

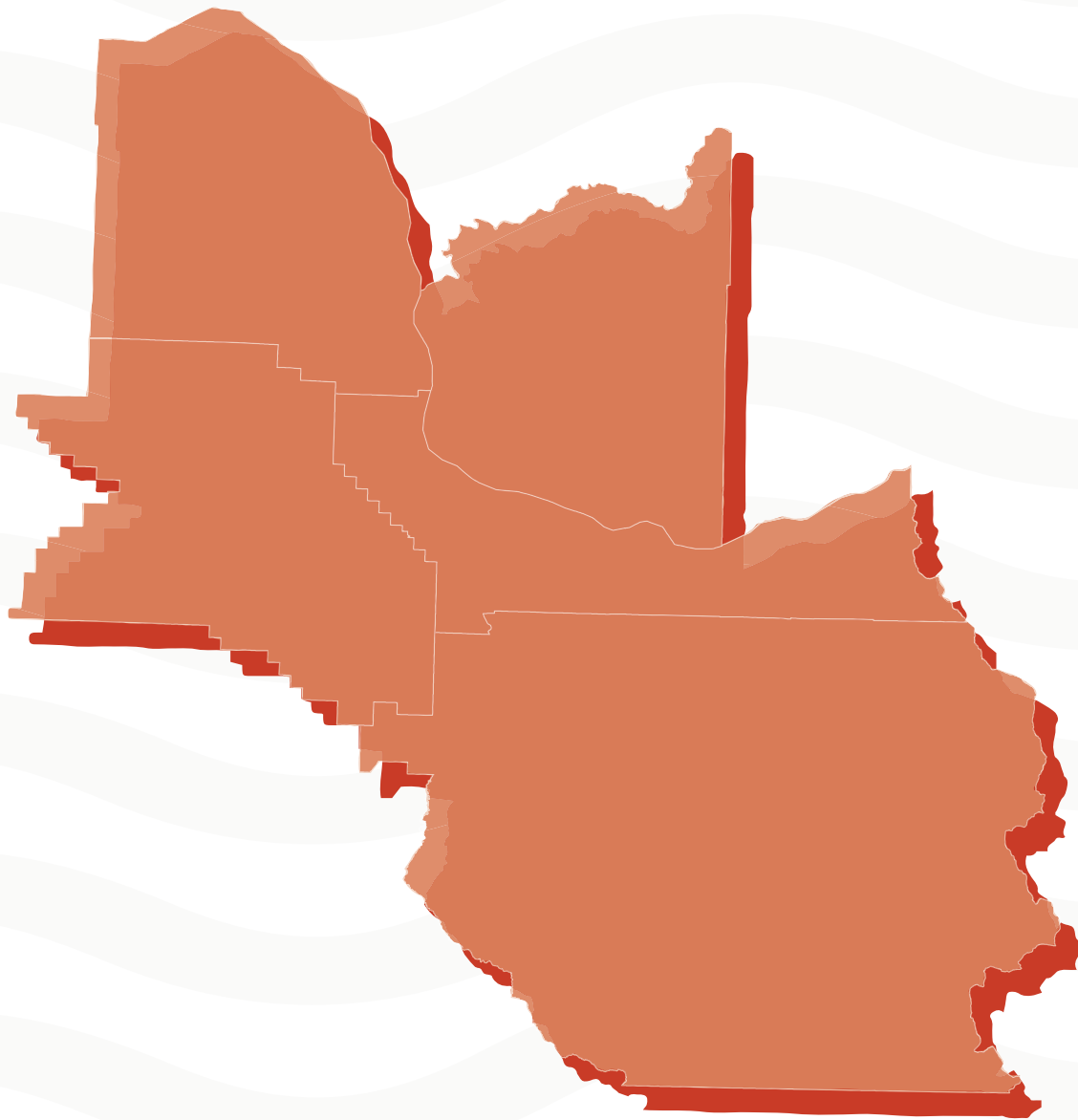


# Extreme Heat & Wildfire Smoke

Reducing Risks to Public Health  
in the Portland Region

April 2021





This map shows the five-county region covered in this report, including Clackamas, Columbia, Multnomah, and Washington Counties in Oregon and Clark County in Washington.

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# Introduction



**T**he U.S. EPA provided technical assistance to Oregon Metro and the Regional Disaster Preparedness Organization to focus on ways to mitigate impacts from extreme heat and wildfire smoke in the Portland metropolitan region. The project covered five counties, including Clackamas, Columbia, Multnomah, and Washington Counties in Oregon and Clark County, Washington.

The project involved a series of virtual workshops in early 2021, for elected officials and agency leaders from the five counties and cities within those counties; and planners and practitioners from the fields of public health, emergency management, land use, and climate action planning. The workshops presented information about how extreme heat and wildfire smoke can impact people's health, including acute impacts like shortness of breath and itchy eyes, as well more serious impacts up to and including premature death. The planners then worked together to identify what guidance might help them all more easily add these risks to plans that result in state and federal funding, with a primary focus on the FEMA-funded natural hazard mitigation plans.

This report presents information that can be used by planners to add these increasingly impactful natural hazards to plans. It includes a screening tool that will help planners take a look at the data about who lives in their communities and determine what risks these hazards pose to the community at large and to more vulnerable people or to more vulnerable neighborhoods within the community. The report also includes a list of potential actions that not only local governments, but regional partners, can take to help protect these vulnerable people and places from extreme heat and wildfire smoke. Lastly, the report offers some suggested funding sources to help pay for these actions.

# Why did the Region pick Extreme Heat & Wildfire Smoke?

## ◎ Public Health

Natural hazard mitigation is often focused on property, infrastructure, or immediate loss of life. These hazards pose real threats to public health, for people young and old, and have ranging impacts to people with pre-existing conditions and those that are healthy.

## ◎ Equity

Extreme heat and wildfire smoke disproportionately impact vulnerable populations who have existing health issues like cardiovascular disease or to communities already facing poor air quality because of proximity to industry or highways. And neighborhoods that have been historically red-lined are often those with the worst urban heat island impacts due to lack of green space. These existing inequities are exacerbated by natural hazards. Equity is also an issue in terms of taking mitigation action. For example, renters do not own their homes and may not be able to retrofit their own living spaces to add air conditioning, or low-income people may not be able to afford to buy portable air filters to reduce smoke exposure. Many people in the region work outside, often doing manual labor, and may not have sick leave or the ability to refuse to work in unsafe conditions. Mitigation actions can be developed that consider disproportionate impacts on specific people and groups in the region.

## ◎ Cascading Impacts

These hazards often arrive together – if there is a heat wave, there is a greater likelihood of wildfire, and then smoke from those fires. It makes sense to plan for them together, not only because they both impact respiratory health but because they may happen simultaneously.

## ◎ Limited Air Conditioning

Buildings in the Pacific Northwest were not designed with air conditioning, and historically, heat waves with temperatures significantly above 80 degrees have been rare. The lack of air conditioning means that many homes and even public facilities like schools and libraries lack air conditioning that can offer cooling for extreme heat events and air filtration during smoke events.

## ◎ Climate Change

These disasters are likely to worsen in the coming years and decades due to Climate Change. From the 2020 Oregon NHMP:

“An overall trend towards more intense fire events has emerged in the last 7 years. This observation is consistent with the trend over the last several decades of warmer and drier conditions during the summer months that have contributed to an increase in fuel aridity enabling more frequent large fires and an increase in the total area burned across the western United States. Human-caused climate change is partially responsible for these trends, which are expected to continue increasing under continued climate warming (Dalton, Dello, Hawkins, Mote, & Rupp, 2017).” (page 370)

“Historically, extreme heat and heat waves have not been common, but days above 90°F occur nearly every year. Portland has an average of about 10 days per year above 90°F. The frequency of prolonged periods of high temperatures is expected to increase. Because extreme heat is relatively rare in Region 2, many people may not be accustomed or prepared when an extreme heat event occurs.” (page 569)

“It is extremely likely (>95%) that the frequency and severity of extreme heat events will increase over the next several decades across Oregon due to human-induced climate warming (very high confidence).” (page 571)

## ◎ Missing from Current Plans

A review of the current natural hazard mitigation plans for the five counties in the region reveals that only two counties, Clackamas and Multnomah, include extreme heat in their plans, and only Multnomah County addresses wildfire smoke as a natural hazard. Adding these two hazards to natural hazard mitigation plans will give more focus to these risks and potentially provide FEMA funding for actions that can reduce impacts to vulnerable people.

# Community Engagement: Early Steps

**S**uccessful community planning for disaster resilience relies on people working together and trusting one another. Too often, non-English speakers, underserved communities, houseless people, and other groups can be left out of or choose not to participate in planning efforts. And yet disasters that create the most significant impacts often disproportionately affect these same communities. In the Portland region, there are several efforts to address how social vulnerability is determined and how government agencies are engaging community members and conducting outreach. The project team will continue to share info from this project to inform that work, including RDPO's efforts to improve outreach around resilience planning, Metro's Social Vulnerability Tool, and the upcoming update to the City of Portland's Mitigation Action Plan.

The project team, including staff from Metro, RDPO, and EPA conducted interviews with community based organizations that represent some of the people who are most directly impacted by extreme heat and wildfire smoke to get early input and identify big issues or questions about these hazards. The project team wanted to lay the groundwork for this project by talking to these groups first. Highlights from these interviews are included below and were presented to elected officials, agency leaders, and planners and practitioners with government agencies as part of the workshop series.



## Asian Pacific American Network of Oregon (APANO)

- Smoke exacerbates existing air quality issues. Census tracts in the Jade District have existing high rates of asthma attacks and low birth rates from low air quality.
- People living in the Jade District were mostly staying home, but rushing to buy air filters that were in short supply.
- Chinese immigrants are familiar with poor air quality and have more consciousness about it. But in general, they feel that air quality is overall very good in the Portland region.
- People who were less familiar with poor air quality were very concerned about smoke event of September 2020.



## Pineros y Campesinos Unidos del Noroeste (PCUN)

- PCUN represents farmworkers and working Latinx families in Oregon
- Communication is critical, materials and messages need to be multilingual
- Current instructions, which focus on instructing residents not to go outside, are not workable for field workers, who need more refined and targeted guidance for both heat and smoke events.
- Use existing NGO relationships, radio stations, Univision, and churches to do outreach to working Latinx families
- Government partners need to listen to our feedback when we give it
- Sent a letter to OR OSHA about these same needs and concerns (see Appendix C for the full letter).





## Home Forward

- Housing authority of Multnomah County
- COVID-19 was a big concern during the smoke event of fall 2020, because staff had to leave residents on site without staff
- Need better planning for evacuation and event procedures
- Even adding filters to box fans is out of budget for many living in affordable housing
- Difficulty with travel to get supplies as well
- As a result of the smoke event, Home Forward has created a Wildfire & Smoke Emergency Response Protocol



## Joint Office of Homeless Services, Multnomah County

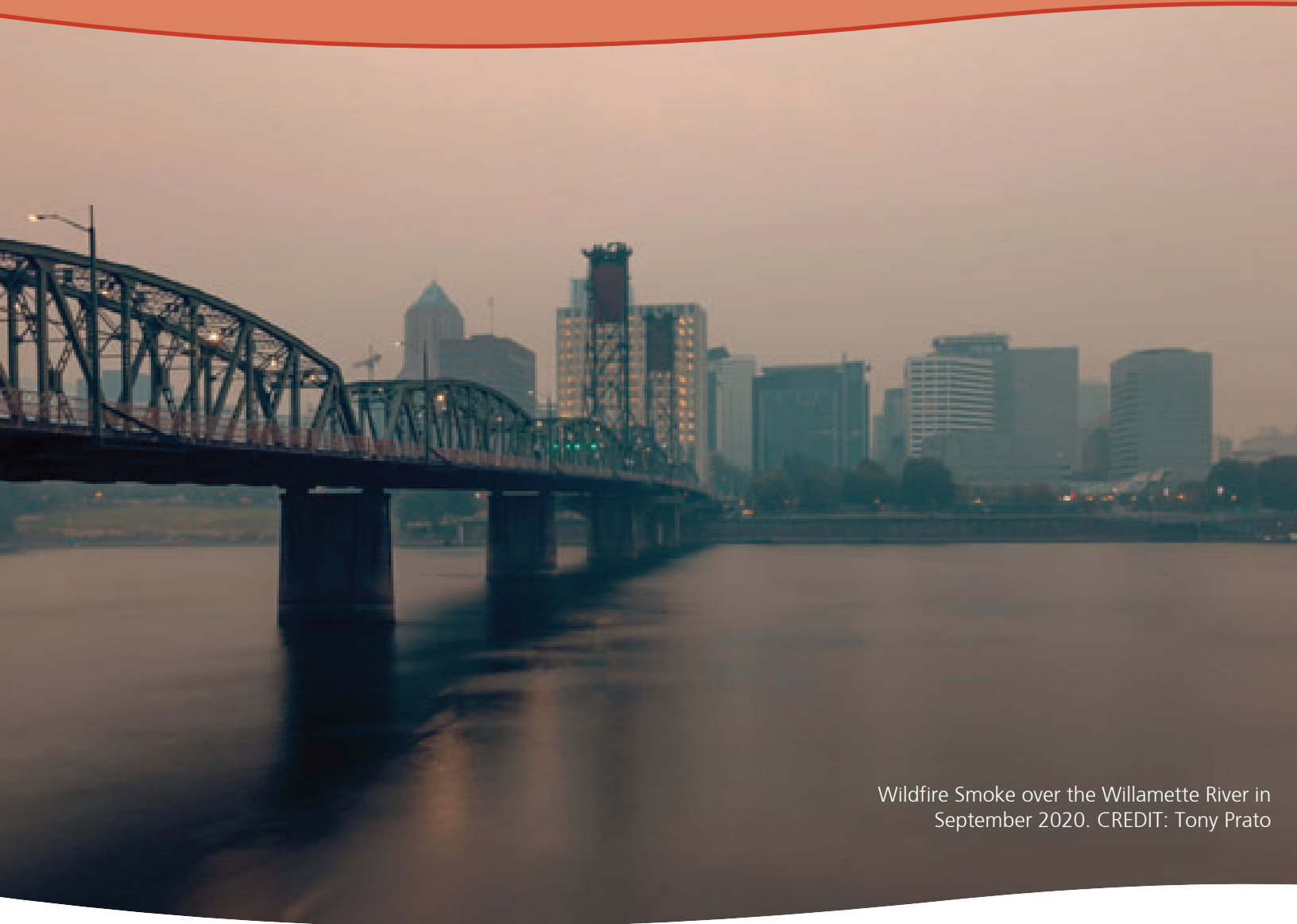
- Definitely concerned about impacts of both extreme heat and wildfire smoke on houseless people, and COVID-19 issues compounded by these issues
- JOHS is in a learning phase about what these risks mean and how to address them and would like to follow-up with this project

RDPO, the five counties, and other government entities will need to continue to listen to feedback from these and other organizations as plans are updated and specific projects are identified. Workshop participants provided a list of additional community-based organizations that work in the region and should be engaged as projects move forward, including:

- Black Parent Initiative
- Immigrant and Refugee Community Organization (IRCO)
- Native American Youth and Family Center (NAYA)
- Familias en Accion
- Latino Network
- Micronesia Islander Community
- Verde
- Voz Workers' Rights Education Project



# Public Health Risks to the Region



Wildfire Smoke over the Willamette River in September 2020. CREDIT: Tony Prato

**T**his section summarizes information presented during the workshop by Dr. Vivek Shandas from Portland State University and Dr. Ana Rappold from U.S. EPA's Office of Research and Development. Wildfire smoke and extreme heat have negative impacts on human health, particularly in people who are more vulnerable because of where they live, the jobs they work, or preexisting health conditions.

For each hazard type, the information below presents some basic information about impacts to public health, a list of which populations are more susceptible to these impacts, and a list of negative outcomes for those people. These are starter lists to use in developing a vulnerability assessment, but each community or county may want to do further detailed analysis of local demographics and public health data and talk to community members, particularly susceptible people, to better understand how extreme heat and wildfire smoke are impacting public health in the community.



# Extreme Heat

## Susceptible Populations

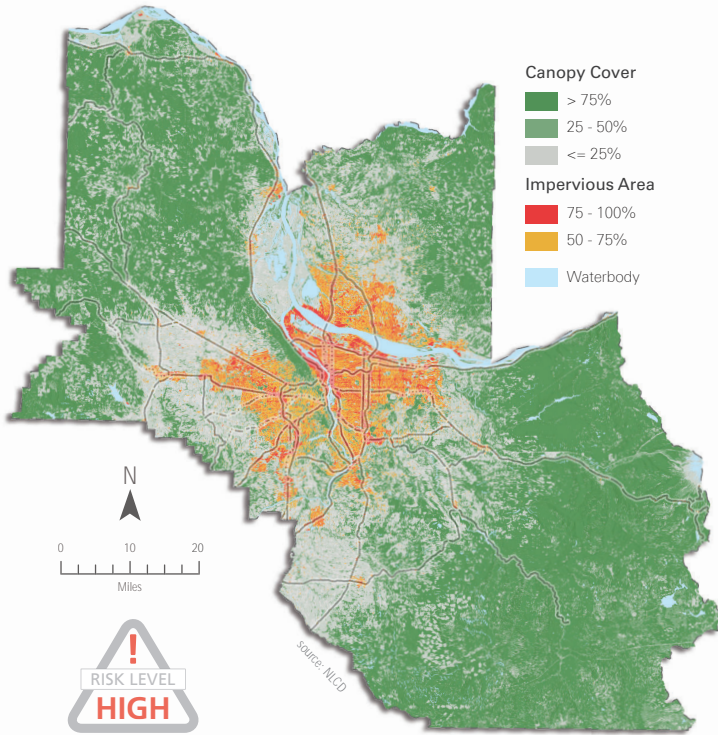
- Adults 65 years of age and older (a growing group)
- Children, especially infants under one year old
- Populations with cardiovascular disease and respiratory illnesses
- People with lower incomes
- Outdoor workers, including farm workers, landscapers, park personnel, utility staff, and others
- Non-Hispanic Blacks
- Houseless people
- People who are socially isolated
- People with mobility restrictions or mental impairments
- People taking certain medications (e.g. for high blood pressure, depression, insomnia)
- Athletes engaged in vigorous outdoor exercise or work or
- People under the influence of drugs or alcohol

## Outcomes

- Heat stroke
- Heat exhaustion
- Anxiety
- Listlessness
- Increase in interpersonal, domestic, and group violence
- Deaths from heart attacks, strokes, cardiovascular disease
- Lost school and workdays

# Extreme Heat

## Fact Sheet



### Definition

Extreme heat is when temperatures are much hotter than average. For our region, this is generally days 11 over 90° F.

### Location

Because of the Urban Heat Island effect, extreme heat is typically concentrated in cities in our region.

### Timing

June - August.

**1.5° F**

Hotter than the first half of 20th century  
USGCRP, 2017

**4-9° F**

Hotter averages by 2100  
USGCRP, 2017

**30%**

Households with no A/C  
Census AHS, 2019

**36.5%**

Urban Impervious Area  
NLCD, 2016

**296**

Average Heat-Related ER Visits 2016-2018  
Multnomah County, 2019

**5°-19° F**

Hotter in Urban Areas  
Climate Central, 2014

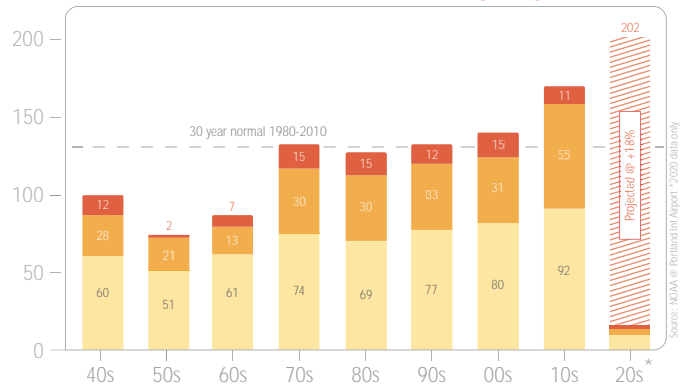
**24%**

Urban Canopy Cover  
NLCD, 2016

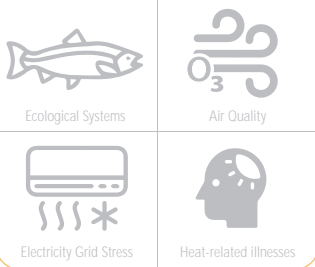
**702**

Average Heat-Related Deaths in US 2004-18  
CDC, 2018

### Hot Days by Decade



### Impacts



### Actions



### Symptoms

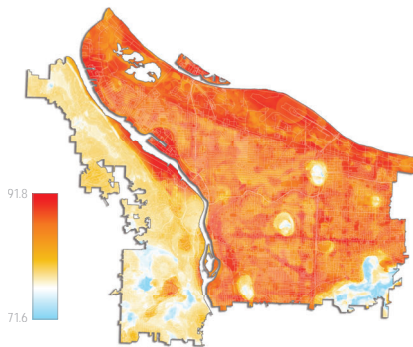
- ◇ Dizziness
- ◇ Heavy Sweating
- ◇ Fever
- ◇ Nausea
- ◇ Tired/Weak
- ◇ Dizziness
- ◇ Fainting

HS Heat Stroke  
HE Heat Exhaustion  
CDC, 2017

### Vulnerable Groups

- ◇ Older Adults (65+)
- ◇ Children
- ◇ People with medical conditions
- ◇ Pregnant people
- ◇ Communities of color
- ◇ Outdoor workers
- ◇ People experiencing homelessness

Multnomah County, 2019



Portland Evening Temperatures, 2014

Sustaining Urban Places Research (SUPR) Lab (2018), Portland State University.

### Historic Heat Waves

July 20-24  
2006

Summer  
2015

August 11-14  
2016

August 25-26  
2016

May 22-23  
2017

August 1-4  
2017



RDPO

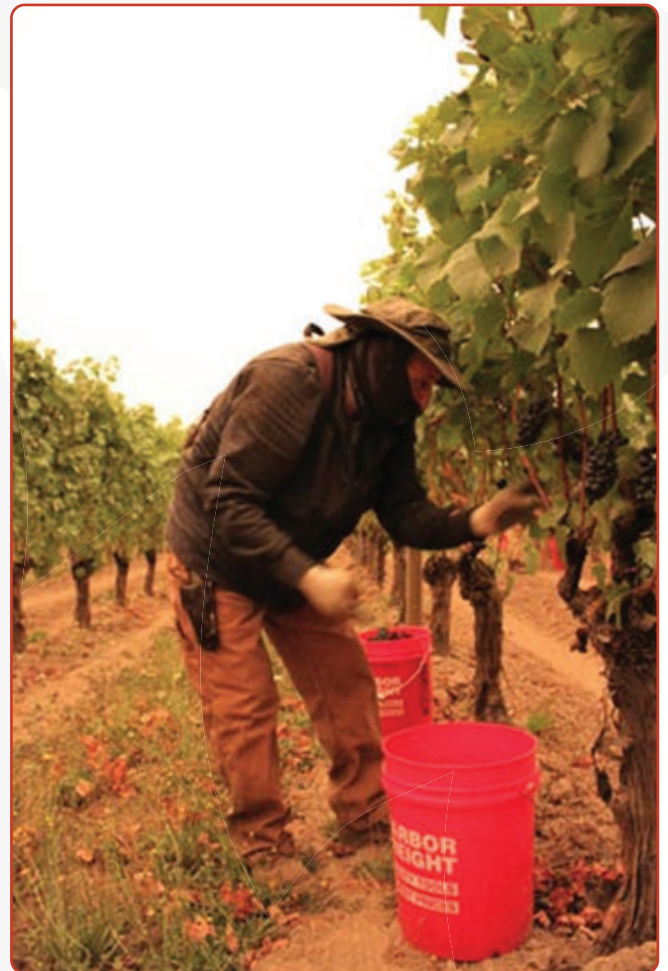
# Wildfire Smoke

## Susceptible Populations

- Adults 65 years of age and older (a growing group)
- Pregnant women and their fetuses
- Children
- Populations with cardiovascular disease and respiratory illnesses
- Populations with lower incomes
- Outdoor workers, including farm workers, landscapers, park personnel, utility staff, and others
- Populations with chronic inflammatory diseases (e.g., diabetes, obesity)

## Outcomes

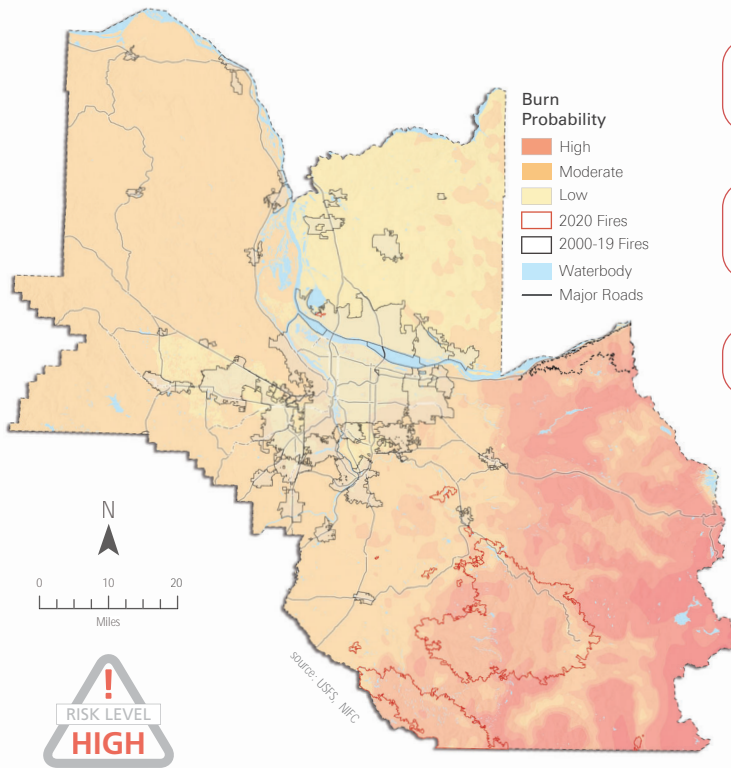
- All-cause mortality
- Asthma & COPD exacerbations
- Bronchitis & pneumonia
- Childhood respiratory disease
- Cardiovascular outcomes
- Adverse birth outcomes
- Anxiety
- Symptoms such as: eye irritation, sore throat, wheeze and cough
- Lost school and workdays



Amador Silva harvest grapes in Willamette Valley during the September 2020 smoke event. Photo credit: Emily Teel/Stateman Journal.

# Wildfire

## Fact Sheet



### Definition

A wildland fire is a type of wildfire that spreads through consumption of vegetation.

### Location

Steeply sloped areas, especially south-facing slopes, and forested areas with available fuel.

### Time

July - October.

### Conditions

Lightning, Low Humidity, Hot, Windy.

**\$25.9m**

Cost to fight 2020 fires  
NWICC, 2020

**200k+**

Total area burned acres  
since 1972 regionally  
ODF, DNR

**8th**

In Nationwide Risk  
Verisk

**4,244**

Fires since 1972  
ODF, DNR

**39%**

Projected increase in very  
high fire danger days  
OCCRI

**3,655**

Fire deaths in USA  
FEMA, 2018

### Causes



High Winds



Human Activity



Equipment



Downed Power Lines

### Impacts



Property Damage



Water Quality



Air Quality



Flooding

### Actions



Maintain Buffer



Plant Native Groundcover



Emergency Kit



Listen, Evacuate



### Climate Change

Higher temperatures and drier soils are likely to cause an increase in fire prone conditions.



### Cascading Hazards

Hazards don't happen in isolation. Wildfire can cause and be caused by many regional hazards.

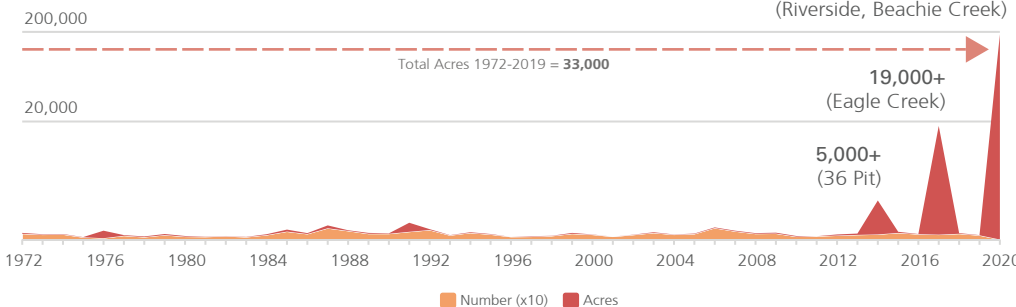


**RDPO**

### Number of Fires + Acres Burned

(within Regional Boundary)

5.7x all previous acreage combined  
**190,000+**  
(Riverside, Beachie Creek)



# Risk Assessment Screening Tool

**T**he goal of the assessment is to determine where hazards and social vulnerability intersect and to determine where extreme heat and wildfire smoke will have the greatest impacts, particularly for the most susceptible people in the community. This analysis should lead to the development and implementation of appropriate and achievable mitigation actions that can be added to Natural Hazard Mitigation Plans and other local and regional plans.

This screening tool includes two steps: 1) Define High Risk Areas and 2) Define High Risk People. The first step will narrow the geographic scope to understand what areas are exposed to risks from extreme heat and wildfire smoke. The second step will further narrow the scope by understanding who within those areas is most vulnerable to impacts from extreme heat and wildfire smoke.

This tool provides an example of how to develop a risk assessment for extreme heat and wildfire smoke, but the data sources provided in tables on the following pages are not comprehensive. Each step has a list of issues to consider and suggested data sources to find out information about each issue. The screening tool is organized by a “good, better, best” set of data sources, so that depending on resources, time, and skills of the department or agency conducting the assessment, there are options that will provide different degrees of detail or fine-grained assessment. The “good” range offers nationally-available, free data. The “best” range suggests teaming up with a local university to access more refined data, working with regional partners like Metro that have more fine-grained data, or relying on local health departments and other agencies to access the most refined data available.

For each issue, there is a basic question that can be answered to summarize what the data revealed. At the end of both steps, answers to these questions can be combined to produce an Initial Problem Statement. We have provided two types of Initial Problem Statements as examples for how simple or complex these might be in the end.

Finally, this screening tool is meant to provide an overall picture of a geographic area’s vulnerability to extreme heat and wildfire smoke. But there may be minor or major data shortcomings, including granularity of available data as well as biases within data collection methods that fail to accurately or fully represent vulnerable people or places. Given these potential shortcomings, it is important to talk with community-based organizations, social service providers, and community members themselves to refine the vulnerability assessment and provide a more complete picture of the region’s vulnerability and resilience to these hazards.



# STEP 1

## Define High Risk Areas

Data	Good	Better	Best	Results
<p>What to measure. In general, you will learn more and be able to plan for smaller areas with data from smaller scales.</p>	<p>These data sources are nationally available and easy to access online.</p>	<p>These data sources are nationally available and easy to access online.</p>	<p>These data sources are available at finer scales (e.g. census tracts or block groups) or are available at important local geographies like districts, wards, neighborhoods, etc that are unique to your area.</p>	<p>Save yourself some time and digging later and use this space to document what you found out as a simple sentence that states exactly what you found out, noting the geography and any data limitations. E.g. According to the SOURCE, in YEAR, within the GEOGRAPHY/PLACE, the DATA POINT is X.</p>
<p>City/county-wide heat exposure</p>	<p>Climate Resiliency Toolkit (NOAA) National Integrated Heat Health Information System <a href="https://nihhis.cpo.noaa.gov/">https://nihhis.cpo.noaa.gov/</a> CDC National EPH Tracking Network: <a href="https://ephtracking.cdc.gov/DataExplorer/">https://ephtracking.cdc.gov/DataExplorer/</a></p>	<p>NW Climate Toolbox; Oregon State Prism Dataset</p>	<p>Landsat thermal band imagery for high spatial and temporal resolution surface temperature modeling Find literature review/publications from regional universities, like PSU Citizen science collected heat data</p>	<p>Example: Clackamas County is likely to see 19 days over 90 degrees by 2030 and 26 days over 90 degrees by 2050.</p>
<p>Neighborhood (or block group) heat exposure by determining how fast different locations cool down at night</p>	<p>-</p>	<p>Map using Average Reduction in Nighttime Ambient Temperature from EPA's EnviroAtlas. Data are based on aerial photography which has an overall accuracy of 80 to 90 percent.</p>	<p>Recommend finding literature review/publications from regional universities, like PSU</p>	<p>Are there neighborhoods that have worse exposure to heat, including higher nighttime temperatures during heat events?</p>
<p>Wildfire smoke risk</p>	<p>Use language from Oregon State Hazard Mitigation Plan (See Page 15)</p>	<p>-</p>	<p>-</p>	<p>-</p>



# STEP 1

## Define High Risk Areas

Data	Good	Better	Best	Results
Tree Cover	EPA EnviroAtlas uses NLCD 2011 data to develop Percent Tree Cover at the watershed scale	I-Tree Landscape Tool offers surface coveragem and demographics at block group level <a href="https://landscape.itree-tools.org/">https://landscape.itree-tools.org/</a>	Citizen science or other localized inventory	Example: Clark County, Washington has an average of X% percent tree cover, with many Census block groups at 10% tree cover or lower.
Impervious Surface: Impervious surfaces, such as conventional roofs, sidewalks, roads, and parking lots, replaces vegetation and results in less shade and moisture to keep urban areas cool.	National Land Cover Database <a href="https://www.mrlc.gov/">https://www.mrlc.gov/</a>	Map Impervious Area per capita from EPA's EnviroAtlas. This estimates the square meters of total land per person within each Census block group that is covered by impervious surfaces	Local impervious data generated from aerial, LiDAR, and ancillary data, e.g. Metro Regional Barometer	Example: Washington County has areas with very low imperviousness (less than 1%) in the western part of the county, and areas with over 40% impervious surface area in the eastern, more urbanized parts of the county.
Proximity to park space or natural areas	Oregon Stewardship Geodatabase	Conservation lands network explorer tool	Metro Regional Barometer	List any neighborhoods or block groups with 100% of the residential population not within 500 meters of a park entrance.
Distance from/transport to hospital emergency department	-	County tax assessor parcel data	Local emergency operations plans	-
Homeless shelters, assisted living, affordable housing	-	County tax assessor parcel data	Homeless Management Information System (HMIS) data County human services data	List overall numbers of these facilities and specific locations.
Cooling and clean air centers	-	County tax assessor parcel data	Local emergency operations plans	List locations of these facilities and any relevant info about who operates them.
List any data gaps or questions that are difficult to answer with available datasets	-	-	-	-

## STEP 1

# Define High Risk Areas

New tools are being developed to better predict the impacts of wildfire smoke, but it can be difficult to predict, far in advance, exactly when and where wildfire smoke may occur. The following text is taken from the Oregon State Hazard Mitigation Plan and can provide the necessary information to add wildfire smoke to local hazard mitigation plans.

“All eight regions in Oregon are projected to be affected by an increased incidence of wildfire. (Page 377)

According to Oregon Forest Resources Institute which gathered information on the “Impacts of Oregon’s 2017 Wildfire Season,” large wildfires caused significant economic impacts from smoke alone. There were cancellations of cultural, social, and athletic events. Tourism and recreation were negatively impacted. People couldn’t get to work because they were sick or roads were impassable. Over 665,000 acres of wildfire across the state in both forests and rangelands sent particulates and hazardous compounds into the air. The over 2,000 fires that caused this smoke problem diminished air quality for everyone, especially children, pregnant women and the elderly. Aftereffects of the fires included landslides, flooding, and reduced drinking water quality.” (Page 357)

“Clearly an overall trend towards more intense fire events has emerged in the last 7 years. This observation is consistent with the trend over the last several decades of warmer and drier conditions during the summer months that have contributed to an increase in fuel aridity enabling more frequent large fires and an increase in the total area burned across the western United States. Human-caused climate change is partially responsible for these trends, which are expected to continue increasing under continued climate warming (Dalton, Dello, Hawkins, Mote, & Rupp, 2017).” (Page 370)

“Although usually thought of as being a summer occurrence, wildland fires can occur during any month of the year. The vast majority of wildfires burn during the June to August time period but in recent years have extend into September or even October months. The decline mountain snowpack and earlier spring snowmelt due to climate change has resulted in a lengthening of the fire season over the last several decades (Dalton, Dello, Hawkins, Mote, & Rupp, 2017). Dry spells during the winter months, especially when combined with winds and dead fuels, may result in fires that burn with an intensity and rate of spread that surprises many people. During a typical year, in excess of 2,000 wildland fires are ignited on protected forestlands in Oregon. Due to growth in the WUI and changes in climate, the number of wildfires on ODF protected lands has trended upward. This trend is expected to continue increasing under continued climate warming.” (Page 371)

# STEP 2

## Define High Risk People

Data	Good	Better	Best	Results
<p>What to measure. In general, you will learn more and be able to plan for smaller areas with data from smaller scales.</p>	<p>These data sources are nationally available and easy to access online.</p>	<p>These data sources may be available from state or regional agencies and have more detailed information.</p>	<p>These data sources are available at finer scales (e.g. census tracts or block groups) or are available at important local geographies like districts, wards, neighborhoods, etc that are unique to your area.</p>	<p>Use this space to document what you found out as a simple sentence that notes the geography and any data limitations. E.g. According to the SOURCE, in YEAR, within the GEOGRAPHY/PLACE, the DATA POINT is X.</p>
<p>Populations with pre-existing cardiovascular and respiratory disease</p>	<p>CDC Interactive Atlas of Heart Disease and Stroke provides state and county-level data and factors in race, ethnicity, gender, and more.</p>	<p>CDC PLACES data which models this for each census tract based on state and county data</p>	<p>Data from your local county health department and/or local Federally-Qualified Health Centers</p>	<p>According to the CDC, in 2020, Clackamas County has X% of the population with pre-existing cardiovascular and respiratory disease.</p>
<p>Adults 65 years of age and older</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>In 2016, LOCATION's population included X% of adults over 65, with a concentration of adults over 65 located in X LOCATION/ GEOGRAPHY.</p>
<p>Pregnant women or women of reproductive age</p>	<p>Number or percentage of women of reproductive age (15-44 years old per Census) County level data available from <a href="http://www.Data.census.gov">www.Data.census.gov</a></p>	<p>CDC Geographic Calculator for Estimating Number of Pregnant Women: <a href="https://www.cdc.gov/reproductive-health/emergency/docs/Geographic-Calculator-for-Pregna nt-Women_508.xlsx">https://www.cdc.gov/reproductive-health/emergency/docs/Geographic-Calculator-for-Pregna nt-Women_508.xlsx</a></p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>In 2010, there were 607 women of reproductive age (WRA) in LOCATION.</p>
<p>Children under 18 years old</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>In 2010, there were 876 children under 5 years old in LOCATION.</p>
<p>Children under 5 years old</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>Decennial Census, 5-year American Community Survey (ACS)</p>	<p>In 2010, there were 876 children under 5 years old in LOCATION.</p>

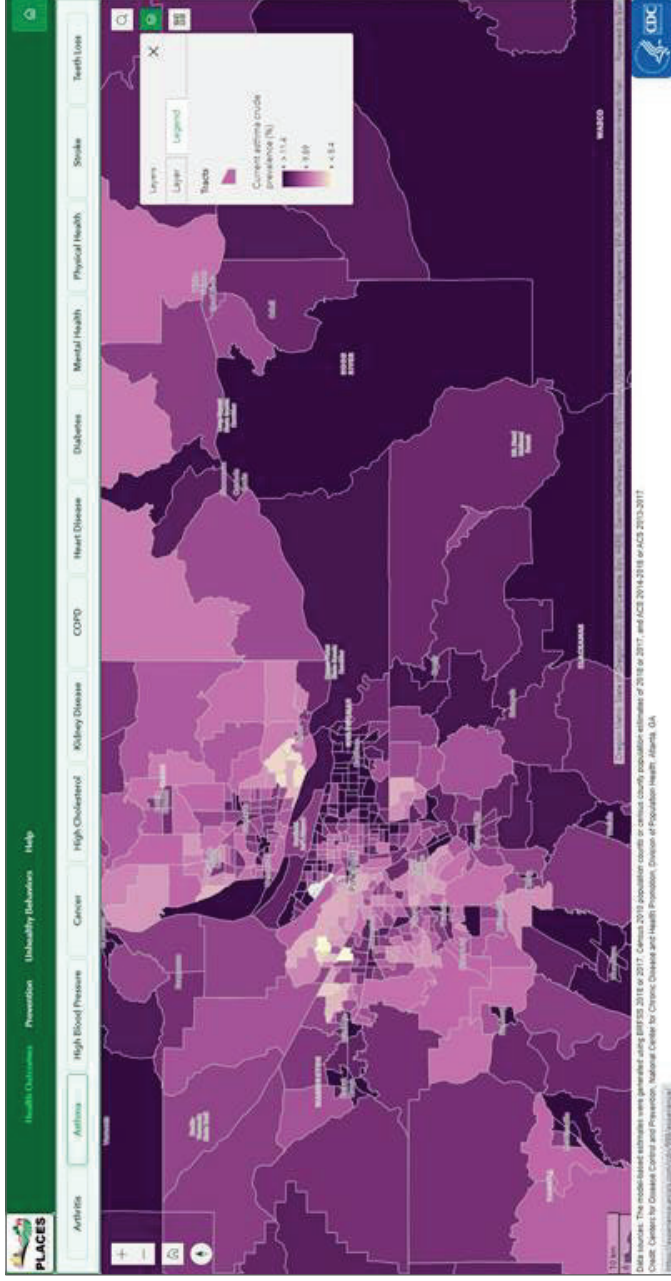
# STEP 2

## Define High Risk People

Data	Good	Better	Best	Results
People with low incomes	Decennial Census, 5-year American Community Survey (ACS)			In 2010, there were 94 households and a total population of 614 below poverty level in LOCATION.
People working outdoors	Longitudinal Employer-Household Dynamics (LEHD), from U.S. Census		Reach out to local CBOs for information if no data available or to confirm data.	In 2010, LOCATION had a population of X working jobs outdoors.
Populations with chronic inflammatory diseases (e.g., diabetes, obesity)	Diabetes - <a href="https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Diagnosed-diabetes-among-adults-aged-18/cn78-b9bj">https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Diagnosed-diabetes-among-adults-aged-18/cn78-b9bj</a> Obesity - <a href="https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Obesity-among-adults-aged-18-years/bju-3y7d">https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Obesity-among-adults-aged-18-years/bju-3y7d</a>			In 2010, LOCATION had a population of X adults over 18 with diabetes and X% of the population of adults over 18 that are obese.
Transit access	<a href="https://alltransit.cnt.org/">https://alltransit.cnt.org/</a>	-	Local transit agency (e.g. Trimet)	LOCATION has X transit routes within 1/2 mile, X transit trips per week, and X% of commuters who use transit. X number of jobs are accessible in a 30-minute trip.
Air conditioning at home	-	County-level AC info (Bureau of Labor Statistics or Census data)	-	In 2016, X number of homes in LOCATION had air conditioning at home, or X% of the total homes.
Percent of residential population within close proximity to busy roadway	EPA EnviroAtlas - Percent of Residential Population within 300m of Busy Roadway	-	-	In 2010, X% of the population of LOCATION lived or worked within 500 meters of a major road with high traffic volumes.
Poor air quality near homes, due to relevant air toxics with respiratory effects	EJ Screen - Respiratory Hazard Index	DEQ AQ Monitoring Reports to Identify Large Emitters	-	Residents of LOCATION have respiratory hazards higher than X% of block groups in the STATE.

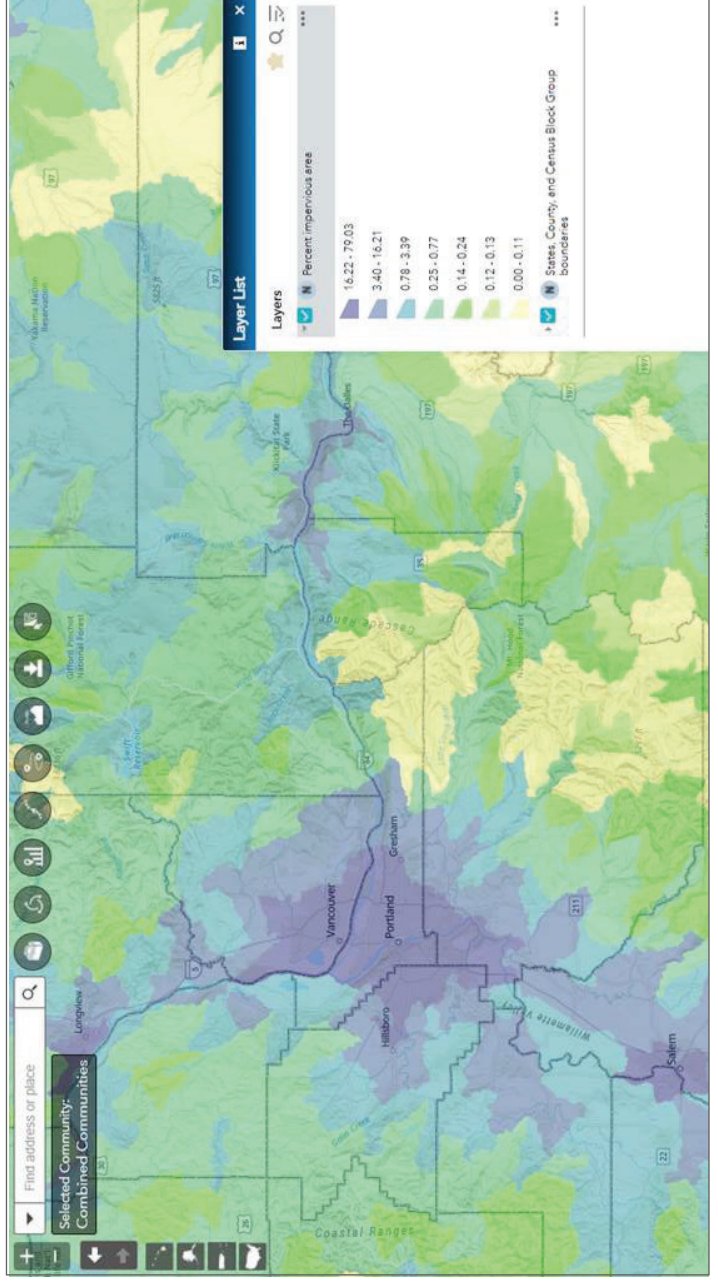
Example map showing asthma prevalence among adults 18 years and older.

Source: PLACES Data Portal, CDC.



Example map showing percent imperviousness in the region.

Source: EPA EnviroAtlas





# Problem Statements

After using the screening tool to assess high-hazard areas and susceptible people, summarize the findings to identify the most significant risks in the community. These findings or “problem statements” will help to craft effective strategies and actions. Problem statements will help to:

- Communicate critical planning issues, for example which neighborhoods are particularly vulnerable or which groups of people are clustered in specific areas.
- Prioritize and focus on the areas that have the greatest need for mitigation actions based on the risk assessment.
- Create a clear and cogent “story” to help support decision making by elected officials and engagement with key stakeholders and community members.
- Provide a foundation to seek funds to reduce risks and increase community resilience.

The first step in writing problem statements is to review the summary sentences in the screening tool above. It is often the case that a number of areas or populations groups will have similar characteristics, conditions and challenges, so it makes sense to read through and reflect on all of the answers before beginning to summarize.

Problem statements can summarize the screening tool findings for specific groups of people, a particular neighborhood, or the community as a whole. Consider whether the problem statements can address both annual likelihood of extreme heat and wildfire smoke, as well as refer to more extreme compound scenarios. Planners should also reach back out to at-risk communities to confirm that problem statements are reasonable and will lead to the most effective mitigation actions.

On the next page are two example problem statements based on the list of questions and available data sets from the screening tool above.

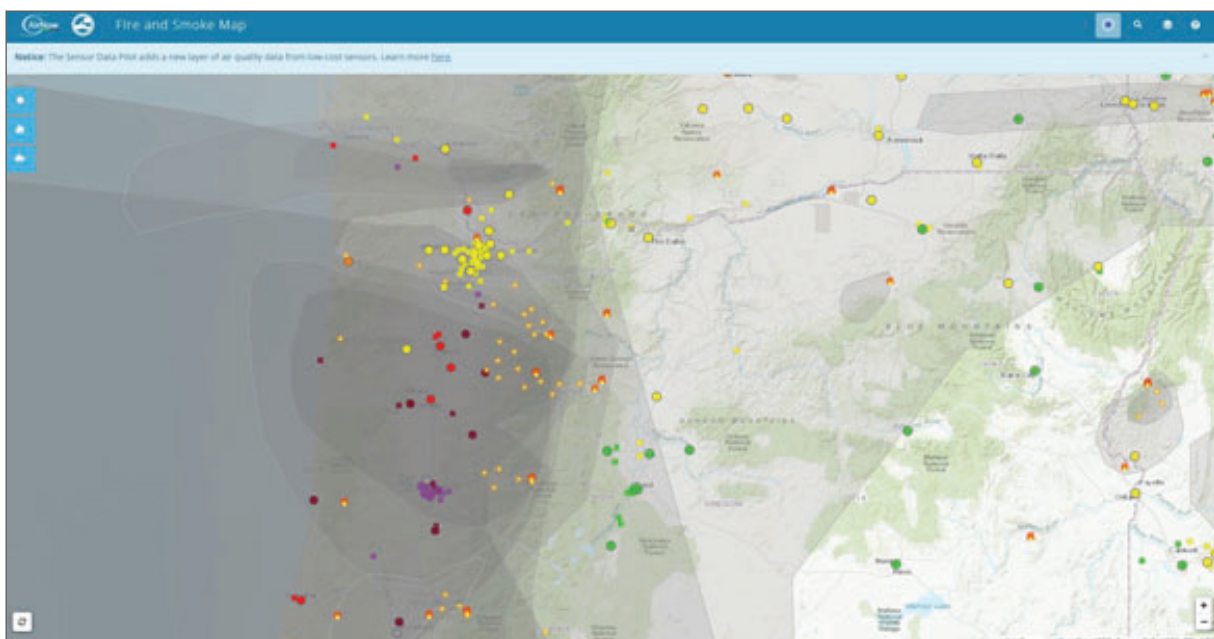


Image from AirNow.gov Fire and Smoke Map from September 9, 2020, in the middle of a two week-long wildfire smoke event that permeated Oregon and much of the West Coast of the United States.



# Examples

## Good

Five of the eight neighborhoods in this city include populations that are at high risk from impacts of both wildfire smoke and extreme heat. The city has 75% tree cover, though three neighborhoods have only 25% tree cover. Every block in the city is within a 1-mile radius of a hospital. There are no known cooling centers or clean air centers in the city.

## Better

Wildfire smoke events are expected to increase in frequency across the State. In 2017 alone, over 2,000 fires created smoke that diminished air quality for everyone, especially children, pregnant women and the elderly. The overall community is likely to see at least 10 days over 90 degrees each year, an increase of 5 days of extreme heat from 1980 levels.

With a total citywide tree cover of 50%, and high rates of imperviousness in the downtown, the city is much more vulnerable to higher nighttime temperatures during extreme heat events, posing additional risk to susceptible people, especially those living in the 2 homeless shelters and one assisted living facilities located in downtown. Every block in the city is within a 1-mile radius of a hospital, though a lack of access to transportation leaves some vulnerable people, such as the elderly, low-income and houseless people, without reliable and quick access to hospital emergency departments. There are no known cooling centers or clean air centers in the city.

# Mitigation Actions



**T**his section lists a range of potential actions that cities, counties, regional governments, public health agencies, fire departments, nonprofits, and other partners might take to mitigate impacts from extreme heat and/or wildfire smoke. This is not a comprehensive list, but includes ideas generated through this project, including input from workshop participants. This section includes a simple list of the actions, but please see attached spreadsheet of each action with references and additional ideas that were gathered from regional partners during the workshop.

# Extreme Heat Actions

## Assessment

- Improve urban heat data collection
- Assess who in the community is most vulnerable to heat impacts
- Evaluate impacts of extreme heat events
- Assess homes with cooling and ventilation capabilities or proper insulation properties

## Communications, Outreach, and Education

- Public education and preparedness; media campaigns; heat event notification and heat health alerts
- Targeted outreach for different audiences and in different languages
- Demonstrations in heat vulnerable areas
- Contact and monitor high risk groups
- Workforce protections (guidance for inspectors/supervisors for outdoor workers during heat events)
- Create information hotline for the public
- Create mechanisms for the community to provide feedback as policies are planned and implemented.

## Local Plans, Codes, and Incentives

- Develop a local heat action plan
- Create community cooling centers (local)
- Protocols for cancelling/limiting outdoor events and activities
- Streets and Transportation: Improve public transit access and vehicle access restrictions. Support reduction of off-street parking. Support reduction of asphalt in favor of permeable pavers or high-albedo materials.
- Green building design guides and/or regulations, including passive design and urban cooling
- Property tax incentives, e.g. cool roof rebates
- Change zoning laws and update comprehensive plans to allow more green space and street trees; shaded overpasses; tree planting; other green infrastructure.
- Support for home cooling (AC installation) as well as increased insulation and energy efficiency, and other home upgrades that add cooling but don't require more energy.
- Local tree codes for communities that call out public health benefits of trees and urban forests
- Land use planning and building codes to promote landscape and green building design in high-heat or highly vulnerable neighborhoods

## Regional Actions

- Mutual aid, e.g. transportation and access to cooling centers
- Create regional cooling centers
- Set up a regional heat info website
- Regional heat vulnerability assessment

# Wildfire Smoke Actions

## Assessment

- Identify other sources of smoke/air pollution. Consider policies to limit unnecessary emissions during smoke events.
- Evaluate air filtration systems at community buildings, as well as other potential clean air shelters.

## Communications, Outreach, and Education

- Public education and preparedness
- Targeted outreach for different audiences and in different languages
- Contact and monitor high risk groups before events
- Contact and monitor high risk groups during active events
- Workforce protections (guidance for inspector/supervisor for outdoor workers during wildfire smoke events)
- Create mechanisms for the community to provide feedback as policies are planned and implemented.

## Local Plans, Codes, and Incentives

- Create clean air shelters (local)
- Distribute at-home filters, supplies
- Update building codes for shelter-in place
- Protocols for cancelling/limiting outdoor events and activities

## Regional Actions

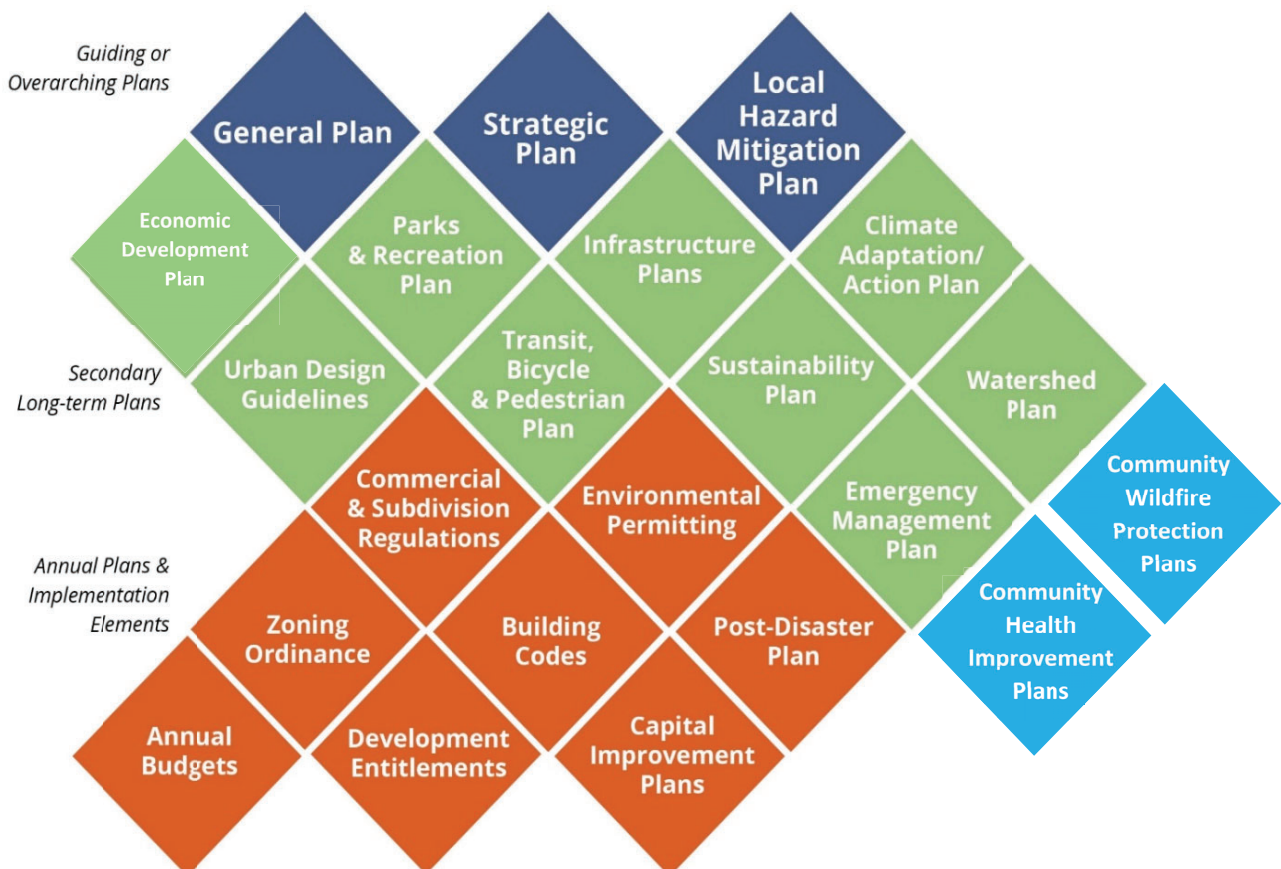
- Mutual aid, e.g. transportation and access to clean air centers
- Controlled burning to limit high-severity fires
- Create regional clean air shelters
- Regional Alerts, Regional Smoke Info Website
- Regional guidance for employers

# Plan Integration

Communities across the region are motivated by a number of different state and federal planning programs, including for land use and natural hazards, as well as by additional planning for environmental justice, climate change, and public health. Ideally, partners within a city or county, and across the region, can align mitigation actions across different plan requirements and then get regulatory credit and funding for those actions.

Some key plans identified during the workshop include not only hazard mitigation plans, but Community Wildfire Protection Plans, Community Health Improvement Plans, and climate action plans. In addition, The Social Vulnerability Tools Project (SVT) is funded by a federal Urban Areas Security Initiative (UASI) grant to the RDPO and managed by Metro. The project will identify which communities in the region experience barriers to emergency services and programs before, during, and after disasters. For more information, go to <https://rdpo.net/social-vulnerability-tools-project>.

Mitigation actions that address extreme heat and wildfire smoke have not often appeared in plans outside the realm of public health agencies. But adding mitigation actions to plans like Natural Hazard Mitigation Plans and Community Wildfire Protection Plans makes them eligible for funding from FEMA and other emergency management funding streams.





# Next Steps & Funding Options



## Improve Communication about Extreme Heat and Wildfire Smoke

- Create consistent, shared messaging and materials across the entire region.
  - This will be especially beneficial to smaller cities with less staff and resources.
- Messaging should educate the public on who is most vulnerable and what the health impacts are, as well as clear, simple information about how to create safe spaces at home for both extreme heat and wildfire smoke events.
  - Multnomah County has websites that are tailored every year and for every incident, including Help for When It's Hot (<https://multco.us/help-when-its-hot>) and Smoke and Wildfire (<https://multco.us/air-quality-public-health-problem/smoke-and-wildfire>).
- Develop targeted information and outreach to key groups, including businesses, outdoor workers, vulnerable people, and people who do not speak English.
  - Work with and distribute information through existing, trusted networks and organizations.
- Develop consistent methods or a program to identify, contact, and monitor high-risk groups of people both before and during events.
  - Pre-disaster activity to understand who and where high-risk people are and conduct outreach to make them aware of why they are at risk, what the risks are, and possible protective measures.
  - Do active outreach and follow-up during extreme events, again, working with existing networks of trusted organizations and even neighbors and friends.

**Potential Lead:** RDPO Regional Disaster Messaging Work Group





## Update Plans & Policies

- Develop a regional risk assessment for extreme heat and wildfire smoke.
  - Create a "base plan" with county-specific annexes.
- Community Wildfire Protection Plans
  - Oregon Department of Forestry and Oregon Department of Environmental Quality are working with counties and communities across Oregon to add wild fire smoke mitigation actions to CWPPs. This type of plan integration may make smoke mitigation actions eligible for multiple sources of funding, including through the U.S. Forest Service, Bureau of Land Management, and FEMA.
  - Ensure links to Community Smoke Response Plans required by the state for any areas designated as Smoke Sensitive Receptor Areas (SSRAs).
- Community Health Improvement Plans
  - TriCounty Plan for Clackamas, Multnomah and Washington Counties. This Regional Climate and Health Monitoring Report is a good example of linking plans and actions across counties, and this plan already addresses extreme heat and poor air quality from wildfire smoke.
  - Clackamas County also has their own Community Health Improvement Plan/Blueprint for a Healthy Clackamas County provides an assessment of health data for the county and prioritizes action items and recommendations.
- Green Infrastructure and Green Building
  - Look for opportunities in land use and building codes to expand green infrastructure and green building programs in high-heat neighborhoods or those places with the most vulnerable people, to make it easier for residents to shelter in place during extreme heat and smoke events.
  - Look for opportunities to align with climate change mitigation, greenhouse gas reduction, and energy efficiency retrofit programs.
  - Work with parks departments and natural resource agencies on identifying opportunities to increase green space and tree cover to reduce impacts from extreme heat events, especially in the most vulnerable neighborhoods.
  - Again, include public health agencies in the conversation to highlight the health benefits of green infrastructure investments, beyond the environmental benefits.

**Potential Lead:** RDPO Mitigation and Recovery Sub-Committee (MitRec)



## Create Clean Air Shelters and Cooling Centers

- Assess where clean air shelters and cooling centers are most needed based on vulnerable people and on high-heat areas of the region or on a county-by-county basis.
- Assess existing filtration systems and availability of AC in community buildings, as well as in potential volunteer sites to serve as clean air shelters and cooling centers, such as university buildings and other large congregant spaces.
- Work with willing partners to retrofit community spaces, such as schools, libraries, city/county buildings, shelters, and other facilities to serve as either clean air shelters and/or cooling centers.
  - Consider full HVAC retrofits so these spaces can work for both extreme heat and wildfire smoke events. But consider large, portable air filters if HVAC retrofits are not an option.
  - Work with OHA and ODEQ on potential state funding.
  - Work with US EPA and possibly Department of Education for federal funding.

**Potential Lead:** Individual county or city follow-up.



## Create Standards for Protecting Workers and the Public During Events

- These actions may be regional actions or may need to be developed by or at least in concert with the appropriate state agencies, such as OSHA, OHA, Department of Education.
- Develop protocols for cancelling or limiting outdoor events and activities, including information for schools, sports teams, large events, and employers with outdoor workers.
- Develop workforce protections for people who work outdoors
  - Create consistent guidance for employers, supervisors, and inspectors to follow, and develop a plan for enforcement.
- Consider creating financial incentives or unemployment insurance for employers and employees who may need to cancel work during extreme heat and smoke events.

**Potential Lead:** Oregon OSHA is already taking steps on these actions. If interested, reach out to Oregon Environmental Council and PCUN, who are working with OSHA on new smoke and heat worker protection rulemakings.

# Appendix A

## Extreme Heat Resources

- IT'S HOT, AND GETTING HOTTER: Implications of Extreme Heat on Water Utility Staff and Infrastructure, and Ideas for Adapting (September 2020). Appendix B of this document lists specific protections for outdoor workers during heat events: <https://www.wucaonline.org/assets/pdf/pubs-implications-of-extreme-heat.pdf>.
- <https://www.epa.gov/heatislands/heat-island-compendium> (See Chapter 6, which lists the range of voluntary and regulatory policy options local governments can use.)
- <https://www.epa.gov/heatislands/heat-island-cooling-strategies>
- <https://www.epa.gov/heatislands/what-communities-are-doing-reduce-heat-islands>
- <https://www.epa.gov/heatislands/heat-island-impacts>
- Multnomah County "Help for when it's hot" website: <https://multco.us/help-when-its-hot>

# Appendix B

## Wildfire Smoke Resources

Wildfire Smoke: A Guide for Public Health Officials: <https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smoke-a-guide-for-public-health-officials/>

- Prepare for Fire Season: <https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smokeprepare-for-fire-season>
- Indoor Air Filtration: <https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smoke-indoorair-filtration-factsheet>
- Reduce Your Smoke Exposure: <https://www.airnow.gov/publications/wildfire-smoke-guide/reduce-yoursmoke-exposure>
- Protect Yourself from Ash: <https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smokeprotect-yourself-from-ash>
- Protect Your Lungs from Wildfire Smoke or Ash: <https://www.airnow.gov/publications/wildfire-smokeguide/protect-your-lungs-from-wildfire-smoke>
- Protecting Children from Wildfire Smoke and Ash: <https://www.airnow.gov/publications/wildfire-smokeguide/protecting-children-from-wildfire-smoke-and-ash>
- Protect Your Pets from Wildfire Smoke: <https://www.airnow.gov/publications/wildfire-smoke-guide/%20wildfire-smoke-protect-your-pets>
- Protect Your Large Animals and Livestock from Wildfire Smoke: <https://www.airnow.gov/publications/wildfire-smoke-guide/wildfire-smoke-protect-your-large-animals-and-livestock>

Multnomah County "Smoke and Wildfire" website: <https://multco.us/air-quality-public-health-problem/smoke-and-wildfire>

Ashland's Smokewise website: <https://www.ashland.or.us/Sectionindex.asp?SectionID=534>





# Unhealthy Air Events

## OPERATIONAL GUIDELINE

The employees at risk due to unhealthy air include, but are not limited to:

- **All staff** travelling to and from work, especially those travelling by foot, bike or public transit.
- **Firefighters and police officers** work in all quadrants of the City at all hours. Fire apparatus are equipped with self-contained breathing apparatus which are only used during emergency responses which require specific respiratory protection.”
- **Field staff** in several bureaus work in all quadrants of the city beginning early in the morning.
- **Parks** employees who work outside with the public:
  - **Field staff** who work in all quadrants of the City beginning early in the morning (7 days/week; 6:30 am in the summer, and into the evening).
  - **Recreation program staff** who work with seniors and children (who may have increased sensitivities); summer camps, outdoor pools, summer lunch programs.
  - **Staff working large events sponsored and coordinated by PP&R** such as summer movies/concerts, new park grand openings, Sunday Parkways, and special celebrations.
  - **Staff working large events held at PP&R locations by a third party** such as Waterfront Blues Festival, Rose Festival, Portland Marathon.

# Appendix C

## PCUN Letter to OSHA



9/11/2020

To: Oregon OSHA Director Michael Wood  
Labor Commissioner Val Hoyle  
Marion County Commissioner Kevin Cameron  
Governor Kate Brown

Agricultural workers make a significant part of the population of residents in the counties most affected by Wildfire smoke. Right now Oregon is in a state of emergency, and as we see evacuations in Marion, Clackamas, and Jackson County. It is important to understand that thousands of outdoor agricultural workers are breathing high density of smoke due to the unprecedented effects of the fires that are burning in our state today without any protections or instructions.

It is our understanding that Oregon OSHA has approved of agricultural workers being outside in level 1, 2 evacuation levels. Agricultural workers are currently working outside, ensuring Oregonian's have food, and ensuring crops do not go unpicked despite this global pandemic and wildfires burning in the background. Wildfire smoke is a health hazard for our agricultural workers as it can irritate the lungs and can cause fatal health effects such as worsening of asthma, heart failure and bronchitis. In these conditions it is difficult to breathe. We've received several reports that farms in Mt. Angel, Oregon are telling their employees to come to work despite level 2 evacuation orders. Workers have expressed concerns because there is little information in Spanish (which is the primary language of these workers, in addition to other indigenous languages), and many are having health issues when they go out to work, or not given precious time to be with their families, and prepare for evacuations if/when level 2 becomes level 3. Some farms and employers are making the decision to stop work due to unbearable conditions. Others are choosing to call their workers in despite the air quality. *In all of this, we have heard radio silence from our leaders in agencies and industry about what must be done to protect workers in these times.*

PCUN would also like to request that Oregon OSHA take steps to protect workers during the wildfires. We'd like OSHA to implement guidance that would create clear instructions to employers for levels of fire smoke - with a "no work" policy when cities and counties are at level 2 and 3 during wildfires. It is paramount that OR-OSHA provide immediate and strong guidance to employers now on how to protect their workers from wildfire smoke. This emergency guidance should include a monitor of air quality levels, culturally appropriate communication from employers to workers on wildfire hazards, training and instruction information and employers should actively work to reduce wildfire smoke exposure to workers by providing NIOSH-approved respirators.

A year ago, California's Division of Occupational Safety and Health, implemented new standards for protecting outdoor workers from wildfire smoke. It requires employers to provide proper respiratory protection equipment, such as N-95 masks, when air quality is harmful. The Governor's Executive Order on Climate Action directs OHA and OR OSHA to work together and develop a proposal for standards to protect workplace employees from exposure to wildfire smoke and excessive heat no later than June 30, 2021. While this is a good first step, a proposal is not enough. *We request that OR-OSHA adopt permanent strong rules to protect workplace employees from wildfire smoke and extreme heat in the near future.*

Our agricultural workers are bearing the impacts of wildfire smoke. Please take action today to keep our outdoor agricultural workers safe while wildfires ravage our community.

Reyna Lopez  
Executive Director

