



STATE OF WATER JUSTICE IN OREGON

A PRIMER ON HOW OREGON WATER
INFRASTRUCTURE CHALLENGES AFFECT
FRONTLINE COMMUNITIES ACROSS THE STATE



Oregon
Environmental
Council



Oregon
Water
Futures

Prepared for Oregon Environmental Council and the Oregon Water Futures Project

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**Oregon Water Futures Collaborative partners*

Oregon Environmental Council | oeonline.org

Oregon Environmental Council's (OEC) mission is to advance innovative, collaborative, and equitable solutions to Oregon's environmental challenges for today and future generations. The 2012-2022 strategic plan focuses on: climate protection to safeguard Oregon communities and economy; clean and plentiful water to support people, fish and wildlife; and toxic-free environments to protect human health, starting with children's health. It also includes two cross-cutting goals to advance change at a transformative scale and to ensure that all organizational efforts are developed and implemented through a social equity lens. OEC is a founding partner of the Oregon Water Futures Collaborative.

Oregon Water Futures Collaborative | oregonwaterfutures.org

Oregon Water Futures is a collaboration between water and environmental justice interests, Indigenous peoples, communities of color, low-income communities, and academic institutions. Through a water justice lens, the Collaborative aims to impact how the future of water in Oregon is imagined through storytelling, capacity building, relationship building, policymaking, and community-centered advocacy at the state and local level.

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EXECUTIVE SUMMARY

Clean water is foundational to every aspect of our lives — community health, spiritual and cultural fulfillment, a strong economy, relaxation and recreation, and thriving ecosystems. Yet, Oregonians have no guaranteed right to clean water. This leaves people vulnerable to the impacts of poor water quality, lack of access to water, unaffordable water costs, and diminished natural resources.

This report builds on existing research to provide statewide context to water challenges identified by frontline communities.¹ Snippets of national research, media reports, and anecdotes viewed together begin to paint a picture of how to understand water justice in Oregon. However, broader analysis comparing Oregon water issues in the context of social vulnerability and environmental justice is still needed. Many of these issues affect everyone, but frontline and low-income communities are impacted by compounding challenges that multiply the negative impacts of water problems and make it harder to adapt to them.

An environmental justice analysis of Oregon water challenges. Water stewardship has been a central focus of Oregon tribes since time immemorial, and there are long-term, regional efforts to elevate equity in water pollution cases like the Portland Harbor Superfund cleanup and Willamette River restoration. However, until recently, a comprehensive environmental justice lens has not been broadly applied to Oregon’s water challenges, nor has water been a leading campaign issue for statewide environmental justice coalitions. There is limited understanding at the state level of water insecurity risks and potential interventions to mitigate those risks in Oregon.² This points to the need for more focused analysis and coordination to address the breadth of water justice challenges facing Oregonians.

Starting with clean water access and affordability. This report focuses primarily on issues related to drinking water and sanitation infrastructure due to the readily available data and studies on these sectors. However, this is only one pillar of water justice in Oregon. There are also extensive ecosystems challenges, water rights settlements, disproportionate climate risks, and barriers to accessing policy decision-making that impact frontline communities and water resources. While all ecosystem threats are, on some level, water justice concerns, there are fewer studies examining the environmental justice-specific intersections of Oregon’s surface and groundwater challenges, threatened species, toxics exposure, and water-specific climate impacts. More research is needed in these areas, and *Appendix A: Water Justice Data Analysis Opportunities* (p. 47) suggests some opportunities to analyze existing state data with this lens.

A launchpad for deeper investigation. The studies and stories presented here are not comprehensive of all water justice issues that people in Oregon are experiencing. Some data are more than 20 years old and some are incomplete for Oregon, pointing to the need for updated analysis comparing water issues in the context of social vulnerability and environmental justice. As new voices are engaged in historically opaque water policy and management processes, we are learning more about the cumulative risks and impacts to frontline communities and identifying gaps in existing regulations and programs to address these challenges.

An overview of the existing conditions of water justice in Oregon. As water justice becomes a growing part of statewide policy conversations, this report seeks to provide a foundation of evidence that can help set the stage for further development of strategic priorities to address these challenges. It highlights key issues of water justice in Oregon, but does not rank challenges by priority, nor does it attempt to definitively answer why these disparities have evolved or what is likely to happen in the future.

Oregon's specific water justice challenges. First, this report introduces what is meant by “water justice” and puts it in context of recent water policy actions at the state and federal level. In the second section, eight of Oregon’s most pressing water challenges are examined through an environmental justice lens based on existing studies and media coverage that help paint a picture of how Oregon frontline communities experience water resources. The issues covered in this report are:

- Failing infrastructure impacting frontline communities and where lack of reliable access to a sink, shower or bath, and toilet are daily challenges for Oregonians (p. 19);
- How safe and acceptable drinking water quality impacts communities of color and renters in Oregon (p. 24);
- Lead in schools, daycares, and public buildings (p. 27);
- Affordability of drinking water for Oregonians (p. 29);
- Struggles for small water systems and mobile home parks (p. 34);
- Challenges for low-income private well and septic owners or renters (p. 36);
- Water access in workplaces (p. 37); and
- Threat multipliers of climate change and extreme weather (p. 40)

While these issues are not limited to Oregon, they are of particular concern to Oregon communities. Finally, the report includes broad observations about the state of water justice in Oregon and barriers to policy change in this arena, and makes recommendations for advancing water justice for all Oregonians.

Barriers to water justice in Oregon. The findings of this and other research on water justice point to structural barriers in Oregon’s water management system that may slow the state’s progress on advancing water justice. Key themes that emerged include the following:

- Some community-identified water challenges do not fit neatly into current agency jurisdictions, keeping them from getting on the water policy agenda;
- Definitions of environmental justice that are too narrow or too broad can dilute impact;
- Pockets of water challenges can hide within larger communities;
- Communities need more analysis comparing water issues in the context of social vulnerability and environmental justice; and
- Issue areas without public plans and prioritization are harder to navigate without deep policy expertise.

The full discussion can be found in *Section 3: Observations and Recommendations on the State of Water Justice in Oregon* (p. 42).

This report provides background for those working to institutionalize environmental justice in Oregon water policy and management systems.

In outreach conversations conducted over the past five years, Oregon Environmental Council water staff have heard from both community-based organizations and policymakers that, in order to better engage in this arena, they need a clearer understanding of the ways in which water issues are directly impacting frontline communities. This report brings forward examples of these intersections to help build a case for centering environmental justice as a key tenet of Oregon water policy decision-making.

A water justice movement is building in Oregon and will be a driving force in future state water policy decision-making. This movement recognizes the unique challenges facing rural, urban, suburban, frontier,³ and reservation communities. It seeks to engage and uplift low-income and hard-to-reach households experiencing the greatest water insecurity risks today, and in our climate-impacted future. It aims to remedy the existing disparities in clean water access based on race, class, age, ability, immigration status, and other forms of discrimination. It stands on the shoulders of decades of clean water advocacy and stewardship by many organizations, governments, and individuals across the state. And it is not naive to the complex and contentious water policy landscape in Oregon, but it is hopeful and trusting in our ability to find common ground to meet the needs of Oregonians today and future generations.

Water justice is an essential lens to addressing Oregon’s water challenges, and the aim of this report is to bring it into focus at the state level.

For a definition of “frontline communities,” see *Section 1.1 What is Water Justice?*, p. 11



1. INTRODUCTION

In 2020, the Oregon Water Futures Collaborative interviewed Native communities, people of color, immigrants, and low-income Oregonians about their experience with water in the state. This included culturally specific ways of interacting with water, concerns about residential water quality and cost, and resiliency in the face of challenges to accessing water resources essential for physical, emotional, and spiritual health. Researchers found a widespread distrust of tap water due to unknown water quality and lack of access to information about drinking water, for renters in particular. People served by small water systems and those living in employer-provided housing reported inconsistent water access, ranging from showers running out midstream and infrequent water deliveries to tap water with advisories that it was not potable. Most people interviewed relied on costly bottled water for essential needs because of lack of trust in drinking water, linking water quality concerns with water affordability.⁴



These community interviews were a major contribution to the data available on water justice in Oregon. The information gleaned from these interviews elevated critical investment needs and propelled a statewide conversation about water and environmental justice within the Oregon Legislature, state agency leadership, Oregon’s academic institutions, and frontline community-based organizations working to reshape the state water policy arena.

Moving forward, more qualitative and quantitative analysis of water issues in the context of environmental justice is needed to describe the root challenges, identify and prioritize projects, and improve water equity for communities across the state. **This report builds on the work of the Oregon Water Futures Collaborative by compiling available research demonstrating how water challenges affect frontline communities in Oregon**, from racial disparities in plumbing access to overburdened rural water utilities.

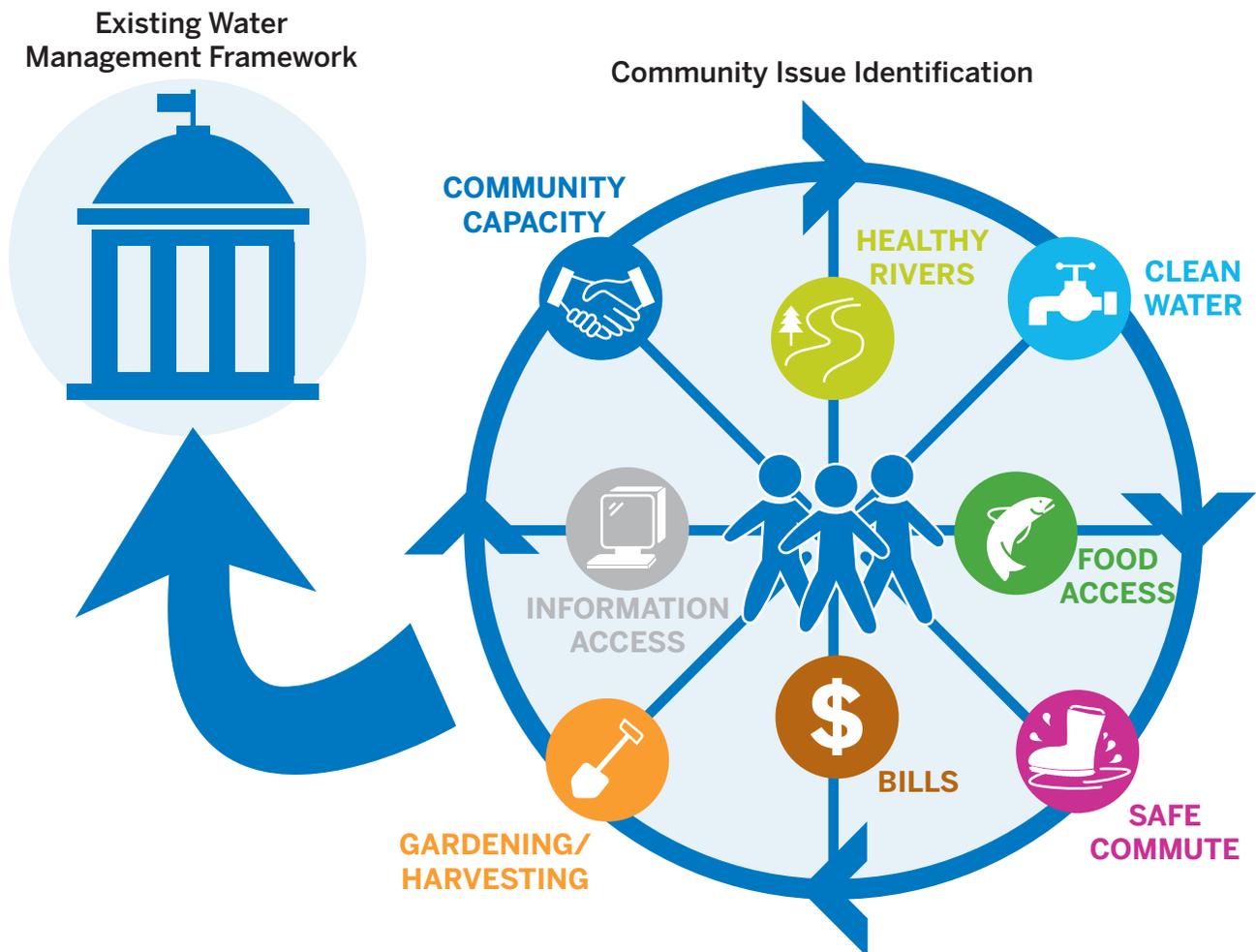
National conversations have elevated the following as key water justice issues in the U.S.:

- Lead service lines,
- Water contamination from per- and polyfluoroalkyl substances (PFAS “forever chemicals”),
- Inadequate or lack of infrastructure for basic running water or sewer services,
- Rising water utility prices and an ensuing affordability crisis,
- Groundwater contamination,
- Flooding, and
- Siting of hazardous facilities and land uses in low-income neighborhoods and communities of color.⁵

Each of these issues can be found within Oregon. Although few cities in Oregon have lead pipes in their water delivery systems, **88% of Oregon school districts found detectable levels of lead in drinking water in 2016**,⁶ likely from fixtures within buildings. While a total lack of sewer infrastructure is rare,⁷ it is estimated that **45,000 septic systems fail each year in the state**.⁸ Disparities have existed throughout Oregon’s history. For example, a study in 2000 found that **Black Oregonians were almost three times as likely as white Oregonians to live without complete plumbing**,⁹ a reality that can have long-term ramifications for health and economic outcomes.

None of these data are new. However, the fact that these issues are not central to the conversation about water management in Oregon is a sign that decision makers have not been asking all the right questions, do not have all the right tools, or adequate resources (human and financial). There are more than 3,400 public water systems¹⁰ and at least 16 state agencies managing, or with the potential to impact, clean water access throughout the state for public health, cultural, economic, or environmental purposes.¹¹ Yet, in most cases, no agency is directly responsible for ensuring that people can afford their water bills and have both water and sewer connections at their home.¹² Starting at the community level and building out a grounded understanding of water justice through people’s experience of water resources reveals how these issues compound and where the gaps are in Oregon’s current water management system.

FIGURE 1. WATER MANAGEMENT SYSTEMS



Existing laws and agency programs guide how water is understood and managed within state government structures. However, water challenges that do not fit into these frameworks leave important community issues without a clear path of authority to address them. For example, no state agency is directly responsible for ensuring people can afford their water bills. Shifting to a community-centered approach helps illuminate how water affordability impacts food access, gardening, hygiene, health, housing, and other issues important to people’s daily lives.

1.1 WHAT IS WATER JUSTICE?

Water security, water equity, equitable water access, water justice... these are ways that water stakeholders, researchers, advocates, and protectors describe the realm of water issues that are affecting frontline communities. Much of the focus of existing research and advocacy for water justice has centered on clean water infrastructure and affordability. However, few existing definitions fully encompass the range of physical, spiritual, socio-economic, and political intersections that have been raised as priorities in Oregon.

Frontline communities throughout the state have elevated water priorities that are central to envisioning a more just water future. This includes the right to a healthy and functioning ecosystem, safe access to First Foods in waterways, the right to access information about water, tribal sovereignty and treaty rights, impacts of water-related natural disasters (e.g., flooding, harmful algal blooms), and capacity to influence water decision-making.



FRONTLINE COMMUNITIES

Frontline communities are frequently described as those who experience impacts “first and worst.” In the context of water challenges and climate change, this includes people who are highly exposed to water-related risks (because of where they live) and have “fewer resources, capacity, safety nets, or political power to respond to [or reduce] those risks.”¹³

Who is on the front lines of any challenge can be context specific (as we have seen in job sectors exposed to the front lines of the pandemic compared to those working on the front lines of extreme climate). However, tribes, people of color, immigrant and low-income communities, people who have disabilities, and other groups of people who have been oppressed or overlooked by our society have fewer advantages or access to resources than other people and consistently face greater exposure to environmental risks. In Oregon, frontline communities include but are not limited to:¹⁴

- Tribes and Native Americans
- Communities of color, especially in rural areas
- Immigrant and refugee communities, in urban, suburban, and rural areas
- Low-income households in high-cost water service areas or on domestic wells
- Low-income residents in flood prone areas, especially mobile home residents
- Families reliant on resident fish for protein, especially tribal elders and immigrants
- People experiencing houselessness, housing insecurity, and displacement
- Outdoor workers/climate-vulnerable labor, particularly migrant and seasonal farmworkers
- Youth and elderly
- LGBTQ+ communities
- Persons with disabilities or chronic illness

1.2 A CONTEXTUAL FRAMEWORK FOR OREGON'S WATER JUSTICE CHALLENGES

As we set out to better understand and illuminate what water justice means to Oregonians, this report starts with a basic framework for understanding disproportionate water impacts. This framework recognizes that:

- Tribal people that have and continue to live in what we now refer to as Oregon were the first stewards of this land. Broken treaties, forced removal from their homelands, land ownership policies, and environmental degradation prevent or limit many Native communities from accessing traditional First Foods and sufficient cold, clean water to fulfill cultural and social practices today, as well as impact tribal capacity and standing to co-manage these vital resources.
- We all have a basic human right to clean water, sanitation, and healthy ecosystems. Our existence is inextricably linked to the natural world that we depend on. Therefore, all ecosystem threats are, on some level, water justice concerns. However, these threats are not distributed equitably.
- As climate change impacts grow in frequency and severity, many of the effects will be felt as water challenges. This includes increased flooding and drought, warming rivers, diminished water quality, rising costs of water service, and increased competition for water. At the same time, our water systems hold immense power to help us mitigate and adapt to the effects of climate change.¹⁵
- Loss of water access has cascading impacts on public health, community economic outcomes, food security, and mental health.¹⁶ These cumulative impacts have long-term community ramifications, and those parts of Oregon that bear a disproportionate burden of water challenges face greater barriers to overcoming them because of these impacts.
- Rural parts of Oregon face specific environmental hazards at a greater magnitude than other parts of the state. This includes “increased risk of wildfire, limited access to water, and inadequate infrastructure.”¹⁷ Lack of broadband or cell phone access are additional barriers for rural residents to influence water policy decisions.
- Tribes and communities of color throughout Oregon already face disproportionate social, economic, and environmental impacts created by current and historical systems of oppression. The additional impacts caused by climate change and degraded water systems exacerbates existing disparities between white and non-white Oregonians.¹⁸
- Lower-income households have fewer resources and safety nets to adapt to new challenges and are often forced to work and live on the front lines of environmental risk factors with less financial stability and fewer alternatives.¹⁹



Portland area elders
at the Portland All
Nations Canoe Family
Canoe Launch,
Photo by Eddie
Sherman



To understand water justice in Oregon, we must recognize who historically and currently has had standing in water policy and management conversations. For tribes, the importance of “land and political recognition for Indigenous self-governance, cultural practices, and social identities”²⁰ is fundamental. However, termination-era policies cut off benefits owed to tribal members, reduced and disconnected reservation lands, and took away fishing rights,²¹ resulting in a legacy of broken government promises and unceded resource seizures that impact water access and First Foods today.

Oregon tribes are not the only communities that have been left out of water management conversations. Due to historic inequities, exclusion, racist landownership and housing policies, and language barriers, immigrants and communities of color in Oregon — particularly those that are rural and low-income — are often on the front lines of water challenges yet lack access to state policy and infrastructure decisions. These are the same reasons why environmental justice advocates have historically been under-resourced to participate in water policy discussions, resulting in a lack of understanding by policymakers and government agencies of what water justice looks like across the state.

Water resource decisions have the power to promote community wellbeing, resilience, and economic development. “There is an intrinsic link between the quality of basic services such as water and sanitation and the economic opportunities that follow their improvement.”²² Senate Concurrent Resolution 17 directs the State of Oregon to make reparative investments in frontline communities, watershed protection, and a regenerative economy that promotes the “full and fair participation of Black, Native American, Indigenous and People of Color communities, essential workers, youth, low-income people and those who are most vulnerable in rural and urban communities.”²³ Equitable resource distribution is key to achieving water justice outcomes.

For the purposes of this report, water justice requires equal protection from environmental and health hazards, universal and affordable access to safe drinking water and sanitation, equitable investments that create economic opportunity and community resilience for historically marginalized and excluded communities, and meaningful engagement of frontline communities in developing solutions to the water challenges people experience daily.

1.3 CURRENT POLICY LANDSCAPE

A vision for the future of water. In 2019, the Oregon Governor’s office and state agencies began developing a 100-year water vision to help guide water management and water investments in the state, and the House Water Committee was created in the state legislature to bring greater focus to water challenges and policy opportunities. That same year, a collaboration of researchers, environmental nonprofits, and community-based organizations formed the Oregon Water Futures Collaborative to elevate the experiences and priorities of communities currently underrepresented or historically discriminated against in water policy decision-making, particularly Native, people of color, migrant, and low-income communities.²⁴

Propelling public investment. As these efforts were underway, the compounding crises of the COVID-19 pandemic, economic hardship across the country, and climate disasters like the 2020 Umatilla River floods and Labor Day fires, deadly heat waves, and severe drought pushed conversations about water access and infrastructure investments into the spotlight. At both the state and federal levels, historic investments in water infrastructure and water resource planning in 2021 laid the groundwork for new opportunities to improve water equity. In June of 2021, the Oregon Legislature passed a landmark \$538.1 million package to improve access to clean water across the state.²⁵ This was followed by the federal Bipartisan Infrastructure Investment and Jobs Act in November of 2021, which included the single largest investment in water the federal government had ever made, with more than \$50 billion directed to the Environmental Protection Agency to improve our nation’s drinking water, wastewater, and stormwater infrastructure.²⁶

Progress on Water Justice Policy and Funding

In 2021, the Oregon Legislature and U.S. Congress both passed historic funding to improve access to clean water in cities and counties across the state. Advocates see these investments as a down payment on our water future, but sustainable funding sources are still needed to achieve water justice.

Oregon Legislature

The \$538.1 million package included the following:

- Support for Oregon’s 100-Year Water Vision, equitable water access, and state, local, and regional water planning
- Septic system repair and replacement
- Domestic well testing, remediation, and replacement
- Modernized data collection and technology used to monitor Oregon’s water supply
- Water, sewer, stormwater, and other water infrastructure replacements — especially in low-income and rural towns²⁷

U.S. Congress

The \$50 billion federal water investment addressed the following:

- Aging water infrastructure for rural, tribal, and small water systems
- Ensuring federal obligations are met under tribal water rights settlements
- Toxics exposure from lead pipes and emerging contaminants of concern
- Expanding large scale water recycling projects²⁸

Momentum for water equity. As part of the 2021 water funding package, the Oregon Legislature dedicated \$1.5 million to the Oregon Water Resources Department for community-led water needs assessments centering Black, Indigenous, Latinx, Asian, Pacific Islander, Native American, and Tribal communities — a priority elevated by the Governor’s Racial Justice Council. Funding was also allocated for septic systems, domestic wells, and water infrastructure improvements for low-income and rural towns. These were priorities for the Oregon Water Futures Collaborative²⁹ and many other advocacy networks as critical investments to ensure everyone has access to clean water. However, additional advocacy will be needed to ensure programs prioritize low-income households, communities of color, and vulnerable Oregonians.

Additionally, the 2021 Oregon Legislature made the Racial Justice Council housed within the Governor’s office permanent, required that racial justice impact statements accompany agency budget requests,³⁰ pledged to consider environmental justice in agency decision making,³¹ and authorized water agencies to use existing project funding for local community engagement.³² Then in 2022, the Legislature strengthened the role of the Environmental Justice Task Force and renamed it the Environmental Justice Council within the office of the Governor, as well as directed agencies to develop an environmental justice mapping tool for the state.³³ It is within the context of these environmental justice and water equity policy advancements that we see momentum building for water justice efforts at the state level.

Oregon’s complex water management system continues to leave policy gaps. There are still major gaps in policy and agency authority to address the range of water justice challenges that are rising across the state. The Oregon Integrated Water Resources Strategy, Oregon’s statewide water plan that is updated every five years, includes recommendations to provide additional assistance to small water systems, protect drinking water sources, increase well testing, reduce toxics and other pollutants, assist communities with septic system challenges, and reduce water pollution. But there is limited data on how clean water threats impact low-income households, communities of color, vulnerable Oregonians, and other frontline communities.

Even with major infrastructure investments on the way, there is currently no federal or state statute that ensures water access for vulnerable residents.³⁴ Oregon has state programs for drinking water source protection, water quality monitoring, domestic well safety, healthy school facilities, information about wildfire and cyanobacteria (harmful algal blooms) for water systems, and funding for septic upgrades and clean water infrastructure. But there is no statewide drinking water strategy to coordinate and prioritize efforts to ensure clean water in all communities or identify Oregon’s biggest threats to water security.

“Oregon currently has no public health-focused water insecurity program, ... [and] there are few water insecurity policies that seek to promote public health and health equity.”³⁵

— Oregon Health Authority staff in the *International Journal of Environmental Research and Public Health*



Water Management Responsibilities in Oregon

Water management is complex and fragmented. Critical functions ranging from permitting water rights to wetland mitigation to drinking water safety standards are managed by different government agencies in Oregon. These issues all have very different legal, policy, and management frameworks that shape how agencies are able to affect both built and natural water systems. The following chart shows a sample of the programs and responsibilities of various state agencies impacting water access and management in Oregon. The federal government, tribal nations, and local and regional entities also play significant roles in water resources management across the state.

| | | | |
|---|--|--|--|
| <p>Oregon Water Resources Dept.</p> <ul style="list-style-type: none"> • Oregon’s Integrated Water Resources Strategy (inter-agency) • Water rights and use, including instream rights • Basin and place-based planning • Well construction and compliance • Dam safety • Emergency water use permits during drought | <p>Oregon Dept. of Environmental Quality</p> <ul style="list-style-type: none"> • Clean Water Act implementation • Water quality standards for rivers and water bodies • Wastewater permits • Environmental cleanup and emergency response • Toxics reduction strategy • Groundwater management areas • Clean Water State Revolving Fund • Graywater permits • Beach monitoring program (with OHA) | <p>Oregon Health Authority (OHA)</p> <ul style="list-style-type: none"> • Safe Drinking Water Act implementation • Drinking water quality standards for public water systems • Fish consumption advisories • Public health emergency preparedness (with OEM) • Standards for public drinking water wells • Domestic well safety program and database of well test results • Harmful algal bloom (cyanobacteria) advisories | <p>Oregon Watershed Enhancement Board</p> <ul style="list-style-type: none"> • Oregon Plan for Salmon and Watersheds • Funding for the protection and enhancement of watersheds and fish and wildlife habitat • Pacific Coastal Salmon Recovery Fund projects • Research investment strategy |
| <p>Business Oregon</p> <ul style="list-style-type: none"> • Funding for water infrastructure needs • Safe Drinking Water Revolving Loan Fund • Community Development Block Grant Disaster Funds • Brownfields redevelopment financing | <p>Oregon Depts. of Agriculture and Forestry</p> <p>These two state agencies are responsible for many water management intersections with agricultural and forestry lands, including:</p> <ul style="list-style-type: none"> • Oregon Forest Practices Act • Agricultural water quality management • Confined Animal Feeding Operations • Forest stewardship plans • State forest lands management • Pesticides and fertilizer management | <p>Oregon Dept. of Land Conservation and Development</p> <ul style="list-style-type: none"> • Oregon Climate Change Adaptation Framework (inter-agency) • Flood prevention planning • Coastal resource planning and management • Public water and sewer system development plans | <p>Oregon Dept. of State Lands</p> <ul style="list-style-type: none"> • Wetland mitigation and management • Marine renewable energy project leases <p>Office of Emergency Management (OEM)</p> <ul style="list-style-type: none"> • Natural hazard mitigation and recovery grants • Oregon Emergency Response System |

Source: *Oregon’s Integrated Water Resources Strategy, Recommended Action 1.C: Mapping Oregon’s Water Related Institutions*, Version 1 (Oregon Water Resources Department, January 2015). Available at https://www.oregon.gov/OWRD/WRDPublications/Program_Mapping_January_2015.pdf.

Setting an equitable direction for Oregon water management. As agencies prepare to deploy significant state and federal investments in water infrastructure, begin the 5-year update to the Oregon Integrated Water Resources Strategy, and implement new environmental justice policies, the issue-framing conversations underway today will shape the direction of water policy decisions into the future. The State of Oregon has a significant role to play in ensuring equitable management of water resources while supporting solutions that recognize the unique regional conditions and concerns of Oregonians. Centering how communities experience water resources in their daily lives will reveal key gaps in our current water management system that must be addressed to achieve just outcomes for all people in Oregon.

2. EQUITABLE ACCESS TO CLEAN WATER & SANITATION

What do we know today about who has equitable access to clean water and sanitation across Oregon and who does not? Which communities disproportionately bear the burden of poor drinking water quality or unaffordable bills? How does where you live dictate your options for clean water? Which issues are not addressed by existing state programs and policies? Who is shaping policy and planning decisions about water resources?

These questions and more are central to understanding the state of water justice in Oregon. This report builds on the community research conducted by the Oregon Water Futures Collaborative in 2020 by compiling available studies and media stories to provide statewide context to water challenges identified by frontline communities. Snippets of national research, media reports, and anecdotes viewed together begin to paint a picture of how to understand water justice in Oregon. However, broader analysis comparing Oregon water issues in the context of social vulnerability and environmental justice is still needed. Many of these issues affect everyone, but frontline and low-income communities are often impacted by compounding challenges that multiply the negative impacts of water problems and make it harder to adapt to them.

This section examines eight specific areas of concern for Oregon regarding safe, acceptable, accessible, affordable, and non-discriminatory³⁶ drinking water and sanitation infrastructure using available data. The issue areas that follow cover statewide challenges with inadequate infrastructure, drinking water quality, lead exposure in drinking water, affordability of water utility rates, small water systems, domestic wells and septic systems, water in the workplace, and climate change impacts.



2.1 INADEQUATE INFRASTRUCTURE: LACK OF PLUMBING ACCESS, FAILING PIPES, AND SERVICE INTERRUPTIONS CREATE PUBLIC HEALTH RISK AND ECONOMIC HARDSHIP

An essential quality of equitable water resources is the degree to which it is **accessible** to all Oregonians. Infrastructure systems can fail to deliver in two ways: 1. absence of basic water or sanitation piping and fixtures in homes and houseless communities, and 2. infrastructure breakdowns from aging pipes, insufficient water systems, or climate impacts. Explored below are examples of individuals and communities in all parts of the state living without reliable access to running water or bathrooms.

WATER ACCESSIBILITY: The US Water Alliance and Dig Deep define accessible water infrastructure as people having a sink, shower or bath, and toilet in their home; water and wastewater services that are continuous and not subject to interruptions; and where plumbing facilities are shared in the case of homeless shelters or affordable housing, it must be well maintained, clean, and safe without an unreasonable wait time.³⁷

Source: Closing the Water Access Gap (2019)

2.1.1 PLUMBING POVERTY

For the small percentage of people in Oregon who lack complete plumbing, accessing water for basic needs can be a daily challenge. Water rationing can be especially hard on families with babies that need to do laundry more frequently, or children who don't want to go to school because they may be worried about how they smell.³⁸

A study found that **Portland has the second highest share of unplumbed households among the 50 largest U.S. metro areas**, after San Francisco.³⁹ Researchers estimated that nearly 5,000 households in Portland lack complete plumbing despite being somewhat close to networked supply, and they found housing affordability and widening wealth gaps to be key factors.⁴⁰

Based on historic trends, Oregonians living without complete plumbing are more likely to be rural and people of color. An analysis of the 2000 U.S. Census by the Rural Community Assistance Partnership **found that more than a third of these homes were rural, and Black Oregonians were almost three times as likely as white Oregonians to live without complete plumbing.**⁴¹ Hispanic/Latino and Native American households were more than two and 2.5 times as likely to lack plumbing as white households, respectively. And Asian and Pacific Islander households were also more likely to lack plumbing than white households in Oregon (See Figure 2).⁴² These numbers are more than 20 years old at the time of writing this report, but the trends are concerning and should motivate further investigation of more recent data.

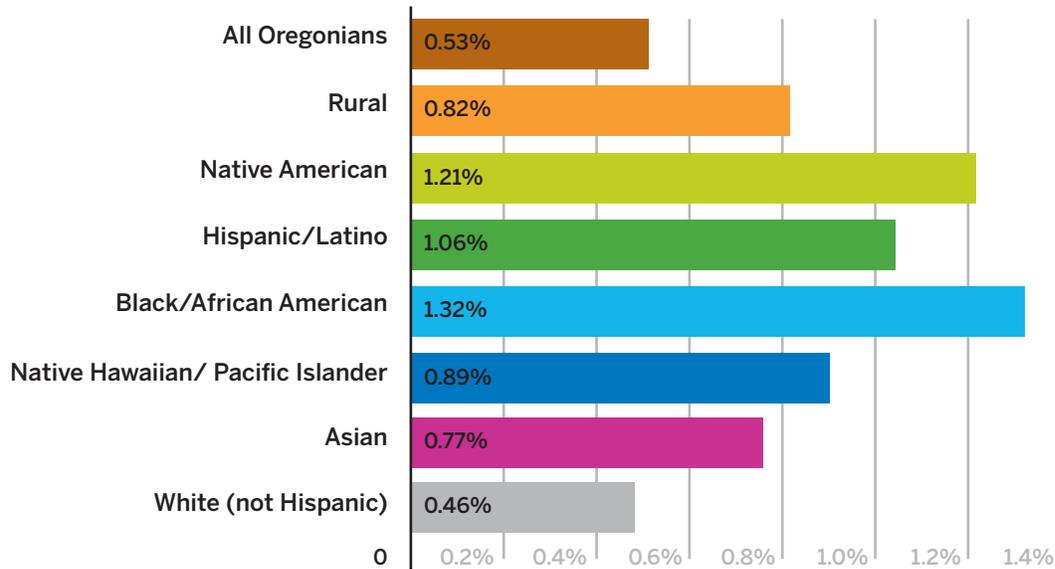
Multiple reports note that these numbers likely underrepresented the extent of plumbing gaps. "Water access issues disproportionately affect lower-income people, people of color, undocumented immigrants, and people who do not speak English — all groups that are considered Hard to Count (HTC) populations and are underrepresented in the census."⁴³ Homeless populations and migrant laborers are also likely undercounted.⁴⁴ The Oregon Water Futures Collaborative heard from some farmworkers that water is delivered infrequently in winter to their employer-provided housing site, requiring community members to collectively ration water use while they wait for more.⁴⁵

NON-DISCRIMINATORY WATER ACCESS:

The US Water Alliance and Dig Deep define water as non-discriminatory when "access to services is not determined by race, ethnicity, national origin, citizenship status, gender, age, income, housing situation, geography, religion, creed, disability, sexual orientation, gender identity, gender expression, or any other status."⁴⁶

Source: Closing the Water Access Gap (2019)

FIGURE 2. PERCENT OF OCCUPIED HOUSING UNITS LACKING COMPLETE PLUMBING FACILITIES IN OREGON IN 2000, BY PERCENT OF POPULATION



Data from the 2000 U.S. Census as presented in *Still Living Without the Basics in the 21st Century: Analyzing the Availability of Water and Sanitation in the United States* by the Rural Community Assistance Partnership. As of 2000, there were 7,025 occupied housing units reported as lacking complete plumbing facilities in Oregon, more than a third of which were rural. While a majority of these households are white, communities of color lack complete plumbing at higher rates based on their share of the overall population.

2.1.2 UNHOUSED COMMUNITIES

In 2019, there were an estimated 15,800 people experiencing homelessness in Oregon, with the majority of families experiencing homelessness residing in coastal counties or Southern Oregon.⁴⁷ **Unhoused people frequently have to rely on public facilities like libraries, parks, and malls for water and bathrooms,⁴⁸ which can be more difficult to access in rural communities and during the COVID-19 pandemic when buildings were closed to the public.** In 2020, Oregon had one of the highest rates of unhoused people living outdoors (unsheltered) in the country.⁴⁹

A 2021 report from Bonneville Environmental Foundation’s Watersheds Program, in collaboration with community advocates and Trauma Informed Care experts, detailed the hardships unhoused Portlanders face accessing infrastructure for basic hygiene. Seeking out bathrooms and showers when experiencing homelessness has always been a challenge, creating stigma and barriers to accessing jobs, and contributing to the dehumanization of unhoused communities.⁵⁰ Some people have even reported being denied access to shelter due to lack of hygiene, and access to laundry facilities is also a significant water-related hygiene concern.⁵¹ During COVID-19, facilities became increasingly scarce and people had to travel farther from their encampments to find running water, restrooms, and showers. This distance can completely cut off elderly residents or those with disabilities from accessing hygiene needs, and it increases safety risks, particularly for those with marginalized gender identities.⁵² “When bathroom or hygiene needs arise in the middle of the night, people must leave their shelter to search for hygiene access in the dark, risking their own safety and the loss of the possessions they leave behind.”⁵³

In Multnomah County, people of color are overrepresented in the unhoused community. According to the 2019 Point in Time Count, Native Americans made up 11.6% of the houseless population despite being only 2.5% of the general population, and Black or African American residents accounted for 16.1% of the county’s unhoused compared to only 7.2% of the general population.⁵⁴ The snowball effect of lack of access to water and hygiene infrastructure exacerbates and perpetuates the homelessness crisis, which disproportionately impacts communities of color and other marginalized groups.

From *The Nation*, May 23, 2019:

THE POLITICS OF GOING TO THE BATHROOM

Access to adequate restrooms is a fundamental necessity for everyone, but it's harder to come by the less structural power you have.

Poverty and houselessness can make it challenging to access many essential health needs, from places to safely use the bathroom or wash hands to healthcare. Reports of hepatitis A outbreaks have been linked to lack of toilet access, as well as susceptibility to urinary tract infections. Studies have suggested that “unhoused people experience health problems from holding their urine or are likely to skip doses of medication whose side effects include frequent urges to use the bathroom.”⁵⁵

2.1.3 FAILING AND INADEQUATE INFRASTRUCTURE

Even where people are housed and have plumbing, sometimes the water does not come or is not safe to drink due to broken, outdated, or inadequate infrastructure systems. Infrastructure that is reaching the end of its planned lifespan is a widespread concern across Oregon, in all types of communities and income brackets. However, the ability to fund capital improvements to keep water systems functioning in a safe manner is not always financially feasible for low-income areas, rural water providers, and tribal communities. In 2021, Portland State University and League of Oregon Cities estimated there will be approximately \$23 billion in statewide water infrastructure needs in the next 20 years based on a survey of 100 cities.⁵⁶

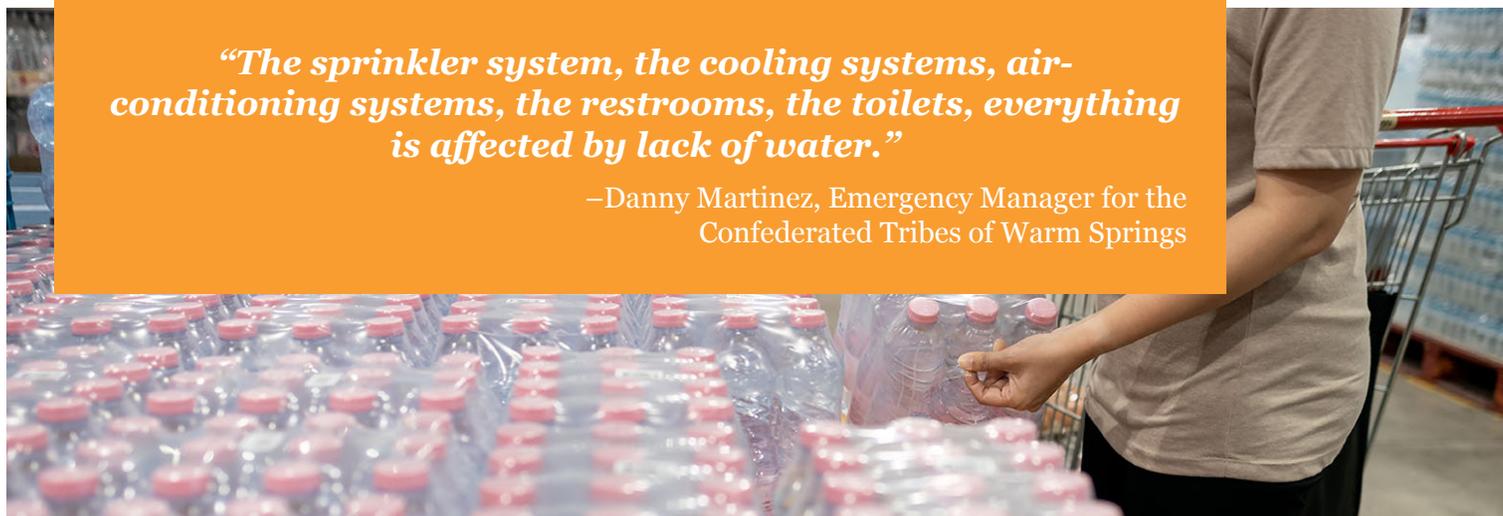
Reports on the distribution of service interruptions or water contamination as a result of inadequate water infrastructure, what populations or regions are disproportionately impacted, and the affordability of needed capital investments are not readily available for Oregon. Nationally, there are examples of deliberate and discriminatory infrastructure actions that continue to leave a legacy of underdevelopment of water resources in frontline communities, starting with federal investments in drinking water and irrigation for settlers in the West at the expense of tribes. Municipal water lines were not constructed in African American neighborhoods in Zanesville, Ohio, and rural Latinx communities in California's Central Valley were discouraged from incorporating as cities, limiting their access to infrastructure funding.⁵⁷ For communities that were historically excluded from or unable to develop adequate water infrastructure, declining federal funding since the 1980s has made it even harder to catch up to better resourced water systems.⁵⁸

From *OPB*, August 8, 2019:

WATER CRISIS IN WARM SPRINGS DRAGS INTO 3RD MONTH

“The sprinkler system, the cooling systems, air-conditioning systems, the restrooms, the toilets, everything is affected by lack of water.”

—Danny Martinez, Emergency Manager for the Confederated Tribes of Warm Springs



EXAMPLES OF FAILING OR INADEQUATE WATER INFRASTRUCTURE SERVING OREGON FRONTLINE COMMUNITIES:

● *As well goes dry, residents of Bend mobile home park struggle without steady water supply*

KTVZ Bend
January 2022

A Bend mobile home park with a sizable Latino population lost water access in 2022 when the well serving 49 homes failed as a result of low groundwater supplies after an extended regional drought. Although park management hauled in water as a temporary fix, supplies frequently ran out midday and residents had to expend additional finances to pay for bottled water and laundry services.⁶⁴ The Oregon Water Futures Collaborative also heard from mobile home park residents in Eastern Oregon about intermittent “do not drink” notices due to water quality problems, and a national study showed that mobile home park residents experience nearly three times the number of service gaps as residents in all other housing types.⁶⁵



● *Water crisis returns to Warm Springs as virus cases rise*

OPB
June 2020

On the Warm Springs Reservation, 3,000-4,000 people are served by an aging community water system that has frequent failures and boil water notices.⁵⁹ In June of 2020, 60% of the reservation had low water pressure, just as COVID-19 cases were on the rise.⁶⁰ Distrust of tap water is high, and community members haul water home from local springs and donated supplies, but not everyone can easily get to these resources, for example elders and people without cars.⁶¹ Sometimes springs are inaccessible due to wildfires.⁶² At times, up to 90% of the community has been affected by the water crisis.⁶³



● *Federal official announces ‘down payment’ on improving Columbia River treaty fishing sites*

The Oregonian
May 2022

Along the Columbia River, lack of clean water infrastructure at ‘treaty access fishing sites’ has created distressed, unsafe, and unhealthy conditions for Native people who visit and live there. These sites were created by the federal government to compensate tribes who were displaced when dams flooded tribal villages and fishing sites, but they were never equipped with adequate sewer and power systems, shower and bathroom facilities, shelters, or safe drinking water wells. Over time, the lack of affordable housing nearby has resulted in tribal citizens living at these sites in trailers, campers, and semi-permanent structures. Drinking water wells at these sites have had contamination problems, wastewater systems require frequent and costly pumping, and some are missing fire hydrants. Tribal governments have fought for years to be compensated for the loss of the land and provide safe sites for citizens to access the river to exercise their treaty rights. Now the federal government is developing a plan to address these infrastructure deficiencies.⁶⁷

● ***“There are times of the day in some areas when you cannot flush the toilet because the tides bring the water up”***

Oregon Water Futures Project Report
Community Gathering September 2020

On the Oregon Coast, members of Chinook Indian Nation reported that in buildings on septic systems, there are times of day when you cannot flush the toilet without it backing up because of the impact of tides on the water table.⁶⁶ Community members have adapted to this dynamic as a temporary inconvenience, but long-term impacts of sea level rise on the water table could increase the frequency of system outages, resulting in lack of access to safe sewage options.

2.1.4 COMMUNITY-WIDE IMPACT

Lack of water or sanitation in the home can lead to serious health and economic costs, both at the household and community level. Researchers from the CDC found lack of water services in the home to be correlated with increased rates of hospitalizations from pneumonia, influenza, and skin infections in rural Alaska communities, particularly among infants, children, and elderly residents.⁶⁹ Houseless community members interviewed in Portland reported experiencing medical issues consistent with chronic lack of sanitation and hygiene, including staph infections, Methicillin-resistant *Staphylococcus aureus* (MRSA), scabies, endocarditis, and urinary tract infections.⁷⁰ The critical importance of handwashing to prevent community spread of COVID-19 elevated the conversation around water access and water shutoffs across the country.

The economic burdens of failing or nonexistent water infrastructure go beyond direct costs to ratepayers to repair or replace water systems. At the household level, people may have to buy bottled water or travel to friends or family to fill up water jugs and shower, as happened during the Salem algae crisis in 2018 when cyanotoxins were found in the City’s drinking water.⁷¹ In communities with extended water service disruptions, property values may decline where houses do not have running water, and businesses may be reluctant to locate there, stalling local economic growth.⁷² The American Society of Civil Engineers describes how these costs play out nationally:

“Every \$1 spent on water and sanitation infrastructure will save \$1.18 in avoided direct healthcare cost.”⁷⁴

- Indian Health Service (2022)

“Water and wastewater service disruptions to US households can result in large, unexpected personal costs to individuals and families. In 2019, service disruptions and flooding (due to sewer overflows and stormwater drainage problems) cost [U.S.] households an estimated \$2 billion. During drinking water outages, household residents need to find alternative water supplies and, in extreme situations, must relocate either temporarily or permanently. Increased climate-related flooding in some areas of the country will increase the cost burden on households from repeated cleanup, rehabilitation, and structural repair. As infrastructure ages and the rate of infrastructure failures increases, household costs would more than double in 10 years to \$4.3 billion, climbing to almost \$14 billion by 2039.”⁷³

These costs are felt more acutely in frontline communities that have higher exposure to water-related risks and fewer resources, capacity, and safety nets to respond to water emergencies.

From housing that lacks plumbing to people that do not have housing, living without regular access to water has significant health and economic impacts. Failing water delivery pipes or septic systems that cannot flush create interruptions that can turn into community emergencies. And climate change is fueling more severe and prolonged drought conditions threatening local water supplies. According to the American Society of Civil Engineers, if trends continue, water and wastewater failures would cost U.S. households seven times more in 20 years than they do today.⁷⁵

RE-ENVISIONING WATER INFRASTRUCTURE

In 2019, a burst water pipe on the Warm Springs Reservation triggered a series of infrastructure failures that left nearly 4,000 people without safe water for upwards of three months.⁷⁶ The reservation has had documented water challenges for years, but upgrades are prohibitively expensive and most federal funding requires utilities to charge people for their water⁷⁷ — a model that does not fit well with tribal values around commodifying something that is central to life and ceremony.⁷⁸ While plans for a new water system take years to implement, the tribe utilized private donations and COVID relief funds in 2021 to invest in a “water farm.” Now 300 hydropanels pull condensation from the air to provide an alternative drinking water source for tribal members to fill up for free, even when the main water system fails. At its current capacity, the system can produce 720 gallons of water per day, enough to meet the most basic daily needs of approximately 50 tribal members.⁷⁹ Additional hydropanels were also installed on the rooftops of 50 remote households, reducing the burden of traveling long distances across Oregon’s largest reservation to haul water for cooking and drinking. The water farm does not entirely solve the community’s urgent water needs, but it is a step toward greater water sovereignty in the face of unfulfilled federal treaty obligations and an opportunity to shift away from Deschutes River water, which is widely recognized as a poor-quality drinking water source.⁸⁰

2.2 SAFE AND ACCEPTABLE DRINKING WATER: WATER QUALITY CHALLENGES IMPACTING FRONTLINE COMMUNITIES

Nationally, there are **more violations of the Safe Drinking Water Act** in communities with more people of color, more low-income households, more non-native English speakers, and crowded conditions and/or sparse access to transportation.⁸² Slow and inadequate enforcement of the Safe Drinking Water Act is also a disproportionate challenge in these communities. “Drinking water systems in counties with higher vulnerability ... related to race, ethnicity, or language spoken were likely to spend more time out of compliance with the law for more violations for more contaminants,” according to a national analysis.⁸³ Drinking water that contains an unsafe level of contaminants can cause negative health effects, including gastrointestinal illnesses, nervous system or reproductive effects, or chronic diseases such as cancer.⁸⁴

SAFE AND ACCEPTABLE WATER:

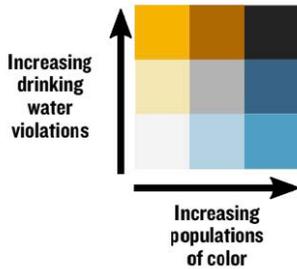
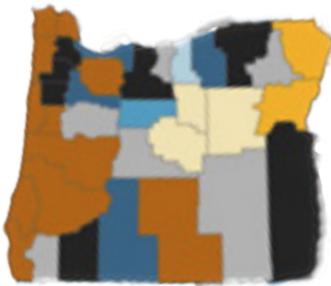
The US Water Alliance and Dig Deep define “safe” and “acceptable” water resources as hot and cold running water in the home that does not have adverse effects on human health; meets or exceeds safety standards set by the World Health Organization and U.S. Environmental Protection Agency; and that is acceptable in color, odor, and taste. Wastewater and sanitation systems should be culturally appropriate to communities and effectively store and treat sewage in a manner that prevents human contact and prevents backup, overflow, flooding, or runoff that can endanger public health.⁸¹

Source: Closing the Water Access Gap (2019)

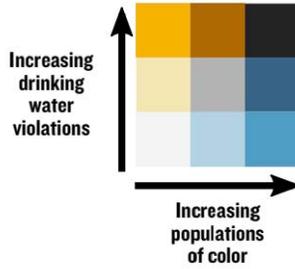
In Oregon, these correlations were most pronounced in Jackson, Malheur, Polk, Umatilla, and Wasco counties (See Figure 3). These regions are often less populated, rural households outside of municipal boundaries are more reliant on private domestic wells for drinking water, and many residents are renters (see *Section 2.2.1 Renters* for a discussion of the unique barriers renters face, p. 27). In Malheur, Polk, and Umatilla counties, people interviewed for the Oregon Water Futures Collaborative reported lack of trust in drinking water and purchased bottled water at home to drink and, at times, to cook with because they believe their tap water is not safe.⁸⁵ Some reported gastrointestinal illnesses from drinking tap water.⁸⁶ Some who live in mobile home parks have received intermittent notices that the water is not potable.⁸⁷

FIGURE 3. DRINKING WATER VIOLATIONS AND COMMUNITY VULNERABILITY BY COUNTY

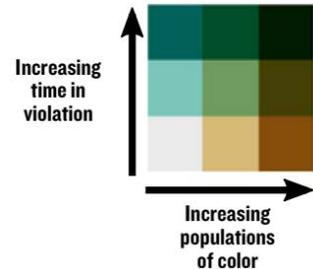
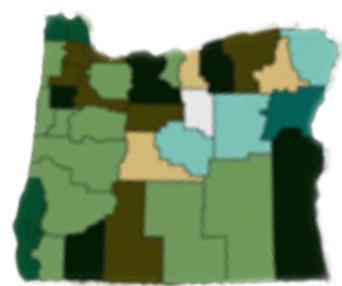
All Drinking Water Violations



Health-Based Drinking Water Violations



Length of time out of Compliance



Maps illustrate the intersection of drinking water violations and racial, ethnic, and language vulnerability by county. Data is from June 1, 2016 to May 31, 2019.

Source: Kristi Pullen Fedinick, Steve Taylor, and Michele Roberts, *Watered Down Justice Report* (Natural Resources Defense Council, Coming Clean and the Environmental Justice Health Alliance for Chemical Policy Reform, 2019), p. 20-21. Available at <https://www.nrdc.org/sites/default/files/watered-down-justice-report.pdf>.

Malheur County is 41% non-white (including 35% Hispanic or Latinx), 26% of households speak a language other than English, and nearly 20% live below the poverty line.⁸⁸

Umatilla County is home to the Confederated Tribes of Umatilla Indian Reservation. County-wide, 36% of people are non-white (including 29% Hispanic or Latinx and 4% Native American), 12% live below the poverty line, and 23% speak a language other than English at home,⁸⁹ including Indigenous Latin American languages.

Polk County is home to the Confederated Tribes of Grand Ronde. County-wide, 24% of the population is non-white (including 15% Hispanic or Latinx, 3% Native American, and 2% Asian), 12% of households speak a language other than English, and 11% live below the poverty line.⁹⁰

Multnomah County is 32% non-white (including 13% Hispanic or Latinx, 8% Asian, and 6% Black or African American), 20% speak a language other than English at home, and 11% live below the poverty line.

Source: U.S. Census Bureau QuickFacts

Oregon’s three designated Groundwater Management Areas in Northern Malheur County, the Lower Umatilla Basin, and the Southern Willamette Valley also overlap with counties in Figure 3 that had the strongest intersection of drinking water violations and populations of color. Groundwater can be contaminated with nitrates, arsenic, pesticides, volatile organic compounds, and bacteria,⁹¹ which can cause health problems

FIGURE 4. OREGON GROUNDWATER MANAGEMENT



Oregon Groundwater Management Areas as designated by Oregon Department of Environmental Quality: Lower Umatilla Basin Groundwater Management Area (declared in 1990), Northern Malheur County Groundwater Management Area (declared in 1989), and Southern Willamette Valley Groundwater Management Area (declared in 2004). Map from Gareth Baldrice-Franklin, “Groundwater” [Storymap], Oregon Explorer (Institute for Water and Watersheds, Oregon State University). Available at <http://oregonwater.info/groundwater.html>.

including severe gastrointestinal distress, blue-baby syndrome, respiratory infections, cancers,⁹² and poor cognitive development in children.⁹³ The Department of Environmental Quality designates Groundwater Management Areas when elevated contaminant concentrations resulting from nonpoint sources (e.g., contaminants that seep into groundwater, like from agriculture or septic systems) are severe enough for the state to step in.⁹⁴ Oregon’s existing Groundwater Management Areas are all designated for elevated nitrate concentrations and have voluntary action plans to reduce nitrates in groundwater.⁹⁵

Groundwater contamination is particularly concerning for private domestic well users due to limited regulations and resources for testing or remediating contaminated private wells (see *Section 2.6 Off the Grid* for more on the lack of water quality monitoring or notification for renters served by domestic wells, p. 36). Malheur County is known to have challenges with arsenic and nitrates in water sources affecting both public water systems and private wells.⁹⁶ The Northern Malheur County Groundwater Management Area

New contamination of the Lower Umatilla Basin continues to be a problem for the region. In January 2022, DEQ fined the Port of Morrow \$1.3 million (and increased it to \$2.1 million in June 2022) for repeatedly overapplying wastewater containing nitrogen to agricultural fields from 2018-2022. However, food processors like the Port only account for 5% of the problem, according to the local action plan. The primary source of contamination in the area (about 70%) is from fertilizers applied to irrigated farmland.⁹⁹
Source: Oregon Department of Environmental Quality (2022)

was designated in 1989 for widespread groundwater nitrate contamination caused primarily by regional agricultural activities as well as on-site septic systems.⁹⁷ In June 2022, Morrow County, which overlaps the Lower Umatilla Groundwater Management Area, declared a state of emergency due to high nitrate levels in domestic wells and started distributing bottled water to area residents.⁹⁸ Groundwater is the primary drinking water source for Morrow and Umatilla counties, and both counties are impacted by the Lower Umatilla Groundwater Management Area, setting the stage for potentially serious public health and safety issues.

Many other frontline communities at the sub-county level also experience ongoing water quality challenges.¹⁰⁰ The Oregon Water Futures Collaborative heard from community members in the Willamette Valley, Clackamas County, Eastern Oregon, Portland, and Eugene about concerns with poor tasting and dirty looking water (one person in Woodburn said their water smells rotten), skin irritation from bathing and showering, and toxics showing up on drinking water quality reports.¹⁰¹

Having contaminated water that is not safe to drink is effectively the same as not having water. When the color, odor, or taste is unacceptable to the people drinking and cooking with it, buying bottled water can become an affordability challenge. The Oregon Water Futures Collaborative found that people with questionable water quality (e.g., unpleasant odors or colors, distrust of water source, drinking water advisories) reported regularly spending money on bottled water in addition to paying water bills, rationing bottled water for affordability reasons, or drinking tap water and feeling sick.¹⁰²

"19.5 million Americans become sick annually from waterborne pathogens such as Escherichia coli, Giardia, and other infectious agents found in contaminated water from public water systems."¹⁰³

- Watered Down Justice Report (2019)

As Oregon prepares for emerging drinking water threats that our water treatment technology is not currently equipped to handle — such as toxic algal blooms (cyanotoxins), PFAS forever chemicals,¹⁰⁴ pharmaceuticals, and toxics from personal care products that wash down the drain — addressing the socio-economic and environmental justice intersections of these public health crises up front will be key to achieving water justice outcomes.

2.2.1 RENTERS FACE UNIQUE BARRIERS TO ACCESSING INFORMATION OR IMPROVING WATER

The Oregon Water Futures Collaborative also highlighted the unique barriers renters face in accessing information about the quality of their drinking water or directly addressing water issues within their home. Many renters do not pay a water bill directly (it is included in their rent), and therefore they may not receive Consumer Confidence Reports required from water providers.¹⁰⁵ Consumer Confidence Reports are an important tool for providing public health information and building trust in water quality. The absence of information can create fear and drive people toward more expensive bottled water or other beverages.¹⁰⁶ For Oregon homes with private wells or individual domestic surface water diversions, there are no requirements that landlords regularly test or provide drinking water quality information to tenants.^{107,108} And as people try to adapt to climate change impacts, renters are less able to make updates to their homes or landscaping, which can affect water quality and affordability.



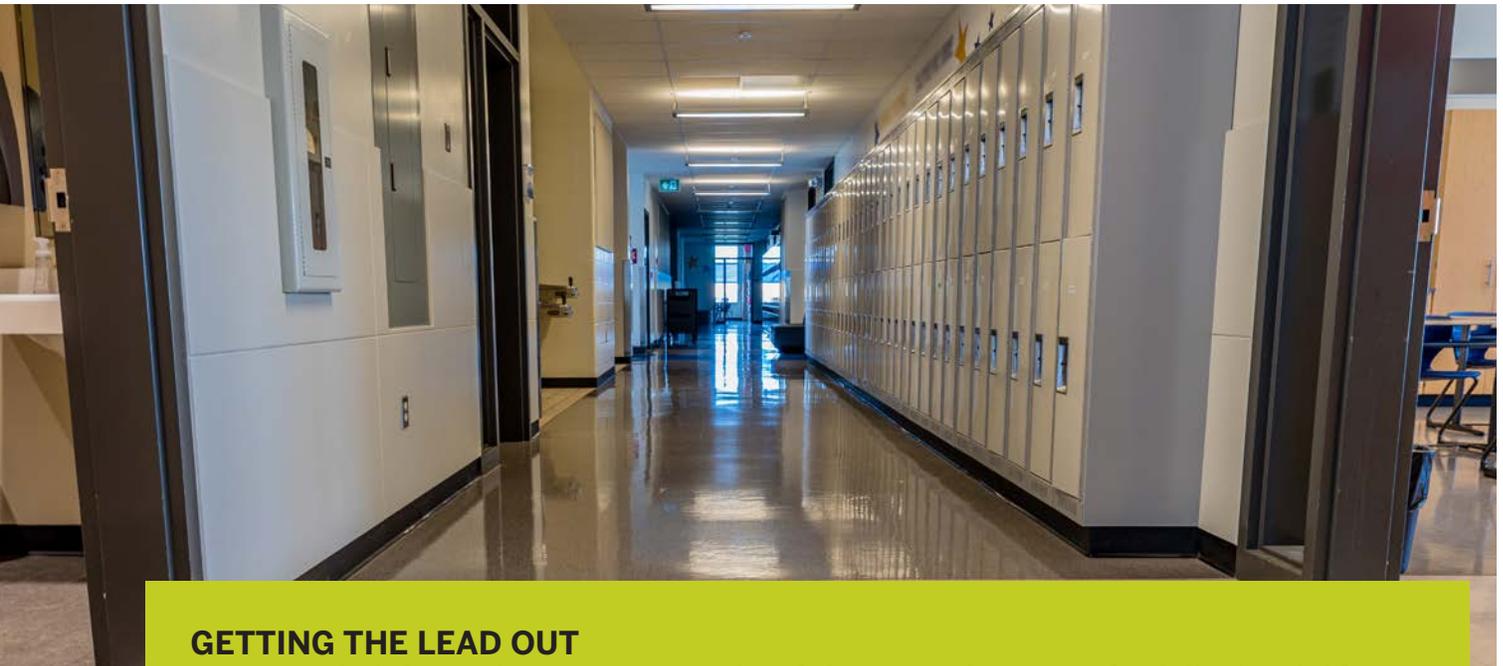
2.3 LEAD IN WATER: DANGEROUS PLUMBING IN SCHOOLS, DAYCARES, AND PUBLIC BUILDINGS

The U.S. Environmental Protection Agency estimates that drinking water can make up to 20% or more of a person's total lead exposure — more for infants who consume mostly mixed formula.¹⁰⁹ There is no safe level of lead in our bodies, and children are particularly vulnerable because of their smaller body mass and developing brains.¹¹⁰ Lead exposure is known to slow child development and speech, lower IQ, increase learning and behavioral problems, and damage the brain and nervous system for life.¹¹¹

In Oregon, 88% of school districts found detectable levels of lead in drinking water,¹¹² and Portland has exceeded the federal safety threshold for lead in water 11 times since the late 1990s.¹¹³ Dangerous levels of lead have also been found in Oregon childcare facilities on tribal reservations,¹¹⁴ youth prisons,¹¹⁵ and university dormitories.¹¹⁶ Medical professionals say there are no safe levels of lead and recommend lead levels in water of 1 ppb or less.¹¹⁷

In Oregon, lead in water typically comes from plumbing connections and fixtures within homes and buildings, not lead service lines owned by the utility. This makes it a particularly challenging public policy issue to tackle, but utilities can — and have a responsibility to — manage water supplies in a way that reduces the corrosion that increases exposure risk from older pipes. Investments in public and private buildings that reduce or eliminate lead in drinking water are a significant opportunity to reduce and prevent lead exposure statewide, starting with Oregon’s most vulnerable and least able to make changes to their drinking water infrastructure.

During the early COVID-19 pandemic, lockdowns meant that families were spending more time at home, potentially exposed to higher levels of lead in water or paint, and routine childhood lead screenings and lead-removal efforts dropped off dramatically.¹¹⁸ Nationally, “children of color, and those who live in low-income neighborhoods, are particularly likely to be exposed to lead.”¹¹⁹ And widespread building closures increased the risk of lead contamination from stagnant water sitting in pipes until students returned to schools and childcare centers.¹²⁰



GETTING THE LEAD OUT

A 2016 analysis by Environment Oregon found that 88% of Oregon school districts (with 97% reporting) had detectable levels of lead in drinking water.¹²¹ There is no safe level of lead, but under Oregon Health Authority rules for schools, districts are only required to remove and replace fixtures at or above 15 ppb.¹²² Despite lax requirements, some districts have gone above and beyond. After replacing fixtures and still finding high lead levels in some buildings, **Portland Public Schools piloted new drinking water stations fitted with advanced lead filters** at six schools in 2019 and is now rolling them out to 93 Portland Public Schools sites. **This remedy has reduced lead levels to under 1ppb**, saved the district millions of dollars in construction costs, and prevented the disruptive replacement of plumbing pipes in the walls of those schools. When the project is complete, Portland Public Schools claims it will have some of the lowest lead in water levels in the nation.¹²³

Getting the lead out of schools and childcare facilities can eliminate lead exposure for millions of young children where they spend a majority of their time under normal circumstances. National Science Foundation-certified filters have been proven to effectively remove lead and can be an affordable short-term solution to the problem of lead in drinking water.¹²⁴ Installing them in schools and childcare facilities would immediately protect children from lead in their water.

2.4 AFFORDABILITY: INTERSECTION OF INCOME AND UTILITY BURDEN

Water bills are becoming increasingly unaffordable for households across the country, particularly as utilities have to make major investments in aging infrastructure systems and to prepare for climate impacts.¹²⁵ As the federal share of water infrastructure funding decreased over the past several decades, water utility customers have had to take on a greater share of the costs with rate increases. **Almost 10% of Oregon census tracts are at high risk for affordability challenges based on current water rates and 30% are at risk of not affording water bills in the future**¹²⁶ — meaning that households are or will likely be spending more than 4.5% of their income on water and sewer bills.¹²⁷ And nearly 30% of Oregon cities ranked “affordability and equity for ratepayers in disadvantaged communities” as a high priority concern for drinking water and wastewater services in the League of Oregon Cities 2021 Infrastructure Survey.¹²⁸

WATER AFFORDABILITY: The US Water Alliance and Dig Deep consider water and wastewater services to be affordable when they do not create a cost burden that limits the ability of households to procure other essential goods and services like food, medicine, electricity, or housing.¹²⁹

Source: Closing the Water Access Gap (2019)

The Duke Water Affordability Dashboard includes data for nine Oregon cities from Pendleton to Newport.¹³⁰ In every example, a significant share of Oregonians are paying more than 4.5% of household income for water services, which is generally considered unaffordable in the U.S. In Lincoln City, Newport, Pendleton, and Portland, nearly a quarter of homes are utility burdened. **In Tillamook, 40% of homes have water bills above 5% of their income, and 17% are paying upwards of 10% of their income toward water services.** These rates fall more heavily on lower-income Oregonians. For Tillamook households that make less than \$25,000 annually, water services start at 6.3% of household income and go up from there. However, the same water rates are only 1.8% of household income for those making \$75,000 per year.¹³¹ Most utilities do not differentiate rates based on income level, therefore the burden of rising water costs falls most significantly on lower income households.

TABLE 1. INCOME DEDICATED TO WATER SERVICES BY CITY

| City | Average annual cost of water services (used to calculate utility burden) | Percent of homes spending more than 5% of income on water services | Percent of homes spending more than 10% of income on water services |
|--------------|--|--|---|
| Hermiston | \$947 | 12.7% | 5.9% |
| Lincoln City | \$1,126 | 25.5% | 9.4% |
| Medford | \$825 | 15% | 6.8% |
| Newport | \$1,095 | 22.4% | 6.4% |
| Ontario | \$608 | 12.8% | 5.7% |
| Pendleton | \$1,098 | 23.3% | 10.4% |
| Portland | \$1,485 | 21.5% | 10.5% |
| Salem | \$917 | 14.1% | 5.3% |
| Tillamook | \$1,577 | 40.1% | 16.8% |

Data compiled from the Duke Nicholas Institute Water Affordability Dashboard on April 6, 2022.

<https://nicholasinstitute.duke.edu/water-affordability/water-affordability-dashboard>

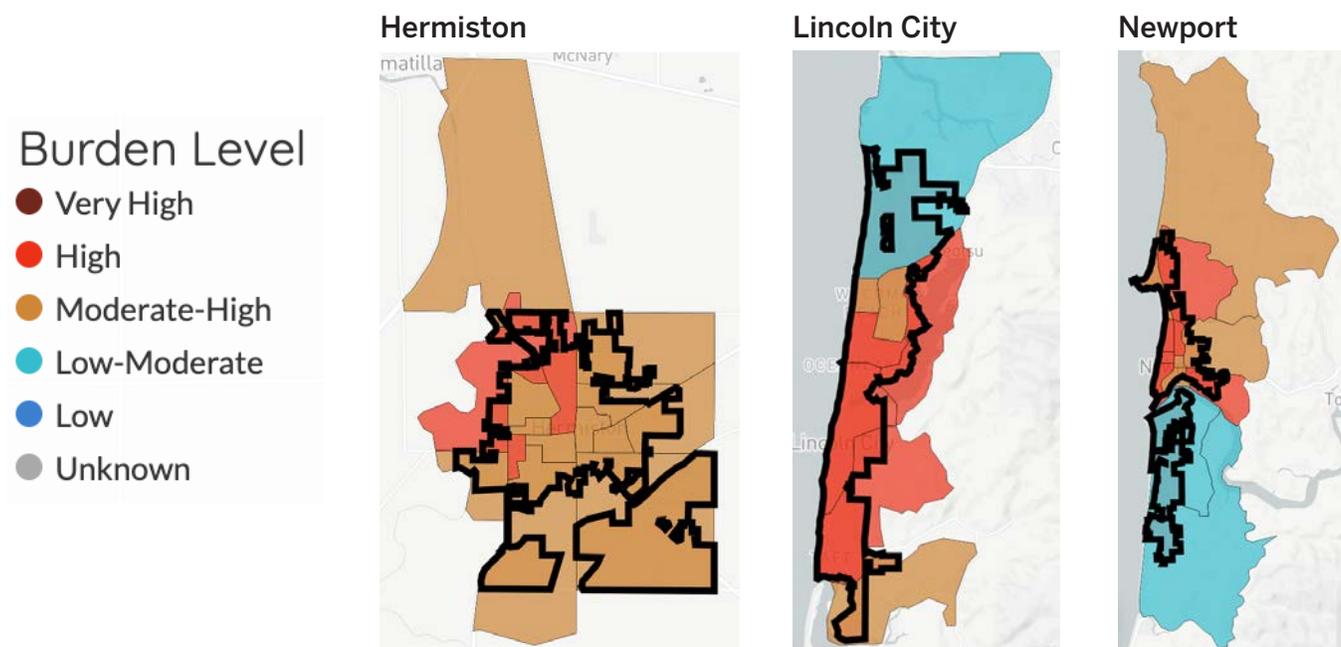
At the census block level, **we find neighborhoods where some low-income households are paying more than 20% of their income toward water services; this includes parts of North and East Portland, and Pendleton.** All of Ontario and Hermiston are experiencing a moderately-high to high level of water burden. This is particularly concerning when utility providers have fewer customers over which to spread the large, fixed costs of water service. “This means affordability issues have cascading impacts for other customers, whose water rates may rise as utilities seek to recover the costs of service by raising rates” if residents fall behind on payments.¹³² While water affordability is a concern across the state, these pockets of concentrated utility burden deserve special attention and may benefit from community-level affordability strategies.

AFFORDABILITY VS ASSISTANCE

Traditionally, water utilities have focused on customer assistance programs to help low-income households pay bills. “Assistance” typically assumes the need is short-term, temporary, and limited. Often, customers are not eligible for these programs until they are already behind on their bills. An “affordability” approach acknowledges the underlying rising unaffordability of water and that the need is long-term, requiring ongoing aid based on low-income ability to pay.¹³³ These programs are designed to prevent water shutoffs and debt accumulation from the outset, as opposed to mitigate them after the harm is caused.

In 2021, Congress established the Low Income Household Water Assistance Program to assist low-income households with paying water and wastewater bills. Oregon Housing and Community Services works with county governments and Community Action Agencies across the state to distribute relief assistance to households that have been disconnected from water services, who are in imminent danger of disconnection, and those with arrearages in Oregon.¹³⁴ This funding is an important financial support to prevent water disconnections and their cascading impacts, but it does not address the underlying challenges of rising water costs.

FIGURE 5. CITY UTILITIES AND THE COST OF SERVICES AND AFFORDABILITY FOR SINGLE FAMILY HOUSEHOLDS



For tribal members whose families have cared for this place since time immemorial, the idea of paying for water that used to be drinkable straight from the river — before the impacts of settlers degraded the water quality — can be particularly offensive. The Confederated Tribes of Warm Springs does not charge tribal members living on the reservation for water service,¹³⁵ and a Chinook Indian National tribal council member expressed frustration to the Oregon Water Futures Collaborative at having to purchase water in their own ancestral territory, noting that “lack of water just makes an already impoverished community more impoverished.”¹³⁶

“My parents were old enough that they could recall being able to drink untreated water right out of our rivers. Those waterways were pure and clean, and fish were still coming back into the tributaries. My generation is at the pivotal point of wondering, will there still be fish in the mainstem river, are we going to have abundant waters, will we still have snowpack?”

– Direlle Calica, Warm Springs, Wasco, Yakama, Molalla, and Snoqualamie



“Our people used to drink straight out of the Columbia River. After the dams went in in the 50s and industry increased, we started to get sick. Now, tribal elders say you couldn’t pay them to drink out of the Columbia, our historic lifeline.”

– Kat Brigham, Board of Trustees Chair, Confederated Tribes of the Umatilla Indian Reservation

Photo by BLM, Flickr

The COVID-19 pandemic exacerbated these challenges. By May 2020, Seal Rock Water District on the Oregon Coast reported a threefold increase in the number of customers unable to pay their bills, and 1,253 customers were behind on their bills to Tualatin Valley Water District.¹³⁷ People interviewed for the Oregon COVID-19 Farmworker Survey struggled to pay bills due to loss of wages and ineligibility for federal stimulus checks; 28% reported difficulties paying for water services specifically.¹³⁸ The City of Bend saw customer utility debt balloon to nearly four times its previous average from 2020-2022.¹³⁹

Although water shutoffs for nonpayment were suspended by most utilities early in the COVID-19 pandemic, these policies are widely used to enforce payments under normal circumstances.

There is no statewide data available on the extent of water shutoffs or arrearages (i.e., past due payments), and the wide variety of payment structures and technologies (e.g., frequency of billing, billing software) used by utilities throughout Oregon has made it challenging to compile a broader picture of water assistance needs and households at risk of losing water service. “Water shutoffs in many cities reflect a utility financing model that punishes low-income customers without addressing underlying drivers of unaffordability.”¹⁴⁰ **Most high-income countries do not legally allow water shutoffs, but there is currently no federal statute or policy that ensures water access for vulnerable residents in the U.S.**^{141,142}



The intersection of affordability and water access plays out in more ways than just household utility bills. From the housing crisis to the interdependence of our infrastructure systems, here are some additional examples of the intersections between water and affordability:

- **Lack of safe, affordable housing:** In 2021, one of the largest and longest-lasting Legionnaires’ outbreaks in Multnomah County history resulted in at least six confirmed cases and one death at a senior living facility in Portland. As building owners searched for the source of the waterborne outbreak, many residents who wanted to move could not afford to live elsewhere or housing waitlists were years long due to Oregon’s severe shortage of affordable housing.¹⁴³ Seniors and other Oregonians on fixed incomes face limited options to affect their own water quality.
- **Water rationing:** Most people interviewed by the Oregon Water Futures Collaborative reported regularly spending money on bottled or filtered water for drinking and other household needs in addition to paying water utility bills. In some instances, people rationed their water use because of limited resources. This was the case for one person who “explained that they ration how much water they drink because they cannot afford more bottled water, even when they feel like they are not drinking enough.”¹⁴⁴
- **Interdependence of neighboring systems:** The City of Turner purchases its drinking water from Salem, relying on four tie-ins to Salem’s water transmission lines. Following a drinking water crisis in 2018, Salem started improvements to its filtration and distribution system that required upgrades by Turner to continue to utilize the system for its residents. When expected public funding for the project fell through at the beginning of the pandemic, Turner was left scrambling to find \$4 million to keep its system viable. Without backup options for water, Turner had to seek out new funding sources to avoid large rate increases.¹⁴⁵ Infrastructure affordability is particularly challenging for small systems with fewer customers to share costs.
- **Shrinking customer base:** As Portland Water Bureau began development of a new \$1 billion water treatment plant, four of its five largest wholesale customers were simultaneously looking at switching to more affordable, seismically secure sources. Portland already faces high water rates, but the potential departure of large customers could leave remaining customers with higher rate increases in the future.¹⁴⁶
- **Limiting housing options:** When communities can’t afford to address failing or deficient water infrastructure, “this can, and has, resulted in some [Oregon] communities being unable to support additional housing.” Growth moratoriums in the cities of Banks and Wilsonville both resulted from insufficient public water supply facilities.¹⁴⁷

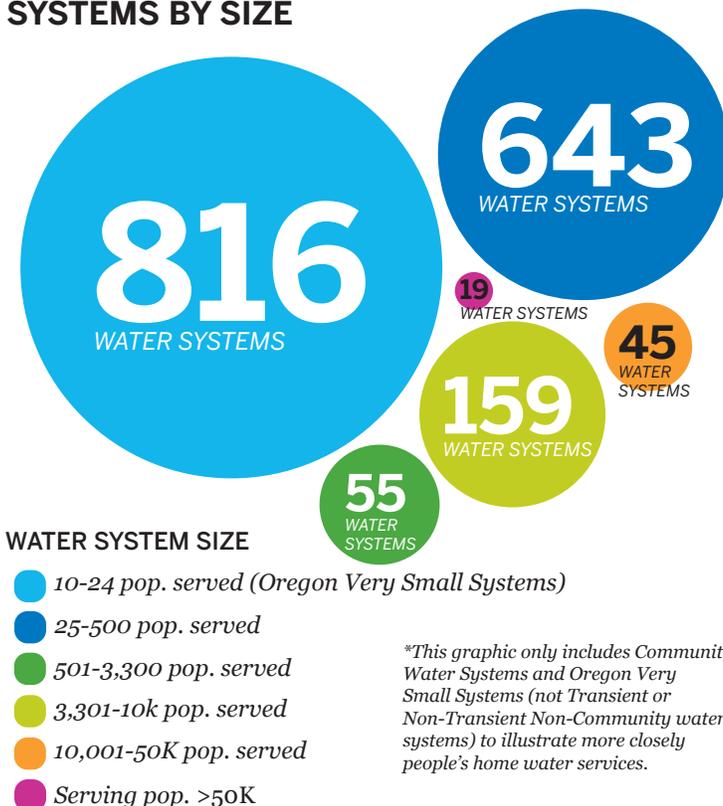
2.5 SMALL WATER SYSTEMS: RESOURCE LIMITATIONS IN RURAL COMMUNITIES AND MOBILE HOME PARKS

Maintaining water infrastructure is particularly challenging in small, rural communities and manufactured home parks. Most water utilities can operate and make needed improvements using revenue generated by local water rates, but smaller systems have fewer customers to share those costs. Some water utilities are so small that they do not have full time staff, and private mobile home park owners may not have any experience with water treatment yet are responsible for providing safe water services to tenants. In unincorporated areas, residences may be spread out, increasing infrastructure needs to reach each household, or the lack of a centralized government may create management challenges. All of these factors can contribute to water users served by these systems being at a greater risk of exposure to contaminants or service interruptions.

A 2016 USA Today Network investigation found that drinking water regulators are more lenient with small water systems because those utilities lack resources, expertise, or sometimes motivation to fix problems, allowing rural communities and mobile home park residents to be potentially exposed to harmful contaminants like lead, copper, and other toxins for longer periods of time.¹⁴⁸ An analysis of Safe Drinking Water Act violations by the Natural Resources Defense Council showed that **rural drinking water providers have less capacity and fewer resources to test water quality regularly, stay up-to-date on current rules and best practices, and update treatment systems to 21st Century standards.**¹⁴⁹ Nationally, the smallest systems regulated by the Environmental Protection Agency (serving 500 or fewer people) accounted for 70% of drinking water violations in 2015.¹⁵⁰

Of Oregon’s more than 3,000 water systems, nearly 90% serve 500 or fewer people.¹⁵¹ According to the Oregon Integrated Water Resources Strategy, “state resources to apply regulations to [the smallest] systems are severely limited, leaving very small system users potentially exposed to contaminants in drinking water.”¹⁵²

FIGURE 6. NUMBER OF OREGON WATER SYSTEMS BY SIZE



In fact, of the 816 water providers regulated by Oregon Health Authority as “very small systems” (serving 10-24 people), 21% are out of compliance with federal drinking water standards,¹⁵³ compared to less than 1% of those regulated under the Safe Drinking Water Act (systems that regularly serve 25 people or more).¹⁵⁴

As climate change, aging infrastructure, and new regulations drive increased costs for water providers, rural and low-income communities are disproportionately impacted by rising utility rates. Most utilities must operate on a balanced budget based on income from customers’ water bills, and water systems that serve very small or declining populations often do not have the resources to maintain well-staffed operations or make infrastructure improvements. Not only do utility rate increases hit the budgets of low-income households harder, but it can also be challenging for utilities serving low-income or small populations to get approved for loans or manage large grants. Oregon Health Authority staff found that “many

Oregon Health Authority, “Drinking Water Data Online.” Available at <http://yourwater.oregon.gov>, accessed September 1, 2022.

rural community water systems have limited capacity to withstand drought, degrading infrastructure or declining resources to support system safety and integrity.”¹⁵⁵

Manufactured home parks are frequently on their own water systems managed by park owners who may not have previous experience managing utilities. These communities face similar affordability limitations for water infrastructure investments as other small communities, and residents are at higher risk of displacement if aging infrastructure is not addressed by park owners.¹⁵⁶ National studies have found that **mobile home residents are more than three times as likely to experience water service interruptions**¹⁵⁷ and nearly two times more likely to lack piped water access than other housing types.¹⁵⁸

EXAMPLES OF WATER CHALLENGES FACING RURAL COMMUNITIES AND MANUFACTURED HOMES IN OREGON:

Water infrastructure repair costs tap out Oregon’s small cities

KOIN
August 2021

Former Amity Mayor Ryan Lehman described the City’s water system as being so old as to still have wood pipes in some areas. The city (population 1,809)¹⁵⁹ has been working on a long-term infrastructure project to replace old pipes, move the water intake, and bring water storage tanks back online that have been out of commission for several years. However, financing the project was challenging for a small community with few people to help pay back loans, and the city is already approaching its debt limit. Ultimately, the city had to increase sewer costs to complete the system upgrades.¹⁶⁰

History of septic failures at Deer Pointe Meadows

The Clatskanie Chief
July 2017

Repeated septic failures at Deer Pointe Meadows Mobile Home Park near Rainier triggered community outcries in 2017. When a previous owner illegally expanded the park from 33 to 46 home spaces, the park’s treatment system did not have the capacity to handle the increased wastewater load appropriately. Decades later, neighbors complained of contaminated liquid flowing onto their properties and asked county officials to revoke permits in the park and declare the septic system a public nuisance.¹⁶³ If the system is not fixed, county staff say the number of spaces will have to be reduced, displacing current residents who may not have a lot of other housing options.¹⁶⁴

‘They’re gonna shut people off’: Mapleton residents angry over water bills

KPIC/KVAL
October 2021

Households served by the Mapleton Water District were under a boil water notice for nearly five months in 2020. Then in 2021, old and unreliable water meters led to some bills as high as \$4,000, according to local residents. The new superintendent for the water district reported to local news that a new treatment plant was coming that July along with new smart meters thanks to grants from the American Rescue Plan.¹⁶¹ Without access to grants, it likely would be difficult for Mapleton’s 918 residents to afford needed system upgrades.¹⁶²

‘I didn’t think it was possible,’ small trailer park makes mighty recovery from February floods

East Oregonian
September 2020

Residents of Hall’s Trailer Park on the border of the Umatilla Indian Reservation and Pendleton were forced to evacuate in February 2020 when the Umatilla River flooded. Groundwater clogged septic system pipes and surged through the wellhead in the basement of one house on the property, leaving many without working plumbing. Park owners did not own flood insurance, and many tenants are low income or rely on Social Security. With donations and community support, repairs were made by volunteers and park residents themselves, who dug trenches and pumped flood waters out of homes.¹⁶⁵

2.6 OFF THE GRID: CHALLENGES FOR DOMESTIC WELLS, DOMESTIC DIVERSIONS, AND SEPTIC SYSTEMS

More than 600,000 people in Oregon use private domestic wells as their primary source of drinking water,¹⁶⁶ and 30% of Oregonians rely on some form of decentralized wastewater treatment (i.e., septic systems) at their homes or businesses.¹⁶⁷ Other homes are dependent on private domestic surface water diversions that pull water directly from creeks, rivers, and lakes that can easily be impacted by nearby land uses. Not being connected to a municipal water or sewer network presents a unique set of challenges, particularly for low-income households and renters.

- **Oregon’s Department of Environmental Quality estimates that more than 45,000 septic systems fail each year in the state.**¹⁶⁸ Failing septic systems and other groundwater problems can contaminate nearby wells, creating unsafe drinking water for homeowners or neighbors without many options for addressing the problem. Pollution caused by failing privately owned septic systems is a leading cause of water quality contamination across the state.¹⁶⁹
- **Homeowners are directly responsible for these systems, but not everyone can afford necessary repairs and upgrades,** creating disparities in access to clean water or pollution of nearby water sources. For low-wealth households, qualifying for and affording loans to pay for expensive fixes may be a challenge. Oregon has a low-interest loan program to help address septic problems, but it has only funded 181 loans to homeowners and small businesses since 2016,¹⁷⁰ a small fraction of the problem identified by Oregon’s Department of Environmental Quality above. In 2021, the Oregon Legislature funded a new grant program within Oregon Water Resources Department for domestic well repairs and upgrades, particularly in areas affected by drought and wildfires.¹⁷¹
- **Water contamination is a serious threat in some parts of Oregon, and domestic water users (wells and surface water diversions) do not have the benefit of dedicated and knowledgeable staff to manage treatment.** In the Willamette Valley, 33% of rural wells contain at least one pesticide, and the Department of Environmental Quality has designated three Groundwater Management Areas across the state due to elevated nitrate concentrations resulting from nonpoint sources.¹⁷² In order for private domestic water users to be aware of these issues, they must proactively test and monitor their own water quality, but water testing labs can be hard to access in rural parts of the state and many people are not aware that they should test their water.
- **There are no requirements that landlords test or provide information to tenants about drinking water quality of domestic wells or surface water diversions,** and renters living at residences with private domestic water and wastewater systems do not have agency over that infrastructure to fix water quality problems where they live. Domestic wells are the least regulated source of drinking water in the country.
- **Domestic water users are hard to reach during public health crises.** Morrow County declared a state of emergency due to high nitrate levels in domestic wells in 2022, and local health department officials went door-to-door to test tap water for residents outside of city limits.¹⁷³ Several households were not aware their drinking water was unsafe and did not know about the potential health risks associated with high levels of nitrates, which include respiratory infections, thyroid dysfunction, stomach or bladder cancer, and “blue baby syndrome.”¹⁷⁴ Language and cultural barriers can make some households even harder to reach with public health information or during emergencies.

Failing septic systems can cause/ contribute to:¹⁷⁵

- Sewage backups in homes or surrounding property
- Groundwater contamination
- Pollution of downstream waters
- Harmful algal blooms
- Closures of water bodies for recreational or traditional shellfish harvest uses

Overall, there are few regulations for domestic wells, domestic surface water diversions, and septic systems that require that households have safe water flowing from their taps and that ensure sewage doesn't pollute local groundwater or waterways. The Oregon Groundwater Act of 1955 created the state's basic well construction standards and established a database of wells across the state. Although wells built prior to 1955 are more likely to have problems, an estimated 11% of new wells constructed each year have at least one deficiency, according to the Oregon Water Resources Department in the *Capital Press*.¹⁷⁶ Deficiencies can cause serious health and safety impacts for home residents and neighbors when wells are improperly sealed; placed too close to septic tanks, drain fields, or other toxic zones; or lead to groundwater level declines and loss of pressure.¹⁷⁷ Due to resource limitations, Oregon Water Resources Department staff only have time to review 10% of well logs and inspect 25% of new wells annually, according to reporting by the *Capital Press*.¹⁷⁸



2.7 WATER AT WORK: DIGNITY THROUGHOUT THE DAY

Where a person works has a big impact on how accessible clean water is for staying hydrated, washing hands, and using the bathroom — all basic human needs to stay healthy and move with dignity throughout the day. For most office workers, water coolers and bathrooms are reliable resources. This is not always the case for mail carriers and delivery workers, construction trades workers, farmworkers, and many other non-office-based jobs where **water and bathroom stops may be few and far between or employer-provided resources are inadequate or unclean.**

ARE FRONTLINE WORKERS AND FRONTLINE COMMUNITIES DIFFERENT?

In the labor sector, “frontline” has a unique definition based on the type of job, whereas frontline communities are defined based on historical oppression, socio-economic disparities, and increased exposure to environmental risks. However, there is a clear correlation between frontline workers and frontline communities related to who has access to what types of jobs and how that impacts socio-economic mobility.

“Frontline workers” are a subset of the essential workforce that face greater environmental risks because they must work *in person* when others can work from home, like during a pandemic or heat wave. While essential workers have a similar group makeup to the overall labor force, the “narrower category of frontline workers, on average, is less educated, has lower wages, and has a higher representation of minorities, especially Hispanics, and immigrants.”¹⁷⁹

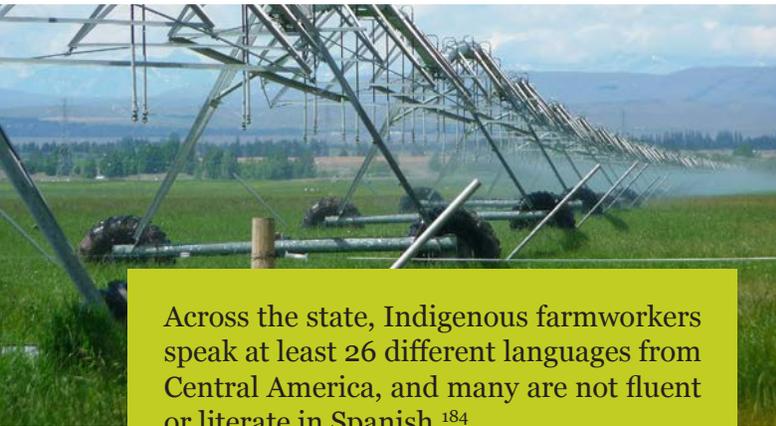
See *Section 1.1 What is water justice?* for more on defining frontline communities, p. 11.

Who are Oregon's frontline workers?

- Nationally, **frontline workers earn lower wages, have fewer years of formal education, and are more likely to be low-income or people of color** than national averages. In Oregon, these trends are strongest in the building cleaning services, child care and social services, and grocery and convenience store industries,¹⁸⁰ as well as among farmworkers.¹⁸¹
- Many of these **jobs are also more impacted by climate change**. Any employee working in extreme heat and wildfire smoke like Oregon experienced in 2020 and 2021 will require frequent and increased access to water. Flooding events can temporarily shut down employer operations, leaving some workers without paid hours, and in some communities, flooded streets can prevent people from getting to work.
- Additionally, when the COVID-19 pandemic shifted many people to work from home (where water and bathrooms are presumably more available), **workers with less education were more than twice as likely to continue to work away from home.**¹⁸³

People interviewed by the Oregon Water Futures Collaborative in Independence reported that “sometimes roads are closed or their building entrance is blocked by seasonal flooding,” affecting their ability to get to work.¹⁸²

- Oregon Water Futures Project Report
(2021)



Across the state, Indigenous farmworkers speak at least 26 different languages from Central America, and many are not fluent or literate in Spanish.¹⁸⁴

- Oregon COVID-19 Farmworker Study
(2021)

Job-related health risks ranging from extreme heat and dehydration to communicable diseases like COVID-19 and parasitic infections are exacerbated when clean drinking water or proper sanitation are not available. In Oregon, social factors like racism, lack of housing, and language barriers contribute to disproportionate rates of occupational injuries and illness for migrant farmworkers, the vast majority of whom are Latinx immigrants.¹⁸⁵ Presumably, this could include heat exhaustion and water-borne illnesses, if they are reported. Lack of job security and immigration status can also make it risky for people to advocate for needed water and bathroom resources.

EXAMPLES OF WATER INJUSTICE AT WORKPLACES:

● 14-hour days and no bathroom breaks: Amazon's overworked drivers

The Guardian
March 2021

The UN recognizes the human right to both water *and sanitation* as essential to the realization of all human rights.¹⁸⁶ When your workplace is on the road, it can be challenging to find bathrooms throughout the day. Workplace cultures that prioritize quotas and limit stops add to the pressure to skip needed breaks. A Portland delivery driver reported regularly going to the bathroom in a cup in her van “due to the lack of available public restrooms and pressure against taking time off of routes to use them.”¹⁸⁷ Warehouse workers have also reported being penalized for taking bathroom breaks that reduce their productivity rate.¹⁸⁸

Oregon farmworkers who say they were denied water sue farm

The Oregonian
September 2021

During extreme heat, access to frequent and increased water breaks are critical for workers from farms to warehouses, but safe water is not always readily available. A lawsuit filed by five farmworkers in the Willamette Valley asserted that requests for water were repeatedly denied during 90-degree heat in 2020. Supervisors initially offered to sell workers beer or juice instead, then provided water that was lukewarm and murky. Plaintiffs said they went between four and seven hours without water.¹⁸⁹ The following year, the death of a 38-year-old farmworker brought statewide attention to issues of worker safety during heat waves.

Migrant Oregon cannabis workers face threats amid illegal boom

Associated Press/OPB
November 2021

The issue of illegal marijuana farming in Southern Oregon came to a head in 2021 over water and worker abuses. Immigrant workers at illegal cannabis farms faced threats of violence, missed pay, and “had to use holes in the ground for toilets, bathe with makeshift showers, [and] cook in unsanitary kitchens,” according to the county sheriff.¹⁹⁰ While these operations are inherently under-the-radar and hard to regulate, workers experiencing these abuses are facing extreme water insecurity here in Oregon. Solutions that meet their clean water needs could lead to improved water security for the broader community as well.

STRENGTHENING WORKER PROTECTIONS

In response to the COVID-19 pandemic and historic wildfires and heat waves across the state, Oregon took several important actions to strengthen worker protections and water justice statewide:

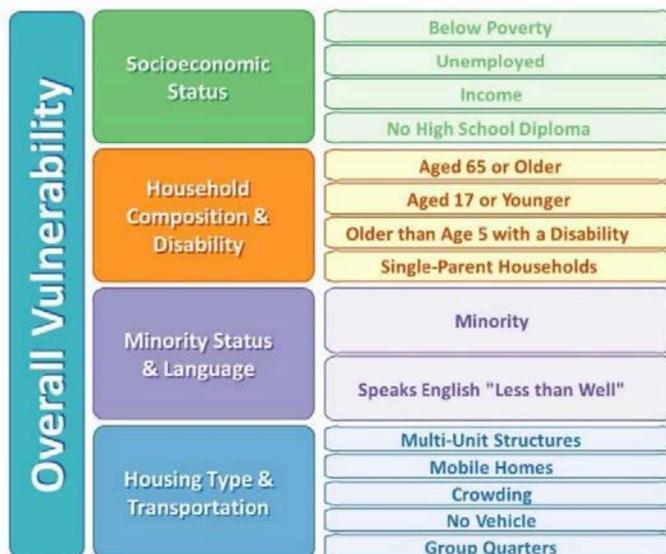
- **April 2020:** Oregon Occupational Safety and Health Administration passed temporary rules to increase bathrooms, hand washing stations, and other COVID-19 protections for farmworkers.¹⁹¹ Some people interviewed by the Oregon Water Futures Collaborative reported an improvement in bathroom and hand washing facilities by the fall.
- **April 2020:** Emergency Board of the Oregon Legislature approved an initial \$10 million for the Oregon Worker Relief Fund created by community-based organizations to provide financial assistance to people who did not qualify for unemployment benefits or stimulus assistance checks because of immigration status. In its first year, the fund disbursed more than \$60 million to more than 37,000 individuals across the state.¹⁹² This funding helped provide relief for many people struggling to pay bills, including water utility bills.¹⁹³
- **July 2021:** Oregon Occupational Safety and Health Administration passed temporary rules that established the most protective standards in the nation for excessive heat, requiring adequate supplies of cool drinking water, additional paid breaks and other health provisions at various high heat levels.¹⁹⁴ Permanent rules were adopted in May 2022.¹⁹⁵

Despite these efforts, 20% of farmworkers interviewed for the Oregon COVID-19 Farmworker Study reported no changes to the conditions of bathrooms and handwashing areas.¹⁹⁶ Workers in various parts of the state reported taking turns cleaning bathrooms themselves,¹⁹⁷ having to use dirty bathrooms without water or soap, or that too many people used the same bathroom.¹⁹⁸ These issues extend beyond the pandemic and highlight essential water and sanitation needs of workers that should be addressed in a wide range of industries and workplace settings year round.



2.8 THREAT MULTIPLIERS: CLIMATE CHANGE AND EXTREME WEATHER

As climate change creates more extremes in the water cycle, Oregon can expect increased flooding to damage homes and create unsafe conditions in the streets, disproportionately affecting low-income households, racial and ethnic minorities, as well as the elderly, renters, non-native English speakers, and those with mobility challenges.¹⁹⁹ Increased drought will threaten drinking water availability and water quality, while extreme heat increases the urgency for universal access to safe drinking water to prevent dehydration and other heat-related illnesses. Wildfires or earthquakes can interrupt clean water systems, and landslides will impact aquatic species and ecosystems we depend on to coexist. Lower income Oregonians have less financial stability to mitigate and recover from climate crises. And undocumented immigrants are excluded from most forms of disaster relief aid, leaving millions of people across the U.S. in a state of “hyper-marginalization.”²⁰⁰



Understanding social vulnerability:

The CDC’s Social Vulnerability Index (pictured) considers 15 variables to determine a community’s social vulnerability score. Oregon agencies incorporate these variables when developing community risk assessments for natural hazards. Source: Oregon Natural Hazards Mitigation Plan, (State Interagency Hazard Mitigation Team, 2020), p. 111. Available at https://www.oregon.gov/lcd/NH/Documents/Approved_2020ORNHMP_00_Complete.pdf.

Social vulnerabilities multiply risks to health and safety. In the face of natural disasters and extreme weather, households with limited resources, language barriers, or other social vulnerabilities face greater risks to personal health, safety, and economic hardship. The Oregon Water Futures Collaborative

found that lack of money, transportation, or a place to go during an evacuation are significant emergency preparedness concerns for some Oregonians.²⁰¹ In other states, fear of being asked for identification at shelters, evacuation orders that people may not be able to read, and disabilities that limit transportation options have left people stranded in harm's way during natural disasters.²⁰²

During the 2018 algae (cyanotoxin) crisis in the mid-Willamette Valley, non-English speaking residents did not receive health advisories in a timely manner. Some continued drinking the water and others tried boiling it, not knowing that boiling water contaminated by cyanotoxins from harmful algae (cyanobacteria) does not make that water safe to drink. People reported feeling unwell as a result.²⁰³

Forced displacement left tribes more exposed to climate crises. Compared to their historical territory, lands possessed by tribes today have on average two additional extreme heat days per year and 23% less annual precipitation.²⁰⁴ Additionally, 37% of tribes across the country currently experience increased drought compared to places where they lived historically.²⁰⁵ In Oregon, wildfires on the Warm Springs Reservation have destroyed water pipes at local springs that tribal members rely on for drinking water. In other instances, active fires have prevented access to those local springs during the hottest parts of the summer at the same time as the reservation struggled with intermittent boil water notices (See *Section 2.1 Inadequate Infrastructure*, p. 19). These springs are an important alternative drinking water source for tribal members, and the impact on water insecurity is felt both during fire events and after.²⁰⁶

Mobile home residents and well users increasingly at risk while facing barriers to resources. Climate change-fueled weather events like wildfires and flooding can have particularly harmful effects for manufactured home communities and domestic well users. OPB reported that two-thirds of the homes destroyed by the Alameda Fire in 2020 were manufactured homes.²⁰⁷ Mobile home parks are frequently sited in less expensive, out of the way areas that are more prone to fire or floods, like along the Bear Creek Greenway in Southern Oregon, and the informal process of buying a mobile home can make it more challenging to provide the documentation required to apply for disaster assistance.²⁰⁸ This leaves many manufactured home residents more exposed to climate change impacts and less able to access resources to prepare for or rebuild after a disaster event. Nationally, low-income families, non-English speakers, and families who live in mobile homes often face additional barriers to receiving emergency assistance and have higher relief application rejections.²⁰⁹

For domestic well users, wildfires and floods can push toxic contaminants from elsewhere in the environment into their groundwater, increasing their exposure to harmful chemicals even if their home was not directly impacted. Fire-scarred landscapes are more prone to landslides that carry pesticides and other heavy metals into watersheds, and drought can increase the concentration of pathogens or other contaminants in well water.²¹⁰ When well equipment is directly damaged by fire, it can cause bacterial growth or leach toxic chemicals from plastic components into drinking water, and flood waters that inundate nearby septic systems, sewers, or agricultural lands can transport pathogens and fertilizers into groundwater drawn up by wells.²¹¹ Since domestic wells are privately maintained, repairs can be expensive and may be a low priority for some families just trying to get back into their homes. However, concern over water contamination was documented to cause anxiety, stress, and depression for 54% of surveyed community members after the 2018 Camp Fire in California, and uncertainty about water and plumbing safety prompted 83% of survey respondents to alter water use in their homes.²¹²

These and other examples of climate change impacts across the state should be a call to policymakers to invest in community capacity and make resources available in unconventional ways for Oregonians that do not fit neatly into municipal boundaries where coordinated climate planning and investments have historically taken place.

3. OBSERVATIONS AND RECOMMENDATIONS ON THE STATE OF WATER JUSTICE IN OREGON

The studies and stories presented in this report illuminate some of the ways water justice issues are impacting specific Oregon communities. As Oregon’s greatest water threats and who is impacted by them are identified, it is also important to understand the broader barriers to policy change in this issue area. Key themes that emerged during this research include the following:

- Some community-identified water challenges do not fit neatly into current agency jurisdictions, keeping them from getting on the water policy agenda;
- Definitions of environmental justice that are too narrow or too broad can dilute impact;
- Pockets of water challenges can hide within larger communities;
- Communities need more analysis comparing water issues in the context of social vulnerability and environmental justice; and
- Issue areas without public plans and prioritization are harder to navigate without deep policy expertise.

Cutting across all of these themes is the importance of shared leadership with communities impacted by water challenges. Environmental justice is not just equal protection from harm. It is also meaningful community engagement in defining the problems and developing solutions that reflect people’s lived experience and cultural knowledge. This requires new ways of thinking about public participation and outreach, investments in partnerships with community-based organizations and community leaders, and moving beyond consultation toward true collaboration.²¹³



Policy silos prevent key water justice concerns from getting on the agenda. Water management conversations typically focus on water quality, water quantity, and ecosystems issues. This is directly in relation to the legal structures that give our state and federal agencies authority to act. However, this leaves gaps on issues that do not have a clear path of authority or fall in between multiple jurisdictions. This includes water affordability, guaranteed access to drinking water for basic survival, how housing impacts clean water access, monitoring of decentralized water and wastewater systems, health-based water quality standards that truly reflect the myriad ways people interact with water, and clean water access for continuing spiritual and cultural practices.

Recommendation: Oregon needs a management structure that looks at water impacts comprehensively, cumulatively, and through a community-centered lens to help elevate environmental justice blind spots in our current system.

Defining water equity and environmental justice too broadly or too narrowly dilutes impact. As environmental justice becomes more integrated into the water policy landscape, there is a tendency to misidentify the scope of water justice issues and communities. This can result in resources being allocated too broadly to actually address underlying biases or disparities, or communities being excluded from issue areas that have not been identified by decision-makers as relevant to environmental justice concerns. For example, in some programs, such a broad range of communities meet the relevant definition of “frontline” or “disadvantaged” that it loses its intended impact. In other areas, water equity is examined only in a narrow subset of policy issues. For example, among all of the critical water issues that Oregon faces, Oregon’s 2017 Integrated Water Resources Strategy only mentions environmental justice in the context of public health.

Recommendation: Defining water justice may change based on the issue area and regional context, but frontline communities must be meaningfully engaged in any decisions that affect the environment in which people live, work, learn, practice spirituality, and play in order to authentically pursue environmental justice as an outcome in any policy arena.

Environmental justice is defined by the State of Oregon as “equal protection from environmental and health hazards, and meaningful public participation in decisions that affect the environment in which people live, work, learn, practice spirituality, and play.”²¹⁴

- *Environmental Justice: Best Practices for Oregon’s Natural Resource Agencies, Oregon Environmental Justice Task Force (2016)*

County or city-wide analyses can hide pockets of disparities. Researchers have

observed that pockets of households experiencing water justice concerns can hide within larger regions with overall higher levels of access.²¹⁵ For example, in Pendleton, household water utility burden is moderately-high for most areas, ranging between 1.7% and 9.3% of household income, but there is one census tract downtown where low-income residents are spending 24.3% of household income on average for water utilities.²¹⁶ While it may not be practicable to set priorities at the household level for some policies, an examination of water insecurity and water justice concerns at the sub-county and neighborhood level will help identify the most impacted and underserved community members.

Recommendation: Oregon should view these pockets of disparities as priorities, not outliers, and design programs and policies around these specific challenges to meet the needs of all Oregonians.

Data and information justice can help build community capacity to engage. Communities across Oregon have concerns about water in their taps, in their backyards, and beyond.²¹⁷ However, most people do not have the time or tools to seek out water information or compare public data and census demographics to understand the complex hydrological, political, and social factors impacting water in their communities. These capacity challenges are exacerbated in frontline communities that have fewer resources for organizing and advocacy to begin with, and there are few existing Oregon-specific analyses of water issues in the context of environmental justice to help inform community-based organizations being asked to weigh in on water policy decisions. State agencies have greater technical capacity to analyze who is impacted by water challenges and who is being served by state programs and investments through a socio-economic vulnerability lens, but these evaluations have been minimal to date. In some cases, there may be gaps in authority to collect or analyze needed data. Ultimately, lack of accessible data and relevant information about community water resources to pair with people’s lived experience is a limiting factor for engaging new voices in water policy.

Recommendation: With direction from the 2022 Oregon Legislature to develop an environmental justice mapping tool,²¹⁸ state agencies should engage communities to align program goals and strategies based on evidence grounded in people’s water realities. Interfacing with frontline communities will be key to ensuring data analysis and representation does not inadvertently cause unnecessary harm or exacerbate disparities.

Lack of issue prioritization and clear action plans stifles momentum. The Integrated Water Resources Strategy (IWRS) is Oregon’s statewide water plan that is updated every five years. This strategy is an opportunity to articulate state water priorities and build momentum to secure the support and legal authorities needed to advance water justice across agencies, as it did for water resources management and protection in its first iteration.²¹⁹ However, environmental justice is barely mentioned outside of public health. As an example, although the 2017 IWRS identifies safe drinking water as a critical issue area, Oregon does not have a coordinated statewide drinking water strategy that outlines the state’s major threats to drinking water security and a prioritized approach to addressing those challenges. Where water challenges and strategies are not clearly prioritized and publicly available, Oregon’s complex water management system can be an opaque process that only a small set of stakeholders are able to navigate.

Recommendation: Oregon’s water strategies at the inter-agency and inter-department levels should more clearly and publicly articulate priorities and plans of action that enable communities to track progress on and advocate for their needs and public resources.



4. AREAS FOR FURTHER INVESTIGATION

This report covers only some of the water access and affordability challenges Oregon communities are struggling with based on readily available data and community insights. Research and community outreach have also identified the following water challenges as needing additional focus by state and local authorities:

- **Failing sewage systems:** Properly managed sewage is one of the most basic public health tools, but seasonal sewage overflows and aging wastewater treatment systems (including septic systems) put downstream communities at significant health risk. Tribal communities and others who harvest fish, clams, and other resources in waterways have reported feeling sick after coming into contact with water in such situations. Research is needed to identify impacted natural resources and populations disproportionately exposed. As climate change brings more frequent and intense flooding episodes, it is also worth investigating the distribution of where seasonal flooding is causing sewage backups in homes or streets, and the economic and public health impacts to those communities.



- **Frontline flooding impacts:** Researchers at Portland State University found that low-income neighborhoods in East Portland face more acute flooding potential than other parts of the city, which creates disproportionate health risk and economic burden in these neighborhoods.²²⁰ People interviewed by the Oregon Water Futures Collaborative faced difficulties getting to work during flood events because of blocked roads.²²¹ A statewide analysis examining the sociodemographic intersections of households in flood zones could help with equitable zoning policies, natural infrastructure investments, hazard mitigation planning, and economic recovery programs. Particular attention is needed to the unique challenges faced by mobile homes, houseless communities, and employment sectors that frequently shut down due to flooding, like farm work.

- **Accessibility of information:** Access to information about drinking water quality and utility bills is a significant concern for many low-income renters, non-English speakers, immigrant communities, and farmworkers. A study published in *Utilities Policy* found that less than 10% of Consumer Confidence Reports reviewed were available in a second language, the average report was scored at a college reading level, and they frequently were not accessible for visually impaired customers.²²² Additionally, many Mesoamerican languages spoken in Oregon do not have a formal written method, so written materials may not be useful.²²³ Further investigation is needed regarding whether non bill-paying customers receive notices of Consumer Confidence Reports or any official information about water rates and water quality. Accessibility of information about drinking water is critical to promote equity and build trust throughout the community.
 - **Equity in water financing:** In other parts of the country, it has been documented that municipalities deliberately did not build water lines in African American neighborhoods and discouraged predominantly Latinx communities from formally incorporating, preventing them from accessing infrastructure financing.²²⁴ Since then, declining federal infrastructure funding and limited local capacity has made it even more challenging for these communities to catch up with the rest of the country on infrastructure investments. The historic allocation of water rights and landownership policies have ramifications for water access today. An examination of what parts of Oregon have experienced underinvestment or disinvestment in water infrastructure could help public agencies reallocate resources to address these disparities. Public grant and loan programs like the Clean Water State Revolving Fund, Safe Drinking Water Revolving Loan Fund, Onsite Septic Financial Aid Program and other water infrastructure resources should evaluate who has historically benefited from these programs and who has underutilized them to focus funding where it can help achieve water justice outcomes.
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APPENDIX A: WATER JUSTICE DATA ANALYSIS OPPORTUNITIES

AREAS FOR FURTHER RESEARCH

DRINKING WATER SERVICES

- **Rates:** Assess current and projected water utility rates across Oregon and percentage of households that face unaffordable water utility bills. Determine intersections of socioeconomic vulnerability. Compare billing rates for private and public water providers. Study the risk of privatization at the community level.
- **Shutoffs:** Survey utility shut off policies for nonpayment. Compare rates of shutoffs and arrearages across sociodemographic indicators at the state and utility-level. Interview households that have had water services shut off due to nonpayment to understand the impact of losing water service (e.g., financial, health, emotional distress) and what could have prevented it.
- **Water quality reports:** Are Consumer Confidence Reports and other critical water quality communications reaching non-bill paying water users, e.g. renters, people in apartment buildings? Are they accessible for all water users in appropriate languages, reading levels, visual accessibility, and communications channels?
- **Lead:** Analyze lead testing data collected by water providers to assess exposure by race, income, housing type and tenure (multi-family, rent vs own), and regional/neighborhood pockets of exposure.
- **Very Small Systems:** Oregon's Very Small Systems (serving 10-24 people) have some of the highest rates of drinking water violations. Where are these water systems distributed (rural or peri-urban, Eastern or Western Oregon, which counties)? Who is served by them (how many people, median household income, race/ethnicity, housing type and tenure)?
- **Shrinking populations:** To what degree are communities that are experiencing dwindling populations facing challenges of a relatively overbuilt water infrastructure system for their new needs? This can lead to stagnation, growth of biofilms, and opportunities for development of waterborne diseases (like legionellosis).

HOUSING

- **Mobile homes:** Compare the sociodemographic and regional distribution of flood risk and drinking water quality for manufactured homes statewide. What is the risk of flooding to and preparedness level of manufactured home parks statewide? Are mobile homes more likely to be in the path of climate disasters in Oregon? Are mobile homes eligible for and accessing water infrastructure funding, hazard mitigation planning resources, and disaster relief funds? How do challenges unique to mobile home ownership/rentership impact flood preparedness and water quality in Oregon?
- **Unplumbed households:** Assess the number and regional distribution of households without complete plumbing in Oregon based on the American Community Survey and any surveys produced upon passage of the WASH Sector Development Act of 2022. Evaluate sociodemographic vulnerabilities, proximity to existing utilities, and feasibility for utilities to help ensure safe access to drinking water and wastewater removal for all households.
- **Renters:** What rights do renters have to test their drinking water or impact their water quality, particularly on private domestic wells? Can landlords legally limit water usage for gardens or other uses? Evaluate water quality data and access to information about water quality and rates for renters.
- **Individual domestic surface water diversions:** How does surface water quality impact vulnerable homeowners, renters, and short-term guests that are not connected to community water systems? What is the sociodemographic and regional distribution of domestic surface water diversions? Compare water quality/contamination to domestic groundwater wells. What populations are most at risk?

- Housing insecurity: What is the intersection between water insecurity and housing insecurity in Oregon, including the development of legionellosis in low income housing?
- Water census: Conduct a statewide water census to understand the scope of and intersectionalities (e.g., race, income, housing type and tenure, age, disability, geography) around lack of access to water at the neighborhood level and inconsistent water or wastewater service. Identify community clusters of water access challenges for public investment. Assess clean drinking water access for houseless communities.

PUBLIC HEALTH

- Water-related illnesses: Compare rates of water accessibility (defined as home water service or other determined variables) with hospitalization rates for sanitation related diseases at the local level. Assess sociodemographic and regional distribution of illnesses associated with known drinking water contaminants.
- Stress/mental health: Studies have demonstrated a correlation between water insecurity and psychological distress, adding to the health and economic impacts of inadequate water services. Assess mental health impacts of events causing a loss of safe water service, e.g. Salem cyanotoxin crisis of 2018, Morrow County emergency declaration for nitrates in well water in 2022, wildfires, or water shutoffs for nonpayment. Evaluate sociodemographic and regional distribution of stress effects.
- Incarcerated individuals: Reports of lead in drinking water in Oregon youth prisons and guards punishing prisoners by denying them water in other states raise significant questions about safe water access in prisons. Incarcerated individuals arguably have some of the least agency over their water resources, and access to clean water as a basic right should be evaluated in jails and prisons statewide.
- Lead in schools: Map schools with detectable levels of lead between 1-14 ppb and 15 ppb and above. Evaluate the sociodemographic and regional distribution of schools with any detectable level of lead in water. Is there greater lead exposure in older schools, rural or urban schools, schools with lower Median Household Income or higher rates of free/reduced school lunch participation, or schools in communities of color?

LABOR & ECONOMIC IMPACT

- Water and bathroom breaks: Survey workers in various industries about access to clean and adequate water and bathroom facilities during their work shifts, work culture around water and sanitation breaks, and water quality. Analyze sociodemographic and industry-specific distribution of water concerns at workplaces.
- Economic and community development limitations: Where in Oregon is housing development limited due to water infrastructure, water availability, or water quality constraints? How does this impact regional affordable housing availability? Are there examples of businesses that have not located somewhere in Oregon because of water limitations, climate-related water risks, or water affordability concerns?
- Flood impacts on work hours: People interviewed by the Oregon Water Futures Collaborative reported difficulties getting to work during seasonal flooding events that blocked roads or building access. How many frontline workers live in flood-prone areas and may be at risk of losing paid work hours if unable to leave home due to flooding? What industries frequently shut down during seasonal flooding, cutting labor hours, and who is most impacted by those lost hours?
- Impacts of water emergencies: Analyze the sociodemographic and regional distribution of household economic impacts due to water emergencies, e.g. buying bottled water, flooding repair and mitigation, moving temporarily or permanently, medical bills or lost work hours. Evaluate business impacts of water emergencies and subsequent labor impacts, e.g. food processing facilities stopping production or restaurants closing during the Salem algae (cyanotoxin) crisis in 2018. Assess potential economic impact of future water emergencies related to infrastructure failure or climate change.

EMERGENCY PLANNING

- Drinking watersheds and wildfire: Map drinking watersheds most at risk for wildfire impacts based on water source, land uses, socioeconomic vulnerability, type of water pipes, and number of households on wells or septic.
- Flooding: Analyze flood zones for socioeconomic vulnerability, housing type (particularly mobile home parks), labor sector impacts, and drinking water contamination risk.
- Domestic wells: Assess whether homes with private domestic wells are located more often in places vulnerable to increasingly intense wildfires, flooding, or the effects of drought.
- Funding distribution: Assess disaster mitigation and recovery funding and planning efforts for sociodemographic and geographic distribution. Who applies for funding and who does not? Who directly benefits from funding? Who has a harder time recovering after disasters? Who is shaping policy and planning decisions about climate change and natural disasters?
- Emergency communications: Survey drinking water provider emergency communications plans for accessibility (including strategies for hearing or visually impaired and low-literacy), community reach (with special focus on hard to reach households), and culturally responsive communications.

NATURAL RESOURCES & ECOSYSTEMS

- First Foods access: How has development in/near Indigenous communities cut off access to rivers and other First Foods gathering areas? How have events like wildfires and harmful algal blooms impacted access to First Foods? When fish and shellfish advisories are issued, they have been known to remain in effect longer than toxins are present (e.g. for cyanotoxins or red tides) due to lack of management capacity at the state level to monitor, test, and lift advisories. How do the length of fish consumption advisories impact First Foods access?
- First Foods vulnerability: Some First Foods spend all or part of their life cycles in the parts of rivers that carry the most pollution, like sediments (e.g. lamprey and wapato). Evaluate the regions most impacted by pollution and how the relation between life cycle development in polluted areas increases risks to First Foods survival and people when harvesting and eating them.
- Dam removal: A national analysis found that dams are disproportionately removed from areas with more white residents. Assuming an overall benefit from dam removal – in environmental improvement, economic benefits of infrastructure investment, and scenic benefits of restored rivers – evaluate sociodemographic distribution of dam removal benefit broadly, access to restored areas, and jobs/economic impact.
- Recreation areas: Analyze recreation site usage data to assess sociodemographic and regional distribution of exposure to contaminated water when fishing and recreating in Oregon water bodies, e.g. what reservoirs regularly have cyanotoxin or arsenic alerts and who uses those sites most frequently.

INFRASTRUCTURE INVESTMENT

- Grants and loans: Evaluate who has historically benefited from public grant and loan programs and who has underutilized, e.g. Clean Water State Revolving Fund, Safe Drinking Water Revolving Loan Fund, Onsite Septic Financial Aid Program.
- Definition of frontline/disadvantaged: Compile all definitions of frontline or disadvantaged communities that are directly tied to public funding prioritization or subsidies. Analyze how many people/towns/communities qualify under these definitions and whether they meet our expectation for prioritizing those most in need and who have benefited the least from previous policy/funding. How do these definitions impact sociodemographic and regional distribution of public funds?
- Housing policies: How have historically racist housing policies (e.g. redlining) driven underinvestment and disinvestment in drinking water, wastewater and stormwater infrastructure across Oregon? How does the historic allocation of water rights in Oregon impact equitable water access today?

REFERENCES & RESOURCES

WATER JUSTICE ESSENTIAL READING

ChangingCurrents.net

OregonWaterFutures.org

ClimateWaterEquity.org

A Twenty-First U.S. Water Policy, [Chapter 3: Water and Environmental Justice](#)

REFERENCES

¹ See Alaí Reyes-Santos, Cheyenne Holliday, Stacey Dalgaard, Taren Evans, and Kristiana Teige Witherill, [Oregon Water Futures Project Report: 2020-2021 Community Engagement](#) (University of Oregon, 2021). Available at <https://www.oregonwaterfutures.org/report-20-21>.

² Cordelia Schimpf and Curtis Cude, “[A Systematic Literature Review on Water Insecurity from an Oregon Public Health Perspective](#),” *International Journal of Environmental Research and Public Health*, 17 (February 2020): 1122, p. 4. <https://doi.org/10.3390/ijerph17031122>

³ The National Center for Frontier Communities defines a community as frontier when there is a density of between 12-20 people per square mile and the distance to a market/service center is 30-90 miles or takes 30-90 minutes. National Center for Frontier Communities, “[What is Frontier?](#)” Available at <https://frontierus.org/what-is-frontier>, accessed June 21, 2022.

⁴ The Oregon Water Futures Collaborative conducted 75 phone interviews and held two community gatherings in Fall 2020. In total, 104 individuals were consulted about water resources in Clackamas, Clatsop, Lane, Malheur, Marion, Multnomah, Polk, and Umatilla counties. Reyes-Santos, et al., *Oregon Water Futures Project Report*, pp. 12-20.

⁵ [An Equitable Water Future, A National Briefing Paper](#) (US Water Alliance, 2017), pp. 12-15. Available at http://uswateralliance.org/sites/uswateralliance.org/files/publications/uswa_waterequity_FINAL.pdf, accessed May 15, 2022.

⁶ John Rumpler and Emma Dietz, [Get the Lead Out: Ensuring Safe Drinking Water for Our Children at School](#) (Environment America Research & Policy Center, 2019), p. 7. Available at https://environmentamerica.org/sites/environment/files/reports/GetTheLeadOut_032119.pdf.

⁷ In parts of the American South, disparities in wastewater infrastructure have left whole communities without sewage treatment, leading to a resurgence of hookworm. Ed Pilkington, “[Hookworm, a disease of extreme poverty, is thriving in the US south. Why?](#),” *The Guardian*, September 5, 2017. Available at <https://www.theguardian.com/us-news/2017/sep/05/hookworm-lowndes-county-alabama-water-waste-treatment-poverty>, accessed May 15, 2022.

⁸ Oregon House, “Relating to on-site septic system financing; declaring an emergency,” [HB 3090](#), 81st Oregon Legislative Assembly, 2021 Regular Session, (Introduced February 2, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB3090/Introduced>.

⁹ Stephen Gasteyer and Rahul T. Vaswani, [Still Living Without the Basics in the 21st Century: Analyzing the Availability of Water and Sanitation Services in the United States](#) (Rural Community Assistance Partnership, 2000), pp. 31, 33. Available at <https://www.rcap.org/wp-content/uploads/2017/05/Still->

Living-Without-the-Basics-Water.pdf.

¹⁰ Oregon Drinking Water Services, Oregon Health Authority, “[National Drinking Water Week](https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/pages/drinkingwaterweek.aspx).” Available at <https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/pages/drinkingwaterweek.aspx>, accessed March 25, 2022.

¹¹ Agencies with responsibilities that intersect with water justice issues in Oregon: Oregon Dept. of Agriculture, Oregon Dept. of Environmental Quality, Oregon Dept. of Forestry, Oregon Dept. of Fish and Wildlife, Oregon Dept. of Land Conservation and Development, Oregon Dept. of Energy, Oregon Dept. of Geology and Mineral Industries, Oregon Dept. of Transportation, Oregon Dept. of State Lands, Office of Emergency Management, Oregon Health Authority, Oregon State Marine Board, Oregon Parks and Recreation Department, Oregon Occupational Safety and Health Division, Oregon Watershed Enhancement Board, Oregon Water Resources Department. For a full overview of Oregon’s water related institutions, see *Oregon’s Integrated Water Resources Strategy, Recommended Action 1.C: Mapping Oregon’s Water Related Institutions*, Version 1 (Oregon Water Resources Department, January 2015). Available at https://www.oregon.gov/OWRD/WRDPublications1/Program_Mapping_January_2015.pdf.

¹² The Oregon Public Utility Commission regulates the rates of some private and investor-owned water utilities, but those utilities make up a small percentage of Oregon’s water systems. Oregon Public Utility Commission, “[Water - Who We Regulate](https://www.oregon.gov/puc/utilities/Pages/Water-Regulation.aspx).” Available at <https://www.oregon.gov/puc/utilities/Pages/Water-Regulation.aspx>, accessed June 21, 2022.

¹³ Tiffany Ganthier, Lisa Anne Hamilton, Annie Bennett, Katherine McCormick, Anne Perrault, Joel Smith, Sara Hoverter, Jennifer Li, and Jessica Grannis, *Equitable Adaptation Legal & Policy Toolkit*, Introduction (Georgetown Climate Center, Georgetown Law, 2020). Available at <https://www.georgetownclimate.org/adaptation/toolkits/equitable-adaptation-toolkit/introduction.html?full>.

¹⁴ List of Oregon frontline communities compiled based on Ganthier, et al., *Equitable Adaptation Legal & Policy Toolkit* (Georgetown Climate Center) and work conducted by the Oregon Water Futures Collaborative.

¹⁵ UN Water, “[Water and Climate Change](https://www.unwater.org/water-facts/climate-change).” Available at <https://www.unwater.org/water-facts/climate-change>.

¹⁶ Schimpf and Cude, pp. 7-8.

¹⁷ Oregon Senate, “Establishing environmental justice framework of principles for State of Oregon,” [SCR 17](https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/SCR17/Enrolled), 81st Oregon Legislative Assembly, 2021 Regular Session, (Enrolled June 15, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/SCR17/Enrolled>.

¹⁸ *Climate and Health in Oregon* (Oregon Health Authority, 2020), p. 4. Available at <https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/CLIMATECHANGE/Documents/2020/Climate%20and%20Health%20in%20Oregon%202020-%20Full%20Report.pdf>.

¹⁹ *Climate and Health in Oregon* (Oregon Health Authority, 2020), p. 4.

²⁰ Justin Farrell, Paul Berne Burow, Kathryn McConnell, Jude Bayham, Kyle Whyte, and Gal Koss, “[Effects of land dispossession and forced migration on Indigenous peoples in North America](https://doi.org/10.1126/science.abe4943),” *Science*, 374 (October 29, 2021), p. 6. <https://doi.org/10.1126/science.abe4943>

²¹ Eric A. Howald, “[We want to decide what’s good for us](https://www.keizertimes.com/posts/1774/we-want-to-decide-whats-good-for-us),” *Keizertimes*, July 24, 2020. Available at <https://www.keizertimes.com/posts/1774/we-want-to-decide-whats-good-for-us>.

²² Gasteyer and Vaswani, *Still Living Without the Basics in the 21st Century*, p. 5.

²³ Oregon Senate, SCR 17 (2021).

²⁴ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 17.

²⁵ Office of the Senate President, Oregon Legislature, “[Legislature passes landmark water package](#),” published June 26, 2021. Available at <https://www.oregonlegislature.gov/courtney/Documents/2021-Water-Package-Release.pdf>.

²⁶ United States Environmental Protection Agency, “[FACT SHEET: EPA & The Bipartisan Infrastructure Law](#),” (November 6, 2021). Available at <https://www.epa.gov/infrastructure/fact-sheet-epa-bipartisan-infrastructure-law>.

²⁷ Darren Golden, Vivian Satterfield, and Bobby Cochran, “[Oregon Leans in on Water, Climate, Health, and Justice](#),” Willamette Partnership, July 7, 2021. Available at <https://willamettepartnership.org/oregon-water-climate-health-justice>.

²⁸ For federal investments, see [Building a better America: A guidebook to the Bipartisan Infrastructure Law for state, local, tribal, and territorial governments, and other partners](#) (The White House, 2022), p. 228, available at https://www.whitehouse.gov/wp-content/uploads/2022/01/BUILDING-A-BETTER-AMERICA_FINAL.pdf. For state investments, see [2021 Legislative Session Water Funding Package](#) (June 26, 2021), available at https://leg-my.sharepoint.com/personal/shermaj_oregonlegislature_gov/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fshermaj%5Foregonlegislature%5Fgov%2FDocuments%2FWater%20Funding%20Package%2Epdf&parent=%2Fpersonal%2Fshermaj%5Foregonlegislature%5Fgov%2FDocuments&ga=1.

²⁹ Oregon Water Futures Collaborative, “[Oregon Water Justice - Early Actions for the State](#),” (April 26, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/CommitteeMeetingDocument/240929>.

³⁰ Oregon House, “Relating to state entities: Creates Racial Justice Council within Office of Governor,” [HB 2167](#), 81st Oregon Legislative Assembly, 2021 Regular Session, (Enrolled June 26, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2167/Enrolled>.

³¹ Oregon Senate, SCR 17 (2021).

³² Oregon House, “Relating to water project community engagement,” [HB 3293](#), 81st Oregon Legislative Assembly, 2021 Regular Session, (Enrolled May 25, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB3293/Enrolled>.

³³ Oregon House, “Renaming and Reorganizing the Environmental Justice Task Force,” [HB 4077](#), 81st Oregon Legislative Assembly, 2022 Regular Session, (Enrolled March 8, 2022). Available at <https://olis.oregonlegislature.gov/liz/2022R1/Downloads/MeasureDocument/HB4077/Enrolled>.

³⁴ Elizabeth A. Mack and Sarah Wrase, “[A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States](#),” *PLoS ONE*, 12 (January 11, 2017): e0169488, p. 15. <https://doi.org/10.1371/journal.pone.0169488>

³⁵ Schimpf and Cude, p. 11.

³⁶ For a detailed definition of equitable water infrastructure, see Roller, Z., et al., [Closing the Water Access Gap in the United States: A National Action Plan](#) (US Water Alliance and Dig Deep, 2019), p.16. Available at https://static1.squarespace.com/static/5e80f1a64ed7dc3408525fb9/t/6092ddcc499e1b6a6a07ba3a/1620237782228/Dig-Deep_Closing-the-Water-Access-Gap-in-the-United-States_DIGITAL_compressed.pdf.

³⁷ Roller, et al., *Closing the Water Access Gap*, p. 16.

³⁸ Jay Willis, “[The hidden racial inequities of access to water in America](#),” GQ, November 25, 2019, para. 11. Available at <https://www.gq.com/story/hidden-racial-inequities-water-access>.

³⁹ Katie Meehan, Jason Jurjevich, Nicholas Chun and Justin Sherrill, “[Geographies of insecure water access and the housing-water nexus in US cities](#),” *Proceedings of the National Academies of Sciences*, 117:46 (November 2020), 28700-28707. <https://doi.org/10.1073/pnas.2007361117>

⁴⁰ This study used Metropolitan Statistical Areas (MSAs), which are defined as counties that contain a densely settled urbanized area with a population of at least 50,000, and adjacent areas that are socially and economically integrated with the urban core. This means that the analysis may include peri-urban (rural) populations around Portland that are regionally and socioeconomically connected through the city. Meehan et al. (2020), p. 28705.

⁴¹ Gasteyer and Vaswani, *Still Living Without the Basics*, p. 31, 33, 51, 53.

⁴² Gasteyer and Vaswani, *Still Living Without the Basics*, p. 19, 22, 47, 49.

⁴³ Roller, et al., *Closing the Water Access Gap*, p. 21.

⁴⁴ Gasteyer and Vaswani, *Still Living Without the Basics*, p. 10.

⁴⁵ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 67.

⁴⁶ Roller, et al., *Closing the Water Access Gap*, p. 16.

⁴⁷ Oregon Housing and Community Services, “[2019 Point-in-Time Count](#).” Available at <https://public.tableau.com/app/profile/oregon.housing.and.community.services/viz/2019Point-in-TimeDashboard/Story1>, accessed January 9, 2022.

⁴⁸ Lisa Hawash, Lindsay Goes Behind, and Ericka Kimball, *Hygiene Project Report 2016* (Portland State University and Native American Youth Association, 2016). Available from lhawash@pdx.edu.

⁴⁹ The January 2020 national Point-in-Time Count saw a decrease in the overall number of people experiencing homelessness (prior to the pandemic) in Oregon, but only three other states had a worse rate (Oregon’s rate was 35 people per 10,000). “Oregon also had one of the highest rates of unhoused people who were living unsheltered, tied for second place with Nevada. Both states saw 61% of their homeless population living outdoors. Only California had a higher rate.” Rebecca Ellis, “[Federal analysis shows Oregon’s homeless population in decline prior to pandemic](#),” OPB, March 19, 2021. Available at <https://www.opb.org/article/2021/03/19/federal-analysis-shows-oregons-homeless-population-in-decline-prior-to-pandemic>.

⁵⁰ [Human Nature: Summary outcomes of a City of Portland-funded project to support access to hygiene and work opportunities through a Trauma Informed Care approach](#) (Bonneville Environmental Foundation, 2021), p. 4-5. Available at https://www.b-e-f.org/wp-content/uploads/2021/05/BEF_white_paper_hygiene_station_2021.pdf, accessed June 27, 2022.

⁵¹ Hawash, et al., *Hygiene Project Report 2016*, p. 1.

⁵² *Human Nature* (Bonneville Environmental Foundation, 2021), p. 4-5.

⁵³ *Human Nature* (Bonneville Environmental Foundation, 2021), p. 5.

⁵⁴ City of Portland; Home Forward; A Home for Everyone; Multnomah County; City of Gresham; Tiffany Renée Conklin; Cameron Mulder; and Regional Research Institute, Portland State University, [2019 Point-in-Time: Count of Homelessness in Portland/Gresham/Multnomah County, Oregon](#) (Regional Research Institute, 2019). Available at https://pdxscholar.library.pdx.edu/rri_facpubs/63, accessed June 27, 2022.

⁵⁵ Natalie Shure, “[The Politics of Going to the Bathroom](#),” *The Nation*, May 23, 2019. Available at <https://www.thenation.com/article/archive/toilet-urination-disability-access>.

⁵⁶ [2021 Water Infrastructure Survey: Summary Report](#) (League of Oregon Cities, May 2021), p. 2. Available at https://www.orcities.org/application/files/3816/2196/3174/Infrastructure_Survey_Summary_Report_5-25-21.pdf.

⁵⁷ Roller, et al., *Closing the Water Access Gap*, p. 24.

⁵⁸ Roller, et al., *Closing the Water Access Gap*, p. 24.

⁵⁹ The number of people affected by Warm Springs water outages has been reported as 3,200 and 4,000 in various news articles: Emily Cureton Cook, “[Water Crisis In Warm Springs Drags Into 3rd Month](#),” OPB, August 8, 2019, available at <https://www.opb.org/news/article/warm-springs-water-showers-sinks>. Emily Cureton Cook, “[Water Crisis Returns To Warm Springs As Virus Cases Rise](#),” OPB, June 30, 2020, available at <https://www.opb.org/news/article/water-crisis-returns-to-warm-springs-as-virus-cases-rise>.

⁶⁰ Emily Cureton Cook, “Water Crisis Returns To Warm Springs As Virus Cases Rise,” OPB.

⁶¹ Circle of Blue, “[Water assistance to Warm Springs and the State of Oregon](#),” YouTube, February 19, 2021. Available at <https://youtu.be/8jOjiH7x8io>.

⁶² Personal communication with Dirlle Calica, Affiliated Tribes of Northwest Indians, December 14, 2021.

⁶³ Personal communication with Danny Martinez, Warm Springs Tribal Emergency Manager, July 27, 2022.

⁶⁴ Bola Gbadebo, “[As well goes dry, residents of Bend mobile home park struggle without steady water supply](#),” KTVZ News Channel 12, January 13, 2022. Available at <https://ktvz.com/news/bend/2022/01/13/bend-mobile-home-parks-well-goes-dry-leaving-little-or-no-water-for-residents>.

⁶⁵ Gregory Pierce and Silvia Jiminez, “[Unreliable Water Access in U.S. Mobile Homes: Evidence From the American Housing Survey](#),” *Housing Policy Debate*, 25:4 (2015), p. 749. <https://doi.org/10.1080/10511482.2014.999815>

⁶⁶ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 29.

⁶⁷ Chris Aadland, “[Federal official announces ‘down payment’ on improving Columbia River treaty fishing sites](#),” *Underscore.news* and *Indian Country Today for The Oregonian*, May 11, 2022. Available at <https://www.oregonlive.com/environment/2022/05/federal-official-announces-down-payment-on-improving-columbia-river-treaty-fishing-sites.html>, accessed June 27, 2022.

⁶⁸ Emily Cureton Cook, “Water Crisis In Warm Springs Drags Into 3rd Month,” OPB.

⁶⁹ In some low-water service areas, pneumonia hospitalizations among infants were 11-times higher than the general U.S. population. Thomas W. Hennessy, et al., “[The relationship between in-home water service and the risk of respiratory tract, skin, and gastrointestinal tract infections among rural Alaska Natives](#),” *American Journal of Public Health*, 98:11 (September 2008), 2072-2078. <https://doi.org/10.2105/AJPH.2007.115618>

- ⁷⁰ Hawash, et al., *Hygiene Project Report 2016*, p. 1.
- ⁷¹ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 46.
- ⁷² Willis, “The hidden racial inequities of access to water in America,” *GQ*, para. 10.
- ⁷³ [The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery](http://www.uswateralliance.org/sites/uswateralliance.org/files/publications/The%20Economic%20Benefits%20of%20Investing%20in%20Water%20Infrastructure_final.pdf) (Value of Water Campaign and American Society of Civil Engineers, 2020), p. 24. Available at http://www.uswateralliance.org/sites/uswateralliance.org/files/publications/The%20Economic%20Benefits%20of%20Investing%20in%20Water%20Infrastructure_final.pdf.
- ⁷⁴ Indian Health Service, [Justification of Estimates for Appropriations Committees](https://www.ihs.gov/sites/budgetformulation/themes/responsive2017/display_objects/documents/FY_2022.pdf) (Department of Health and Human Services, FY 2022), p. CJ-224. Available at https://www.ihs.gov/sites/budgetformulation/themes/responsive2017/display_objects/documents/FY_2022.pdf.
- ⁷⁵ *The Economic Benefits of Investing in Water Infrastructure* (Value of Water Campaign), p. 19.
- ⁷⁶ Cureton Cook, “Water Crisis In Warm Springs Drags Into 3rd Month,” OPB.
- ⁷⁷ Cureton Cook, “Water Crisis In Warm Springs Drags Into 3rd Month,” OPB.
- ⁷⁸ Warm Springs tribal members do not currently pay user fees for water services. Emily Cureton Cook, “[The Cost Of Clean Water In Warm Springs](https://www.opb.org/news/article/clean-water-warm-springs-tribe-reservation),” OPB, April 10, 2019. Available at <https://www.opb.org/news/article/clean-water-warm-springs-tribe-reservation>.
- ⁷⁹ The World Health Organization defines sufficient water to prevent public health problems as 50-100 liters per person per day. That is the equivalent of about 13 gallons of water per person per day at the minimum. UN Water, “[Water for Life Decade: Human right to water](https://www.un.org/waterforlifedecade/human_right_to_water.shtml).” Available at https://www.un.org/waterforlifedecade/human_right_to_water.shtml.
- ⁸⁰ Cureton Cook, “The Cost Of Clean Water In Warm Springs,” OPB.
- ⁸¹ Roller, et al., *Closing the Water Access Gap*, p. 16.
- ⁸² Kristi Pullen Fedinick, Steve Taylor, and Michele Roberts, [Watered Down Justice Report](https://www.nrdc.org/sites/default/files/watered-down-justice-report.pdf) (Natural Resources Defense Council, Coming Clean, and the Environmental Justice Health Alliance for Chemical Policy Reform, 2019), p. 4. Available at <https://www.nrdc.org/sites/default/files/watered-down-justice-report.pdf>.
- ⁸³ The same report highlights that there are incomplete records of Safe Drinking Water Act violations, which imply this could be just the tip of the iceberg. “In 2004, the EPA Inspector General found that states were reporting only 65 percent of health-based violations and a miniscule 23 percent of the monitoring and reporting violations.” Fedinick, et al., *Watered Down Justice Report*, p. 28.
- ⁸⁴ United States Environmental Protection Agency, “[Report on the Environment: Drinking Water](https://www.epa.gov/report-environment/drinking-water).” Available at <https://www.epa.gov/report-environment/drinking-water>, accessed June 27, 2022.
- ⁸⁵ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 37, 63.
- ⁸⁶ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 64.
- ⁸⁷ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 65.

- ⁸⁸ United States Census Bureau, “[Quick Facts: Malheur County, Oregon](https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221).” Available at <https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221>, accessed August 9, 2022.
- ⁸⁹ United States Census Bureau, “[Quick Facts: Umatilla County, Oregon](https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221).” Available at <https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221>, accessed August 9, 2022.
- ⁹⁰ United States Census Bureau, “[Quick Facts: Polk County, Oregon](https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221),” Available at <https://www.census.gov/quickfacts/fact/table/polkcounyoregon,malheurcountyoregon,umatillacountyoregon,multnomahcountyoregon/PST045221>, accessed August 9, 2022.
- ⁹¹ DEQ Water Quality Programs, “[Groundwater Protection in Oregon](https://www.oregon.gov/deq/wq/programs/Pages/GWP.aspx).” Available at <https://www.oregon.gov/deq/wq/programs/Pages/GWP.aspx>, accessed June 23, 2022.
- ⁹² Oregon Health Authority, “[Nitrate in Drinking Water – Frequently Asked Questions](https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/monitoring/healtheffects/pages/nitrate.aspx).” Available at <https://www.oregon.gov/oha/ph/healthyenvironments/drinkingwater/monitoring/healtheffects/pages/nitrate.aspx>, accessed July 28, 2022.
- ⁹³ World Health Organization, “[Arsenic](https://www.who.int/news-room/fact-sheets/detail/arsenic).” Available at <https://www.who.int/news-room/fact-sheets/detail/arsenic>, accessed July 28, 2022.
- ⁹⁴ DEQ Water Quality Programs, “[Groundwater Management Areas](https://www.oregon.gov/deq/wq/programs/Pages/GWP-Management-Areas.aspx).” Available at <https://www.oregon.gov/deq/wq/programs/Pages/GWP-Management-Areas.aspx>, accessed June 23, 2022.
- ⁹⁵ DEQ Water Quality Programs, “Groundwater Management Areas.”
- ⁹⁶ [Malheur River Basin Agricultural Water Quality Management Area Plan](https://www.oregon.gov/ODA/shared/Documents/Publications/NaturalResources/MalheurAWQMAreaPlan.pdf) (Oregon Department of Agriculture and Malheur Local Advisory Committee, 2021), p. 24. Available at <https://www.oregon.gov/ODA/shared/Documents/Publications/NaturalResources/MalheurAWQMAreaPlan.pdf>.
- ⁹⁷ *Malheur River Basin Agricultural Water Quality Management Area Plan*, p. 23, 28.
- ⁹⁸ Monica Samayoa, “[Morrow County declares emergency over high nitrate levels in wells](https://www.opb.org/article/2022/06/10/morrow-county-state-of-emergency-drinking-water-contamination-nitrate-levels),” OPB, June 10, 2022. Available at <https://www.opb.org/article/2022/06/10/morrow-county-state-of-emergency-drinking-water-contamination-nitrate-levels>.
- ⁹⁹ Oregon Department of Environmental Quality, “[DEQ increases Port of Morrow fine to \\$2.1 million for additional nitrate violations in Eastern Oregon](https://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=65409),” published June 17, 2022. Available at <https://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=65409>, accessed June 23, 2022.
- ¹⁰⁰ Authors of the *Watered Down Justice Report* used counties as the geographic unit of analysis because that is how drinking water data were available from EPA. However, they note that if there was a drinking water utility serving people of color or a low-income population with excessive drinking water violations, but it was located in a majority-white or high-income county, these violations could be missed in their analysis. Fedinick, et al., *Watered Down Justice Report*, p. 37.
- ¹⁰¹ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 41, 43, 52, 63-65, 81-83.
- ¹⁰² Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 16, 59, 66.

¹⁰³ Fedinick, et al., *Watered Down Justice Report*, p. 5.

¹⁰⁴ PFAS-contaminated groundwater was found at 10 Oregon military sites in 2017, and near Portland Water Bureau's Columbia South Shore Well Field in northeast Portland and Kingsley Field in Klamath Falls in 2019, all sites where firefighting foam has been used frequently. There is currently no evidence that drinking water has been contaminated, and PFAS is a priority for Oregon officials. Jamie Pang and Stacey Dalgaard, "[Emerging Toxics: PFAS in Groundwater](#)," Oregon Environmental Council, September 25, 2020. Available at <https://oeonline.org/emerging-toxics-pfas-in-groundwater>.

¹⁰⁵ Drinking water providers are required to produce annual Consumer Confidence Reports under the Safe Drinking Water Act. However, Oregon Administrative Rules do not require water providers to deliver Consumer Confidence Reports to every water user. The rules state, "The system must make a good faith effort to reach consumers who do not get water bills ... such as renters or workers," and offers suggestions for appropriate outreach methods. [OAR 333-061-0043\(6\)-\(b\)](#), "Consumer Confidence Reports." Available at <https://www.oregon.gov/oha/PH/HealthyEnvironments/DrinkingWater/Rules/Documents/61-0043.pdf>.

¹⁰⁶ William Nicholas and Sridhar Vedachalam, "[Poor accessibility of water utilities' consumer confidence reports](#)," *Utilities Policy*, 72 (August 2021): 101272, p. 1. <https://doi.org/10.1016/j.jup.2021.101272>

¹⁰⁷ Benita Tsao, et al., [Water Through a Kaleidoscope: A Comprehensive Approach to Promoting Well Stewardship in Oregon](#) (Change Lab Solutions, 2018), p. 9. Available at https://www.changelabsolutions.org/sites/default/files/CLS-BG177-Water-Regulation-%26-Policies_CASE-STUDY-%231-Oregon_v04_FINAL_20181129.pdf.

¹⁰⁸ Personal communication with Curtis Cude, Oregon Health Authority, on June 6, 2022.

¹⁰⁹ United States Environmental Protection Agency, "[Basic information about lead in drinking water](#)." Available at <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water>.

¹¹⁰ Centers for Disease Control and Prevention, "[Health Effects of Lead Exposure](#)." Available at <https://www.cdc.gov/nceh/lead/prevention/health-effects.htm>, accessed June 24, 2022.

¹¹¹ Centers for Disease Control and Prevention, "Health Effects of Lead Exposure."

¹¹² Rumpler and Dietz, *Get the Lead Out*, p. 7.

¹¹³ Rebecca Ellis, "[Oregon wants quick fix to high lead levels in Portland's water](#)," OPB, January 7, 2022. Available at <https://www.opb.org/article/2022/01/08/oregon-wants-quick-fix-to-high-lead-levels-in-portlands-water>.

¹¹⁴ Emily Cureton Cook, "[Elevated Lead Levels In Warm Springs Childcare Building](#)," OPB, April 9, 2019. Available at <https://www.opb.org/news/article/oregon-warm-springs-reservation-lead-water-childcare-building>.

¹¹⁵ Brad Schmidt, "[Why Oregon took 8 months to fix its lead problem in youth prisons](#)," OregonLive, January 9, 2019. Available at https://www.oregonlive.com/pacific-northwest-news/2017/05/why_oregon_took_8_months_to_fix.html.

¹¹⁶ Tom Adams, "[Elevated lead levels found in some fixtures in 4 UO dorms](#)," KVAL, September 15, 2016. Available at <https://kval.com/news/local/elevated-lead-levels-found-in-some-fixtures-in-4-uo-dorms>.

- ¹¹⁷ Environmental Working Group, EWG’s Tap Water Database, “[Lead](#),” November 2021. Available at <https://www.ewg.org/tapwater/reviewed-lead.php>, accessed June 24, 2022.
- ¹¹⁸ Emily Anthes, “[More childhood lead poisoning is a side effect of Covid lockdowns](#),” *The New York Times*, March 11, 2021. Available at <https://www.nytimes.com/2021/03/11/health/virus-lead-poisoning-children.html>.
- ¹¹⁹ Anthes, “More childhood lead poisoning is a side effect of Covid lockdowns,” *The New York Times*.
- ¹²⁰ Anthes, “More childhood lead poisoning is a side effect of Covid lockdowns,” *The New York Times*.
- ¹²¹ Rumpler and Dietz, *Get the Lead Out*, p. 7.
- ¹²² [ORS 333-061-0400\(6\)](#), “Reducing Lead in School Drinking Water.” Available at <https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/DRINKINGWATER/RULES/Documents/pwsrules.pdf#page=339>, accessed on February 4, 2022.
- ¹²³ Portland Public Schools, “[PPS Water Quality aims to be among the best in the nation](#).” Available at <https://www.pps.net/Page/11458>, accessed February 4, 2022.
- ¹²⁴ Personal communication with Celeste Meiffren-Swango, State Director for Environment Oregon, on September 13, 2020.
- ¹²⁵ Mack and Wrase, p. 2.
- ¹²⁶ Mack and Wrase used national water rate averages to determine that households making less than \$32,000 per year are considered water burdened by current rates, and those making less than \$45,120 will be at risk of not affording water if rates increase as projected. Mack and Wrase, p. 7, 12, 14.
- ¹²⁷ “It is commonly inferred that EPA would consider a combined annual water and wastewater bill of less than 4.5% of [Median Household Income] to be affordable (2.5% for water, plus 2% for wastewater services and [stormwater]).” *Affordability Assessment Tool for Federal Water Mandates* (The United States Conference of Mayors, The American Water Works Association, and The Water Environment Federation, 2013). Available at <https://www.awwa.org/Portals/o/AWWA/ETS/Resources/AffordabilityAssessmentTool.pdf>.
- ¹²⁸ Scott Lazenby and Diane Odeh, *League of Oregon Cities 2021 Infrastructure Survey Report* (Center for Public Service, Portland State University, January 2021). Available at https://www.orcities.org/application/files/4216/2195/6603/Final_Draft_LOC_PSU_Infrastructure_Survey_4-7-21.pdf, accessed June 27, 2022.
- ¹²⁹ Roller, et al., *Closing the Water Access Gap*, p. 16.
- ¹³⁰ Duke Nicholas Institute for Environmental Policy Solutions, “[Water Affordability Dashboard](#).” Available at <https://nicholasinstitute.duke.edu/water-affordability/water-affordability-dashboard>, accessed April 6, 2022.
- ¹³¹ In almost every Oregon city included in the Duke Water Affordability Dashboard, households with an annual income of \$50,000 or more had water bills below 3% of household income, which would be considered affordable by the EPA threshold. Rates by census income brackets can be found at the Water Affordability Dashboard under the “How affordable are water services?” tab, and by selecting “Select to see a table based on census income brackets.” Duke Nicholas Institute, “Water Affordability Dashboard.” Accessed April 6, 2022.

¹³² Mack and Wrase, p. 13.

¹³³ People’s Water Board Coalition, “[Affordable Water](https://www.peopleswaterboard.org/affordable-water).” Available at <https://www.peopleswaterboard.org/affordable-water>, accessed March 14, 2022.

¹³⁴ [Low Income Household Water Assistance Program: Oregon LIHWAP profile summary](#), Office of Community Services, Administration for Children and Families, U.S. Dept. of Health and Human Services. Available at https://www.acf.hhs.gov/sites/default/files/documents/ocs/RPT_LIHWAP_Profile%20Summary_OR_FY2022_o.pdf.

¹³⁵ Cureton Cook, “The Cost Of Clean Water In Warm Springs,” OPB.

¹³⁶ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 26.

¹³⁷ House Interim Committee on Water, “[Oregon Water Utilities](#),” 80th Oregon Legislative Assembly, 2019-2020 Interim Session (Informational Hearing, May 29, 2020). Available at <https://olis.oregonlegislature.gov/liz/2019I1/Committees/HWTR/2020-05-29-15-00/Agenda>.

¹³⁸ Jennifer Martinez, Lynn Stephen, Ronald L. Mize, Gabriela Pérez Báez, Valentin Sanchez, and Julie Samples, [Oregon COVID-19 Farmworker Study](#) (CASA of Oregon, July 2021), p. 16. Available at https://cirsinc.org/wp-content/uploads/2021/10/COFS_Report2021_ENG_FULL-compressed.pdf.

¹³⁹ Brenna Visser, “[City of Bend is owed \\$1 million in water, sewer bills](#),” *The Bulletin*, March 11, 2022. Available at https://www.bendbulletin.com/localstate/city-of-bend-is-owed-1-million-in-water-sewer-bills/article_091b211e-a185-11ec-950c-9362ff6783ba.html.

¹⁴⁰ Marian Swain, Emmett Mckinney, and Lawrence Susskind, “[Water shutoffs in older American cities: Causes, extent, and remedies](#),” *Journal of Planning Education and Research* (February 21, 2020). <https://doi.org/10.1177/0739456x20904431>

¹⁴¹ Gregory Pierce, Ahmed Rachid El-Khattabi, Kyra Gmoser-Daskalakis, and Nicholas Chow, “[Solutions to the problem of drinking water service affordability: A review of the evidence](#),” *WIRES Water*, 8:4 (July/August 2021), p. 10. <https://doi.org/10.1002/wat2.1522>

¹⁴² In the United Kingdom, it is illegal for service providers to disconnect water service due to nonpayment or delinquent payments. Mack and Wrase, p. 15.

¹⁴³ Rebecca Ellis, “[Seniors in Portland apartment complex want to escape Legionnaires’ disease. But there’s nowhere else to go](#),” OPB, October 12, 2021. Available at <https://www.opb.org/article/2021/10/12/seniors-portland-apartment-complex-legionnaires-disease>.

¹⁴⁴ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 59.

¹⁴⁵ Bill Poehler, “[Salem’s water improvements puts Turner in a \\$4 million bind](#),” *Salem Statesman Journal*, July 30, 2020. Available at <https://www.statesmanjournal.com/story/news/2020/07/31/salem-water-improvements-impact-turner-oregon/5520624002>.

¹⁴⁶ Amelia Templeton, “[Portland Water Bureau could lose big customers as it builds \\$1 billion filtration plan](#),” OPB, November 6, 2019. Available at <https://www.opb.org/news/article/portland-oregon-water-bureau-customers-filtration-plant-tualatin-valley-gresham>.

¹⁴⁷ *2021 Water Infrastructure Survey* (League of Oregon Cities), p. 3.

¹⁴⁸ Laura Ungar and Mark Nichols, “[4 million Americans could be drinking toxic water and would never know](https://www.usatoday.com/story/news/2016/12/13/broken-system-means-millions-of-rural-americans-exposed-to-poisoned-or-untested-water/94071732),” *USA Today*, December 13, 2016. Available at <https://www.usatoday.com/story/news/2016/12/13/broken-system-means-millions-of-rural-americans-exposed-to-poisoned-or-untested-water/94071732>.

¹⁴⁹ Fedinick, K. P., Mae Wu, Mekela Panditharatne, and Erik D. Olson, *Threats on Tap: Widespread Violations Highlight Need for Investment in Water Infrastructure and Protection* (Natural Resources Defense Council, May 2017), p. 15. Available at <https://www.nrdc.org/sites/default/files/threats-on-tap-water-infrastructure-protections-report.pdf>.

¹⁵⁰ Fedinick, et al., *Threats on Tap*, p. 4.

¹⁵¹ There are 3,317 water systems in OHA’s Drinking Water Data Online database, including Community Water Systems, Transient Non-Community Systems, Non-Transient Non-Community Systems, and Oregon Very Small Systems. As a subset, 84% of Community Water Systems and Oregon Very Small Systems serve 500 or fewer people. These systems are more likely to serve residential water needs. Oregon Health Authority, Drinking Water Data Online, “[Inventory by County](https://yourwater.oregon.gov/countyinventory.php?county=All&actstat=A®ag=ALL&source=ALL&includeNP=y).” Available at <https://yourwater.oregon.gov/countyinventory.php?county=All&actstat=A®ag=ALL&source=ALL&includeNP=y>, accessed September 1, 2022.

¹⁵² Alyssa Mucken and Brenda Bateman, *Oregon’s 2017 Integrated Water Resources Strategy* (Oregon Water Resources Department, 2017), p. 152. Available at https://www.oregon.gov/owrd/WRDPublications1/2017_IWRS_Final.pdf.

¹⁵³ The federal Safe Drinking Water Act defines “community water systems” as those serving at least 25 people or 15 connections, but Oregon rules also include “very small systems” serving at least 10 people or 4 connections. Compliance scores for Oregon Very Small Systems can be found at Oregon Health Authority, Drinking Water Data Online, “[System Scores](https://yourwater.oregon.gov/sscore.php?cs=all&ra=all&st=np&src=all&sat=all&compl=all&sort=ss)” for Oregon Very Small Systems. Available at <https://yourwater.oregon.gov/sscore.php?cs=all&ra=all&st=np&src=all&sat=all&compl=all&sort=ss>, accessed September 1, 2022.

¹⁵⁴ There are five Community Water Systems in Oregon that serve fewer than 25 people but are regulated as Community Water Systems because they have 15 or more service connections. This analysis included those five systems with Community Water Systems serving 25 people or more to distinguish them from Oregon Very Small Systems. Compliance scores for Community Water Systems can be found at Oregon Health Authority, Drinking Water Data Online, “[System Scores](https://yourwater.oregon.gov/sscore.php?cs=all&ra=all&st=c&src=all&sat=all&compl=all&sort=ss)” for Community Water Systems. Available at <https://yourwater.oregon.gov/sscore.php?cs=all&ra=all&st=c&src=all&sat=all&compl=all&sort=ss>, accessed September 1, 2022.

¹⁵⁵ Schimpf and Cude, p. 3.

¹⁵⁶ *Manufactured Home Park Solutions Collaborative: Local Agency Toolkit*, Version 1.0, published September 30, 2016. Available at <https://www.oregon.gov/ohcs/mmrc/Documents/Manufacture-Home-Park-Solutions-Collaborative-Local-Agency-Toolkit.pdf>, accessed May 16, 2022.

¹⁵⁷ Pierce and Jiminez, p. 749.

¹⁵⁸ Meehan, et al., p. 28704.

¹⁵⁹ Portland State University Population Research Center, “[2021 Certified Population Estimates, July 1](https://drive.google.com/uc?export=download&id=1yYQZE_p1-Lsdc-rhtNYviR1ns2bmh1pT).” Available at https://drive.google.com/uc?export=download&id=1yYQZE_p1-Lsdc-rhtNYviR1ns2bmh1pT.

¹⁶⁰ Amanda Arden, “[Water infrastructure repair costs tap out Oregon’s small cities](https://www.koin.com/news/special-reports/water-infrastructure-repair-costs-tap-out),” KOIN, August 25, 2021. Available at <https://www.koin.com/news/special-reports/water-infrastructure-repair-costs-tap-out>.

oregons-small-cities.

¹⁶¹ Olivia Young, “[They’re gonna shut people off: Mapleton residents angry over water bills](#),” KPIC/KVAL, October 27, 2021. Available at <https://kpic.com/news/local/theyre-gonna-shut-people-off-mapleton-residents-angry-over-water-bills>.

¹⁶² Wikipedia, “Mapleton, Oregon.” Available at https://en.wikipedia.org/wiki/Mapleton,_Oregon.

¹⁶³ Cody Mann, “[Mobile home park sewage leaks spark citizen outcries](#),” *The Chief News*, August 24, 2017. Available at https://www.thechiefnews.com/news/mobile-home-park-sewage-leaks-spark-citizen-outcries/article_4aecbf1a-8904-11e7-be5d-572980407449.html.

¹⁶⁴ Cody Mann, “[History of septic failures at Deer Pointe Meadows](#),” *The Chief News*, July 26, 2017. Available at https://www.thechiefnews.com/news/history-of-septic-failures-at-deer-pointe-meadows/article_odccaec3-b1c0-5183-9710-fe5eda169619.html.

¹⁶⁵ Alex Castle, “[I didn’t think it was possible, small trailer park makes mighty recovery from February floods](#),” *East Oregonian*, September 22, 2020. Available at https://www.eastoregonian.com/news/local/i-didn-t-think-it-was-possible-small-trailer-park-makes-mighty-recovery-from-february/article_7ece9bd2-fc1f-11ea-92ba-2f8cf9f7eb49.html.

¹⁶⁶ DEQ Water Quality Programs, “Groundwater Protection in Oregon.” Accessed June 23, 2022.

¹⁶⁷ [Onsite septic system repair & replacement loan support](#) [Fact sheet], (Oregon Department of Environmental Quality, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/PublicTestimonyDocument/2412>.

¹⁶⁸ Oregon House, HB 3090 (2021).

¹⁶⁹ [Onsite septic system repair & replacement loan support](#) [Fact sheet], (Oregon DEQ, 2021).

¹⁷⁰ [Onsite septic system repair & replacement loan support](#) [Fact sheet], (Oregon DEQ, 2021).

¹⁷¹ Oregon House, “[Relating to the performance of work on wells: Establishes Water Well Abandonment, Repair and Replacement Fund](#),” HB 2145, 81st Oregon Legislative Assembly, 2021 Regular Session, (Enrolled June 30, 2021). Available at <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2145/Enrolled>.

¹⁷² DEQ Water Quality Programs, “Groundwater Management Areas,” accessed June 23, 2022.

¹⁷³ Samayoa, “Morrow County declares emergency over high nitrate levels in wells,” OPB.

¹⁷⁴ Samayoa, “Morrow County declares emergency over high nitrate levels in wells,” OPB.

¹⁷⁵ [Onsite septic system repair & replacement loan support](#) [Fact sheet], (Oregon DEQ, 2021).

¹⁷⁶ Sierra Dawn McClain, “[Oregon plays catch-up on overseeing wells across the state](#),” *Capital Press*, February 27, 2020. Available at https://www.capitalpress.com/ag_sectors/water/oregon-plays-catch-up-on-overseeing-wells-across-state/article_6b334d38-58c9-11ea-96c2-3792ae624bab.html.

¹⁷⁷ McClain, “Oregon plays catch-up on overseeing wells across the state,” *Capital Press*.

¹⁷⁸ McClain, “Oregon plays catch-up on overseeing wells across the state,” *Capital Press*.

¹⁷⁹ Francine D. Blau, Pamela A. Meyerhofer, and Josefine Koebe, “[Essential and frontline workers in the COVID-19 crisis \(updated\)](#),” EconoFact, March 22, 2022. Available at <https://econofact.org/essential-and-frontline-workers-in-the-covid-19-crisis>.

¹⁸⁰ Hye Jin Rho, Hayley Brown, and Shawn Fremstad, *A Basic Demographic Profile of Workers in Frontline Industries*, Table 1: Characteristics of Workers in Frontline Industries, Oregon (Center for Economic and Policy Research, April 2020). Available at https://cepr.net/wp-content/uploads/2020/04/CEPR_frontline_workers_states.xlsx.

¹⁸¹ Martinez, et al., *Oregon COVID-19 Farmworker Study*, p. 7, 12.

¹⁸² Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 39.

¹⁸³ “Workers with higher levels of education were much more likely to work at home in 2020 than were those who had less education. Among workers aged 25 and over, 65 percent of employed persons with a bachelor’s degree or higher worked at home on days they worked in 2020 (up from 37 percent in 2019), compared with 19 percent of employed persons whose highest level of education was a high school diploma (up from 13 percent in 2019).” Bureau of Labor Statistics, U.S. Department of Labor, “[American time use survey - May to December 2019 and 2020 results](#),” July 22, 2021. Available at <https://www.bls.gov/news.release/pdf/atus.pdf>.

¹⁸⁴ Martinez, et al., *Oregon COVID-19 Farmworker Study*, p. 21.

¹⁸⁵ *Climate and Health in Oregon* (Oregon Health Authority, 2020), p. 4.

¹⁸⁶ UN Water, “Water for Life Decade: Human right to water.”

¹⁸⁷ Michael Sainato, “[14-hour days and no bathroom breaks: Amazon’s overworked delivery drivers](#),” *The Guardian*, March 11, 2021. Available at <https://www.theguardian.com/technology/2021/mar/11/amazon-delivery-drivers-bathroom-breaks-unions>.

¹⁸⁸ Alex Zielinski, “[What it’s like to work at Troutdale’s notoriously dangerous Amazon warehouse](#),” *Portland Mercury*, December 9, 2019. Available at <https://www.portlandmercury.com/blogtown/2019/12/09/27615479/what-its-like-to-work-at-troutdales-notoriously-dangerous-amazon-warehouse>.

¹⁸⁹ Jamie Goldberg, “[Oregon farmworkers who say they were denied water sue farm, labor contractor after state fails to step in](#),” *The Oregonian*, September 24, 2021. Available at <https://www.oregonlive.com/business/2021/09/oregon-farmworkers-who-say-they-were-denied-water-sue-farm-labor-contractor-after-state-fails-to-step-in.html>.

¹⁹⁰ Andrew Selsky, “[Migrant Oregon cannabis workers face threats amid illegal boom](#),” *Associated Press / OPB*, November 4, 2021. Available at <https://www.opb.org/article/2021/11/04/migrant-oregon-cannabis-workers-face-threats>.

¹⁹¹ PCUN, “[Oregon farmworker union applauds Oregon OSHA’s temporary rules](#),” April 28, 2020. Available at <https://pcun.org/31467-2>.

¹⁹² Stephen W. Manning and Stephanie Powers, *Narrowing the Gap: A Report from the Oregon Worker Relief Coalition after a year of pandemic* (Oregon Worker Relief, 2021). Available at <https://workerrelief.org/wp-content/uploads/2021/05/OWR-Narrowing-the-Gap-May-2021.pdf>.

¹⁹³ The Oregon COVID-19 Farmworker Survey reported that 28% of interviewees struggled to pay for water due to loss of wages during the early pandemic (Martinez, et al., p. 16). In a May 29, 2020, informational hearing before the Oregon House Water Committee, Tualatin Valley Water District reported that 1,253 customers were behind on their bills, and Seal Rock Water District on the Oregon Coast had seen a 3x increase in the number of customers unable to pay their bills. House Interim Committee on Water, “Oregon Water Utilities,” (Informational Hearing, May 29, 2020).

¹⁹⁴ Ira Cuello-Martinez, Kate Suisman, and Jamie Pang, “[Oregon OSHA’s emergency heat rules are a good start to protecting workers; strong enforcement will be necessary](#)” (PCUN, Northwest Justice Workers Project, and Oregon Environmental Council, July 8, 2021). Available at <https://oeonline.org/osha-emergency-heat-rules>.

¹⁹⁵ Leslie Kochan, Kate Suisman, Jamie Pang, Nargess Shadbeh, and Patti Verduzco, “[Oregon OSHA raises the bar for worker protections from climate extremes, though advocates note loopholes](#)” (Climate Jobs, Northwest Workers’ Justice Project, Oregon Environmental Council, Oregon Law Center, and PCUN, May 10, 2022). Available at <https://oeonline.org/or-osha-heat-and-smoke-rules-joint-press-release>.

¹⁹⁶ Martinez, et al., *Oregon COVID-19 Farmworker Study*, p. 27.

¹⁹⁷ Martinez, et al., *Oregon COVID-19 Farmworker Study*, p. 26.

¹⁹⁸ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 68-69.

¹⁹⁹ María Paula Rubiano, “[Facing floods and fires, undocumented immigrants have nowhere to turn for help](#),” Grist, October 12, 2021. Available at <https://grist.org/equity/undocumented-immigrants-have-nowhere-to-turn-for-help-after-climate-emergencies>.

²⁰⁰ Rubiano, “Facing floods and fires, undocumented immigrants have nowhere to turn for help,” Grist.

²⁰¹ Reyes-Santos et al., *Oregon Water Futures Project Report*, p. 17.

²⁰² Rubiano, “Facing floods and fires, undocumented immigrants have nowhere to turn for help,” Grist.

²⁰³ Reyes-Santos et al., *Oregon Water Futures Project Report*, p. 46.

²⁰⁴ Farrell et al., p. 4.

²⁰⁵ Farrell et al., p. 4.

²⁰⁶ Personal communication with Direlle Calica, Affiliated Tribes of Northwest Indians, December 14, 2021.

²⁰⁷ April Ehrlich, “[FEMA denied most Oregonians’ requests for wildfire disaster assistance](#),” OPB, February 11, 2021. Available at <https://www.opb.org/article/2021/02/11/oregon-2020-wildfires-fema-disaster-aid-denied>.

²⁰⁸ Ehrlich, “FEMA denied most Oregonians’ requests for wildfire disaster assistance,” OPB.

²⁰⁹ Ehrlich, “FEMA denied most Oregonians’ requests for wildfire disaster assistance,” OPB.

²¹⁰ Erika Bolstad, “[Climate change is pushing toxic chemicals into drinking wells](#),” Pew, April 28, 2022. Available at <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/04/28/climate-change-is-pushing-toxic-chemicals-into-drinking-wells>.

²¹¹ Bolstad, “Climate change is pushing toxic chemicals into drinking wells,” Pew.

²¹² Tolulope O. Odimeyomi, Caitlin R. Proctor, Qi Erica Wang, Arman Sabbaghi, Kimberly S. Peterson, David J. Yu, Juneseok Lee, Amisha D. Shah, Christian J. Ley, Yoorae Noh, Charlotte D. Smith, Jackson P. Webster, Kristin Milinkevich, Michael W. Lodewyk, Julie A. Jenks, James F. Smith, and Andrew J. Whelton, “[Water safety attitudes, risk perception, experiences, and education for households impacted by the 2018 Camp Fire, California](#),” *Natural Hazards*, 108 (May 3, 2021), 947-975. <https://link.springer.com/article/10.1007/s11069-021-04714-9>

²¹³ The Spectrum of Participation developed by the International Association for Public Participation (IAP2) is widely referenced as a tool for moving beyond one-way community outreach to more meaningful community engagement. See an adaptation of the spectrum by the Centers for Disease Control and Prevention Agency for Toxic Substances and Disease Registry at <https://www.atsdr.cdc.gov/communityengagement/community-engagement-continuum.html>.

²¹⁴ *Environmental Justice: Best Practices for Oregon’s Natural Resource Agencies* (Oregon Environmental Justice Task Force, January 2016), p. 1. Available at https://www.oregon.gov/odot/Business/OCR/Documents/Oregon_EJTF_Handbook_Final.pdf.

²¹⁵ Roller, et al., *Closing the Water Access Gap*, p. 23.

²¹⁶ This information is based on the Nicholas Institute for Environmental Policy Solutions [Water Affordability Dashboard](#) (accessed April 6, 2022). Households paying more than 4.5% of household income for water and wastewater utilities are commonly considered water burdened in the U.S. Further exploration is needed to understand what is causing the spike in utility burden in downtown Pendleton or if the nature of residential housing distribution is such that few full-time residences are counted.

²¹⁷ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 12-20.

²¹⁸ Oregon House, HB 4077 (2022).

²¹⁹ Mucken and Bateman, *Oregon’s 2017 Integrated Water Resources Strategy*, p. 11.

²²⁰ Cristina Rojas, “[PSU Study: Low-Income Neighborhoods in East Portland More Vulnerable to Flooding, Extreme Heat](#),” Portland State University, March 21, 2019. Available at <https://www.pdx.edu/news/psu-study-low-income-neighborhoods-east-portland-more-vulnerable-flooding-extreme-heat>, accessed June 24, 2022.

²²¹ Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 39.

²²² Nicholas and Vedachalam, p. 2.

²²³ Martinez, et al., *Oregon COVID-19 Farmworker Study*, p. 21.

²²⁴ Roller, et al., *Closing the Water Access Gap*, p. 24.

²²⁵ A study found that “if water rates rise at projected amounts over the next five years, conservative projections estimate that the percentage of U.S. households who will find water bills unaffordable could triple from 11.9% to 35.6%.” Mack and Wrase, p. 1.

²²⁶ U.S. Senate, [WASH Sector Development Act](#), S.3893, 117th Cong., 2nd Sess. (Introduced March 22, 2022). Available at <https://www.congress.gov/bill/117th-congress/senate-bill/3893>.

²²⁷ Researchers have observed that small pockets of households lacking water access can hide within counties with overall higher levels of access. “In Coconino County, Arizona, for example, only about four percent of the population lack complete plumbing. By analyzing the census tracts within the county, we found that there are some tracts where 40 percent of people lack access.” Roller, et al., *Closing the Water Access Gap*, p. 23.

²²⁸ Past research has examined the relationship between the presence of in-home piped water and wastewater services and hospitalization rates for respiratory tract, skin, and gastrointestinal tract infections in rural Alaska. Hennessy, et al. (2008).

²²⁹ Nadia Gaber, Andrew Silva, Monica Lewis-Patrick, Emily Kutil, Debra Taylor, and Roslyn Bouier, “[Water insecurity and psychosocial distress: case study of the Detroit water shutoffs](#),” *Journal of Public Health*, 43:4 (December 2021), p. 6. <https://doi.org/10.1093/pubmed/fdaa157>

²³⁰ Schmidt, “Why Oregon took 8 months to fix its lead problem in youth prisons,” OregonLive.

²³¹ Roller, et al., *Closing the Water Access Gap*, p. 89.

²³² Reyes-Santos, et al., *Oregon Water Futures Project Report*, p. 39.

²³³ Geological Society of America, “[Dams disproportionately removed from areas with more non-Hispanic white residents](#),” Phys.org, October 8, 2021. Available at <https://phys.org/news/2021-10-disproportionately-areas-non-hispanic-white-residents.html>.

STATE OF WATER JUSTICE IN OREGON

A PRIMER ON HOW OREGON WATER
INFRASTRUCTURE CHALLENGES AFFECT
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AUGUST 2022