CHAPTER 2

# CLIMATE

1

## INTRODUCTION

Climate change is a major concern for the region. People and agencies around the world are working together to adapt to and reduce its effects. Thurston County is already facing challenges like severe storms, wildfires, and extreme heat. Humans, ecosystems, infrastructure, and economies will all experience climate issues. Thurston County is taking steps to plan for the future of the community, including the impacts of climate change. Adding to existing climate plans in Thurston County, the climate chapter (Chapter 2) is new to the Comprehensive Plan.

This chapter follows new Growth Management Act (GMA) requirements (Chapter 36.70A RCW). These requirements were introduced in 2023 by Washington House Bill (HB) 1181 (see textbox on next page). Cities and counties must now include climate change policies in all future updates to their comprehensive plans. This climate chapter addresses key climate issues facing the Thurston County community. It aims to reduce local emissions of climate-changing greenhouse gases. It also seeks to build community resilience to climate change impacts.

## 2025 Update: Critical Issues

- Average annual temperatures in Thurston County have warmed 2.4°F over the past century, with warming projected to continue in the future. Warmer temperatures threaten public health, infrastructure, natural resources, and agriculture.
- Anticipated reductions in summer precipitation and increases in winter precipitation will impact groundwater availability, surface stream flows and baseflows, and aquatic species (e.g., salmon), habitats, and water supply in the county.
- Increased flood risk from extreme precipitation events and sea level rise threatens public and private infrastructure systems and buildings—especially in low-lying areas.
- In 2022, the Thurston County community emitted an estimated 4.2 million metric tons of carbon dioxide equivalent (MTCO2e) of greenhouse gases, equivalent to 14.1 MTCO2e per capita—compared to a statewide average of 13.5 MTCO2e per capita[1], with emissions projected to rise as county population and economic growth increase.
- The top contributor to GHG emissions in Thurston County is energy consumption

## GROWTH MANAGEMENT REQUIREMENTS

**The Growth Management Act (GMA) sets the following goals for climate change and resiliency:**

- Ensure that comprehensive plans, development regulations, and regional policies, plans, and strategies adapt to and mitigate the effects of a changing climate.
- Support reductions in greenhouse gas emissions and per capita vehicle miles traveled.
- Prepare for climate impact scenarios; foster resiliency to climate impacts and natural hazards.
- Protect and enhance environmental, economic, and human health and safety.
- Advance environmental justice.

**The climate chapter:**

- Results in reductions in overall greenhouse gas emissions and enhances resiliency to avoid the adverse impacts of climate change.
- Includes efforts to reduce localized greenhouse gas emissions and avoid creating or worsening localized climate impacts to vulnerable populations and overburdened communities.
- Includes a greenhouse gas sub-element that identifies actions the jurisdiction will take during the planning cycle that will result in reductions in overall greenhouse gas emissions generated by transportation and land use, result in reductions in per capita vehicle miles traveled, prioritize reductions that benefit overburdened communities.
- Includes a resiliency sub-element that equitably enhances resiliency to, and avoid or substantially reduce the adverse impacts of, climate change in human communities and ecological systems.
- Identifies, protects, and enhances natural areas and community resiliency.
- Addresses natural hazards created or aggravated by climate change.

**RCW 36.70A.095**

1. The statewide value is based on 2019 emissions, which is the most recent year currently available. Source: Washington Department of Ecology (December 2022). Washington State Greenhouse Gas Emissions Inventory: 1990-2019. https://apps.ecology.wa.gov/publications/documents/2202054.pdf

(electricity and natural gas) in commercial and residential buildings. On-road vehicle travel and tree canopy loss are the second and third largest contributors to the county's GHG emissions, respectively.

2

# PLANNING CONTEXT FOR CLIMATE

This chapter, developed per state GMA goals, coordinates with other Comprehensive Plan chapters. Thurston County has a long history of investing in climate action and resilience planning, including collaborating on the 2018 Thurston Climate Adaptation Plan in 2018 and Thurston Climate Mitigation Plan in 2020. The climate chapter of the Comprehensive Plan builds on this work, setting county climate change goals and policies and complying with the new GMA requirements.

**Resilience policies aim to:**

- Advance environmental justice.
- Adapt to and mitigate the effects of climate change.
- Protect and enhance the environment, economy, and human health and safety.

**GHG emissions reduction policies aim to:**

- Measure, reduce, and eliminate local GHG emissions.
- Measure, reduce, and eliminate vehicle miles traveled per person.
- Both done in a way that benefits overburdened communities and maximizes co-benefits of reduced air pollution and environmental justice.

This chapter builds on past planning efforts. It strengthens existing goals and policies, where needed. It also adds new goals and policies to fill gaps. Thurston County's land conservation programs also support climate mitigation and resiliency. Chapter 4 (Environment, Recreation, and Open Space) has more details on these programs. The climate chapter aims to include a mix of policies for Thurston County. This includes climate resilience and GHG emissions reduction policies.

This chapter uses the best available science to identify Thurston County's main climate risks and GHG emission sources. It also highlights opportunities for improvement. As climate change is an issue that crosses sectors, this chapter seeks to align with and support the goals of other related Comprehensive Plan chapters.

## A. County-wide Planning Policies

The Growth Management Act requires jurisdictional coordinate and develop county-wide policies to prepare for anticipated growth. The County-wide Planning Policies (CWPPs) are a regional framework for planning. They were first adopted in 1992 and amended in 2015 and 2025. They apply to the county, cities, and towns in Thurston County. CWPPs relate to all chapters of the Comprehensive Plan. Those specific to climate change include CWPPs 10.1, 10.2, 10.4, 10.5, 10.6, 10.7, 10.8, and 9.3.

## B. Regional Planning Efforts

Climate issues cross jurisdictional boundaries and a regional plan is needed to tackle them. Thurston County has a long history of regional collaboration to address climate change. This includes initiatives coordinated through the Thurston Regional Planning Council (TRPC). Examples include:

The **Thurston County Climate Adaptation Plan** prioritizes actions to respond to the region's worst climate risks.

- Developed in 2018
- Partners include:
    - Thurston County.
    - TRPC.
    - Tribes.
    - Municipalities.
    - Universities.
    - Nonprofits.
    - Businesses.

The **Thurston County Climate Mitigation Plan** is a road map for regional efforts to reduce climate change.

- Developed in 2020
- Partners include:
    - Thurston County.
    - TRPC.
    - Municipalities.
    - Community Organizations.
- This plan outlines ways to cut GHG emissions in five sectors:
    - Buildings and Energy.

Photo Credit: Experience Olympia

- Transportation and Land Use.
- Water and Waste.
- Agriculture, Forests, and Prairies.
- Cross-Cutting.

Under Washington State law (RCW 77.85), 25 watershed-based groups called "lead entities" are recognized and contracted through Washington's Recreation and Conservation Office (RCO). These lead entities run salmon recovery workgroups, including all Thurston County watersheds. They coordinate the identification and prioritization of salmon habitat projects.

Under the Streamflow Restoration Act (RCW 90.94), watershed planning groups have submitted watershed plans. These plans assess projected water use from permit-exempt wells. They also identify sources of water to offset the new water use by augmenting streamflows. Plans were created for all watersheds in Thurston County.

This chapter includes goals and policies aimed at fostering and strengthening these collaborations and partnerships.

3

# RESILIENCE IN THURSTON COUNTY

Thurston County is already experiencing the impacts of climate change. Flooding, droughts, wildfire, heatwaves, and other extreme events affect quality of life in Thurston County. These hazards are expected to have cascading effects on many sectors. They will worsen and stress county infrastructure and communities. The **Hazard Mitigation Plan for the Thurston Region** provides more detail on different types of hazards than what is mentioned in this section.

## A. Hazards

### Temperature

The 2015 Paris Agreement is a global treaty previously signed by the United States. It aims to keep the global average temperature rise to below 2°C (3.6°F) and ideally to 1.5°C above pre-industrial levels. As of 2023, the Earth's temperature has warmed at least 1.1°C (2°F), and emissions continue to rise.

From 1895 to 2024, Thurston County's average annual temperatures warmed about 1.3°C (2.4°F). The average daily maximum temperatures rose slightly between 1961 and 2013. The National Environmental Modeling and Analysis Center projects that the average daily maximum temperature in Thurston County will warm another 3.1°C - 4.9°C (5.6°F to 8.9°F) (Fig. 2-1).

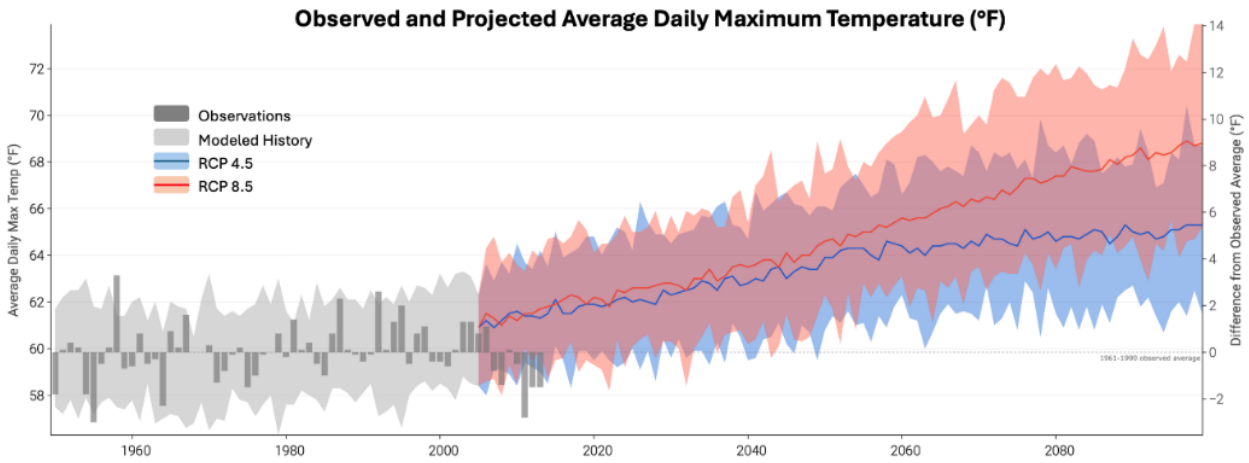


**Figure 2.1 Observed and Projected Average Daily Maximum Temperature (°F)**

Source: U.S. Climate Resilient Toolkit Climate Explorer, version 3.1. [2,3]

## Precipitation

Annual precipitation varies from year-to-year. Summer precipitation is projected to decrease while fall and winter precipitation are projected to increase. More winter precipitation is expected to fall as rain rather than snow.[4] The shift to more rain-dominant watersheds will have impacts on aquatic species (such as salmon), habitats, and water supply for the county.[5] [6] Atmospheric rivers—long, narrow bands of water vapor in the atmosphere—are contributing to extreme precipitation events, especially in fall and winter.[7] As the atmosphere warms, atmospheric rivers are expected to intensify. This will increase extreme rainfall events in Thurston County by approximately 31% by 2100, according to a high-emissions climate scenario (RCP8.5).[8] As extreme precipitation events intensify, flash flooding risk increases.

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2. Data from the U.S. Climate Resilient Toolkit Climate Explorer version 3.1. Accessed 10 June 2024. Climate projections and graphics produced by the National Environmental Modeling & Analysis Center (NEMAC) at the University of North Carolina Asheville.

3. RCP stands for Representative Concentration Pathway, which is a type of climate model. RCP4.5 a model based on a scenario with medium emissions; RCP8.5 is a model that assumes high emissions.

4. Rogers M. & Mauger, G. (2021), Pacific Northwest Climate Projection Tool. University of Washington Climate Impacts Group.

5. Atlas, W. I., Seitz, K. M., Jorgenson, J. W. N., Millard-Martin, B., Housty, W. G., Ramos-Espinoza, D., Burnett, N. J., Reid, M., & Moore, J. W. (2021). Thermal sensitivity and flow-mediated migratory delays drive climate risk for coastal sockeye salmon. FACETS, 6, 71-89. https://doi.org/10.1139/facets-2020-0027

6. Chang, M., Erikson, L., Araújo, K., Asinas, E. N., Chisholm Hatfield, S., Crozier, L. G., Fleishman, E., Greene, C. S., Grossman, E. E., Luce, C., Paudel, J., Rajagopalan, K., Rasmussen, E., Raymond, C., Reyes, J. J., & Shandas, V. (2023). Northwest Chapter. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), Fifth National Climate Assessment. *U.S. Global Change Research Program,* p. 5. https://doi.org/10.7930/NCA5.2023.CH27

7. Rhoades, A. M., Jones, A. D., Srivastava, A., Huang, H., O'Brien, T. A., Patricola, C. M., et al. (2020). The shifting scales of western U.S. landfalling atmospheric rivers under climate change. Geophysical Research Letters, 47, e2020GL089096. https://doi.org/10.1029/2020GL089096

8. Raymond C. & Rogers M. (2022), Climate Mapping for a Resilient Washington. Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow.

### Sea Levels

Sea levels in Puget Sound rose about 0.68 feet between 1899 and 2023.[9] Sea levels are expected to continue rising in Thurston County (Table 2-1).

**Table 2-1. Relative sea level rise projections, in feet, for Thurston County**

| Year | 99% Likelihood of Exceedance | 50% Likelihood of Exceedance | 1% Likelihood of Exceedance |
|---|---|---|---|
| 2050 | 0.1-0.3 | 0.8 | 1.4-1.6 |
| 2100 | 0.5-0.8 | 2.2-2.3 | 5.0-5.1 |
| 2150 | 0.9-1.4 | 3.7-3.9 | 10.2-10.4 |

Source: Table data from Miller et al. 2018[10]

### Wildfire

Fire is a natural part of Thurston County's ecosystems. While large wildfires are rare in Thurston County, climate change is increasing wildfire risk across the county. As wildfires in the Pacific Northwest continue to intensify, Thurston County is expected to experience more wildfire smoke days.

### Sector Impacts

These hazards—including extreme heat, flooding, sea level rise, and wildfire—are expected to have ripple effects on many sectors. The effects will worsen and stress county infrastructure and communities. These sector impacts are described in more detail below.

## B. Human Well-Being and Public Services

Each climate-related hazard can bring its own set of adverse public health outcomes. [11] Wildfires greatly reduce air quality, both nearby and downwind, in addition to their possible deadly and destructive impacts. They cause particle pollution as well as other pollutants, such as carbon monoxide or nitrogen oxides. Wildfire smoke contains respiratory irritants that can irritate the eyes and lungs. This can cause impacts such as bronchitis, respiratory infections, and worsen asthma, COPD, and other respiratory diseases. Smoke exposure also impacts the cardiovascular system, increasing the risk of heart failure, heart attacks and

9. Local relative sea level (RSL) trend computed at 142 long-term water level stations using a minimum span of 30 years of observations at each location. *NOAA Tides & Currents* (2024). https://tidesandcurrents.noaa.gov/sltrends/sltrends.html

10. Miller, I., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., . . . Grossman, E. (2018). Projected Sea Level Rise for Washington State – A 2018 Assessment. Seattle, WA: Climate Impacts Group, University of Washington. Retrieved from Climate Impacts Group, University of Washington: https://cig.uw.edu/projects/projected-sea-level-rise-for-washington-state-a-2018-assessment/

11. Chang, M., Erikson, L., Araújo, K., Asinas, E. N., Chisholm Hatfield, S., Crozier, L. G., Fleishman, E., Greene, C. S., Grossman, E. E., Luce, C., Paudel, J., Rajagopalan, K., Rasmussen, E., Raymond, C., Reyes, J. J., & Shandas, V. (2023). Northwest. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth National Climate Assessment.* U.S. Global Change Research Program, pp. 26-29. https://doi.org/10.7930/NCA5.2023.CH27

strokes. For pregnant people, smoke exposure may increase the risk of low birth weight and preterm birth.

Extreme heat can lead to heat-related illness, like heat stroke or dehydration. If untreated, these can lead to critical illness, brain injury, and death. Extreme heat can also exacerbate cardiac disease. Hot weather can also increase air pollutants such as ground level ozone. This can worsen respiratory conditions such as asthma and COPD. Also, heat can increase discomfort and disrupt sleep. This stresses the body and can harm mental health. The 2021 heat dome event raised temperatures to 107°F in Thurston County. This led to more emergency medical visits and at least six deaths.

The impacts of climate change are not experienced evenly across the county. Different groups of people feel the effects more than others. Examples include:

- Residents who live in more remote areas.
- Older adults.
- Low-income households.
- Children.
- Outdoor workers.
- People with pre-existing health conditions or disabilities.

Photo Credit: Experience Olympia

These groups are typically more sensitive to the impacts of climate change (Figure 2-2). For example, during the 2021 heat dome event, almost all heat-related injuries and excess deaths were within sensitive population groups such as older adults, children, outdoor workers, and people without air conditioning.[12] More urban areas will experience heat island effects[13] than rural areas because of more impervious surfaces and less tree or vegetation coverage. Heat island effects are temperature fluctuations across natural and built environments, and are expected to increase temperatures by 10-15°F relative to the county average. Tribes and Indigenous peoples will be additionally affected across the county, as access to cultural foods, harvest areas, and ceremonial sites may be impacted.

12. Vogel, J., J. Hess, Z. Kearl, K. Naismith, K. Bumbaco, B.G. Henning, R. Cunningham, N. Bond. (2023). In the Hot Seat: Saving Lives from Extreme Heat in Washington State. Report prepared by the University of Washington's Climate Impacts Group, UW's Center for Health and the Global Environment, the Washington State Department of Health, the Office of the Washington State Climatologist, and Gonzaga University's Center for Climate, Society & the Environment.

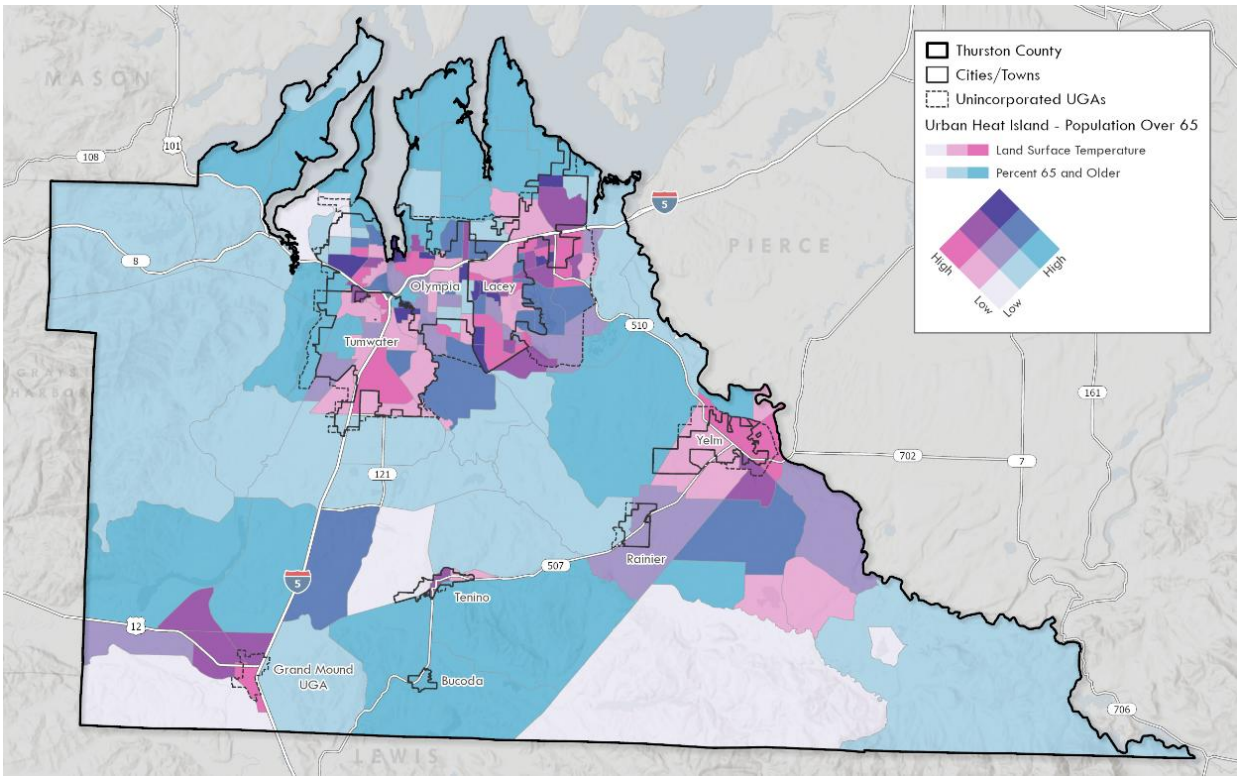


**Figure 2-2. Bivariate map of heat island effect and older adults, Thurston County (2023)**

Source: Spatial data from the U.S. Census Bureau American Community Survey, 5-year Estimate, 2018-2022; BERK 2024

Some public services and amenities are at risk of being damaged, disrupted or destroyed by climate change. These include:

- Medical services.
- Libraries.
- Parks and open spaces.

Climate change can lead to events like flooding, landslides, or wildfires, which can cut off road access. This is especially concerning for remote communities in south Thurston County or on Steamboat Peninsula. Residents in these areas often drive to buy food, medicine, and other necessities. Households without access to a vehicle (Figure 2-3) may rely on transit services. Disruptions to these services can hurt their ability to get essentials.

Public spaces help build community resilience. They can serve several important functions, such as:

- Acting as cooling centers during heat waves.
- Providing internet access, shelter, and meeting points during natural disasters.
- Strengthening social connections, which facilitate mutual aid networks.

Health care and social services are essential for mitigating the health impacts of climate change. This is especially true for those with chronic conditions, limited mobility, or other access and functional needs.[14] These services help ensure that everyone has support during times of crisis.

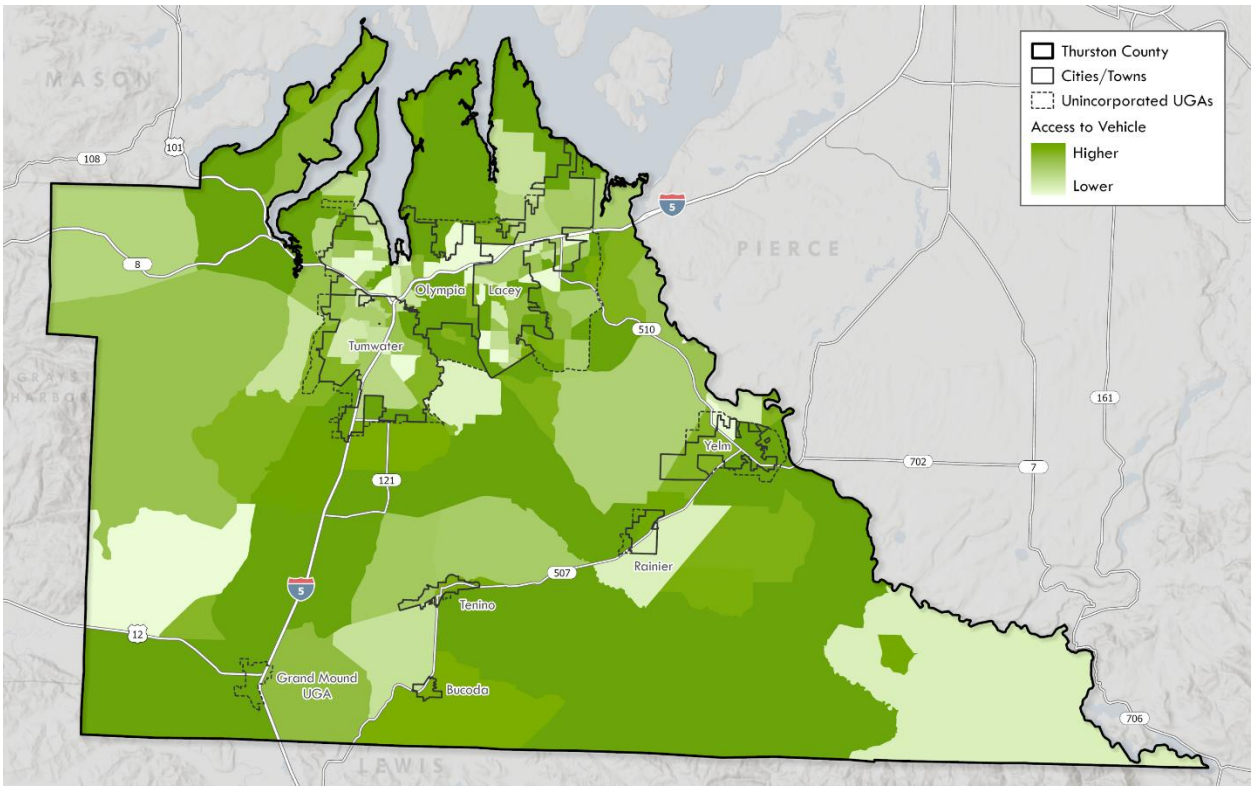


**Figure 2-3. Access to Vehicles by Block Group, Thurston County (2022)**

Source: U.S. Census Bureau American Community Survey, 5-year Estimates 2018-2022; BERK, 2024

## C. Ecosystems and Water Resources

### Ecosystems

Climate change threatens Thurston County's ecosystems and water resources. Many ecosystems will be significantly impacted, including:

- Forests.
- Prairies.
- Waterbodies.
- Wetlands and riparian areas.
- Montane and steep slope areas.

14 Individuals with "access and functional needs" refers to those with and without disabilities who may need additional assistance because of any condition (temporary or permanent) that may limit their ability to act in an emergency. https://www.fema.gov/sites/default/files/documents/fema_access-and-functional-needs-support_fact-sheet.pdf

- Shorelines.

These changes will affect ecosystems' ability to provide important ecological services. These ecosystems help us by providing clean air and water, cooling temperatures, and supporting wildlife habitat. For details on climate impacts on these ecosystems, see the **Vulnerability Assessment.**

Rising temperatures and shifting precipitation patterns are expected to alter streamflow. Key changes include higher runoff during the winter and reduced flow in the summer. These changes will increase water temperatures and worsen water quality issues such as algal blooms in lakes. This degradation will harm salmon and other species.[15] Extreme weather events will also cause flooding and erosion, especially in areas with steep slopes. Additional information on Thurston County's habitat vulnerabilities can be found in the **Vulnerability Assessment**, and wildlife corridor and habitat connectivity policies are detailed in the Environment, Recreation, and Open Space chapter (Chapter 4).

Forests will face significant challenges due to climate change. Hotter, drier summers will reduce suitable habitat for key species, like Douglas fir. It will also make plants more vulnerable to pests and diseases, like Armillaria root disease and Swiss needle cast. Forests will also face higher risks of intense wildfires due to decreased fuel moisture and increased tree deaths, affecting public safety.[16]

Oregon white oak woodlands are another critical ecosystem under threat. This habitat is now limited and declining. Oregon white oak woodlands are protected by Thurston County's Critical Areas Ordinance. In the future, these habitats may face reduced climate suitability and conifer encroachment. This will further stress a habitat that hosts more than 200 vertebrate species, including:

- Birds.
- Reptiles.
- Amphibians.
- Mammals, such as the state endangered western gray squirrel.

Many invertebrates, including various moths, butterflies, gall wasps, and spiders, are found exclusively in association with this oak species.

Prairies in Thurston County, designated as critical areas, support several endangered or threatened species, including:

- Mazama pocket gophers.

15. Chang, M., Erikson, L., Araújo, K., Asinas, E. N., Chisholm Hatfield, S., Crozier, L. G., Fleishman, E., Greene, C. S., Grossman, E. E., Luce, C., Paudel, J., Rajagopalan, K., Rasmussen, E., Raymond, C., Reyes, J. J., & Shandas, V. (2023). Northwest Chapter. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), Fifth National Climate Assessment. *U.S. Global Change Research Program,* p. 5. https://doi.org/10.7930/NCA5.2023.CH27

16. Climate Impacts Group (2020). Washington Climate Change Impacts Assessment: How will climate change affect forests in Washington. https://cig.uw.edu/wp-content/uploads/sites/2/2020/12/snoveretalsok2013sec7.pdf

- Oregon vesper sparrow.
- Streaked horned lark.
- Mardon skipper.
- Taylor's checkerspot butterfly.
- Western pond turtle.

Photo Credit: Experience Olympia

Prairie ecosystems may experience shifts in species composition and biodiversity.[17] Wetter winters could possibly expand wetland prairies. Invasive species and changes in flowering times could disrupt native species and reduce plant-pollinator interactions. This may harm some plant populations, such as camas (*Camassia quamash*), which is harvested by local Tribes.

The Washington Department of Fish and Wildlife says pollinator numbers are also at risk. For example, the endangered Taylor's checkerspot butterflies (TCBs) are sensitive to extreme temperatures and drought.[18] Montane TCB populations are affected by reduced snowpack and earlier snowmelt. These changes create new, exposed conditions for overwintering larvae, likely increasing mortality rates. Reduced snowpack also hastens harmful conifer encroachment in the butterfly's open, grassland habitat. Sea level rise will significantly affect beaches, marine bluffs, coastal wetlands, and shorelines. It will lead to:

- Erosion.
- Seawater intrusion.
- Habitat loss.
- Coastal squeeze, a term for intertidal habitat loss.

Marine bluffs along Puget Sound, especially in areas like Boston Harbor and Burfoot Park, are at risk of accelerated erosion. Rising sea levels increase wave action and destabilize these cliffs. Coastal wetlands, such as those in the Billy Frank Jr. Nisqually National Wildlife Refuge, face inundation. These wetlands are trapped between rising sea levels and human infrastructure with nowhere to migrate.[19]

This could destroy vital near-shore habitats for species including salmon, forage fish, and migratory birds. Without space for natural habitat migration, some species may decline. The

17. Dunwiddle, P.W., E.R. Alverson, R.A. Martin, & R. Gilbert. (2014). Annual Species in Native Prairies of South Puget Sound Washington. Northwest Science. 88(2): 94-105.

18. Taylor's checkerspot | Washington Department of Fish & Wildlife

19. Johannessen, J., & MacLennan, A. (2007). Beaches and bluffs of Puget Sound.

Nisqually River Delta and Mud Bay are especially vulnerable to both flooding and erosion, leading to long-term habitat degradation.

As ecosystems change from climate pressures, species in Thurston County may migrate out of the county. Some new species may migrate or expand their habitat into the county as well. Some species will become more vulnerable, population sizes will decrease, and habitat will be lost because of climate impacts. As Thurston County prepares for a changing climate, it is important to address that what is now considered a "local" species may not always be true. Species such as the Marbled Murrelet seabird may depend on migration to new habitat locations as their suitable environments decrease or shift.

Photo Credit: Experience Olympia

**Water Resources**

Climate changes to water quality and quantity also impact human populations. Thurston County's drinking water supply mainly comes from groundwater. Increasing demands for water come from:

- Ongoing population growth.
- Agriculture.
- Other consumptive uses.
- Associated land use practices.

These demands have led to lower streamflow and declining groundwater levels in some areas. These decreases have impacted fisheries and general stream health. Groundwater overdraft conditions have not been observed for any of the wells used for county drinking water. However, smaller wells may be at risk in future droughts.

Changes in freezing elevation and snowpack loss may harm groundwater in the county's aquifers. This will affect supply issues in the Nisqually Watershed, the only snow-driven watershed of the five Water Resource Inventory Areas (WRIAs) in the county.[20] The lower Nisqually Watershed is one of the most heavily farmed basins in Western Washington. The Nisqually River is an important source of hydropower and municipal supply. As a result, most water in the watershed is already appropriated.

As precipitation patterns change, surface flows and baseflows will be affected. This will place additional stress on groundwater to support additional uses including:

20. The other four WRIAs are the Deschutes, Kennedy-Goldsborough, and Upper and Lower Chehalis Watersheds. WRIA Plans developed under RCW 90.94 will help guide efforts to restore streamflows to levels that support salmon recovery. Federally recognized Tribes like the Nisqually with a usual and accustomed harvest area within the WRIA are invited to participate as part of the planning unit.

- Pumping for escalating needs.
- New drought purposes such as dust abatement on working lands.
- Emergency response pumping.

Seawater intrusion is also a concern for coastal areas of Puget Sound. This occurs when saltwater moves into freshwater aquifers. Thurston County Public Works is monitoring the Tamoshan Aquifer, the sole source for one of three drinking water systems operated by the county. Public Works is documenting potential seawater intrusion at a newly established well in the area. This is a concern if sea level rise shifts the hydraulic gradient, which can influence the direction of flow. If intrusion from sea level rise happens, Thurston County will require control/management and treatment to ensure drinking water safety.

Two coastal sewer systems operated by the county in the Boston Harbor and Tamoshan Service Areas are sometimes forced to exceed their permit limits. This happens during prolonged, heavy rainfall, which is expected to become a more frequent occurrence due to climate change. These older systems are not as tight and well-sealed, allowing stormwater entry through:

- Sewer lines.
- Manholes.
- Poorly sealed septic tanks.

These overflow discharges not only impact water quality, but also present a financial liability for the county.

Photo Credit: Experience Olympia

## D. Infrastructure

Energy and transportation systems face future stressors, including climate risks and population growth. Hydropower supply will face supply issues as snowpack declines. Energy delivery may be disrupted by more frequent, intense extreme events. Transportation systems, especially low-lying assets (such as roads, railroads, and depots), face risks from extreme heat and flooding. Safe transportation routes and modes are vital for evacuations before and during wildfires and extreme weather.

### Energy

As temperatures rise and heatwaves worsen, energy demand is expected to grow. This is especially true in summer. Cooling degree days measure the energy demand for cooling. These cooling days have already increased in Thurston County and are expected to rise

significantly through the end of the century (Figure 2-4). Surges in energy demand during heatwaves can lead to blackouts or brownouts – or temporary disruptions in power supply. This happens when energy utilities can't meet the immediate demand. The 2021 heat dome event caused a surge in cooling demand. As a result, almost 6,000 Puget Sound Energy customers lost power across the region. Additionally, climate change can affect energy delivery. For example, extreme rains and storms can down power lines or flood energy assets, such as substations. Heatwaves can cause lines to sag, reducing transmission efficiency.

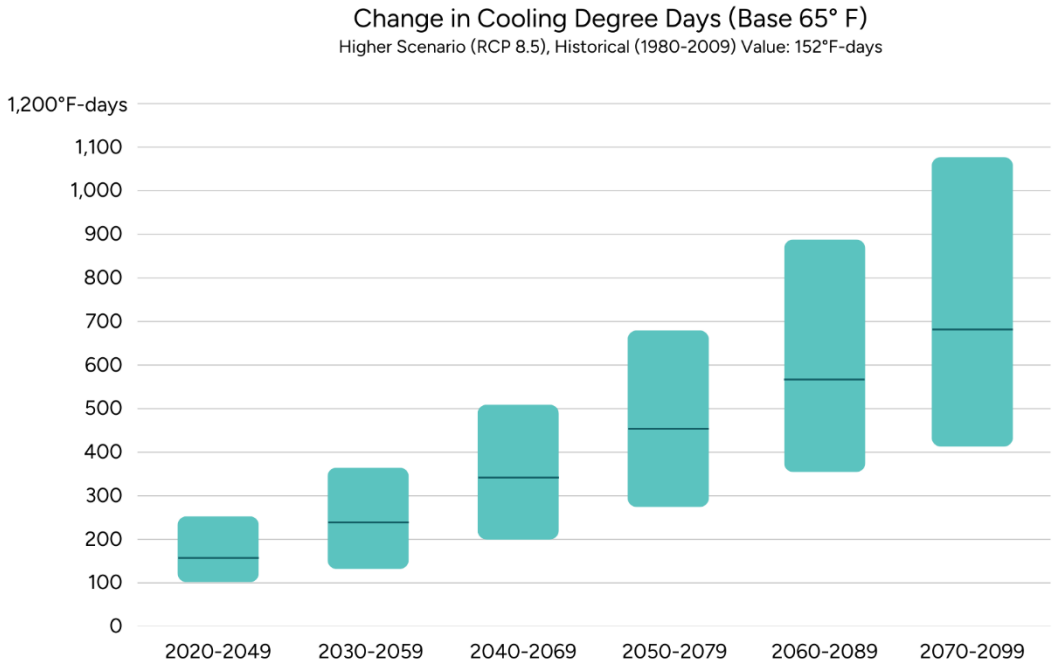


**Figure 2-4. Change in Cooling Degree Days Under RCP 8.5, Thurston County**
Note: Cooling degree days measure the energy increase from the need to cool indoor spaces to be a comfortable temperature

Source: Raymond and Rogers, 2022

## E. Transportation

Transportation networks across Thurston County face significant risks (Figure 2-5). Extreme heat can cause pavement to rut and crack. This harms roads, bike paths, and pedestrian walkways. Heat can also cause metal parts of bridges and rail lines to expand, potentially leading to warping or damage. Repeated flooding and heavy rains can increase corrosion rates. This affects the stability and integrity of various transportation assets, such as bridges or elevated roads.

Safe transportation routes are crucial for evacuations and emergency response access. Many households in Thurston County can evacuate with a private vehicle. However, households without access to private vehicles are more likely to rely on public transit, like buses.

During wildfire and other extreme weather events, public transit systems can face challenges such as:

- Delays.
- Unavailability because of power outages.
- Increased demand.

People who rely on public transit may spend extended time outdoors during these emergencies. They are exposed to smoke while waiting for public transit, which can be especially harmful for:

- People with existing cardiac or respiratory illness.
- Older adults.
- People with other existing vulnerabilities.

Communities with lower access to transit and those who live in remote areas with limited routes (such as the Olympic National Forest area) may be especially vulnerable during wildfires or other extreme weather emergencies.

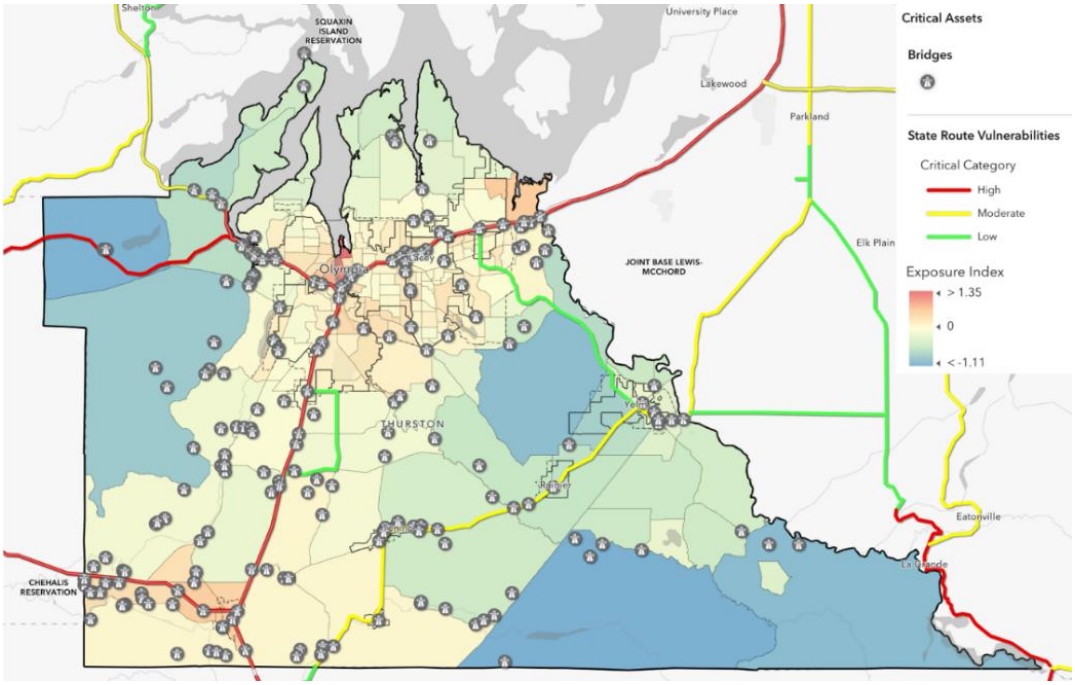


**Figure 2-5. Transportation Asset Climate Impact Exposure, Thurston County**

Source: WSDOT 2021[21]; BERK, 2024

Low-lying roads, especially in south Thurston County, face annual traffic closures due to flooding. For example, after an atmospheric river event in January 2022, many roads, including parts of I-5, were partially or completely closed due to flooding (Figure 2-6).

21. Washington State Department of Transportation. (2021). Climate Impacts Vulnerability Assessment. https://wsdot.wa.gov/sites/default/files/2021-10/Climate-Impact-AssessmentforFHWA-12-2011.pdf

The 2023 **Hazard Mitigation Plan for the Thurston Region** notes the vulnerability of transportation assets in the county:

- 15 transportation community lifelines located in the 50-year special flood hazard area.
- 19 in the 100-year special flood hazard area.
- 23 in the 500-year special flood hazard area.[22]

Understanding these risks is essential for improving transportation safety and resilience in Thurston County.

**Figure 2-6. Flooding south of Rochester due to an atmospheric river on January 7, 2020**

Source: Tony Overman, The Olympian

## F. Community Design, Land Use, and Economic Development

### Residential

Land use and zoning can boost economic growth and housing. But they can also worsen some types of climate-related risks. For example, increased development can lead to more encroachment into wildland-urban interface (WUI) areas. WUI areas are where structures meet or intermingle with a wildland area. WUI areas are at higher risk of climate hazards such as wildfire and flooding. Approximately 34% of unincorporated Thurston County, or 18,500 structures, are in the WUI. This makes these structures and communities more at risk of flooding and fires.

Rural residents depend on cars to access goods and services in south county's rural towns. Climate change may cause flooding and wildfires that could temporarily isolate households. Encouraging commercial services in south county UGAs or rural nodes could support community health and resilience as noted in the Thurston Climate Adaptation Plan.[23]

### Commercial

22. Thurston Regional Planning Council. (2023). Hazards Mitigation Plan for the Thurston Region. https://www.trpc.org/160/Hazards-Mitigation-Plan.

23. Thurston Regional Planning Council. (2018). Thurston Climate Adaptation Plan: Climate Resilience Actions for Thurston County and South Puget Sound: TRPC, 2018.

Climate change is also expected to affect county commercial zoning and economic development. Commercial zones are usually in areas with more impervious surfaces, such as pavement, roofs, and less tree cover. This increases heat island effects (Figure 2-7, Figure 2-8). For example, commercial areas in Yelm have some of the worst heat island impacts in the county. Also, some county commercial areas are at risk of sea level rise and coastal flooding (e.g., downtown Olympia). Flooding events are becoming more frequent and intense, disrupting, or damaging businesses.

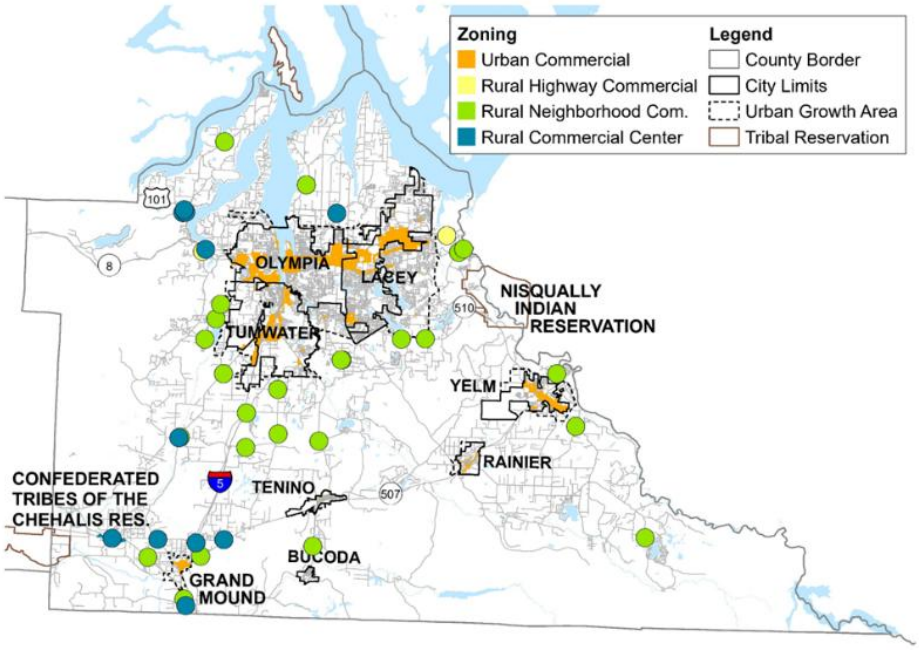


**Figure 2-7. Commercial Zoning Nodes, Thurston County**

Source: Thurston Regional Planning Council, 2021

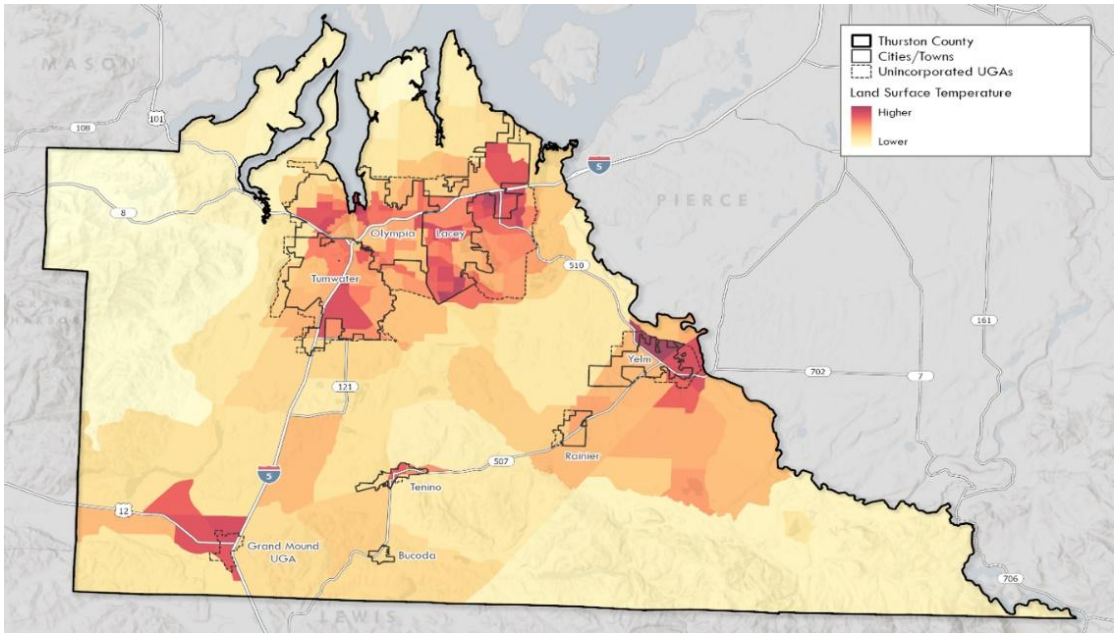


**Figure 2-8. Land Surface Temperature, Thurston County**

Source: LANDSAT8; BERK, 2024

## G. Natural Resource Lands and Economies

Thurston County has a vibrant mix of economies that rely on natural resources. These include agriculture, shellfish, and forestry. The county's agricultural economy is primarily:

- Aquaculture (33%).
- Livestock production on pastureland (33%).
- Hay/silage production (19%).
- Other crop types.[24]

According to the 2022 Census of Agriculture, about 78% of the county's $190M in agricultural production was for livestock and poultry.

Agriculture and Food Industries

Natural resource-dependent industries will be impacted by climate change in several ways. Warmer temperatures will extend growing seasons for some crops, but climate change is expected to affect most crop's quality and quantity. This will impact agricultural revenues for farmers and ranchers.[25] Impacts can include:

- Warmer temperatures can reduce the nutritional quality of forage and pasture lands, which comprise of approximately one-third of agricultural lands in the county.[26]
- Varietal crops, such as fruits and vegetables may get sunburns that affect produce quality and market revenues.[27]
- Crop yields could be lowered by extreme weather events.
- Pollinator loss could reduce yields of fruits, vegetables, and nuts that depend on them.
- Climate change may reduce the supply of vitamin and mineral-rich foods important for healthy diets.[28]

Pasture and forage quality could impact agricultural operation costs and livestock health. Livestock are also vulnerable to heat stress, flooding, and wildfire. Recent fire and flooding

24. WSDA. (2023). Agricultural Land Use. Available: https://agr.wa.gov/departments/land-and-water/natural-resources/agricultural-land-use. Accessed: July 15, 2024.

25. Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover. (2015). *State of Knowledge: Climate Change in Puget Sound.* Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D

26. Thurston Regional Planning Council. (2018). Thurston Climate Adaptation Plan: Climate Resilience Actions for Thurston County and South Puget Sound: TRPC, 2018.

27. Chang, M., Erikson, L., Araújo, K., Asinas, E. N., Chisholm Hatfield, S., Crozier, L. G., Fleishman, E., Greene, C. S., Grossman, E. E., Luce, C., Paudel, J., Rajagopalan, K., Rasmussen, E., Raymond, C., Reyes, J. J., & Shandas, V. (2023). Northwest. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth National Climate Assessment.* U.S. Global Change Research Program, pp. 26-29. https://doi.org/10.7930/NCA5.2023.CH27

28. Semba RD, Askari S, Gibson S, Bloem MW, Kraemer K. (2022) The Potential Impact of Climate Change on the Micronutrient-Rich Food Supply. Adv Nutr. 2022 Feb 1;13(1):80-100. doi: 10.1093/advances/nmab104. PMID: 34607354; PMCID: PMC8803495.

events have led to evacuations and emergency assistance. Thurston County partnered with non-profits and others to promote emergency response plans for animals, barns, and agricultural facilities. [29] State agencies provided funding for flood hazard reduction projects.[30]

The shellfish industry covers one-third of the county's agriculture lands. It faces risks from multiple climate stressors, such as:

- Ocean warming.
- Sea level rise.
- Acidification.
- Heat stress.
- More stormwater pollution from extreme precipitation events.

Non-climate stressors such as shoreline development also pose threats to aquaculture. Loss of access to shellfish puts members of Tribes within the county at risk of diminished physical and mental health. This is due to nutritional and cultural ties to their traditional harvest and use of shellfish.

**Forestry**

Forests cover over 40% of the county's area but declined by more than 41,000 acres between 1992 and 2011. However, between 2011 and 2016, forestland increased slightly, a reversal of previous losses (TRPC 2024).[30] The county is studying tree canopy at risk of conversion and opportunities for conservation and restoration. It has updated its rules on forest conversions.

Summer moisture stress, wildfire, invasive species, and insects could reduce forest growth.[31] Changes in temperature and precipitation could alter the range of Oregon white oak (Garry oak), Douglas fir and other species.

Photo Credit: Experience Olympia

29. Thurston County. (2023). 8 Steps to develop and implement an emergency response plan for your horse, barn or boarding/training facility. Available: https://s3.us-west-2.amazonaws.com/thurstoncountywa.gov.if-us-west-2/s3fs-public/2023-04/TCEO%20Letter8%20Steps%20-%20with%20logo%20FINAL%20%2812%29.pdf. Accessed: September 6, 2024.

30. TRPC. (2024). Sustainable Thurston Report Card, Land Cover. Accessed: https://www.trpc.org/680/Conserving-Rural-Lands. Accessed: September 5, 2024.

31. Raymond, C., Morgan, H., Peterson, D., Halofsky, J. (2022). A Climate Resilience Guide for Small Forest Landowners in Western Washington. A Collaboration of the University of Washington Climate Impacts Group, the U.S. Forest Service, and the Northwest Climate Hub. https://cig.uw.edu/wp-content/uploads/sites/2/2022/04/SmallForestLandowner-Guide-RedSize.pdf.

This may cause pest and disease outbreaks.[32] Oregon white oaks are tolerant to drought and periodic wildfire may help oak regeneration. However, frequent fire could damage soil and allow for invasive species.[33]

4

# GREENHOUSE GAS EMISSIONS IN THURSTON COUNTY

A critical component of addressing climate change is reducing emissions of climate-changing greenhouse gases. This chapter focuses on two key sources of GHG emissions: community activities and county government operations.

## A. Community-wide Emissions Summary

In 2022, the Thurston County community emitted an estimated 4.2 million metric tons of carbon dioxide equivalent (MTCO2e), the equivalent of 14.1 MTCO2e per capita. As shown in Figure 2-9, key sources of GHG emissions include:

- On-road vehicles (27%), including passenger vehicles, freight, and other commercial cars and trucks.
- Electricity (24%) used to heat, cool, and power residential, commercial, and industrial buildings.
- Tree loss (20%) from land use conversion and forest management.

32. Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover. (2015). *State of Knowledge: Climate Change in Puget Sound.* Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D

33. Hudec, J.L.; Halofsky, J.E.; Peterson, D.L.; Ho, J.J., eds. (2019). Climate change vulnerability and adaptation in southwest Washington. Gen. Tech. Rep. PNW-GTR-977. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 249 p. https://www.fs.usda.gov/pnw/pubs/pnw_gtr977.pdf

- Natural gas (9%) used for building space/water heating, cooking, and other uses.
- Aviation (6%) from passenger air travel.
- Refrigerants (4%) used within the county, including for building and vehicle cooling.
- Agriculture (2%) emissions from livestock and soil management.
- Solid waste (3%) from generation and disposal in landfills and composting facilities.

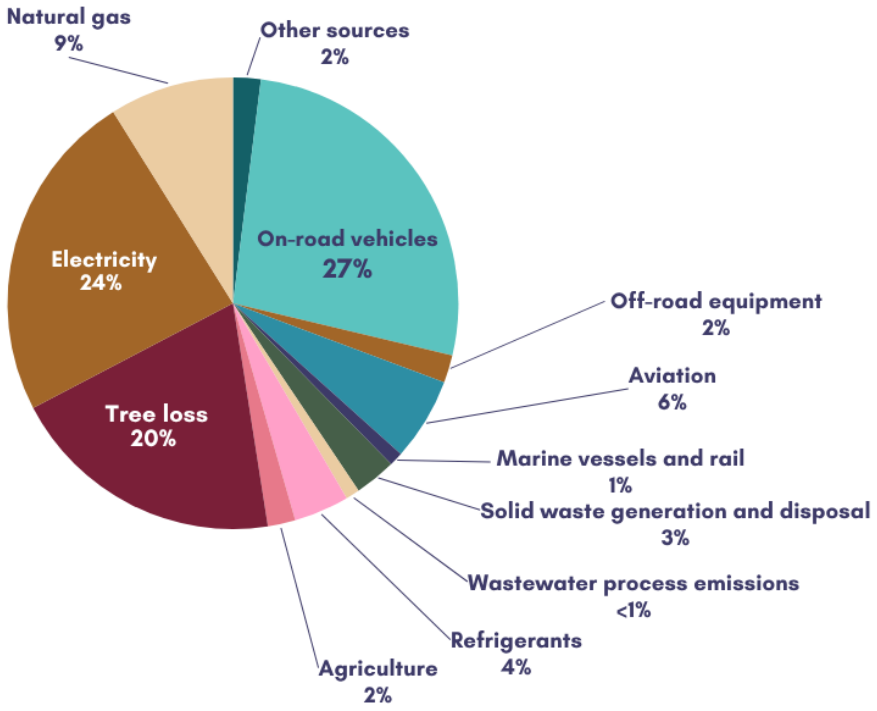


**Figure 2-9. Community-wide GHG Emissions, Thurston County (2022)**

Source: Thurston County 2022 Greenhouse Gas Emissions Analysis, Washington Department of Commerce, 2024. Additional updated data is accessible through Washington Department of Commerce.

## B. County Operations Emissions Summary

While community-wide GHG emissions account for most county emissions, it is also important to consider the County government's own GHG emissions. The county has the most direct influence over its own GHG emissions sources. Policies to reduce these emissions sources help the county lead by example and inspire community-wide action.

In 2022, Thurston County government emitted an estimated 11,995 $MTCO_2e$. This is equivalent to 0.3% of total community-wide emissions. Figure 2-10 shows the largest sources of County government operations GHG emissions were from:

- County facility electricity consumption (32%).
- County-owned landfills (21%).
- Employee commuting (18%).
- On-road fleet vehicles (12%).

- County facility natural gas consumption (11%).

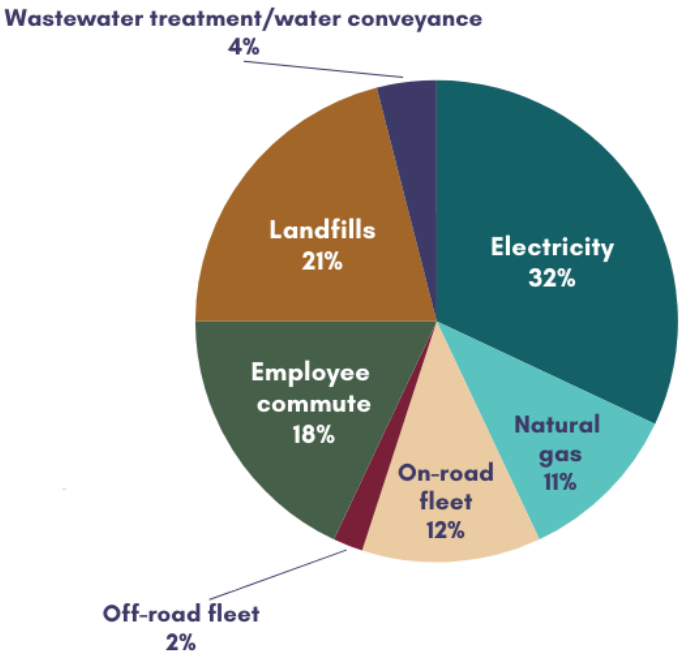


**Figure 2-10. County Operations GHG Emissions, Thurston County (2022)**

Source: Thurston County 2022 Greenhouse Gas Emissions Analysis, Washington Department of Commerce, 2024. Additional updated data is accessible through Washington Department of Commerce.

## C. Greenhouse Gas Emission Reduction Targets

Thurston County set targets to reduce county-wide GHG emissions 45% and 85% from 2015 levels by 2030 and 2050, respectively (*Resolution #15644*). However, to be compliant with state targets and Washington Department of Commerce guidance, Thurston County has the following new community-wide GHG emission reduction targets:

- 45% reduction by 2030.
- 70% reduction by 2040.
- Net-zero emissions by 2050 (95% reduction).

The goals, objectives, and targets developed in this chapter aim to work towards achievement of these targets.

### Built Environment

The built environment is a major GHG emission source in Thurston County. It accounts for more than a third of community emissions. Figure 2-12 shows that the majority of emissions within this sector come from electricity use in residential and commercial buildings, as well as residential natural gas use. While electricity is currently a major emissions source, electricity emissions have generally been declining as state policy and electric utilities transition to renewable electricity generation sources such as solar and hydropower. Past Thurston County GHG emissions inventories show that natural gas emissions have been rising over time. Policies that reduce energy use in new and existing buildings, shift to renewable energy, and improve energy efficiency in homes will reduce GHG emissions.

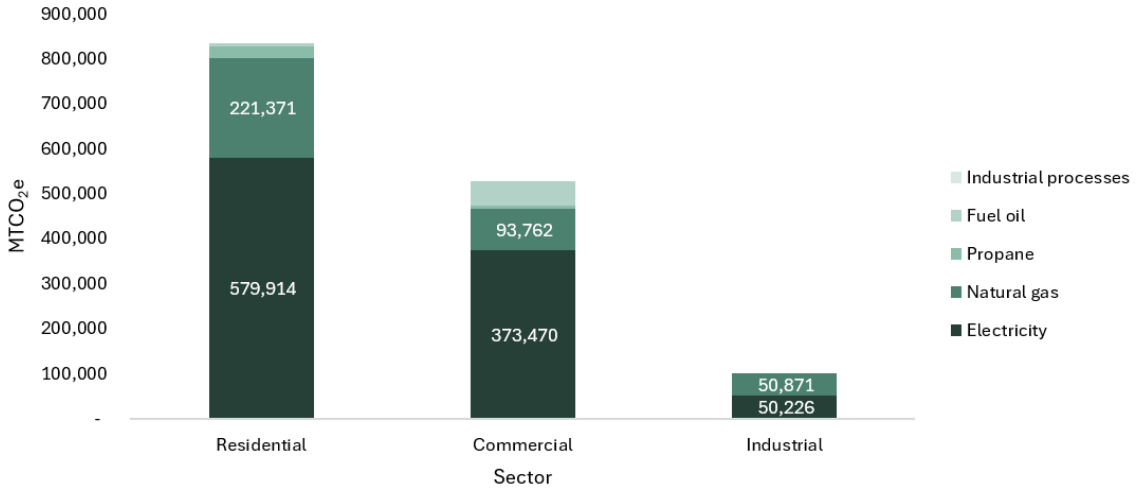


**Figure 2-11. Building GHG Emissions in Thurston County, by Sector and Source**

Source: Thurston County 2022 Greenhouse Gas Emissions Analysis, Washington Department of Commerce, 2024. Additional updated data is accessible through Washington Department of Commerce.

## Transportation

In 2022, the transportation sector contributed over a third of Thurston County's total community-wide GHG emissions. Over half of emissions within the transportation sector come from passenger vehicle travel. This is followed by freight/commercial vehicles, air travel, and off-road equipment (Table 2-2). In 2022, there were over two billion vehicle miles traveled (VMT) within the county. This equates to 7,039 annual miles per capita. Policies that reduce transportation emissions include VMT reduction measures (e.g., transit-oriented development, expanded multimodal and transit options) and expanding use of more efficient and alternative fuel (e.g., electric) vehicles through expansion of EV infrastructure and promotion of EV adoption.

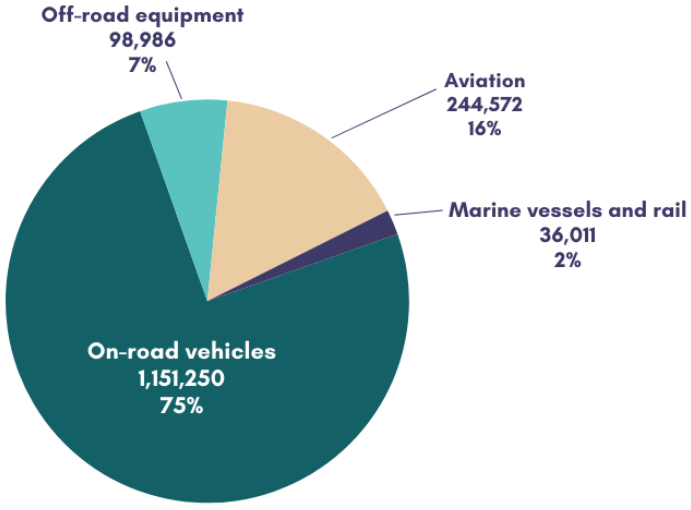


**Figure 2-12. Transportation GHG Emissions in Thurston County, by Sector and Source**

Source: Thurston County 2022 Greenhouse Gas Emissions Analysis, Washington Department of Commerce, 2024. Additional updated data is accessible through Washington Department of Commerce.

### Land Use

Land use changes and practices accounted for almost a quarter (22%) of Thurston County community-wide GHG emissions in 2022. This includes agriculture, forest management, and tree canopy loss. The GHG inventory estimates that over 20,000 acres of land in Thurston County have experienced tree loss since 2016.[34] In some cases, tree loss will be replaced with new tree plantings. However, there is a time lag between tree loss and regrowth that result in net GHG emissions in the near-term. Emissions from agriculture are relatively small in comparison and include emissions from livestock and soil management. Policies that would reduce net GHG emissions from land use include:

- Preserving and enhancing carbon stocks through improved forest management.
- Improved agricultural practices.
- Avoiding tree loss.
- Afforestation/reforestation.

### Other Emission Sources

Other sources of community-wide GHG emissions in Thurston County include refrigerant use, solid waste generation and disposal, and wastewater treatment. Compared to other Washington counties, Thurston County does not have significant industrial point sources.[35] Policies that reduce greenhouse gas emissions in the waste category include waste minimization, waste diversion, and sustainable consumption measures.

## 5 GOALS AND POLICIES

This section highlights goals and policies that support Washington Department of Commerce requirements (Table 2-), organized by key sectors (Table 2-). Additional programmatic or department-specific goals, objectives, and policies are listed within the relevant chapters of the Comprehensive Plan.

**Table 2-2. Washington Department of Commerce Climate Chapter Requirements**

| Focus | Requirement |
|---|---|
| Resilience | **Requirement 1:** Address natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, drought, heat, smoke, wildfire, and other effects of changes to temperature and precipitation patterns; |

34. Note that land within this boundary could include land owned and/or managed by federal, state, Tribal, and city governments.

35. As indicated by U.S. EPA reporting. Source: U.S. EPA Facility Level Information on GreenHouse gases Tool (FLIGHT), reported for data year 2022. https://ghgdata.epa.gov/ghgp

| | |
|---|---|
| | **Requirement 2:** Identify, protect, and enhance natural areas to foster climate resilience, as well as areas of vital habitat for safe species migration; and |
| | **Requirement 3:** Identify, protect, and enhance community resilience to climate impacts, including social, economic, and built-environment factors, which support adaptation to climate impacts consistent with environmental justice. |
| GHG Emission Reduction | **Requirement 1:** Result in reductions in overall GHG emissions generated by transportation and land use within the jurisdiction but without increasing emissions elsewhere in Washington; |
| | **Requirement 2:** Result in reductions in per capita vehicle miles traveled (VMT) within the jurisdiction but without increasing greenhouse gas emissions elsewhere in Washington; and |
| | **Requirement 3:** Prioritize reductions that benefit overburdened communities to maximize the co-benefits of reduced air pollution and environmental justice. |

**Table 2- 3. Climate Chapter policy structure by key sector and climate nexus**

| Sector(s) | Climate Policy Nexus |
|---|---|
| Zoning, Buildings, and Energy Resilience and GHG emission reduction policies are incorporated in this sector. | • Create land use patterns that enhance the resilience of built environments and communities to climate impacts while promoting environmental justice outcomes.<br>• Encourage sustainable infrastructure, resilient design standards, renewable energy generation, and decarbonization strategies. |
| Transportation Resilience and GHG emission reduction policies are incorporated in this sector. | • Develop transportation systems and infrastructure that can withstand climate-related hazards, with special attention to vulnerable populations.<br>• Guide the expansion of transit access and options in addition to encouraging the adoption of electric vehicles. |

| | |
|---|---|
| Waste Management GHG emission reduction policies are incorporated in this sector. | • Reduce waste generation.<br>• Promote sustainable consumption. |
| Water Resources Resilience policies are incorporated in this sector. | • Preserve water quality and quantity while addressing the challenges posed by climate change, such as drought, sea level rise, and other hazards.<br>• Building adaptation against flooding leads to a more flood-resilient communities, decreasing the amount of damage and health concerns associated with extreme precipitation events. |
| Community Well-Being and Emergency Services Resilience policies are incorporated in this sector. | • Prioritize investments to protect overburdened communities from disproportionate climate-related health hazards, ensuring that resilience resources and benefits reach the most vulnerable populations.<br>• Strengthen emergency response, recovery efforts, and hazard mitigation strategies, focusing on extreme weather events exacerbated by climate change, while enhancing public awareness, data collection, and community preparedness. |
| Cultural Resources and Practices Resilience policies are incorporated in this sector. | • Collaborate with Tribes and communities to protect culturally and historically significant sites and natural resources vulnerable to climate change impacts, such as flooding, erosion, and wildfires. |
| Environment and Ecosystems Resilience and GHG emission reduction policies are incorporated in this sector. | • Implement climate-resilient strategies to protect, preserve, and expand forests, prairies, and aquatic ecosystems, including carbon sequestration, habitat restoration, and coordination with private landowners and jurisdictions for long-term sustainability. |
| Agriculture and Food Systems Resilience and GHG emission reduction policies are incorporated in this sector. | • Promote climate education, regenerative practices (farming practices that enhance ecosystem functions, emphasizing soil health and carbon sequestration), and sustainable farming techniques to help agricultural producers adapt to climate impacts, while enhancing local food security and ecosystem health.<br>• Support the adoption of carbon-sequestering agricultural practices, renewable energy solutions, and improved land management. |

Economic Development Resilience policies are incorporated in this sector.

- Supports workforce needs that move towards green, resilient, and sustainable industries and economies. Focusing on creating opportunities in frontline communities.

### Zoning, Buildings, and Energy

## **GOAL 1:** Equitably Enhance Community and Infrastructure Resilience to Climate Change by Integrating Sustainable, Efficient, and Adaptive Practices into Zoning and Development Regulations.

**Goal 1 | Objective A** Establish land use patterns that increase the resilience of the built environment, ecosystems, and communities to climate change and further environmental justice outcomes.

**POLICIES:**

**CL-1.A.1** Conduct environmental justice audits prior to creating new zoning designations or rezoning.

**CL-1.A.2** Utilize land use tools to increase resilience to climate hazards and protect vulnerable areas.

**CL-1.A.3** Maintain a stable urban growth area to reduce development pressure on rural and resource lands.

**CL-1.A.4** Identify and implement strategies to increase the resilience of the shoreline environment to sea-level rise and other climate hazards, while also protecting shoreline ecological functions, allowing and adjusting water-dependent uses, and providing public access consistent with what is required for shoreline protection.

**CL-1.A.5** Update and maintain a critical areas ordinance that incorporates climate change considerations.

**CL-1.A.6** Incorporate climate resilience principles such as floodwater containment, climate resilient vegetation, and heat reduction strategies into county landscaping, as well as and parks, trails, and open space plans.

**CL-1.A.7** Recognize climate-related opportunity costs when making decisions on infrastructure and land use. Establish a standard for approving transportation, zoning, land use and industrial, commercial, or residential developments based

on the costs and impacts these changes or projects will have on resilience to climate impacts and the greenhouse gas emissions of the region.

**CL-1.A.8** Direct growth away from natural hazards created or aggravated by climate change, including sea level rise, landslides, flooding, areas likely to experience a concentration of smoke, wildfire, and other localized effects of changes to temperature and precipitation patterns, by avoiding urban growth area, density increase or upzoning, or residential designations into areas. Use both regulatory and voluntary, incentive-based approaches to steer development toward safer, more resilient areas.

### **Goal 1 | Objective B** Ensure buildings and infrastructure are designed, built, and maintained sustainably to enhance operational efficiencies, lower greenhouse gas emissions, reduce environmental impacts, and remain resilient to extreme weather and other hazards worsened by climate change.

**POLICIES:**

**CL-1.B.1** Identify and assess cost-effective project opportunities for increasing resilience and reducing greenhouse gas emissions. Seek cost effective approaches to implementing climate adaptation and mitigation actions.

**CL-1.B.2** Establish development regulations that reduce loss of life and property by reducing the risk of wildfire, extreme heat, flooding, drought, and other climate-exacerbated hazards on buildings and infrastructure.

**CL-1.B.3** Factor climate impacts and resilient design into the full life-cycle costs of roads, buildings, parks, utilities, and other assets, from their initial siting and design to their ongoing operations and maintenance. Ensure that infrastructure investments contribute to long-term climate mitigation and adaptation outcomes that best support the county's greenhouse gas reduction and resilience goals.

**CL-1.B.4** Discourage development in riverine or marine flood hazard areas when feasible, and require that new or renovated buildings utilize riverine or marine flood-protection measures to accommodate projected sea-level rise over the structures' lifespan.

**CL-1.B.5** Evaluate and implement strategies (e.g., elevating, reinforcing, or relocating equipment) to improve the safety and reliability of existing and planned electrical equipment that is within areas vulnerable to climate change impacts.

**CL-1.B.6** Provide local funding and seek funding opportunities to provide incentives and rebates to support cooling, weatherization, energy and water efficiency, and renewable energy investments in buildings and land use.

**CL-1.B.7** Prioritize increasing energy efficiency and climate resilience of existing buildings through adaptive reuse projects, refuge cooling, and weatherization. Focus on preserving and retrofitting buildings, infrastructure, and lighting to be more energy efficient and resilient during climate hazards, emphasizing accessible

and affordable weatherization in overburdened communities, particularly those at higher densities, to reduce emissions and increase resilience.

**CL-1.B.8** Encourage the use of energy efficient appliances in new construction, including water heaters that control timing of demand.

### **Goal 1 | Objective C** Reduce energy use and support decarbonization in new and existing residential, commercial, and government buildings.

**POLICIES:**

**CL-1.C.1** Strengthen state building and energy code development and implementation specific to decarbonization and electrification. Educate and support building officials, partners, industry professionals, residents, and staff to implement energy and building codes that reduce energy use, embodied carbon of materials, and phase out fossil fuel use.

**CL-1.C.2** Lead the coordination of a regional policy for assessment and disclosure of residential and commercial building energy performance ratings. Implement proactive adoption of supportive actions and programs.

**CL-1.C.3** Foster equitable partnerships with organizations and educational institutions serving overburdened communities to promote and implement energy education and incentive programs that alleviate energy cost burdens for residents.

### **Goal 1 | Objective D** Increase the production of local renewable energy.

**POLICIES:**

**CL-1.D.1** Advocate with the Legislature, the Utilities and Transportation Commission and other regulatory bodies to support climate mitigation policy and the transition of utility energy fuel mixes to renewable sources.

**CL-1.D.2** Install solar photovoltaics on all available and feasible county properties, including building rooftops and available ground areas.

**CL-1.D.3** Facilitate the development of community-owned and driven renewable energy generation projects and prioritize placement in historically underserved communities.

**CL-1.D.4** Advance development efforts of local microgrid solar and battery storage facilities.

**CL-1.D.5** Amend local development code to require solar-ready construction for all building types, as appropriate. Explore exceptions as appropriate, including but not limited to accessory dwelling units, non-electrified buildings, and small agricultural buildings.

Transportation

# GOAL 2: Reduce Greenhouse Gas Emissions and Increase Resilience to Climate Change Impacts in the Transportation Sector.

**Goal 2 | Objective A** Ensure that the local transportation system, including infrastructure, evacuation routes, and travel modes, can withstand and recover quickly from the impacts or hazards exacerbated by climate change, with special attention to the needs of overburdened and vulnerable populations, including isolated communities.

**POLICIES:**

**CL-2.A.1** Continue to support the development of the Thurston Regional Planning Council Regional Transportation Plan, ensuring the integration of local climate impacts risk assessment into planning efforts.

**CL-2.A.2** Conduct audits of existing transportation systems to identify and address accessibility gaps among overburdened and vulnerable populations.

**CL-2.A.3** Relocate or retrofit low-lying roads, pedestrian and bicycle trails, rail systems, and bridges vulnerable to coastal or inland flooding and repetitive flooding and/or landslides.

**Goal 2 | Objective B** Prioritize development to increase housing diversity and supply in urban areas well served by public transportation and other services while increasing resilience to climate impacts.

**POLICIES:**

**CL-2.B.1** Evaluate and adjust zoning to support a range of housing types and income levels. Consider strategies such as inclusionary and incentive-based zoning to promote socioeconomic integration by encouraging the development of mixed-income housing near the region's urban centers or moderate-density zones.

**CL-2.B.2** Develop incentives that promote long term equity and healthy communities, such as density bonuses near public transportation hubs for development where a percentage of the units will be permanently affordable for household incomes.

**CL-2.B.3** Continue to collaborate with TRPC to develop and maintain a regional inventory of cycling paths and trails.

**CL-2.B.4** Expand regional multimodal travel options for rural communities to connect them with employment centers and essential services.

**CL-2.B.5** Increase the adoption and infrastructure support of public and low-carbon transportation options and more sustainable modes of travel, including remote work, using policies, incentives, and education.

**CL-2.B.6** Promote more efficient, affordable, and healthier transportation and community development, reducing motorized vehicle miles to achieve greenhouse gas reduction goals.

### **Goal 2 | Objective C** Expand electric vehicle infrastructure development and support the transition to electric vehicles.

**POLICIES:**

**CL-2.C.1** Work with regional partners to monitor availability of public electric vehicle chargers and identify locations for deployment of electric vehicle infrastructure throughout the county.

**CL-2.C.2** Increase electric vehicle charging capabilities within the county.

**CL-2.C.3** Partner with organizations such as the Thurston Regional Planning Council to identify efficient rural transit delivery opportunities and the replacement of the existing commercial fleet with electric vehicles and/or the electrification of heavy-duty vehicles.

**CL-2.C.4** Replace county fleet vehicles with electric models as practicable based on replacement schedule, business needs, and availability of charging infrastructure.

**CL-2.C.5** Partner with environmental organizations and other agencies to increase consumer awareness about electric vehicle options and incentives for use and purchase.

## Waste Management

# **GOAL 3:** Reduce Greenhouse Gas Emissions from Materials and Organic Waste.

### **Goal 3 | Objective A** Minimize waste generation, maximize waste diversion, and promote sustainable consumption.

**POLICIES:**

**CL-3.A.1** Update waste composition studies as needed to track progress towards waste reduction and diversion program performance, refine existing programs, and identify new program opportunities.

**CL-3.A.2** Conduct outreach, prioritizing historically underserved communities, to encourage recycling and composting of materials with the highest GHG reduction impact.

**CL-3.A.3** Provide composting outreach and education to businesses. Pursue funding and/or partnerships to share education on practices that decrease waste for business owners such as waste audits.

**CL-3.A.4** Develop, implement, and enforce construction and demolition recycling and deconstruction ordinances.

**CL-3.A.5** Prioritize the use of lower-carbon building materials in new construction and building retrofits to reduce embodied carbon.

**CL-3.A.6** Support efforts to increase consumer awareness about local goods and services to reduce transportation-related impacts.

### Water Resources Management

## **GOAL 4:** Manage Water Resources and Systems that Seek to Protect and Preserve Water Quality and Quantity from Drought, Sea Level Rise, and Other Hazards Exacerbated by Climate Change.

**Goal 4 | Objective A** Fund and support further research on climate change impacts to water resources and promote water conservation initiatives to inform future policy and enhance water supply and resilience.

**POLICIES:**

**CL-4.A.1** Develop and implement a comprehensive drought-response strategy that sets action levels for different drought stages.

**CL-4.A.2** Determine needs to reduce impacts and risks of harmful algal blooms on surface water (e.g., lakes, reservoirs), public health, and the impacts to recreationists and water users.

**CL-4.A.3** Assess and implement adaptation measures to mitigate the vulnerability of the county's aquifers, drainage systems, wastewater systems, and septic systems to saltwater intrusion, inundation from rising sea levels, and changing groundwater tables. Prioritize efforts in vulnerable communities, such as areas with low topographic relief and very low hydraulic gradients between freshwater and saltwater.

**CL-4.A.4** Mitigate the impacts of increased temperatures to local waterways and waterbodies through climate-resilient riparian buffer plantings.

**CL-4.A.5** Expand water quantity and quality monitoring programs to improve capacity to measure and analyze climate impacts and trends to water resources.

**CL-4.A.6** Develop approaches to forecast surface and groundwater quantities at the subwatershed and watershed scale.

**CL-4.A.7** Encourage sponsoring research by the county and regional partners to develop and implement resilient water resource management techniques.

**CL-4.A.8** Maintain funding and implementation of streamflow restoration efforts and water rights acquisitions, while actively pursuing additional funding and support opportunities to restore waterways for salmon, wildlife, and communities.

**Goal 4 | Objective B** Incentivize the use of green infrastructure and nature-based solutions for water resources management. Where feasible, require use of green infrastructure and low-impact development to address increased storm intensities and stormwater runoff.

**POLICIES:**

**CL-4.B.1** Incentivize stormwater techniques, including infiltration where feasible, that enhance climate resilience for legacy development where stormwater facilities do not exist or are substandard.

**CL-4.B.2** Ensure that the County's codes support stormwater management plans, infrastructure designs, and operation and maintenance standards to account for projections in increased precipitation, storm intensities, durations, and stormwater runoff volumes as well as drought conditions.

**CL-4.B.3** Manage stormwater runoff through actions to protect, acquire, sustainably manage, or restore natural and modified ecosystems to help mitigate climate change-related impacts on water quality, water supplies, and instream flows.

**CL-4.B.4** Ensure that developed water is protected primarily as instream flow and be made available for other purposes based on prevailing annual conditions.

### Community Well-Being and Emergency Services

## **GOAL 5:** Protect Community Health and Well-Being from the Impacts of Climate-Exacerbated Hazards to Promote Environmentally Just Outcomes and Ensure That the Most Vulnerable Residents Do Not Bear Disproportionate Health Impacts.

**Goal 5 | Objective A** Identify overburdened communities facing disproportionate environmental and health hazards and prioritize these communities in focusing policy implementation and resource allocation.

**POLICIES:**

**CL-5.A.1** Identify and address the disproportionate impacts of climate change on overburdened communities when prioritizing investments, policies, programs, and projects. Ensure benefits are accessible to and focused on underserved communities.

**CL-5.A.2** Develop community-based resilience hubs, prioritizing access for at-risk populations, to support residents and coordinate the distribution of resources and services before, during, and after a hazard event.

**CL-5.A.3** Ensure investments, policies, programs, and projects are equitably distributed and promote environmental justice outcomes. Use equitable collaboration and inclusive engagement strategies with overburdened communities to provide accessible and ample opportunities for their input.

### **Goal 5 | Objective B** Enhance emergency preparedness, response, and recovery efforts to mitigate risks and impacts associated with extreme weather and other hazards worsened by climate change.

**POLICIES:**

**CL-5.B.1** Support enhanced data collection for climate hazard events to provide a fuller understanding of the community's hazard characteristics, including identifying demographic groups/community members most vulnerable to climate impacts such as extreme heat, flooding, and wildfire.

**CL-5.B.2** Continue to develop and support planning documents identified in the Hazard Mitigation Plan, including using new data to update Hazard Mitigation Plan strategies and enhance resilience efforts.

**CL-5.B.3** Include messages on the impacts of climate change on health and safety in public communications and outreach efforts, as well as in information to help residents plan and practice actions to protect themselves from climate impacts.

**CL-5.B.4** Increase the number of residents who receive Community Emergency Response Team (CERT) training to improve local hazard preparedness, response, and recovery efforts.

**CL-5.B.5** Develop and implement a strategy to expedite management of debris, toxic materials, and other health hazards (e.g., downed tree limbs and buildings blocking roads and streams, or mobilized pollutants and hazardous waste) after a disaster incident to reduce the risks to ecosystems and human health from subsequent fire, flood, injury, and disease vectors.

**CL-5.B.6** Plan and prepare for climate change impacts so as to reduce damage from droughts, flooding, tree disease, wildfires, and other hazards which have immediate and long-term health implications and are projected to increase as our region’s climate changes.

**CL-5.B.7** Factor climate impacts into the planning and coordination of operations and disaster response and recovery activities among first responders, including public health, law enforcement, fire, and emergency medical services personnel.

**CL-5.B.8** Plan for sea level rise and its adverse impacts utilizing a framework aligned with the California Coastal Commission approach that protects the County’s coastal resources, development, and advances environmental justice.

### Cultural Resources and Practices

## GOAL 6: Protect and Preserve Valued Cultural and Historic Resources at Risk to Climate Change Impacts.

**Goal 6 | Objective A** Consult and work with communities, agencies, and Tribes to identify and protect important historical or cultural sites and natural resources at risk by climate change impacts, such as coastal or inland flooding, erosion, and wildfires.

**POLICIES:**

**CL-6.A.1** Protect, enhance, and restore ecosystems, water resources, and water quality to fulfill Tribal treaty and federally reserved rights and conserve culturally important consumptive and non-consumptive resources, including foods, wildlife, salmon, medicinal plants, and materials that could be adversely impacted by climate change.

**CL-6.A.2** Expand inventories, prioritize resources for preserving and restoring such areas, and update permit review processes to reflect new information.

**CL-6.A.3** Maintain government-to-government relations with Tribes for the preservation of archaeological sites and traditional cultural properties that are vulnerable to climate impacts. The county and Tribes should consider climate impacts on specific sites and collaborate on strategies to preserve such sites, including land use planning across boundaries in shared watersheds.

### Environment and Ecosystems

## GOAL 7: Protect, Restore, and Expand Ecosystems that are Resilient to Climate Change.

**Goal 7 | Objective A** Continue funding the implementation of County incentive programs while supporting and refining tools for land purchase and restoration. Identify opportunities to expand habitat protection and improve habitat quality and connectivity to foster climate resilience using conservation area expansion, designations, buffers, and open space corridors.

**POLICIES:**

**CL-7.A.1** Ensure no net loss of ecosystem composition, structure, and functions, especially in Priority Habitats and Critical Areas, such as prairie habitat including Oregon white oaks, biodiversity and wildlife corridors, habitat for anadromous fisheries, and others. When possible, net ecological gains should be the standard to maintain ecological functions and resilient ecosystems.

**CL-7.A.2** Identify and quantify the ecosystem services benefits of natural systems that support climate resiliency and include these natural capital assets in cost-benefit assessments for community and development planning.

**CL-7.A.3** Coordinate County programs that affect aquatic and wildlife habitat to benefit their protection via local policies, rules, and management activities. Assess gaps or inefficient practices that could impede climate resilience within these programs.

**CL-7.A.4** Establish incentives and regulations to maintain open space and/or riparian buffers to increase climate resilience, enhance carbon sequestration, and provide viable habitat corridors.

**CL-7.A.5** Recognize the importance of native vegetation, wildlife, and healthy ecosystems in improving climate and environmental hazard resilience.

**CL-7.A.6** Protect and restore natural ecosystems that sequester and store carbon, such as forests, wetlands, prairies, and estuaries.

**CL-7.A.7** Identify, protect, and restore submerged aquatic vegetation (eelgrass, kelp, etc.) and ecosystems that provide aquatic habitat, "blue" carbon storage, or other ecosystem services.

**CL-7.A.8** Identify areas where wetlands, marshes, and vegetation may be able to migrate inland due to sea level rise. Establish development siting and setback standards for development and redevelopment that allow for necessary movement of habitat and vegetation.

### **Goal 7 | Objective B** Create and support natural resource management plans that address existing stressors to forests and prairies, considering climate change impacts and integrating adaptive management principles.

**POLICIES:**

**CL-7.B.1** Ensure that forestry and prairie management plans include considerations for the impacts of climate change.

**CL-7.B.2** Set goals for future forest canopy and prairie acreage to increase resilience and biodiversity, considering the competing and equitable distribution of health, safety, and climate resiliency benefits.

**CL-7.B.3** Implement education and outreach programs to provide private landowners with resources and technical guidance for conserving their prairie and/or forestland to support climate resiliency.

**CL-7.B.4** Maximize conservation and carbon sequestration through alignment of current conservation policies and programs.

**CL-7.B.5** Lead a collaborative effort including Tribes, land trusts, state DNR, federal agencies, and private landowners to establish a community forest in the County

that promotes carbon sequestration efforts.

### Agriculture and Food Systems

## GOAL 8: Support Sustainable Local and Regional Agricultural Practices that Sequester Carbon and are Resilient to Climate Change.

### Goal 8 | Objective A Improve the agricultural economy's resiliency to the impacts of extreme weather, salinity intrusion, and other natural hazards worsened by climate change.

**POLICIES:**

**CL-8.A.1** Provide climate education to agricultural producers and increase capacity for conservation technical assistance, especially related to regenerative agricultural practices, climate-smart soil health or organic practices.

**CL-8.A.2** Support the expansion of local food security and the food-related economy to address climate impacts and increase access to healthy, affordable, and climate-friendly foods.

**CL-8.A.3** Promote environmentally sustainable water-storage and farming practices that help agricultural producers adapt to changing conditions and reduce production losses while balancing ecosystem needs.

**CL-8.A.4** Promote the Voluntary Stewardship Program to encourage farmers to adopt sustainable practices that enhance soil health, water conservation, and biodiversity, thereby increasing resilience to climate impacts.

**CL-8.A.5** Increase access to sustainable agricultural inputs, including biochar, native seeds, and local processing facilities, to improve soil fertility, enhance crop resilience, and support sustainable food systems. Promote agricultural innovation, technology adoption, and management regimes that reduce input costs, energy demand, and greenhouse gas emissions.

### Goal 8 | Objective B Reduce emissions from the agriculture sector and support agricultural practices that sequester carbon.

**POLICIES:**

**CL-8.B.1** Provide technical and financial assistance (e.g., grants, loans) to encourage improved manure and fertilizer management, along with other regenerative practices, prioritizing greenhouse gas emission reduction and outreach to historically underserved communities. Provide education on how to increase organic matter content and water retention in soils within agricultural settings.

**CL-8.B.2** Seek to protect and maintain working agricultural lands.

**CL-8.B.3** Facilitate the adoption of renewable energy sources and storage solutions for the agricultural sector and farms, such as solar panels and battery storage systems, to reduce emissions and provide energy back-up during climate-related disruptions.

### Economic Development

## **GOAL 9:** Support a Resilient and Sustainable Local Economy That Can Quickly Adapt to Climate Change Impacts.

### **Goal 9 | Objective A** Improve the local economy's resiliency to climate disruptions and foster business opportunities associated with climate mitigation and adaptation.

**POLICIES:**

**CL-9.A.1** Provide education, technical assistance, and funding opportunities to bolster local business' climate preparedness efforts and continuity of operations. Prioritize assistance to economically disadvantaged businesses, including small, women-owned, and BIPOC-owned businesses.

**CL-9.A.2** Partner with organizations committed to providing good-paying jobs that contribute to protecting and enhancing the environment to develop a green jobs pipeline for communities affected most by climate disruptions - such as in low-income communities, workers in energy-intensive jobs, and outdoor workers.

**CL-9.A.3** Advance sustainability and resilience in rural areas by supporting economic development initiatives consistent with Thurston's climate mitigation and adaptation goals and needs.

**CL-9.A.4** Support expanded capacity for south Thurston County cities to develop a resilient local economy, such as expanding sustainability industries and supporting existing industries to cope and be resilient to climate change. Ensure equitable protection and inclusion of these communities during the growth of green jobs and expansion of green industries (e.g., onsite solar and EV infrastructure installers), including through training and outreach programs, community engagement, and support for small and local businesses.

**CL-9.A.5** Support coordination and implementation of the Thurston Region Disaster Recovery Framework objectives that strengthen key systems and resource assets that are critical to the economic stability, vitality, and long-term sustainability of the community.

### **Goal 9 | Objective B** Promote the growth of a circular economy by increasing demand for reused and recycled materials and decreasing demand for new raw materials with embodied carbon.

**POLICIES:**

**CL-9.B.1** Encourage collaborative waste management practices, where the waste stream from one form becomes the raw materials for another.

**CL-9.B.2** Support local businesses in partnering with Washington's Recycling Development Center to explore and adopt circular economic practices, such as using recycled materials and reducing waste.

**CL-9.B.3** Provide funding for community reuse programs (e.g., fix-it fairs, tool libraries, repair cafés) to promote a circular economy.

### Partnerships and Collaboration

## **GOAL 10:** Lead and Strengthen Collaboration and Partnerships Among Agencies, Local Governments, Community Organizations, Businesses, and Residents to Achieve Sustainable Development, Enhance Resilience, and Address Climate Change Impacts.

**Goal 10 | Objective A** Expand partnerships with energy facilities, utilities, developers, businesses, and local energy providers to enhance renewable energy opportunities, improve energy efficiency, and strengthen infrastructure resilience against climate impacts.

**POLICIES:**

**CL-10.A.1** Partner with energy facilities and providers, including generation and transmission, to accommodate renewable energy opportunities that withstand and recover quickly from the impacts of extreme weather, wildfires, and other natural hazards worsened by climate change.

**CL-10.A.2** Partner with utilities to support expansion and retrofit of the region's energy distribution, monitoring, and storage infrastructure to support and enable more on-site renewable energy generation.

**CL-10.A.3** Collaborate with environmental and other organizations and agencies to support sustainable purchase programs to subsidize or incentivize fuel efficient or renewable energy replacements for consumer vehicles and home upgrades to reduce energy cost burdens and advance consumer decarbonization within Thurston County. Help provide financial support for these efforts, by seeking grant funding, supporting other organizations' funding proposals, and providing match or other funding to assist these efforts.

**CL-10.A.4** Partner with developers, businesses, and local energy providers to provide incentives and examples that support and increase accessibility of energy efficiency programs for both new and existing buildings.

## **Goal 10 | Objective B** Promote collaborative initiatives and partnerships to support sustainable resource management, enhance climate resilience, and implement environmentally smart practices.

**POLICIES:**

**CL-10.B.1** Initiate pilot projects that promote community collaboration and develop mechanisms to safeguard sustainable water supplies. This could include mechanisms such as water banks - which facilitate water rights trading and encourage the transfer of private water rights to a trust, either temporarily or permanently, irrigation modernization, and others to safeguard sufficient water supply for domestic, environmental, and agricultural needs.

**CL-10.B.2** Build and sustain partnerships with community-based organizations with the capacity and relationships to organize, educate, and empower diverse coalitions of residents to implement climate resilience and greenhouse gas reduction actions. Through grants and contracts, provide needed funding to these organizations to support this work.

**CL-10.B.3** Develop and share education campaigns about ways drivers can improve sustainability and efficiency of their vehicles, for example, the 'Don't Wait To Inflate' campaign from King County.

**CL-10.B.4** Support local partners in climate-smart forest management and adopt a forest management plan to improve tree and watershed health, prioritize carbon sequestration, and build climate resilience. Additionally, encourage participation in Washington's small forest landowner assistance cost-share and stewardship programs.

**CL-10.B.5** Collaborate with and support Tribes, agencies, and community organizations working to restore the natural functions of streams, riparian areas, wetlands, and floodplains to improve resilience and reduce flood risk.