Stationary Sensors

- Site one sensor indoors and one outdoors at a school
- Collect measurements for 1-2 weeks, ideally during high levels of outdoor PM_{2.5}
- Estimate daily averages of both sensors for hours when building in use
- Identify the ratio of indoor to outdoor PM_{2.5} for when building in use



Washington Wildfire Smoke Response for Public Health

Public health needs for wildfire smoke response in Washington are increasing.

DOH worked with local health jurisdictions to form a network of stakeholders. We are improving our collective public health response by strengthening knowledge and expanding tools.

This is how climate-readiness looks!

DOH plans to continue to work with others to update wildfire smoke response resources for public health as is necessary and as we are able with our resources.

Q&A?

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Washington State Department of Health is committed to providing customers with forms and publications in appropriate alternate formats. Requests can be made by calling 800-525-0127 or by email at civil.rights@doh.wa.gov. TTY users dial 711.