



2026 Chelan County Climate Resilience Element

Climate Impacts, Policy Audit, and Vulnerability Assessment Summary

June 2025

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BACKGROUND

Following the Washington State Department of Commerce’s Intermediate Planning Guidance document, we have used the Climate Element Workbook to document our assessment of climate impacts, existing plans and policies, and climate change vulnerabilities. This summary describes the data added to the workbook and planning deliverables 2, 3, and 4.

Climate change scenarios and data

The Chelan County Climate Advisory Team supported the identification of assets to be evaluated in the assessment. The assets were evaluated against hazards including drought, extreme heat, extreme precipitation, flooding, reduced snowpack, wildfire, and wildfire smoke.

We identified climate hazards, indicators, and impacts specific to Chelan County using the Climate Mapping for a Resilient Washington (“CMRW”) webtool. The CMRW tool provided a long list of climate indicators across 11 sectors, including agriculture, buildings and energy, cultural resources and practices, economic development, ecosystems, emergency management, human health, transportation, waste management, water resources, and zoning and development. The assessment used the higher greenhouse gas scenario (RCP 8.5) as compared to the lower greenhouse gas scenario (RCP 4.5) as the scenarios do not differ significantly prior to 2050.

Primary information sources

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| 01 | UW Climate Mapping for a Resilient Washington: A climate projections database used to build baseline awareness of how climate change is expected to affect Chelan County (water resources, transportation, etc.) and its social, economic, and environmental assets in coming decades. The Department of Commerce considers the CMRW webtool a source of best-available science and scientifically credible projections. |
| 02 | Washington Department of Health Environmental Health Disparities Map: The Environmental Health Disparities map is a collage of lived experiences across Washington. It compares communities using census tracts to identify disparities. Using the EHD map can determine where more attention needs to be paid to address and reduce the specific pollution, societal, and health harms affecting Washington residents. |
| 03 | NOAA National Centers for Environmental Information: NOAA NCEI provides access to an extensive archive of environmental data through several platforms. It provides climate, coastal, oceanographic, and geophysical data in a variety of formats. |
| 04 | FEMA National Risk Index: The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards . It was designed and built by FEMA in close collaboration with various stakeholders and partners in academia; local, state and federal government; and private industry. |
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- 05 **Western Regional Climate Center:** The WRCC acts as a repository for high-quality historical climate data and information for the western U.S., a region covering the eleven westernmost states, including Alaska, Hawaii, and the U.S.
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- 06 **CDC Social Vulnerability Index:** The Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry Social Vulnerability Index is a place-based index, database, and mapping application designed to identify and quantify communities experiencing social vulnerability.
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- 07 **FirstStreet.Org:** A platform that assesses and quantifies climate risk, particularly focusing on flooding, wildfire, and other climate hazards for properties globally. It provides data and tools for individuals, businesses, and governments to understand and manage climate-related financial risks.
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- 08 **Wildfirerisk.Org:** A free resource created by the USDA Forest Service to help communities understand, explore, and reduce wildfire risk. It provides interactive maps, charts, and tools to help community leaders, such as elected officials, planners, and fire managers, assess and address wildfire risk. The website was last updated in May 2024.
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- 09 **2024 Chelan County Hazard Mitigation Plan:** The Chelan County HMP is a comprehensive document that identifies natural hazards, assesses potential risks, and outlines strategies to mitigate and respond to hazard events within the county. It was approved by FEMA on December 6, 2024.
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- 10 **2025 Chelan County Community Wildfire Protection Plan:** The Chelan County CWPP is a comprehensive document that assesses wildfire risk, identifies areas for risk reduction, and outlines mitigation strategies for Chelan County. It was adopted by the Board of County Commissioners on March 31, 2025.
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CLIMATE IMPACTS ASSESSMENT

Deliverable 2

Introduction

The consultant team, working with the core planning team and climate advisory team, identified hazards, climate indicators, and climate impacts specific to Chelan County for each of the 11 sectors utilizing the Climate Mapping for a Resilient Washington (CMRW) webtool. For each of the 11 sectors, we analyzed five hazard categories, including drought, extreme temperatures, extreme precipitation and flooding, reduced snowpack, and wildfire and wildfire smoke under the higher greenhouse gas scenario (RCP 8.5). In this step, as requested by the Climate Advisory Team, we documented climate impacts for the near-term (2020-2049) and mid-term (2050-2079) timeframes.

Potential climate impacts in Chelan County

- Chelan County faces a probability of more than one drought occurrence per year (2024 HMP).
- Forested and grassland areas in Chelan County can become extremely hazardous during droughts.
- Water demand and scarcity may increase.
- Hydropower production capacity may decrease.
- Freshwater quality and temperatures may change, increasing mortality of salmonids and other aquatic species.
- Some plants will experience drought stress and loss of growth and productivity.
- Increases in groundwater recharge due to more annual precipitation (less snow) falling as rain are expected to be offset by precipitation droughts.
- Current cooling degree days for Chelan County is 129; demand for air conditioning will more than double during mid-century.
- Increased urban heat island effect in areas that lack shade and tree coverage, along with increased health risks to outdoor workers and vulnerable populations.
- Increased potential for heat stress on crops. Greater pest survival rates and population size. Increase demand for irrigation water.
- Extreme cold events can damage or ruin crops.
- Heat stress on power infrastructure may cause disruptions.
- Extreme heat/cold events are expected to increase the demand for emergency services to plan, prepare, and respond to human health impacts.
- Extreme heat can damage roads and bridges. Freeze-thaw events can also damage roads.
- 0-0.5 springtime streamflow ratio in Chelan County has been ~90%. More streamflow in winter and early spring will change the timing of water available for irrigated agriculture and hydropower.

- Earlier spring snowmelt and changes in streamflow timing may alter migration timing and survival rates for salmonids.
- Growing seasons for crops may be altered and require additional irrigation and/or other interventions to sustain productivity.
- Loss of snowpack may impact winter outdoor recreation and shorten the winter recreation season.
- Warm season outdoor recreation opportunities may increase, shifting tourism from one recreation sector to another and into different seasons.
- Steep canyons or areas that contribute to drainage into floodplains are at higher risk of flash flooding and debris flows.
- The threat of flash flooding is increased in areas that have burned because of loose debris and ground cover burnt away.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management, and ecosystem functions.
- Natural, historic, and cultural resources are in areas vulnerable to flooding. Many terrestrial and aquatic animal species live in floodplain ecosystems.
- Increases in impervious surfaces such as roads, buildings, and pavement which reduce natural infiltration and increase runoff, lead to a higher flood risk during heavy rainfall events.
- Development in the floodplain may also reduce natural water storage areas and impact ecosystems that play a vital role in absorbing and storing excess water during heavy rainfall.
- 99% of properties in Chelan County have some risk of being affected by wildfire over the next 30 years. (FirstStreet.org).
- Hot dry spells create the highest fire risk. Increased temperatures and drought may intensify wildfire danger by warming and drying out vegetation.
- As climate alters fuel loads and moisture, susceptibility to wildfires changes. Climate change also may increase winds that spread fires and embers. Faster fires are more likely to expand into residential neighborhoods.
- As development increases in the wildland urban interface, wildfire potential and the probability of fire starts will increase.
- Risk to human health, especially vulnerable and exposed populations, will increase as the county faces more smoke days.

In reviewing assets across Chelan County, 16 categories of assets were selected for analysis, ranging from agriculture and agriculture-related businesses to community members and residential housing. The full list of asset categories can be found in the workbook appendix. Using the five hazard categories, a total of 80 asset-hazard pairs were analyzed. These asset-hazard pairs were analyzed for climate impacts, focusing on exposure to the hazard, non-climate stressors that increase exposure, and the overall consequences to the asset. This exercise leveraged hazard and climate change data collected in the previous step.

Of the 80 asset-hazard pairs, approximately 60 were found to be exposed to climate change impacts. Key takeaways from this step are listed below. The list is not exhaustive and may expand based on the best available science and community input. Future community engagement may identify other assets that can be analyzed for climate hazard impacts.

Chart: Asset-hazards categories with impacted assets denoted by an X.

	Asset Categories	Drought	Extreme Temps	Floods & Precip.	Wildfire & Smoke	Snowpack Loss
1	Orchards, ranches, vineyards, and other food producers	X	X	X	X	X
2	Agriculture-related businesses (fruit processing, storage, equipment suppliers)	X	X	X	X	X
3	Power infrastructure (transmission lines, substations), hydroelectricity, natural gas system	X	X	X	X	X
4	Emergency radio and radio communications, other communication systems		X	X	X	
5	Commercial buildings & businesses, county buildings, medical facilities, schools, churches, community centers, historical buildings		X	X	X	
6	Cultural sites, culturally significant activities	X	X	X	X	X
7	Recreation areas, tourism, fairgrounds, open spaces, parks	X	X	X	X	X
8	All sensitive aquatic and terrestrial species and habitats, including waterways, water bodies, wetlands, shrub-steppe, ESA, forest ecosystems	X	X	X	X	X
9	Sheriff Department, Fire Stations, Emergency Management	X	X	X	X	

	Asset Categories	Drought	Extreme Temps	Floods & Precip.	Wildfire & Smoke	Snowpack Loss
10	Community members, vulnerable populations, visitors, farm workers	X	X	X	X	X
11	Transportation infrastructure including roads, sidewalks/pathways, bridges/culverts		X	X	X	
12	Waste hauling, waste management, recycling			X	X	
13	Water supply, water infrastructure, irrigation infrastructure	X		X	X	X
14	Sewer and wastewater infrastructure, stormwater infrastructure			X	X	
15	Industrial land, undeveloped land, LAMIRDS			X	X	
16	Residential buildings, farm worker housing		X	X	X	

Priority climate hazards

Priority climate hazards were identified based on the most common recurrences among asset-hazard pairs. Priority hazards were also identified based on the County's existing plans and anecdotal information. The climate hazards most relevant to Chelan County include:

- Drought
- Extreme temperatures
- Extreme precipitation & flooding
- Reduced snowpack
- Wildfire & wildfire smoke

Other hazards, including earthquakes, avalanches, and dam/levee failure, are relevant to the County. However, the impacts of climate change on hazard probability cannot be confirmed, so these hazards were not assessed.

PLAN & POLICY AUDIT

Deliverable 3

Introduction

Chelan County's existing plans and policies were audited as part of the 2026 Comprehensive Plan periodic update. This audit will guide the development of the Climate and Resiliency Element of the 2026 Comprehensive Plan update, as required by HB 1181 (2023), adopted as RCW 36.70A.070(9). Plans and policies reviewed in the audit include:

- 2017 Chelan County Comprehensive Plan
 - Resolution 2022-09 Comprehensive Plan Amendment
- 2017 Flood Hazard Mitigation Plan
- 2021 Shoreline Management Program
- 2024 Hazard Mitigation Plan
- 2025 Community Wildfire Protection Plan

The audit summarizes each document's relevance to climate resilience, identifies any gaps in specific policies, and suggests edits to strengthen climate resilience impact. Where appropriate, the audit identifies applicable co-benefits of each policy.

GMA planning communities are required to incorporate climate resiliency into the required elements of the comprehensive plan. Those elements are Land Use, Housing, Capital Facilities, Utilities, Rural (for counties), and Transportation. Chelan County's comprehensive plan has several elements beyond what the state requires. The goals and policies from those elements were also reviewed for climate resiliency and hazard mitigation.

We initially screen goals and policies to determine whether they are addressed or could be amended to address climate resiliency or hazard mitigation. All goals and policies that didn't meet these criteria were removed from the audit. The remaining goals and policies were audited using the Department of Commerce guidebook and the Climate Element Workbook.

The audit revealed the following:

- Resolution 2022-09 amending the 2017 Chelan County Comprehensive Plan has addressed climate resilience in all elements except for rural, housing, and economic development.
- The 2024 Hazard Mitigation Plan and 2017 Flood Hazard Mitigation Plan included significant climate resiliency measures. Most of the goals and policies address climate risk and strategies and should be retained.
- The 2025 Community Wildfire Protection Plan includes some climate considerations, but the next update should include future conditions.

Policy Audit Summary

2017 Chelan County Comprehensive Plan

The team reviewed all goals and policies outlined in the 2017 Chelan County Comprehensive Plan, as well as policies from Resolution 2022-09, a text amendment to the 2017 Comprehensive Plan. The 2022 amendment integrated non-regulatory climate resilience strategies into the goals and policies, including updates to existing policies and the addition of new policies for Chelan County.

After reviewing all goals and policies, we found that the rural, housing, and economic development elements of the Comprehensive Plan lacked goals or policies that supported climate resiliency or climate-related hazard mitigation. For the required elements, policies will need to be reviewed and amended, or new goals/policies developed to address climate-exacerbated hazards. Additionally, within the elements, not all hazards were addressed. Capital facilities, utilities, parks and recreation, and the transportation element failed to provide policies that address snowpack loss. The utilities, parks and recreation, and transportation elements also failed to provide policies that addressed drought. The parks and recreation also failed to address the extreme precipitation hazard.

The following table counts the number of goals and/or policies that address climate change or climate resilience across the Elements of the county's Comprehensive Plan.

	Drought	Flooding	Extreme Precipitation	Extreme Temperatures	Wildfire & Smoke	Snowpack Loss
Land Use & Sub Elements	8	4	1	7	2	6
Rural Element	0	0	0	0	0	0
Resource Element	5	1	1	5	4	7
Natural Systems	12	11	10	7	10	10
Housing	0	0	0	0	0	0
Capital Facilities	2	8	6	5	7	0
Utility Element	0	1	1	2	1	0
Economic Development	0	0	0	0	0	0
Parks and Rec Element	0	1	0	1	1	0
Transportation Element	0	2	2	1	1	0

2017 Comprehensive Flood Hazard Management Plan

We identified three policies in the 2017 Comprehensive Flood Hazard Management Plan that support resilience. The policies address flooding, extreme precipitation, and wildfire but need to be updated to address future conditions exacerbated by climate change hazards.

2021 Shoreline Management Program

The 2021 Shoreline Management Program includes six goals that address conservation measures along the shoreline but lack elements of resiliency for future conditions. The policies address conservation for economic development, resource protection, and historic/cultural/scientific/educational elements.

Hazards most commonly impacting the shoreline are flooding and extreme precipitation, though wildfire, drought and snowpack loss, and extreme temperatures can also affect the natural functions of a shoreline. Adding mitigation measures to policies that anticipate and prepare for hazards will provide better protection for resources.

2024 Hazard Mitigation Plan

Every five years, Chelan County is required to update its Hazard Mitigation Plan (HMP). The 2024 HMP was an update to the 2019 HMP and was approved by FEMA on December 6, 2024. The HMP update assessed the risk and vulnerabilities of communities within Chelan County and identified actions and strategies to minimize damage and protect lives and property. The vision statement and goals identified in the 2024 HMP incorporated resiliency and do not require updates or amendments. However, the objectives didn't address climate resiliency for the future.

2025 Community Wildfire Protection Plan

We identified four goals in the 2025 Community Wildfire Protection Plan (CWPP) that can be updated to address future conditions. The goals supported climate resilience but lacked intended outcomes for future conditions.

VULNERABILITY ASSESSMENT

Deliverable 4

To determine vulnerability, we evaluated asset-hazard pairs for sensitivity and adaptive capacity using a qualitative rating system. Wildfire hazards were not included in the vulnerability assessment because the vulnerability was already known to be high based on the 2025 CWPP. Based on the results of the assessment, each asset-hazard pair was assigned a vulnerability risk rating of low, medium, or high.

Vulnerability criteria and rating

The framework for determining climate change vulnerability consists of three key components: exposure, sensitivity, and adaptive capacity. Exposure assesses the degree to which a system is subject to climate-related hazards, such as rising temperatures or extreme weather events, highlighting areas that face the greatest risk. Sensitivity evaluates how inherently affected a system is by these climate impacts, considering characteristics that may heighten vulnerability, such as age and condition of infrastructure or socio-economic factors like poverty. Adaptive capacity measures a system's ability to adjust to climate change and minimize damage, influenced by governance, available resources, technologies, and social networks.

Each asset-hazard pair was assigned a high, medium, or low sensitivity and adaptive capacity rating. The sensitivity and adaptive capacity ratings were determined using indicators such as age, asset condition, physical design, social assets, and economic costs. These indicators were compared to the criteria to determine the ratings. The ratings were then charted to determine the overall vulnerability rating for each asset-hazard pair.

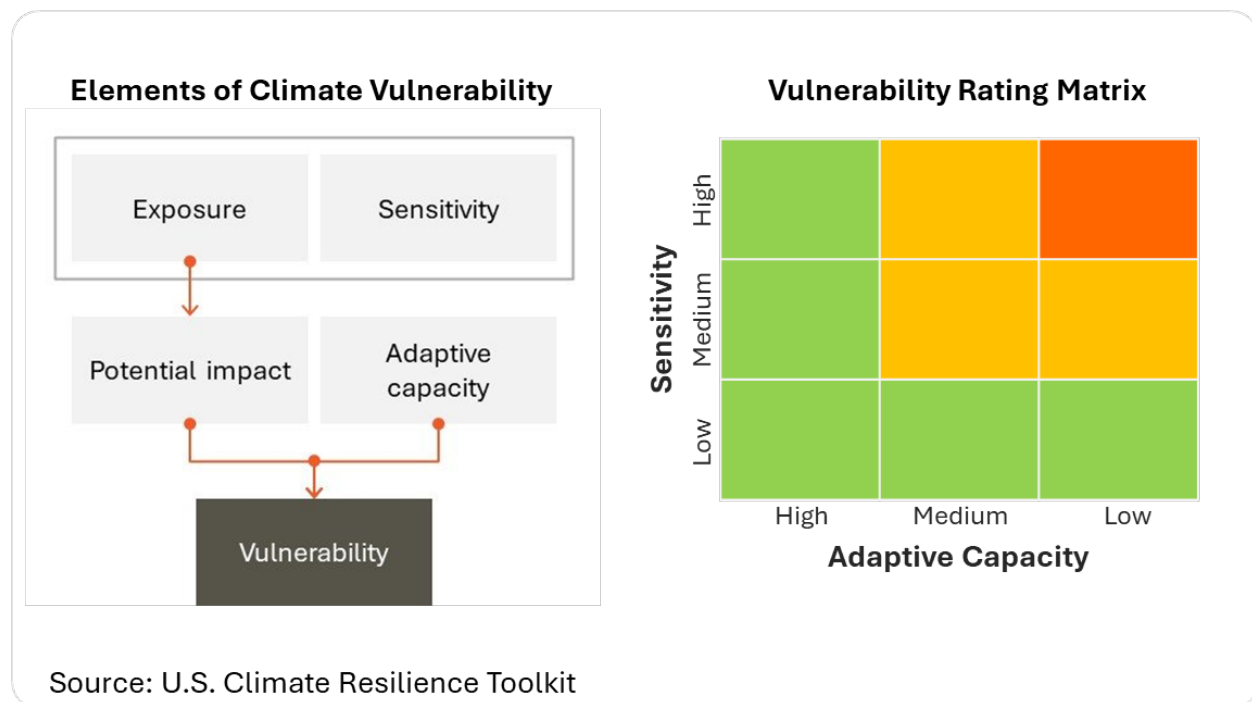


Table: Criteria used to determine the level of sensitivity and adaptive capacity.

	Sensitivity	Adaptive Capacity
Low	<ul style="list-style-type: none"> • Minor repairs and accommodation required. • Slight inconveniences and temporary loss of services. • Minor disruption to business continuity and minimal loss of revenue and wages. • Little to no increase in costs and demands to respond to emergency events. 	<ul style="list-style-type: none"> • Adaptive solutions are innovative but costly. • Adaptive solutions may require coordination with multiple agencies to implement, leading to disruptions in service and longer implementation times. • Solutions require change in lifestyle or changes in political decisions. • The ability to avoid damage is limited.
Medium	<ul style="list-style-type: none"> • Temporary loss of food production, transportation, and distribution. Temporary loss of functionality and operations closure of emergency response services. • Moderate repairs and replacements required. • Moderate increase in costs and demands to respond to emergency events. 	<ul style="list-style-type: none"> • Impacts can be reduced or mitigated to a certain extent; however, adaptive solutions are only feasible for limited assets. • Some assets may face difficulties in adapting in terms of cost and implementation. • Coordination with third party agencies may be necessary for adaptivity measures. • Solutions require some change in systematic operations but are somewhat executable.
High	<ul style="list-style-type: none"> • Significant impact requiring reconstruction of parts or an entirety of an asset. • Extensive rehabilitation of assets resulting in long-term or permanent loss of functionality or operations closure. • Significant impact to vulnerable populations due to flooding and extreme precipitation-related deaths and illnesses, population displacement, or migration. • Permanent loss of species is not able to adapt to weather events exacerbated by climate change. 	<ul style="list-style-type: none"> • Assets can adapt with little to no difficulty. • Direct influence on the implementation of strategies or solutions for the asset is apparent. • Adaptive solutions are highly feasible for most, if not all assets with affordable costs. • Solutions are implemented immediately and face little to no resistance.

Vulnerability assessment results

The following section summarizes the vulnerability assessment results for each asset-hazard category. Wildfire hazards were not included in the vulnerability assessment because the vulnerability was already known to be high based on the 2025 CWPP.

Orchards, ranches, vineyards, and other food producers

Crop loss is a recurring issue in the County, exacerbated by drought, severe weather, and climate change impacts such as snowpack loss, invasive species adaptation, and extreme heat affecting both crops and workers. Orchards dependent on surface water supplied irrigation and middle-elevation lands are especially vulnerable. Some producers are already taking adaptive measures, such as crop covers and frost protection, but occasional crop failures are still expected. Solutions, including investments in irrigation efficiency, watershed-level drought planning, the Voluntary Stewardship Program, and regional strategies like the Icicle Strategy, are essential. Less than 2% of agricultural land is at risk from flooding, and impacts from floods or landslides are generally localized and temporary.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Medium	Low	Medium
Extreme Temperatures	Medium	Low	Medium
Snowpack Decline	High	Medium	Medium
Extreme Precipitation & Flooding	Low	Medium	Low

Agriculture-related businesses

Agriculture-related businesses, including fruit processing, storage, and equipment suppliers, face long-term vulnerability to drought, primarily through the potential loss of locally provided products and eventual loss of products for businesses dependent on a single source, resulting in reduced demand for equipment and supplies. These drought impacts are less about physical infrastructure and more about the availability of agricultural products moving through these operations. While flooding can damage facilities and reduce productivity, these instances are comparatively localized. Recent county policies and plans, such as those adopted in Resolution 2022-09, aim to address vulnerability to climate change through updated goals and coordinated actions in the HMP and CFHMP.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Medium	Medium/High	Low/Medium
Extreme Temperatures	Medium	Medium/High	Low/Medium
Snowpack Decline	Medium	Medium	Medium
Extreme Precipitation & Flooding	Low	Medium	Low

Power infrastructure

Chelan County’s power infrastructure, including transmission lines, substations, hydroelectric generation, and a small natural gas distribution system in Wenatchee, faces growing vulnerability to extreme weather, wildfires, flooding, and declining river flows that reduce hydropower output. For hydropower, upstream water use and drought further threaten supply stability. Other power infrastructure vulnerabilities include exposure to high heat, ice storms, flooding, and landslides, particularly for facilities located in floodplains, highlighting the need for resilience upgrades such as underground or hardened infrastructure. The county’s energy sector is primarily designed to handle winter peak loads, with system loads nearly doubling during this period. Extreme heat can slow maintenance and restoration efforts, while fixed loads increase infrastructure vulnerability. Recent county policy and PUD’s Vision 2075 emphasize climate adaptation, infrastructure hardening, and expanding energy diversification (e.g., solar for drought resilience).

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Medium	Low	Medium
Extreme Temperatures	High	Medium	Medium
Snowpack Decline	High	Low	High
Extreme Precipitation & Flooding	Medium	Low	Medium

Emergency radio and radio comms, other comms transmission

Emergency communications infrastructure is vulnerable to temporary disruptions from extreme temperatures, heavy rain, or flooding, particularly for facilities located in floodplains. The resilience of these systems depends on the hardiness of infrastructure, redundancies in the systems, and their capacity to meet increased demands during emergencies. Recent county policies, including the Resolution 2022-09 climate adaptation goals and the HMP and CFHMP, aim to reduce these vulnerabilities.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	Low	High	Low
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	Low	Medium/High	Low

All public, commercial, and historic buildings

Several schools and numerous buildings in places like Cashmere, Leavenworth, and Wenatchee are at heightened risk due to their location in floodplains or downstream of canyons. Floods and debris flows caused by heavy precipitation can damage buildings, causing expensive repairs and rendering buildings unusable. Structures without adequate heating and cooling are more vulnerable to extreme temperatures, especially in areas of the county that experience significant heat or cold, while those with proper systems have greater resilience. Retrofitting buildings to improve temperature control is possible but may be costly, posing challenges for low-income populations. Recent county policies and plans focus on reducing these vulnerabilities through climate adaptation and management strategies.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	Medium	Medium	Medium
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	High	Medium	Medium

Cultural sites, culturally significant activities

Riparian areas, culturally significant sites, and sensitive habitats in the county—including Stehekin, The Icicle, Peshastin Pinnacles, Lake Chelan, and the Wenatchee Foothills—are highly vulnerable to drought, reduced streamflow, snowpack loss, and changing water temperatures, all of which can stress plant and animal species (such as huckleberry, balsamroot, and deer) and impact salmonid migration and tribal fishing. Extreme weather events also elevate risks to archaeological sites and historic structures, particularly those in floodplains. Locations and resources managed by local or federal agencies, such as the Leavenworth National Fish Hatchery, Peshastin Pinnacles, and Cashmere Museum, generally benefit from adaptive management protocols, whereas more natural, undisturbed sites often have lower adaptive capacity. While some drought-tolerant species may adapt, overall habitat and species health are increasingly sensitive as climate stressors intensify.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	High	Medium	Medium
Extreme Temperatures	High	Medium	Medium
Snowpack Decline	High	Medium	Medium
Extreme Precipitation & Flooding	High	Medium	Medium

Recreation areas, tourism, fairgrounds, open spaces, parks

Open spaces and parks are moderately vulnerable to drought, snowpack decline, and extreme weather, which can create hazardous recreation conditions and alter aquatic environments due to low streamflow. Flooding threatens a small percentage of open spaces and new trails, particularly in flood-prone areas like Cashmere, Leavenworth, and Wenatchee. Flooding in areas with recreational infrastructure or facilities can have costly, long-term impacts; however, preserving open spaces within floodplains can protect other assets. Extreme events may temporarily restrict public access or safe use, especially due to damage or emergency management use of facilities. Longer, warmer summers may increase park use and maintenance demands, including irrigation. Areas managed by local or federal agencies may have higher adaptive capacity due to planning, protocols, and resources.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	High	Medium	Medium
Extreme Temperatures	Medium	Medium	Medium
Snowpack Decline	High	Medium	Medium
Extreme Precipitation & Flooding	Medium	Medium	Medium

All sensitive aquatic and terrestrial species and habitats

Non-irrigated ecosystems and riparian communities in Chelan County are highly sensitive to decreased precipitation, streamflow, and increased temperatures, with many natural habitats holding cultural significance for Native American communities. Drought and snowpack loss threaten habitat complexity and species survival—particularly for aquatic species and migratory fish—while promoting the spread of invasive species over less-adaptive native flora and fauna. Flooding can introduce pollutants into rivers and soils, disrupt natural stream courses, and endanger critical habitats and life stages of fish, potentially affecting key conservation and compliance objectives. Many species lacking adaptive capacity will increasingly depend on human intervention for survival. To address these vulnerabilities, the county relies on recent climate adaptation policies, critical areas ordinances, shoreline management programs, watershed planning, habitat projects such as the Peshastin Fishway, Cashmere Pond, Nason Creek Oxbow, and local fish hatcheries to conserve and restore vital habitats, especially those within floodplains.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	High	Medium	Medium
Extreme Temperatures	High	Medium	Medium
Snowpack Decline	High	Low	High
Extreme Precipitation & Flooding	High	Medium	Medium

Sheriff Department, Fire Stations, Emergency Management

Emergency response demand can temporarily increase during flooding and extreme precipitation, especially if evacuations, roadblocks, or rescue are required. Droughts and extreme temperatures can also increase demand, especially due to secondary impacts, such as health emergencies, wildfires, dust storms, and limited access to affected areas. Two protective critical facilities are located within a 100-year floodplain, heightening vulnerability during floods. Recent goals and policies, including actions in the Hazard Mitigation Plan, as well as the County's existing emergency management plans, aim to enhance preparedness, response, and recovery efforts for these climate-related hazards.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Low	High	Low
Extreme Temperatures	Medium	High	Low
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	High	Medium	Medium

Community members, vulnerable populations, visitors, farm workers

Drought and snowpack loss in Chelan County primarily have economic impacts on community members, especially those dependent on seasonal jobs, such as agriculture job and summer and winter recreational jobs, with potential for temporary job loss. Extreme weather events most affect people living or working in inadequately heated or cooled buildings, outdoor workers, unsheltered individuals, people with health conditions, and those in poverty or with limited mobility, as they have the least capacity to adapt. Flooding poses significant risks in areas like Cashmere, Leavenworth, and Wenatchee, affecting health and safety through exposure to contaminated floodwaters, hazardous buildings, and long-term psychological impacts, particularly for those with disabilities or other access and functional needs. Community organizations provide crucial support during emergencies, while local governments play a key response role. Recent county policies, the HMP, and resources such as cooling shelters aim to increase resilience among vulnerable populations.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Medium	Medium	Medium
Extreme Temperatures	High	Medium	Medium
Snowpack Decline	Low	High	Low
Extreme Precipitation & Flooding	High	Medium	Medium

Transportation infrastructure

Chelan County's road infrastructure, including roads, sidewalks, pathways, bridges, and culverts, is highly vulnerable to extreme heat, freeze-thaw cycles, heavy rainfall, and convective storms. Poorly maintained roads deteriorate more quickly under extreme temperatures, while blacktop surfaces remain vulnerable even when new. There is limited grant funding for local road maintenance, which is primarily supported by local budgets, sometimes resulting in deferred maintenance. Major reconstruction or improvement projects are often dependent on grant funding. Seventy-three County-owned bridges (including ten identified as scour critical) are in floodplains, increasing their risk during storms and floods. Mountainous routes are especially vulnerable to heavier winter rainfall, flooding, erosion, and landslides, while stormwater infrastructure is at risk from intense, short-duration storms. Recovery and repair costs can strain agency budgets. Although some mitigation actions have been completed, the climate resilience policies from Resolution 2022-09 have not yet been widely implemented in planning. Integrating future climate projections into transportation planning will be essential to increasing the resilience of the county's transportation network.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	High	Low	High
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	High	Low	High

Waste hauling, waste management, recycling

While most of Chelan County's transfer stations are located outside of floodplains, some are situated at the base of slopes and remain vulnerable to flooding or debris flows, while the Wenatchee transfer station is adjacent to a FEMA flood zone. Some hazards can disrupt household waste collection routes, placing additional stress on hauling operation. Many hazards, such as flooding, can create massive quantities of debris, which must be removed and managed by the County. The recently developed Disaster Debris Management Plan increases the County's adaptability to changing conditions. Recent county policies, the HMP, and the CFHMP address these vulnerabilities and emphasize the need for post-disaster debris management plans and adequate financial resources for response and recovery.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	N/A	N/A	N/A
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	Medium	High	Low

Water supply, water infrastructure, and irrigation infrastructure

All snowpack-fed drainage basins in Chelan County are highly sensitive to snowpack loss, with areas reliant on snowmelt for groundwater recharge particularly vulnerable to changes in recharge rates and water quality. Reduced snowpack and streamflow, combined with population growth, are likely to increase the demand for groundwater pumping, potentially accelerating groundwater depletion and altering water chemistry. Rising temperatures also increase water demand, and changes in river flows may impact regulatory compliance and water quality standards, particularly for the Chelan River and associated public utility requirements. Increased storm intensity could further degrade groundwater quality by flushing accumulated nitrates into the water table, especially in agricultural zones. Additionally, 25 of the county's 42 inventoried dams are rated as high risk for economic loss and environmental damage, with flooding posing a threat to both infrastructure and habitat. Local watershed management efforts, conservation plans, and recent climate resilience policies are in place to address these vulnerabilities, although high project costs and permitting complexity remain significant barriers.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	High	Low	High
Extreme Temperatures	Low	High	Low
Snowpack Decline	High	Medium	Medium
Extreme Precipitation & Flooding	High	Low	High

Sewer and wastewater infrastructure, stormwater infrastructure

Stormwater infrastructure in Chelan County, including ditches, culverts, and catch basins, is highly sensitive to heavy rain and flooding, which can cause backups, blockages from debris, and localized urban flooding. When stormwater systems are overwhelmed, the treatment ability is lost, allowing polluted waters to flow directly into waterbodies. Floods can also contaminate drinking water supplies and cause sewer system overflows, leading to wastewater spills into homes, neighborhoods, and waterways. Aging infrastructure, such as wood-bound culverts at Lake Chelan, heightens these risks, while stormwater systems can also be damaged by debris from flooded roads. The Wenatchee Valley Plan and available reactive upgrades help increase adaptive capacity, but full implementation of recent climate resilience policies is still lacking.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	N/A	N/A	N/A
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	High	Low	High

Industrial land, undeveloped land, LAMIRDs

Unlike more developed areas, undeveloped land has qualities that can make it less vulnerable to environmental stressors. Undeveloped land can serve as a natural buffer by absorbing excess water, reducing flood risks, and helping regulate local temperatures to mitigate heat island effects. Natural vegetation and soil can enable effective absorption and filtration of stormwater, preventing pollutants from entering waterways and aiding groundwater recharge. In contrast, development replaces these natural surfaces with impermeable materials, such as pavement, which increases runoff, flood risks, and urban temperatures, while also making the area less resilient to environmental stressors like droughts and flooding. In Chelan County, less than 2% of the county's industrial and undeveloped land is within a 100-year floodplain, reducing vulnerability. Site plan review and regulations can help to ensure that new development in these areas does not increase risk on site or on adjacent properties.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	Medium	High	Low
Extreme Temperatures	N/A	N/A	N/A
Snowpack Decline	Medium	High	Low
Extreme Precipitation & Flooding	Medium	High	Low

Residential housing, farm worker housing

Housing without adequate heating and cooling is especially sensitive to extreme temperatures, with retrofitting possible but often costly, creating challenges for low-income residents. Structures with proper systems are more resilient, but vulnerability varies across the county, particularly in areas prone to both heat and cold. Cashmere, Leavenworth, and Wenatchee face the highest flood risk, with 14.9% of residential land located in 100-year floodplains and many areas experiencing recurring floods. Current regulatory requirements address only the existing 100-year floodplain, not future flood risks associated with climate change.

Vulnerability summary

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Drought	N/A	N/A	N/A
Extreme Temperatures	High	Medium	Medium
Snowpack Decline	N/A	N/A	N/A
Extreme Precipitation & Flooding	High	Low	High