

**Testimony of Patricia Kullberg MD, MPH representing
Oregon Physicians for Social Responsibility May 14, 2019
“The Economic and Health Consequences of Climate Change”**

Dear Chairman Neal, Ranking Member Brady, and Members of the Committee,

Thank you for convening this important hearing on **The Economic and Health Consequences of Climate Change**. Oregon has been a state of stunning natural beauty and plentiful natural resources, including rich agricultural soils, native forests, abundant clean water, and thriving populations of fish and shellfish. Going back thousands of years, natural resources sustained dozens of Native American tribes and, beginning in the nineteenth century, the seemingly vast resources attracted and enabled white settlement of the region. Even today, natural resources form the bedrock of Oregon’s economy and its rugged, outdoor lifestyle.

Climate change threatens all of it: Oregon’s economy, the health of its people, and its way of life. The effects are already apparent in drought, wildfires, and extreme heat events that plague the region. In 2018 alone, wildfire destroyed over one million bushels of wheat in Eastern Oregon, a toxic algal bloom contaminated the water supply for the city of Salem, residents of southern Oregon were subject to a summer of hazardous levels of air pollution from wildfire smoke, and the commercial harvest of Dungeness crab was delayed due to undersized crabs. All of these untoward events were related to climate change. Ill effects can be seen in our drying forests, declining fish runs, degraded drinking watersheds, and smoke pollution of our air.

Current climate science predicts the following impacts of climate change in Oregon:¹²³

- An overall warming trend
- More extreme heat events
- Significant loss of snowpack
- Increased drought
- Increased flooding

¹ May, C. (2018). *Impacts, Risks, and Adaptation in the United States: Northwest*. Fourth National Climate Assessment. <https://nca2018.globalchange.gov/chapter/northwest>.

² Hamilton, R. (2009). *Projected Future Conditions in the Lower Willamette River Subbasin of Northwest Oregon*. <https://scholarsbank.uoregon.edu/xmlui/handle/1794/10737>.

³ Vynne, S., Adams, S., Hamilton, R., & Doppelt, B. (2011). *Building Climate Resiliency in the Lower Willamette Region of Western Oregon*. Resource Innovation Group's Climate Leadership Initiative. https://issuu.com/getresilient/docs/lower_will_report_1-26-11_final_lores.

- Higher intensity and increased distribution of wildfires
- Sea-level rise
- Increased ocean acidity

These effects will have wide-ranging impacts on the health, safety, and well-being of Oregon communities, as summarized in Figure 1 from the Fourth National Climate Assessment (NCA4).⁴

⁴ Ebi, K. (2018). *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Human Health*. https://nca2018.globalchange.gov/downloads/NCA4_Ch14_Human-Health_Full.pdf

Figure 1

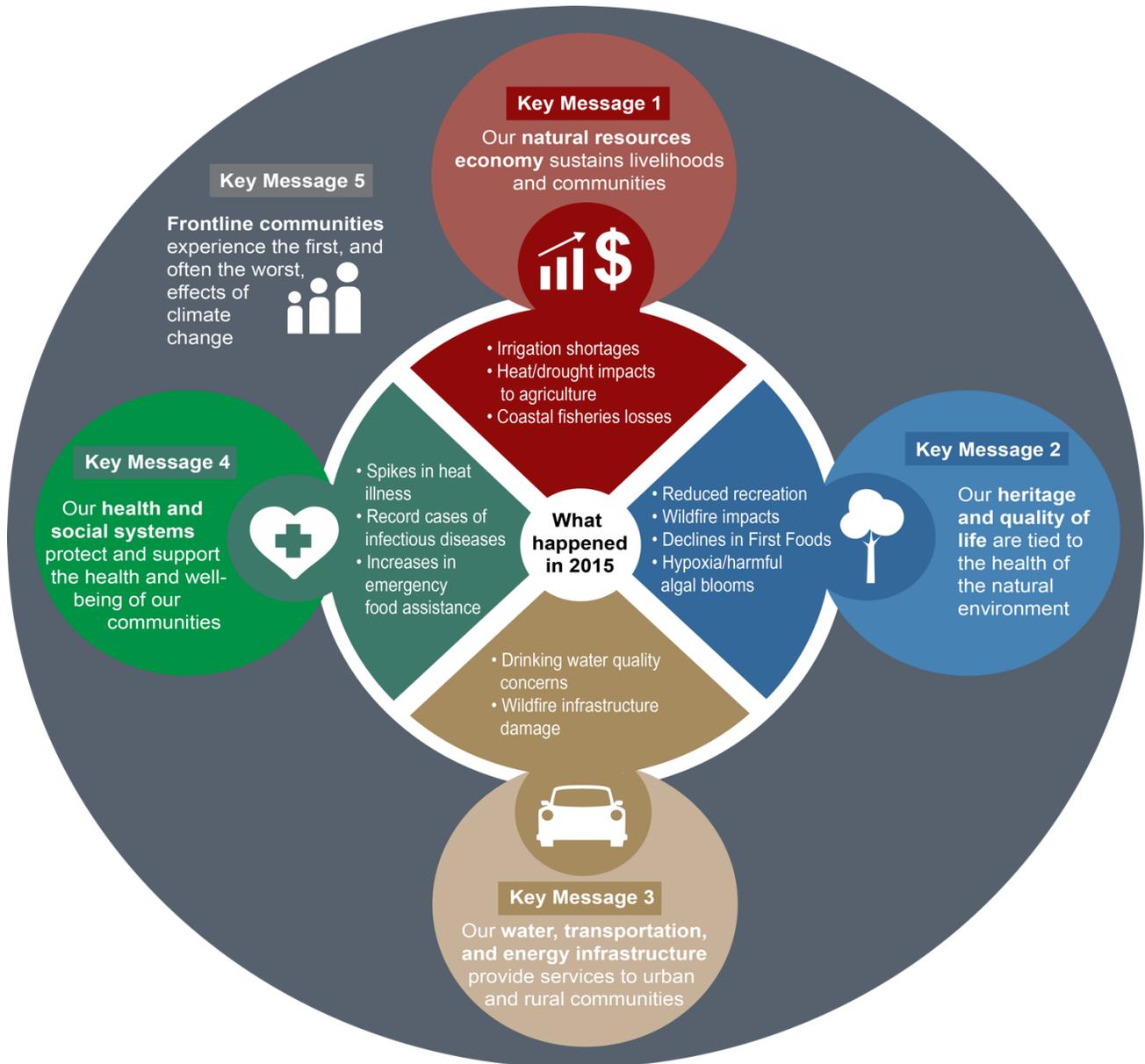
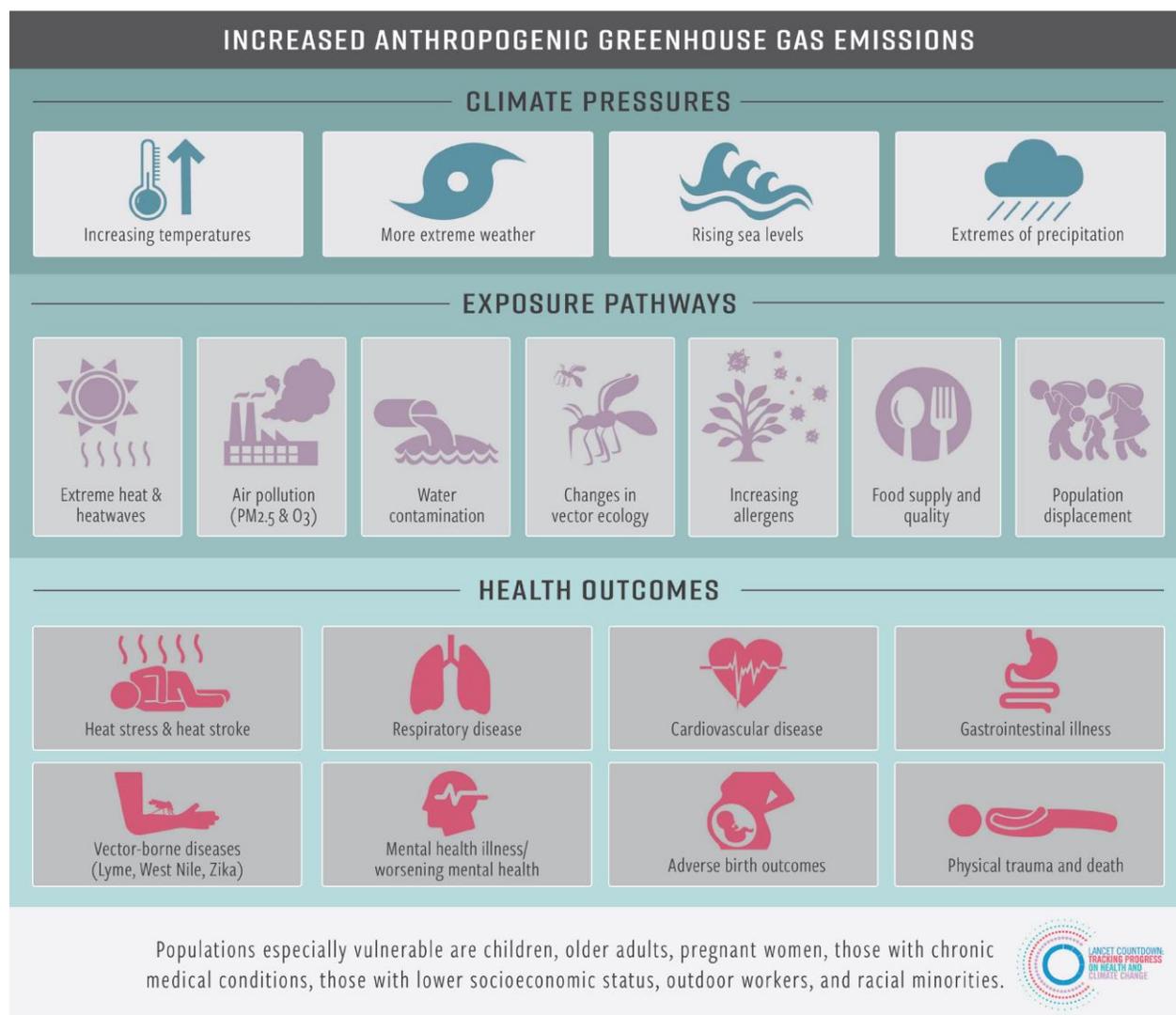


Figure 2, from the Lancet Countdown on Climate Change and Health⁵ summarizes the effects of climate change on health outcomes.

⁵ Salas, R. N. (2018). *Lancet Countdown on Health and Climate Change: Brief for the United States*. <http://www.lancetcountdown.org/media/1426/2018-lancet-countdown-policy-brief-usa.pdf>

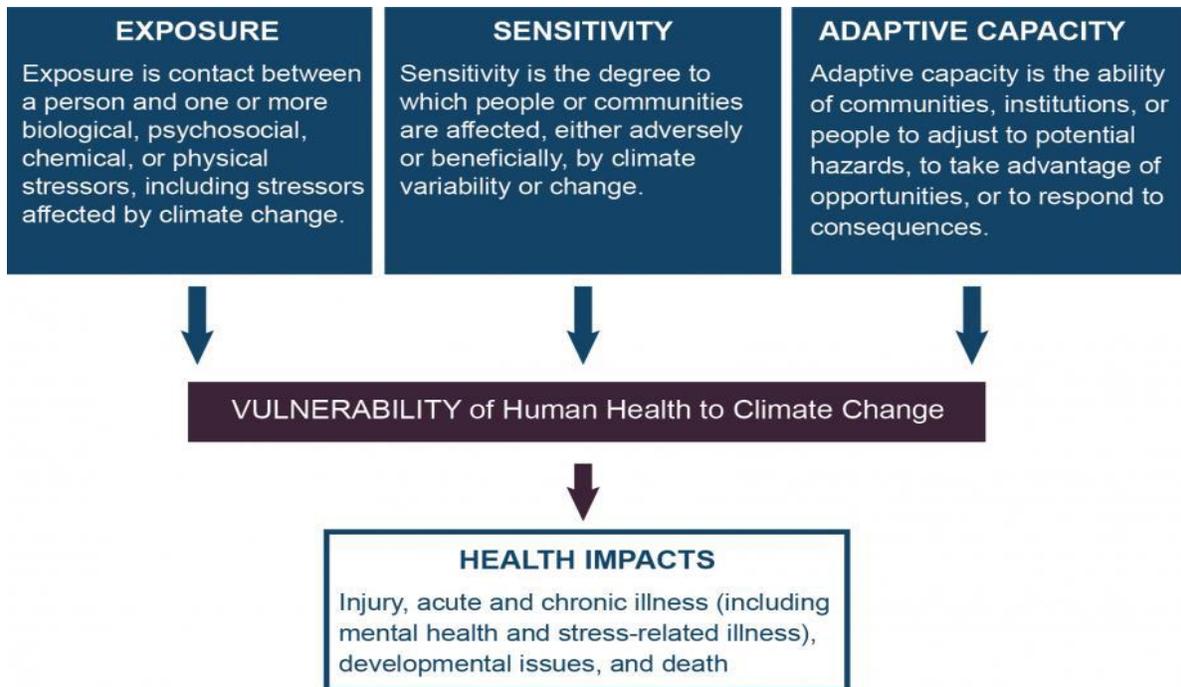
Figure 2



Not all communities and persons are equally at risk for adverse outcomes from climate change. The U.S. Global Change Research Program, which conducts scientific assessments of the global environment, determined that vulnerability to the adverse health effects of climate change depend on three factors: exposure, sensitivity, and adaptive capacity, as illustrated in Figure 3.⁶

Figure 3

⁶ Crimmins, A. E. (2016). *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. <https://health2016.globalchange.gov/>



Exposure depends largely on where people live, which determines likely contact with heat, drought, fires, floods, or sea level rise. Sensitivity is determined by the underlying health of both individuals and communities. The very young, the very old, and those with underlying chronic disease are most susceptible. But also at risk are those who live in stressed communities, for example, neighborhoods already polluted by local industry, where tree canopy is sparse, or where housing stock is not air conditioned. Adaptive capacity depends largely on local resources available to prevent, prepare for, mitigate, and respond to climate-related effects. Wealthy and socially cohesive communities fare better than poor communities or those riven by conflict.

Table 1, adapted from multiple reports, identifies impacts on health and those persons and communities most at risk in Oregon.

Table 1: Climate Change Health Effects and Susceptible Populations: Oregon. ^{7 8 9}		
	Outcomes	Susceptible Populations
Heat related illness	Heat rash, heat cramps, heat exhaustion, heat stroke	Very young and very old, pregnant women, people with chronic disease, socially isolated, houseless, outdoor workers
Heat related death	Heart attack, stroke, renal failure, heat stroke, respiratory failure	Very young and very old, people with chronic disease, socially isolated, houseless, outdoor workers
Heat related violence	Homicide and intentional injury	Children and young adults especially in communities with pre-existing higher rates of interpersonal violence
Heat related air pollution and ozone formation	Chest pain, coughing, throat irritation, exacerbation of emphysema, bronchitis and asthma, cancer and cardiopulmonary death	Children, those living in areas with pre-existing air pollution, persons with pre-existing cardiac and respiratory conditions
Drought related food insecurity	Hunger and malnutrition	Low income, communities of color, pregnant women, children
Smoke pollution from wildfires	Asthma, bronchitis, pneumonia, cardiopulmonary disease and death, motor vehicle crash	Very young and very old, those with pre-existing respiratory and cardiac disease
Drought and heat related harmful algal blooms	Toxic contamination of drinking water affecting liver, skin, gastrointestinal tract, nervous system	Residents dependent on affected water systems
Wildfires	Accidental injury and death	Those who live or work in fire-prone areas
Heavy rains	Accidental injury and death	Those who live, work or attend school near or on unstable slopes, including houseless
Flooding	Accidental injury and death, water borne disease, exposure to toxins	Those who live, work or attend school in low lying areas, including houseless
Weather related increase in mold, pollens and other allergens	Exacerbation of asthma and allergic rhinitis	Those with pre-existing allergic disorders
Infectious disease	Vector borne disease, food and water borne disease, fungal disease	Low income, those with pre-existing chronic disease, very young and very old, immune-compromised
Stress related to extreme weather events	Anxiety, depression, suicide, substance abuse, violence	Those with pre-existing mental health disorders and pre-existing socioeconomic stressors
Stress from weather-related displacement	Anxiety, depression, suicide, substance abuse, violence	Low income, residents of flood- and fire-prone areas, coastal communities

⁷ Salas, R. N. (2018). *Lancet Countdown on Health and Climate Change: Brief for the United States*.

⁸ Haggarty, B. e. (2014). *Oregon Climate and Health Profile Report*.

<https://www.oregon.gov/oha/ph/HealthyEnvironments/climatechange/Documents/oregon-climate-and-health-profile-report.pdf>

⁹ Haggarty, B. (2015). *Climate and Health Vulnerability Assessment*.

<https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/CLIMATECHANGE/Documents/Social-Vulnerability-Assessment.pdf>

Climate change is the most pressing issue of environmental justice of our time. The worst effects tend to stress most those communities already environmentally, socially, and economically stressed. Climate change is, in that way, a threat multiplier.

Communities in Oregon that are most susceptible to the adverse health effects include communities of color, immigrants, low income persons, and the houseless. These populations already bear a disproportionate burden of sickness and premature death (health outcome disparities) related to a long history of systematic socioeconomic deprivation. They bear the additional burden of living in unhealthy environments that are poorly prepared to withstand adverse climate events. The most important drivers of these health outcome disparities are the social determinants of health. These include factors such as poor education, unemployment, lack of access to health care, exposure to industrial pollutants and toxins, substandard housing, racism, poor social cohesion, and political disenfranchisement. For Native American populations in particular, the prospect of loss of valued resources and traditional values after centuries of forced migration and marginalization is a source of substantial mental and physical stress.

Stress and other mental health effects of climate change tend to be left out of the discussion on climate change, especially the phenomenon known as ecological grief.¹⁰ Ecological grief affects all persons who face threats to climate-related losses of valued species, ecosystems, and landscapes. Climate-related changes and events have been linked to increases in depression, anxiety, post-traumatic stress disorder, substance abuse, suicide, and loss of cultural identity, all of which have negative impacts on the health of both individuals and communities.

Researchers at Portland State University combined demographic variables of income, race, education, employment, and age with exposure variables to toxic air pollution.¹¹ The resulting index score identifies communities by census tract in Oregon that are most at risk to the effects of climate change. In Figure 4 the vulnerability index score is given as a percentage; a higher percentage reflects greater vulnerability.

Figure 4

¹⁰ Cunsolo, A. & Ellis, N. (2018) Ecological grief as a mental health response to climate change-related loss, *Nature Climate Change* Volume 8, pages 275–281. <https://www.nature.com/articles/s41558-018-0092-2>.

¹¹ Zapata, M. (2017). *Findings Brief for Equity Considerations for Greenhouse Gas Emissions Cap and Trade Legislation in Oregon*. https://www.oregonlegislature.gov/helm/workgroup_materials/WG%204%20-%20Marisa%20A.%20Zapata%20Findings%20Brief.pdf.

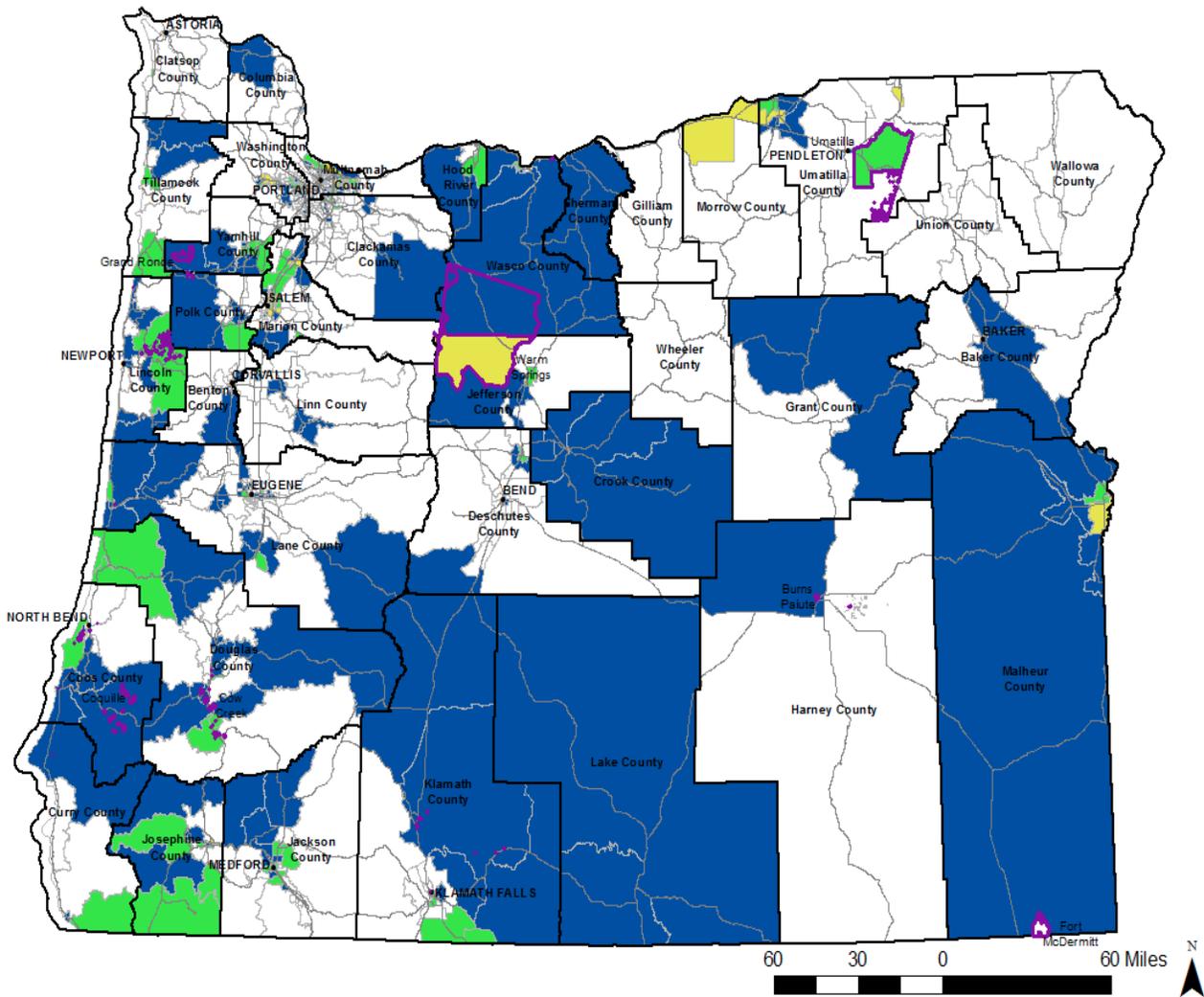


Figure 4: Top 10%, 25%, and 50% of Census Tracts Most Vulnerable to Climate Change in Oregon. GIS data source: US Census Bureau and State of Oregon. Index scores are based on data from: U.S. Census American Community Survey (ACS) 2011-2015 5- year estimates and the National Air Toxics Assessments (NATA) 2011.

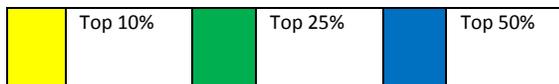


Figure 5 zooms in on Multnomah County and reveals disparities in the susceptibility to climate change even within the narrow geographic confines of a single county.

Figure 5

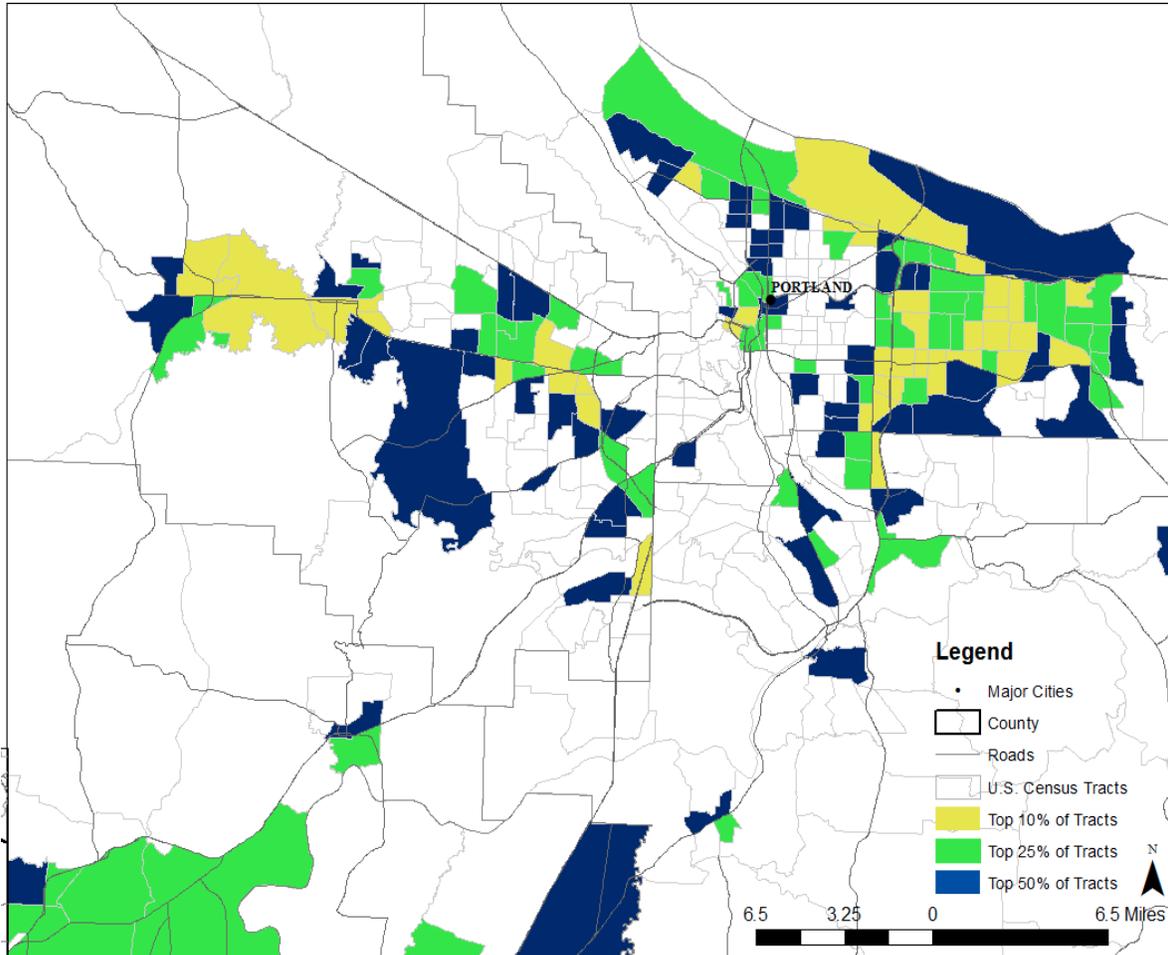


Figure 5: Top 10%, 25%, and 50% of Census Tracts Most Vulnerable to Climate Change in Oregon Zoomed View of Portland Metropolitan Area. GIS data source: US Census Bureau and State of Oregon. Index scores are based on data from: U.S. Census American Community Survey (ACS) 2011-2015 5 year estimates and the National Air Toxics Assessments (NATA) 2011

Mitigating the effects of climate change would have wide-ranging salutary effects on some of Oregon’s most at risk communities. The Fourth National Climate Assessment (NCA4) noted that addressing climate change, specifically by reducing greenhouse gas emissions, would benefit the health of Americans not only in the long term, but also in the short run.¹² The co-benefits of reducing greenhouse gas emissions would be immediate and affect most those persons already suffering from chronic mental and physical health disorders.¹³ Addressing climate change would be an important and profound step toward achieving environmental justice, as defined by the EPA: “fair treatment and meaningful involvement of all people

¹² Ebi, K. (2018). *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Human Health*. https://nca2018.globalchange.gov/downloads/NCA4_Ch14_Human-Health_Full.pdf

¹³ Vossler, M., et al. (2018). *The Health Co-Benefits of Climate Change Mitigation in Washington State*. <https://drive.google.com/file/d/1dJbzciwVQ0T8MXEzjvqRRUxXp8bfCho/view>

regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.”¹⁴

Effective federal actions which address our climate crisis must include building healthy communities, which enjoy the resources to prevent, prepare for, mitigate, and respond to adverse climate events. In a healthy community, housing units are in good repair, free of mold, vermin, lead paint and other toxics, and adequately heated and cooled. Litter, graffiti and vandalism are absent. The neighborhoods include common spaces, green spaces and an ample tree canopy. Bikeways, walkways and parks are safe and easy to access. The air and water are free of pollutants. Health clinics, schools, healthy food outlets and public transportation are all nearby. The neighbors know each other, trust each other and are willing to help out. Residents tend to remain in the neighborhood over a span of years. Crime rates are low and civic engagement is high. People are more likely to volunteer and more likely to vote.

A growing body of literature supports the hypothesis that living in a healthy neighborhood promotes mental and physical health and longevity and that poor conditions increase morbidity and premature mortality.¹⁵ Improving neighborhood conditions has salutary effects on both mental and physical health and is key to addressing the threats of climate change on the communities of Oregon most at risk for the adverse health effects of climate change.

Climate change threatens the health and well-being of Oregonians in complex and profound ways. The need to address these effects on federal, state and local levels is urgent. We so appreciate your critical work on the federal level to support healthy communities and a stable climate to sustain them.

¹⁴ U. S. Environmental Protection Agency, <https://www.epa.gov/environmentaljustice>

¹⁵ Srinivasan, S., et al. (2003). *Creating Healthy Communities, Health Homes, Healthy People: Initiating a Research Agenda on the Built Environment and Public Health*. American Journal of Public Health, 93(9), 1446-1450. <https://www.ncbi.nlm.nih.gov/pubmed/12948961>